



# **Bank of Israel**

## **Investment of the Foreign Exchange Reserves**

### **Annual Report 2018**

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## Main developments

1. Israel's foreign exchange reserves totaled \$115.3 billion at the end of 2018, an increase of \$2.3 billion over the course of the year.
2. At the end of 2018, the level of reserves was slightly above the upper bound of the range of the appropriate level of reserves, which was set at \$70–110 billion, and remained stable at 31 percent of GDP.
3. In 2018, on average, 63.4 percent of the reserves were invested in government assets, 12.8 percent in equities, 5.9 percent in corporate bonds, 11.8 percent in long term bonds of other public entities, and the remainder were invested in short term assets.
4. The holding rate of return on the reserves portfolio in 2018 was 0.18 percent in numeraire terms, which is a basket of currencies—primarily comprised of the dollar and euro. The portfolio's rate of return was lower than in recent years, mostly due to equity market declines in the final months of 2018.

**Table 1**

**Holding rate of return on the foreign exchange reserves portfolio, from annual and multiyear perspectives, 2014–18**

	<b>2018</b>	<b>2016–18</b>	<b>2014–18</b>
<b>Actual portfolio return</b>	0.18	1.58	1.33
<b>Benchmark return</b>	1.06	0.52	0.38
<b>Excess return</b>	-0.87	1.06	0.95

5. The excess return vis-à-vis the benchmark rate of return was -0.87 percent in 2018. The investment in equities reduced the return by 1.1 percent, while in contrast, a duration longer than the benchmark's duration and the decline in the yield to maturity in the euro portfolio, together with short-term investments in the dollar portfolio, made a positive contribution of 0.27 percent.
6. The loss this year due to investment in equities reflects the risk inherent in investment in assets that are relatively risky compared to government bonds but that have a higher expected return over the medium term and long term. This is within the framework of the risk level authorized by the Monetary Committee. From a multiyear perspective, over the last 5 years, the portfolio's actual return performed better than the benchmark by almost a full percentage point in annual terms.
7. The Bank of Israel's decision to invest part of the foreign exchange reserves in equities was made in 2012, with a long term view<sup>1</sup>, against the background of the increase in the level of the reserves and the low interest rate environment. The share of investment in equities increased gradually to approximately 12.5 percent. Since then, the investment in equities contributed approximately 66 percent of the total overall excess return.
8. In the beginning of 2019, the Monetary Committee approved a new version of the investment policy guidelines<sup>2</sup>—the maximum level of risk, CVaR(5%), over a 1-year horizon, was increased from 400 basis points to 475 basis points. The importance of achieving the goal of maintaining the reserves' purchasing power also in the medium term was emphasized, and the maximum share of investment in equities was increased from 15 percent to 17.5 percent; the asset allocation for 2019 was set within the framework of the new version of the guidelines.

<sup>1</sup> See Box 1 in the Investment of the Foreign Exchange Reserves Report for 2017.

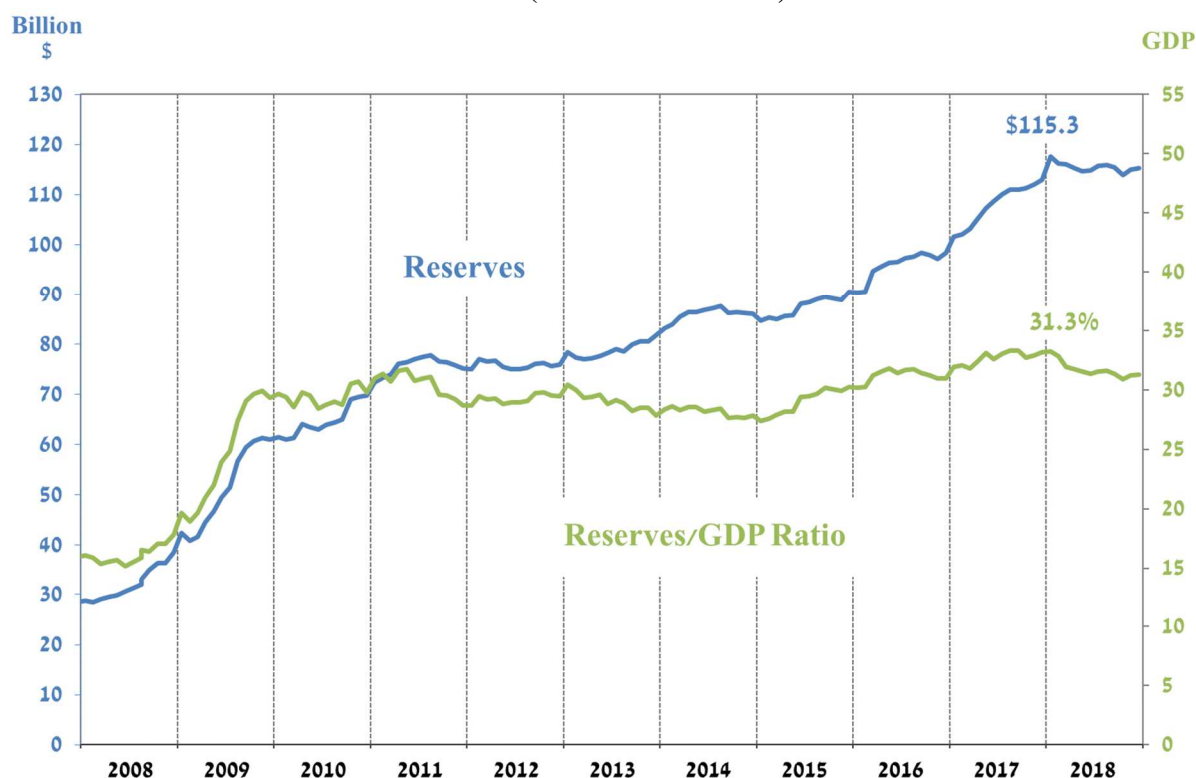
<sup>2</sup> See Box 1 in this report.

## The Level of the Foreign Exchange Reserves

### 1. The level of the reserves and the changes in it

In 2018, Israel's foreign exchange reserves grew by \$2.3 billion, from \$113 billion at the end of 2017 to \$115.3 billion at the end of 2018.<sup>3</sup> The reserves reached a peak at the beginning of the year and subsequently declined. The increase in 2018 was markedly smaller than the increase in the previous year (Figure 1).

**Figure 1**  
**The Level of Israel's Foreign Exchange Reserves, and the Ratio of the Reserves to GDP, 2008–18 (month-end balance)**



Source: Bank Of Israel

The increase in the reserves was mainly a result of \$3.3 billion in foreign currency purchases by the Bank of Israel, but mark to market reduced the reserves by \$1.6 billion (Table 2). The mark to market is the change in the dollar value of the reserves attributed to profits realized from income from interest, 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, due to the strengthening of the dollar against the euro and the pound sterling, currencies in which approximately 30 percent of the reserves are invested, and due to declines in the value of equities, a decline of approximately \$3.4 billion was recorded in the revaluation account. This

<sup>3</sup> 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 2018, their combined level was approximately \$1.8 billion. For more on this issue, see "Bank of Israel Financial Statements for 2018" (forthcoming).

decline was partly offset by income of \$1.8 billion from interest and capital gains. Government deposits, among other things from two bond issuances abroad, added \$0.6 billion to the reserves.

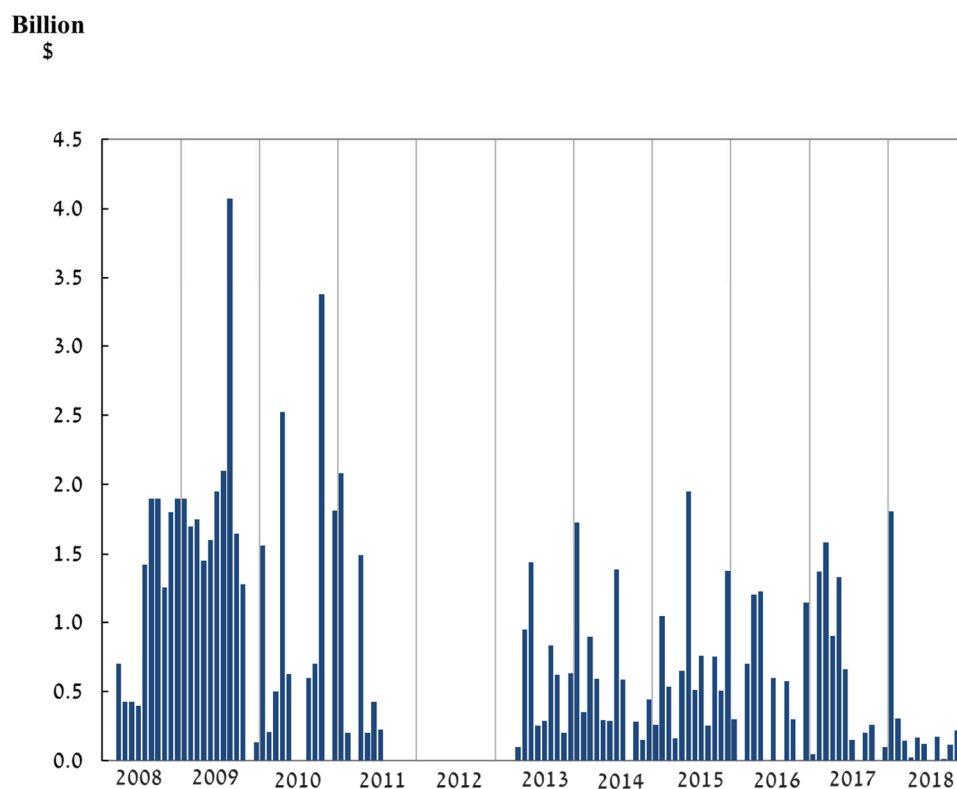
**Table 2**  
**Components of the Change in the Reserves, 2018 (\$ million)**

FX Purchase	3,319
Mark To Market	-1,605
Private Sector	-24
Government	578
<b>Total Change</b>	<b>2,268</b>

Source: Bank of Israel

Purchases by the Bank of Israel this year were carried out as part of the Bank of Israel's monetary policy<sup>4</sup> and were markedly lower than purchases in 2017 (\$6.6 billion) (see Figure 2).

**Figure 2**  
**Bank of Israel Foreign Exchange Purchases, January 2008–December 2018 (\$ billion)**



Source: Bank Of Israel

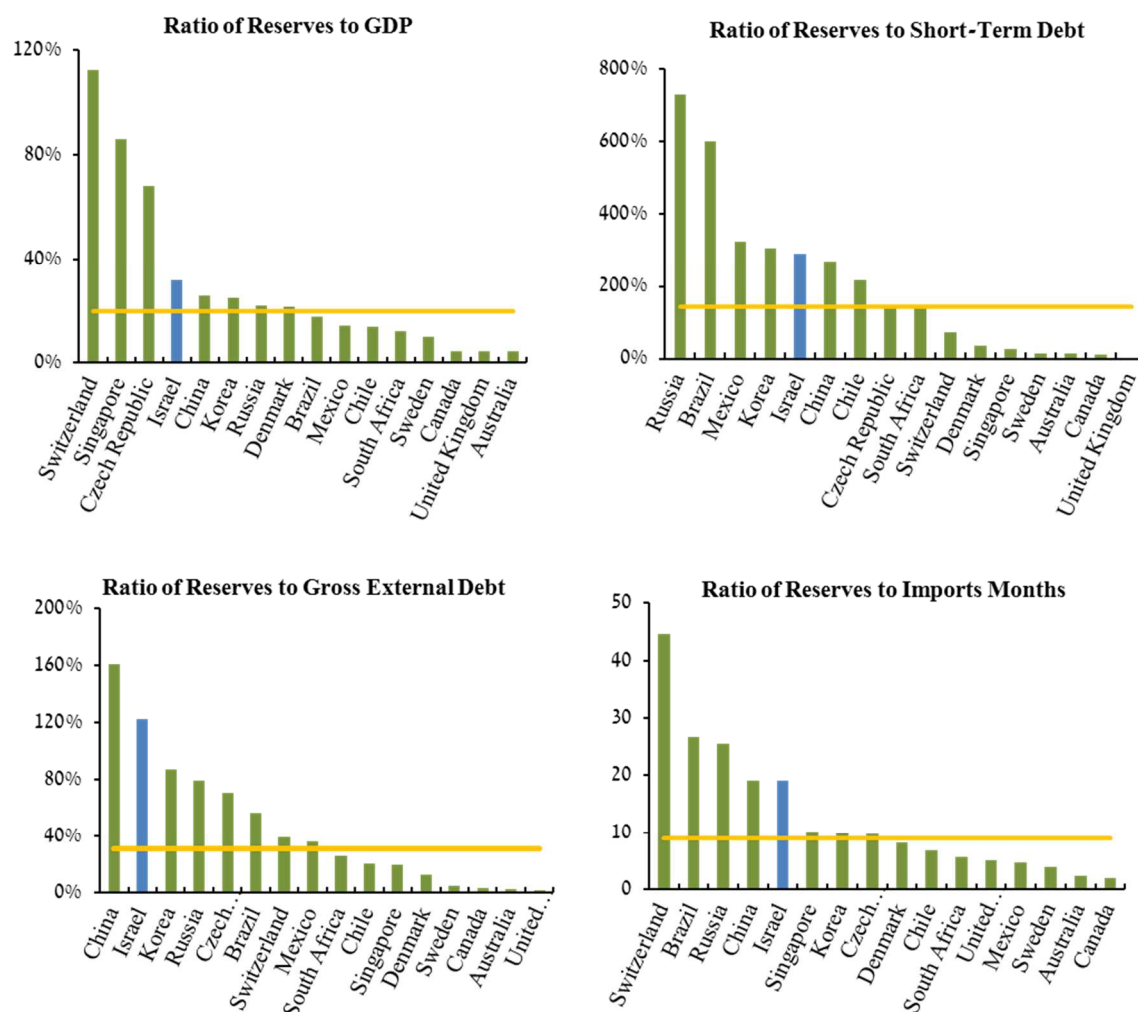
<sup>4</sup> See Box on "Exchange rate policy at the Bank of Israel: Reasons, outcomes and decision-making process" available at <http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Pages/IMF201602h.aspx#>

## 2. The appropriate level of the reserves

At the end of 2018, the level of reserves was slightly above the upper bound of the range of the appropriate level of reserves<sup>5</sup>, \$70–110 billion (Figure 1), as a result of actions taken as part of the Bank's monetary policy. The level of reserves as a share of GDP remained around the stable level it has been at since 2009, and this year even declined by approximately 2 percentage points, to 31.3 percent, in light of the growth in GDP and despite some increase in the reserves.

Figure 3 presents the reserves of Israel and other countries as a ratio to economic aggregates, against which it is common to measure reserves levels.

**Figure 3**  
**The Ratio of the Reserves<sup>1</sup> to Economic Aggregates at the End of 2018, Israel and Selected Other Countries**



<sup>1</sup>in -31..12.2018

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

<sup>5</sup> 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 Committee also approves and revises the allocation of responsibilities for the investment of the reserves between it and the Market Operations Department.

The **investment guidelines** include the specification of the assets, 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 Market Operations Department by the Monetary Committee. The strategic allocation is set 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 maximum level of risk for 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 appropriate risk**, 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,<sup>6</sup> spread and credit risk, currency and asset risk, and liquidity risk.

The risk measure **CVaRp (Conditional Value at Risk)** is used to quantify the level of 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<sub>5%</sub>—would not be greater than 400 basis points. 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 used to determine the strategic allocation for that year**, based on the expected macroeconomic and financial background conditions. For 2018, the Committee chose a lower level of risk than for 2017—300 basis points as opposed to 350 basis points, in view of the concern that the markets' volatility will increase in 2018, compared with the very low levels of volatility that prevailed in 2017. With that, it is important to emphasize that despite the lower level of risk that was chosen, the share of investment in risk assets remained almost unchanged, as a result of the notable increase in the cushion for loss absorption, which derived primarily from the US interest rate increase.

In January 2019, the Monetary Committee approved **a new version of the guidelines** (see Box 1): The maximum risk level (CVaR<sub>5%</sub>) was raised from 400 basis points to 475 basis points; the importance of achieving the target of maintaining the reserves' purchasing power also in the medium term was emphasized; the maximum percentage of investment in equities was raised from 15 percent to 17.5 percent, and the asset allocation for 2019 was determined in accordance with the new version of the guidelines.

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<sup>6</sup> Price risk for bonds is the interest rate risk measured in terms of duration (the average lifespan).



## Box 1

### The New Version of the Guidelines (which went into effect in January 2019)

In January 2019, the Monetary Committee approved the new version of the guidelines, after a consultation process with the Minister of Finance, as required by the Law. Following are the changes in the guidelines:

1. Risk constraint—the maximum level of risk was increased, from  $\text{CVaR}_{5\%}$ <sup>7</sup> of 400 basis points to  $\text{CVaR}_{5\%}$  of 475 basis points.
2. The following sentence was added, emphasizing the importance of achieving the goal of maintaining the purchasing power in the medium term, in the range of considerations taken into account when establishing the reserves portfolio's risk profile: "This risk level is determined in order to limit the risk in the short term and to increase the probability of meeting the goal of maintaining the purchasing power in the medium term".
3. Limitation on investment in equities—the maximum percentage of investment in equities was increased from 15 percent to 17.5 percent.<sup>8</sup>
4. The following sentence was added, emphasizing the importance in giving weight to the reserves portfolio's performance in the medium term, subject to complying with the security and liquidity constraints in the short term: "The reserves portfolio's investment strategy shall be formulated while assigning a weight to the risk profile and to the reserves portfolio's returns in the short term as well as to the risk profile and to the reserves portfolio's returns in the medium term. This is subject to complying with the security and liquidity constraints at any given time".

It is important to emphasize that the guidelines refer to the maximum risk level and percentage of investment in equities, and not necessarily to set the actual risk level and percentage of investment in equities. These are established within the framework of the annual strategic allocation.

#### The considerations behind the decision to change the guidelines

The basic parameters of the investment policy—investment objectives, investment horizon, and risk profile—were established when the level of the reserves was approximately \$75 billion. Since then their level has grown and at the end of 2018 it was \$116 billion (Figure 3 in Chapter A).

**The basic parameters of the investment policy should be impacted by the level of the reserves** relative to the level of potential uses in an emergency. The main goal of holding the reserves is to provide the economy sufficient foreign currency in a crisis, such that the reserves will be the main source of financing in foreign currency for the State. In order to achieve this goal, the Bank of Israel, similar to many other central banks, defined the investment objectives with the following order of priorities: safety (maintaining the purchasing power of the reserves), liquidity, and achieving an adequate return. The growth in the level of the reserves should not necessarily lead to a change in the priorities, but it could impact on the weight and emphases ascribed to each of the goals. Thus, for example, the importance of the safety objective declines with the increase in the reserves as the risk that the level of reserves will decline to below the required level, decreases.

In view of recent years' growth in the level of the reserves, the Monetary Committee re-examined the basic variables of the investment policy, and in particular, the investment

<sup>7</sup> The  $\text{CVaR}_{5\%}$  measurement estimates the average loss expected in the reserves portfolio with a probability of 5 percent; that is, the average of the worst 5 percent of possible outcomes.

<sup>8</sup> We note that the limitation on total percentage of combined investment in equities and corporate bonds was not changed.

horizon and risk profile. Following are the main considerations in examining the investment policy:

1. **The level of the reserves and the investment horizon:** As even in the most severe crisis, the use of the reserves is expected to be gradual and to be spread out over time, not all the reserves need to be available for immediate use. The higher the level of the reserves is, the smaller the relative share of the reserves that needs to be available for immediate use in an emergency, and therefore it is appropriate to invest some of the reserves for a longer investment horizon. Moreover, the higher the level of the reserves is, the larger the “cushion” for absorbing losses. This cushion makes it possible to invest in more volatile assets such as equities, and to benefit in the long term from the risk premium inherent in such assets.
2. **The level of the reserves and achieving an adequate return:** The importance of achieving an adequate return grows as the level of reserves increases. When the level of reserves is high, the marginal utility of holding them, derived from the decline in the country’s risk premium and the reduced probability of a crisis, declines with their growth. In contrast, the cost of holding them—the spread between the financing cost and the yield generated by the reserves portfolio—does not change in relative terms, but increases in absolute terms. Thus in the cost-benefit balance, the marginal contribution to the economy from holding the reserves declines with their growth. Therefore, when the level of reserves rises, there is increased importance of achieving an adequate return that will decrease the cost of holding them, even at the cost of some increase in the risk level in the short term.
3. **The volatility in the short term and the returns in the medium term:** Only managing the reserves portfolio with the goal of minimizing the risk in the short term, without taking into account its returns in the medium term, not only is liable to lead to a lower return over time, but is also liable to increase the risk level of the portfolio in the medium term (as will be shown below). Therefore, when establishing the risk level for the reserves portfolio, it is appropriate to balance the short term volatility of the asset returns and the medium term risk premium inherent in them.
4. **Maintaining the purchasing power of the reserves:** In view of the low level of the current yields to maturity in most advanced economies, and in Europe in particular, it is reasonable to assume that in the foreseeable future they will increase and certainly will not decline at the rates that they declined over the past twenty years. In the reasonable assumption that in the medium term the yields to maturity will increase gradually and that inflation in advanced economies will converge to central bank targets, low, and maybe even negative, real holding rates of return in investment in government bonds may be expected. As a result, unlike in the past, preserving the purchasing power of the reserves via investment in government bonds only, is expected to be challenging.

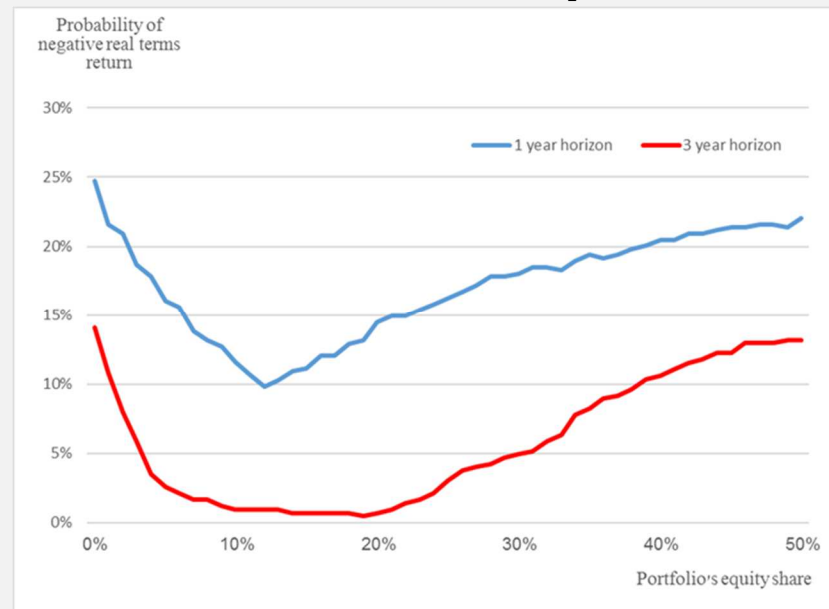
**Combining equities into the reserves portfolio up to a certain percentage is expected to improve its returns in the medium term and to increase the probability of achieving the goal of preserving the purchasing power.** This claim can be demonstrated by comparing the historical returns of portfolios with varying levels of investment in equities. Figure 1 presents the probability of achieving a negative real return based on historical data of asset returns (1980–2018) over horizons of 1 year and 3 years, in portfolios with varying levels of investment in government bonds<sup>9</sup> and equities, with a currency composition similar to that of the

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<sup>9</sup> With maturity of 1–5 years.

numeraire.<sup>10</sup> This, for example, the probability of a negative real return over a 3-year horizon in a portfolio with 20 percent in equities is essentially zero.

**Figure 1**  
**The Probability of a Negative Real Return in Portfolios Made up of Varying Weights of Investment in Government Bonds and Equities (1980–2018)**



The historical data displayed in Figure 1 indicate that adding equities to the portfolio, at a proportion of up to 20 percent, is expected to reduce the probability of a negative real return over an investment horizon of 3 years. It may be concluded from this that adding equities, up to that percentage, to the reserves portfolio is expected to increase the probability of achieving the goal of maintaining the purchasing power in the medium term. In contrast, the weight of investment in equities that minimizes the probability of a negative real return over a 1 year horizon is approximately 13 percent. Thus, as noted above, given the current level of the reserves, it is appropriate to balance the portfolio risk in the short term and its returns in the medium term, and as such to conclude that the share of equities in the portfolio should range from 13 percent to 20 percent.

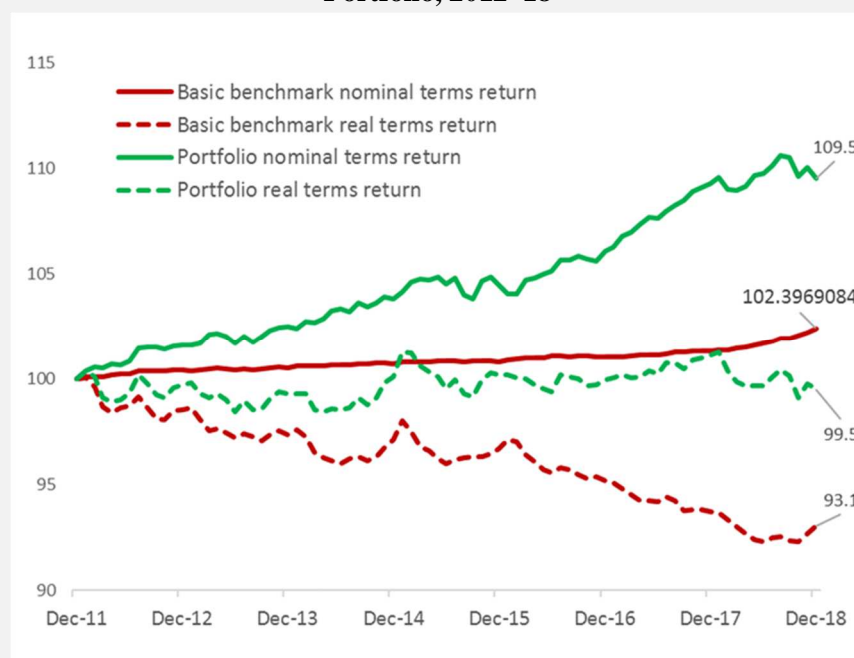
The contribution of equities to achieving the goal of preserving the purchasing power in the medium term can also be shown through the reserves portfolio's real returns since 2012. Figure 2 presents the cumulative real and nominal yields of the reserves portfolio and of the basic benchmark which represents a conservative and investable asset composition (and made up only of short-term government bonds).<sup>11</sup> The data in the figure indicate that the cumulative real yield of the basic benchmark in that period was approximately -7 percent. Therefore, if the reserves would be invested in the basic benchmark, they would have eroded by approximately 7 percent in real terms. In contrast to the basic benchmark, the actual portfolio maintained its real value most of the time. Despite the relatively small share of equities in the reserves

<sup>10</sup> The currency composition of 65 percent dollar and 35 percent euro. The investment in dollar assets is represented by investment in US government bonds and the S&P 500 Index, and the investment in euro assets is represented by investment in German government bonds and the CDAX Index. The distribution of real returns in portfolios is calculated via the moving periodic (1-year and 3-year) real return of monthly observations.

<sup>11</sup> See also Chapter C of this report.

portfolio during that time<sup>12</sup>, about half the cumulative return came from the investment in equities. These data illustrate the importance of integrating equities into the reserves portfolio, with the goal of increasing the probability of achieving the goal of preserving the purchasing power.

**Figure 2**  
**The Cumulative Nominal and Real Return of the Basic Benchmark and of the Reserves Portfolio, 2012–18**



In conclusion, in view of the current high level of the reserves, it is appropriate to invest part of them with a longer investment horizon. In light of that, there is increased importance of a proper balance between short term volatility of the assets' returns and the risk premium inherent in them in the medium term. In addition, in view of the low level of real interest rates expected in the foreseeable future, there is increased importance of integrating equities into the reserves portfolio, with the goal of increasing the chances of complying with the goal of preserving the purchasing power. These considerations were at the basis of the Monetary Committee's decision to make the changes noted above in the guidelines.

The strategic asset allocation for 2019 was set within the framework of the new version of the guidelines. The considerations that guided the Monetary Committee's decision to increase the maximum share of investment in equities in the new version of the guidelines, were among the considerations that were taken into account in its decision to increase the share of investment in equities in the strategic allocation for 2019, from 12.5 percent to 15 percent.

### 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.

<sup>12</sup> The share of equities increased gradually from 3 percent in 2012 to 13 percent in 2018.

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)<sup>13</sup>, high-rated government bonds with a high degree of liquidity and the same currency composition as the numeraire.

**An annual strategic allocation process in the reserves portfolio determines the composition of the portfolio for the coming year.** 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 is a process in which the expected economic and financial environments and their effect on the prices of the assets and on the optimal portfolio composition based on it are assessed. It relies on a broad range of data and on statistical models, and therefore involves a degree of uncertainty. Beyond the results of the models, judgment is used when choosing the allocation based on a sensitivity analysis of the models' results and stress scenario analysis. **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 2018, the Committee decided to leave the investment in equities unchanged at 12.5 percent, to decrease the investment in corporate bonds from 8 percent to 6 percent, and to lengthen the duration of the dollar portfolio (see Table 3).

**Table 3**  
**Strategic Allocation for 2017 and 2018**

	<b>2017</b>	<b>2018</b>
<b>Duration (Years)</b>	<b>1.70</b>	<b>1.80</b>
USD	1.80	2.00
EURP	1.50	1.50
GBP	1.50	1.50
<b>Bonds</b>	<b>79.5%</b>	<b>81.5%</b>
<b>Equity</b>	<b>12.5%</b>	<b>12.5%</b>
US	7.5%	7.4%
Germany	0.8%	0.9%
UK	0.8%	0.8%
France	0.8%	0.9%
Japan	1.1%	1.2%
Hong - Kong	0.3%	0.3%
Switzerland	0.4%	0.4%
Australia	0.3%	0.3%
Canada	0.5%	0.4%
<b>Corporate Bonds</b>	<b>8.0%</b>	<b>6.0%</b>
US	6.5%	4.5%
Europe	1.5%	1.5%

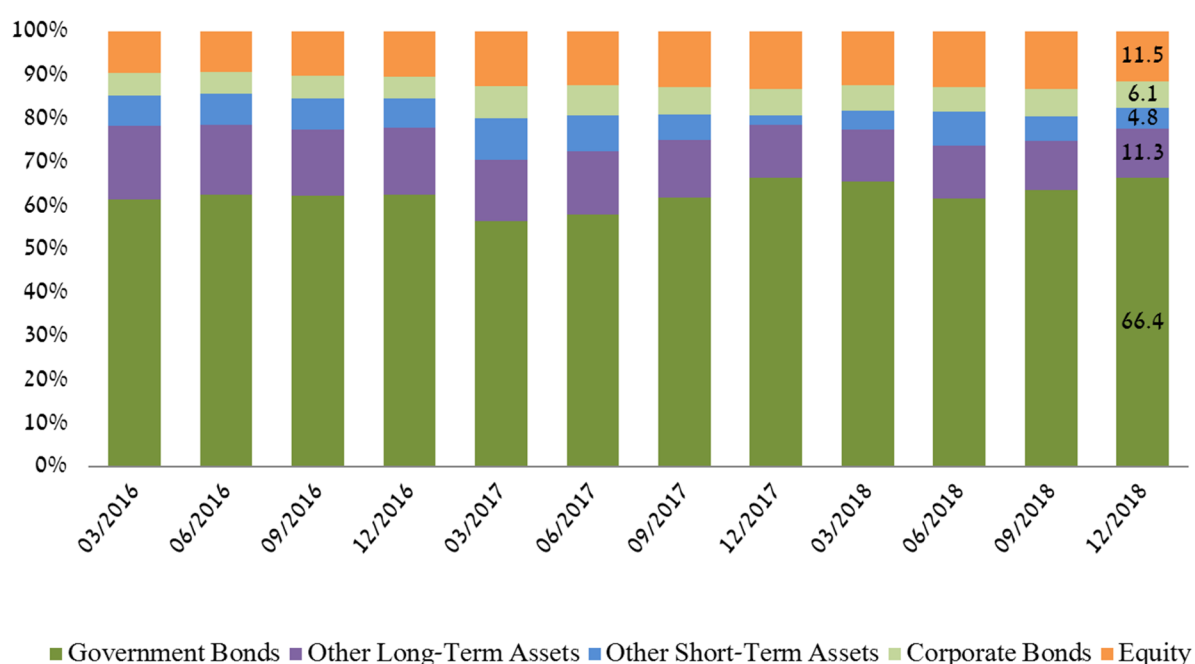
Source: Bank of Israel

<sup>13</sup> Before March 2014, the duration of the basic benchmark was identical to the duration of the reserves portfolio.

It should be noted that **the Monetary Committee allows the Market Operations 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. **At the end of 2018**, 66.4 percent of the reserves were invested in government assets<sup>14</sup>, and 11.5 percent were invested in equities (Figure 4). The share of investment in short term spread assets was 4.8 percent, and the share of investment in corporate bonds was 6.1 percent.

In 2018, on average, 63.4 percent of the reserves were invested in government assets, 12.8 percent in equities, 5.9 percent in US and European corporate bonds, 11.8 percent in long-term spread assets, and the remainder in short-term spread assets.

**Figure 4**  
**The Distribution of the Reserves Portfolio by Assets, 2016–18 (period-end)**



Source: Bank of Israel

<sup>14</sup> This includes cash and deposits at central banks, the inherent risk of which is equal to the country risk inherent in government bonds.

## C. The Holding Rate of Return on the Reserves

### 1. Economic and financial background conditions

**The rate of worldwide growth was essentially unchanged this year (a decline from 3.7 percent to 3.6 percent<sup>15</sup>), and the inflation environment remained moderate.** The US economy was notably good, while in contrast the growth rate moderated in the other major regions (Figure A.1 in Appendix 1). Monetary policy remained accommodative in Europe and Japan, but the withdrawal from accommodative monetary policy continued in the US. The risk level increased, influenced by the increased severity of the trade war, the continued process of raising the interest rate in the US, and political developments in Europe. The loss of momentum in the macroeconomic environment and the increased risk level led to negative sentiment in the markets, and equity markets worldwide declined relatively sharply, mainly toward the end of the year. Corporate bond spreads widened and risk assets traded with high volatility. The dollar strengthened in 2018 (Figure A.4 in Appendix 1) against most currencies and by 4.4 percent against the DXY index<sup>16</sup>, against the background of the exit from risk assets and the increase in short term dollar yields. Oil prices declined sharply at the end of the year, due to an increase in supply and concern that moderation in economic activity will lead to a decline in demand.

The **US economy** accelerated this year driven by private consumption, from 2.2 percent to 2.9 percent, against the background of fiscal incentives announced by the US government. The US Federal Reserve increased the federal funds rate four times during the course of the year, in light of core inflation solidifying around the 2 percent target, and led to a rise in bond yields and continued flattening of the yield curve (Figure 5 and Figure A.5 in Appendix 1). In **the eurozone**, economic activity continued to grow in 2018 by a solid rate of 1.9 percent, but was more moderate than the 2.4 percent growth rate in 2017. The ECB ended its asset purchase program and core inflation remained moderate. In **the UK**, growth moderated from 1.7 percent to 1.3 percent, due to the uncertainty surrounding Brexit. Over the course of the year, the BOE raised the interest rate by only 0.25 percentage points.

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<sup>15</sup> Growth data in this report are based on the World Bank's "Global Economic Prospects" from January 2019.

<sup>16</sup> The dollar strengthened by 4.4 percent against the DXY (dollar index spot) Index, a weighted average of the exchange rates of the following currencies vs. the dollar: euro, pound sterling, Swiss franc, Japanese yen, Canadian dollar, and Swedish krona.

**Figure 5**  
**Ten-year Government Bond Yields—US and Germany, 1998–February 2019**



Source: Bloomberg

The trends in financial markets deteriorated at the end of the year, mainly in the US, even though macroeconomic background conditions did not markedly worsen relative to 2017. Possible explanation for this include a high level of risk asset prices at the beginning of the year, concern over the end of the advanced business cycle, the uncertainty and more rapid than expected pace of the Fed's interest rate increases, political uncertainty, particularly the trade war. The strengthening of the concerns was reflected in increased volatility from the lows in 2017 to a higher level in various assets and in various periods during the course of the year (Figure 8 and Figure 14 in Chapter E).

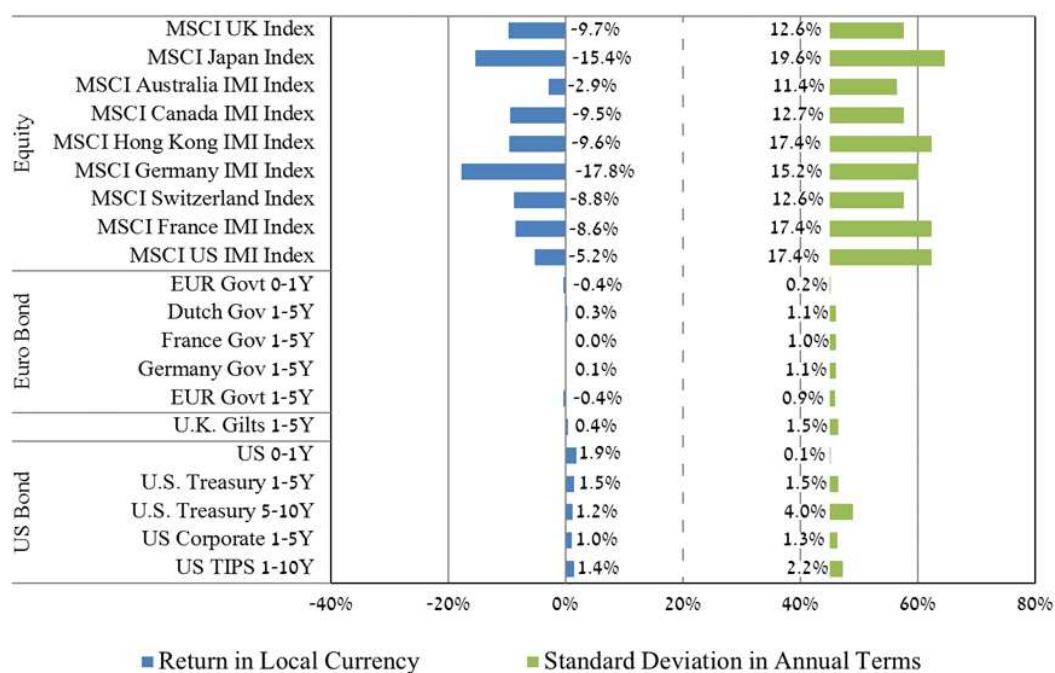
Appendix 1 presents a more detailed analysis of the economic and financial environments.

**In 2018, most asset types in the portfolio, except for US bonds, had a negative holding rate of return** (Figure 6—yields are presented in local currency terms). The assets that generated the highest holding rates of return in 2018 were US government bonds, which make up the majority of the portfolio. In the beginning of 2019, equity indices recovered notably (Figure 7) and generated a positive return for the portfolio.

European equities and short term bonds had negative holding rates of return. The volatility (standard deviation) of equities was, as expected, relatively higher than other assets and more than double the volatility of the previous year (Figure 8).



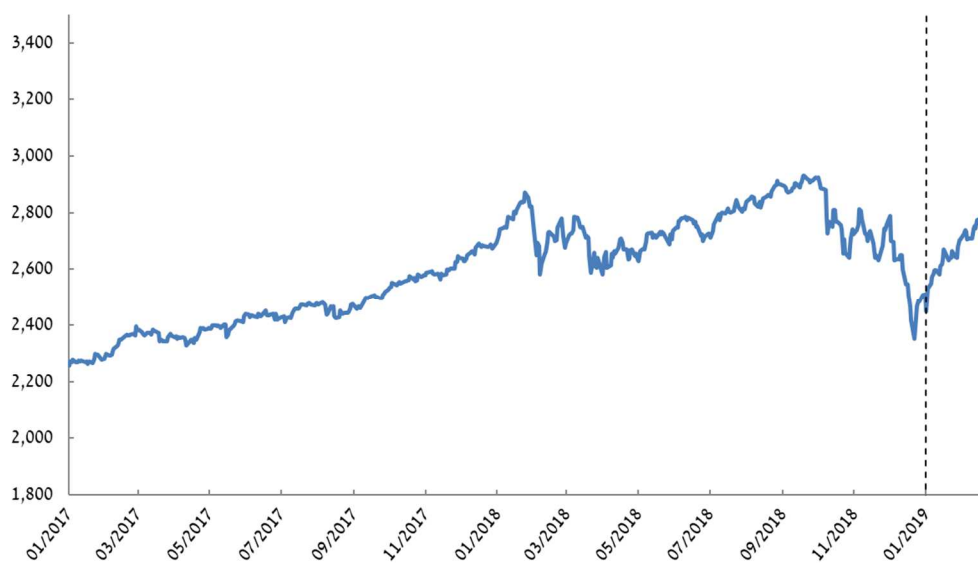
**Figure 6**  
**Holding Rates of Return and Standard Deviation for Indicators of the Main Assets in the Reserves Portfolio, 2018**



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

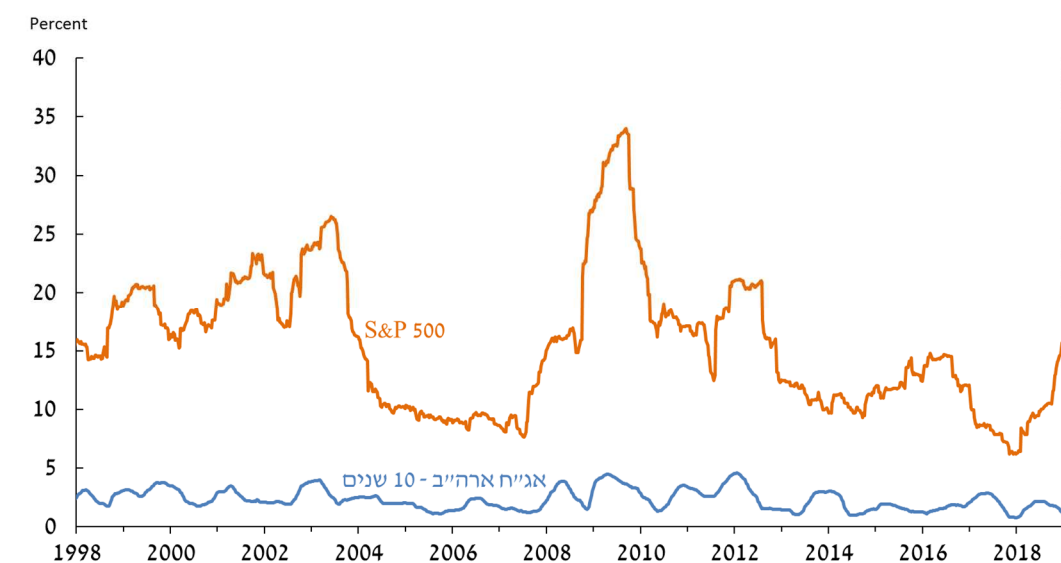
**Source:** Bank of Israel and Bloomberg.

**Figure 7**  
**S&P 500 Equity Index, from 2017 to February 2019**



**Source:** Bank Of Israel and Bloomberg

**Figure 8**  
**Standard Deviation of the S&P 500 Index and of 10-Year US Treasury Notes, 1998–February 2019**

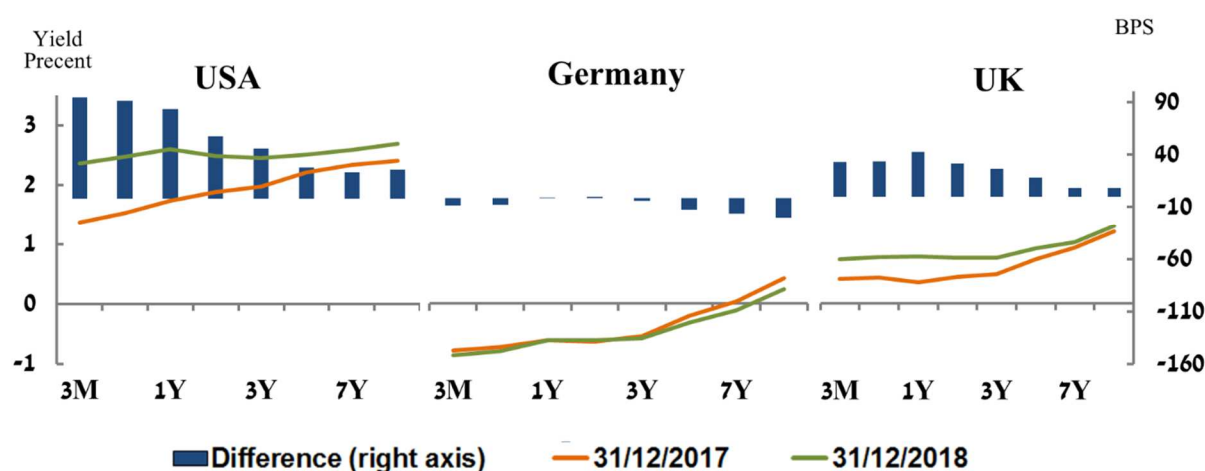


Weekly standard deviation of the return on the S&P500 and of the yield to maturity on 10-year US Treasury Notes, in annual terms, 1-year<sup>1</sup> moving average.

Source: Bank of Israel

In the US, the yield to maturity for short terms increased markedly (by approximately 100 basis points) and had a considerable impact on financial markets and the reserves portfolio's return. In contrast, the yield to maturity for long terms increased only slightly, and the curve “flattened”. There was a similar development in the UK as well, while in Europe the yield to maturity declined somewhat (Figure 9).

**Figure 9**  
**Change in Yield Curves, Government Bonds of US, Germany, and UK, 2018**



Source: Bloomberg

## 2. Return on the reserves portfolio

**The holding rate of return on the reserves portfolio in 2018 was the lowest since 2009.** The return was 0.18 percent in numeraire terms, and the return on the basic benchmark was 1.06 percent (Table 4).

The return in numeraire terms was positive, in contrast to the negative revaluation in dollar terms (see Table 2). The return is measured in numeraire terms as the currency distribution of the numeraire reflects the distribution of the reserves' potential uses in an emergency. In contrast, the negative contribution of the mark to market component (amounting to \$1,605 million) to the change in the reserves in dollars was caused by negative exchange rate differentials, as a result of weakening of the currencies in which the reserves are invested, against the dollar. These exchange rate differentials are not included in the return in numeraire terms.

The **numeraire** is a basket of currencies consisting of three currencies, whose weights were distributed over the year, on average, as follows: dollar—66.6 percent, euro—30.8 percent and pound sterling—2.6 percent. The numeraire's composition is derived from the possible uses of the reserves when needed and the principles that reflect the objectives of holding those reserves. The holding rate of return on foreign exchange reserves is measured in terms of the numeraire, so that from the point of view of the reserves portfolio manager, its composition is considered to be risk-free. The composition of the numeraire is reviewed at least once a year and revised when necessary with the approval of the Monetary Committee. The numeraire is defined quantitatively (a quantity-based currency basket) so that its composition varies daily in line with changes in the exchange rates of its currencies.

The return was achieved under financial conditions of an increase in yields to maturity on dollar bonds in which the vast majority of the reserves is invested, of negative returns on European bonds, and an increase in volatility in equities from the previously historically low levels. As such, the volatility of the portfolio was higher in 2018 than in the preceding two years, even though the share of risk assets in the portfolio did not increase.

**Table 4**  
**Reserves Portfolio Performance vs. the Basic Benchmark, 2009–18**  
**(percent, in annual numeraire terms)**

	<b>Performance</b>		<b>Excess Return <sup>1</sup></b>
	<b>(1)</b>	<b>(2)</b>	<b>(1)-(2)</b>
	<b>Actual Portfolio</b>	<b>Basic Benchmark</b>	<b>Total</b>
<b>2009</b>	<b>1.91</b>	<b>0.81</b>	<b>1.10</b>
	(0.60)	(0.65)	(0.22)
<b>2010</b>	<b>1.73</b>	<b>1.19</b>	<b>0.54</b>
	(0.57)	(0.36)	(0.53)
<b>2011</b>	<b>1.28</b>	<b>1.07</b>	<b>0.21</b>
	(0.80)	(0.39)	(0.71)
<b>2012</b>	<b>1.59</b>	<b>0.42</b>	<b>1.17</b>
	(0.57)	(0.17)	(0.52)
<b>2013</b>	<b>0.87</b>	<b>0.07</b>	<b>0.80</b>
	(0.80)	(0.16)	(0.74)
<sup>2</sup> <b>2014</b>	<b>1.28</b>	<b>0.22</b>	<b>1.06</b>
	(0.85)	(0.09)	(0.88)
<b>2015</b>	<b>0.64</b>	<b>0.10</b>	<b>0.54</b>
	(1.29)	(0.12)	(1.29)
<b>2016</b>	<b>1.56</b>	<b>0.21</b>	<b>1.35</b>
	(1.33)	(0.13)	(1.33)
<b>2017</b>	<b>3.03</b>	<b>0.30</b>	<b>2.73</b>
	(0.80)	(0.10)	(0.77)
<b>2018</b>	<b>0.18</b>	<b>1.06</b>	<b>-0.87</b>
	(1.67)	(0.16)	(1.69)

<sup>1</sup> In parentheses—the standard deviation of the weekly returns in annual terms.

<sup>2</sup> 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.

Source: Bank of Israel.

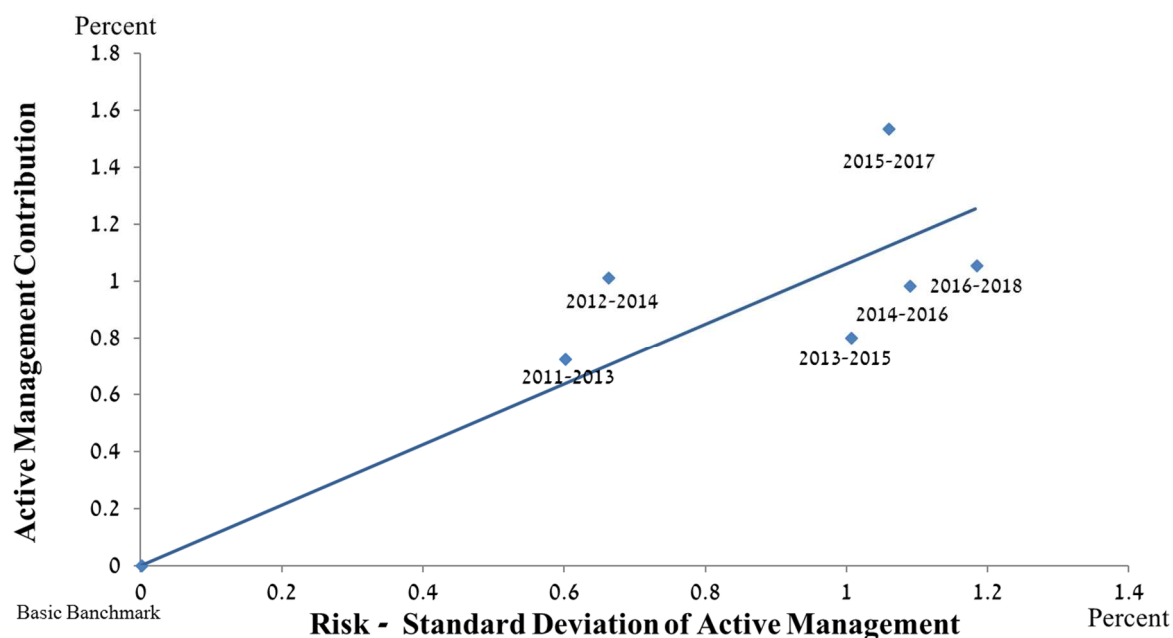
### 3. Multiyear return on the reserves portfolio

**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) basis. The increased proportion of the reserves portfolio invested in risk assets in recent years strengthens these effects and boosts the phenomenon. **Measuring the multiyear return** weakens the importance of the timing of the investment and its measurement. Thus, for example, this year's decrease in the return was notable due to the declines at the end of the year in equity markets.

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. A focus on

multiyear measurement is likely to moderate the pressure to reduce holdings at such times.<sup>17</sup> Multiyear measurement provides a clearer picture of the expected link between high risk and high return (Figure 10).

**Figure 10**  
**The Moving Average Annual Contribution, for 3-Year Periods, of Active Management vis-à-vis its Standard Deviation, 2009–18**



Standard deviation based on daily returns  
**Source:** Bank of Israel.

**The three-year average holding rate of return on the reserves portfolio decreased this year to 1.58 percent in numeraire terms** (Table 5). The **active management** contribution also declined, to 1.06 percent. The relatively low return and the negative contribution this year pulled the three-year returns and contributions downward. The three-year **risk level** increased compared to the preceding year.

<sup>17</sup> Regarding the issue of investment in equities, see also Box 1 in the Investment of the Foreign Exchange Reserves report for 2017.

**Table 5**  
**Portfolio Return and Active Management Contribution, Annual and 3-Year Periods<sup>1</sup>**

	Return		Active Management Contribution	
	Annual	3-year, annual terms	Annual	3-year, annual terms
<b>2013</b>	<b>0.87</b> (0.80)	<b>1.25</b> (0.70)	<b>0.80</b> (0.74)	<b>0.72</b> (0.60)
<sup>2</sup> <b>2014</b>	<b>1.28</b> (0.85)	<b>1.25</b> (0.74)	<b>1.06</b> (0.88)	<b>1.01</b> (0.66)
<b>2015</b>	<b>0.64</b> (1.29)	<b>0.93</b> (1.04)	<b>0.54</b> (1.29)	<b>0.80</b> (1.01)
<b>2016</b>	<b>1.56</b> (1.33)	<b>1.16</b> (1.09)	<b>1.35</b> (1.33)	<b>0.98</b> (1.09)
<b>2017</b>	<b>3.03</b> (0.80)	<b>1.74</b> (1.06)	<b>2.73</b> (0.77)	<b>1.53</b> (1.06)
<b>2018</b>	<b>0.18</b> (1.67)	<b>1.58</b> (1.14)	<b>-0.87</b> (1.69)	<b>1.06</b> (1.14)

<sup>1</sup>In parentheses—the standard deviations of the weekly returns in annual terms.

<sup>2</sup>In March 2014, the basic benchmark's duration was shortened from 10 months to 6 months, and acted to increase the spread between the benchmark return and the reserves portfolio return.

Source: Bank of Israel

#### **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, credit spread assets, corporate bonds, and currency and other exposures.

Since 2012, the 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 inherent in them. 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.

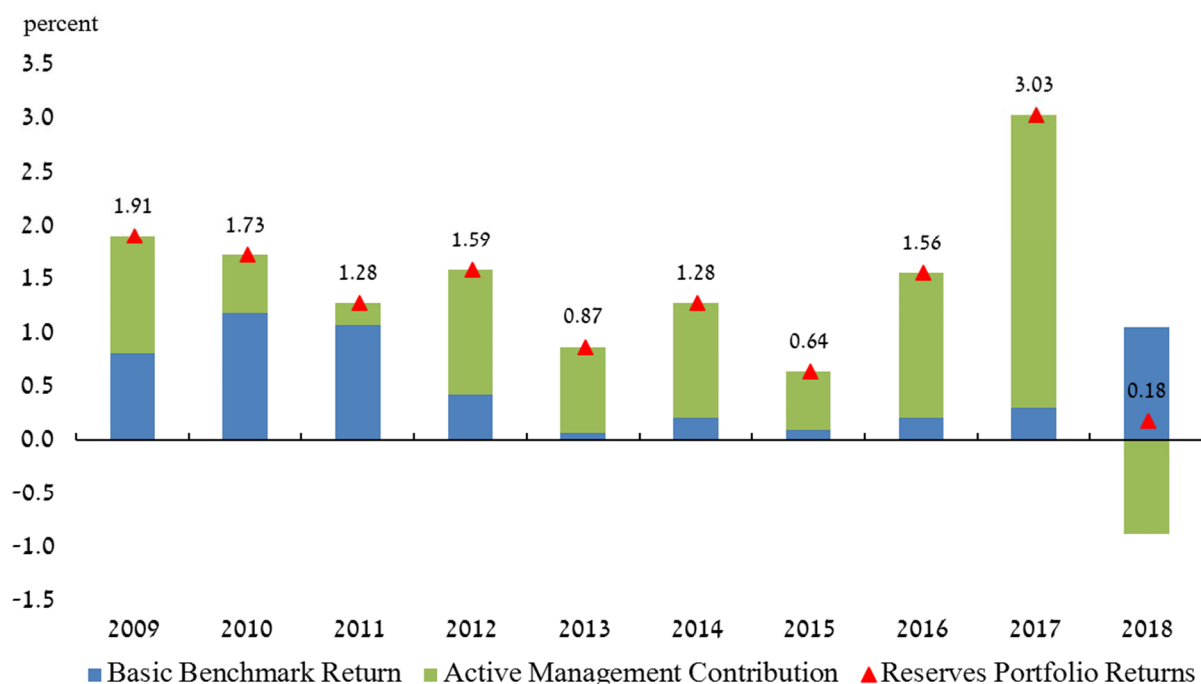
This year, active management reduced the reserves portfolio's return by 0.87 percent, compared with a positive contribution of 2.73 percent in the preceding year (Table 4)—the only negative contribution in the past decade.

**Table 6**  
**Active Management Contribution Breakdown, 2016–18**  
(basis points, in numeraire terms, annual)

	2016	2017	2018
Equity	94	219	-110
Duration & Diversification	19	19	15
Spread assets	22	27	12
Corporate Bonds	7	10	-7
Currency and asset exposures	-7	-1	2
<b>Total</b>	<b>135</b>	<b>273</b>	<b>-87</b>

Source: Bank of Israel.

**Figure 11**  
**Rate of Return: Reserves Portfolio, Basic Benchmark, and Active Management Contribution, 2009–18 (percent, in numeraire terms)**



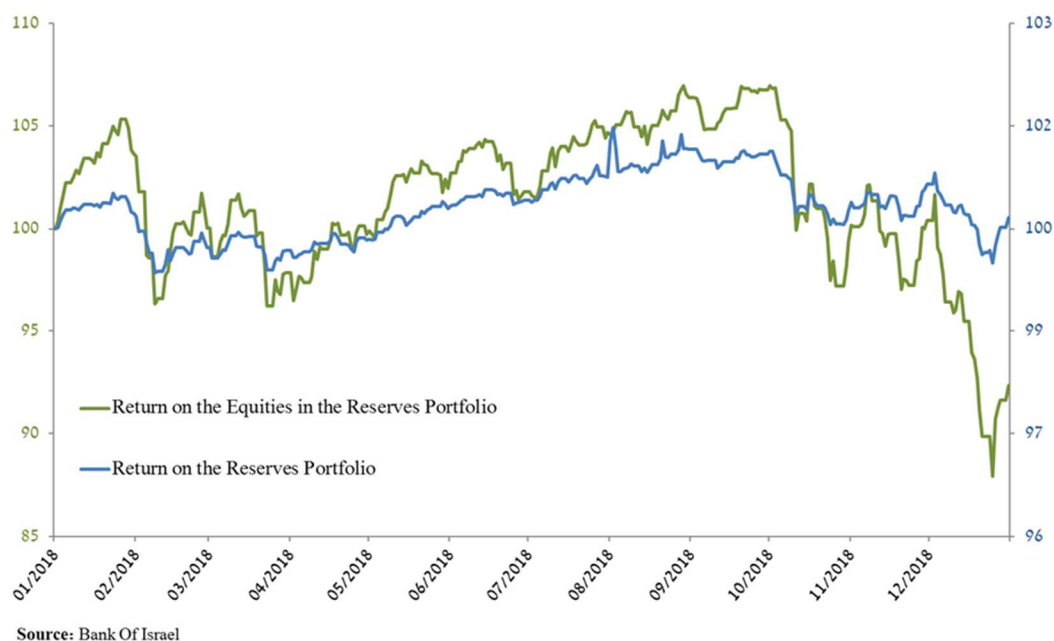
Source: Bank Of Israel

The negative contribution of equities was the most significant of risk assets' contributions, at -110 basis points (Table 6). In contrast, the other risk components contributed 23 basis points. Among the spread assets, this year also the contribution of investment in short term assets was the most notable, while the investment in corporate bonds decreased the return (7 basis points).

Investment in equities has a very large impact on the reserves portfolio's performance and volatility (Figure 12), despite their low share relative to the reserves portfolio. This is particularly the case in the relatively low-return environment in the non-equity part, which generates a low

current return. Since the start of the investment in equities in 2012, it has contributed 66 percent of the total overall return of active management (4.5 percent out of a total of 6.8 percent).

**Figure 12**  
**Return on the Reserves Portfolio and on the Equities in the Reserves Portfolio in 2018**  
**(100 = 1.1.2018)**



Note that there is a negative correlation, primarily during times of crisis, between the risk components, duration, and equities, which reduces the investment risk. This is because in times of financial market volatility in which equity prices fall, there is a parallel demand for safer government bonds. Higher bond duration will lead to a compensating higher contribution, when equities decline.

## 1. Equities

The reserves' investment in equities began in 2012. It tracks a broad index of equities in advanced economies, based on the MSCI Developed Markets Index. Investments in equities in markets that are not denominated in numeraire currencies, are hedged against the effect of a change in the exchange rate of the dollar against the currencies of the various markets.

**The contribution of the investment in equities in 2018 was negative 110 basis points, and is of considerable size compared to the contributions of other risk components** (Table 7). The negative contribution was recorded after major equity markets weakened markedly for the year overall (Figure 6 and Figure A.3 in Appendix 1). During the course of the year, there was considerable volatility. In the first quarter there were declines, the sharpest since 2012. Afterward, equity markets recovered, as did their contribution to the reserves (Figure 12)—but at the end of the year equity markets declined steeply. Note that after the report period, in the first months of



2019, equity indices increased markedly. The maximum profit recorded by the equity component in the reserves portfolio during the year was approximately 7 percent, and the maximum loss was approximately 12 percent. Despite the considerable volatility, it was decided over the course of the year to maintain the share of investment in equities at the level set in the strategic allocation, in accordance with the long term objectives of the investment.

**The largest negative contribution was recorded in the US, followed by Japan.** The contribution is the product of the weight of investments in a specific market and changes in the equity index in that market. The largest portion of this investment, 7.0 percent at the end of 2018, was invested in the US equity market, which, together with a 5.2 percent decrease in prices, reduced the contribution by approximately 51 basis points (Table 7). The contribution of the investments in Germany and Japan was negative and relatively large, despite their relatively low weight in the portfolio. This resulted from a marked decrease in equity prices there during the course of the year.

**Table 7**  
**Share of Equities by Country, and Contribution to the Reserves Portfolio in 2018**

	Holding Percentage		Equity Contribution (b.p)	Index Return 2018
	End of 2017	End of 2018		
US	7.3	7.0	-51	-5%
Germany	0.9	0.7	-15	-18%
France	0.9	0.8	-6	-9%
UK	0.9	0.7	-9	-10%
Japan	1.8	1.0	-18	-15%
Canada	0.5	0.4	-4	-10%
Switzerland	0.3	0.3	-1	-3%
Hong Kong	0.3	0.3	-3	-10%
Switzerland	0.4	0.4	-3	-9%
<b>Total</b>	<b>13.3</b>	<b>11.6</b>	<b>110</b>	

Source: Bank of Israel

## 2. Duration and diversification

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 is also more volatile. The Monetary Committee decided at the beginning of the year to lengthen the dollar portfolio from 21.6 months to 24 months, and to leave the euro and pound duration at 18 months.

**The contribution of duration and diversification was 15 basis points this year.** The portfolio's duration averaged 21 months in 2018, compared with 19 months in the preceding year and compared with the duration of the basic benchmark, which was 6 months. In general, there was some rise in the yield curves of the dollar and pound and a decline in the yield of the euro (Figure

9). Most of the contribution (9 basis points) derived mainly from the decline in the yield of the long term euro curve. The dollar portfolio had a positive contribution (6 basis points), due to the increase in the current return following the increase in interest rates in the US. In addition, lengthening the duration of the portfolio at the end of the year after a prolonged rise in yields generated capital gains when yields subsequently declined sharply. During the course of the year, there was considerable volatility in the contribution of this risk component.

The yield curve in the US rose in 2018 and flattened due to a sharp increase in the short term yield to maturity. During the course of the year, the long term yield rose to a record level, in light of the continued growth and monetary tightening, but it declined toward the end of the year due to the moderation in inflation expectations and the declines in equity markets in the final quarter, which were accompanied by high volatility. In Germany, the long term yield rose at the beginning of the year, but in the middle of the year there was a decline in yields because of the political uncertainty vis-à-vis Italy. Afterward, yields rose slightly, but ended 2018 at a lower level than at the beginning of the year. In the UK, curves increased slightly relative to the previous year, and flattened.

### 3. Spread assets

Spread assets are debt instruments, such as those issued by multinationals and by the public sector, that are not included in the basic benchmark.<sup>18</sup> 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 various spread assets contributed 12 basis points.** The investment in short-term spread assets in the dollar portfolio was notable this year again and accounted for the majority of the contribution of this component, 10 basis points. These assets include variable rate bonds, synthetic assets (investments in short-term bonds not denominated in dollars, hedged through currency swap transactions), and commercial paper. The investment in such spread assets generated excess returns, mainly due to the high current returns of these assets, which exceeded the current returns of short-term government bonds of numeraire countries, which make up the basic benchmark.

### 4. Corporate bonds

**The exposure to corporate bonds reduced the return by 7 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 US and euro-denominated European corporate bond markets. In light of narrowed spreads, in the beginning of 2018 the Monetary Committee reduced corporate bonds' allocation to 6 percent. The average share of the investment in corporate bonds in 2018 was 5.9 percent, compared to 6.4 percent in 2017.

**The marked widening of the corporate bond yield spreads since the beginning of the year is the main factor in their negative contribution.** The yield spread between corporate bonds and government bonds widened gradually, from 60 basis points to 100 basis points at the end of the

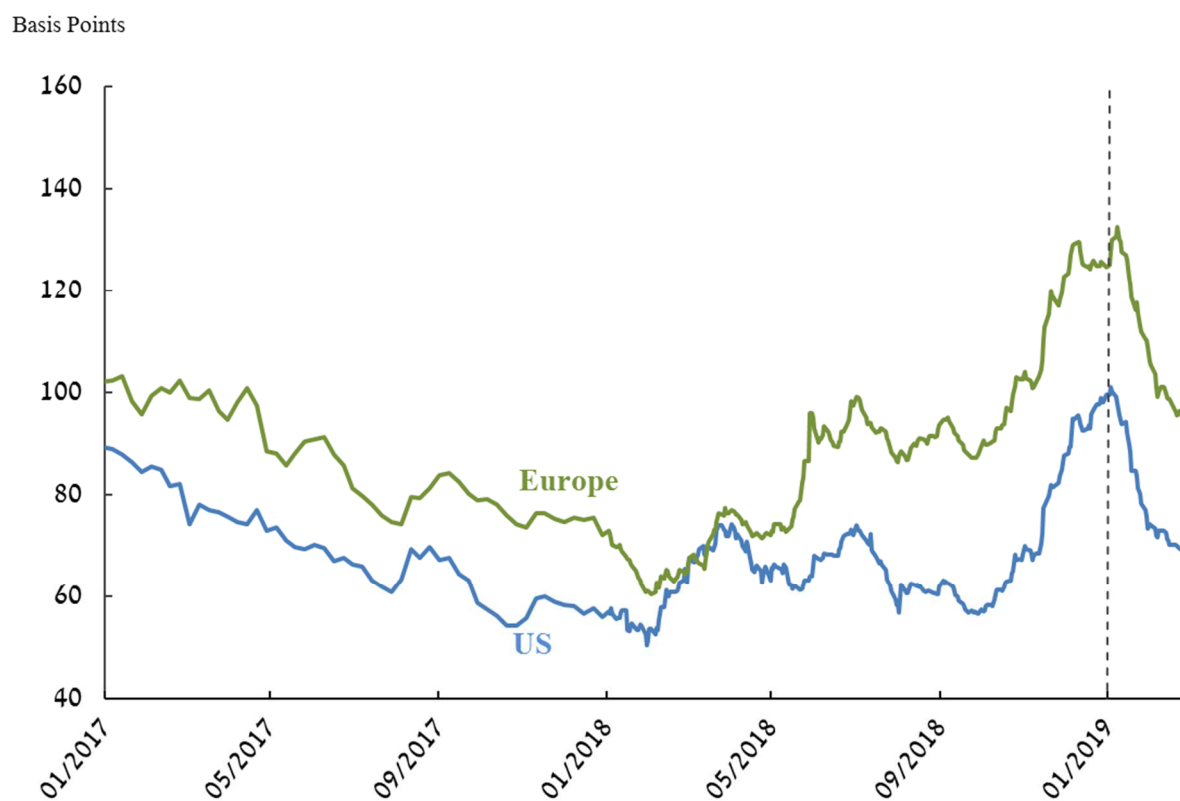
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<sup>18</sup> Excluding corporate bonds, which are reviewed separately in Section 4 of this chapter.

year for dollar bonds, and from 70 basis points to 125 basis points for euro-denominated bonds (Figure 13). The widening of the spreads is attributed primarily to a rise in government bond yields and the increase in market volatility, and to a lesser extent to a deterioration in corporate returns. In addition, the spreads were also affected by the increased concern about the credit quality of low-rated companies, in which the reserves are not invested. In Europe, uncertainty created in Italy and the cessation of bond purchases by the ECB were seen as having impacts.

During the course of the year, several trend changes were seen in the development of spreads, and the volatility during the year was higher than in the previous year. In January, the previous year's trend of narrowing spreads continued, and immediately afterward there was a marked widening in parallel with sharp changes in other financial assets. Following that, there was some stability in spreads, but in May there was a further increase, primarily in European debt securities, against the background of increasing uncertainty there. In October, there was a further notable widening, both in the US and in Europe.

**Figure 13**  
**US and European Corporate Bonds Spreads in the 0–5 Year Benchmark over**  
**Government Bonds, 2017–February 2019**



Source: Barclays

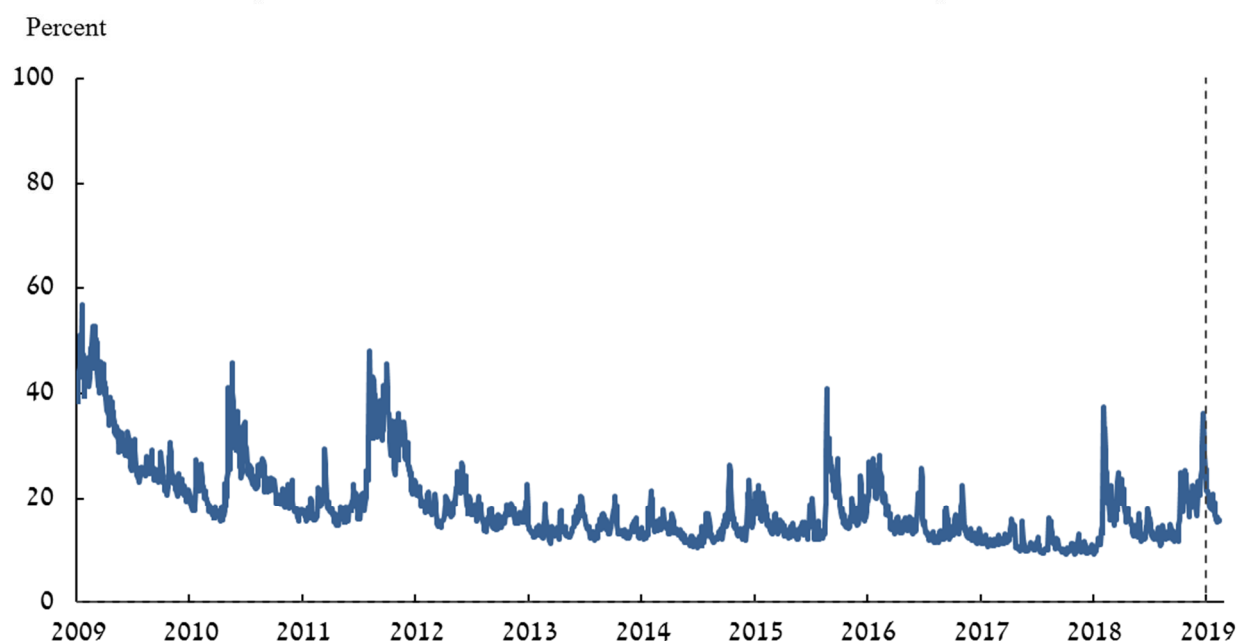
**The excess current return over government bonds** (approximately 70 basis points in the dollar market and 90 basis points in the euro market) partly offset the loss caused due to the widening of the spreads.

## E. Measures of Risk and Risk-Adjusted Returns

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

**In 2018, the volatility risk in the reserves portfolio increased markedly, after an unusually low level of volatility in previous years.** The increased volatility was notable in equities in the beginning and end of the year, but extended to bonds too, particularly in the second quarter (Figure 14). The deterioration to an extent in macroeconomic conditions or various other geopolitical factors, does not sufficiently explain the increase in volatility. Among possible explanations provided were uncertainty in the Fed’s guidance on monetary policy, the increase in short term returns in the US compared to dividend yields and the concern that the flattening of the curve could signal an approaching recession.

**Figure 14**  
**The Volatility Index (VIX<sup>19</sup>) on the S&P 500, from 2009 to February 2019**



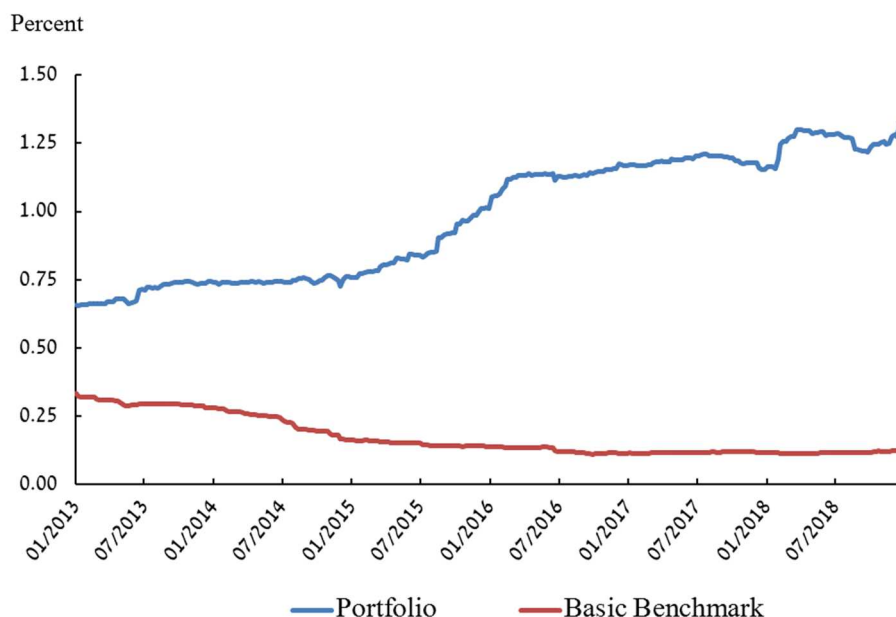
Source: Bloomberg

**Since the increase in the share of risk assets as part of the active management, the reserves portfolio risk grew in the short term.** The increase in market volatility this year was reflected also in increased volatility in the reserves portfolio (Figure 15). The reserves portfolio’s risk is derived mostly from the active management contribution, while the risk in the basic benchmark is low and stable.

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<sup>19</sup> The Volatility Index (VIX), also termed “the fear index” estimates the expected volatility in the S&P 500 Index. The VIX serves as an accepted index of the level of volatility in the market and of investors’ concerns of price declines.

**Figure 15**  
**Standard Deviation of the Reserves Portfolio and the Basic Benchmark,**  
**2013–18**



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

The short-term volatility of the reserves portfolio was relatively high this year (1.7 percent) (Table 4), as most risk assets experienced sharp price changes and negative holding rates of return. The volatility of the basic benchmark remained low, as in preceding years (0.16 percent), as expected in view of the conservative composition of its assets.

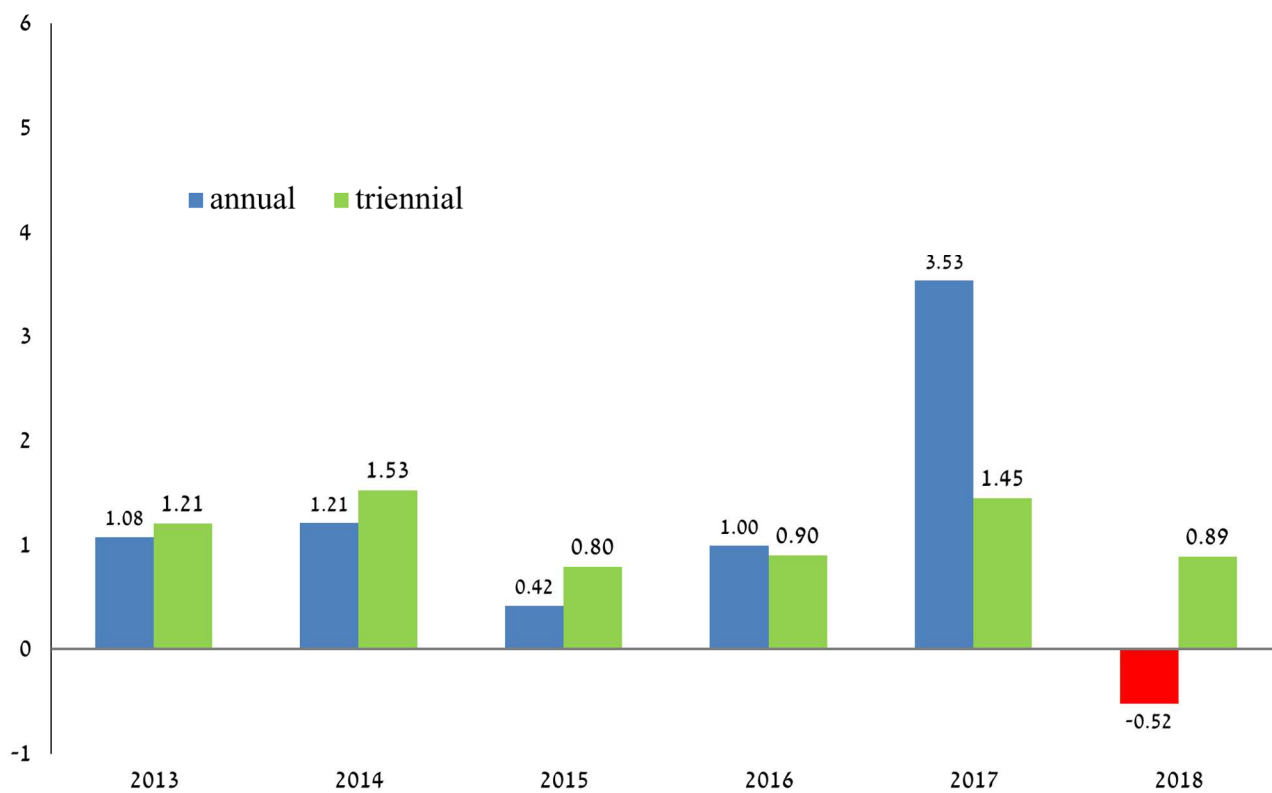
In 2018, the CVaR<sub>5%</sub> of the portfolio was lower than the maximum level set in the strategic allocation, at around 280 basis points. The low level of this measurement was caused by the decline in the share of risk assets in the portfolio, in view of their decline in value, and despite the increase in volatility.

## 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 on additional risk. The index is calculated as the ratio of the contribution of active management to its standard deviation.

This year, the investment in risk assets was not worthwhile in view of the increase in volatility alongside low returns. The risk-adjusted return, measured by the IR, is not measurable due to the negative return, but it declined sharply this year due to the combination of the high contribution of the negative return of active management and the increased volatility in the markets (Figure 16). When measured over 3 years, the decline in the excess risk's contribution relative to the preceding 3 years can be seen.

**Figure 16**  
**The Ratio of Active Management Contribution to its Standard Deviation—the**  
**Information Ratio, annual and 3-year measurement, 2013–18**



Source: Bank Of Israel

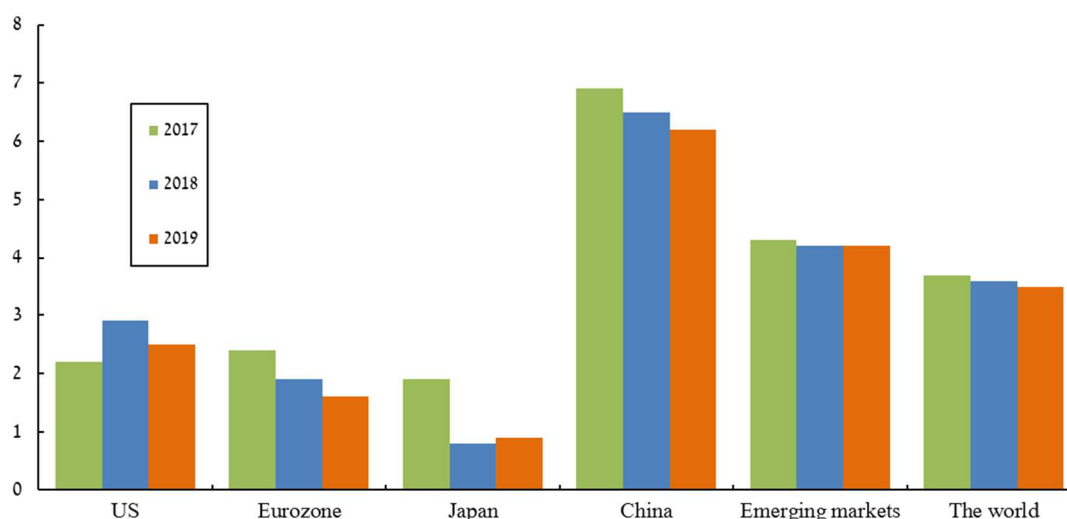
## Appendices

### Appendix 1

#### The Global Economic and Financial Environment

The rate of worldwide growth was essentially unchanged this year (a decline from 3.7 percent to 3.6 percent<sup>20</sup>), the US economy was notably good, while in contrast the growth rate moderated in the other major regions (Figure A.1). World trade loss some momentum against the background of the increasing severity of the trade war between the US and China, leading indicators (sentiment) weakened relative to their levels at the beginning of 2018, and international entities revised their growth forecasts downward. Economic activity continued to grow at a solid pace, supported this year as well by continued growth in private consumption and in investment, and was positively impacted by the strong labor market and continued trend of decline in the unemployment rate. In the US, the Fed continued the policy of increasing interest rates in light of inflation settling around the target rate and the increase in salaries, while in the eurozone and Japan a (core) price environment that remained moderate led to continued accommodative policy. The risk level increased, influenced by the worsening of the trade war, the continued process of raising the interest rate in the US, and political developments in Europe.

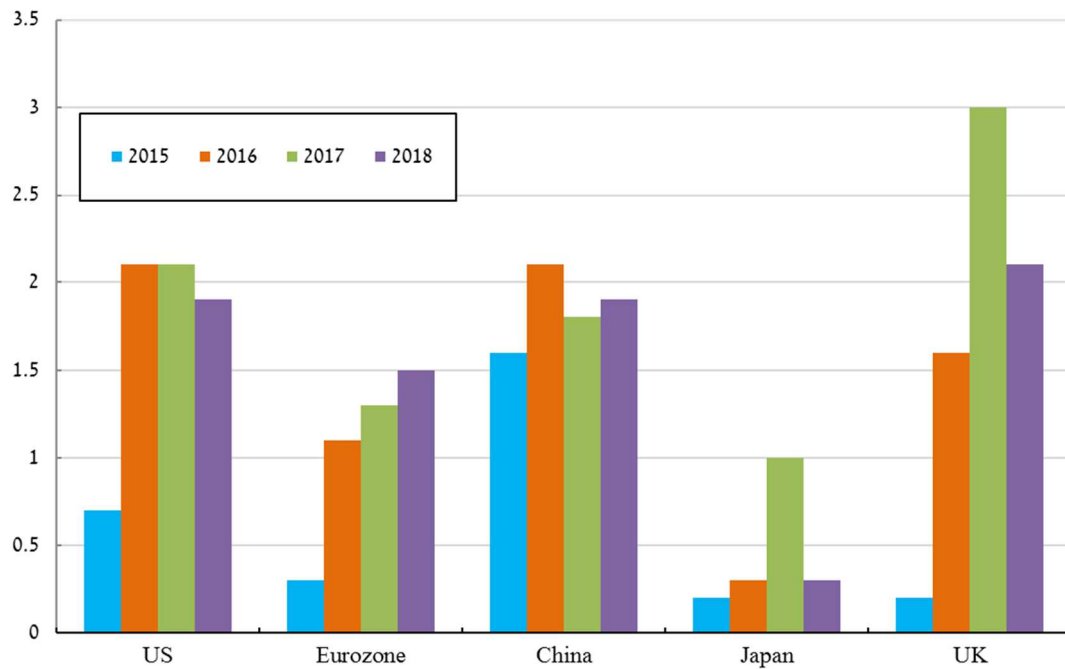
**Figure A.1**  
**Annual Growth by Major Countries/Blocs**  
(percent)



Source: World Bank  
2017 - 2018: Actual data  
2019: Estimation

<sup>20</sup> Growth data in this report are based on the World Bank's "Global Economic Prospects" from January 2019.

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

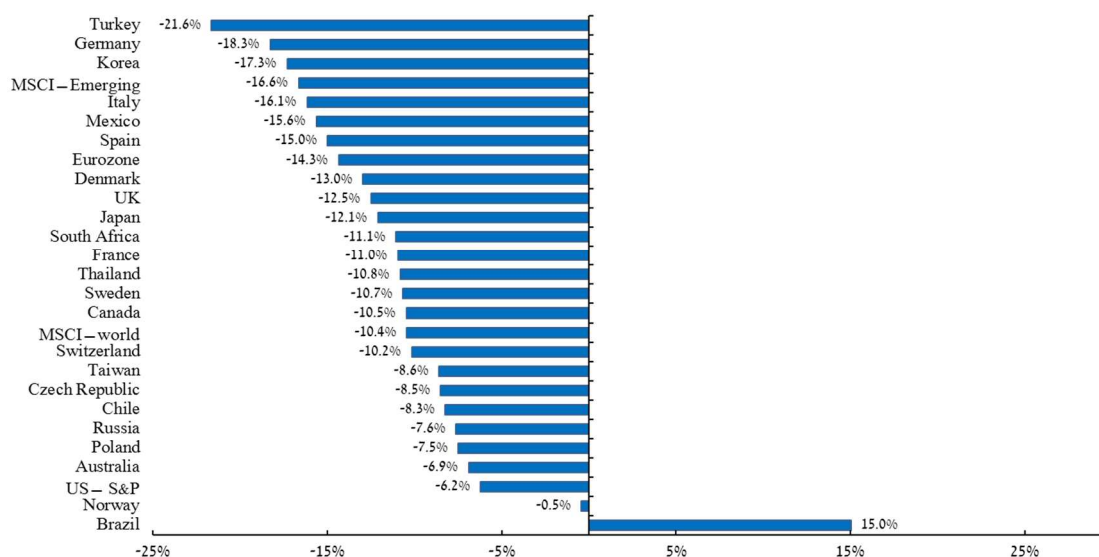


Source: Bloomberg

The loss of momentum in the macroeconomic environment and the increased risk level led to negative sentiment in the markets, and equity markets worldwide declined, led by emerging markets (Figure A.3). The federal funds rate increases in the US, which led to the strengthening of the dollar, led to capital outflows and depreciation pressures in countries with high foreign-currency debts and balance of payments deficits—particularly those that experienced domestic crises (Turkey and Argentina). Corporate bond spreads widened and risk assets traded with high volatility. The dollar strengthened in 2018 against most currencies due to the exit from risk assets (Figure A.4). Oil prices declined sharply because of an increase in supply and concern that moderation in economic activity will lead to a decline in demand.

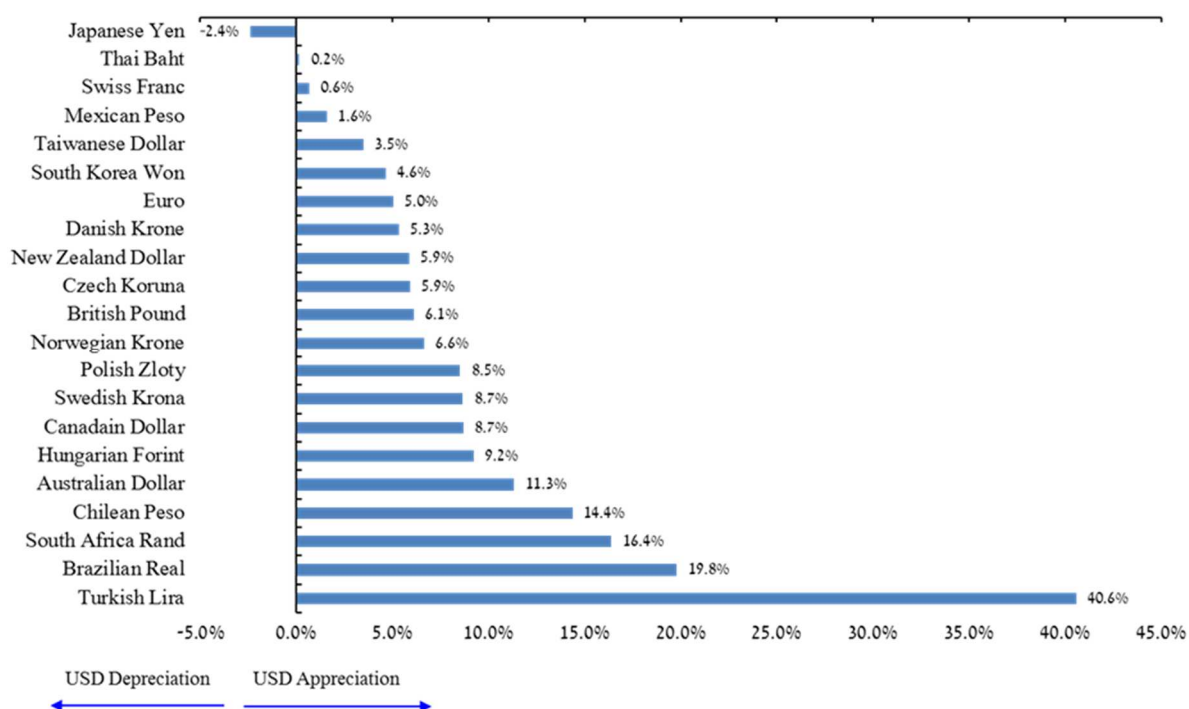


**Figure A.3**  
**Equity Returns in Local Currency Terms, 2018**



Source: Bloomberg

**Figure A.4**  
**Performance of Major Currencies vs. the Dollar, 2018**

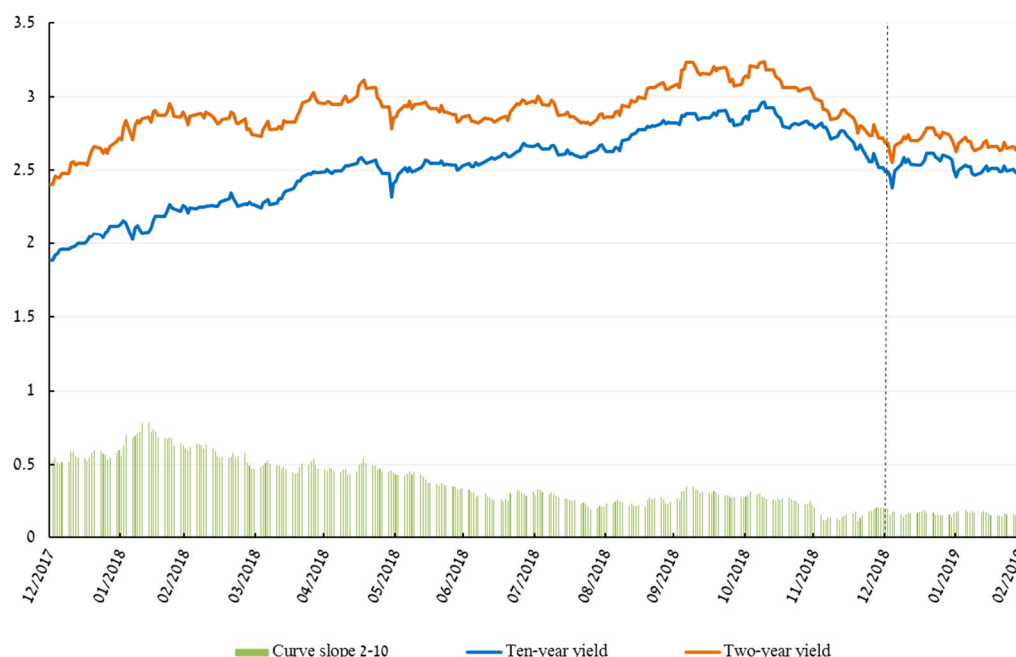


Source: Bloomberg

The **US economy** accelerated this year driven by private consumption, from 2.2 percent to 2.9 percent (World Bank forecast), against the background of fiscal incentives announced by the US government. The US Federal Reserve increased the federal funds rate four times during the course

of the year, against the background of core inflation solidifying around the 2 percent target, and led to a rise in bond yields and continued flattening of the yield curve (Figure A.5). The risk level increased and led to volatility in markets, which became more severe toward the end of the year. Equity markets, which rose solidly in recent years, declined this year in accordance with the global trend, and the dollar strengthened against most major currencies.

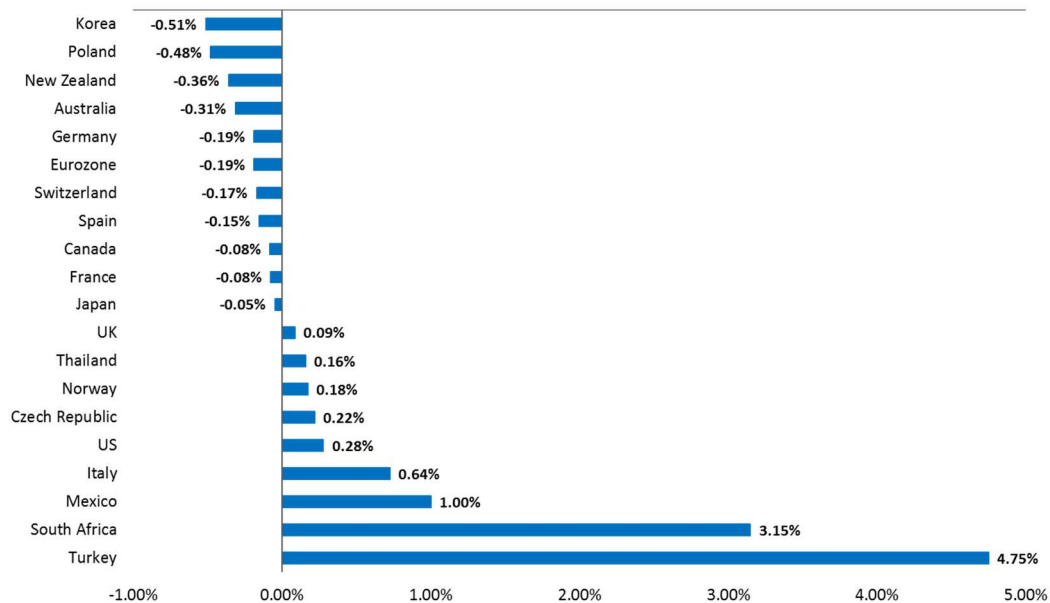
**Figure A.5**  
**US Government Bond Yield for 10 Years and for 2 Years, and the Slope of the Curve**  
(percent)



Economic activity in **the eurozone** continued to grow in 2018, at a solid pace of 1.9 percent (World Bank forecast), but more moderately than the 2.4 percent growth rate of 2017. There was moderation in all the major economies. Eurozone equity markets declined this year, similar to the global trend, and were impacted by the moderation in economic activity of China's trading partners and by the increase in political risk against the background of discussions between Italy and eurozone leadership on the percentage of the fiscal deficit in Italy. Core inflation remained moderate and the ECB ended its asset purchase program.

**In the UK**, growth moderated in 2018, from 1.7 percent to 1.3 percent (World Bank forecast), in light of uncertainty regarding Brexit. The strong labor market and private consumption supported economic activity, but in contrast, the drawn out discussions with the eurozone about Brexit and the inability to reach an agreed upon solution ahead of the date of withdrawal from the EU in March 2019, weighed on companies' capital investments and led the BOE to increase the interest rate by only 25 basis points during the course of the year.

**Figure A.6**  
**Changes in Yield to Maturity on 10-Year Notes in Major Countries, 2017**



**Japan's economy** slowed in 2018, from 1.9 percent to 0.8 percent (World Bank forecast), impacted by the trade war. The pace of salary increases remained moderate despite the tight labor market conditions. Equity indices declined, similar to the rest of the world, and the domestic currency strengthened against the dollar against the background of the trend of exiting risk assets. Bond yields traded at near-zero levels, impacted by the central bank's accommodative policy, as it continued its purchasing policy and yield curve control.

The growth rate in **emerging market economies** slowed in 2018, primarily in countries with high foreign currency debt and a balance of payments deficit, and in countries that endured domestic crises (Turkey and Argentina). Currencies of emerging market countries weakened against the dollar and equity indices declined and underperformed advanced economies, in light of the trend of exiting from risk assets. **China's economy** continued its "soft landing", as part of the implementation of a long term structural change, which includes a shift from a manufacturing and investment based economy to an economy based on services and consumption. During the year, local authorities dealt with the development of the trade war with the US at the same time as the ramifications of the initiated process of reducing nonbank credit (shadow banking), with the goal of reducing the level of risk. Economic activity moderated due to the reduction of credit, while investments continue to slow as part of the long-term structural change in the economy.

## Appendix 2

### Foreign Exchange Reserves: Investment Policy Guidelines

#### Foreign Exchange Reserves: Investment Policy Guidelines<sup>21</sup>

In effect from September 26, 2016

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).

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

The Foreign Currency Committee—an internal Bank of Israel committee headed by the Governor—will translate the guidelines into the detailed foreign exchange reserves investment policy.

The Market Operations Department will implement the investment policy, within the framework of degrees of freedom which will be set periodically by the Monetary Committee and the Foreign Currency Committee, and will report to the Monetary Committee and the Foreign Currency 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 decisions reached by

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<sup>21</sup> The characteristics of the reserves portfolio are reported to the public in an annual report published on the Bank of Israel website.

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

The Market Operations Department will advise the Monetary Committee and the Foreign Currency Committee on fulfilling their functions, through position papers and suggestions for discussion in the Committees.

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 allocation<sup>22</sup> is decided by the Monetary Committee. The allocation of the numeraire is set according to principles which 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 Market Operations 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.

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.

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<sup>22</sup> 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.

#### **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 400 basis points over a 1-year horizon.

#### **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 15 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 Market Operations 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 international 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 category is BBB is limited to DVP<sup>23</sup> (delivery versus payment) alone.

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.
2. Low-liquidity assets that can be realized in a period exceeding three months without negatively impacting their realization value. A minimum level of investment was set for

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<sup>23</sup> 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.

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 Market Operations 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 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 400 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 owned exclusively 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	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 Market Operations Department.
15	Modified duration	An approximation of 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.

16	Numeraire	A currency basket used for measuring the returns on the foreign exchange reserves. See Chapter C, Section 2 above.
17	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.
18	Risk assets	Assets featuring higher risk than government bonds. In this report, the term refers to equities and corporate bonds.
19	Risk-free portfolio	A portfolio in which the investor is not subject to gains or losses.
20	Risk premium	The excess return of a risk asset over the risk-free interest rate.
21	Spread asset	An asset which is not included in the basic benchmark. 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.
22	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.
23	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.).
24	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.
25	Yield spread	The difference between yields to maturity of two debt instruments.
26	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.