Box 1.1: Macroeconomic stress testing of the banking system in 2021

- As is the accepted practice worldwide, the Banking Supervision Department again carried out a macroeconomic stress test of the banking system in 2021, based on a uniform scenario.
- The stress scenario involved a global shock, reflected in a drastic economic slowdown and declines in markets in Israel and other countries, alongside an increase in the interest rate in Israel and worldwide due to high inflation. It is important to emphasize that the scenario does not represent any sort of forecast, but rather is a hypothetical scenario intended to evaluate the resilience of the banks and their focal points of vulnerability.
- The test was conducted under the "dynamic balance sheet" assumption, such that it also examines the effect of an increase in the credit portfolio and in the public's deposits. This assumption has opposing effects, since it works toward an increase in interest income as a result of the growth in credit, while in contrast the increase in credit works to increase the quantity of risk assets, which constitutes one of the main factors affecting the capital ratios over the course of the test.
- The results of the stress test indicate that the banking system is expected to maintain its resilience and its stability even in this scenario. None of the banks decline to below the minimum capital ratio required in a stress test by the Banking Supervision Department (Tier 1 Capital Ratio of 6.5 percent).
- The policy to strengthen capital adopted by the Banking Supervision Department in recent years has supported the ability of the banks to absorb shocks and maintain their stability even in a stress scenario.
- The results of the stress test indicate that an increase in the inflation rate and the interest rate bring about an increase in net interest income in the banking system, as a result of the surplus of CPI-indexed assets over CPI-indexed liabilities. In contrast, this increase creates pressure on borrowers, including mortgage holders, which as a result leads to credit losses in the bank credit portfolio.
- As in previous scenarios, the credit losses were the main threat to the capital ratios, where high rates of credit loss provisions were recorded for all parts of the economy in this scenario.
- The Banking Supervision Department, like other supervisory authorities worldwide, will in the future carry out a climate-related stress test to examine the banking system's preparedness for these risks and to identify the focal points of vulnerability.

As is common practice worldwide, the Banking Supervision Department again this year[1] carried out a macroeconomic stress test of the banking system, based on a uniform scenario.[2] In this context, the banks estimate the results of the test based on a variety of commonly used methods (bottom-up). At the same time, the economists of the Banking Supervision Department tests the banks and the banking system as a whole using a uniform method (top-down). 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.

1 The Banking Supervision Department has been conducting stress tests since 2012.

2 The test is based on a uniform scenario and its goal is to evaluate whether the banks can absorb the losses resulting from an extreme macroeconomic event by means of ensuring a sufficient level of capital and without endangering their stability and the funds of depositors.

The Banking Supervision Department has expanded the stress tests to include the credit card companies as well, and this is the second year in which the stress scenario includes them too, while making the relevant modifications to fit the characteristics of their activity.

The stress scenario was constructed during the second half of 2021, when the consequences of the COVID-19 crisis were still a source of uncertainty and volatility worldwide. The results indicate that the banking system is expected to remain resilient and stable, **while maintaining reasonable capital ratios over the course of the scenario.**

The test is based on macroeconomic scenarios that were constructed together with the Bank of Israel's Research Department (Figure 1): a **baseline scenario**, which reflects the expected path of the economy and is based on the assessments of the Bank of Israel's Research Department, the macro forecast of international organizations regarding global developments, and other assessments of economic developments in Israel and worldwide. The **stress scenario this year** reflects a slowdown of economic activity and declines in stock and bond markets in Israel and worldwide. In the scenario, the Bank of Israel, like other central banks, raises the interest rate due to high inflation, and in parallel, there is a sharp decline in real estate prices. The slowdown in economic activity worldwide works to reduce the demand for the services of Israeli high tech companies and to reduce exports, which together with the declines in the markets leads to a sharp depreciation in the shekel against the dollar. The slowdown in the activity of the high tech sector is reflected in an economic slowdown and leads to an increase in unemployment in the sector and in the other sectors as well. The developments as a whole also lead to a sharp decline in Israel's credit rating. In addition, it was assumed that structural changes in the business environment are working to intensify competition for the public's deposits, in the providing of credit to the public and in the payments domain. This competitive environment works toward an increase in the interest rate on the public's deposits and the erosion of spreads in the banking system. **It is important to emphasize that the scenarios do not constitute any sort of forecast, but rather are meant to evaluate the resilience of the banks in a macroeconomic crisis.**

In 2021, as in 2020, the **stress scenario assumed a dynamic balance sheet (changes in the banks' balance sheet according to the scenario's development), which assesses the effect of developments in the credit portfolio and in the public's deposits over the course of the scenario.**[3] To this end, models were developed that forecast the path of growth in credit[4] and deposits (Figure 2), which rely on a machine-learning model[5] developed in cooperation with the Bank of Israel's Information and Statistics Department. As in the case of the macroeconomic scenarios, the **path of growth in credit and deposits in the scenarios do not constitute forecasts but rather are only hypothetical.**

The shift to a dynamic balance sheet is based on the understanding that stress events also have significant consequences for the development of the banks' balance sheets, thus creating additional

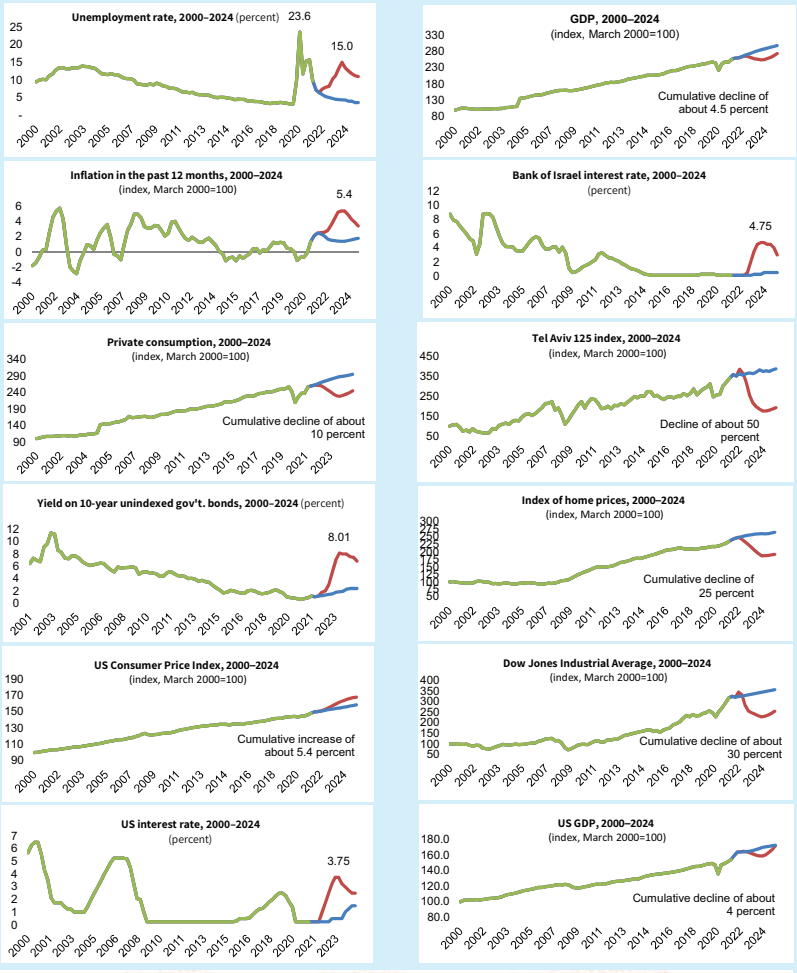
[3] Until 2020, the stress test was carried out under the assumption of a static balance sheet, according to which the bank's balance sheets remain unchanged during the scenario, with respect to both the quantity of credit and the public's deposits.

[4] Models were developed to evaluate the development of credit in each of the main sectors of the economy: construction and real estate, businesses other than construction and real estate, housing, consumer credit and activity abroad.

[5] Use was made of machine learning models because the correlation between the development of credit and the public's deposits on the one hand and macroeconomic variables on the other hand are non-linear and it is difficult to estimate these correlations using traditional models.

The stress scenario includes a sharp increase in the interest rate, inflation, and unemployment, alongside significant declines in housing prices and in the capital markets.

Figure 1
Main Historical Macroeconomic Data and their Development According to the Scenarios

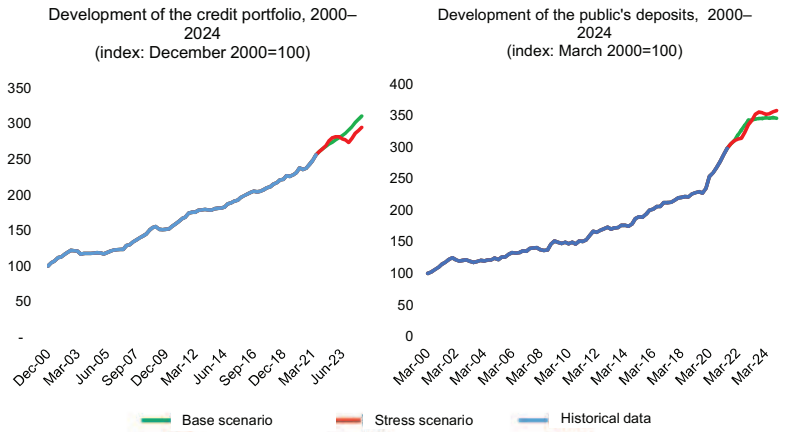


SOURCE: Historical data - Based on Central Bureau of Statistics, Tel Aviv Stock Exchange; Scenario data - Bank of Israel.

risk for the banks that are not estimated under the assumption of a static balance sheet (under which the balance sheet remains fixed over the course of the scenario). This assumption has opposing effects, since it works to increase interest income due to the growth in credit yet in contrast the growth in credit works to increase the banks' risk assets, which is one of the main factors affecting the Tier 1 Capital Ratio.

The credit portfolio and the public's deposits increase throughout the stress scenario.

Figure 2



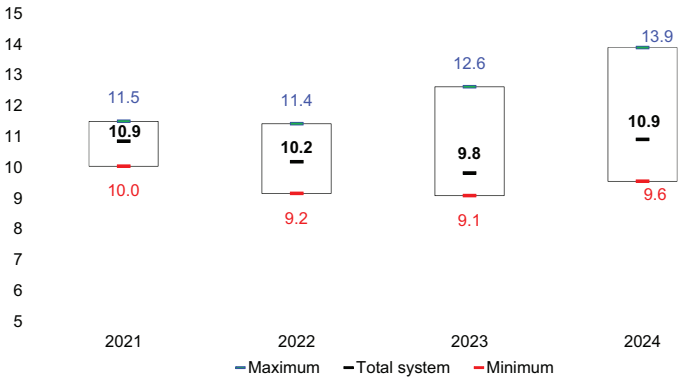
SOURCE: Banking Supervision Department calculations.

The results

The results of the stress test this year indicate that the banking system in Israel is stable and has sufficient capital to withstand a major shock, as described by the scenario. This is in spite of the severity of the scenario. Thus, **none of the banks decline to below the minimum level of capital required in the stress scenario by the Banking Supervision Department (a Tier 1 Capital Ratio of 6.5 percent).** The average Tier 1 Capital Ratio declines in the stress scenario by 1.3 percentage points, from a rate of 10.9 percent in 2021 to about 9.6 percent during 2023 (at the peak of the scenario; Figure 3). This decline is relative large in comparison to scenarios carried out in recent years[6] (between 0.5 and 0.9 percentage points). With respect to specific outcomes, there is variation among the banks, which is the result of differences in their starting capital ratio, the mix of their asset portfolios, and the quality of their credit portfolio.

No banking corporation falls below the Banking Supervision Department's minimum capital requirement level in the stress scenario.

Figure 3
Development of the Tier 1 Capital Ratio in the System Throughout the Stress Scenario (percent)



SOURCE: Banking Supervision Department calculations.

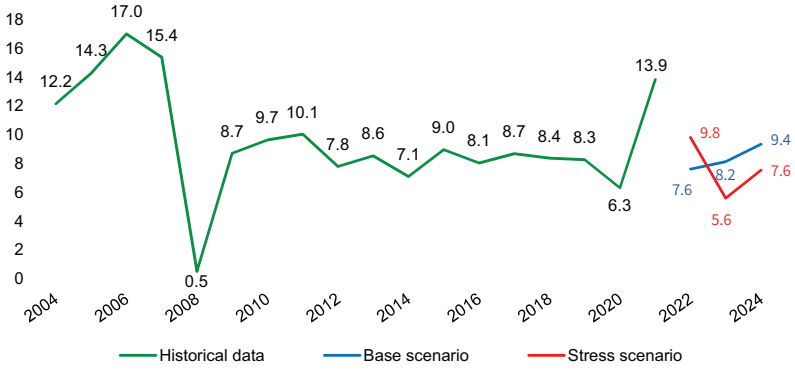
The stability of the banks over the course of the scenario is the result of the capital reinforcement policy adopted by the Banking Supervision Department in recent years. Furthermore, the path of the scenario, which includes high rates of inflation and interest, works to increase net interest income in the banking

6 In comparison to scenarios carried out during the period 2017–20.

system due to a surplus of CPI-indexed assets over CPI-indexed liabilities in the banking system (for further details, see the section on business results). Nonetheless, this increase puts pressure on borrowers, including mortgage holders, and therefore leads to an increase in credit losses in the housing portfolio, alongside substantial losses in the rest of the economy's sectors. Nonetheless, the profitability of the system is maintained over the course of the scenario, as reflected in the return on equity (ROE; Figure 4).

The return on equity rates are high, even during the entire stress scenario.

Figure 4
Return on Equity (ROE) by Stress Scenario, Total Banking System
2004–2024



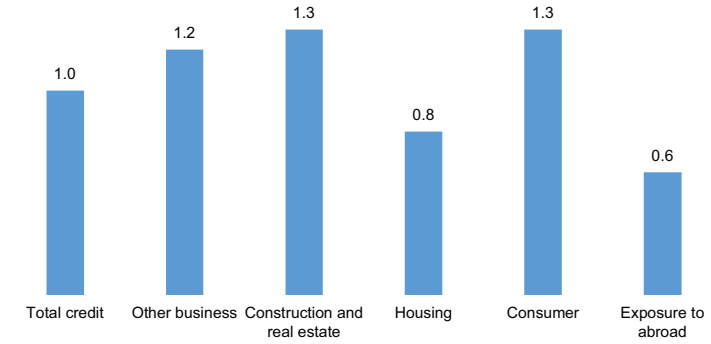
SOURCE: Banking Supervision Department calculations.

As in past scenarios, credit losses **are the main factor affecting the capital ratios**, where high rates of credit loss provisions are recorded in all sectors. The average rate of the credit loss provisions during the course of the scenario is 1 percent, which is similar to the scenarios in recent years, in which the average rate ranged from 0.8 percent to 1.2 percent. Furthermore, it appears that over the course of the scenario there is a gap between the distribution of the credit portfolio and that of the credit losses. The main losses in the scenario are the result of "Other businesses" (excluding construction and real estate)—approximately 34 percent of the total losses originate in this type of credit, even though its share of the credit portfolio is only about 27.5 percent (Figure 5), which reflects an average loss rate over the course of the scenario of 1.2 percent (Figure 5). There are also high rates of losses in the construction and real estate sector, which

reach a level of 1.3 percent and are the result of, among other things, the increase in credit risk in this sector (for further details, see Box 1.8 in this survey). With respect to the housing portfolio, which accounts for 38 percent of the total credit portfolio, its weight within total losses is 30 percent over the course of the scenario (Figure 6). This gap originates in the low level of risk of housing credit relative to other sectors, which is the result of the measures adopted by the Banking Supervision Department over the years to mitigate the various risks. Nonetheless, it appears that the risk in the housing credit portfolio has increased in recent years, with the increase in the share of variable interest rate loans and in the portfolio's average PTI (for further details, see the section on credit). Relative to past scenarios, this is reflected in slightly higher loss rates. In the consumer credit portfolio, there are high rates of provisions (1.3 percent on average over the course of the scenario), but its weight in the total provisions is relatively low (about 13 percent) due to its low share of the credit portfolio. Another channel that threatens the capital ratio is the increase in bond yields, which works to reduce the value of the available-for-sale portfolio and to erode equity capital by way of total profit.

Loan-Loss Provisions rates are high in all segments.

Figure 5
Average Loan-Loss Provision Rates in the Primary Segments Throughout the Stress Scenario (percent)



SOURCE:Banking Supervision Department calculations.

Housing credit as a share of total losses is lower than it is as a share of the total credit portfolio.

Figure 6
Distribution of Loan-Loss Provisions in the Stress Scenario vs Distribution of the Credit Portfolio by Primary Segment (percent)

SOURCE: Banking Supervision Department calculations.

A climate-related stress test

The Banking Supervision Department, like other supervisory authorities worldwide, will in the future carry out a climate-related stress test to evaluate the preparedness of the banking system for these risks and to identify focal points of vulnerability.[7] Climate stress tests relate to various risks (and first and foremost transition risk and physical risk) that have a significantly longer horizon (decades). Therefore, the Bank of Israel and the Banking Supervision Department are making the necessary preparations by gathering data from various sources, developing a predictive long-term model, and creating tools to analyze the scenarios (for further details on climate risk, see Box 1.2 in this survey).

[7] For further details, see the survey by the NGFS with respect to climate stress tests carried out by various supervisory authorities worldwide. "Scenarios in Action: A progress report on global supervisory and central bank climate scenario exercises", NGFS, October 2021.