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2017

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Statistical Bulletin—2017

Introduction

The Statistical Bulletin provides the public with easy, clear and friendly access to the main data and aggregates regarding financial activity in Israel. The data and aggregates in this publication have been compiled and calculated by the Bank of Israel, mostly by the Information and Statistics Department, as part of the management of information and statistics on economic activity. The information produced is used by the Bank in fulfilling its roles in accordance with the Bank of Israel Law, and helps in decision-making, economic research, and reporting to the public and to international organizations. The publication also includes explanations of the main terms and of the methodological frameworks developed at the bank, which are adapted to accepted and updated international standards.

The first part surveys the main developments of four main issues in Israel's financial statistics in 2017: The public's financial assets portfolio, nonfinancial private sector debt, the economy's activity vis-à-vis abroad, and foreign exchange activity of the main sectors. The main developments and long-term trends in the most important data in each issue area are presented through graphs, together with short text descriptions. Tables of selected indicators, a "zoom-in" focus on prominent phenomena in 2017, and definitions explaining the main terms in each topic are found at the end of each section.

The second part presents two papers on statistical methodology and the economic information used at the Bank of Israel. These papers deal with the anonymization process of itemized data, and with the measurement of external debt vis-à-vis abroad.

The publication can be accessed on the Bank of Israel website as well, in Hebrew and in English. For readers' ease, the online version has the surveys, the papers and main data compiled in separate downloadable files (Excel and PDF).

Dr. Eyal Rozen

Director of the Information and Statistics Department

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Part One

Main developments in four main areas of financial statistics in Israel in 2017

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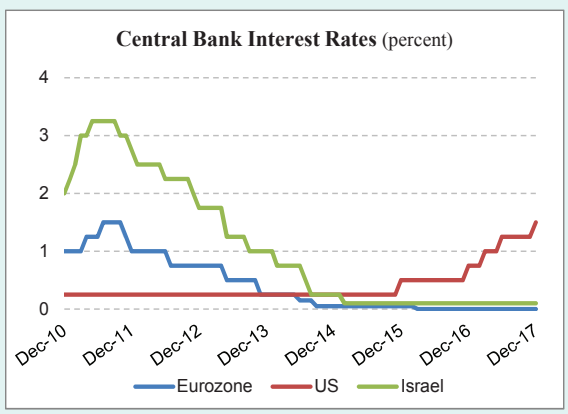
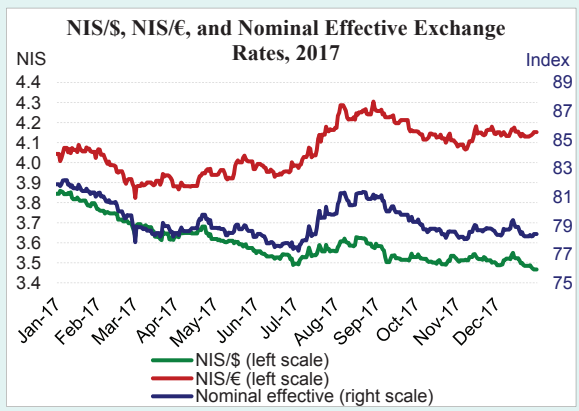
d. Foreign Exchange Activity of the Main Sectors

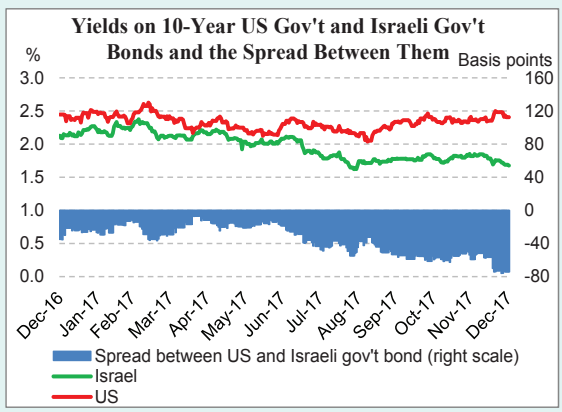
Financial background conditions in 2017

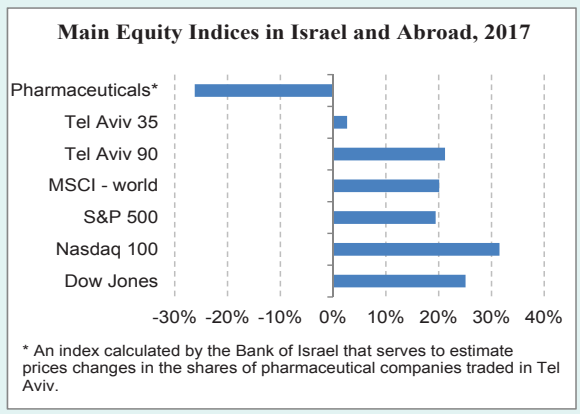
There were a number of main financial background conditions underlying the developments of the public's financial assets portfolio, debt, economic activity vis-à-vis abroad, and activity in the foreign exchange market in 2017.

- The Bank of Israel interest rate remained at 0.1 percent, while the federal funds rate in the United States increased by 0.75 percentage points to 1.5 percent.
- The yields on 10-year government bonds declined, and the negative yield spread vis-à-vis US government bonds expanded.
- Similar to the previous year, the shekel strengthened against the US dollar and in terms of the nominal effective exchange rate in 2017 as well. Most of the appreciation was in the first half of the year.
- The local stock market registered negative performance among some of the large traded companies in the pharmaceuticals industry. Against that, there were positive performances in most of the other Israeli companies, similar to the positive performances in the global equities market.









SOURCE: Bank of Israel.

A. THE PUBLIC'S FINANCIAL ASSETS PORTFOLIO

The public's financial asset portfolio[1] continued to increase in 2017, at a higher pace than in the previous two years. The current accounts and bonds components were the main contributors to the increase in the portfolio's balance. During the year, the downward trend in the portion of the portfolio managed directly by the public (including mutual funds)[2] continued, in conjunction with the increase in the portion of the portfolio managed by institutional investors. This followed the long-term trend. Net deposits in mutual funds resumed, leading to a change in the composition of assets held by the funds. While the growth of assets managed by each of the institutional investors has accelerated, the new pension funds were particularly prominent, with the highest rate of growth.

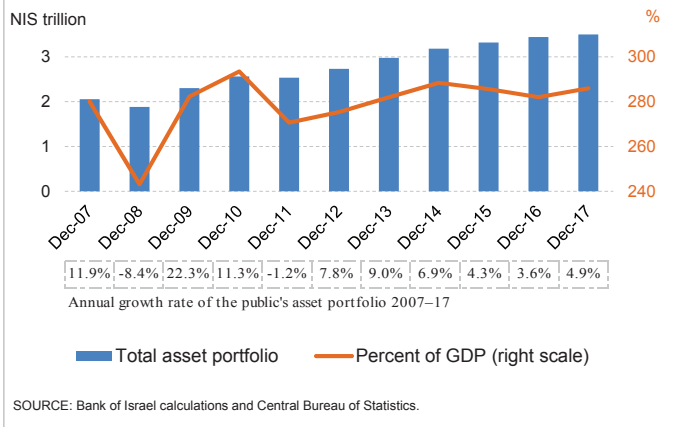
The institutional investors' rate of exposure to foreign assets was virtually unchanged in 2017, averaging 25.6 percent.

1. TOTAL ASSET PORTFOLIO

In 2017, the increase in the asset portfolio continued, at a higher pace than in the previous two years. The asset portfolio to GDP ratio increased, following two years of decline.

The public's financial asset portfolio increased by 5 percent, greater than the 4 percent average growth rate of the previous two years. The balance of the public's financial asset portfolio increased by NIS 168 billion in 2017, to NIS 3.61 trillion. The asset portfolio as a share of GDP increased by about 4 percentage points, because the increase in the financial asset portfolio was greater than the increase in GDP (3.4 percent in current prices).

Figure 1.1
The Public's Financial Asset Portfolio, 2007–17



SOURCE: Bank of Israel calculations and Central Bureau of Statistics.

1 See Data Sources and Main Terms at the end of the chapter.

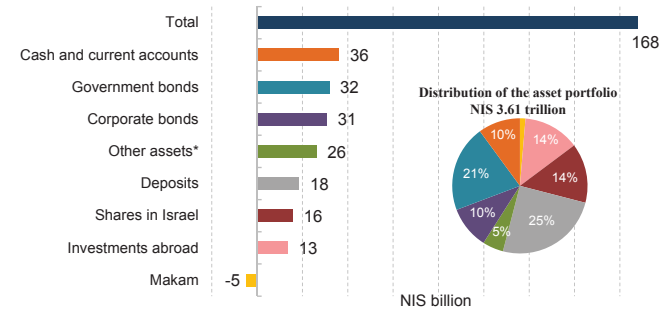
2 In this chapter, any reference to "directly by the public" includes data on assets held through mutual funds and portfolio managers.

Most of the increase in the asset portfolio was recorded in the cash, current accounts, and bond components.

The cash and current accounts components increased by about NIS 36 billion (11.1 percent), mainly in the current accounts component. Investment in government bonds also increased, by about NIS 32 billion (4.4 percent), and investment in corporate bonds increased by about NIS 31 billion (9.1 percent)—comprising net investments and an increase in prices.

The increase in the shares component in Israel is a result of net investments combined with increases in share prices on the Tel Aviv Stock Exchange.

Figure 1.2
Composition of the Change in the Asset Portfolio, 2017



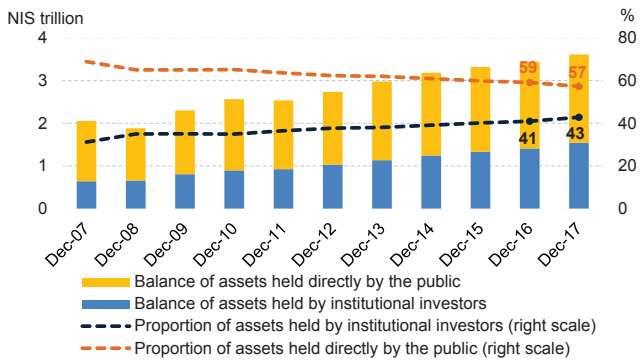
* Other assets includes loans, mortgage portfolios, mutual fund participatory notes, land rights, futures assets, and other structured assets.

SOURCE: Bank of Israel.

In 2017, the downward trend in the portion of the portfolio managed directly by the public continued, in conjunction with an increase in the portion managed by institutional investors.

The proportion of the portfolio managed directly by the public declined by about 1.8 percentage points in 2017, to about 57 percent, despite an increase of about NIS 33 billion (1.6 percent) in the balance, to about NIS 2.1 trillion. The balance of assets managed by institutional investors increased by about NIS 135 billion (9.6 percent) to about NIS 1.5 trillion. This trend has continued since 2008, when the compulsory pension arrangements for every employee began.

Figure 1.3
Balance of the Asset Portfolio and Distribution by Managing Entity, 2007–17



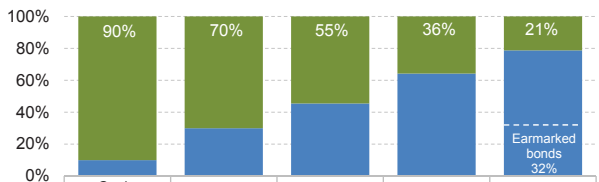
SOURCE: Bank of Israel.

The public's direct holdings are mainly in cash, current accounts, and shares in Israel, while holdings through institutional investors are mainly in government bonds, *makam*, and investments abroad.[3]

In corporate bonds, the public's direct holdings and their holdings through the institutional investors are similar.

The differences in the composition of holdings reflect structural differences[4], such as access to international markets, the advantage of scale, and investment channel.

Figure 1.4
Distribution of Holdings by Asset, December 2017



	Cash, current accounts and deposits	Shares in Israel	Corporate bonds	Investments abroad	Gov't bonds and makam
Direct public	1,128	387	209	174	144
Institutional investors*	124	165	175	312	531

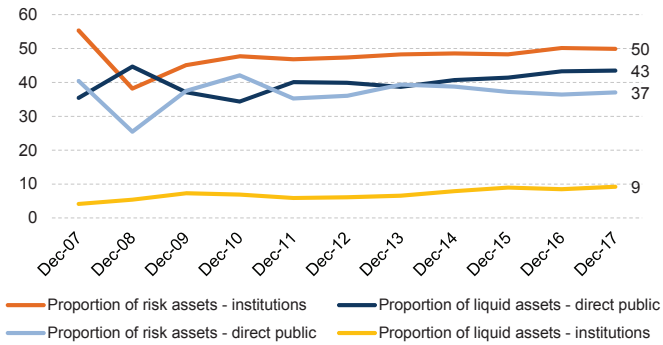
NIS billion

* Excluding assistance to the old pension funds.
SOURCE: Bank of Israel.

The rate of holdings of risk assets through institutional investors remained stable at about 50 percent of total managed assets.

The rate of the public's direct holdings of risk assets stabilized at about 37 percent.

Figure 1.5
Proportion of Liquid and Risk Assets[a], 2007–17 (percent)



[a] See definitions in the Table of Indicators at the end of this chapter.
SOURCE: Bank of Israel.

[3,4] See Main Terms at the end of the chapter.

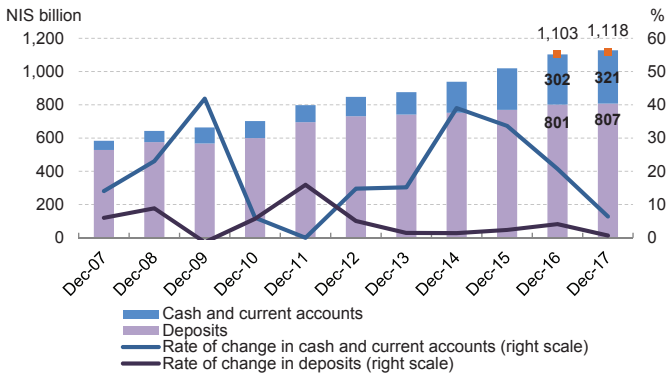
2. THE PORTFOLIO MANAGED DIRECTLY BY THE PUBLIC

The slowdown in the growth of the cash and current accounts components held directly by the public continued 2017.

This balance increased by NIS 19.3 billion (about 6.4 percent) in 2017.

The deposits component increased moderately, by 0.7 percent, similar to its rate in previous years. The balance of this component was about NIS 807 billion at the end of 2017.

Figure 1.6
Balance of Cash, Current Accounts and Deposits Held Directly by the Public, and Annual Rate of Change, 2007–17



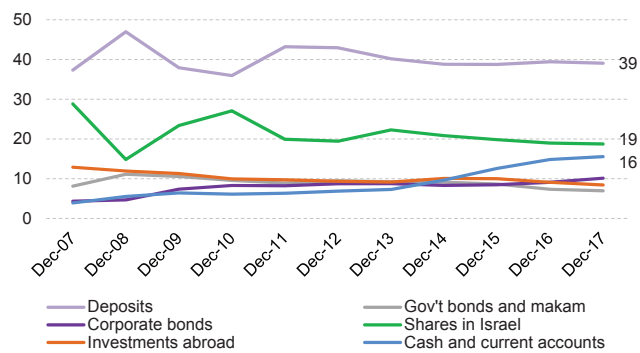
SOURCE: Bank of Israel.

The marked slowdown in the growth rate of the cash and current accounts components was reflected in a moderation of the increase of their proportion of the public's asset portfolio in 2017.

In addition, the proportion of investments abroad declined in 2017 as a result of the appreciation of the shekel, which lowered the shekel value of the asset portfolio abroad. The effect of the appreciation was partly offset by price increases abroad and net investments, so that the decline totaled 0.5 percentage points.

Against that, the proportion of investments in corporate bonds increased by 1 percentage point, combining net investments and price increases.

Figure 1.7
Composition of the Asset Portfolio Held Directly by the Public, 2007–17
(percent)



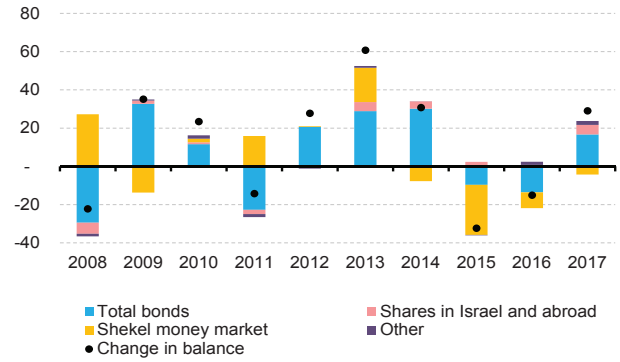
SOURCE: Bank of Israel.

Net deposits in mutual funds resumed in 2017.

Net deposits during the year in funds specializing in bonds[5] totaled about NIS 16.7 billion. Net deposits of about NIS 22.4 billion in general and corporate bond funds were partly offset by net redemptions from most other bond specializations.

The volume of net redemptions in money market funds totaled about NIS 4.3 billion in 2017, further to the trend of redemptions in recent years, which led to a decline in the balance.

Figure 1.8
Total Sources for Mutual Fund Activity[a], by Specialization, 2008–17
(NIS billion)

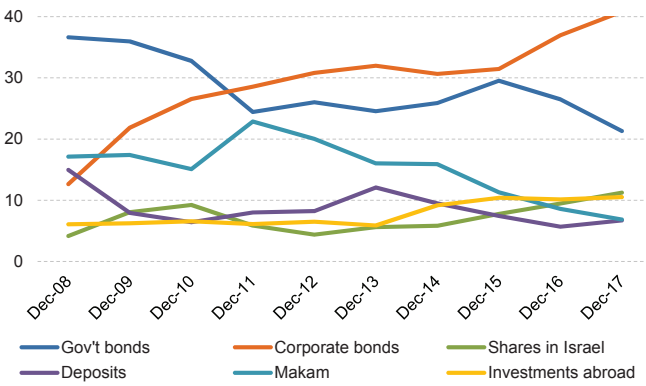


[a] Total sources for activity are the surplus of deposits over redemptions minus cash dividends.
SOURCE: Bank of Israel.

There was a change in the composition of assets held by the mutual funds.

Net deposits in funds specializing in general and corporate bonds, combined with price increases, contributed to an increase of 3.9 percentage points (NIS 20.2 billion, 25.4 percent) in the proportion of holdings of the corporate bond component. Against that, there was a 5.2 percentage point (NIS 4.9 billion, 8.6 percent) decline in the proportion of government bond holdings, mainly a result of net redemptions.

Figure 1.9
Distribution of Mutual Fund Assets, 2008–17 (percent)



SOURCE: Bank of Israel.

[5] See further details at the end of the chapter – "Zoom In", regarding the mutual funds' specialization in bonds.

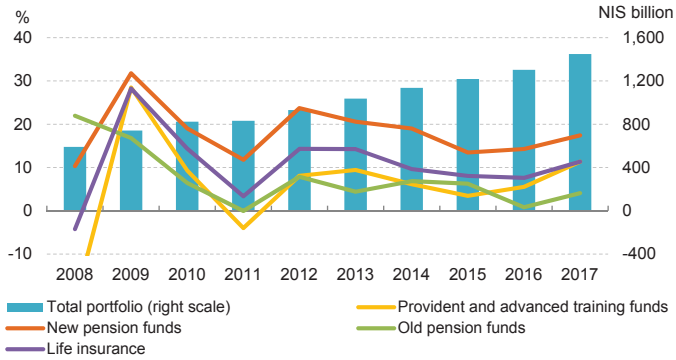
3. THE PORTFOLIO MANAGED BY INSTITUTIONAL INVESTORS

The growth of the balance of assets managed by all institutional investors accelerated.

The growth of the balance of assets managed by the provident funds and advanced training funds increased by about 5.8 percentage points, to 11.4 percent, as provident investment funds and the "Savings for Every Child" program opened. The balance of assets of the new pension funds also continued to increase rapidly (about NIS 50 billion, 17.4 percent), a trend that has continued since 2008, when the compulsory pension arrangements for every employee began.

The balance of assets in the old pension funds increased by only about NIS 10.5 billion (4.1 percent), due to price increases that were offset by net realizations.

Figure 1.10
Annual Growth of Balance of Assets Managed by Institutional Investors[a], 2008–17

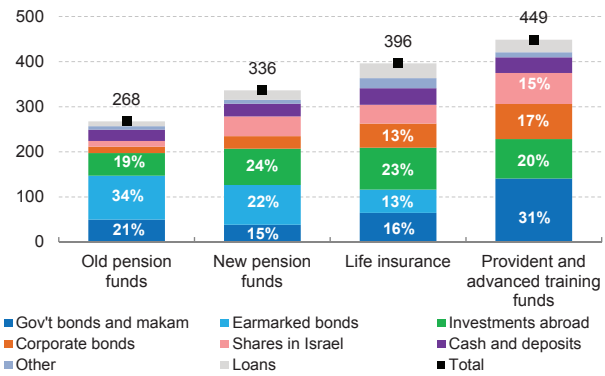


* Excluding assistance to the old pension funds.
SOURCE: Bank of Israel.

Investments by the institutional investors are concentrated in government bonds and investments abroad. The provident and advanced training funds are also prominent investors in corporate bonds.

The various institutional investors have adopted investment policies with a similar mix of assets. The institutional investors hold an average of about 38 percent of their holdings in government bonds (including earmarked) and *makam*.

Figure 1.11
Distribution of Assets of Institutional Investors[a], December 2017
(NIS billion)

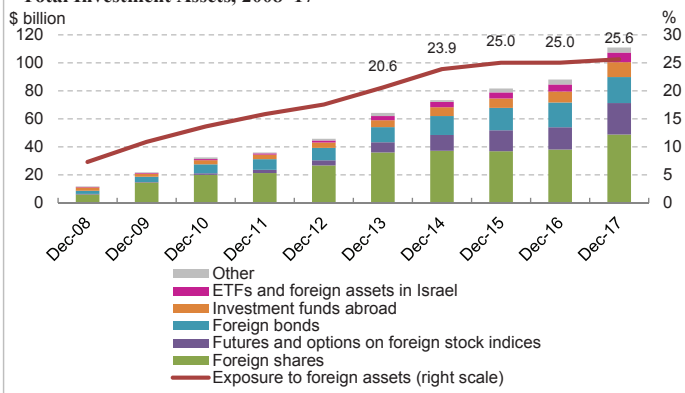


[a] Excluding assistance to the old pension funds.
SOURCE: Based on reports by the institutional investors.

The rate of exposure of the institutional investors[6] to foreign assets[7] remained almost unchanged in 2017, at about 25 percent. Most of the exposure to foreign assets is through shares and equity instruments—contracts, options and tracking indices.

The rate of exposure to equity channels at the end of 2017 was more than 60 percent of total exposure to foreign assets, reflecting a continuation of their balance growth ($17.3 billion, 32 percent). The balance of foreign bonds increased moderately ($0.9 billion, 5.1 percent).

Figure 1.12
Balance of Institutional Investors' Foreign Assets, and Its Proportion of Total Investment Assets, 2008–17

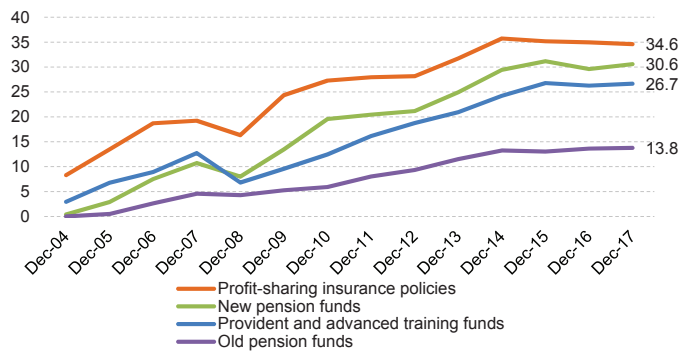


SOURCE: Based on reports by the institutional investors.

The stability in the rate of exposure to foreign assets was characteristic of all institutional investors.

Following accelerated growth in the rate of exposure to foreign assets between 2004 and 2015, this rate of exposure has remained virtually unchanged in all managing entities. The highest exposure rate was in the "profit sharing" insurance companies, at 36.4 percent in 2017, and the lowest rate was in the old pension funds—13.8 percent.

Figure 1.13
Institutional Investors' Exposure to Foreign Assets, by Institution, 2004–17
(percent)



SOURCE: Based on reports by the institutional investors.

[6] The provident funds and advanced training funds, pension funds, and the insurance companies with profit-sharing insurance policies.

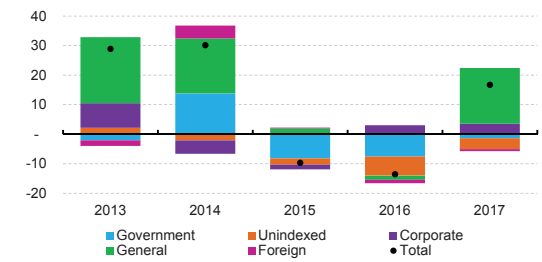
[7] For further details of the definitions, terms and explanations, see "Measuring Institutional Investors' Exposure to Foreign Exchange and to Foreign Assets" in Chapter 2 of the Statistical Bulletin for 2016.

ZOOM-IN

INVESTMENTS IN BONDS THROUGH THE MUTUAL FUNDS

Most of the net deposits in 2017 were in the general bond funds.

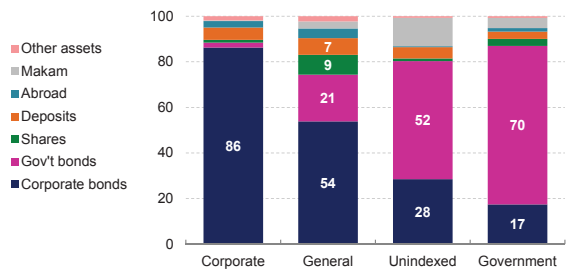
Figure 1.14
Composition of the Sources for Activity[a] of the Mutual Funds Specializing in Bonds, 2013–17 (NIS billion)



[a] Total sources for activity are the surplus of deposits over redemptions minus cash dividends.

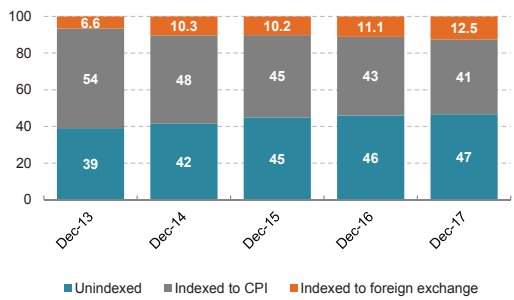
In the general bond specialization, about 68 percent of bond holdings are invested in corporate bonds.

Figure 1.15
Distribution of Investment Assets by Selected Bond Specializations, December 2017 (percent)



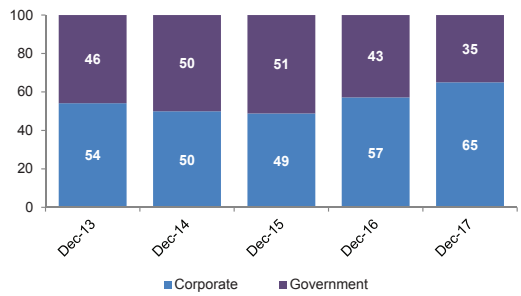
There was a marked decline in investment in CPI-Indexed bonds.

Figure 1.16
Distribution of Investment in Bond Instruments in Mutual Funds by Indexation, 2013–17 (percent)



There was a marked increase in the proportion of mutual funds' holdings in corporate bonds

Figure 1.17
Distribution of Investment in Bond Instruments in Mutual Funds by Issuer (on the TASE), 2013–17 (percent)



SOURCE: Bank of Israel.

Main indicators in the public's asset portfolio (percent)

		2008	2010	2012	2014	2016	2017
The public's asset portfolio							
Volume of the portfolio	Value of the public's asset portfolio (NIS billion)	**1.9**	**2.6**	**2.7**	**3.2**	**3.4**	**3.6**
	The asset portfolio as a percentage of GDP	243.1	293.5	275.3	288.4	282.0	285.9
Risks and liquidity	Tradable assets	42.3	54.2	50.8	52.7	49.0	49.0
	Risk assets[a]	30.4	44.3	40.2	41.8	41.8	42.6
	Assets abroad[b]	10.3	11.1	11.9	14.2	13.7	13.5
	Foreign exchange assets[c]	17.7	16.4	17.6	20.7	20.5	20.0
	Unindexed assets[d]	64.8	69.4	67.5	70.0	71.0	71.2
	Liquid assets[e]	31.0	24.8	27.2	27.9	29.1	29.1
The portfolio managed directly by the public and through mutual funds							
As a share of the total asset portfolio		**65.0**	**65.1**	**62.3**	**60.9**	**59.1**	**57.2**
Risks and liquidity	Tradable assets	42.3	55.2	49.6	52.1	47.0	47.4
	Risk assets[a]	25.5	42.1	36.0	38.8	36.3	47.3
	Assets abroad[b]	11.9	10.0	9.3	10.1	9.1	8.6
	Foreign exchange assets[c]	22.9	17.8	17.9	19.3	18.6	17.9
	Unindexed assets[d]	84.8	85.2	83.9	85.8	87.9	88.5
	Liquid assets[e]	44.7	34.4	39.9	40.7	43.3	43.7
The portfolio managed by institutional investors[h]							
As a share of the total asset portfolio		**35.0**	**34.9**	**37.7**	**39.1**	**40.9**	**42.8**
Risks and liquidity	Tradable assets	42.5	53.1	53.4	54.3	52.6	52.3
	Risk assets[a]	38.2	47.7	47.3	48.5	50.1	49.9
	Assets abroad[f]	6.9	13.0	15.9	20.0	19.7	19.6
	Foreign exchange assets[g]	7.9	13.8	17.2	22.5	22.8	22.8
	Unindexed assets[d]	27.9	40.0	40.1	43.8	45.1	47.0
	Liquid assets[e]	5.4	6.9	6.1	7.9	8.5	9.2

[a] Total assets excluding government bonds, *makam*, deposits in Israel and abroad, and cash.

[b] Israelis' investments abroad..

[c] Assets indexed to foreign currency + shares abroad.

[d] All assets excluding CPI-indexed assets.

[e] Cash, deposits of up to one year in Israel, and *makam*.

[f] Investment in deposits and Israeli securities abroad, excluding investment in ETNs traded in Israel on foreign indices. This definition differs from the exposure to foreign exchange and the exposure to foreign securities definitions

[g] Holdings of assets denominated in foreign currency and assets indexed to foreign currency, excluding shekel/forex assets.

[h] Investments by institutional investors as a share of the total asset portfolio. Excludes investments in ETNs, structured bonds, certificates of deposit, and mutual funds.

SOURCE: Bank of Israel.

DATA SOURCES AND MAIN TERMS

The Bank of Israel Information and Statistics Department manages a database of balances in the public's financial asset portfolio. This system records and processes data and information from various sources, through which the balance of the public's financial assets portfolio is calculated according to various breakdowns. The sources of data in the system are: the Tel Aviv Stock Exchange; banking system reports to the Banking Supervision Department; institutional investors' reports to the Ministry of Finance and to the Bank of Israel; direct reports from large Israeli corporations to the Bank of Israel on their activity vis-à-vis nonresidents; reports by banks and other financial intermediaries to the Bank of Israel regarding nonresidents' holdings of Israeli financial assets; and the Ministry of Finance.

The public's financial asset portfolio includes the assets of households and of the business sector (financial and nonfinancial firms). The portfolio does not include the government's assets or those of the Bank of Israel, nonresidents, or the banks. Management of the asset portfolio can be divided into two types, which differ in how they are managed.

- **The asset portfolio directly managed directly by the public**—The stock of financial assets, including cash and deposits, tradable and nontradable securities, and index products, held directly by the public and by portfolio managers or mutual funds.
- **The asset portfolio managed by institutional investors on behalf of the public**—The public's long-term savings managed by the institutional investors. These institutions include the provident funds and severance funds, advanced training funds, old and new pension funds, and life insurance policies managed by the insurance companies (excluding the insurance companies' nostro portfolio, which they manage on their own behalf). The public's savings in these channels are invested in tradable and nontradable securities and in other instruments, according to the investment guidelines of each entity.

The composition of the public's financial assets portfolio reflects the decisions of the public and of the institutional investors, mainly according to considerations of yield, risk and liquidity, based on their expectations of future developments in the capital and money markets. The division of the asset portfolio into two—assets managed directly by the public and assets managed by the institutional investors on behalf of the public—reflects a number of structural differences, including: (1) Control—The public has full and ongoing control over the size of investment and the composition of assets held directly by it, compared with only partial and infrequent influence on the composition of assets held by the institutional investors; (2) Range—In general, the public

directly holds assets for a short-to-medium term, while the institutional investors hold assets for a longer term, which affects the liquidity and risk profiles of the assets; (3) Expertise—The institutional investors specialize in the management of financial assets and in regularly monitoring and analyzing a broad range of information on the assets. In contrast, only some of the portfolio held directly by the public is managed by experts; (4) The institutional investors have the advantage of scale.

- **Exposure to foreign assets**[1]—The monetary amount at risk in the case of a decline in the value of assets issued by nonresidents (mostly assets held abroad). Investment in foreign assets and in foreign economies creates exposure to crises that may erupt in those economies and to other changes that have a negative impact on the value of the securities.
- **Investments abroad**—The balance of assets invested outside of Israel. This definition includes holdings of securities issued abroad by Israeli companies, and does not include holdings of foreign assets in Israel.
- **Cash and current accounts**—Cash is calculated as the total money (banknotes and coins) issued by the Bank of Israel and in circulation, minus cash in the hands of the banks. This item may also include cash in the hands of nonresidents, but the assumption is that this latter amount is low. Current accounts are demand deposits in shekels (excluding nonresidents' current accounts in shekels).
- **Deposits**—Funds of Israeli customers at banks, that generate yields and can be withdrawn. The deposits are categorized as follows: (1) Savings plans—plans that are structured for the customer's needs, by various ranges and indexations; (2) Self-renewing Overnight Deposit (SRO)—a deposit that enables deposits and withdrawals every business day subject to the restriction that the principal amount shall not be less than the amount set by the bank; (3) Fixed-term deposit—allows for the withdrawal of the deposit after a preset period; (4) CPI-indexed deposit; (5) Foreign exchange-indexed deposit; (6) Foreign currency deposit—a deposit by Israelis in foreign exchange in Israeli banks.

[1] For further details of the definitions, terms and explanations, see "Measuring Institutional Investors' Exposure to Foreign Exchange and to Foreign Assets" in Chapter 2 of the Statistical Bulletin for 2016.

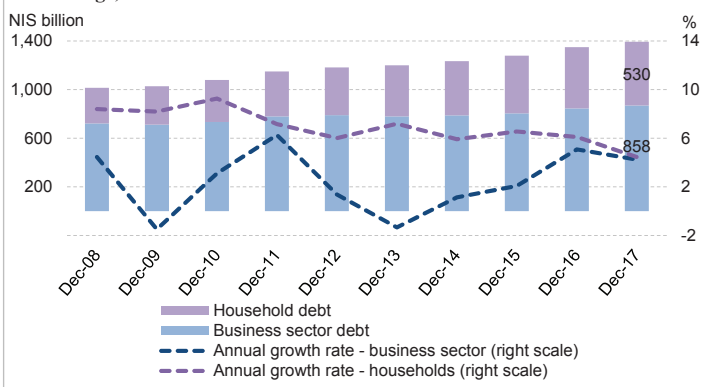
B. PRIVATE SECTOR DEBT

The outstanding debt of the nonfinancial private sector[1] continued to increase in 2017, but at a lower rate than that of the previous year (2.9 percent compared with 5.5 percent). This increase was mainly due to a quantitative increase in the debt of both the business sector and households, which was partly offset by the shekel's appreciation against the dollar, which lowered the shekel value of the debt denominated in and indexed to foreign currency.
The decline in the growth rate of household debt, both housing and nonhousing, continued.
The decline in the growth rate of nonhousing debt, particularly to banks, was prominent.
Most of the increase in outstanding business sector debt was in domestic nonbank debt, combining an increase in debt to households through their holdings of tradable bonds and debt to institutional investors through direct loans. The increase in business sector debt to banks continued, but its rate of increase was slower than that of its domestic nonbank debt.

1. NONFINANCIAL PRIVATE SECTOR (BUSINESS AND HOUSEHOLD) DEBT

The increase in nonfinancial private sector debt continued in 2017, at a slower pace than in the previous year. The outstanding debt of the nonfinancial private sector increased by about NIS 39 billion (2.9 percent) in 2017 to NIS 1.4 trillion. Outstanding business sector debt increased by about 1.5 percent (about NIS 13 billion), significantly less than the previous year. Outstanding household debt grew by about NIS 26 billion (5.1 percent), and constituted about 38 percent of the total nonfinancial private sector debt at the end of the year.

Figure 2.1
Outstanding Debt of the NonFinancial Private Sector, and its Annual Rate of Change, 2008–17



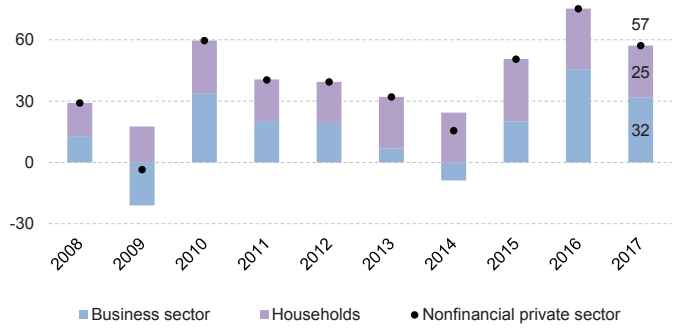
SOURCE: Bank of Israel.

[1] This section deals with the debt of the nonfinancial business sector to the main lenders (banks, institutional investors and nonresidents), and does not include debt to other lenders (such as private credit companies). For further details, see the explanation in Main Terms at the end of the section. Data on the debt to banks are based on monthly balance-sheet data and not on data from the annual financial statements, since the statements for 2017 have not yet been published.

The increase in the outstanding debt was mainly a result of a net quantitative increase[2] in the two component sectors, but at a lower volume than in the previous year.

The total net quantitative increase was about NIS 57 billion: about NIS 32 billion in business sector debt and about NIS 25 billion in household debt. This quantitative increase was partly offset by the shekel's appreciation against the dollar, which lowered the shekel value of the debt denominated in and indexed to foreign currency.

Figure 2.2
Estimated Annual Net Quantitative Change in Nonfinancial Private Sector Debt, 2008–17 (NIS billion)

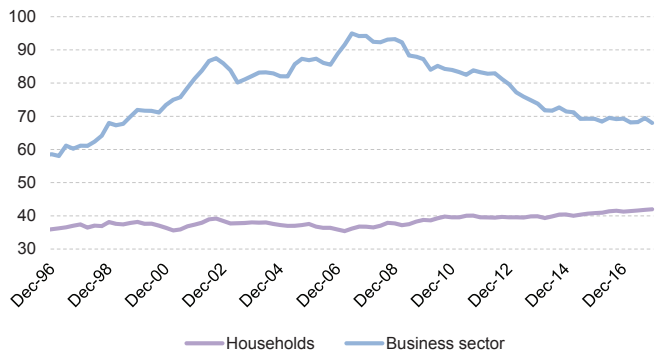


SOURCE: Bank of Israel.

The business sector debt to GDP ratio declined in 2017, while the household debt to GDP ratio increased slightly.

The business sector debt to GDP ratio declined by about 1.3 percentage points in 2017, to about 68 percent at the end of the year, because the increase in GDP (3.4 percent in current prices) was larger than the increase in the debt (1.5 percent). The household debt to GDP ratio continued to increase—by about 0.7 percentage points, to about 42 percent at the end of 2017.

Figure 2.3
Nonfinancial Private Sector Debt to GDP Ratio, 1996–2017 (percent)



SOURCE: Bank of Israel, and Central Bureau of Statistics.

[2] See the Main Terms at the end of the section.

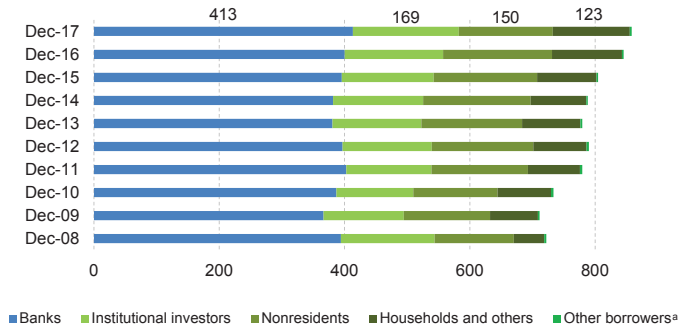
2. NONFINANCIAL BUSINESS SECTOR DEBT

The upward trend in business sector debt continued in 2017, mainly in domestic nonbank debt.

The balance of business sector debt to domestic nonbank entities increased by about NIS 23 billion (9 percent), in conjunction with a decline of a similar volume (14 percent) in debt to nonresidents. The increase in business sector debt to banks continued (3 percent, NIS 13 billion), and it totaled about 48 percent of total business sector debt.

About 41 percent of total business sector debt is owed by companies in the financial services, trade and production industries[3].

Figure 2.4
Outstanding Nonfinancial Business Sector Debt, by Lender, 2008–17
(NIS billion)

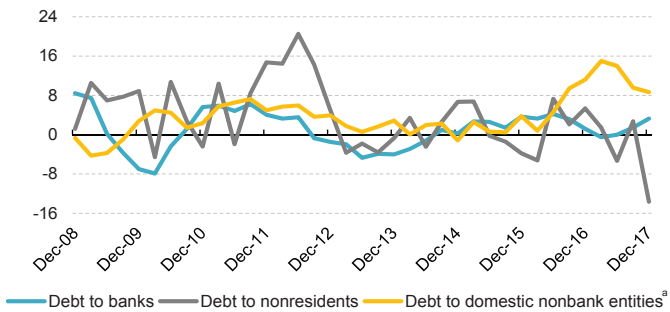


[a] Credit card companies and earmarked credit from the government.
SOURCE: Bank of Israel.

Further to the previous two years, the annual growth rate of debt to domestic nonbank entities is higher than that of debt to banks.

However, starting in the second half of 2017, the growth rate of debt to the banks has increased. In the fourth quarter of the year, there was a sharp drop in the growth rate of debt to nonresidents, following the repayment of a loan by a large company.

Figure 2.5
Annual Growth Rate of Outstanding Nonfinancial Business Sector Debt, by Lender, 2008–17 (moving 4-quarters, percent)



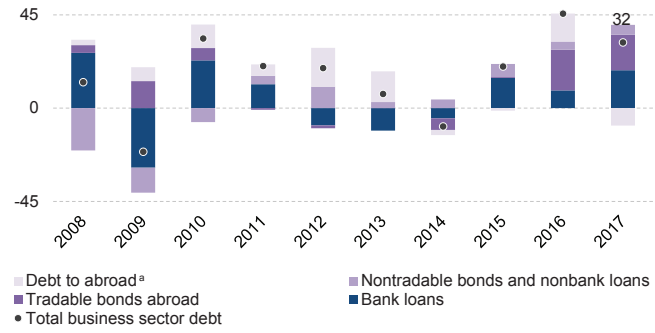
[a] Institutional investors, households and others, credit card companies, and earmarked credit from the government.
SOURCE: Bank of Israel.

[3] For more information on the industry distribution of outstanding nonfinancial business sector debt, see "Zoom In" at the end of this section.

The increase in outstanding debt in 2017 was mainly a result of a net quantitative increase in bank loans and in tradable bonds in Israel.

The quantitative increase of total debt came to about NIS 32 billion, lower than the previous year (NIS 46 billion), of which about NIS 22 billion was in domestic nonbank debt, which was impacted by tradable bond issues in Israel and direct loans from institutional investors.

Figure 2.6
Estimated Annual Net Quantitative Change in Nonfinancial Business Sector Debt, 2008–17 (NIS billion)

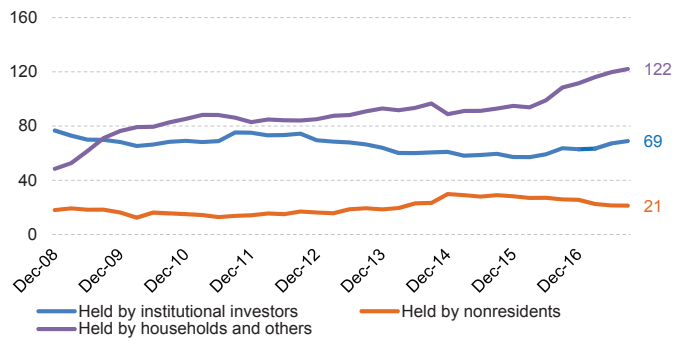


[a] Total volume of Israeli bonds abroad and loans from nonresidents.
SOURCE: Bank of Israel.

Further to previous years, households increased their holdings of tradable business sector bonds.

The balance of tradable business sector bonds increased by about NIS 11 billion, to about NIS 216 billion, mainly reflecting the expansion of households' holdings of these bonds. The outstanding holdings of business sector bonds by institutional investors increased by about NIS 7 billion, while the balance of holdings by nonresidents declined by about NIS 5 billion.

Figure 2.7
Outstanding Nonfinancial Business Sector Debt in Tradable Bonds[a] to Nonbank Lenders, 2008–17 (NIS billion)



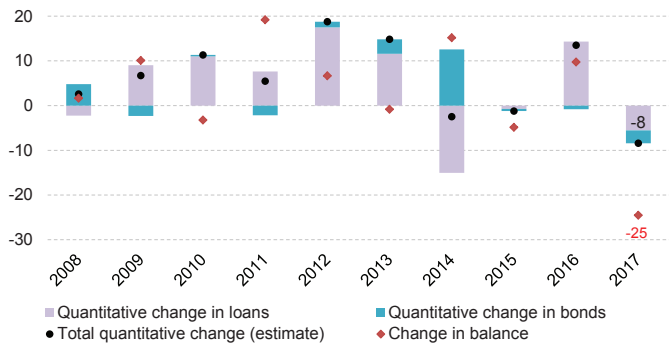
[a] In Israel and abroad.
SOURCE: Bank of Israel.

[3] For more information see "Zoom In" at the end of this section.

Outstanding business sector debt to nonresidents declined as a result of a net quantitative reduction in this channel, and the effect of the shekel's appreciation.

The net quantitative reduction of debt to abroad totaled about NIS 8 billion in 2017, and was comprised of a decline of about NIS 6 billion in loans—mainly due to the repayment of a loan by a large company—and a decline of about NIS 3 billion in bonds. The shekel's appreciation against the dollar also contributed to the decline in outstanding debt to abroad. These effects led to a decline of about NIS 25 billion in this balance in 2017.

Figure 2.8
Estimated Annual Net Quantitative Change in Nonfinancial Business Sector Debt to Abroad, 2008–17 (NIS billion)

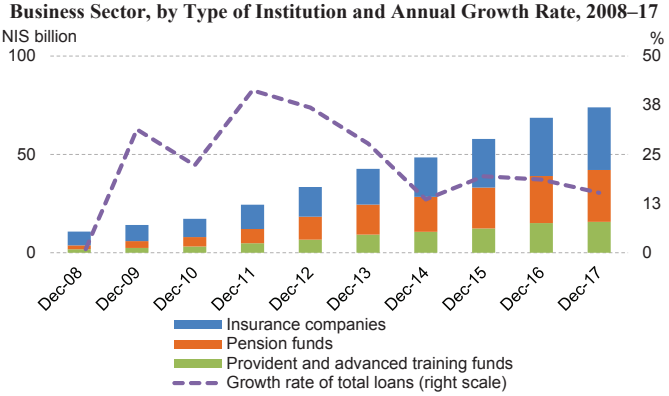


SOURCE: Bank of Israel.

The yearly growth rate of institutional investors' outstanding direct loans to the business sector moderated.

Outstanding business sector loans from all institutional investors increased by about NIS 8 billion, to about NIS 77—a growth rate of 12 percent, compared with 19 percent in the previous year. Divided by type of institutional investor, insurance companies account for a high proportion—about 43 percent of total loans.

Figure 2.9
Outstanding Direct Loans from Institutional Investors to the Nonfinancial Business Sector, by Type of Institution and Annual Growth Rate, 2008–17



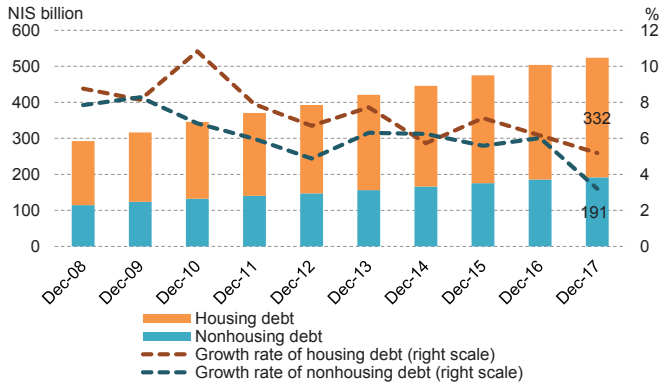
SOURCE: Based on reports by the institutional investors.

3. HOUSEHOLD DEBT

During 2017, the decline in the growth rate of outstanding household debt, both housing and nonhousing, continued.

During the year, outstanding household debt increased by about NIS 26 billion (5.1 percent compared with an average of 6.4 percent between 2012 and 2016), to about NIS 530 billion. The decline in the growth rate of nonhousing debt was prominent—about 3.9 percent compared with an average of 5.8 percent between 2012 and 2016.

Figure 2.10
Outstanding Household Debt, Housing and Nonhousing, and its Yearly Growth Rate, 2008–17

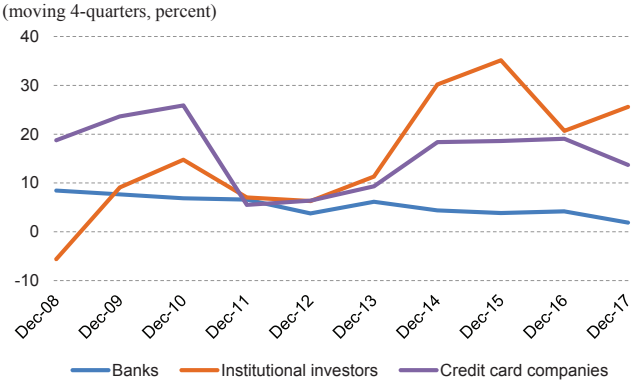


SOURCE: Bank of Israel.

The decline in the growth rate of nonhousing debt was mainly a result of a decline in the rate of this debt to banks.

The growth rate of nonhousing debt to institutional investors (26 percent) increased in 2017. In contrast, the growth of nonhousing debt to credit card companies slowed. Nonhousing debt to these entities accounted for about 16 percent of total nonhousing debt at year-end.

Figure 2.11
Annual Growth Rate of Nonhousing Debt, by Main Lender, 2008–17
(moving 4-quarters, percent)



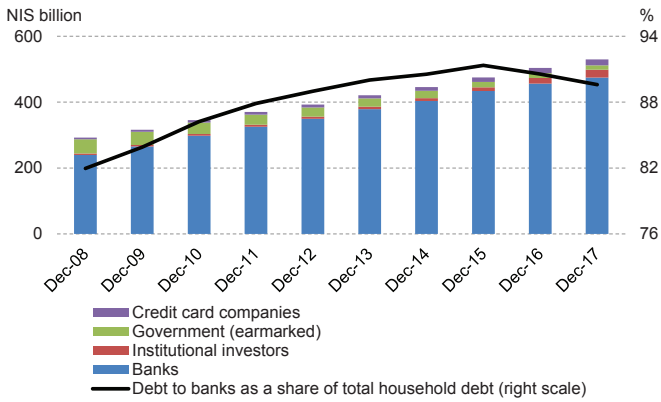
SOURCE: Bank of Israel.

The banks are the main lenders to households, but in the past two years their share of total debt has been declining.

Outstanding household debt to the banks increased by about NIS 18 billion, to about NIS 475 billion—about 90 percent of total household debt.

Outstanding household debt to nonbank entities also increased, by about NIS 8 billion, to about NIS 55 billion.

Figure 2.12
Household Debt, by Lender and Share Owed to Banks, 2008–17

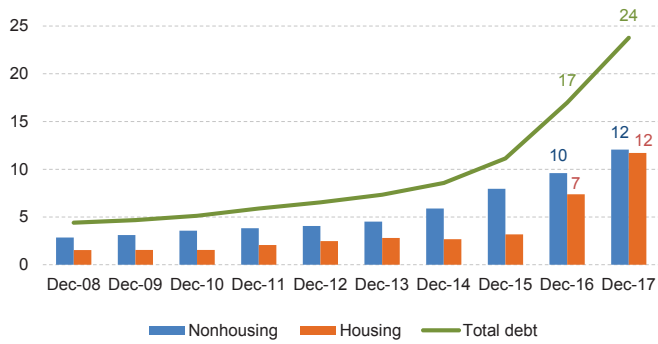


SOURCE: Bank of Israel.

Institutional investors' loans to households continued to increase.

Total household debt to institutional investors continued to increase in 2017, to about NIS 24 billion—about 4 percent of total household debt. The increase encompassed both housing and nonhousing debt.

Figure 2.13
Household Debt, Housing and Nonhousing, to Institutional Investors, 2008–17 (NIS billion)



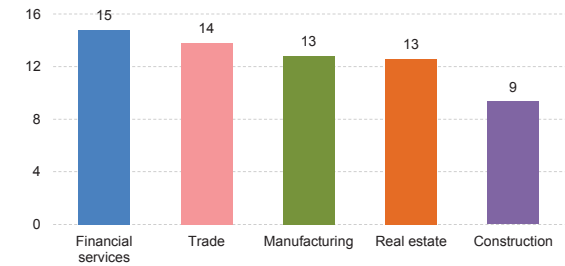
SOURCE: Based on reports by the institutional investors.

ZOOM-IN

BREAKDOWN OF OUTSTANDING NONFINANCIAL BUSINESS SECTOR DEBT BY INDUSTRY[1]

About 63 percent of total business sector debt is concentrated in five industries.

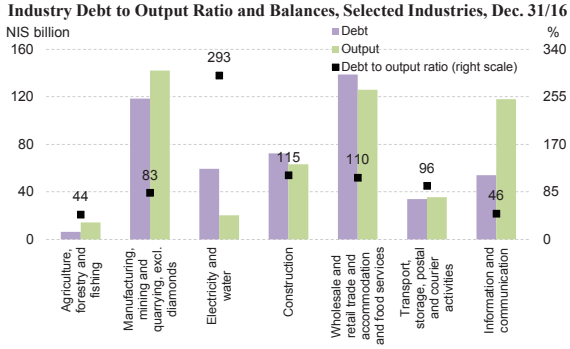
Figure 2.14
Distribution of Nonfinancial Business Sector Debt by the Five Large Industries, Sept. 30/17* (percent of total business sector debt)



* About 9 percent of business sector debt data are unclassified (see note 1 below), so the weight of some of the industries is higher.

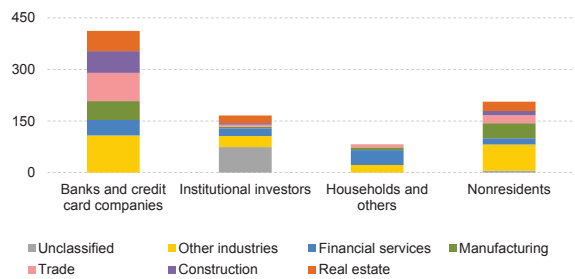
The debt to output ratio of the electricity and water industry is the highest, while that industry's outstanding debt and output are relatively low.

Figure 2.15
Industry Debt to Output Ratio and Balances, Selected Industries, Dec. 31/16



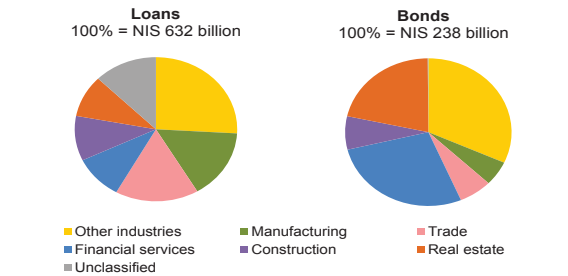
About half of total business sector debt to the banks and credit card companies is owed by companies in the trade, construction and real estate industries.

Figure 2.16
Distribution of Nonfinancial Business Sector Debt by Main Lenders and Industries, Sept. 30/17 (NIS billion)



In the bonds channel, companies from the financial services and real estate industries are prominent, while the loans channel shows more even industry dispersal.

Figure 2.17
Distribution of Nonfinancial Business Sector Debt by Instrument and Industry, Sept. 30/17



[1] According to the Central Bureau of Statistics 2011 industry classification.
The financial services industry includes holding companies.
"Unclassified" refers to debt data that is not classified. The main component that is not classified is direct loans from institutional investors to the business sector (about NIS 74 billion in September 2017), because the information on the industry composition is lacking.
"Other industries" is a combination of industries that account for less than 7 percent of total business sector debt.
SOURCE: Central Bureau of Statistics and estimates made by the Bank of Israel.

Main indicators of private sector debt						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Nonfinancial business sector debt						
Outstanding debt (NIS billion, end of period)	790	779	788	805	845	858
Estimated net quantitative change (NIS billion, yearly cumulative)	19	7	-9	20	46	32
Percentage of nonbank debt (end of period)	50	51	52	51	53	52
Percentage of tradable debt (end of period)	23	23	24	23	24	25
Business sector debt to GDP ratio (end of period)	80	74	71	69	69	68
Household debt						
Total household debt (NIS billion, end of period)	393	421	446	475	504	530
Estimated net quantitative change, net credit taken out (NIS billion, yearly cumulative)	20	25	24	30	30	25
Percentage of housing debt (end of period)	63	63	63	63	63	64
Total new mortgages taken out (NIS billion, yearly cumulative)	47	52	52	65	59	53
Household debt to GDP ratio (end of period)	40	40	40	41	41	42

SOURCE: Bank of Israel.

DATA SOURCES AND MAIN TERMS[1]

The Bank of Israel Information and Statistics Department manages a database of a activity in the credit market. The Department gathers data and information from reports and other sources, processes them into an overall consistent dataset, and calculated the economy's credit aggregates by various segmentations. The sources of data are reports from the banking system to the Banking Supervision Department; quarterly reports by the credit card companies; reports from institutional investors to the Ministry of Finance and the Bank of Israel; the Tel Aviv Stock Exchange; direct reports from large Israeli corporations to the Bank of Israel regarding their activity vis-à-vis nonresidents; reports by the banks and other financial intermediaries to the Bank of Israel regarding nonresidents' holdings of Israeli financial assets; and the Ministry of Finance.

The nonfinancial private sector is comprised of the business sector (Israeli commercial firms that are not banks or insurance companies) and households. This section focuses on the debt of the nonfinancial private sector to the main lenders (banks, institutional investors and nonresidents), and does not include debt to other lenders (such as private credit companies). The assessment is that the volume of other lenders' activity is small relative to that of the main lenders, and they are not currently included in the aggregates due to a lack of data. Gathering such data is expected to increase after the credit data register is established and activated.

Outstanding debt shows the stock of credit (positions, stocks) from the point of view of the borrower at a given point in time. The value of the debt does not depend on the market value of the bond or the value of the loans in the lenders' books. Therefore, outstanding bonds are presented at adjusted par value and outstanding loans are presented before deduction of loan loss provisions (such as doubtful or problematic debt provisions in the banks' balance sheets) in the lenders' books.

Estimated net quantitative change, quantitative increase/decrease of debt, is the change in outstanding debt, which shows economic activity in the credit market. The change in outstanding debt is influenced by net debt issuance (new credit raised, such as taking a loan or issuing bonds, minus repaid credit, such as repaid loans or repayment of bonds), by payment and accumulation of interest, by price changes (such as a change in the Consumer Price Index for CPI-indexed debt) and by other factors. Since there are no direct data on each of these components, an "estimated net quantitative change" is calculated from data on outstanding debt. The estimated quantitative change during a given period is calculated as the difference between outstanding debt at the end of the period and the outstanding debt at its beginning, minus relevant price changes. Since the estimated net quantitative change is derived from balances, it includes other effects on the balance

[1] For more details on the definitions, terms and explanations, see "The Credit Data System in Israel" in the second part of the Statistical Bulletin for 2015.

beyond net debt raised, such as interest accumulations/payments. In this chapter, we do not relate separately to net debt raised.

Housing loans from the banks, as reported to the banks by customers, are defined as loans that fulfill one of the following conditions (provided that they were not issued for business purposes): the loan is intended for the purchase, leasing, construction, expansion or renovation of a residential dwelling; for the purchase of a plot for the construction of a residential dwelling or for the purchase of rights to a residential dwelling in return for key money; or to finance the early repayment of a loan as stated in the first two conditions, in whole or in part.

Nonhousing loans from the banks, as reported to the banks by customers, are defined as loans from the banks to private individuals (including overdrafts) and to private Israeli non-profit organizations, the purpose of which is not housing. These also include loans with a dwelling as collateral that are not for residential purposes (all-purpose loans).

C. ECONOMIC ACTIVITY VIS-À-VIS ABROAD

The upward trend in the balance of Israel's assets vis-à-vis abroad continued in 2017, mainly as a result of increases in the balance of Israelis' financial investments abroad and in the balance of Israel's reserve assets. The increase in the prices of foreign securities had a noticeable impact on the increase in the balance of assets abroad. The net flow of financial investments abroad increased this year, but remained lower than it was between 2007 and 2016. Most financial investments abroad were made by the banking sector and households. Israel's liabilities to abroad also increased this year, in contrast with the decline of the previous year. Nonresidents' net direct and financial investments in the Israeli economy continued, but they were partly offset by a sharp decline in the prices of Israeli shares held by nonresidents and by net repayments of loans issued by nonresidents.

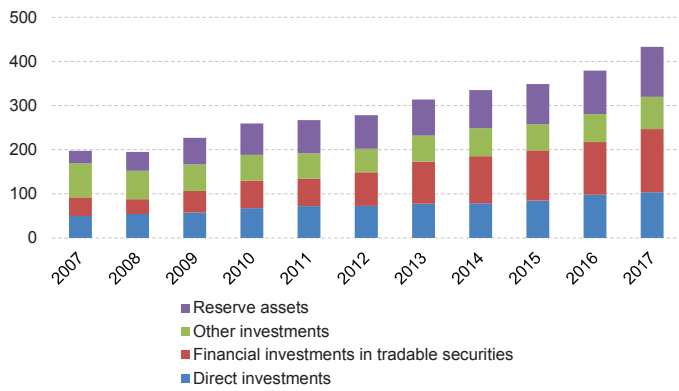
The increase in Israel's assets in excess of the increase in outstanding liabilities led to a significant growth in the surplus of Israel's assets over liabilities vis-à-vis abroad, and to an increase in the surplus of assets in debt instruments (negative external debt).

1. ISRAELIS' ASSETS ABROAD—INVESTMENTS ABROAD BY ISRAELIS

The increase in the balance of Israelis' assets abroad continued in 2017, mainly as a result of the increase in the balance of financial investments abroad by Israelis.

The increase in Israelis' assets abroad, totaling about $54 billion (14.2 percent), was a result of increases in all investment channels. An increase of about $24 billion (6.2 percent) in the balance of financial investments, and of about $15 billion (3.8 percent) in the balance of reserve assets were particularly prominent.

Figure 3.1
Balance of Israel's Assets Abroad, 2007–17 ($ billion)

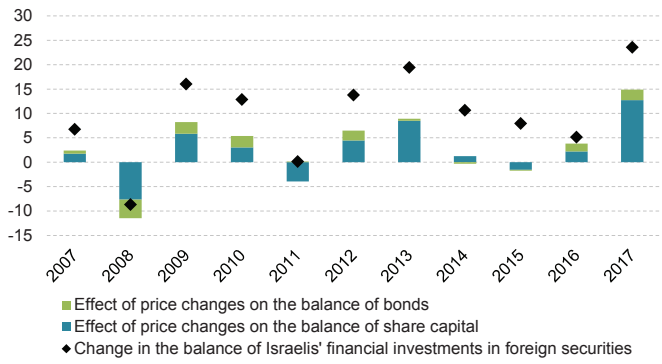


SOURCE: Bank of Israel.

The balance of financial investments abroad by Israelis increased, mainly as a result of price increases in capital markets abroad.

The increase in securities prices increased the balance of financial investments abroad by Israelis by about $15 billion. Most of the growth was a result of increases in the prices of foreign shares.

Figure 3.2
Effect of Price Changes on the Balance of Israelis' Financial Investments in Foreign Share Capital and Bonds, 2007–17 ($ billion)

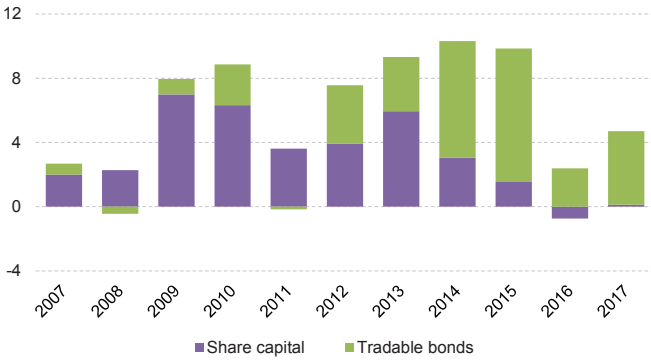


SOURCE: Bank of Israel.

The flow of financial investments abroad by Israelis increased, but its volume remains lower than it was between 2007 and 2016.

Net financial investments in 2017 totaled about $4.7 billion, lower than the average volume between 2007 and 2016, which was about $6.3 billion. The increase in investments this year was concentrated in foreign bonds, while Israelis' activity in shares was balanced.

Figure 3.3
Israelis' Net Financial Investments in Foreign Stocks and Bonds, 2007–17 ($ billion)

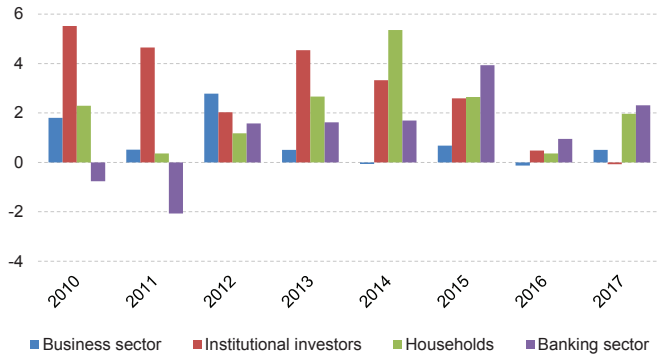


SOURCE: Bank of Israel.

Most of Israelis' financial investments abroad in 2017 were made by the banking sector and households. Net investments of the other sectors were negligible, similar to their activity in 2016.

Financial investments abroad by the banking sector (nostro) and by households totaled about $4.3 billion in 2017 (about 91 percent of total financial investments abroad by all sectors), mostly in foreign bonds.

Figure 3.4
Distribution of the flow of Israelis' Net Financial Investments Abroad by Sector, 2010–17 ($ billion)

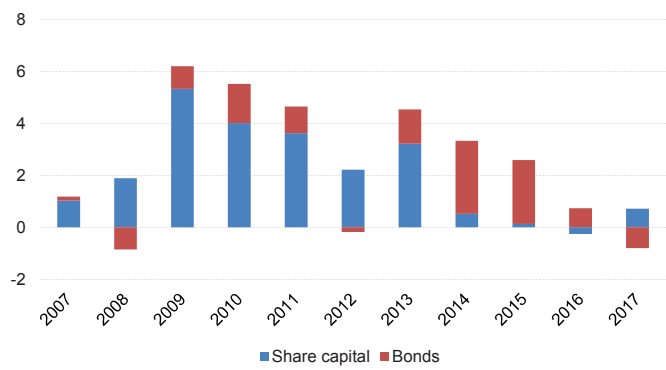


SOURCE: Bank of Israel.

The negligible flow of net financial investments by the institutional investors reflected an offsetting between investment in foreign shares and realizations of foreign bonds of a similar amount.

For the first time in four years, the institutional investors made net investments in foreign shares, totaling about $700 million. These investments were offset by net realizations of foreign bonds of a similar amount.

Figure 3.5
Net Flow of Institutional Investors' Financial Investments Abroad by Instrument, 2007–17 ($ billion)

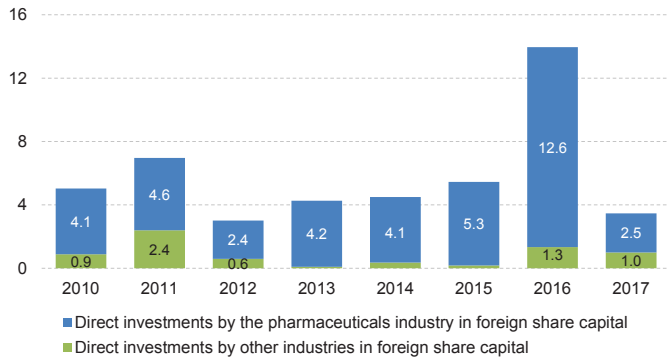


SOURCE: Bank of Israel.

The flow of direct investments abroad by Israelis continued in 2017, and there was a significant decline in net direct investments by companies in the pharmaceuticals industry.

Net direct investments in share capital totaled about $3.5 billion in 2017, mostly accumulated profits[1] of companies in the pharmaceuticals industry. The volume of investments by the pharmaceuticals industry is significantly lower than the average between 2010 and 2016 ($5.3 billion).

Figure 3.6
Distribution of the flow of Israelis' Net Direct Investments in Foreign Share Capital by Industry, 2010–17 ($ billion)

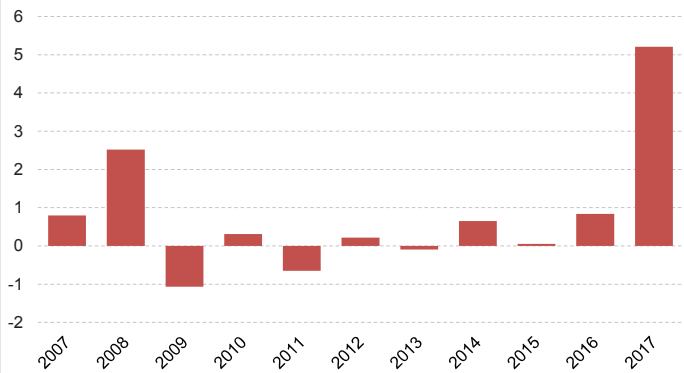


SOURCE: Bank of Israel.

The balance of other investments abroad by Israelis increased in 2017, mainly due to an increase in the volume of financial loans issued by Israelis to nonresidents. About half of the loans this year were issued by a group of companies in the computer production and programming industry.

The financial loans issued by Israelis to nonresidents in 2017 totaled about $5.2 billion (89 percent of the increase in the balance of other assets), significantly higher than in the past 8 years.

Figure 3.7
Financial Loans Issued by Israelis to Nonresidents, 2007–17 ($ billion)



SOURCE: Bank of Israel.

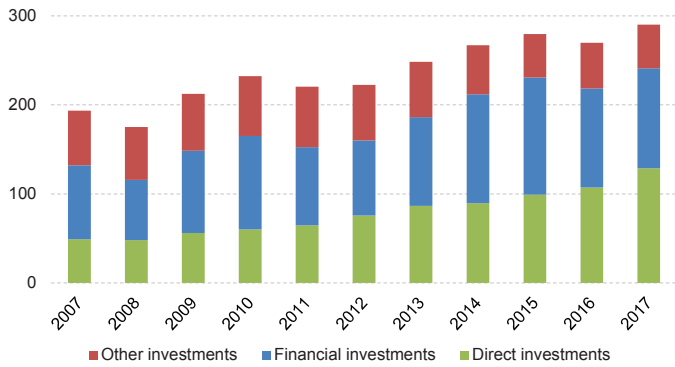
[1] See the Main Terms at the end of the section.

2. ISRAELIS' LIABILITIES TO ABROAD—NONRESIDENTS' INVESTMENTS IN ISRAEL

In 2017, the balance of Israelis' liabilities to abroad increased, mainly due to direct investments in Israel by nonresidents.

The increase in the balance of Israelis' liabilities to abroad, which totaled about $20.4 billion (7.6 percent), was mainly a result of an increase of about $21.5 billion (8 percent) in the balance of direct investments, which was partly offset by a decline of about $2.2 billion (0.8 percent) in the balance of other investments.

Figure 3.8
The Balance of Israelis' Liabilities to Abroad, 2007–17 ($ billion)

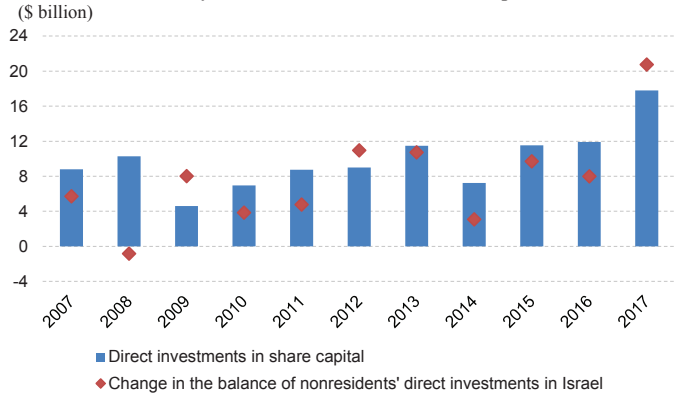


SOURCE: Bank of Israel.

The increase in the balance of direct investments was mainly the result of the net flow of nonresidents' investments.

Net direct investments totaled about $19 billion in 2017, about one-third of which was a direct investment in one company in the computer production and programming industry. The volume of direct investments this year was significantly higher than the average between 2007 and 2016 ($9.1 billion).

Figure 3.9
Direct Investments by Nonresidents in Israeli Share Capital, 2007–17
($ billion)



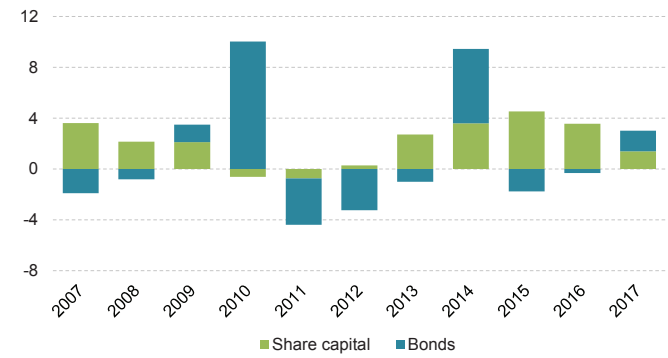
SOURCE: Bank of Israel.

The net flow of financial investments in Israeli bonds and shares by nonresidents also continued.

Net investments in bonds totaled about $1.6 billion (1.5 percent of the balance of financial investments) in 2017, mostly in government bonds, in contrast to net realizations of Israeli bonds in the previous two years.

Net investments in shares totaled about $1.4 billion (1.2 percent), slightly lower than the average between 2007 and 2016 ($2 billion).

Figure 3.10
Net Financial Investments in the Israeli Economy by Nonresidents, 2007–17
($ billion)

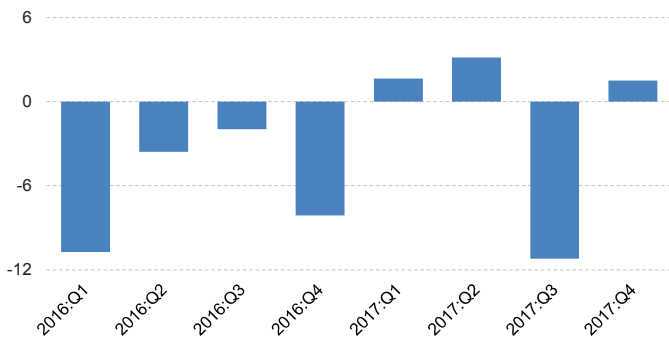


SOURCE: Bank of Israel.

Net investments in Israeli shares by nonresidents were offset due to the decline in Israeli share prices.

The balance of financial investments in Israeli shares by nonresidents declined by about $1.8 billion (1.7 percent of the balance of nonresidents' financial investments in Israel) in 2017, as a result of the sharp decline in share prices of Israeli companies in the third quarter of the year. The decline in prices was concentrated in the shares of companies in the pharmaceuticals industry, which accounts for a high proportion of the investment portfolio of nonresidents.

Figure 3.11
The Effect of Price Changes on the Balance of Nonresidents' Financial Investments in Israeli Share Capital, 2016:Q1–2017:Q4 ($ billion)

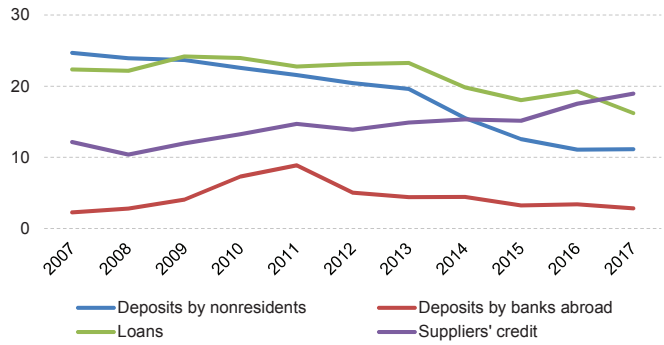


SOURCE: Based on Bloomberg.

The balance of nonresidents' other investments in Israel declined in 2017. The decline was concentrated in the balance of loans issued to Israelis by nonresidents.

In 2017, Israelis repaid loans issued by nonresidents, totaling about $3.2 billion (6.2 percent of the balance of nonresidents' other investments in Israel), mostly the repayment of a loan by one company in the computer production and programming industry. In contrast, the balance of suppliers' credit issued by nonresidents to Israelis increased by about $1.4 billion (2.7 percent), as imports increased in 2017.

Figure 3.12
The Balance of Nonresidents' Other Investments in the Israeli Economy by Instrument, 2007–17 ($ billion)

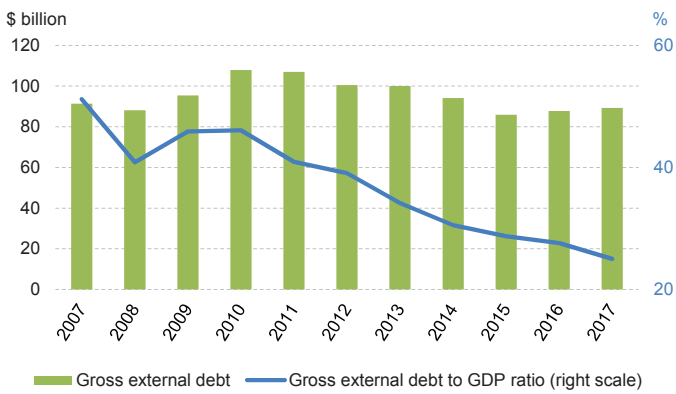


SOURCE: Based on company reports.

The gross external debt to GDP ratio continued to decline in 2017, as a result of the increase in Israel's liabilities in debt instruments along (gross external debt[2][1]) that was less than the increase in GDP in dollar terms.

The rate of growth of Israel's gross external debt totaled about 1.7 percent in 2017. In parallel, GDP grew by about 13.1 percent in dollar terms, mainly due to the appreciation of the shekel. As a result, the external debt to GDP ratio declined by 3 percentage points, to about 25 percent at the end of the year.

Figure 3.13
Gross External Debt and External Debt to GDP Ratio, 2007–17



SOURCE: Based on Central Bureau of Statistics.

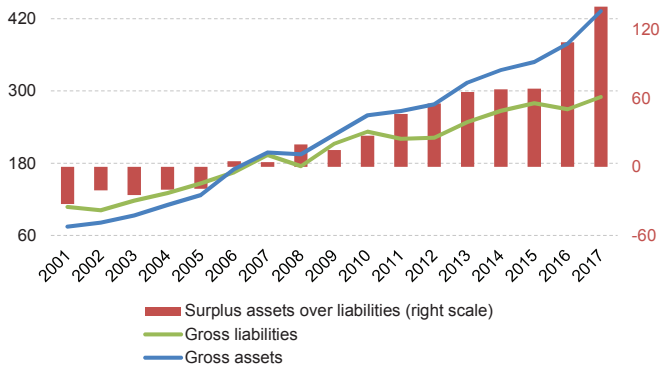
[2] For further details on definitions, explanations and calculations regarding external debt, see "Measuring the Country's External Debt" in Part Two of this publication.

3. SURPLUS ASSETS OVER LIABILITIES

In 2017, the upward trend in the surplus of assets over liabilities vis-à-vis abroad continued.

Israel's surplus assets over liabilities increased by about $33.4 billion (30.6 percent), to $142 billion (39.6 percent of GDP), through a marked increase in the value of Israel's gross assets and a more moderate increase in the value of Israel's gross liabilities.

Figure 3.14
Israel's Surplus Assets (+) Over Liabilities vis-a-vis Abroad, 2001–17
($ billion)

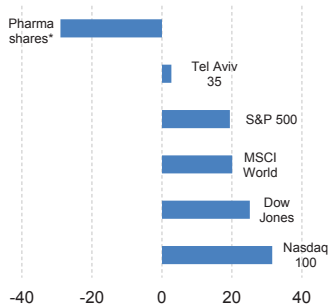


SOURCE: Bank of Israel.

Similar to the previous year, the contrary developments of the domestic and foreign share price indices were a contributing factor to the growth of surplus assets over liabilities.

Share price increases abroad increased the balance of assets held abroad by Israelis, while share price declines in Israel lowered the balance of Israelis' liabilities to abroad. As a result, the net effect of price changes increased the surplus assets over liabilities by about $21 billion. As in the previous year, the effect of the net flow of investments (including reserve assets) on the surplus of assets over liabilities was relatively small , amounting to a net export of capital totaling about $5.7 billion.

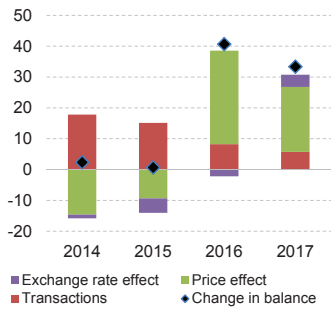
Figure 3.15a
Israeli and Global Stock Indices: Cumulative Rate of Change, 2017



* An index calculated by the Bank of Israel that is used to estimate changes in the prices of pharmaceutical company shares traded in Israel.

SOURCE: Based on Bloomberg data.

Figure 3.15b
Sources of Change in Israel's Surplus of Assets over Liabilities[a], 2014–17 ($ billion)



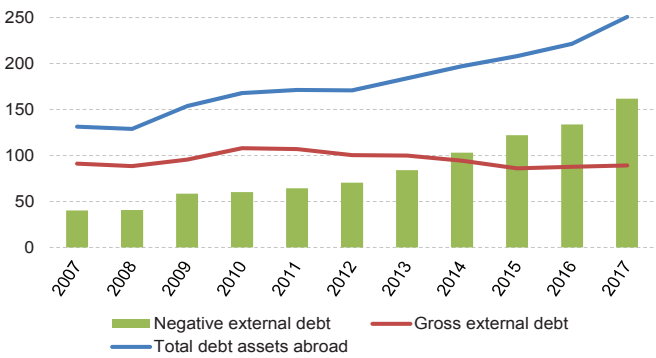
[a] The sources of change do not include other adjustments.

SOURCE: Bank of Israel.

Israel's surplus of assets in debt instruments only (negative net external debt) also increased in 2017, as a result of a marked increase in the balance of debt instrument assets and a slight increase in Israel's gross debt to abroad.

Israel's surplus assets over liabilities vis-à-vis abroad in debt instruments only (negative net external debt), increased by about $28 billion (20.9 percent), to $162 billion at the end of the year.

Figure 3.16
Negative External Debt[a], 2007–17 ($ billion)



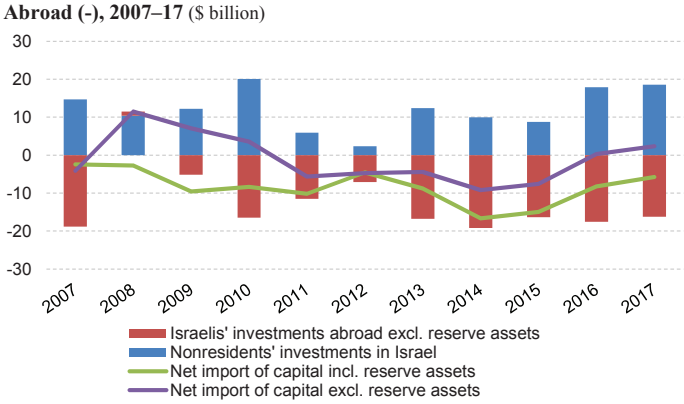
[a] Surplus assets over liabilities in debt instruments only. Positive values = debts owed to Israel from abroad.
SOURCE: Bank of Israel.

Summing the capital movements into and out of the Israeli economy, there was a net import of capital (excluding reserve assets) into the economy in 2017, in contrast with the net export of capital between 2011 and 2015.

Most of the increase in the net import of capital (excluding reserve assets) was due to direct investments in the Israeli economy by nonresidents.

Capital movements into the economy including reserve assets resulted in a net import of capital totaling about $5.7 billion.

Figure 3.17
Nonresidents' Investments in Israel (+) and Israelis' Investments Abroad (-), 2007–17 ($ billion)



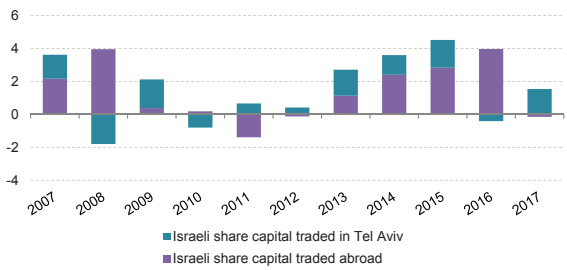
SOURCE: Bank of Israel.

ZOOM-IN

FINANCIAL INVESTMENTS IN THE ISRAELI ECONOMY BY NONRESIDENTS

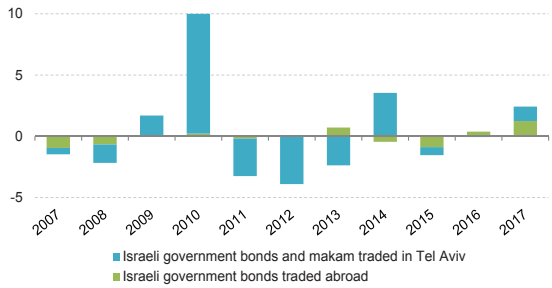
The flow of nonresidents' financial investments in Israeli share capital was concentrated this year in share capital traded in Tel Aviv, unlike in the previous three years.

Figure 3.18
Distribution of Nonresidents' Financial Investments in Israeli Share Capital by Place of Trading 2007–17 ($ billion)



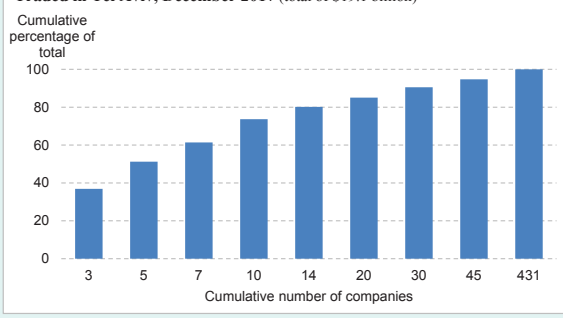
The flow of nonresidents' financial investments in Israeli government bonds traded abroad was higher in 2017 than in previous years.

Figure 3.19
Distribution of Nonresidents' Financial Investments in Israeli Government Bonds by Place of Trading 2007–17 ($ billion)



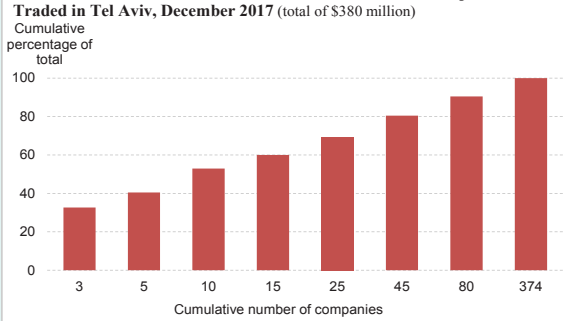
About 50 percent of nonresidents' financial investments in Israeli shares traded in Tel Aviv is invested in just 5 Israeli companies.

Figure 3.20
Concentration of Nonresidents' Financial Investments in Share Capital Traded in Tel Aviv, December 2017 (total of $19.1 billion)



About 50 percent of nonresidents' financial investments in Israeli corporate bonds traded in Tel Aviv is invested in just 10 Israeli companies.

Figure 3.21
Concentration of Nonresidents' Financial Investments in Corporate Bonds Traded in Tel Aviv, December 2017 (total of $380 million)



SOURCE: Bank of Israel.

Main indicators of activity vis-à-vis abroad						
$ billion		Balance to the end of 2016	Transactions	Price changes	Exchange rate differentials and other adjustmens	Balance to the end of 2017
Israel's Assets		**378.7**	**24.3**	**18.9**	**10.5**	**432.5**
of which:	Debt instruments*	221.5	18.7	4.3	6.4	250.9
Direct investments abroad		**98.1**	**6.3**	**0.4**	**-1.0**	**103.8**
of which:	Share capital and land	85.1	4.6	0.4	-1.0	89.0
	Owners' loans	13.0	1.7	0.0	0.0	14.7
Financial investments		**119.2**	**4.7**	**14.9**	**4.0**	**142.8**
of which:	Share capital	61.8	0.1	12.7	3.5	78.2
	Bonds	57.4	4.6	2.2	0.5	64.6
Other investments abroad		**63.5**	**6.6**	**2.2**	**1.2**	**73.5**
of which:	Deposits by Israelis (including banks)	19.7	-4.1	0.3	0.3	16.2
	Loans	11.3	5.2	0.3	0.3	17.1
	Customer credit	21.6	3.3	0.0	0.4	25.3
	Other assets	10.9	2.2	1.5	0.2	14.8
Reserve assets		**98.4**	**8.1**	**1.5**	**5.0**	**113.0**
Derivative instruments		-0.6	-1.4	0.0	1.4	-0.5
Israel's Liabilities		**269.8**	**18.6**	**-2.1**	**4.0**	**290.2**
of which:	Debt instruments	87.7	-1.0	0.0	2.5	89.2
Direct investments		**107.3**	**19.0**	**2.8**	**-0.2**	**128.8**
of which:	Share capital and land	99.1	18.2	2.8	-0.2	119.9
	Owners' loans	8.2	0.7	0.0	0.0	8.9
Financial investments		**111.2**	**3.0**	**-4.9**	**2.9**	**112.2**
of which:	Share capital	82.9	1.4	-4.9	1.7	81.1
	Bonds	28.2	1.6	0.0	1.3	31.1
Other investments		51.3	-3.4	0.0	1.2	49.1
of which:	Depsits by nonresidents and foreign banks	14.5	-1.2	0.0	0.7	14.0
	Loans	19.3	-3.2	0.0	0.1	16.2
	Suppliers' credit	17.5	1.0	0.0	0.4	18.9
Net Liabilities**		**-109.0**	**-5.7**	**-21.1**	**-6.6**	**-142.3**
of which:	Net debt instruments	-133.7	-19.7	-4.3	-3.9	-161.7

* Debt instruments: Owners' loans, bonds, deposits, loans, commercial credit, and reserve assets.

** Net liabilities: Liabilities minus assets.

DATA SOURCES AND MAIN TERMS

The Bank of Israel Information and Statistics Department manages a database of economic activity vis-à-vis abroad. The Department gathers data and information from various sources. Most of the data are received from direct reports[1] by companies and individuals to the Bank of Israel pursuant to the Bank of Israel Order (see "Information on the Development of the Foreign Exchange Market in Israel, 5770–2010). The companies that are required to report are any Israeli company with a balance of direct investments in foreign companies totaling $20 million or more, and any Israeli company in which foreign direct investors hold $40 million or more. In addition, companies and individuals with financial assets abroad totaling $20 million or more also report. Additional data used to measure economic activity vis-à-vis abroad are obtained from reports by the institutional investors, the Bank of Israel Accounting Division, and reports from the Israel Securities Authority, the Ministry of Finance, and domestic banks.

Direct investment[2]—Investment by nonresidents in Israeli companies or investment by Israelis in foreign companies is defined as a direct investment when it involves holdings of more than 10 percent of the company's capital (tradable and nontradable). Direct investment includes stock purchases, accumulated profits (undistributed profits), owners' loans, and investment in real estate.
Financial investment—Transactions between Israelis and nonresidents, involving debt instruments (including government bonds) or company stock where holdings are of less than 10 percent of the company's capital, excluding investment that is included in reserve assets. This category reflects activity in the Israeli stock market or foreign stock markets.
Direct and financial investments are part of capital flows between Israel and the rest of the world, which are recorded in the financial account of Israel's balance of payments. The distinction between direct investment and financial investment reflects the difference in the investor's motive and purpose. Direct investment generally reflects globalization of real economic activity, meaning the geographic diversification of development, production and marketing of goods and services and the establishment of multinational corporations. In contrast, financial investment generally reflects globalization of financial activity—management of the securities portfolio with geographic diversification, in an attempt to improve the yield to risk ratio of the portfolio as a whole.

[1] For more information on forms for reporting to the Bank of Israel, see http://www.boi.org.il/he/DataAndStatistics/Pages/ReportingForms.aspx (in Hebrew).
[2] For further details on definitions, explanations and calculations, see Bank of Israel, "Measuring direct investment as a part of the International Investment Position", Statistical Bulletin 2016, Part 2.

The flows of direct and financial investment by foreign residents in the Israeli economy create a liability of the economy toward abroad, while the flows of direct and financial investments abroad by Israelis create Israeli assets vis-à-vis abroad.

Other investments—Investments abroad by Israelis or investments in Israel by nonresidents in other instruments: deposits, financial loans (that are not owners' loans or bonds), customer/supplier credit. Other investments abroad by Israelis also include investments in other assets (financial derivatives, mutual funds, index funds, and so forth).

Reserve assets—Foreign exchange balances of the central bank, the State's gold reserves, reserves at international organizations such as the International Monetary Fund, and Special Drawing Rights (SDRs—withdrawal rights allocated by the IMF for the purpose of covering liabilities and balance of payments deficits).

D. FOREIGN EXCHANGE ACTIVITY OF THE MAIN SECTORS

In 2017, the shekel strengthened against the dollar in parallel with the significant weakening of the dollar against the major currencies. Most of the shekel's appreciation was in the first half of the year. In terms of the nominal effective exchange rate, which represents the currencies of Israel's main trading partners, the shekel strengthened by a more moderate rate. In 2017, net foreign exchange sales by nonresidents and institutional investors were prominent, against net foreign exchange purchases by the other main sectors. The activity of these sectors was not homogeneous over the year as a whole. Nonresidents' sales of foreign exchange were concentrated mainly in the first half of the year, while there were net purchases in the second half. The institutional investors increased their foreign exchange sales in the second half. The business sector increased its foreign exchange purchases in 2017, through a combination of increased net purchases by importers and lower net sales by exporters.

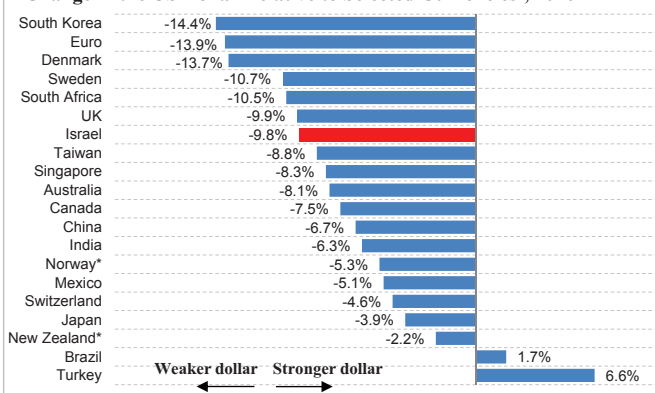
1. BACKGROUND: THE EXCHANGE RATES AND RISK

In 2017, the dollar weakened significantly against most major currencies, including against the euro and the shekel.

The shekel strengthened by about 9.8 percent against the dollar pound this year, continuing the appreciation against the dollar from 2016 (1.5 percent).

Most of the appreciation took place in the first half of the year (8.2 percent).

Figure 4.1
Change in the US Dollar Relative to Selected Currencies[a], 2016



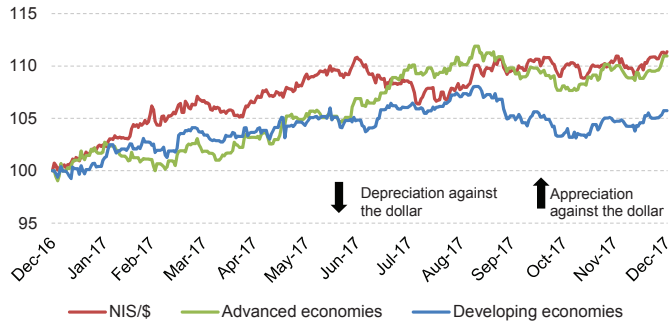
[a] Representative rates except for Norway and New Zealand, which are calculated according to end-of-day data.

SOURCE: Bank of Israel.

The dollar weakened against the currencies of advanced and developing economies, mainly during the first half of the year.

In 2017, the dollar weakened against the currencies of advanced economies by about 11 percent. The dollar weakened by a lower rate of about 6 percent against the currencies of developing economies (affected by the strengthening of the dollar against the Turkish lira by 7 percent since the beginning of the year.)

Figure 4.2
Cumulative Change vis-a-vis the Dollar, 2017 (index)



Developing economies: Mexico, South Korea, Philippines, Poland, Chile, South Africa, Thailand, Hungary, Turkey and Singapore. **Advanced economies:** Australia, Canada, Japan, UK, Switzerland and eurozone.

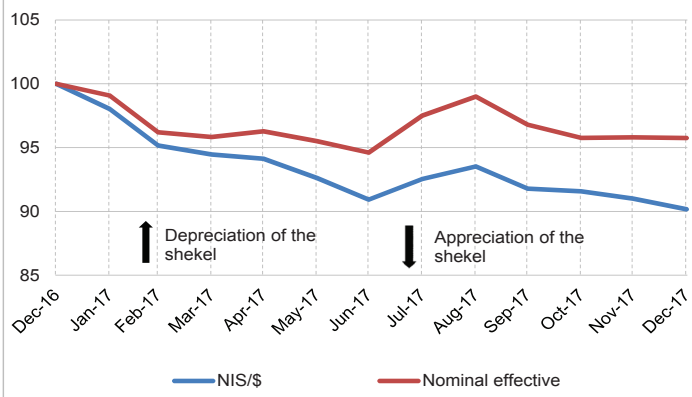
SOURCE: Bank of Israel.

In parallel with the appreciation of the shekel against the dollar, the shekel also strengthened in terms of the nominal effective exchange rate.[1]

The shekel appreciated by 4.2 percent in terms of the nominal effective exchange rate in 2017, further to the 4.8 percent appreciation in 2016.

Similar to the shekel's appreciation against the dollar, the appreciation in terms of the nominal effective exchange rate was recorded in the first half of the year (5.3 percent), while there was a depreciation in the second half of the year (1.1 percent).

Figure 4.3
Shekel/Dollar and Nominal Effective Exchange Rate Indices, 2017



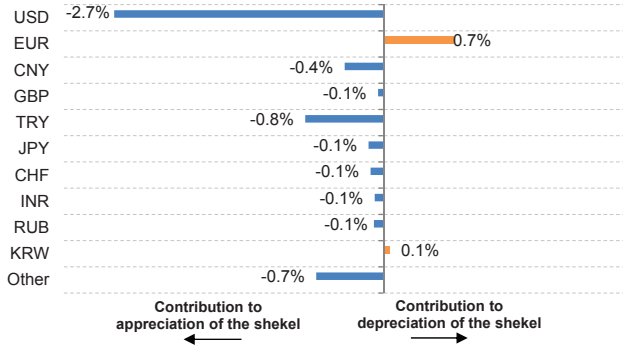
SOURCE: Bank of Israel.

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

The main contributions to the change in the nominal effective exchange rate were the strengthening of the shekel against the dollar and against the Turkish lira, compared with a weakening of the shekel against euro.

The shekel strengthened this year against most currencies in the basket that comprises the nominal effective exchange rate. The shekel's appreciation against the dollar contributed to a change of 2.7 percentage points in the rate, and its appreciation atainst the Turkish lira contributed 0.8 percentage points. In contrast, the shekel's weakening of 2.6 percent against the euro during the year contributed 0.7 percentage points of depreciation against the nominal effective exchange rate.

Figure 4.4
Contribution of the Change in the Various Currencies[a] to the Change in the Nominal Effective Exchange Rate, 2017
(Appreciation of 4.2 percent)

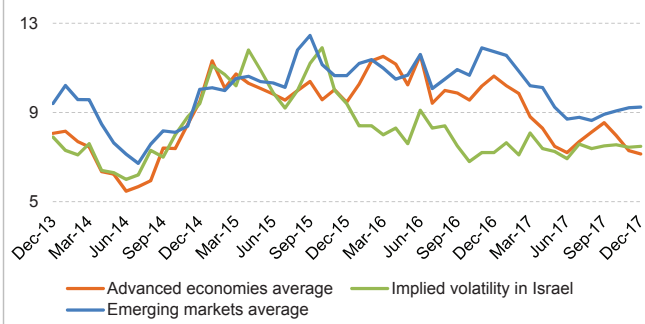


[a] The nine currencies with the highest weight in Israel's trade are specified in the Figure. The others are listed in "Other".
SOURCE: Bank of Israel.

Similar to 2016, the implied volatility[2] of the shekel exchange rate remained low, reflecting expectations of low volatility against the other currencies.

In parallel, the indices of implied volatility of the advanced and developing economies declined, mainly in the first half of the year.

Figure 4.5
International Comparison of Average Implied Volatility in Foreign Exchange Options, 2014–2017 (Weekly data, percent)



Developing economies: Mexico, South Korea, Philippines, Poland, Chile, South Africa, Thailand, Hungary, Turkey and Singapore. **Advanced economies:** Australia, Canada, Japan, UK, Switzerland and eurozone.
SOURCE: Bank of Israel.

2 For an explanation of implied volatility in options, see Main Terms at the end of this section.

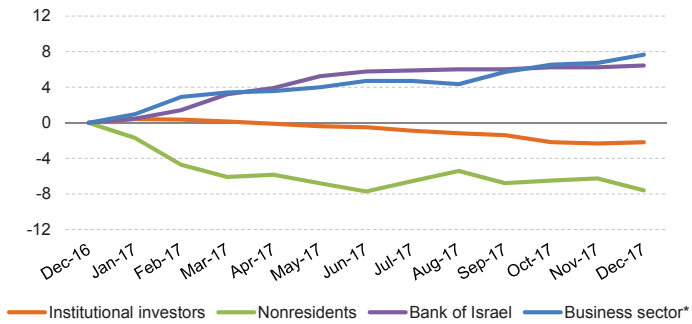
2. FOREIGN EXCHANGE ACTIVITY OF THE MAIN SECTORS

Prominent activity in the foreign exchange market included net foreign exchange sales by nonresidents and institutional investors and net foreign exchange purchases by the other main sectors.

Nonresidents' sales of foreign exchange were concentrated in the first half of the year, and totaled $7.7 billion. In contrast, the business sector purchased $4.8 billion in the first half of the year, and the Bank of Israel purchased foreign exchange in accordance with its policy of the past few years.

Beginning in June 2017, nonresidents moved to net purchases of foreign exchange, which were offset by additional foreign exchange sales at the end of the year. In contrast, the institutional investors increased their foreign exchange sales in the second half.

Figure 4.6
Estimated[a] cumulative foreign exchange transactions of the main sectors, 2017 ($ billion)

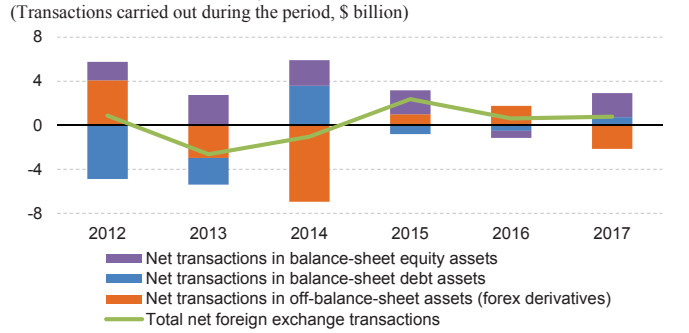


[a] Based on reported transaction data and on an estimate based on balance differentials.
* The main importers and exporters in the economy.
SOURCE: Bank of Israel.

In 2017, nonresidents mad net foreign exchange sales and purchased shekel assets.

The estimate of net investments by nonresidents in shekel assets in 2017 totaled about $800 million, mainly direct investments in equities (equity assets) totaling $1.6 billion and investments in *makam* and government bonds totaling about $1.3 billion. In contrast, nonresidents increased their balance of forward transactions for the sale of shekels (derivatives) totaling about $2.1 billion.

Figure 4.7
Estimate[a] of Nonresidents' Net Transactions in Balance-Sheet[b] and Off-Balance-Sheet Shekel Assets, 2012–17
(Transactions carried out during the period, $ billion)

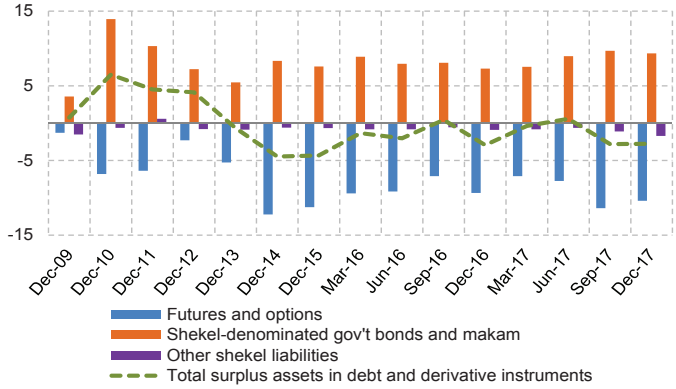


[a] Based on reported transaction data and on an estimate based on balance differentials.
[b] Equity assets: direct investments and financial investments in shares. Debt assets: bonds, *makam*, deposits and financial loans.
SOURCE: Bank of Israel.

In 2017, nonresidents' exposure to appreciation of the shekel through surplus shekel liabilities in debt instruments was about $2.8 billion.

Nonresidents' sales of foreign exchange in the first half of the year were reflected in a decline in the surplus of shekel liabilities, while foreign exchange purchases in the second half contributed to its increase.

Figure 4.8
Nonresidents' Surplus Liabilities (+) of Shekel and Derivative Debt Instruments (2009–2017, $ billion)

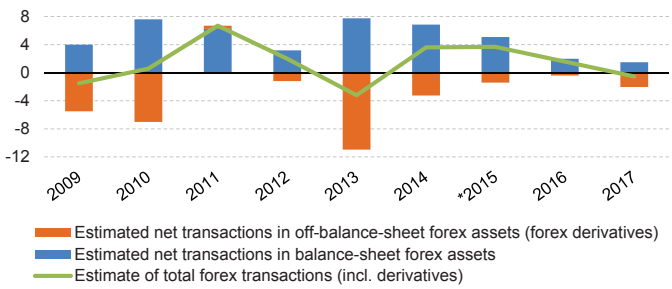


SOURCE: Bank of Israel.

In 2017, similar to the previous year, institutional investors'[3] investments in foreign exchange assets were negligible.

The volume of investment in balance-sheet foreign exchange assets totaled about $1.5 billion in 2017, and was mainly concentrated in the first half of the year. In contrast, the institutional investors made net sales of foreign exchange through derivative instruments totaling about $2 billion.

Figure 4.9
Estimate of Institutional Investors' Net Balance-Sheet and Off-Balance-Sheet Foreign Exchange Transactions, 2009–17
(Transactions carried out during the period, $ billion)



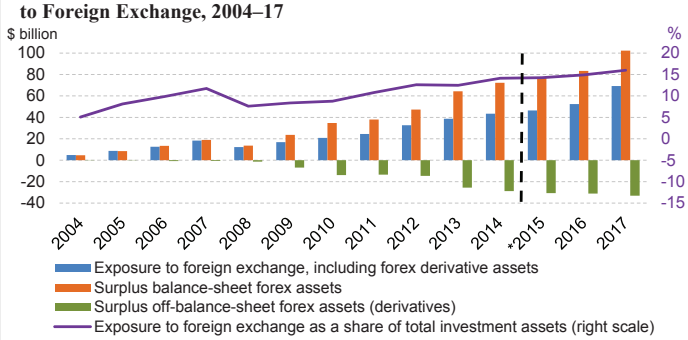
* The Figure for 2015 shows only the transactions for February to December 2015, due to the transition to a different method of calculation for the forex derivatives item.
SOURCE: Bank of Israel.

[3] Provident funds, advanced training funds, pension funds, and insurance companies with profit-sharing policies.

Despite the negligible flow of assets, the institutional investors' exposure to foreign exchange increased during the year, while exposure to foreign exchange as a share of their total assets also increased.

The balance of institutional investors' foreign exchange assets increased by about $19 billion, to $102.3 billion, mainly affected by increases in the prices of securities abroad. The increase in the balance was reflected in an increase of about 1.1 percentage points in institutional investors' exposure to foreign exchange as a share of their total assets, to 16.0 percent.

Figure 4.10
Institutional Investors' Surplus Foreign Exchange Assets (+) and Exposure to Foreign Exchange, 2004–17



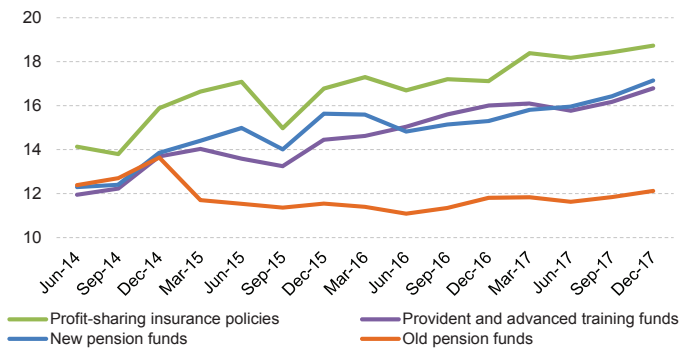
* In January 2015 some of the reporting entities adopted a different calculation method for the forex derivatives item, which makes it impossible to compare the balance at the end of January 2015 to the balances for previous periods.

SOURCE: Based on reports from the institutional investors.

The increase in the rate of exposure to foreign exchange encompassed all institutional investors.

The highest rate of exposure to foreign exchange was at the insurance companies, where the rate was about 19 percent at the end of the year (an increase of about 1.6 percentage points since the beginning of the year). The new pension funds and the provide and advanced training funds had a 17 percent rate of exposure to foreign exchange. The old pension funds maintained a lower exposure rate of about 12 percent.

Figure 4.11
Institutional Investors' Exposure to Foreign Exchange*, 2014–17 (percent)



* Including foreign exchange derivative assets.

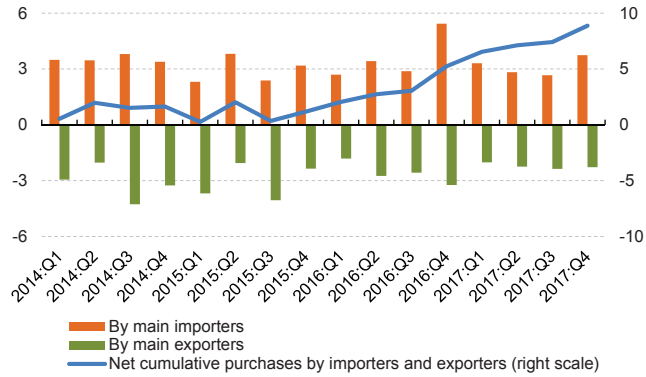
SOURCE: Bank of Israel.

In 2017, the business sector increased its foreign exchange purchases, further to its activity in 2016.

In 2017, there was a marked increase in foreign exchange purchases by import companies, due to the increase in the import of goods and services, mainly energy materials.

In parallel, the moderate decline in foreign exchange sales by export companies continued.

Figure 4.12
Cumulative Foreign Exchange Purchases (+) by the Large Import and Export Companies, 2014–17 ($ billion)

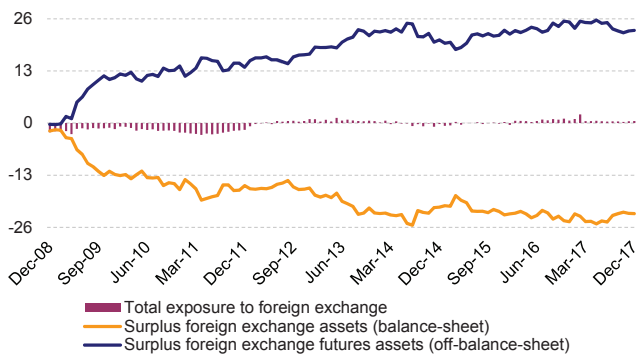


SOURCE: Bank of Israel.

The banking system maintained low exposure to appreciation of the shekel.

The banking system's off-balance-sheet assets in foreign exchange (financial derivatives) declined during the year by $2.2 billion, which was mostly offset by a similar decline in surplus balance-sheet foreign exchange liabilities.

Figure 4.13
Banks' Surplus Balance Sheet and Off-Balance-Sheet Foreign Exchange Assets (+) and Total Exposure to Foreign Exchange, 2008–17 ($ billion)



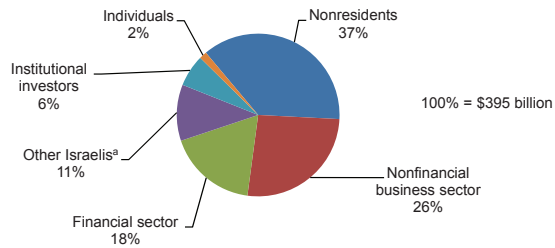
SOURCE: Based on the banks' nonconsolidated monthly balance-sheet figures.

ZOOM IN

THE VOLUME OF FOREIGN EXCHANGE TRANSACTIONS

In 2017, about 63 percent of the volume of transactions in the foreign exchange market (excluding swaps) were carried out by nonresidents and the nonfinancial business sector.

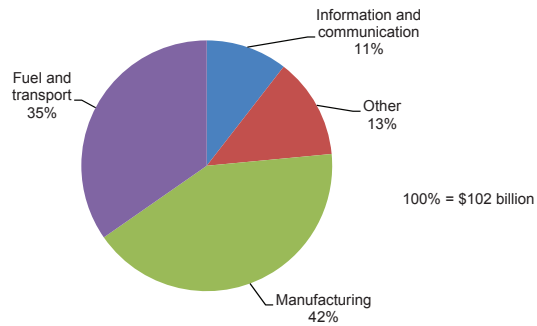
Figure 4.14
Volume of Transactions (Excluding Swaps) in the Foreign Exchange Market by Sector, 2017



[a] Including non-profit organizations, the government, branch customers and unclassified customers.

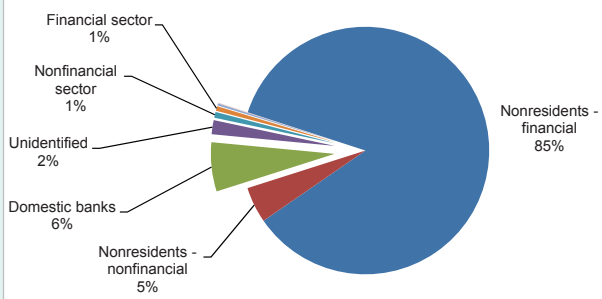
In 2017, about 42 percent of the volume of transactions by the business sector were carried out by companies in the manufacturing industry.

Figure 4.15
Volume of Transactions by the Business Sector, by Industry, 2017



In 2017, about 90 percent of the volume of conversion and derivative transactions in shekels by nonresidents were carried out with other nonresidents.

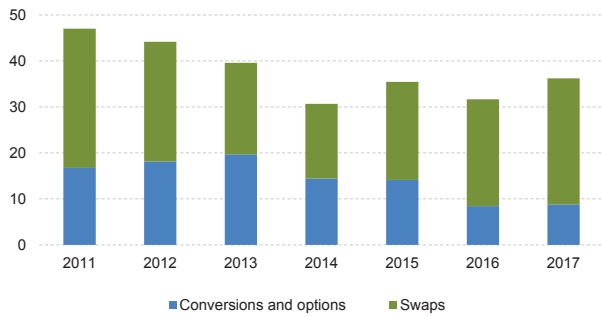
Figure 4.16
Volume of Transactions[a] by Nonresidents, by Sector, 2017



[a] Data from foreign reporting.

In 2017, nonresidents accounted for 36 percent of total trading volume in foreign exchange.

Figure 4.17
Nonresidents' Relative Share of Total Trading Volume
(daily average, percent)



SOURCE: Based reports by the banks.

Main indicators in the foreign exchange market

	Level[a]					Change				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Actual volatility of the shekel/dollar exchange rate (moving 20-day average)[b]	3.5%	9.4%	5.1%	7.2%	4.8%	-2.0	5.9	-4.3	2.1	-2.4
Implied volatility of shekel/forex OTC options[b]	7.9%	9.4%	9.4%	7.2%	7.5%	-1.5	1.5	-0.3	-2.2	0.3
Shekel/dollar representative exchange rate	3.47	3.89	3.90	3.85	3.47	-7.0%	12.0%	0.3%	-1.5%	-9.8%
Shekel/euro exchange rate	4.78	4.73	4.25	4.04	4.15	-2.8%	-1.2%	-10.1%	-4.8%	2.6%
Dollar/euro exchange rate	1.38	1.22	1.09	1.05	1.20	4.6%	-11.8%	-10.4%	-3.3%	14.1%
Yen/dollar exchange rate	104.98	119.49	120.41	117.00	112.55	21.8%	13.8%	0.8%	-2.8%	-3.8%
Nominal effective exchange rate (January 1, 2010 = 100)	89.80	92.75	86.02	81.89	78.40	-7.6%	3.3%	-7.3%	-4.8%	-4.2%
Average daily trading volume - conversions, swaps and OTC options ($ million)	4,393	6,375	6,382	7,277	6,636	-15.9%	45.1%	0.1%	14.0%	-8.8%
Nonresidents' share of trading volume[b]	39.5%	30.5%	35.4%	31.7%	36.2%	-4.4	-9.0	5.1	-3.7	4.5
Nonresidents' exposure to the exchange rate ($ billion)	-0.7	-4.5	-4.3	-2.9	-2.8					
Institutional investors' exposure to the exchange rate ($ billion)	38.7	43.4	46.5	52.4	69.2					
The banking system's exposure to the exchange rate ($ billion)	0.5	-0.2	0.3	0.8	0.5					
Foreign exchange purchases by institutional investors ($ billion)						-3.2	3.6	3.7c	1.6	-2.2
Foreign exchange purchases by main exporters ($ billion)						-9.3	-12.5	-13.8	-10.4	-8.9
Foreign exchange purchases by main importers ($ billion)						12.6	14.1	11.9	13.9	12.5

[a] Level at the end of the period.

[b] The changes shown in the right-hand panel are in percentage points.

[c] In January 2015, some of the reporting entities adopted a different method of calculation for the forex derivatives item, which makes it impossible to calculate the net transactions in foreign exchange assets (forex purchases) for that month. Forex purchases for 2015 therefore do not include that month.

SOURCE: Bank of Israel.

DATA SOURCES AND MAIN TERMS

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 chapter 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 and derivatives

- **Exposure to the exchange rate** (or exposure to foreign exchange) 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**[1]: 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.

[1] For more information on effective exchange rates, see: http://www.boi.org.il/en/Markets/ExchangeRates/Pages/efectinf.aspx

Part Two

Papers on statistical methodology and economic data, and their implementation at the Bank of Israel

1. The Anonymization of Files with Itemized Information
2. Measuring the Country's External Debt

The Anonymization of Files with Itemized Information

Ariel Mansura*

Abstract

The Bank of Israel's Information and Statistics Department gathers and manages files from a variety of sources, some of which contain itemized information. In order to enable freedom of information while also maintaining the confidentiality of the information, the Department builds anonymization procedures for the information files. This is a complex process, the aim of which is to prevent the identification or disclosure of sensitive or confidential information on individuals whose data appear in the files. This work outlines the process of anonymization of itemized data, defines the basic terms involved, presents accepted methods for assessing the risk of disclosure in the files, and samples the implementation of the process.

* Bank of Israel Information and Statistics Department.

1. INTRODUCTION

Following the Global Financial Crisis of 2008, central banks, including the Bank of Israel, began managing macroprudential policy, the aim of which is to identify systemic risks at the formative stage and to advance actions that will deal with them and limit their effect on the financial stability of the economy. The new challenges are motivating the central banks to manage consistent and integrative databases that will support this policy. Alongside technological development, which makes it possible to store and process very large quantities of information, there is an increasing need for databases of itemized data, which will enable the completion of information on the flow of capital in the economy, and on which bases it will be possible to obtain a detailed and available picture of the state of financial stability and robustness.

Against the background of these trends, and in parallel with the development of freedom of information laws that emphasize the importance of increased transparency and sharing of information, various entities that manage statistical information tend to enable access to itemized information as well, for the purposes of managing policy, economic analysis, and research. In order to allow access to such information within the organization or outside it, the Protection of Privacy Law requires that the confidentiality of the information be maintained, as the information relates to individual persons. In addition, the law requires that the commercial confidentiality of business entities be maintained—a complex task, particularly when dealing with financial information that is sometimes characterized by high concentration.

The Information and Statistics Department at the Bank of Israel, which collects and creates financial statistics, manages databases that include, among other things, itemized information on various topics: the capital market, the foreign exchange market, banking, the credit market, and more. In this context, the Bank of Israel is currently building a credit register that includes itemized information on the credit history of borrowers in the economy, and which will help the credit bureaus[1] in building models for the credit rating of borrowers. Based on this register, the Information and Statistics Department will manage a statistical database where the itemized information contained in it is not identified, for the Bank of Israel's internal uses in order to fulfill its legally mandated functions.

In order to enable access to the information, while also maintaining its confidentiality, the Bank of Israel is designing a process called "the anonymization of data files". The objective of the anonymization process is to protect the information so that it will not be possible to identify or expose the individuals whose data appear in the files, particularly information about them that is sensitive or confidential.[2] This process will relate to both data intended for use within the Bank—even though only a few economists within the Bank will be permitted to access them—and information that is permitted to be accessible to researchers from outside the Bank, subject to the privacy protection restrictions and maintaining commercial confidentiality.

A database containing itemized information naturally includes information that directly identifies the individual—a field that on its own exposes the identity of the individual even without needing additional information located in other fields. Examples of this include the identification number and full name of the individual. Therefore, a necessary condition for anonymizing the database is the deletion of all direct identifiers. However, this condition is not sufficient to protect the database, because even without this

1 The Credit Data Law, Section 16. This law will soon come into force.

2 The anonymization process described in this work does not relate to series that the Information and Statistics Department publishes on the Bank of Israel's website. Those series present aggregate, and not itemized, information.

information, it is sometimes possible to discover information on individuals by connecting a number of fields, or cross-referencing them with information from other databases the access to which is permitted. An individual can also be identified by searching for combinations that are not common among the relevant population, which are characteristic only of a particular individual or a small group of individuals.

The anonymization process begins with a precise definition of disclosure scenarios (see terms in Section 2). These scenarios include the possibilities available to users in order to expose information on individuals, and against which we want to be protected. With the given scenarios, we can use methods to blur the identification and protect the information. At the end of the process, we will have to assess the remaining risk and quantify the information that was lost as a result of the process. It is clear that there is a tradeoff between the extent of anonymization, meaning the extent of protection of the file, and the extent of usability of the data, since there is a loss of information.

This work will describe the anonymization process for itemized data, define the basic terms on the subject, present accepted methods for assessing the risk, and sample the implementation of the process on sample tables of data that include itemized information.[3]

2. TERMS THAT ARE RELEVANT TO THE ANONYMIZATION PROCESS

Statistical disclosure control – A general term describing the group of methods for reducing the risk of disclosure (hereinafter "disclosure") of individuals in the file. In general, the methods are divided into two: a. Perturbative methods (which add noise to the data); and b. Nonperturbative methods such as grouping categories of fields or deleting values from fields with higher than permitted risk and inserting missing values in their place.

Anonymization – A process in which an unprotected file becomes a protected file according to the protection level set out in advance through the statistical disclosure control.

Disclosure[4] - The disclosure of information that was not known and published beforehand regarding an individual through an information file that was distributed. There are three types of disclosure:

- **Identity disclosure** – Connecting the known identity of the individual, such as his name and surname, to a record in the file. When such a connection is made, the information in the other fields in the file of this individual is exposed. For instance: cross-referencing a record with two fields—the individual's identification name and monthly income—with a record from an external file where the individual's full name also applies (or with the personal information of the individual with the same identification number) will cause this individual's identity and monthly income to be exposed.

[3] In order to maintain simplicity and precision as much as possible, we will deal here with data that include all of the records of the relevant population ("census file") and not a sample file such as a survey that includes only some of the records of the relevant population, where the method of handling is more complex. We will also assume that the file does not have a hierarchical structure, a structure that is characteristic, for instance, of a data file that includes a variable that indicates the household to which the individual belongs.

[4] See, for instance, item [4] in the Bibliography.

Record from the income file	
Identification number	**Monthly income in shekels**
123456	**5,000**

Record from an external file	
Full name	**Identification number**
Yisrael Yisraeli	**123456**

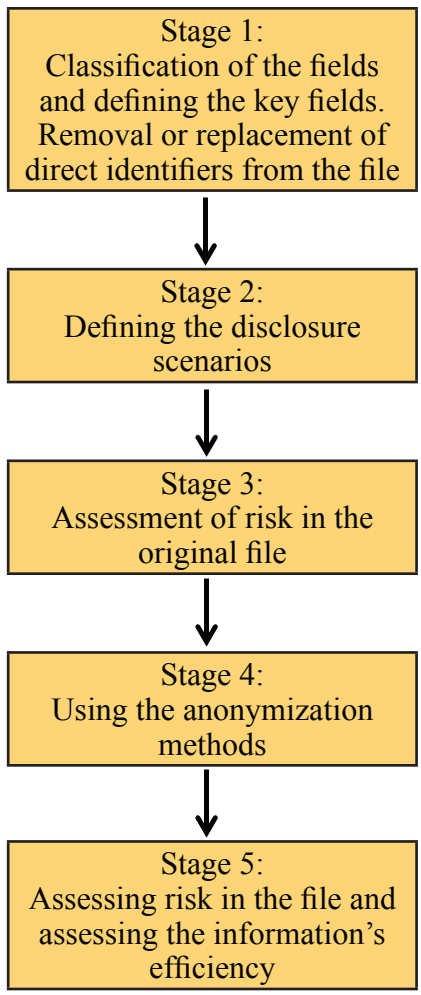
- **Characteristic disclosure** – Disclosing a particular characteristic of the individual even without connecting the individual's identity to a certain record. For instance: if the income of all individuals aged 70–74 in a particular file, with exception, is between 5000 and 10,000 shekels, we can know the income range of an individual whose age is within the age range included in that file, even without knowing his or her identity.

Gender	Age range	Range of monthly income in shekels
Male	**70–74**	**5,000–10,000**
Female	**70–74**	**5,000–10,000**

- **Statistical disclosure** – Identifying the characteristic of a person through a statistical analysis of the file. For instance: a too-precise guess—through a good forecasting model—of the income of a particular person, based on known characteristics of that person that appear in the file.

3. DESCRIPTION OF THE STAGES IN THE ANONYMIZATION PROCESS

Flowchart of the anonymization process



Stage 1: Classification of the fields and defining the key fields

Types of field—It is common to divide the fields in a file into three types. This division is not necessarily exclusive: A field can belong to more than one type.

- **Direct identifiers**—Fields that identify individuals in the file without using other fields. Examples of such fields are the identification number, the full name, and the precise address. Fields of this type are deleted from the file in the first stage of the anonymization process, or are replaced on a one-to-one basis with other fields that are not identifiers.

- **Key fields**[5]—Fields that can be cross-referenced with external information, such as those in the published or partially published census file, thereby exposing the identity of the individuals behind certain records in the file.
- **Sensitive fields**—Fields where, due to their sensitivity, it is prohibited that their values, regarding each of the individuals whose identity is known in the file, be disclosed. Examples of such fields are a person's state of health or income.

In addition to this division, the fields can be divided into two other types:

- **Categorical fields**—Fields that include a final number (generally a low number) of categories or values. This group can be divided into ordinal fields and nonordinal fields.
- **Continuous fields**—Numerical fields that can be the subject of arithmetical actions. These fields can obtain a large number of values.

Stage 2: Defining disclosure scenarios

Disclosure scenarios[6] are a group of assumptions that describe how a user, or another person exposed to the file, can expose information on individuals from within the file. For instance: A user can cross-reference the information from the file with other information he has through a number of common characteristics, or through information on an individual that he knows and he is aware that this individual is in the file. In that way, he can disclose additional sensitive information about that individual through the characteristics he knows.

The disclosure scenario can for the most part be summed up by determining groups of key fields through which information in the file can be cross-referenced with other external information (a file or personal knowledge), to discover information on individuals through combinations that are characteristic of only a few individuals in the file.

Setting disclosure scenarios is necessary to the anonymization process, since we are trying to protect the information from them. The assessment of the level of risk of information disclosure is also dependent on setting these scenarios, because it is not general, but relates to certain disclosure scenarios. The disclosure scenarios are determined with the help of experts in the relevant content worlds, who know how and through what means a user, or anyone with access to the information, can disclose information on individuals in the file. Even so, even experts in the content worlds do not know all of the information disclosure possibilities, and in certain cases, the tendency is therefore to assume the worst case scenario.

The disclosure scenarios can be less or more severe than the objective information disclosure possibilities, according to the disclosure policy that depends on how the data are used, the purpose of the use, the identity of the users, the severity of the damage inherent in disclosure, and so forth. In this context, it is common to distinguish between scientific use files, which are used by researchers under contract, subject to permissions and restrictions such as working within a physical research room or a virtual research room through remote access, and public use files that have no restriction or control. The policy regarding the information files issued to the public is generally very strict, and requires significant data processing.

5 See, for instance, item [7] in the Bibliography.
6 See, for instance, item [7] in the Bibliography.

Stage 3: Assessing the risk of disclosure in the file

As stated, the risk of disclosure relates directly to disclosure scenarios, meaning to groups of key fields (categorical or continuous) that are defined for a certain file. After the key field groups are defined, a number of risk indices can be addressed.

- **The risk of a record in a file**—the probability of matching a certain record in a file to a certain individual whose identity is known. In this context, a distinction should be made between categorical key fields and continuous key fields. In terms of a scenario in which categorical key fields are cross-referenced, there are two common requirements.
- **K-anonymity requirement**[7]—a requirement that in each combination of categorical key fields in groups that are defined in the disclosure scenario, there shall be at least K records with the same combination. In order to check this, a multi-dimensional table (or tables for each disclosure scenario) can be built, in which the number of cells is equal to the number of possible combinations. Based on this table, the disclosure probability of each record can be calculated. The purpose of this requirement is to protect against the disclosure of identity, because if a certain combination from the table relates to only one individual, that combination can be cross-referenced with the same combination in a different table with the same key fields, thereby disclosing the identity of the individual.
- **I-diversity requirement**[8]—another requirement that is meant to protect against disclosure of characteristics. Each cell in the frequency table may have enough records, but regarding a particular sensitive field, there is no variance among those records that belong to the same combination. The I-diversity requirement is that in all possible combinations there should be at least I different values. In a situation where there is no variance, it is enough to know which combination relates to an individual in order to identify that characteristic with certainty, even without knowing that the record relates to him.

The following table presents these two requirements through a simple example of a scenario in which there are only two key fields – gender and age:

Record	Key field 1 – Gender	Key field 2 – Age range	Frequency of the combination in the table	Sensitive field – interest rate (rounded) on the loan	Number of different values
1	Male	50–60	3	2%	2
2	Male	50–60	3	4%	2
3	Male	50–60	3	4%	2
4	Female	40–50	3	2%	1
5	Female	40–50	3	2%	1
6	Female	40–50	3	2%	1

7 See, for instance, item [7] in the Bibliography.
8 See item [5] in the Bibliography.

The table shows that the first individual (Record 1) belongs to a cell with the combination: gender=male; age range=50–60. There are three individuals in the table with this combination (Records 1–3). However, for the sensitivity variable, there are two possibilities (interest of 2% or 4%). All of the records in the table fulfill the 3-anonimity requirement, while only Records 1–3 fulfill the 2-diversity requirement.

- **Risk in continuous key fields**—regarding continuous key fields, we cannot build a frequency table, since most of the values appear only once. It is generally customary to assess the risk in these variables based on the extent to which record linkage is possible between the file where we changed the data on continuous variables, such as by adding noise, and the original file.
- **Global risk of each file**—an index that grades the risk level of the entire file, which is calculated on the basis of an aggregation of the disclosure probabilities of the records in the file. An example of such an index is the total disclosure probability in the file, which is equal to the expected value of the identifications in it.

Stage 4: Using the anonymization method

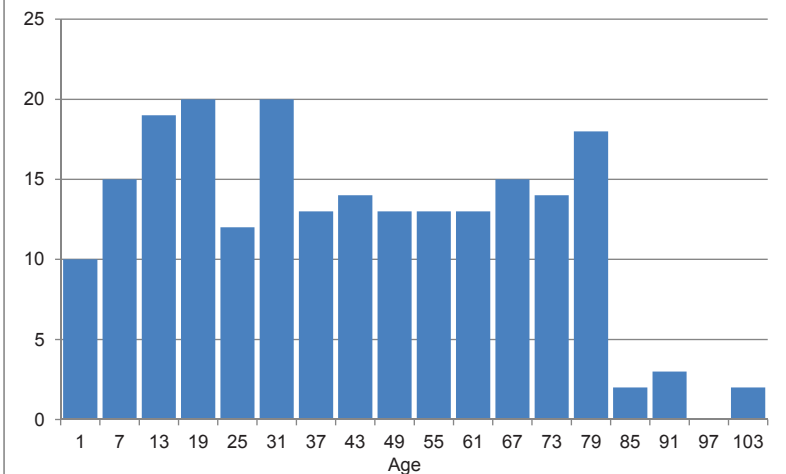
The following is an outline of a number of common anonymization methods:

- **Global recoding**—a method that reduces the level of information in the field and adjusts it to categorical fields and to continuous fields. For a categorical field, global recoding means attaching a number of categories to the common category. For instance, in the field for the individual's profession, the professions of statistician and mathematician can be consolidated into one common category if there are too few records in certain combinations of the key fields that include one of those categories. Another example is changing the age field into ranges of 5 or 10 years. Global recoding in a continuous field is basically replacing a continuous field with a categorical field. For instance, a field that is a loan amount can be replaced by a number of categories that are in ranges of NIS 100,000. The following table shows an example of global recoding of the income field (continuous).

Record number	Monthly income in shekels	Monthly income after recoding
1	8,365	Up to 10,000
2	16,569	10,000–20,000
3	100,200	100,000–200,000
4	5,750	Up to 10,000

- **Upper and lower recoding**—This method is a private case of global recoding, and deals with the tails of the distribution. For a continuous field, it gathers the extreme categories beyond the upper bound of one category, and the same can be done regarding low categories. In a continuous field, the method gathers all the values beyond the upper and/or lower bound of two categories—upper and lower—and in the rest of the range, the data are gathered as in the previous section. This method is appropriate for fields where there are few instances beyond a certain bound. The following figure shows an example of the distribution of the age field, where there are few individuals above age 80. If there are too few records at high ages in the combinations that include the age variable, this method allows us to collect all ages above age 80 into one category—80+.

Figure 1
Distribution of the Age Variable - Sample Data



- **Local suppression**—This method inserts missing values into certain fields of certain records, and is appropriate for categorical fields and not for continuous fields. When there are combinations of key fields where there are few records, a missing value can be inserted in one of the fields. The advantage of this method is that it deals only with records at high risk. On the other hand, it creates a lack of uniformity in a certain field, because a missing value appears in certain records in that field. The following tables shows an example of a local suppression and the insertion of a missing value (NA) in Record 4 regarding the combination of male gender and the 20–30 age range, a combination in which there is only one individual.

	Before local deletion		After local deletion	
Record	**Key field 1 – Gender**	**Key field 2 – Age range**	**Key field 1 – Gender**	**Key field 2 – Age range**
1	**Male**	**50–60**	**Male**	**50–60**
2	**Male**	**50–60**	**Male**	**50–60**
3	**Male**	**50–60**	**Male**	**50–60**
4	**Male**	**20–30**	**Male**	**NA**

- **Adding noise (additive)**[9]—This method changes the numeric values in the field, and is appropriate for continuous fields but not categorical fields. There are a number of accepted paths, two of which are presented below.
- Adding white noise (uncorrelated)—In this method, uncorrelated noise is added to a particular field, which we will label as X, as follows:

$$Z = X + \varepsilon$$

where ε is a vector of normally distributed and uncorrelated noises (white noise). It can be shown that this method maintains (proximately) the common mean and variance between every pair of variables, but does not maintain the variance or correlation coefficients. In particular, it increases the variance of the variables, while reducing the correlation, in absolute value, between each pair of variables, due to the added noise element.

- **Adding adjusted noise**—In this method, we randomize adjusted noise regarding a number of variables. It can be shown that in this method, the correlations between each pair of variables are maintained.

A common problem in adding additive noise is that for high and low values of the variable, noise of the same scale is added. This means that a relatively high value changes only slightly, while a low value changes greatly in relative terms. One way of solving this is to add multiplicative noise, which is proportional to the size of the value in the field, instead of additive noise. This method maintains various characteristics of the fields, such as mean and variance.

- **Micro-aggregation**[10]—A method that reduces the level of information in the field, and is mainly intended for continuous fields. This method can be used on one field or on a number fields simultaneously. It takes one field or a number of fields and divides the records into a number of groups with at least k records in each field. In each group, the value of the fields are replaced with the group average. The principle in the division is to create groups with maximum homogeneity within the group. This method ensures that the file that is distributed contains records that fulfill the k-anonymity requirements. To illustrate on one field, the following is a numerical table that divides the records into groups, each of which contains at least two records where the original values are replaced by the group average.

Record	Old value	New value
1	25	21.5
2	12	9
3	18	21.5
4	10	9
5	105	109
6	99	109
7	5	9
8	122	109

9 See, for instance, item [8] in the Bibliography.
10 See, for instance, item [3] in the Bibliography.

- **Post Randomization Method (PRAM)**[11]—A method that is appropriate for categorical fields. Categories within a certain set are replaced through a probability transition matrix with the probabilities of replacing values. We label the categorical variable in the original file as X and the new variable that is created as Y. We assume that the two variables have K similar categories 1,…k. The transition between the X variable and the Y variable is done through a transition matrix with a generic element that is defined for each {K…,1} = ji.

$$P_{i,j} = P(Y=j \mid X=i)$$

This expression presents the probability that category i will be changed to category j.

The following is an example of such a matrix that is appropriate for a field with three categories.

In this matrix, we can see that the probabilities on the main diagonal, meaning the probabilities that there will be no change in the category, are the highest. If this matrix is known, we can learn about the characteristics of the original variable, such as its mean and variance.

Matrix with the probabilities that the categories will be replaced			
	New category		
Original category	**1**	**2**	**3**
1	**0.8**	**0.1**	**0.1**
2	**0.05**	**0.9**	**0.05**
3	**0.1**	**0.3**	**0.6**

- **Creating a file with synthetic data**—A synthetic file is a file that contains data that are different from the original file, but which is built in a way that proximately maintains the statistical characteristics of the file, such as the marginal distribution of the fields and the correlations between the fields. Even though this method is not preferred by researchers, since they generally prefer access to real data, it can serve to calibrate researchers' models, and conduct trial and error in the absence of access to real data, such as for statisticians conducting anonymization who need a file with similar characteristics.

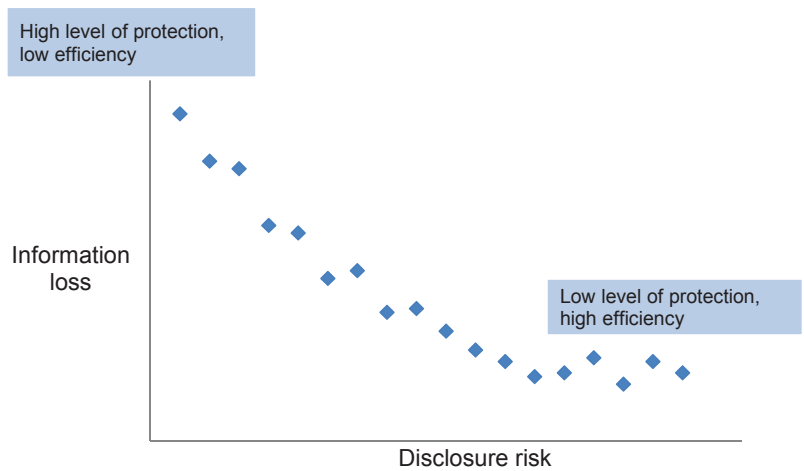
Even though all of the observations are different, this method does not always provide full protection for the file. Similar to a situation in which noise is added to data, it is common to assess the risk in a synthetic file—to what extent can there be record linkage between it and the original file.

[11] See, for instance, items [6] and [2] in the Bibliography.

Stage 5: Assessing disclosure risk in the file and maintaining information efficiency

Maintaining information efficiency and minimizing risk—The objective of the anonymization process is to make a protected file of data accessible so that it embodies a low risk of identification of the individuals, while at the same time, subject to that limitation, maintaining maximum information in the file (information efficiency/usability). There is a tradeoff between the level of information protection and its usability. The higher the level of protection, the greater the information loss (Figure 2).[12] The objective is to find the methods that will lead to the optimum tradeoff given the importance of information use and the damage that may be caused from identification. There are a number of methods for measuring the maintenance of information efficiency in the file, including a direct comparison between the data in the original file and the data after anonymization, and a comparison of calculated statistics (average, standard deviation, and so forth) between them.

Figure 2
Information Efficiency vs. Risk



[12] See item [4] in the Bibliography.

4. CONCLUSION

The Information and Statistics Department uses various complex methods, described above, to anonymize itemized data in a variety of content worlds for users of the information. An effective anonymization process protects the itemized data, while also maintaining the usability of the information even after some of it is lost. The extent of anonymization is determined in accordance with information disclosure scenarios that we want to protect against. Building these scenarios is a complex process that requires expertise in content and also takes into account the existence of complementary databases that are available to users and enable cross-referencing of information and identification of the individuals.

In an era in which information analysis is based more and more on powerful databases of itemized data, the Bank of Israel will have to continue conducting complex anonymization processes in order to allow for freedom of information for policy and economic research needs, while at the same time maintaining the confidentiality of the itemized information as required by law.

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Measuring the Country's External Debt

Tzahi Haham and Nili Yahalom*

The economy's gross external debt to abroad is defined as total liabilities to nonresidents through debt instruments in shekels and in foreign exchange.

Raising debt from nonresidents increases the economy's sources of financing, lowers the costs of raising debt, enables the economy to integrate into global markets, and supports economic growth. An analysis of external debt data shows the level of foreign exchange liquidity available to the economy, and the extent of its financial strength vis-à-vis abroad.

The Bank of Israel's Information and Statistics Department publishes data on the Israeli economy's external debt on a quarterly basis, according to the International Monetary Fund's guidelines. The Bank of Israel uses this information in its current analyses of trends in economic activity vis-à-vis abroad, and publishes the information as part of Israel's International Investment Position.

This work presents the main terms and definitions concerning external debt data, outlines how debt is measured and reported, and samples the main uses of this information, including an international comparison of main data.

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1. Introduction

The economy's gross external debt to abroad is defined as total liabilities (public, private, and banking sectors) to nonresidents through debt instruments in shekels and in foreign exchange.

Raising debt from nonresidents increases the economy's sources of financing, lowers the costs of raising debt, enables the economy to integrate into global markets, and supports economic growth.

The Bank of Israel's Information and Statistics Department publishes data on the Israeli economy's external debt on a quarterly basis, according to the International Monetary Fund's guidelines.[1] The Bank of Israel uses this information in its current analyses of trends in economic activity vis-à-vis abroad, publishes the information, and sends it to the Central Bureau of Statistics to build the economy's balance of payments data.

The gross external debt as a share of GDP, the mix of the debt, and its sectoral composition are important indicators of the level of liquidity available to the economy and of the extent of its financial robustness vis-à-vis abroad. A low debt enables the economy to lower the costs of raising capital, and contributes to strengthening its ability to withstand financial crises. For instance, it enables room for activity to increase debt during a financial crisis.

A low net external debt is an indication of the economy's ability to repay debt abroad. A high coverage ratio between short-term debt and short-term assets indicates a high level of liquidity and financial robustness.

Gross external debt as a share of GDP has declined in recent years, which reflects an increase in the GDP growth rate alongside a decline in the growth rate of debt. The decline in the gross external debt to GDP ratio in Israel is in stark contrast to the increase in this ratio among other OECD countries, mainly against the background of the Global Financial Crisis in 2008–09.

There was also a continued decline in net external debt—the surplus of liabilities over assets in debt instruments only—thanks to a marked increase in the balance of assets abroad, mainly foreign exchange reserves held by the Bank of Israel. At the beginning of the 2000s, net external debt even became negative, meaning that the economy is a net lender to abroad.

This article presents the main terms and definitions of the external debt data framework, outlines how debt is measured and reported, and samples the main uses of external debt data, including an international comparison of the main indicators.

[1] The BPM5 rules and the External Debt Guide that are subject to the National Accounts (SNA) calculation and distribution rules.

2. The data framework and definitions

2.1 Definitions

2.1.1 Debt instruments

Financial instruments created from the unconditional contractual liabilities of one institutional entity (the debtor) toward another institutional entity (the creditor) for future payment of principle or interest. Debt instruments include loans, cash, deposits, bonds, and commercial credit.

2.1.2 Residency

- Israeli resident[2]:
  1. An Israeli citizen, new immigrant, or holder of a permanent residency permit who, in the 12 months preceding the transaction, was in Israel continuously or noncontinuously for a period of more than 180 days.
  2. A corporation registered with the Registrar of Companies in Israel.
- Nonresident – Anyone not an Israeli resident.

2.1.3 External debt

- **Gross external debt**: The economy's total liabilities toward abroad in debt instruments in foreign currency or in Israeli currency.
- **External assets in debt instruments**: The economy's total financial assets vis-à-vis abroad in debt instruments. These assets include loans to nonresidents, deposits at banks abroad, foreign bonds, and any other financial instrument held abroad by Israelis.
- **Net external debt**: The surplus of liabilities over assets in debt instruments only. Net external debt is calculated as gross external debt minus foreign assets in debt instruments.

2.1.4 Tradability

- **Tradable external debt**: Debt instruments traded in the capital markets—government bonds backed by the US government, nonguaranteed government bonds, and corporate bonds.
- **Nontradable external debt**: Debt instruments issued abroad that are not traded on the capital markets—financial loans, owners' loans, suppliers' credit, Israel Bonds, and government loans.

[2] According to the International Monetary Fund (IMF), a resident is defined as a corporation or an individual whose center of economic activity is in the country, or who has resided in the country for more than one year. As part of measuring the Israeli economy's activity vis-à-vis abroad, residency is classified by the resident's place of incorporation or citizenship, due to data collection limitations.

2.2 Indices

Published external debt tables include information on the economy's outstanding debt vis-à-vis abroad, in various indices:

2.2.1 Sector

- **The public sector**: The government, the Bank of Israel, and the national institutions.[3]
- **The banking sector**: The commercial banking corporations, meaning banks that are not mortgage banks or investment banks, as defined by the Banking (Licensing) Law.
- **The nonbanking private sector**: Individuals, corporations and other institutional entities (such as institutional investors and mutual funds) that are not included in either the public sector or the banking sector.

2.2.2 Credit durations

- **Credit duration (term to repayment)**: The duration of time until the principle of the debt is paid off. In this article, we relate to the actual repayment date[4] of the debt instrument, which includes the remaining principle to be paid.
- **Short-term debt instrument**: An instrument with a repayment range of up to one year.

2.2.3 Balances, transactions, exchange rate differentials, and price and other adjustments

- **The balances of external debt** include the principle and accumulated interest (the interest costs accumulated and not yet paid).
- **Transactions in external debt** include net flows (such as the provision of loans minus repayments) in financial debt instruments.
- **Exchange rate differentials and other adjustments**: Exchange rate differentials present the changes in debt balances in instruments that are not denominated in dollars, in respect of translation differentials. Other adjustments present additional changes in the balances, such as changes in the prices of securities, accumulation of interest, and residency changes.

The table below samples a combination of main indices (instruments, sectors and credit durations) in the data on external debt to nonresidents for 2016 and for the second quarter of 2017. It shows that most of the debt of the nonbanking private sector is concentrated in financial loans, most of the external public debt is concentrated in government bonds, and most of the banking system debt comes from deposits by nonresidents.

3 Keren Hayesod, Jewish National Fund, Jewish Agency, and the World Zionist Organization.

4 The repayment date can be measured as the original repayment date or as the actual repayment date. The original repayment date is the repayment date at the time the debt instrument is issued, and the actual repayment date is the repayment date during the reviewed period.

Table 1: Israel's Outstanding Gross External Debt, by Original Debt Period, by Sector and by Instrument
(End of Period, $ million)

		December 2016			December 2017		
	Source of debt	Up to 1 year	More than 1 year	Total	Up to 1 year	More than 1 year	Total
1	Public sector	1,560	26,463	28,023	1,074	30,848	31,922
	Foreign governments and international institutions	81	1,586	1,667	0	1,679	1,679
	Tradable bonds backed by the US government	210	9,749	9,959	0	9,324	9,324
	Nonguaranteed tradable bonds	295	11,347	11,642	1,074	14,809	15,883
	Israel Bonds	965	3,670	4,635	0	4,909	4,909
	Others	9	111	120	0	127	127
2	Nonbank private sector	20,702	24,518	45,220	20,787	22,511	43,298
	Financial loans	1,929	10,930	12,859	950	8,547	9,497
	Bonds	-2	6,638	6,636	0	5,913	5,913
	Owners' loans	1,226	6,950	8,176	895	8,051	8,946
	Suppliers' credit	17,549	0	17,549	18,942	0	18,942
3	Banking system liabilities abroad	12,603	1,886	14,489	12,169	1,826	13,995
	Deposits from banks abroad	2,581	825	3,406	2,019	818	2,837
	Nonresidents' deposits	10,022	1,061	11,083	10,150	1,008	11,158
4	Total gross external debt (1+2+3)	34,865	52,867	87,732	34,030	55,185	89,215

3. The measurement and presentation of external debt

The economy's gross external debt can be derived from its assets and liabilities vis-à-vis abroad[5] (International Investment Position—IIP), which provides a combined view of the financial activity between the economy and abroad.

Israelis' investments in foreign assets are the economy's assets abroad, and nonresidents' investments in Israeli assets are the economy's liabilities.

The IIP report details the economy's assets and liabilities at a point in time, and explains the change between the opening balance and the closing balance. The change is explained by transactions in the economy's financial assets and liabilities vis-à-vis abroad in a particular period, and through the other differences between the balances that are not explained by transactions, such as exchange rate differentials, price differentials and other adjustments.

The economy's gross external debt to abroad is the balance of liabilities in debt instruments only.

3.1 Data sources

External debt data are obtained from various sources according to the activity sector and debt instrument: the Ministry of Finance, the Central Bureau of Statistics, reports from the institutional investors, direct reports from the banks regarding bank debt, direct reports[6] from companies and individuals about their activity vis-à-vis nonresidents pursuant to the Bank of Israel Order, and indirect reports from the banks regarding private sector holdings on the domestic stock exchange and of nontradable debt instruments.

3.2 Measurement

3.2.1 Measurement principles and basic assumptions

External debt is measured in US dollars. Balances denominated in other currencies are translated into dollars according to the representative exchange rate at the end of the measured period.

The measurement of external debt includes both the principal and accumulated interest. The measurement is according to the nominal value of the debt (the balance of the denominated amount for repayment plus indexation differentials).

Several assumptions are used during the measurement of external debt:

- There is no early realization, expansion of the amount raised, delay of repayment, debt reorganization, or other changes in the terms of the debt after its issuance.
- Nontradable external debt (debt instruments issued abroad) are held in full by nonresidents.

[5] For more information on the IIP: http://www.boi.org.il/en/DataAndStatistics/Pages/MainPage.aspx?Level=2&Sid=27&SubjectType=2

[6] For more information regarding the forms for reporting to the Bank of Israel (in Hebrew): http://www.boi.org.il/he/DataAndStatistics/Pages/ReportingForms.aspx

3.2.2 Main calculations

Measuring the balances

The economy's external debt balances are measured through an aggregate calculation of itemized information obtained from various information sources and adjusted to the International Monetary Fund guidelines.

- **Tradable external debt** (liabilities toward nonresidents) is estimated as the balance of total debt instruments issued by Israelis minus the instruments held by Israelis—institutional investors, domestic banks and the domestic private sector. This balance is estimated at market value.
- N**ontradable external debt** is estimated, according to the guidelines, as the balance of total nontradable debt instruments issued by Israelis.

Measuring transactions

- In the absence of direct reports on transactions, most of the measurement of transactions in the external debt of the nonbank private sector and of the banking sector is calculated as the difference in balances.
- Transactions in the external debt of the public sector are measured in accordance with repayment estimates (repayment tables) based on itemized information obtained at the time of issuance[7] after methodological adjustments to the data on debt reported by the Ministry of Finance.[8]

Calculating credit durations

Calculation of the credit durations on outstanding external debt is based on the repayment dates reported by the various information sources. An instrument with a repayment date within one year is defined as a short-term debt instrument (current debt).

In cases where the credit duration is unknown:

- The credit duration of owners' loans and financial loans is estimated assuming that 85 percent of the debt is repaid within a period of more than one year (medium-long credit duration).
- The credit duration of suppliers' credit is estimated on the assumption that it is repaid in full within one year (short credit duration)

Calculating the repayment forecast

The calculation of the repayment forecast for external debt includes the forecast of payment of the principal and interest by sector, excluding the banking sector. The payment forecast is calculated according to repayment tables, which are for the most part estimated on the basis of itemized information obtained at the time of issuance.

The repayment forecast is calculated on a cash basis—the interest is calculated according to payment dates set out at the time of issuance, and does not accumulate during the period.

[7] Excluding the estimate on the issuance of Israel Bonds, which is made according to Ministry of Finance data on monthly issuances and various assumptions regarding repayment dates, interest rates, and currency.

[8] Including SDR liabilities toward the International Monetary Fund and adjustments of the debt of binational funds and the including national institutions, in accordance with IMF guidelines.

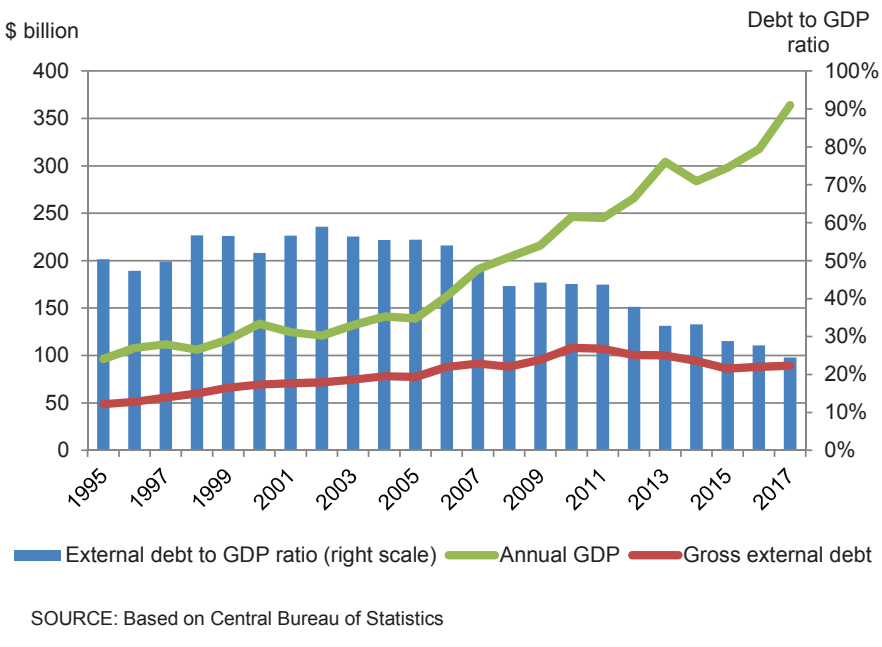
4. Using data on external debt

This chapter samples the possible uses of data on external debt. These uses provide a helpful tool for economic analysis of the state of liquidity in the economy and its robustness vis-à-vis abroad.

4.1 Israel's gross external debt, and international comparison[9]

- The gross external debt to GDP ratio declined from about 55 percent in 1995 to about 25 percent in 2017, mainly due to the accelerated growth of GDP concurrent with the significant slowdown in the growth rate of debt (Figure 1).

Figure 1
Gross External Debt and its Share of Israel's GDP, 1995–2017

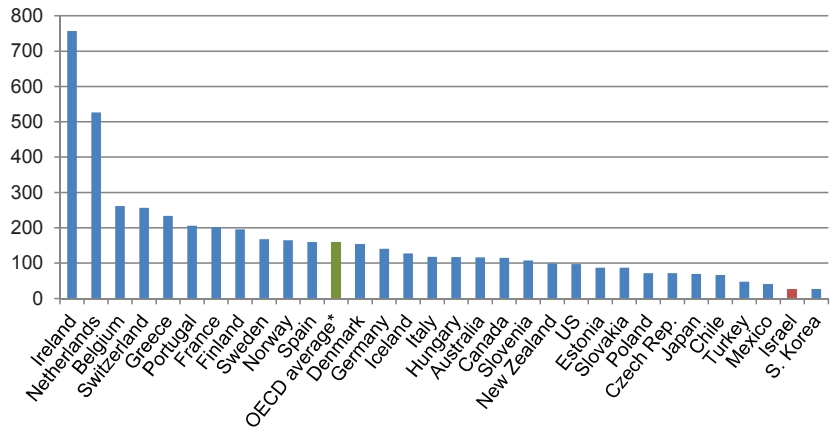


SOURCE: Based on Central Bureau of Statistics

[9] The international comparison presented in this work relates to 2016.

- By international comparison, Israel's gross external debt to GDP ratio is lower than that of most other OECD countries. The average ratio among OECD countries was 159 percent at the end of 2016 (Figure 2).

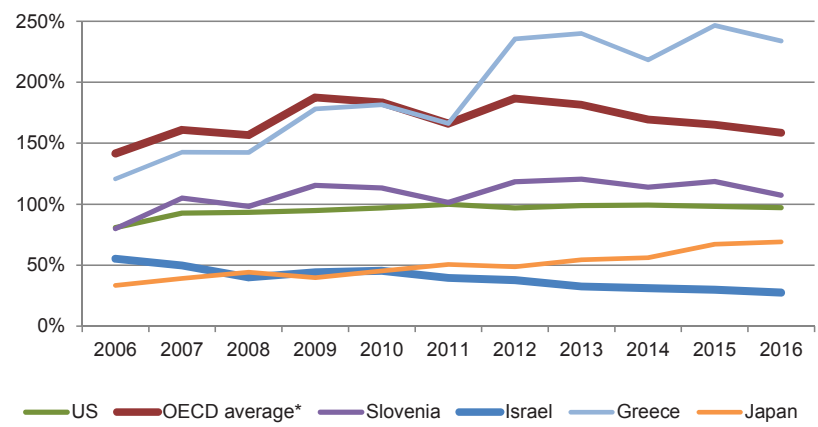
Figure 2
Gross External Debt to GDP Ratio, December 2016 (percent)



* The OECD average does not include Luxembourg, where the debt to GDP ratio is a statistical outlier.
SOURCE: Based on Bloomberg.

- When comparing the development of Israel's gross external debt to GDP ratio with that of other OECD countries between 2006 and 2016, the decline in Israel's ratio is prominent compared with the increase in the ratios of the comparison countries, mainly due to the Global Financial Crisis of 2008–9 (Figure 3).

Figure 3
Gross External Debt to GDP Ratio, 2006–16 (percent)

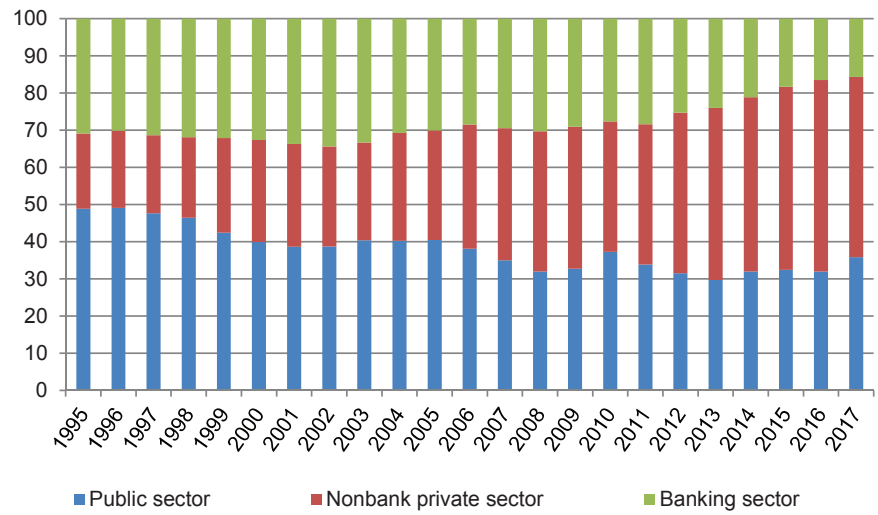


* The OECD average does not include Luxembourg, where the debt to GDP ratio is a statistical outlier.
SOURCE: Based on Bloomberg.

4.2 Distribution of gross external debt by sector

- A breakdown of external debt by sector indicates a marked increase in debt by the nonbank private sector as a share of total gross external debt from about 20 percent in 1995 to about 50 percent in 2016. This increase was a result of this sector's increased outstanding debt, from about $9.8 billion in 1995 to about $43.3 billion in 2017, inter alia against the background of the economy's openness to abroad and an increase in imports (Figure 4).

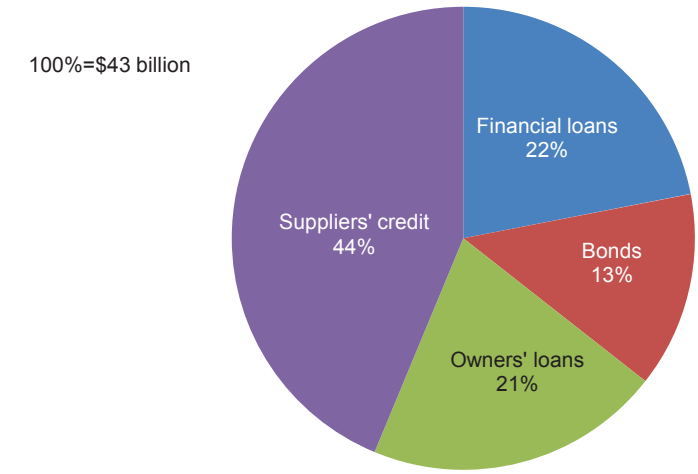
Figure 4
Composition of Gross External Debt by Sector, 1995–2017 (percent)



SOURCE: Bank of Israel.

- Public sector debt as a share of total gross external debt declined from about 49 percent in 1995 to about 36 percent in 2017, despite the increase in this sector's outstanding debt. The balance of this debt reached about $32 billion in the past decade, an increase that resulted mainly from the increase in outstanding government bonds.

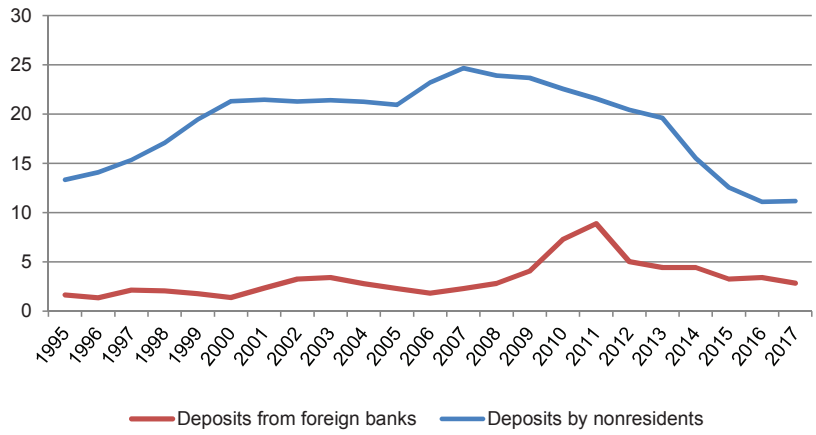
Figure 5
Outstanding Gross External Debt of the Nonbank Private Sector, by Instrument, 2017:Q4



SOURCE: Bank of Israel.

- **The nonbank private sector**—The outstanding gross external debt of the nonbank private sector is comprised mostly of suppliers' credit and financial loans. Alongside the increase in the outstanding debt of this sector since 1995, the mix of debt remains virtually unchanged.
  - **The banking sector**—The outstanding gross external debt of the banking sector is comprised mostly of deposits by nonresidents (foreign exchange). The balance of nonresidents' deposits in Israeli banks increased until 2007. Since then, there has been a marked trend of withdrawals from those deposits. This trend accelerated in the past four years (Figure 6), inter alia due to more stringent foreign investment reporting requirements in the United States (FATCA 2003).

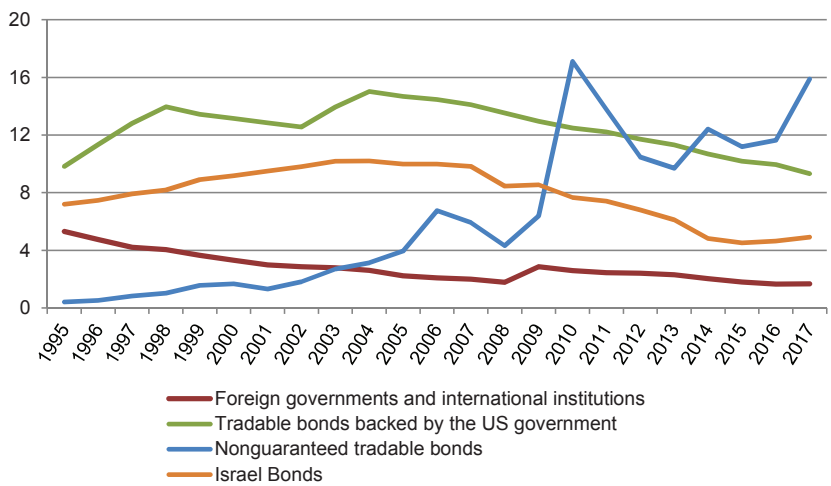
Figure 6
Outstanding Gross External Debt of the Banking System, by Instrument, 1995–2017 ($ billion)



SOURCE: Bank of Israel.

- **The public sector**—A breakdown of the public sector's gross external debt by instrument shows a continued increase in tradable nonguaranteed bonds. At the beginning of the reviewed period, the balance of tradable bonds—both those backed by the US government and those that are not guaranteed—increased. Following the Global Financial Crisis of 2008–9, due to the decline in interest rates on world markets, the balance of guaranteed tradable bonds declined sharply, as a result of the halt in raising debt in this channel. In parallel, there was a marked increase in nonguaranteed bonds (Figure 7).

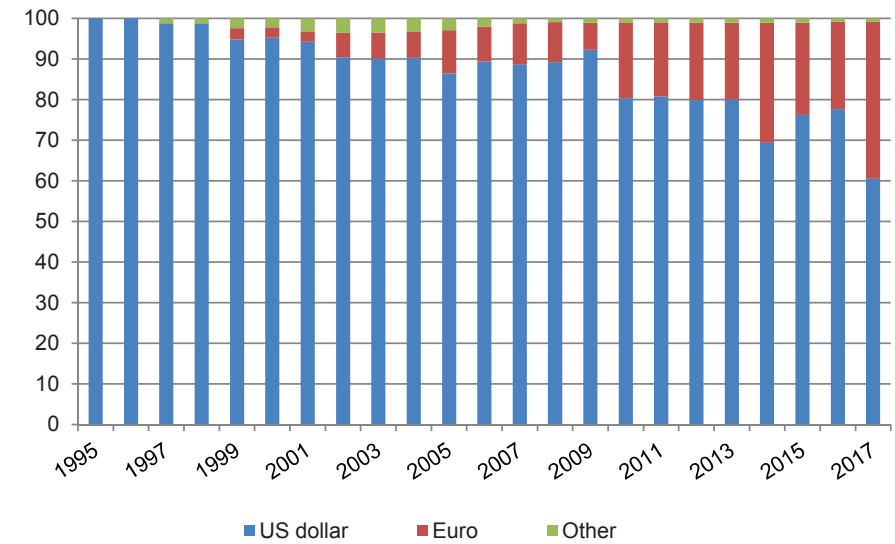
Figure 7
Outstanding Gross External Debt of the Public Sector, by Instrument, ($ billion)



SOURCE: Bank of Israel.

- The currency composition of the public sector's tradable debt changed over time, following the first issuance of nonguaranteed euro bonds in 1997. In 2005, the issuance of bonds backed by the US government (in US dollars only) was halted, and nonguaranteed bonds began being issued alternately in euros and in US dollars. In 2017, there were two issuances in euros totaling €2.25 billion (Figure 8).

Figure 8
Currency Composition of the Public Sector's Tradable External Debt, 1995–2017 (percent)



SOURCE: Bank of Israel.

4.3 Gross and net external debt

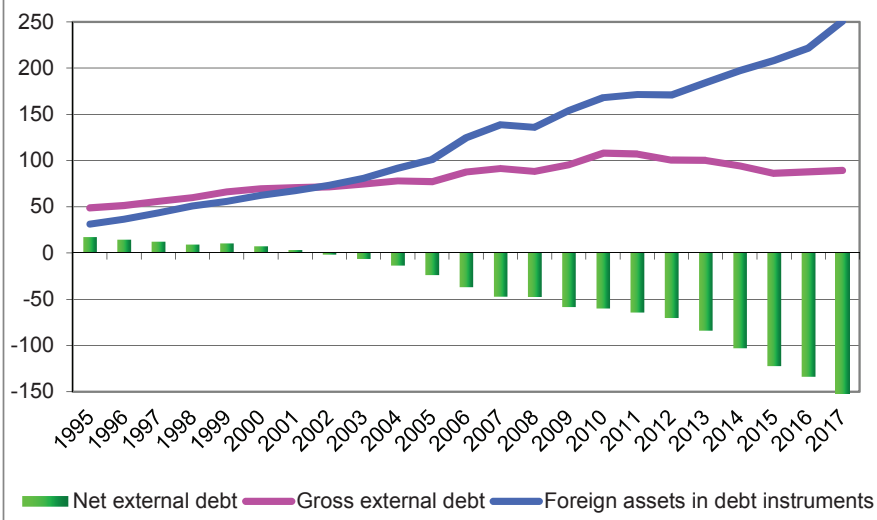
The following table shows Israel's assets and liabilities vis-à-vis abroad in debt instruments. The table summarizes outstanding liabilities by nonresident borrower sector and outstanding assets by lender sector toward abroad divided into credit durations.

Table 2: Israel's External Debt: Gross, Net and Forecast of Actual Repayment
(balances, $ million)

			Repayment/ Realization			Repayment/ Realization	
		Total balance 31.12.16	Within 1 year	Beyond 1 year	Total balance 31.12.17	Within 1 year	Beyond 1 year
Israel's gross external debt to abroad							
1	Public sector	28,024	1,561	26,463	31,921	2,376	29,545
2	Nonbank private sector	45,220	20,702	24,518	43,927	21,710	21,587
3	Banking system	14,489	12,603	1,886	13,995	12,169	1,826
4	Total gross external debt (1+2+3)	87,733	34,866	52,867	89,213	36,255	52,958
	(Percentage)	100	40	60	100	41	59
Israel's assets abroad (debt instruments)							
5	Public sector	101,415	101,415	0	115,691	115,691	0
6	Nonbank private sector	89,918	27,544	62,374	100,652	28,392	72,260
7	Banking system	30,147	19,153	10,994	34,591	21,633	12,958
8	Total assets abroad (5+6+7)	221,480	148,112	73,368	250,934	165,716	85,218
	(Percentage)	100	67	33	100	66	34
Israel's net external debt to abroad							
9	Public sector (1-5)	-73,391	-99,854	26,463	-83,770	-113,315	29,545
10	Nonbank private sector (2-6)	-44,698	-6,842	-37,856	-57,355	-6,682	-50,673
11	Banking system (3-7)	-15,658	-6,550	-9,108	-20,596	-9,464	-11,132
12	Net external debt (4-8)	-133,747	-113,246	-20,501	-161,721	-129,461	-32,260

- Israel's external assets in debt instruments increased in recent years, mainly due to a marked increase in foreign exchange reserves held by the Bank of Israel. The growth rate of foreign assets exceeded that of outstanding gross external debt, resulting in a continued decline in net external debt (surplus liabilities over assets in debt instruments only). At the beginning of the 2000s, net external debt even became negative, meaning that the economy is a net lender to abroad (Figure 9).

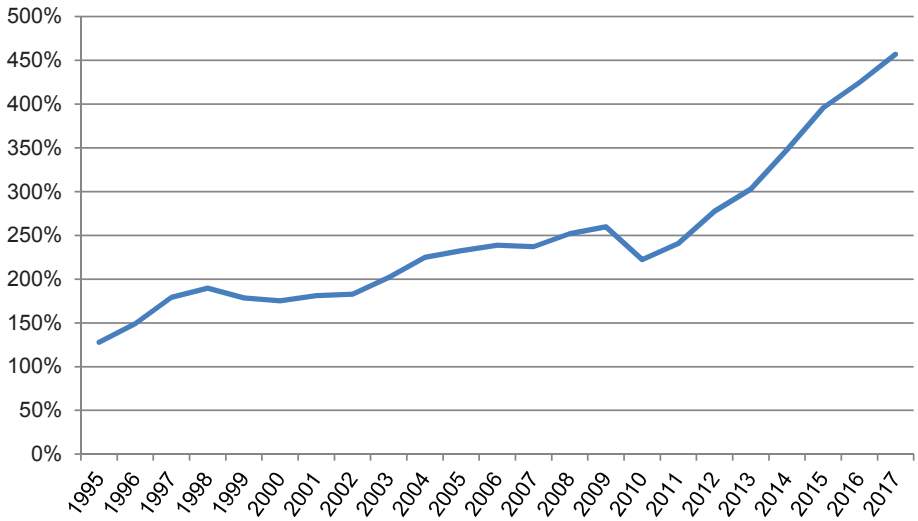
Figure 9
Net External Debt*, 1995–2017 ($ billion)



* External debt minus Israel's assets abroad in debt instruments (excluding share capital).
A negative value means the economy is a net lender to abroad.
SOURCE: Bank of Israel.

- The coverage ratio of short-term gross external debt by short-term debt assets shows that the economy has a high level of liquidity available to it, and is financially robust. This coverage is characterized by a constant upward trend, and at the end of 2017, it reached coverage of close to 5 times, mainly due to an increase in the foreign exchange reserves held by the Bank of Israel. The upward trend in this ratio has even accelerated since 2010, when the ratio was just two times (Figure 10).

Figure 10
Coverage Ratio between Debt Assets and Short-Term Gross External Debt, 1995–2017



SOURCE: Bank of Israel.