Box 1.1
Macroeconomic Stress Tests for the Banking System, 2018

- **The Banking Supervision Department carried out a macroeconomic stress test for the banking system again this year, as is the practice in other countries. The test is based on a uniform scenario and its goal is to determine whether the banks can absorb the losses in an extreme macroeconomic event without endangering their stability and the deposits of the public.**
- **As part of the stress test, each bank estimates the results of the scenario using a variety of models and methods that are commonly used in the industry, and in parallel the Banking Supervision Department carries out the test for each one of the banks using a uniform method.**
- **The stress test is carried out under several assumptions that affect the results of the scenario, including: static balance sheet, no additional raising of capital; and no account taken of actions that the banks' management is likely to take in response to the crisis in order to minimize damage.**
- **Each year, the Banking Supervision Department builds a different macroeconomic scenario, with the goal of examining the resilience of the banks and of the banking system as a whole to various economic developments. This year, the Banking Supervision Department chose to test the resilience to a severe domestic macroeconomic scenario resulting from geopolitical events that lead to an increase in the interest rate in the economy, together with a major crisis in the housing market and the collapse of a large business group of borrowers. The scenario is based on estimates and models and is not a forecast.**
- **The results of the test show that the scenario will have a considerable impact on the banking system and although some of the banks will suffer losses, the scenario does not threaten the banking system's stability and resilience. The Common Equity Tier 1 Capital ratio of the banks is not expected to decline below the minimum required by the Banking Supervision Department in a stress scenario. Similarly, it is found that the banks' capital ratios in the scenario are higher than those in previous stress tests, which were used by the Banking Supervision Department to estimate their resilience.**
- **This result, which is evidence of the banks' stability even in a stress situation, reflects the efficacy of the requirements imposed by the Banking Supervision Department in recent years to strengthen the banks' stability and in particular to reinforce their capital. This is in addition to steps that resulted in more conservative risk management, including a significant reduction in the exposure of the banks to large and leveraged groups of borrowers, an improvement in the characteristics of the housing loan portfolio and the improvement in the profitability of the banks due to increased efficiency.**
- **The main losses in the stress test this year were in the credit portfolio, which is the main domain of activity of the banks in Israel. Another source of losses in the stress scenario this year was the securities portfolio, primarily due to the sharp rise in interest rates.**
- **Although this stress test indicates that the system maintains its stability, this has not led to complacency. The system is exposed as well to a variety of risks that have intensified in recent**

years, including operational risks, and in particular cyber and technology risk, which call for an examination of the system's stability in facing risks of that type.

General

This year again the Banking Supervision Department carried out a macroeconomic stress test on the banking system. The test, which has been carried out since 2012, is based on a uniform scenario. In this context, the banks estimate the results of a scenario provided by the Bank of Israel using a variety of commonly used models and methods.[1] In parallel, the Banking Supervision Department tests the banks and the banking system as a whole using a uniform method. The process is meant to contribute to the understanding of the focal points of risk to which the banking system and each of the individual banks are exposed, and thus it assists in evaluating the strength and resilience of the system and ensuring that capital levels are sufficient. Based on the results of the scenario, the Banking Supervision Department can direct a bank to take steps that will reinforce its capital and may even restrict its distribution of dividends, if it concludes that the bank does not have a sufficient capital buffer to absorb losses. Similarly, the test makes it possible to evaluate the banks' processes of risk management and their ability to estimate the risks that threaten them in a stress situation.

The results of the test carried out by the Banking Supervision Department this year indicate that the realization of a domestic macroeconomic scenario against the background of geopolitical events, together with a serious crisis in the housing market and an increase of the local interest rate will have a significant effect on the banking system. **Nonetheless, even under this scenario it is expected that the banking system will maintain its resilience and stability and the capital adequacy ratio of the banks is not expected to decline to below the minimum required by the Banking Supervision Department in a stress scenario, namely a Common Equity Tier 1 Capital ratio of 6.5 percent.** The results reflect a negative impact to the system due to credit and market risk and to some extent also operational risk. **The scenario is hypothetical and is not meant to include all of the possible economic shocks.** Moreover, the results do not take into account other effects, such as a drop in liquidity, which is possible in an extreme event and that may harm the reputation of the bank and lead to additional negative feedback effects. Yet at the same time, the results do not take into account the actions that the management of the banks is likely to take in response to the crisis, which may reduce the damage.[2]

The stress test carried out in 2018 was based on two scenarios: a base scenario and a stress scenario (Figure 1). The **base scenario** reflects the expected path of the economy and is based on the macro predictions of the Research Department of the Bank of Israel and the macro forecasts of global developments by the international organizations, as well as additional forecasts regarding the local and global economies.

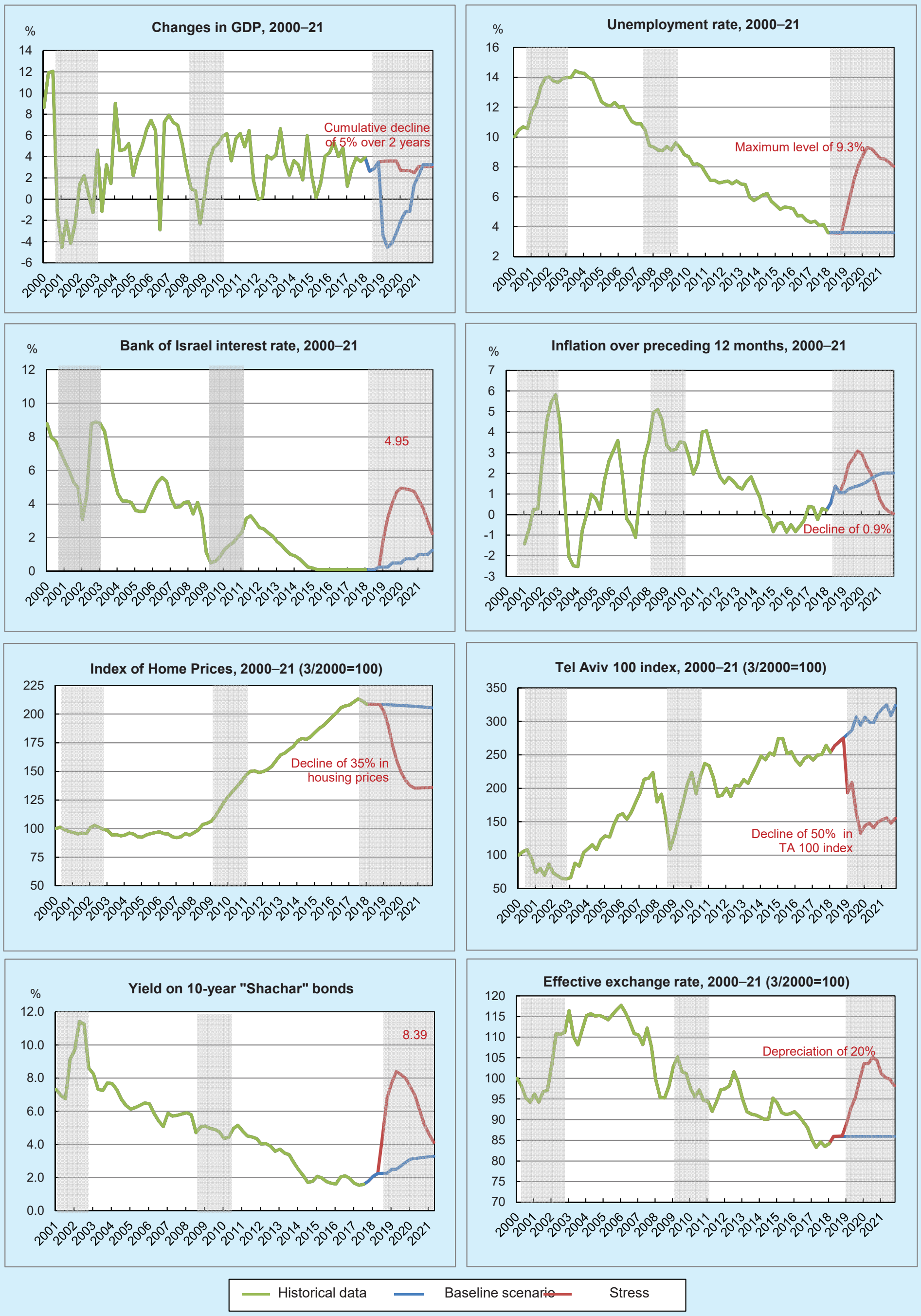
The **stress scenario** is characterized by a high level of severity and reflects the focal points of risk to which the Israeli economy and the banking system are exposed. It is worthwhile emphasizing again that this scenario is not a forecast but an extreme hypothetical situation and it is being used to test the resilience of the banks in a macroeconomic environment that differs from the prevailing one. The starting

[1] The banks included in the stress testing were Leumi, Hapoalim, Discount, Mizrahi-Tefahot, First International, Union and Bank of Jerusalem.

[2] Though not necessarily. It may be that the action taken by the management of one of the banks will intensify the expected harm to a different bank.

A serious macroeconomic stress scenario, including high unemployment, an increase in the Bank of Israel interest rate, and a decline in home prices.

Figure 1
Macroeconomic Data: Historical and According to the Scenarios, 2000–21[a]



[a] Shaded areas represent crisis periods.

SOURCE: Historical data—Based on Central Bureau of Statistics and Tel Aviv Stock Exchange; data on baseline and stress scenarios—Bank of Israel.

point of the test is based on the figures for the banks as on June 2018. The scenario starts in January 2019 and ends in December 2021, for a total of three years (12 quarters).
The stress scenario, which is characterized by a domestic shock against the background of major geopolitical events in Israel combined with a crisis in the housing market, leads to a contraction in all components of GDP and an increase in unemployment, while the global economy continues to grow. As a result, the Bank of Israel raises the interest rate significantly. The shock has serious ramifications for both the real and financial sides of the Israeli economy.

Assumptions

The Banking Supervision Department carried out the stress test based on various assumptions, with the goal of assessing the effect of the scenario on each of the banks and understanding the focal points of risk faced by each bank. Among the assumptions: static balance sheet; there is no raising of capital; and no account is taken of actions that the managements of the banks might take in response to the crisis in order to minimize the damage.[3] The results of the test reflect the direct effect of the scenario on the banks' capital, profitability, credit portfolio and securities portfolio. This test does not consider the possibility of a reduction in the banks' liquidity or a feedback effect, such as reduced confidence of investors.

Findings

A domestic macroeconomic shock combined with a crisis in the housing market and an increase in the interest rate in the economy is expected to have a major impact on the banking system, though it will not endanger its stability. In the scenario, the Bank of Israel raises the interest rate sharply, which means that together with the increased burden of debt repayment on borrowers the economic crisis makes it difficult for the public as a whole to meet their obligations. All this leads to major losses in the banks' credit portfolio. The increase in the interest rate causes losses in the banks' securities portfolio as well. However, the increase in the interest rate also has a moderating effect on the damage to the banks in that it increases their net interest income.
It was found that despite the significant damage to the banks, the banking system is resilient to a stress scenario of this type, since all of the banks maintained a Common Equity Tier 1 Capital ratio that is above the threshold required by the Banking Supervision Department in a stress scenario (i.e., 6.5 percent) for the duration of the scenario.[4] This result emphasizes the **importance of the process to strengthen capital** (an increase of about 3 percentage points in the Common Equity Tier 1 Capital ratio during the past decade) **that has taken place in recent years at the initiative of the Banking Supervision Department.** This is in addition to a series of other measures taken by the Banking Supervision Department which led to more conservative risk management by the banks, including a major reduction in the exposure of the banks to large and leveraged groups of borrowers (for further details, see Box 3.3 "Tightening of restrictions on credit to large borrowers and its implications for credit concentration" in Israel's Banking System—Annual Survey, 2017), an improvement in the characteristics of the housing credit portfolio (for further

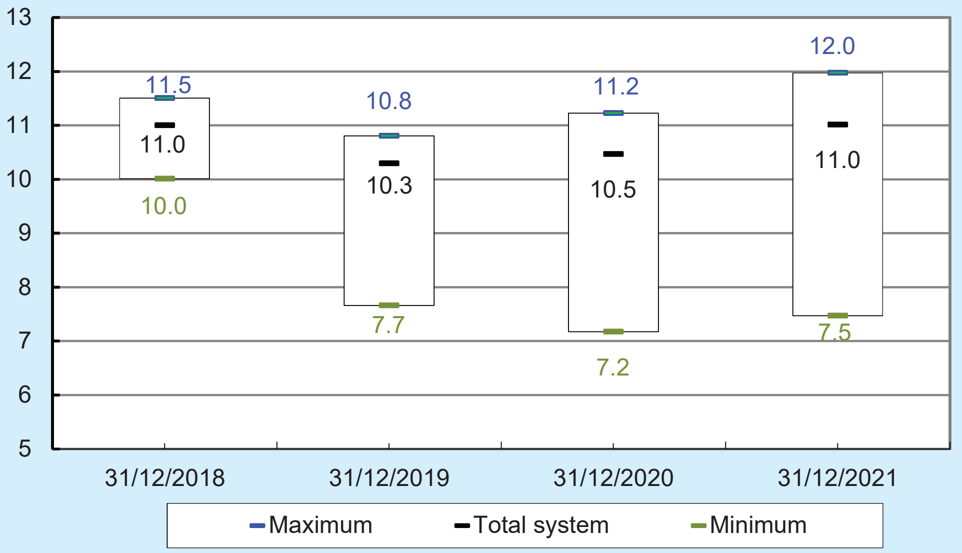
[3] It may be that the action taken by the management of one of the banks will intensify the expected harm to a different bank.
[4] The leverage ratio also reflects the resilience of the system to the stress scenario. During the scenario, the system reached an average leverage ratio of 6.5 percent and the bank that suffered the most serious damage reached a leverage ratio of 4.3 percent.

details, see Box 1.2 on "Effects of the macroeconomic stress scenario on the housing credit portfolio") and the improvement in the banks' profitability, as a result of efficiency measures and cuts in expenses. The average Common Equity Tier 1 Capital ratio in the system is liable to decline in the stress scenario from about 11 percent in 2018 to about 10.3 percent in 2019 (Figure 2).[5] Although the capital ratio in the entire system was not seriously affected during the scenario, the size of the effect varied widely among the banks. Thus, in the bank that suffered the most damage the capital ratio declined to 7.2 percent, while in the other banks the negative impact was much less. (Figure 2). This variation was the result of, among other things, the differences in profitability, in the mix of the asset portfolio and in the quality of the credit portfolio at the starting point.

The profitability of the banking system in this scenario is expected to drop significantly but the increase in the interest rate is expected to moderate the damage due to its effect on net interest income. Nonetheless, it was found that **approximately half of the banks experienced losses in at least one of the years of the scenario.** The average return on equity (ROE) in the system is expected to drop from a level of about 7.2 percent at the start of the scenario to about 2.3 percent at its conclusion. Here as well there is a high

The entire banking system maintained the minimum required capital ratios throughout the stress scenario.

Figure 2
Development of Common Equity Tier 1 Capital Ratio, Total Banking System, December 2018–December 2021[a] (percent)



[a] Based on models and assessments—not a forecast.
SOURCE: Based on reports to Banking Supervision Department.

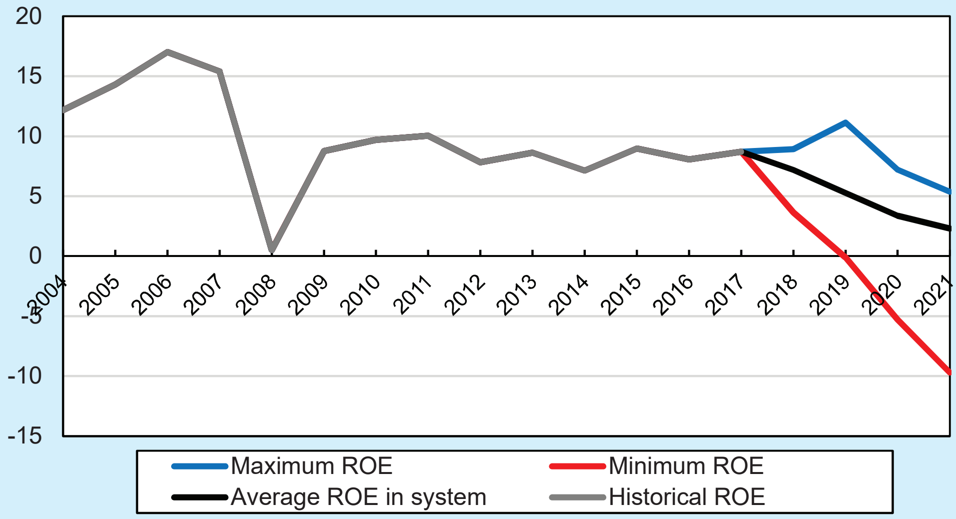
5 The year in which the average capital ratio in the system reached its lowest level ever in a scenario.

degree of variation between the banks: the ROE of the bank that suffers the most damage drops to a level of about –9.7 percent while that of a different bank drops to about 5 percent (Figure 3).

The main expected losses in the stress scenario are in the credit portfolio and amount to about NIS 12.2 billion on average per year, which is about 1.2 percent of the portfolio. Rising unemployment, the decrease in GDP and the housing crisis make it difficult for households and the business sector to meet their obligations, which causes serious losses in the banks' credit portfolio and damage to their equity. In this year's stress scenario, the effect of a collapse of a business group of borrowers was examined.

There was a significant negative impact to the return on equity during the stress scenario.

Figure 3
Development of Return on Equity According to the Banking Supervision Department's Stress Scenario, Total System, 2004–21 (percent)



[a] Based on models and assessments—not a forecast.
SOURCE: Based on reports to Banking Supervision Department.

This intensifies the losses in the business credit portfolio but the damage is less than in past years, which is the result of the major downward trend in the exposure of the banks to the large groups of borrowers (Figure 4; for further details see Box 3.3 "Tightening of restrictions on credit to large borrowers and its implications for credit concentration" in Israel's Banking System—Annual Survey, 2017). The models predict that the average annual loss in the business credit portfolio (without credit to construction and real estate) will be about 1.5 percent.[6] With respect to equity, this is the largest loss among the industries

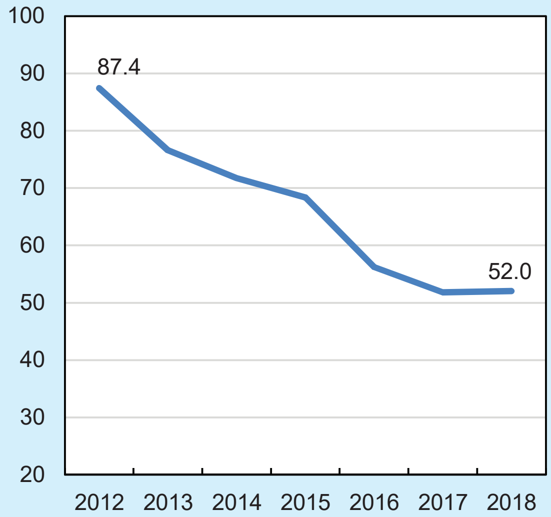
[6] Based on models and estimates and it is not a forecast.

(about 4 percent annually,[7] Figure 5) which is due to the significant exposure of the portfolio to this type of credit.

With respect to the construction and real estate industry, the crisis in the housing market, which is reflected in the scenario by, among other things, the major decline in housing prices, is expected to cause major losses in the stress scenario. Together with the losses in the housing credit portfolio as a result of unemployment and the rise in the interest rate, these are major focal points of risk for the banking system. This is due to both the high correlation between these two industries, which is expected to intensify their losses by way of feedback and their large weight in the total credit portfolio. Nonetheless, it is important to mention that in these two industries the risk has been declining in recent years, a trend that is reflected in their lower rates of loss. (For further details, see the chapter on credit risk. With regard to housing credit in particular, see the box, "Effects of the macroeconomic stress scenario on the housing credit portfolio".)

Over the years, the banking system has significantly lowered its exposure to large borrower groups.

Figure 4
25 Largest Borrowers in the Banking System as a Share of Total Capital, 2012–18 (percent)



SOURCE: Based on reports to Banking Supervision Department.

Consumer credit shows the highest rates of loss in the scenario (an average annual rate of loss of about 2 percent;[8] Figure 5). The high rates of loss in this portfolio are primarily the result of the sharp rise in the unemployment rate, but they are also adversely affected by the increase in the interest rate. This is particularly so in the case of low-income borrowers who are more vulnerable[9] and borrowers with a large amount of debt relative to their income (some of whom have taken out a housing loan in parallel; for further details on the participation of households in the loan market and their financial vulnerability, see Box 1.2 in Israel's Banking System—Annual Survey, 2016). In view of the risk implicit in consumer credit, most of the banks have limited its rate of growth (for further details, see the chapter on credit risk).

Another source of expected losses in the stress scenario this year is losses in the securities portfolio, against the background of the sharp increase in interest rates. Currently, the banks are managing a conservative securities portfolio, which is composed primarily of low-risk securities in the form of government bonds (about 61 percent of the portfolio) which drop in value when interest rates rise. The rest of the portfolio

[7] Based on models and estimates and it is not a forecast.
[8] Based on models and estimates and it is not a forecast.
[9] In addition, there is the assumption that the households in the lower deciles are those most threatened by rising unemployment.

Ong, M. L. L. (2014). *A guide to IMF stress testing: methods and models*. International Monetary Fund.

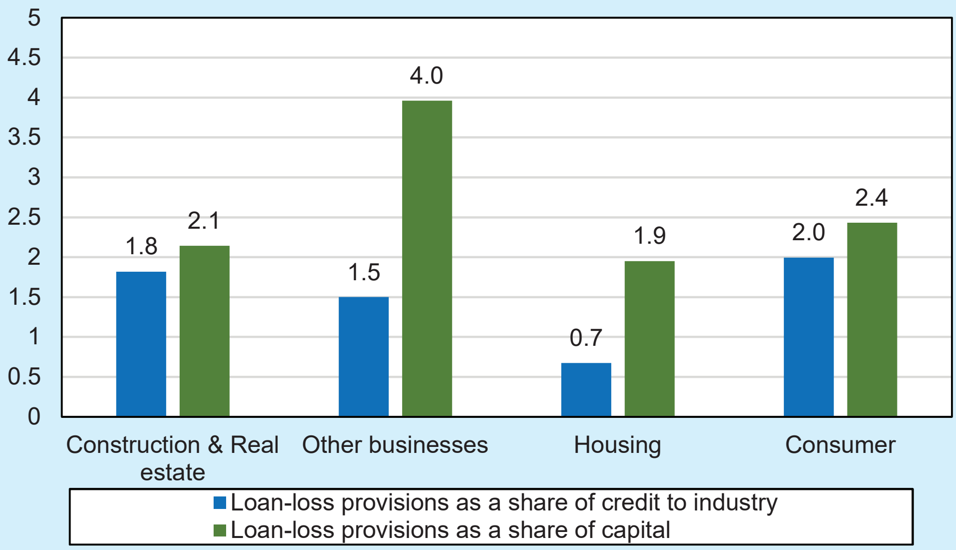
is made up of highly rated foreign bonds whose vulnerability in the scenario is low, since the scenario is a domestic one.

This year's scenario relative to past scenarios

The stress tests examine the banking system in severe macroeconomic scenarios and the source of the crisis changes from one test to the next. There are stress tests, such as the current one, in which the source of the scenario is a domestic crisis while in others it is a global one. Nonetheless, all of the scenarios include a large drop in GDP, a sharp increase in unemployment, declining prices in the financial markets and a drop in housing prices. Alongside the variables that are adversely affected in each scenario, there

Most of the loan loss rate relative to capital was recorded in the business credit portfolio.

Figure 5
Loan-Loss Provisions Expected During Course of the Stress Scenario, Selected Industries, Total System, Average 2019–21 (percent)



[a] Based on models and assessments—not a forecast.

SOURCE: Based on reports to Banking Supervision Department.

are variables that characterize the specific scenario being tested, such as the domestic interest rate, the yields on government bonds, the exchange rate of the shekel against various currencies and indices that reflect global economic activity.

In an examination of the results of the current stress test relative to past ones, it is important to differentiate between the differences that are the result of the nature of the scenario itself and those that are the result of the changes in the risk characteristics of the bank. Thus, the stress test carried out in 2016 was based on a shock in Europe alongside a shock in the local housing market, with the interest rate remaining low.

(For further details on the macroeconomic stress test in 2016, see Box 1.2 in Israel's Banking System—Annual Survey, 2016.) Therefore, the differences between the results of the previous scenario and those of the current one are primarily related to the high interest rate and the lack of an event in the global market in the current scenario. However, there are also differences that are the result of changes in the banking system, which have strengthened its stability and profitability. The increase in the interest rate has opposing effects on the damage to the banking system. The increase in net interest income alongside the reduction in pension commitments moderates the effect of the scenario; however, at the same time, it intensifies the credit losses in local industries. In contrast, there were no losses in credit provided to foreign borrowers in this year's scenario. Therefore, overall the total credit losses were similar between the two scenarios. The source of the losses in the securities portfolio differs between the scenarios.

This year's test therefore demonstrates that the banking system can withstand the type of stress scenario that was tested. Its resilience is the product of the range of measures that the Banking Supervision Department has implemented in the effort to maintain the stability of the banking system during times of crisis as well. Experience has shown that economic crises are difficult to predict, with respect to both their timing and their severity, and therefore it is necessary to continue efforts to strengthen the banking system and to maintain its stability. The banking system is also exposed to a variety of risks that have intensified in recent years, including operational risks and primarily cyber and technology risks, a situation that calls for an examination of the system's stability in the face of these threats as well.