



Bank of Israel

Investment of the Foreign Exchange Reserves

Annual Report 2019

Contents

Main developments

A. The Level of the Foreign Exchange Reserves

B. The Framework for Managing the Foreign Exchange Reserves

1. Objectives of holding the reserves and the guidelines for managing them
2. The risk level of the reserves
3. The basic benchmark, the strategic allocation, and the actual allocation

C. The Holding Rate of Return on the Reserves

1. Economic and financial background conditions
2. Return on the reserves portfolio

D. Active Management Contribution—the excess return over the basic benchmark

1. Equities
2. Corporate bonds
3. Duration and diversification
4. Spread assets

E. Measures of Risk and Risk-Adjusted Returns

1. Volatility of the reserves portfolio, the active management, and the CVaR measurement
2. The risk-adjusted contribution of active management

Appendix 1: The global economic and financial environment

Appendix 2: Foreign exchange reserves: investment policy guidelines

Appendix 3: Glossary

Box 1: The strategic allocation of the reserves portfolio

Main developments

Level of the reserves	Israel's foreign exchange reserves totaled \$126 billion at the end of 2019, an increase of \$10.7 billion over the course of the year. The level of the reserves relative to GDP remained within the stable range that has prevailed since 2009, increasing slightly to 31.9 percent in 2019.
Sources of the change in the reserves	Most of the increase in the reserves was due to profits, revenue, and rate differentials (mark to market) totaling \$6.3 billion, and to the Bank of Israel's foreign exchange purchases as part of the Bank of Israel's monetary policy, totaling \$3.9 billion.
Composition of assets in the reserves	As part of the asset allocation for 2019, risk assets in the reserves portfolio were increased—equities were increased to 15 percent, and corporate bonds were increased to 8 percent. At the end of 2019, 64.9 percent of the reserves were invested in government assets, 11.8 percent in spread assets, 15.1 percent in equities, and 7.7 percent in corporate bonds.
Financial conditions	The financial conditions were supportive of the portfolio's performance. The yield to maturity on US dollar-denominated bonds, which account for the largest part of the reserves, declined, accompanied by an increase in the prices of risk assets, equities, and corporate bonds.
Return on the portfolio	The rate of return on the reserves portfolio in 2019 was 6.1 percent in terms of the numeraire, which is a basket of currencies, primarily comprised of the dollar and euro. Over the past three years, the rate of return has averaged 3.1 percent per year, and over the past five years, it has averaged 2.3 percent per year.

Table 1
Rate of return on the foreign exchange reserves portfolio, annual and multiyear perspectives, annual terms

	2019	3 Year	5 Year
Actual portfolio return	6.12	3.08	2.29
Benchmark return	1.54	0.96	0.64
Excess return	4.59	2.12	1.65

Contribution of active management	The contribution of active portfolio management, the excess return over the risk-free portfolio (the basic benchmark), was 4.6 percent. Equities made the most significant contribution among risk assets—3.4 percent. Duration also made a prominent contribution—0.9 percent.
Changes in guidelines	Following the increase in the level of the reserves in recent years, the Monetary Committee approved a change in the investment guidelines at the beginning of 2019, in order to give a greater weight to the goal of maintaining purchasing power also in the medium term. The maximum risk level, CVaR(5%) to a one-year horizon, was raised from 400 basis points to 475 basis points, and the maximum share of investment in equities was raised from 15 percent to 17.5 percent (for more

information see Box 1 of the [Report on the Investment of Israel's Foreign Exchange Reserves for 2018](#)).

Risk level in the portfolio Even though the share of investment in risk assets in the portfolio increased, the volatility of the portfolio in 2019 was less than in the previous year, due to the decline in the volatility of the equity markets.

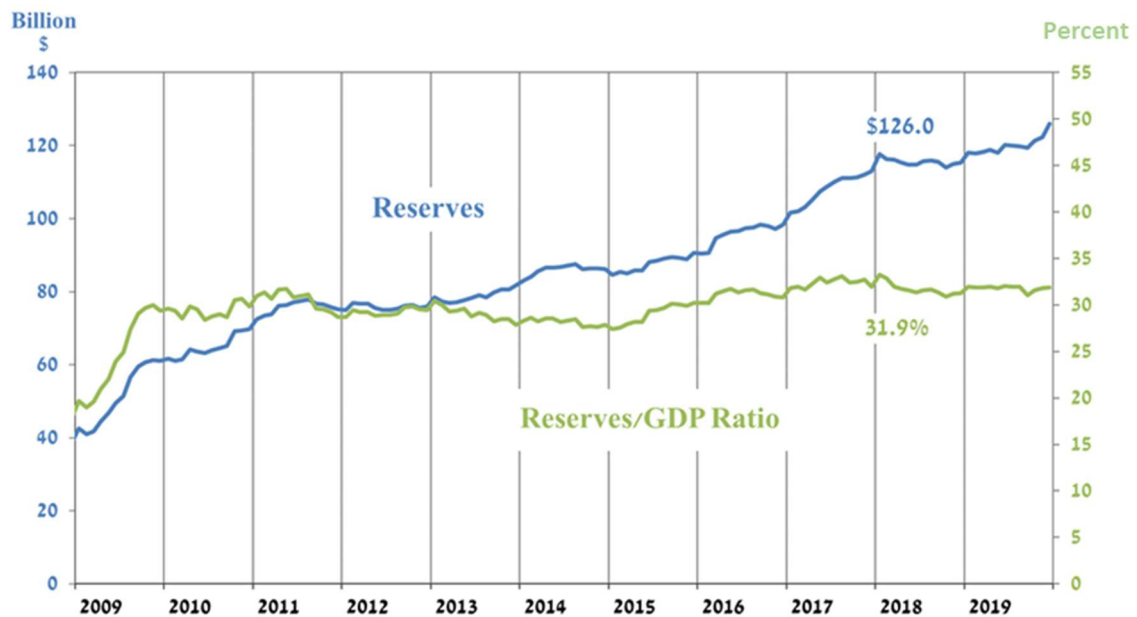
Coronavirus crisis At the beginning of 2020, there was a sharp slowdown in real economic activity and an increase in risks due to the outbreak of the coronavirus. In the financial markets, this was reflected in sharp price declines in equities and corporate bonds, sharp declines in yields on government bonds in the US and Germany, and a sharp increase in volatility of all financial assets.

The sharp declines in equity prices led to losses in the reserves portfolio, some of which were offset by capital gains as a result of declining yields on government bonds. Thus, the loss in the reserves portfolio as of the writing of this report does not exceed the maximum risk level. At this stage, it is difficult to know what the effect of the crisis will be on the financial markets or on the reserves portfolio by the end of 2020. The coronavirus crisis illustrates the importance of a multiyear assessment of returns in the reserves portfolio, which reflects a multiyear average positive return on the investment in risk assets, despite the risk of losses in the short term.

A. The Level of the Foreign Exchange Reserves

In 2019, Israel's foreign exchange reserves grew by \$10.7 billion, from \$115.3 billion at the end of 2018 to \$126 billion at the end of 2019 (Figure 1).¹

Figure 1
The Level of Israel's Foreign Exchange Reserves, and the Ratio of the Reserves to GDP, 2009–19 (month-end balance)



Source: Bank of Israel

The increase in the reserves was mainly a result of two factors—a mark to market of \$6.3 billion and \$3.9 billion in foreign currency purchases by the Bank of Israel (Table 2). The mark to market is the change in the dollar value of the reserves attributed to profits realized from interest income, capital gains, and the change in value from asset price differentials and exchange rate differentials, against the dollar, of currencies in which the reserves are invested. This year, there was an increase of approximately \$3.3 billion in the revaluation account due to an increase in the value of the equities and due to capital gains in bonds deriving from declines in yields. An additional \$3.0 billion was added to that from interest income and realized capital gains. Government deposits added \$0.5 billion to the reserves.

¹ The level of the reserves throughout the Report includes the International Monetary Fund's allocations of SDRs and the balance of Israel's reserve tranche in the IMF. At the end of 2019, their combined level was approximately \$1.8 billion. For more on this issue, see "Bank of Israel Financial Statements for 2019" (forthcoming).

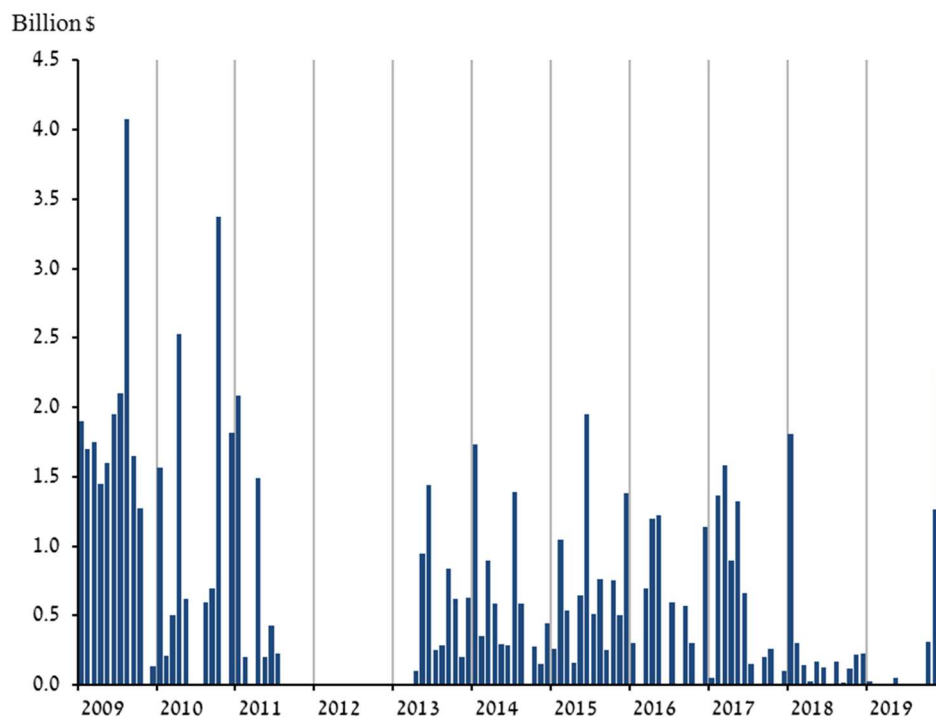
Table 2
Components of the Change in the Reserves, 2019
(\$ million)

FX Purchase	3,936
Mark To Market	6,341
Private Sector	-41
Government	507
Total Change	10,743

Source: Bank of Israel

Purchases by the Bank of Israel this year were carried out as part of the Bank of Israel's monetary policy² and were similar in scope to the purchases in 2018 (\$3.3 billion) (see Figure 2).

Figure 2
Bank of Israel Foreign Exchange Purchases, January 2009–December 2019



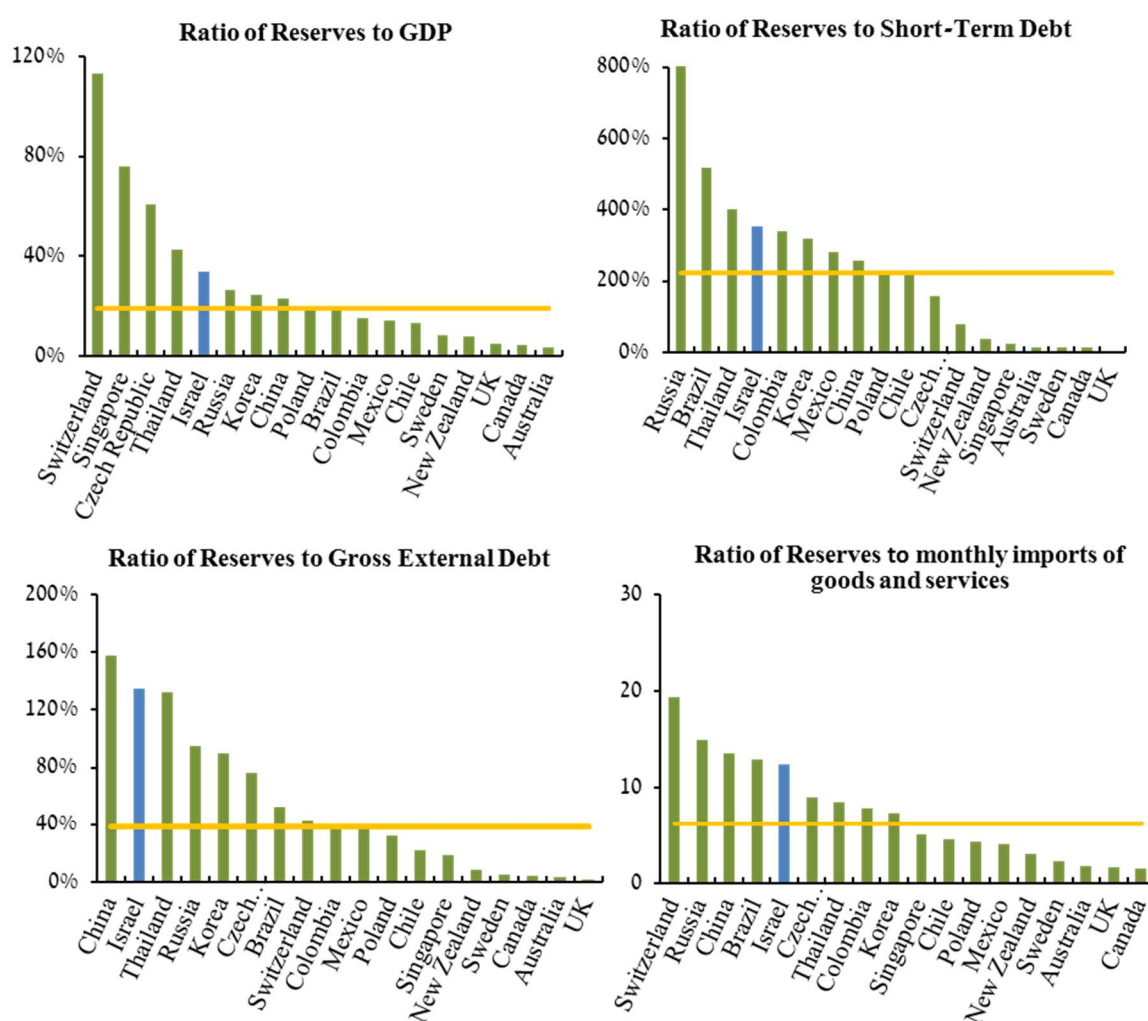
Source: Bank Of Israel

² See Box on "Exchange rate policy at the Bank of Israel: Reasons, outcomes and decision-making process" available at <http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Pages/IMF201602h.aspx#>

The level of the reserves relative to GDP remained at around the stable level it has been at since 2009, increasing this year by approximately 0.6 percentage points, to 31.9 percent. This is a result, as noted, of the positive mark to market and of monetary policy measures (foreign exchange purchases). The reserves level at the end of 2019 was higher than the upper bound of the appropriate level³ that was established, of \$70–110 billion.

Reserves are commonly measured relative to economic aggregates: GDP, the economy's short-term debt, imports, and external debt. It can be seen that the ratio of reserves to economic aggregates for Israel is higher than the median when comparing with other countries, but remained unchanged from previous years (Figure 3).

Figure 3
The Ratio of the Reserves¹ to Economic Aggregates, Israel and Selected Countries



¹Level of reserves as of 31.12.2019 and the economic aggregates as of 31.12.18.

Source: Central Bureau of Statistics, International Monetary Fund, World Bank, and Bank of Israel

³ The appropriate level of the reserves is determined by the Governor in accordance with the objectives of holding them, based on the principles established by the Monetary Committee. See Appendix 2 of the Investment of the Foreign Exchange Reserves report for 2017—Principles for determining the desired level of the foreign exchange reserves.

B. The Framework for Managing the Foreign Exchange Reserves

1. Objectives of holding the reserves and the guidelines for managing them

According to the **Bank of Israel Law, 5770–2010**, one of the Bank's functions is to hold and manage the country's foreign exchange reserves. The Monetary Committee, headed by the Governor, and whose members include representatives of the public, was granted the authority to establish the **guidelines for the investment policy of the reserves** (Appendix 2), in consultation with the Minister of Finance, and to monitor the implementation of this policy.

The **investment guidelines** include the specification of the assets permitted for investment, the risk profile, and the quantitative and qualitative limitations on types of assets permitted for investment. It should be emphasized that the guidelines do not constitute a recommendation for the actual proportion of investment in these assets. The actual proportion of investment is determined in the annual strategic allocation process, and by deviations from this allocation within the framework of degrees of freedom granted to the Markets Department by the Monetary Committee. The strategic allocation is determined subject to the level of risk set by the Committee, and based on assessments of the expected conditions in the relevant financial markets (see Section 3 of this chapter for further discussion of the allocation process).

Countries hold foreign exchange reserves for three main purposes:

- To provide the economy with sufficient foreign currency for an emergency situation (such as war or natural disaster). In such instances, it may be necessary to maintain imports or to increase them rapidly and markedly in order to deal with the emergency, while exports are liable to be severely negatively impacted, thus reducing the inflow of foreign currency. In these circumstances, the government and the private sector will find it difficult to raise foreign currency abroad, and the foreign exchange reserves will become the country's main source for financing in foreign currency.
- To enable the central bank to intervene in the foreign exchange market in the following circumstances: (1) the foreign exchange rate has deviated from the range that is consistent with the economy's fundamental equilibrium; or (2) the foreign exchange market is not functioning properly (market failure).
- To enable the central bank to operate in the foreign exchange market in order to moderate the effect of significant capital flows of either nonresidents or domestic residents, which are liable to undermine the stability of the financial markets, thereby negatively impacting the stability of the economy as a whole (a specific case of the previous purpose).

In order to achieve these goals, the investment of the reserves is carried out according to the following three basic principles:

- Maintaining the purchasing power of the reserves;
- Managing the reserves at a high level of liquidity;
- Achieving a suitable holding rate of return on the reserves portfolio, as long as this does not interfere with achieving the previous objectives (as detailed in Appendix 2—Foreign Exchange Reserves: Investment Policy Guidelines).

2. The risk level of the reserves

The maximum level of risk in the reserves portfolio (the risk profile) is set by the Monetary Committee according to its assessment of the risk that is appropriate for the reserves holding objectives, and is defined as the maximum loss in the reserves that the Committee is willing to accept, without adversely affecting the attainment of the objectives for which they are held. Its

objective is to limit in advance the reserves' exposure to the various financial risks – price risk, credit risk, currency risk, and liquidity risk.

The risk measure CVaRp (Conditional Value at Risk) is used to quantify the level of market risk (price risk and currency risk). It measures the risk in terms of the expected loss on the investment portfolio in a specific time period and given a certain probability (p). It should be noted that CVaRp is an ex ante indicator, affected by changes in the portfolio holdings and the volatility of its assets, but is based on the past level of volatility.

In the guidelines, the Monetary Committee set the maximum level of risk for the reserves, so that given the worst 5 percent of possible outcomes, the average loss in a one year horizon—the CVaR_{5%}—would not be greater than 475 basis points.⁴ This risk level was set with the goal of limiting the short term risk and increasing the probability of achieving the goal of maintaining the purchasing power of the reserves in the medium term. The Monetary Committee continually evaluates the conditions under which the level of risk was set, and is likely to change this level if material changes occur in these conditions.

At the beginning of every year, the Monetary Committee sets the level of risk (in terms of CVaR_{5%}) used to determine the strategic allocation for that year, based on the expected macroeconomic and financial background conditions. For 2019, the Committee chose a level of risk of 300 basis points, which is lower than the maximum risk level established in the guidelines.

3. The basic benchmark, the strategic allocation, and the actual allocation

The management of the Bank of Israel's foreign exchange reserves portfolio, like that of other investors worldwide, uses a **benchmark** as a reference point for measuring returns of investment decisions and risks taken by portfolio managers. A benchmark is a hypothetical portfolio composed of various investable assets and formulated according to known and fixed rules.

The **basic benchmark** represents a conservative, minimum-risk composition of investable assets, which meets the first two goals of the investment policy for the reserves—maintaining their purchasing power and managing them with a high level of liquidity. In order to achieve its objectives, the basic benchmark is composed of selected short-duration (6 months), high-rated government bonds with a high degree of liquidity and the same currency composition as the numeraire.

The **numeraire** is a basket of currencies consisting of 3 currencies divided, on average, over the year, as follows: 67.8 percent US dollar, 29.7 percent euro, and 2.5 percent pound sterling. The numeraire's composition is derived from the possible uses of the reserves when needed and from the principles reflected by the objectives of holding them. The holding rate of return on the foreign exchange reserves is measured in terms of the numeraire and therefore its composition is considered risk free from the perspective of the reserves portfolio manager. The numeraire composition is reviewed at least once per year and is updated when needed, with the approval of the Monetary Committee. The numeraire is defined quantitatively (a quantity-based currency basket) so that its currency composition thus changes with the daily change in the exchange rate of the currencies that make it up.

⁴ In January 2019, the Monetary Committee approved a new version of the guidelines (Appendix 2). The maximum risk level CVaR_(5%) was raised from 400 basis points to 475 basis points; the importance of achieving the target of maintaining the purchasing power in the medium term as well was emphasized, and the maximum percentage of investment in equities was increased from 15 percent to 17.5 percent.

An annual strategic allocation process in the reserves portfolio determines the composition of the portfolio for the coming year (Box 1). The strategic composition of the reserves portfolio is determined so that the expected return on the portfolio is adequate, within the framework of the desired risk level and the guidelines' constraints. The strategic allocation determines the main characteristics of the reserves portfolio, including the currency composition, the asset composition, and the target duration for each currency benchmark.

In the context of the strategic allocation for 2019, the Committee decided to increase the investment in equities from 12.5 percent in the previous year to 15 percent, to increase the investment in corporate bonds from 6 percent to 8 percent—with a currency distribution of two-thirds in dollar-denominated corporate bonds and one-third in euro-denominated corporate bonds—to lengthen the duration of the dollar portfolio by 3.6 months, and to invest 1.2 percent in a basket of currencies, made up of investment with equal weights in the Czech Republic, Norway, Chile and China (see Table 3). The importance of achieving the target of maintaining the purchasing power and reducing the risk of the portfolio in the medium term, as emphasized in the new formulation of the Investment Guidelines that went into effect on January 23, 2019, was an important pillar in the considerations when choosing the composition of the Committee's benchmark for 2019.

Table 3
Strategic Allocation for 2018 and 2019

	2018	2019
Bonds	81.5%	77.0%
Duration (Years)	1.8	2.0
USD	2.0	2.3
EURO	1.5	1.5
GBP	1.5	1.5
Currency exposures	0.3%	1.2%
Equity	12.5%	15.0%
US	7.4%	9.2%
Japan	1.2%	1.4%
France	0.9%	1.0%
Germany	0.9%	0.9%
UK	0.8%	0.9%
Canda	0.4%	0.5%
Switzerland	0.4%	0.4%
Australia	0.3%	0.4%
Canada	0.3%	0.3%
Corporate Bonds	6.0%	8.0%
US	4.5%	5.3%
Europe	1.5%	2.7%

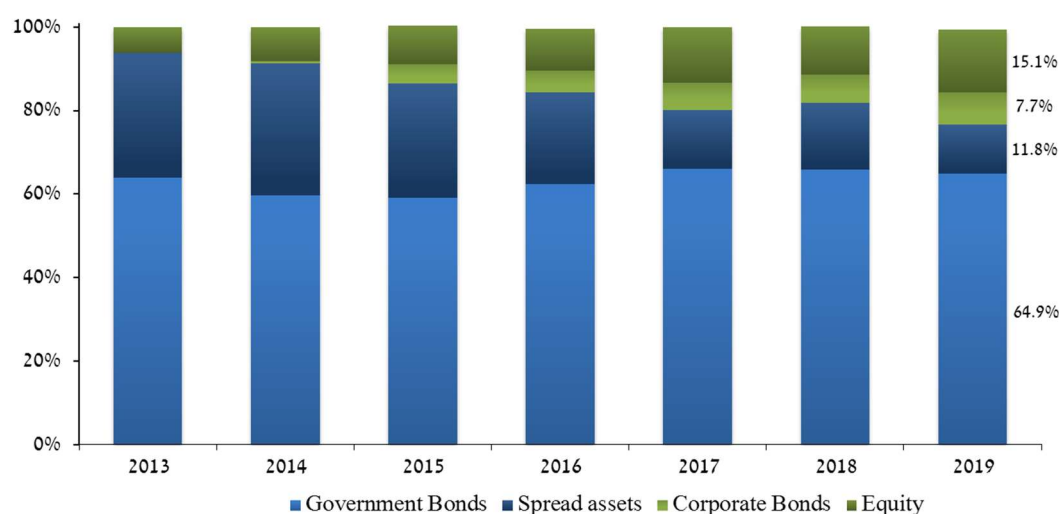
Source: Bank of Israel

It should be noted that **the Monetary Committee allows the Markets Department degrees of freedom for investment of the reserves**, so that the actual composition is likely to differ to some extent from that which was set in the allocation framework. The change can be reflected in the investment at different weights in the risk assets, investment with a different duration than in the allocation, investment in government bonds of countries that are not included in the basic benchmark, or investment in spread assets—debt instruments of multinational issuers and issuers from the public sector, as well as government bonds denominated in a different currency than the local currency of the issuing country.

In view of the extended period of low interest rates worldwide, the negative interest rates in Europe in particular, and the assessment that this situation will continue in the coming years, alternative investments available to the Monetary Committee and the Markets Department are assessed with the goal of increasing the yield earned on the investment of the reserves. These alternatives, should there be any, are expected to lead to some increase in the risk level of the reserves portfolio. The share of the investment in risk assets, equities and corporate bonds, in the reserves portfolio, has increased consistently over the years (Figure 4).

At the end of 2019, 64.9 percent of the reserves were invested in government assets⁵, and 11.8 percent were invested in spread assets, 7.7 in corporate bonds, and 15.1 percent in equities.

Figure 4
The Distribution of the Reserves Portfolio by Assets, 2013–19 (period-end)



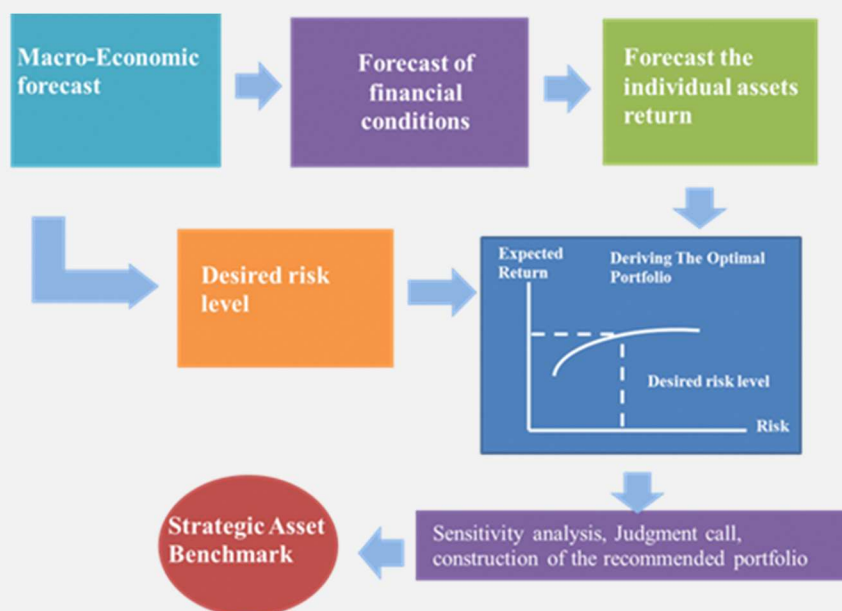
Source: Bank of Israel

⁵ This includes cash and deposits at central banks, the inherent risk of which is equal to the country risk inherent in government bonds.

Box 1: The strategic allocation of the reserves portfolio

The strategic allocation is a process through which the Monetary Committee determines the strategic composition of assets in the reserves portfolio. The strategic allocation is set with the goal of maximizing the reserves portfolio's return, subject to the guidelines and the risk profile set by the Committee, while maintaining the purchasing power of the reserves and managing with a high level of liquidity. The main goals of the allocation are: (1) translating the Committee's priorities and risk profile to a strategic allocation of the assets; (2) outlining the framework for managing the reserves portfolio. Within the framework of the allocation process, the main characteristics of the reserves are set, including the currency composition, the bonds' duration, the share of equities and their diversification among various markets. The actual investment of the reserves is managed by the Markets Department, in accordance with the strategic allocation and within the framework of the degrees of freedom to diverge from it as granted by the Committee.

Figure 1
The process of formulating the reserves portfolio's strategic allocation



The Monetary Committee decides once a year on the strategic allocation, based on the recommendation of the Markets Department. The process of formulating the strategic allocation, which is described in Figure 1, begins with an assessment of the macroeconomic environment expected in the coming year under 3 scenarios—a baseline scenario and 2 alternative scenarios. Constructing the baseline scenario relies on an analysis of the current global economic situation, identification of the main factors expected to drive it in the coming year, assessment of the direction of their development and the extent of their impact with the highest likelihood. Constructing the alternative scenarios is based on 3 principles: (1) the scenarios are derived from the main risks (to the upside and to the downside) inherent in the baseline scenario; (2) they have the highest probability of being realized, after the baseline scenario (in contrast to stress scenarios); and (3) their realization is expected to have a marked impact on the risk and return of the reserves portfolio.

Given the assessments regarding the expected macroeconomic variables (growth, inflation, and monetary policy), the financial conditions in each scenario are assessed, including the structure of the yield curves in the investment currencies, the level of profitability and risk of the companies traded in the relevant markets. Assessing the financial conditions depends on econometric models and on judgment-based assessments. Based on these assessments, an examination of the pricing level in the various markets, and their consistency with the fundamental conditions, a forecast is formulated for the asset returns in each of the scenarios.

Within the framework of analyzing the risks and rewards in the macroeconomic environment and in the various financial markets, the Monetary Committee decides on the desired level of risk of the reserves portfolio. Given the forecast for asset returns under the baseline scenario, their risk level and the correlations between them, the Markets Department examines various compositions of assets that maximize the portfolio's return for the desired level of risk. Choosing the strategic allocation for the reserves portfolio based on the optimal composition—the composition that maximizes the portfolio's return for the desired level of risk—is most accurate when there is certainty regarding the expected distribution of asset returns. However, in reality, there is high uncertainty regarding the future distribution of returns, particularly regarding their expectancy. Therefore, it is possible that preference will be given to investment in compositions that are inferior to the optimal composition or with a risk level slightly different from the desired risk level, but with a higher level of diversification and/or with characteristics that are more consistent with the judgment-based assessments.

In order to reduce the sensitivity of the strategic composition to the returns forecast, the allocation is examined through a range of scenarios, including alternative scenarios and several stress scenarios. The stress scenarios are chosen based on the main risks inherent in the global macroeconomic and financial environments. The performance of the allocation in any scenario is estimated based on events with similar characteristics to those that occurred in the past.

At the end of the process, the Monetary Committee, using judgment, chooses the strategic allocation based on an analysis of the results including the optimal composition of the portfolio in various scenarios and its performance under stress scenarios.

C. The Holding Rate of Return on the Reserves

1. Economic and financial background conditions

After several years of solid growth in economic activity, **2019 was characterized by moderation in global growth, which was only 2.9 percent.** The main factors in the slowdown were the continued US-China trade war and weakness in manufacturing activity. World trade was also adversely impacted, growing at by only 1 percent. **The inflationary environment remained below the target of major central banks, which went back to adopting accommodative monetary policy.** The Fed surprised, reducing the interest rate 3 times during the course of the year, after raising it 4 times in the previous year. The ECB further enhanced its accommodative monetary policy by reducing the interest rate by 10 basis points and launching a quantitative easing program. This policy led to a sharp decline in bond yields in the US and in the eurozone (Figure 5). The scope of bonds traded at a negative yield increased worldwide to approximately \$12 trillion. The low yield led to an increase in investors' risk appetite, to steep increases in equity prices and to a contraction in corporate bond spreads. The risk level remained high most of the year, against the background of the trade war, Brexit, and concerns about the worsening slowdown in growth and the spread of the slowing to the US, and in view of the rising prices of financial assets. Appendix 1 presents a more detailed analysis of the economic and financial environment in 2019.

At the beginning of 2020, there was a sharp slowdown in real activity and an increase in risks, due to the outbreak of the coronavirus. The major central banks announced monetary measures that included, among other things, quantitative easing and interest rate reductions, and in parallel governments announced the adoption of fiscal steps in order to support economic activity. In financial markets there were sharp declines in risk assets, a sharp decline in government bond yields in the US and in Germany, and a steep increase in volatility.

Figure 5
Ten-year Government Bond Yields—US and Germany, 1999–2019, percent



Source: Bloomberg

In 2019, most asset types in the portfolio, except for European government bonds, had a positive holding rate of return (Figure 6—yields are presented in local currency terms). The assets that generated the highest holding rates of return in 2019 were equities, which in most markets, after sharp declines at the end of 2018, yielded returns markedly higher than previous years. US government bonds, which make up the majority of the portfolio, also yielded high returns in 2019, as a result of a policy change at the Fed.

Volatility (standard deviation) of equities was, as expected, relatively high compared to the other assets, but low compared to the volatility in the previous year in most markets in which the reserves are invested (Figure 7).

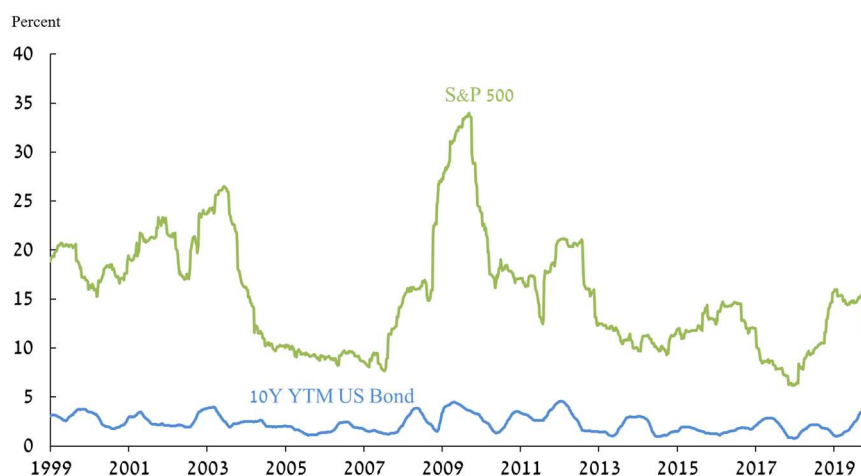
Figure 6
Holding Rates of Return and Standard Deviation for Main Indicators of the Assets in the Reserves Portfolio, 2019

	Return in Local Currency	Standard Deviation in Annual Terms
Equity		
MSCI US IMI Index	31.1%	13.9%
MSCI Switzerland Index	31.1%	9.8%
MSCI France IMI Index	29.3%	12.4%
MSCI German IMI Index	24.8%	12.4%
MSCI Australia IMI Index	23.1%	9.7%
MSCI Canada IMI Index	22.4%	8.8%
MSCI Japan Index	18.9%	13.0%
MSCI UK Index	18.5%	12.2%
MSCI Hong Kong IMI Index	9.2%	16.9%
Euro Bond		
EUR Govt 0-1Y	-0.3%	0.1%
Dutch Gov 1-5Y	-0.2%	0.9%
France Gov 1-5Y	0.2%	0.7%
Germany Gov 1-5Y	-0.4%	0.8%
EUR Govt 1-5Y	2.8%	0.9%
U.K. Gilts 1-5Y	1.2%	1.4%
US Bond		
US 0-1Y	2.4%	0.1%
U.S. Treasury 1-10Y	5.1%	2.6%
US TIPS 1-10Y	7.0%	2.8%
US Corporate 1-5Y	6.3%	1.3%

*Includes interest, dividends, and capital gains/losses.

Source: Bank of Israel and Bloomberg.

Figure 7
Standard Deviation of the S&P 500 Index and of 10-Year US Treasury Notes, 1999–February 2019

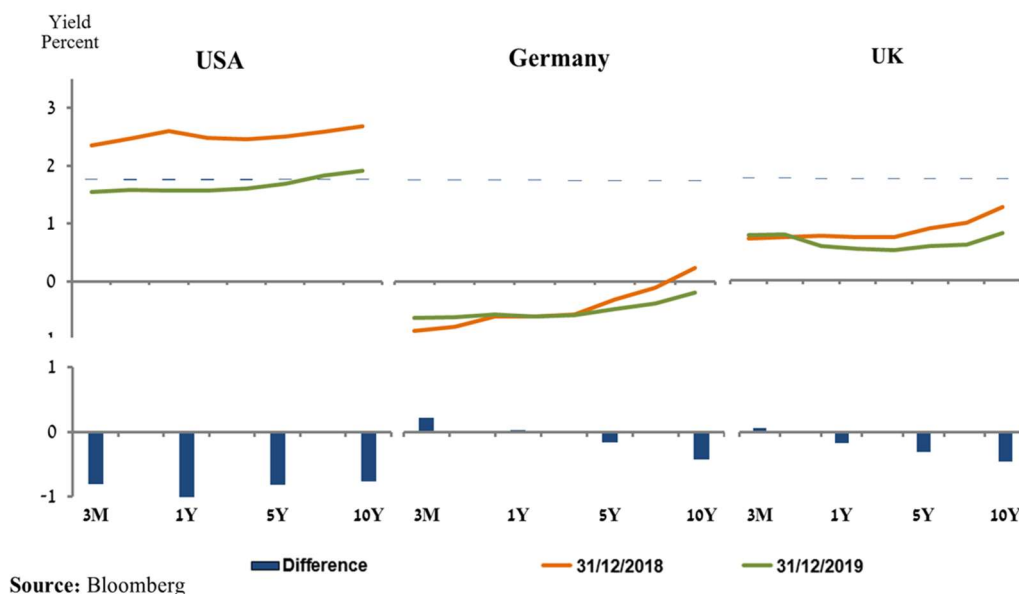


¹ Weekly standard deviation of the return on the S&P500 and of the yield to maturity on 10-year US Treasury Notes, in annual terms, 1-year moving average.

SOURCE: Bank of Israel and Bloomberg.

In the US, the yield to maturity decreased markedly along the entire curve (by approximately 80 basis points) and had a considerable impact on financial markets, and increased the reserves portfolio's return. In Europe and in the UK, yield curves flattened, as in Europe long term yields traded in the negative range as well (Figure 8).

Figure 8
Yield Curves and Changes in them—Government Bonds of US, Germany, and UK, 2019



2. Return on the reserves portfolio

The holding rate of return on the reserves portfolio in 2019 was 6.1 percent in numeraire terms, and the return on the basic benchmark⁶ was 1.5 percent, both being the highest in the past decade (Table 4). The active management return in 2019 was 4.6 percent, the highest return in the past decade. It was achieved due to the increase in prices of the risk assets, equities and corporate bonds, and due to a decline in yields to maturity of dollar bonds in which the vast majority of the reserves is invested (Figure 6). Even though the share of risk assets in the portfolio increased, the portfolio's volatility decreased in 2019 from that of the previous year, due to a decline in the volatility of the equity indices.

⁶ In March 2014, the basic benchmark's duration was shortened from 10 months to 6 months, and caused an increase in the spread between the benchmark return and the reserves portfolio return.

Table 4
Reserves Portfolio Performance vs. the Basic Benchmark, 2010–19
(percent, in annual numeraire terms, the number on parentheses is the weekly standard deviation in annual terms)

	Performance		Excess Return
	(1)	(2)	(1)-(2)
	Actual Portfolio	Basic Benchmark	Total
2010	1.73 (0.57)	1.19 (0.36)	0.54 (0.53)
2011	1.28 (0.80)	1.07 (0.39)	0.21 (0.71)
2012	1.59 (0.57)	0.42 (0.17)	1.17 (0.52)
2013	0.87 (0.80)	0.07 (0.16)	0.80 (0.74)
2014	1.28 (0.85)	0.22 (0.09)	1.06 (0.88)
2015	0.64 (1.29)	0.10 (0.12)	0.54 (1.29)
2016	1.56 (1.33)	0.21 (0.13)	1.35 (1.33)
2017	3.03 (0.80)	0.30 (0.10)	2.73 (0.77)
2018	0.18 (1.67)	1.06 (0.16)	-0.87 (1.69)
2019	6.12 (1.42)	1.54 (0.19)	4.59 (1.45)

Source: Bank of Israel.

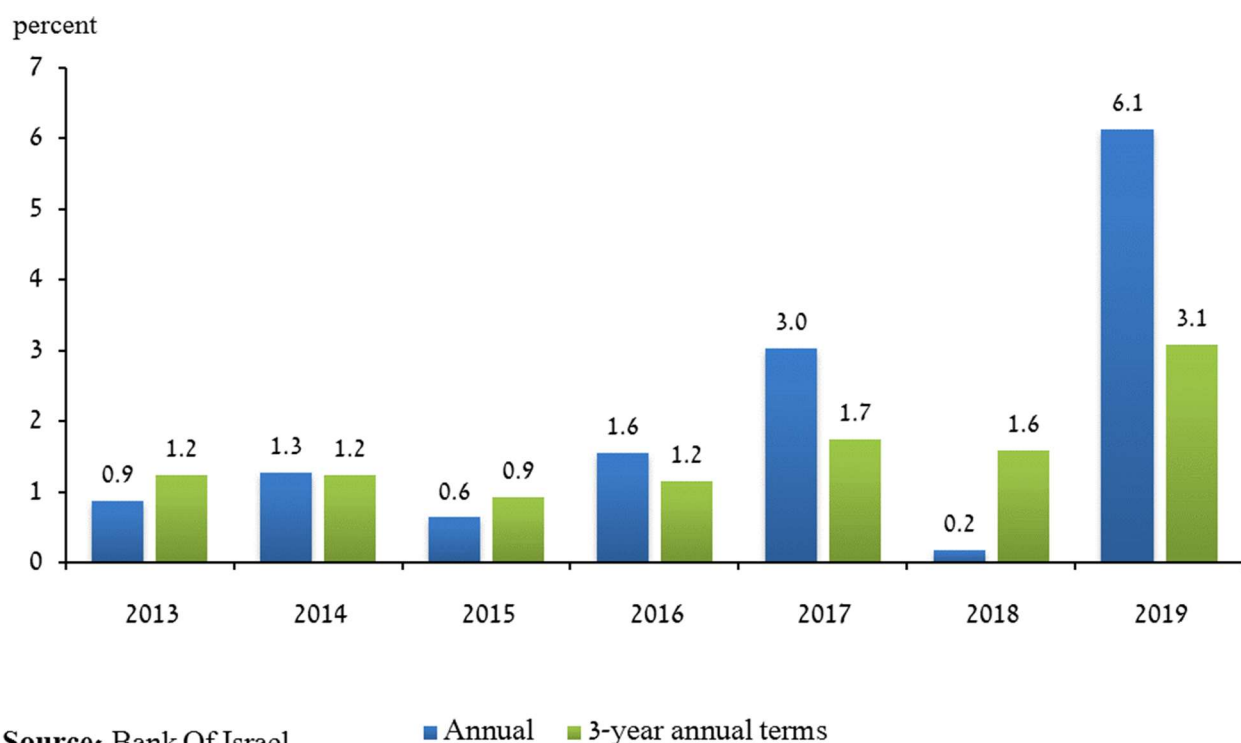
The 3-year average holding rate of return on the reserves portfolio increased this year, to 3.1 percent in numeraire terms (Figure 9). This year's relatively high return and contribution boosted the 3-year return and contribution.

The higher the level of the reserves, the smaller the relative share of the reserves required to be available for immediate use in case of an emergency, and thus part of the reserves can and should be invested with a longer term investment horizon, essentially increasing the investment in risk assets. The high volatility of the risk assets relative to government bonds exacerbates the effects of the timing of entry into an investment and of the return's measurement period. A stronger effect

is obtained when the return is measured on an annual (calendar year) basis. The increased proportion of the reserves portfolio invested in risk assets in recent years strengthens these effects and increases the phenomenon.

The average multiyear return on risk assets is expected to be positive, but risk assets are inherently volatile, and losses should be expected in certain years, especially during a crisis. Managing the reserves portfolio with a medium term investment horizon can moderate the pressure to reduce holdings at such times.⁷ **Three-year measurement shows clearly that the reserves portfolio's return is positive over the years and is less volatile compared to annual measurement** (Figure 9).

Figure 9
The Reserves Portfolio Return, Annual and 3-Year Period, 2013–19
(annual numeraire terms)



The sharp declines in equity prices in the beginning of 2020 caused losses in the reserves portfolio, part of which were offset by capital gains resulting from the decline in government bond yields, so that the portfolio's loss as of the writing of this report does not exceed the maximum risk level. At this stage it is difficult to know what the effect of the crisis will be on financial markets and on the reserves portfolio by the end of 2020. The coronavirus crisis illustrates the importance of looking at the reserve portfolio's return from a multiyear perspective, despite the risk of losses in the short term.

⁷ Regarding the issue of investment in equities, see also Box 1 in the Investment of the Foreign Exchange Reserves report for 2017.

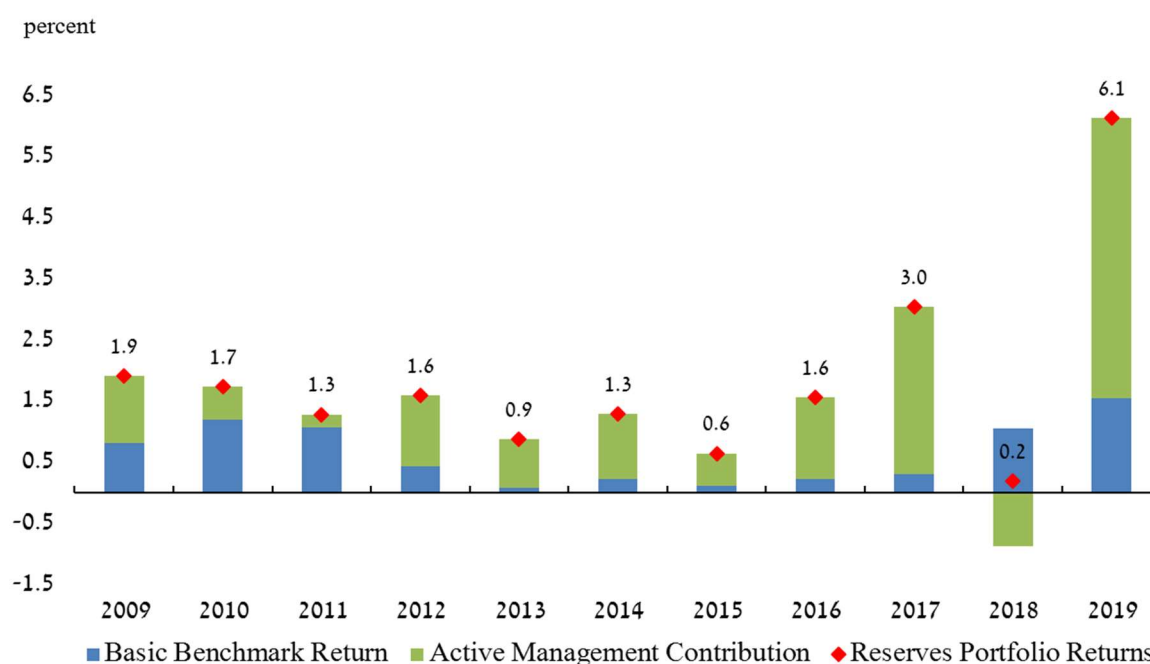
D. Active Management Contribution—the excess return over the basic benchmark

The contribution of active management is mainly the contribution of the decisions to invest in additional countries, or at a different weight, or additional assets not included in the basic benchmark, or with a different duration and diversification. Active management can be classified into the following main risk categories—duration, equities, spread assets, corporate bonds, and currency and other exposures.

Since 2012, active management contribution, the excess return over the basic benchmark, has had the greatest effect on the return on the reserves portfolio, while the return on the basic benchmark has been low and stable. Due to the **risk premium**—the surplus return on risk assets in excess of the risk-free interest rate—increasing the risk components in a portfolio increases the long-term expected return. At the same time, a potential increase in the volatility of active management contribution is also expected. That volatility is also influenced by the correlation between the assets in the portfolio.

This year, active management increased the reserves portfolio's return by 4.59 percent, the highest contribution in the past decade, compared with a negative contribution of 0.87 percent in the preceding year and a positive contribution of 2.73 percent in 2017 (Figure 10). The investment of the reserves in equities began in 2012 and the investment in corporate bonds began at the end of 2014. Over recent years there has been a gradual increase of risk assets in the portfolio, reaching a peak in 2019 (Figure 4). The return in recent years reflects clearly the impact of increasing the investment in risk assets in the reserves portfolio—increasing the medium term return at the cost of increasing short term volatility.

Figure 10
The Reserves Portfolio Return, the Basic Benchmark Return, and the Active Management Contribution, 2009–19
(Numeraire terms)



Source: Bank Of Israel

Table 5
Active management contribution, by its components, 2017–19
(basis points, numeraire terms, annual)

	2017	2018	2019
Equity	219	-110	340
Corporate Bonds	10	-7	17
Duration & Diversification	19	15	92
Spread assets	27	12	11
Currency and asset exposures	-1	2	-1
Total	273	-87	459

Source: Bank of Israel

The contribution of equities was, similar to previous years, the most significant of risk assets' contributions, at 340 basis points. This year, the contribution of duration was also notable, at 92 basis points (Table 5).

1. Equities (340 basis points)

The investment of the reserves in equities began in 2012, and it tracks local equity indices in investment markets. The investment is diversified by broad equity indices of advanced economies, based on the MSCI Developed Markets index. Investments in equities in markets that are not denominated in numeraire currencies are hedged against one or more of the numeraire currencies, in order not to create currency exposure to the currencies of those markets.

The contribution of investment in equities was 340 basis points this year, and is the most significant of all the risk components (Table 5). The return is the highest since the Bank began investing in equities. Investment in equities reached its highest level in 2019, with the increase of the allocation in equities to 15 percent of the Committee benchmark, which became possible with the increase in the investment guidelines of the maximum share of investment in equities to 17.5 percent. The positive contribution was recorded as most equity markets in which the reserves are invested increased at their highest rate since 2013 (Figure 6), which followed the sharp declines at the end of 2018. During the course of the year, volatility was lower than in the previous year.

The largest positive contribution was recorded in the US. The contribution is the result of the share of investment in a particular market and the change in the equity index of that market. The largest portion of the investment in equities is invested, as of the end of 2019, in US equities, at 9 percent, which together with the 31 percent increase in the index, added 228 basis points to the overall contribution (Table 6). The contribution of investments in other countries was positive, and in most cases relatively large, in spite of their relatively low weight in the portfolio, as a result of the marked increase in equity indices there over the course of the year. Hong Kong—due to its political situation vis-à-vis China and due to the impact of the trade war on its economy—was notable for the lowest contribution of all the countries.

Table 6
Shares of equities out of total reserves, by country and the contribution to the reserves portfolio in 2019

	Holding Percentage		Index Return	Equity Contribution
	End of 2018	End of 2019	2019	(b.p)
US	7.0	9.0	31.1	228
France	0.8	1.1	29.3	26
Japan	1.0	1.4	18.9	22
Germany	0.7	1.0	24.8	19
UK	0.7	0.9	18.5	15
Switzerland	0.4	0.5	31.1	12
Canada	0.4	0.6	22.4	9
Australia	0.3	0.4	23.1	7
Hong Kong	0.3	0.3	9.2	2
Total	11.6	15.1		340

Source: Bank of Israel.

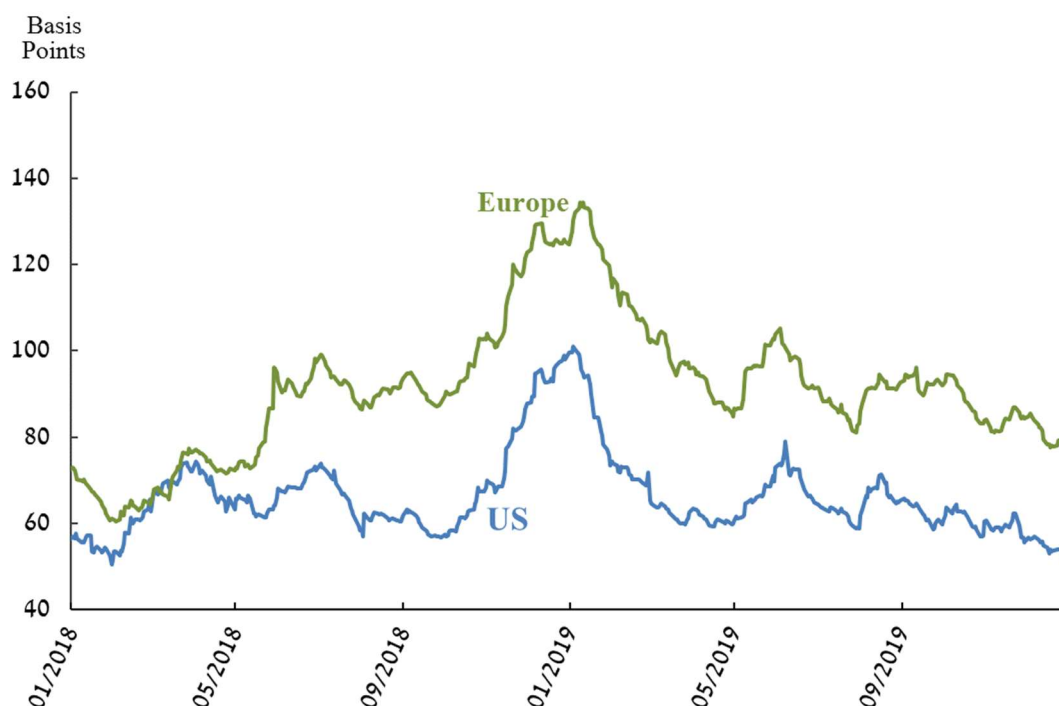
2. Corporate bonds (17 basis points)

The exposure to corporate bonds contributed 17 basis points. The main spread risk in the reserves portfolio derives from the investment in investment-grade corporate bonds traded on the US and European markets. The investment is carried out by means of both internal and external management, vis-à-vis a known benchmark with broad coverage of the dollar-denominated corporate bond traded in the US and euro-denominated corporate bonds traded in European markets. In light of widening spreads, in the beginning of 2019 the Monetary Committee increased corporate bonds' allocation to 8 percent. The average share of the investment in corporate bonds in 2019 was 7.1 percent, compared to 5.9 percent in 2018.

The marked narrowing of the corporate bond yield spreads since the beginning of the year is the main factor in their positive contribution. The yield spread between corporate bonds and government bonds narrowed gradually by 50 basis points for both dollar and euro denominated bonds, to 52 basis points and 78 basis points at the end of the year, respectively (Figure 11). The narrowing of the spreads is attributed to an increase in investors' risk appetite deriving from the sharp decline in government bond yields.

This year, like last year, there were several changes in the trend of development of spreads, and in May and August spreads widened in the US and in Europe, in contrast to the narrowing trend that characterized most of the year (Figure 11).

Figure 11
The Spread between Corporate Bonds and Government Bonds in the US 0–5 Year
Benchmark and the Europe 1–5 Year Benchmark, 2018–19



Source: Bloomberg.

The corporate yield spread over government bonds (approximately 65 basis points in the dollar market and 95 basis points in the euro market) added to corporate bonds' positive contribution.

3. Duration and diversification (92 basis points)

The duration of a fixed-income portfolio is an accepted measure for measuring the interest rate risk to which the portfolio is exposed. The contribution of duration and asset diversification is a function of the decision to invest the reserves at a duration that differs from that of the basic benchmark, and the decision to disperse the assets differently along the curve compared with the basic benchmark. A portfolio with a longer duration usually benefits from a higher current return than that of the basic benchmark, generates more capital gains when yields are falling and more capital losses when yields are rising, and increases the portfolio's volatility. The Monetary Committee decided at the beginning of the year to lengthen the dollar portfolio from 24 months to 27.6 months, and to leave the euro and pound duration at 18 months.

The contribution of duration and diversification this year was 92 basis points, a high contribution for this component compared with the past. The portfolio's duration averaged 23.5 months in 2019, compared with approximately 21 months in the preceding year and compared with the duration of the basic benchmark, which was 6 months. In general, there was a decline in the yield curves of the dollar and pound and a flattening of the yield curve of the euro (Figure 8). Most of the contribution (75 basis points) derived mainly from the

decline in the yield of the dollar curve. The euro portfolio had a positive contribution (15 basis points), despite the negative yield to maturity along most of the curve.

4. Spread assets (11 basis points)

Spread assets are debt instruments, such as those issued by multinationals and by the public sector, as well as government bonds denominated in a currency other than the local currency, that are not included in the basic benchmark.⁸ These assets have a yield spread over government bonds with a similar term to maturity. The spread on the return reflects mainly a credit risk premium over government bonds, and varies according to the level of the asset's credit risk.

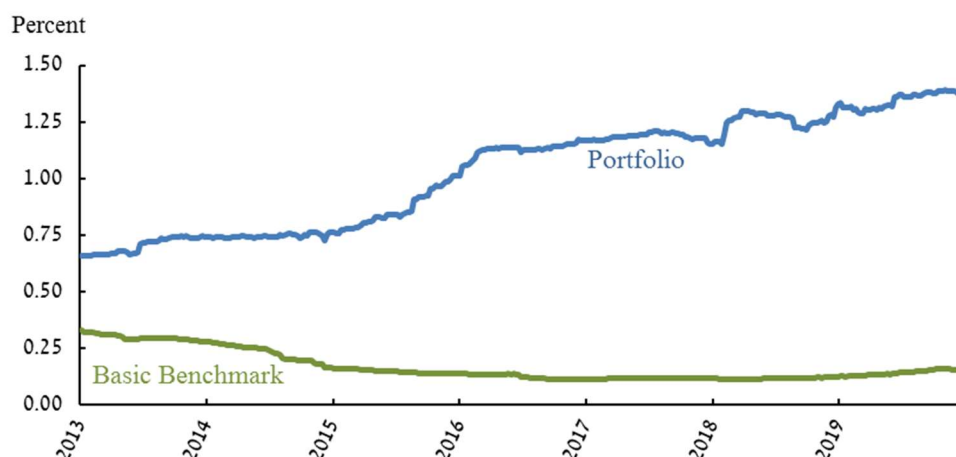
The overall exposure to spread assets contributed 11 basis points. This year again, the investment in short-term spread assets in the dollar portfolio made the largest contribution in this section, 8 basis points. These assets include floating rate bonds, synthetic assets (investments in short-term bonds not denominated in dollars, hedged against the dollar through currency swap transactions), and commercial paper. The investment in such spread assets generated excess returns, mainly due to the current high interest returns of these assets, which exceeded the current returns of short-term government bonds of numeraire countries, which make up the basic benchmark.

E. Measures of Risk and Risk-Adjusted Returns

1. Volatility of the reserves portfolio, active management, and the CVaR measurement

The risk in the reserves portfolio has increased in recent years due to the increased share of risk assets as part of the active management. The volatility in financial markets in 2019 was lower than in the previous year. The reserves portfolio's risk is derived mostly from the contribution of active management while the risk of the basic benchmark is low and stable (Figure 12).

Figure 12
Standard Deviation of the Reserves Portfolio and the Basic Benchmark, 2013–19



¹Standard deviations of weekly returns in annual terms, moving average triennial
Source: Bank Of Israel

⁸ Excluding corporate bonds, which are reviewed separately in Section 2 of this chapter.

The volatility of the reserves portfolio in 2019 (1.42 percent) was lower than in the previous year (1.67 percent), but was still at a high level compared to recent years, while the basic benchmark's volatility remained low (0.19 percent) as in preceding years, as expected from its conservative asset composition (Table 4).

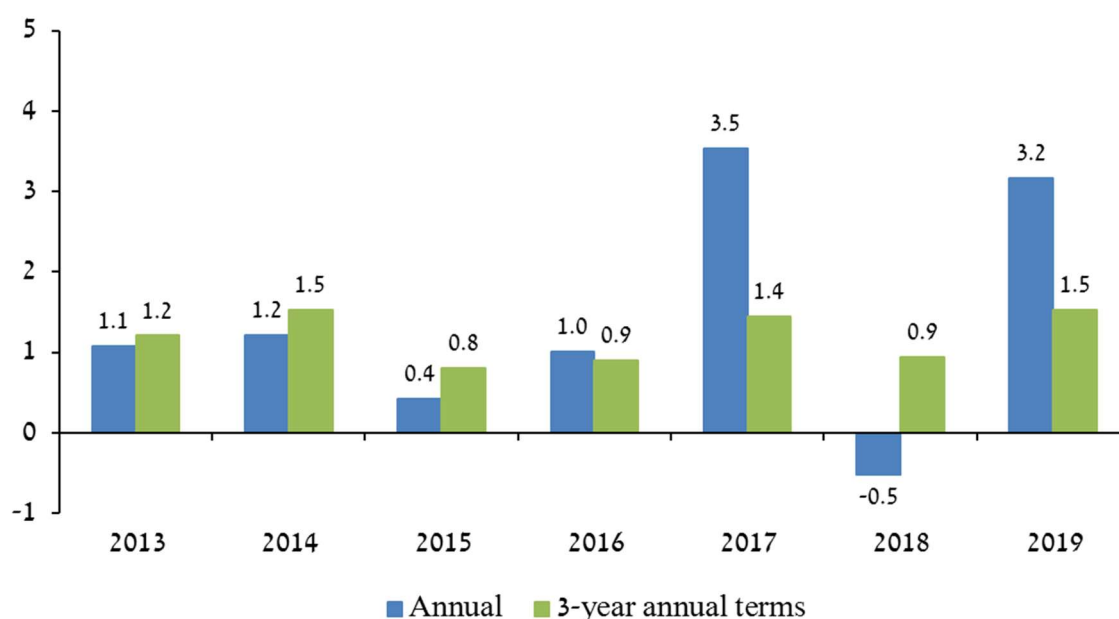
At the beginning of each year, the Monetary Committee establishes the risk level (in terms of CVaR_{5%}) to be used for setting the strategic allocation for that year, based on the expected macroeconomic and financial background conditions. For 2019, the Committee chose a risk level of 300 basis points. The CVaR_{5%} of the portfolio was around 300 basis points during 2019, similar to the maximum level set in the strategic allocation.

2. The risk-adjusted contribution of active management

The **Information Ratio (IR)** measures the **active management** of the portfolio manager (the excess returns), relative to the risk taken, and indicates the degree of consistency in the manager's ability to generate excess returns in exchange for additional risk. The index is calculated as the ratio of the contribution of active management to its standard deviation.

This year, the risk-adjusted return, measured by the IR, increased sharply due to the high contribution of active management (Figure 13). When measured over 3 years, it can be seen that the risk-adjusted return is much less volatile.

Figure 13
The Ratio of Active Management Contribution to its Standard Deviation—the Information Ratio, annual and 3-year measurement, 2013–19



Source: Bank of Israel.

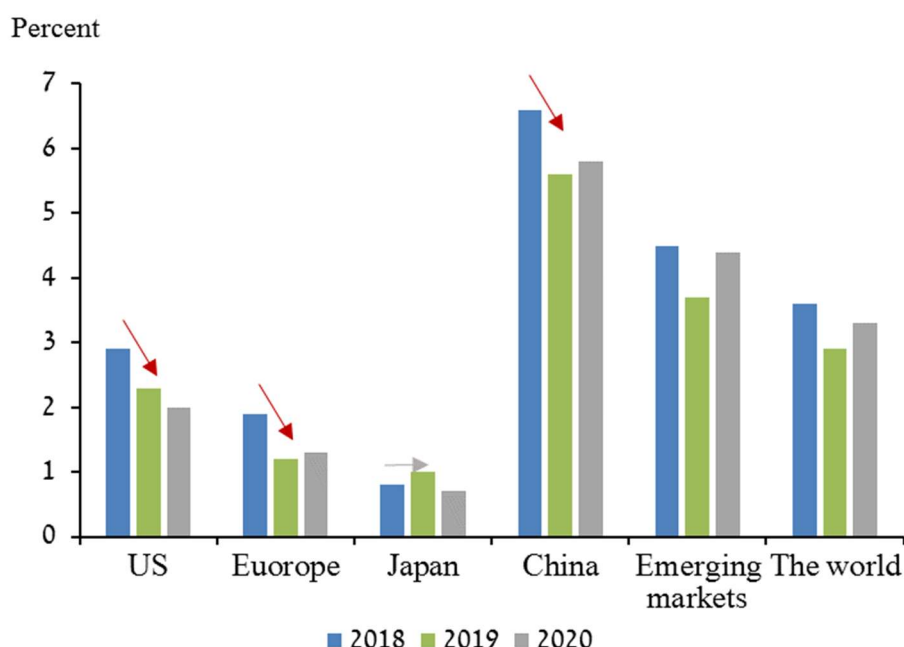
Appendices

Appendix 1

The Global Economic and Financial Environment

After several years of solid growth in economic activity, there was a loss of momentum in 2019. Based on IMF estimates, growth in 2019 is expected to have been only 2.9 percent⁹, the slowest rate of growth since the financial crisis. The slowdown in growth encompassed most major countries/blocs (Figure A.1), and international institutions revised their growth forecast downward. The main factors that adversely impacted growth this year were the continued trade war between the US and China and weakness in manufacturing activity, mainly in the vehicle sector. These factors also negatively impacted world trade, which grew by only 1 percent in 2019.

Figure A.1
Annual Growth by Major Countries/Blocs
(percent)

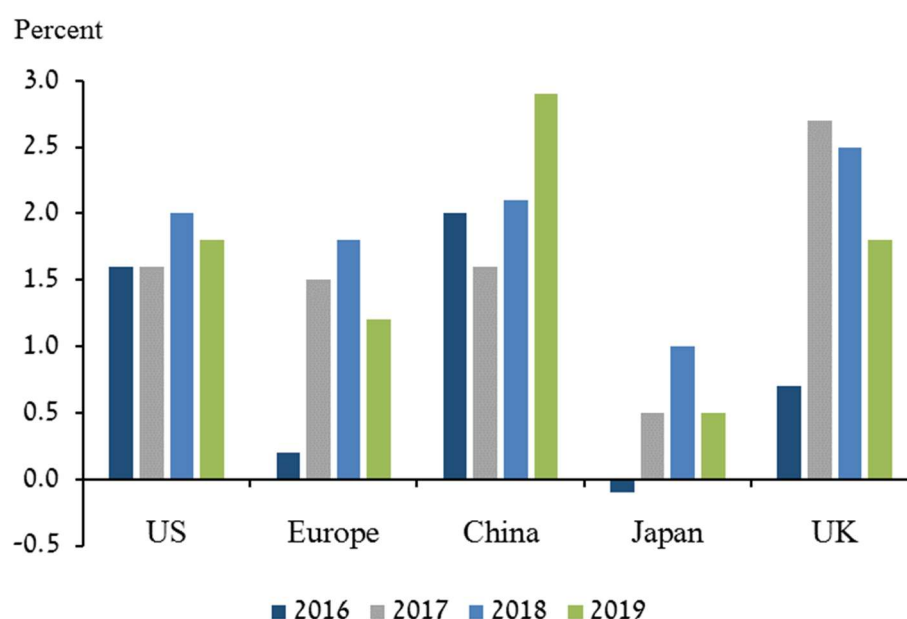


SOURCE: IMF, 2018 actual data, 2019 estimate, 2020 forecast

The inflation environment remained low. The inflation rate remained below the central bank target in the US, Europe, and Japan (Figure A.2). Missing the inflation target from below and the desire to support economic growth led central banks to adopt accommodative monetary policy, leading the US Federal Reserve to change policy from monetary tightening to a declining interest rate path.

⁹ The growth rate in 2018 was 3.6 percent.

Figure A.2
Annual (CPI) Inflation in Major Blocs
 (percent)

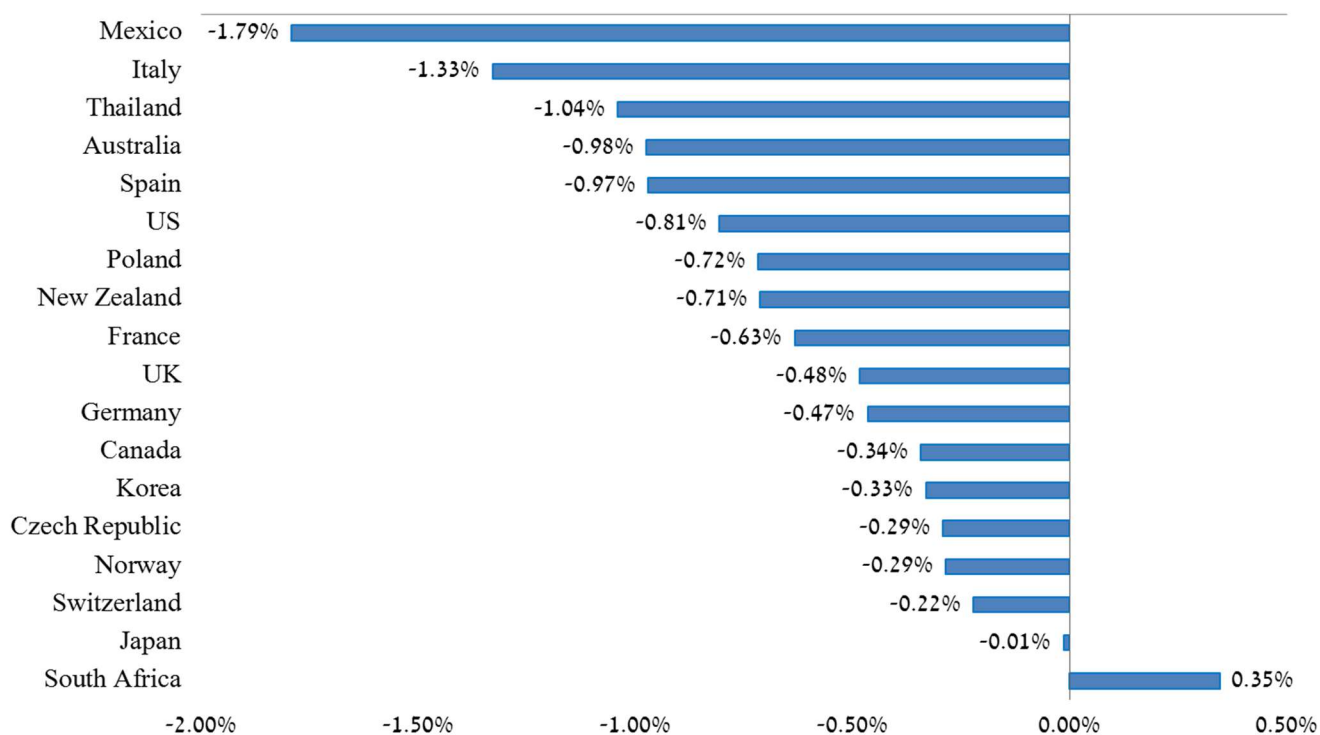


Source: Bloomberg, 2016-2018 Actual data, 2019 Estimate. CPI data, US PCECORE

The risk level remained high for most of the year, primarily against the background of political risks (the US-China trade war and the manner of implementing the UK's exit from the EU) and increasing concerns of an enhanced growth slowdown and its expansion to the US as well. However, the accommodative monetary policy and the decline in political risk led toward the end of the year to a decline in short term risk and in contrast, the medium term financial risk continued to strengthen, against the background of increased prices of financial assets.

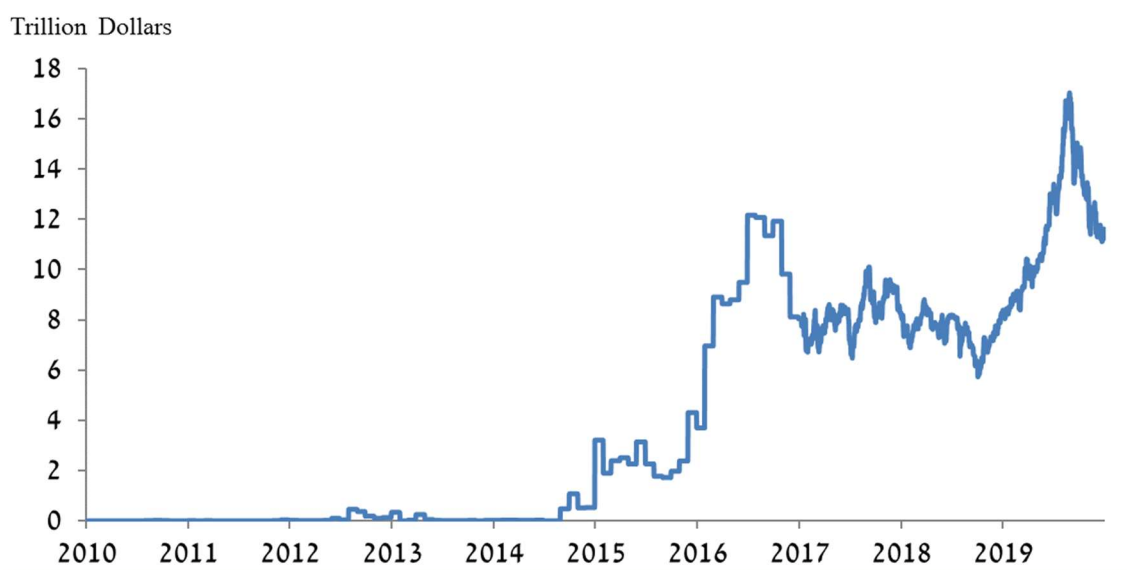
The slowdown in growth and the accommodative monetary policy led to a sharp decline in bond yields (Figure A.3) and the amount of bonds traded at a negative yield reached around \$12 trillion (Figure A.4), most of which is government bonds of Japan and of European countries. The low yield led to growth in investors' risk appetite, which supported rising equity prices and a contraction in corporate bond spreads. In 2019, there were sharp increases in equity indices (Figure A.5) in line with and due to a "correction" to the price declines at the end of 2018. The dollar traded mixed against major currencies, strengthened by 2.2 percent against the euro and weakened by 1 percent against the Japanese yen and by 4 percent against the pound. Despite geopolitical events in the Persian Gulf and OPEC's decisions to cut output, oil traded this year in a relatively narrow range (\$55–66 per barrel of Brent crude), among other things due to the effect of the shale oil industry that benefited from relative flexibility and that reduced the volatility in the price.

Figure A.3
Change in Yield to Maturity on 10-Year Bonds in Major Economies in 2019



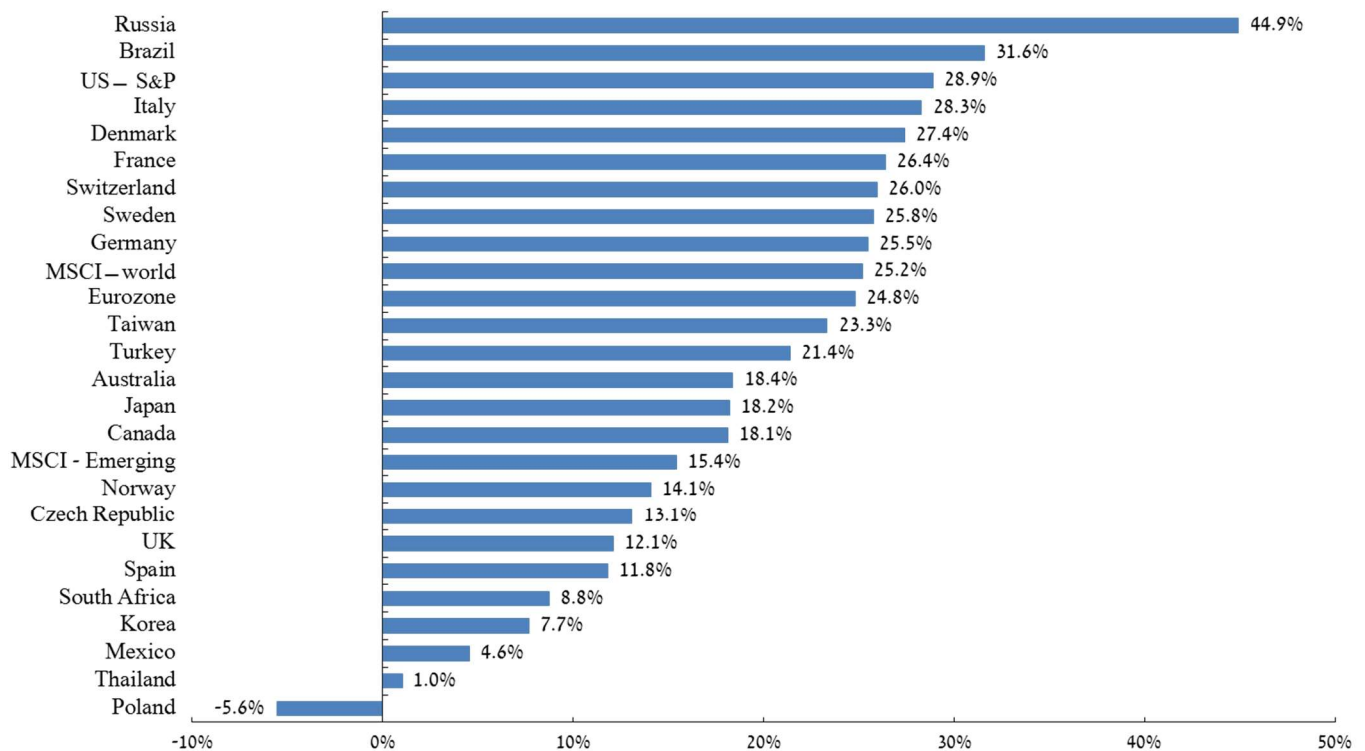
Source: Bank of Israel.

Figure A.4
Total Bonds Traded at Negative Yield



Source: Bloomberg

Figure A.5
Equity Returns in Local Currency Terms, 2019



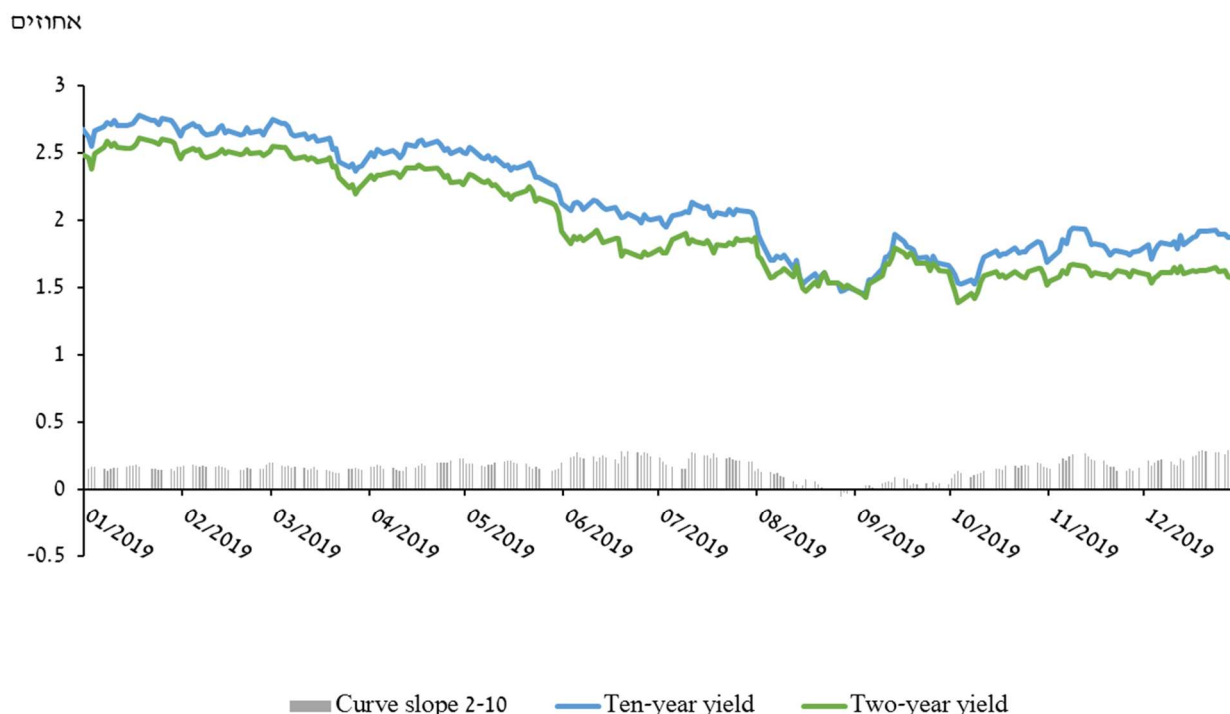
Source: Bloomberg

The US economy: After several years of accelerated growth in the US against the background of fiscal incentives, the growth rate slowed in 2019 to 2.3 percent (IMF estimate), compared with 2.9 percent in 2018. The slowing was greatly impacted by the US-China trade war that adversely impacted investments, by the global weakness in manufacturing and by a loss of momentum in the shale oil industry.

Several factors led the Federal Reserve to change its monetary policy, chief among them the trade war, the slowdown in investment, and the decline in global growth. The Fed reduced the interest rate 3 times during the course of the year, compared with 4 interest rate increases in the previous year. the yield curve remained flat despite the reduction of the interest rate by 75 basis points, as long term yields declined sharply as well (Figure A.6). As noted above, the interest rate reduction and the decline in bond yield, together with the marked progress in the trade war toward the end of the year, led to a decline in short-term risks and to increases in equity prices.

Figure A.6

**US Government Bond Yield for 10 Years and for 2 Years, and the Slope of the Curve
(percent)**



Source: Bloomberg

The growth rate in **the eurozone** declined sharply, to 1.2 percent according to the IMF's assessment, compared with 1.9 percent in 2018 and 2.4 percent in 2017, mainly against the background of weakness in manufacturing and in the auto industry. The weakness in 2019 was most notable in Germany, which grew by only 0.5 percent, and in Italy, which grew by only 0.2 percent. The slowdown in growth led the ECB to further enhance the accommodative monetary policy, by reducing the interest rate by 10 basis points, launching a quantitative easing program, and renewing the operation of the TLTRO plan. These steps led to a decline in bond yields and supported equity markets in the eurozone.

In the **UK**, in 2019 growth was 1.3 percent (IMF estimate), against the background of uncertainty about Brexit. The strong labor market and private consumption supported economic activity. The Conservative party's victory in general elections in December greatly reduced investors' concern of a hard Brexit and supported the pound, which strengthened over the year by about 4 percent against the dollar.

Japan's economy grew in 2019 by about 1 percent (IMF estimate), while inflation remained low and very far from the central bank's target. The accommodative monetary policy remained in place. The yen strengthened in 2019 against the dollar, 10-year bond yields remained—against the background of the Bank of Japan's yield curve control policy—essentially unchanged, and equity prices increased in line with the global trend.

China's economy continued its “soft landing” against the background of the trade war and the weakness in global manufacturing in 2019 China's growth rate slowed to only 6.1 percent (IMF assessment), compared with 6.6 percent in 2018. The authorities took expansionary steps in order to deal with the slowdown in the growth rate, primarily reducing the reserves ratio and moderately reducing the reference interest rate for bank loans.

Appendix 2

Foreign Exchange Reserves: Investment Policy Guidelines

Foreign Exchange Reserves: Investment Policy Guidelines¹⁰

In effect from January 23, 2019

In accordance with Section 40(b) of the Bank of Israel Law, 5770-2010, the Monetary Committee is to establish the guidelines for the investment policy of the foreign exchange reserves.

1. Basic guidelines derived from the goals of holding the reserves

The investment policy of the reserves portfolio is based on the main goal of achieving the Bank of Israel's objectives and proper fulfillment of its functions as they are detailed in the Bank of Israel Law. Subject to that, the investment policy is also based on the following goals:

- a) **Maintaining the purchasing power of the reserves:** This principle is interpreted as preserving the value of the reserves in terms of measurement currency chosen by the Bank—the numeraire (see 3 below).
- b) **Managing the reserves with a high level of liquidity:** A large part of the reserves are to be invested in assets that can be liquidated rapidly at short notice and without negatively impacting their value. The precise level of liquidity is to be increased to the extent that the actual level of reserves relative to the desired level is low (5(e) below).
- c) **Achieving an appropriate return on the reserves portfolio,** at an acceptable level of risk, to the extent that it does not negatively impact the achievement of the previous goals (see 4 below).

The investment strategy of the reserves portfolio shall be formulated with weight given to the risk profile and to the portfolio's return in the short term and the medium term, subject to compliance with the safety and liquidity limitations at any given moment.

2. The division of work between the Monetary Committee, the Foreign Currency Committee, and the Markets Department

In implementing Section 40(b) of the Bank of Israel Law, the Committee made a distinction between establishing the guidelines and periodic monitoring, and setting the detailed instructions for the day to day management of the portfolio.

The Monetary Committee will set the guidelines, in consultation with the Minister of Finance as established by law, will update the guidelines to the extent necessary, and will monitor the implementation of the investment policy by the Markets Department.

The Markets Department will implement the investment policy, within the framework of degrees of freedom which will be set periodically by the Monetary Committee, and will report to the Monetary Committee on a quarterly basis on the implementation of the policy: developments in international markets and their impact on the management of the reserves, the investment

¹⁰ The characteristics of the reserves portfolio are reported to the public in an annual report published on the Bank of Israel website.

decisions reached by the Department, the portfolio's rate of return, and the financial and other risks to which the portfolio is exposed.

The Markets Department will advise the Monetary Committee on fulfilling its functions, through position papers and suggestions for discussion in the Committee.

The Monetary Committee will approve and update periodically the division of authorities regarding the investment policy of the foreign exchange reserves.

3. The measurement currency for the holding rate of return on the foreign exchange reserves and the principles for its determination

The measurement currency for the holding rate of return on the reserves—hereinafter, the numeraire—is a basket of currencies and its composition allocation¹¹ is decided by the Monetary Committee. The allocation of the numeraire is set according to principles that reflect the goals of holding the reserves.

The principles according to which the composition of the numeraire is set are:

- a) The currency composition of actual imports, and of imports expected in an emergency situation
- b) The composition of the short and medium term external debt
- c) Assessments regarding the liquidity of the various currencies in which investment is possible.

The composition of the numeraire is also examined from the perspective of the currency composition of foreign exchange reserves portfolios of all central banks of countries that are IMF members, as reported by the IMF.

The composition of the numeraire will be set at the end of each year by the Monetary Committee, on the basis of the Markets Department's recommendation, in accordance with changes in domestic and global market conditions. If there are significant changes in one or more of principles (a)–(c), the composition of the numeraire will be brought to discussion by the Monetary Committee.

¹¹ The numeraire is defined in terms of units of currency (i.e., X dollars, Y euro, and Z pound sterling). The ratio between the currency units (in the above example, X:Y:Z) is determined by the currency composition of the portfolio (in the above example, % of dollars in the portfolio, % euro, and % pound sterling), which is set by the Committee and the exchange rates of the numeraire currencies at the time of the decision.

The reserves portfolio holding rate of return is measured in terms of the numeraire, so that the currency basket which makes up the numeraire is seen by the reserves portfolio managers as a risk-free currency composition.

4. The risk profile

The risk profile determines the maximum level of risk that the Monetary Committee is willing to accept in order to achieve the goals of holding the reserves. In establishing the risk profile, scenario analysis and a range of analytical tools to measure risk, such as VaR, CVaR, and others should be used. The risk profile is to be set by the Committee on a periodic basis in accordance with the changing conditions in the global capital markets.

The risk profile will be set so that given the worst 5 percent of outcomes, the average loss will not be greater than 475 basis points over a 1-year horizon. The risk level was established with the goal of limiting risk in the short term and increasing the probability of complying with the target of maintaining the purchasing power in the medium term.

5. The rules for managing the financial risks of the reserves

The rules for managing the financial risks to which the reserves are exposed, and their asset allocation, are to be set in accordance with the goals of the investment policy of the reserves (Section 1 above) and subject to the risk profile set by the Monetary Committee (Section 4). The asset allocation of the foreign exchange reserves will be approved at least once a year by the Monetary Committee.

a) The types of assets approved for use in managing the reserves are:

1. Bonds (including bonds with fixed interest, with variable interest, and CPI-indexed bonds)
2. Mortgage-backed securities (MBS) and asset-backed securities (ABS), a maximum of 6 percent of total reserves
3. Tradable Certificates of Deposit (CDs)
4. Fixed term deposits
5. Commercial Paper (CP)
6. Equities, a maximum of 17.5 percent of total reserves
7. Derivatives whose underlying asset is permitted for investment.

b) Management against a benchmark

Control over most features of the financial risk of the reserves is anchored in their management against a system of benchmarks. The rules for managing the financial risks of the reserves generate the currency allocation of the benchmarks, the features of their price risk (such as duration) in each currency, and the asset types included in it. The investment returns of the portfolio managers are measured against these benchmarks.

c) *Currency risk:*

The currency exposure of the reserves is set by:

- 1) The composition of the numeraire.
- 2) Strategic currency exposures relative to the composition of the numeraire: The extent of the strategic currency exposures is limited to 10 percent of total reserves. The composition and amounts of the exposures will be set by the Monetary Committee.
- 3) Short and medium term currency exposures relative to the composition of the numeraire: Their amount is limited to 2 percent of the total reserves. The composition and amounts of the exposures will be set by the Markets Department.

d) *Credit risk:*

In order to limit the credit risk inherent in day-to-day management of the reserves portfolio, the Monetary Committee set the following rules:

1. Investment is permitted in the currency of countries whose major credit rating category is at least BBB. Investment in currencies of countries whose credit rating category is BBB is limited to 1 percent of the total reserves and requires the specific authorization of the Monetary Committee.
2. Investment is permitted in bonds and commercial paper issued by governments, or with government guarantees, if their major credit rating category is at least a BBB rating. Investment in the BBB major rating category is limited to 1 percent of total reserves, and requires the specific authorization of the Monetary Committee.
3. Investment in bonds of public sector entities (PSE) is limited to a maximum of 15 percent of total reserves, and only in bonds whose major credit rating category is at least A.
4. Investment in corporate bonds is limited to 15 percent of total reserves, and only in bonds whose major credit rating category is at least BBB.
5. Investment in bonds and deposits of international financial institutions is limited to 15 percent of the reserves.
6. The exposure of the reserves to the banking system should not be greater than 10 percent of total reserves, and that is only to banks and brokers whose major credit rating category is at least A. Activity with banks and brokers whose major credit rating category is BBB is limited to DVP¹² (delivery versus payment) alone.

¹² DVP activity is when the payment and the asset are transferred between the sides at the same time and thus the credit risk in such activity is essentially zero.

e) *Liquidity risk:*

In order to provide an immediate response to the financial problems which arise during emergencies, a large portion of the reserves should be invested in assets that can be liquidated in large amounts at short notice and without negatively impacting their realization value.

1. The assets in which the reserves are invested are classified into 3 levels of liquidity:
 - a. Highly liquid assets that can be realized within a month without negatively impacting their realization value.
 - b. Assets that can be realized within three months without negatively impacting their realization value.
 - c. Low-liquidity assets that can be realized in a period exceeding three months without negatively impacting their realization value.
2. A minimum level of investment was set for highly liquid assets, and a maximum level was set for low-liquidity assets. Classification of assets into the various liquidity levels can change due to changes in market conditions.
3. At least 45 percent of the total reserves are to be invested in government bonds.

f) *Active management and compliance rules:*

The reserves portfolio is actively managed within the framework of limited and well defined degrees of freedom, as long as the investment policy adheres to the guidelines.

g) *Risk assets:*

Total combined investment in equities (Section 5.a.6) and in corporate bonds (Section 5.d.4) shall not exceed 25 percent of the total reserves.

6. The nonfinancial risks inherent in managing the reserves

In determining the investment policy for the reserves, there must be taken into account the exposure of the Bank and of the portfolio to the various nonfinancial risks inherent in investing the reserves—reputation risk, legal risk, political risk, operational risk, and so forth.

7. Measuring returns and reporting them

The reserves are managed with transparency. The Markets Department shall report periodically to the Monetary Committee (see 2 above) on the amount of the reserves and changes in them, the currency composition, changes in currency exposures, the asset allocation, portfolio duration, country exposure, credit risk, liquidity risk, and the return on the portfolio and its various components. The report should include an analysis of the current developments in the financial markets and their effect on the management of the reserves.

8. Handling passive breaches

The Monetary Committee will set the rules for handling passive breaches from the investment policy guidelines.

Appendix 3

Glossary

1	Active management	<p>An investment management style in which the portfolio manager tries to achieve a return greater than that of a benchmark or market index by deciding to buy or sell securities or by various investment strategies.</p> <p>In this report, the term describes the contributions of decisions to invest in additional assets and countries that are not included in the basic benchmark.</p>
2	Basic benchmark (numeraire-composition benchmark)	Represents an asset composition that is conservative and investable, which meets the first two objectives of the reserves' investment policy—maintaining the purchasing power of the reserves and managing them with a high degree of liquidity. Its currency composition is identical to the numeraire composition. It includes short-term government bonds in the numeraire currencies.
3	Basis point	0.01 percent; one ten-thousandth, or one hundredth of a percentage point.
4	Benchmark portfolio	A hypothetical investable portfolio constructed according to agreed-upon rules, which is used as a yardstick for evaluating the performance of an investment portfolio manager and as an anchor for the portfolio risk management.
5	CVaRp (Conditional Value at Risk)	The risk index that is used to quantify the level of risk, in terms of the expected loss on the investment portfolio in a specific time period and given a certain probability (p). In the guidelines, the Monetary Committee set the maximum level of risk for the reserves, so that given the worst 5 percent of possible outcomes, the average loss—the CVaR5%—would not be greater than 475 basis points over a one-year horizon.
6	Contribution of active management (excess return)	The difference between the return on the reserves portfolio and the return on the basic benchmark, which measures the decisions to invest in additional assets and countries that are not included in the basic benchmark. Also termed “excess return”.
7	Credit risk	The exposure to the possibility of loss due to failure of timely payment on debt, whether of an issuer, a financial institution or a country, or as a result of changes in the market's evaluation of the probability of such an event.
8	Currency risk	The exposure to the possibility of a loss as a result of a change in exchange rates.

9	Foreign exchange reserves	Financial assets that are issued by foreign entities and which are denominated in a foreign currency (including gold). They are exclusively owned and managed by a central bank and are not pledged in any way.
10	Holding rate of return	Rate of change in the value of an asset or portfolio, including interest or dividends, over a defined period.
11	Information Ratio	The Information Ratio measures the active management of the portfolio manager relative to the risk taken, and indicates the degree of consistency in the manager's ability to generate excess returns on additional risk. The risk is calculated as the ratio of the contribution of active management to its standard deviation.
12	Interest rate risk	The exposure to the possibility of a loss as a result of an increase in the yield to maturity.
13	Investment policy guidelines	The investment policy guidelines include details on the assets, risk profile, and quantitative and qualitative limitations on the types of assets permitted for investment. It should be emphasized that the limitations on the various asset types are not a recommendation for the actual share of investment in those asset types.
14	Liquidity risk	The exposure to a potential loss resulting from the compulsory liquidation of assets in a short period of time and at a larger volume than what the market is able to handle without a negative impact on the market price and/or the buy/sell spread.
15	Market risk	The exposure to a potential loss resulting from changes in asset prices. The market risk of bonds combines the interest rate risk and credit risk, if there is any.
16	Monetary Committee	The Monetary Committee was established in accordance with the Bank of Israel Law, 5770-2010. The Committee consists of six members—three from the Bank and three representatives from among the public. The Governor of the Bank of Israel serves as chairperson of the Committee. The Monetary Committee sets the policy for achieving the Bank's objectives, including monetary policy, and decides on the activities that the Bank must take to achieve them. The Committee is charged with outlining the guidelines for the reserves' investment policy, in consultation with the Minister of Finance, and with monitoring the implementation of such policy. The Committee also approves and updates the division of authorities with regard to the reserves' investment policy, between it and the Markets Department.
17	Modified duration	The sensitivity of a small change in the value of a debt instrument, expressed as a percentage of its original value, to the change in the

		yield to maturity (with the opposite sign) of the instrument. Measured in units of time.
18	Numeraire	A currency basket used for measuring the returns on the foreign exchange reserves. See Chapter B, Section 3 above.
19	Portfolio duration	The average duration of a portfolio of fixed income instruments (where the duration of each asset is weighted according to its proportion of the portfolio); a widely accepted measure used to estimate the portfolio's interest rate risk.
20	Risk assets	Assets featuring higher risk than government bonds. In this report, the term refers to equities and corporate bonds.
21	Risk-free portfolio	A portfolio in which the investor is not subject to gains or losses.
22	Risk premium	The excess return of a risk asset over the risk-free interest rate.
23	Spread asset	<p>An asset with a yield to maturity that is greater than that of a government bond with a similar term to maturity, due to differences in exposure to credit risk, liquidity risk, operational factors, etc.</p> <p>The yield spread of this asset is measured as the difference between its yield to maturity and that of a government bond with a similar term to maturity. Spread assets include also government bonds denominated in a currency which is not the local currency of the country of issuance.</p>
24	Standard deviation	A statistical measure used to quantify the dispersion of a distribution around its expected value. Often used as a measure to quantify the exposure to uncertainty. See also volatility.
25	Volatility	The standard deviation (see definition in this glossary) of the distribution of holding rates of return of a financial asset, such as a security or portfolio, over a defined time period (a day, a week, etc.).
26	Yield curve	A curve representing the yields to maturity of bonds with similar characteristics (such as the bonds of a particular country in local currency) and different maturities.
27	Yield spread	The difference between yields to maturity of two debt instruments.
28	Yield to maturity	The holding rate of return, in annual terms, which would be obtained from holding a debt instrument until its final redemption, if it was possible to invest all of its cash flows at the same rate of return until that date. Synonymous term: internal rate of return.