Chapter 1
The Economy and Economic Policy

- The Israeli economy grew by 3.5 percent in 2019, similar to the growth rate in the previous two years, and lower than it was in 2016. Growth was led by exports and private consumption, and total domestic uses expanded according to growth rate of the last two years.
- The economy operated in a full employment environment. The unemployment rate declined to its lowest level in decades, and the employment rate is high. However, the job vacancy rate, which is at a high level, declined, as did the number of hours per employee. In addition, the pace of wage increases moderated, and the increase in the GDP labor share was halted.
- The expansion of world trade slowed in 2019, and some of the central banks enhanced their monetary accommodation. Toward the end of the year, the risks of moderation in economic activity lessened slightly, but at the start of 2020, global activity was significantly impacted by the outbreak of the coronavirus.
- The slowdown in world trade and the appreciation of the shekel contributed to the continued standstill of manufacturing industry exports (excluding high-tech manufacturing). However, the negative impact to growth in Israel was offset thanks to increased private and government consumption, high-tech manufacturing exports, and the continued expansion of services industry exports, which has increased consistently as a share of GDP in recent years, and has suffered less negative impact.
- The inflation environment declined in 2019 to below the lower bound of the target range. At the end of the year, the annual inflation rate was 0.6 percent. The decline in inflation was mainly due to the marked appreciation of the shekel since the beginning of the year, in view of surpluses in the basic account and in the current account of the balance of payments and an increase in capital inflows. Other reasons for the decline in the inflation environment include the moderate decline in goods prices abroad in view of the global slowdown, and increased domestic competition.
- The monetary interest rate remained at 0.25 percent throughout the year, but the policy environment changed. In the first half of the year, the probability of an increase in the interest rate was high, while in the second half of the year, there was greater probability of a decline in the interest rate, in view of the lower inflation environment, the global slowdown, and the accommodative policy in many countries.
- For most of 2019, the Bank of Israel purchased foreign exchange in small quantities, while in the fourth quarter, it purchased large quantities due to the Monetary Committee's assessment that the exchange rate had deviated from the dynamic window that was consistent with orderly activity and price stability.
- The inflation environment and the low interest rates around the world in recent years, have led to consideration of unconventional monetary policy tools, and in some countries even to their broad use. The Bank of Israel has in recent years used forward guidance and intervention in the foreign exchange market.
- Fiscal policy was expansionary in the past four years. The central government's deficit in 2019 was 3.7 percent of GDP, and the general government's deficit was higher than 4 percent of GDP for the second

consecutive year. The increase in government expenditure reflected a change in policy that began with the establishment of the government in 2015, after the previous government engaged in fiscal consolidation, and was intended to improve the level of public services and to increase transfer payments.

- Home prices resumed their increase in 2019, after stabilizing, for the first time in about a decade, in the previous two years. The factors contributing to the increase in prices were continued growth of households purchasing their first home, uncertainty regarding government policy relating to the housing market, and the low interest rate environment.
- In view of the policy of incentives to integrate into the labor market, the dimensions of poverty and inequality in Israel narrowed in the past decade, compared with an increase in the previous decade, and stabilized in the past two years. However, the increase in employment on its own is not sufficient to significantly lower the volume of poverty. Recommendations in the areas of productivity and increasing the quality of employment must be implemented.

The corona crisis that is gripping the global economy, including the Israeli economy, at the current time began in China, and spread to the entire world at the start of 2020. Real economic activity and financial stability have been severely impacted, and at the start of March 2020, many central banks, including the Bank of Israel, took measures to allow their economies to deal with the ramifications of the crisis. According to the Bank of Israel's most recent data and forecasts, the crisis is expected to have a serious impact on growth and to markedly increase unemployment.

This report analyzes the various developments in the domestic and global economies up to the end of 2019. The developments in 2020 due to the outbreak of the COVID-19 virus (the coronavirus) are outside the period dealt with by this report, and its implications and the policy responses to them[1] are not analyzed herein.

1. MAIN DEVELOPMENTS

The economy has operated in a full employment environment in recent years, supported by expansionary fiscal policy and accommodative monetary policy. The unemployment rate fell to its lowest level in a few decades, the employment rate increased and stabilized at record levels, and the increase in wages continued. In addition, the surpluses in the basic account and in the current account of the balance of payments expanded. However, during 2019, the pace of wage increases moderated, and the job vacancy rate, which is high, declined, as did the number of work hours per employee.

The inflation rate for most of the past five years has been below the lower bound of the target range. The low inflation in 2019 was due to the prolonged appreciation of the shekel, which explains its low rate by international comparison, and did not reflect weakness in domestic demand. Two additional factors that explain the low inflation rate are: (1) the change in consumer behavior due to the social protests at the beginning of the decade and technological improvements that supported an increase in online purchases of goods (from abroad as well). Together with government intervention to lower the cost of living (mainly in previous years) and other government actions, these supported increased competition in the economy. (2) A decline in global commodity prices.

In view of these developments, and similar to most other countries, Israel has adopted an accommodative monetary policy. The Bank of Israel interest rate was fixed at an all-time low from 2015, and foreign exchange purchases and forward guidance regarding future monetary policy were used. This policy supported economic activity and the labor market, but also contributed to increases in asset prices. In parallel, marcoprudential measures were taken in previous years to mitigate risks to the economy derived from the low interest rate. Fiscal policy was also expansionary, as reflected in increased government expenditure and tax reductions.

[1] For information published by the Bank of Israel due to the corona virus, see https://www.boi.org.il/en/Pages/CoronaUpdates.aspx

During 2019, and mainly in the second half of the year, there was a slowdown in world trade, and the risks to activity increased with greater uncertainty surrounding the trade war and the UK's exit from the European Union. In view of these developments, policy at some central banks—including in the US and Europe—again became more accommodative.

The slowdown in global activity, the decline in world trade, and the continued appreciation of the shekel have mainly impacted goods exports. However, the Israeli economy's relative advantage in the advanced services industry, where there has been less of an impact on global demand, and the completion of the new Intel plant and start of exports from it, have been reflected in growth of total exports. Together with private consumption, exports have led the increase in GDP, similar to the growth rate of the previous two years. The improvement in Israel's terms of trade and the expansionary and accommodative policies supported the continued growth of domestic demand, while private savings have increased.

There was a significant real appreciation of the shekel in 2019, mainly due to demand pressures in a full employment environment. One of the forces that fed the growth in demand was the increase in income from exports, despite the slowdown in world trade, which led to nominal appreciation. The nominal appreciation, global price declines, and increased competition moderated the increase in domestic prices.

The monetary interest rate in Israel remained unchanged in 2019, at 0.25 percent (since November 2018). Until mid-2019, the expected interest rate path—according to the capital market and professional forecasters—indicated a measured and cautious increased. After that, the path turned around during the second half of the year, and reflected a probability of a future decline in the interest rate. This change was due to the change in the global environment, an unexpected slowdown in inflation in Israel, and increased political uncertainty. In parallel with leaving the interest rate in place, the Bank of Israel changed the text of its forward guidance and noted that a future reduction of the interest rate and/or the use of additional tools may be necessary. In the fourth quarter of 2019, the Bank of Israel adopted further monetary accommodation by renewing foreign exchange purchases of significant amounts in view of the continued appreciation, because the Monetary Committee's assessment was that the exchange rate had deviated from the dynamic window that was consistent with orderly activity and price stability.

Per capita GDP in Israel increased in recent years at a rate similar to that in other OECD countries, and the dimensions of poverty narrowed in the past decade in view of the increase in the labor force participation rate and policy measures such as the provision of grants to workers with low salaries, an increase in the minimum wage, and a gradual increase of benefit payments. However, per capita GDP and labor productivity in Israel are low compared to other advanced economies, and the incidence of poverty in the general population, and even among households with workers, is high by international comparison. In order to increase per capita GDP and labor productivity, and reduce the dimensions of poverty, a public committee was established in 2017

to promote employment, and the Bank of Israel Research Department published recommendations in 2019 in the fields of education, infrastructure and bureaucracy.[2] The following is a broad review of the various developments.

a. Economic activity and the labor market

The economy has been in a full employment environment in recent years, supported by accommodative monetary policy and expansionary fiscal policy.

The Israeli economy grew by 3.5 percent in 2019, similar to the growth rate in the previous two years and lower than the growth rate in 2016, encouraged by expansionary fiscal policy and accommodative monetary policy. Domestic uses continued to expand in real terms in the past two years at a rate similar to that of GDP, and similar to the long-term rate of growth. The growth rates of imports and of consumption abroad moderated in the past two years, but remained high and, together with the appreciation of the shekel, enabled the continued growth of uses without an increase in inflation.

Exports, and to a lesser extent private and civilian public consumption, led growth in 2019. Despite the global slowdown, global demand for advanced services was not negatively impacted, and the trend of expansion of Israeli services exports, which are less sensitive to appreciation of the shekel than goods exports, continued.[3] The increase in Israeli exports was also due to the completion of the new Intel plant and the start of exports of electronic components from it, although this made only a marginal contribution to employment.[4] Private consumption was supported by a real increase in wages and in disposable income, in view of the full employment environment. Gross domestic investment expanded by a moderate rate due to the completion of the Intel plant and the completion of development work on the Leviathan natural gas reservoir. The trade and services industries led the growth in investment (in facilities and in intellectual property—software and R&D), and to a lesser extent investment in residential construction, due to the revival of the housing market.

The nominal and real appreciation of the shekel resumed in 2019.

The trend of real appreciation of the shekel has continued for more than a decade and a half. In the initial years following the eruption of the Global Financial Crisis, some of the appreciation was due to the high per capita growth in Israel relative to other advanced economies. However, in recent years, the per capita growth rate in Israel has been similar to that in the other countries. The factors supporting the significant continued appreciation, which resumed in 2019 following the depreciation of the previous year, are the surplus in the basic account, which includes the current account of the balance of payments and the flow of net direct foreign investment. The current account surplus increased in parallel with the improvement in the terms of trade, thanks to the continued increase in services exports[5], chiefly the export of high-tech services, which increased beyond the growth of world trade, thanks to the

[2] See: "Research Department Special Report: Raising the Standard of Living in Israel by Increasing Labor Productivity", August 2019.

[3] For more information, see Box 2.2 in this Report.

[4] For more information, see Box 2.1 in this Report.

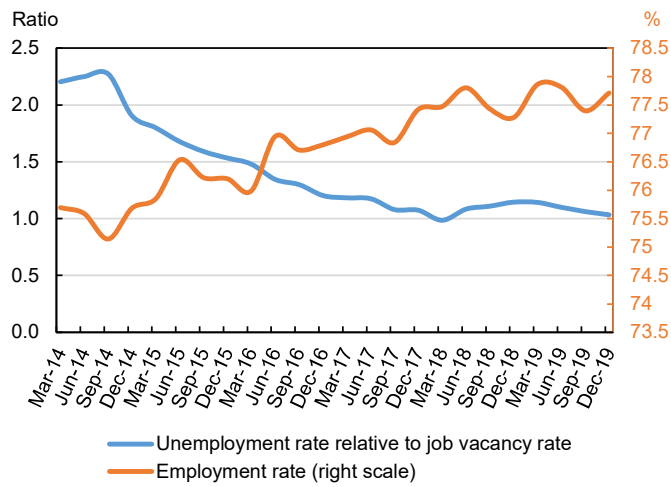
[5] An analysis of the low inflation rate in Israel, using the Research Department's structural model, indicates that the continued appreciation is due to the structural change in the economy, particularly the transition to surpluses in the basic and current accounts, as a main cause of the low inflation.

economy's specialization in such services.[6] The appreciation of the shekel was also supported by the confirmation of Israel's credit rating, despite the political uncertainty, and in view of Israel's forthcoming entrance to the WGBI index in April 2020. Another factor that may explain the resumption of the appreciation since mid-2019 is the monetary interest rate gap between Israel and other countries, particularly relative to the Fed's rate. In view of the slowdown, some countries lowered their interest rates, primarily the US, while the interest rate in Israel was left unchanged, although monetary policy in Israel did change. At the beginning of the second half of 2019, the Monetary Committee announced that the interest rate was not expected to increase, while during the second half, the Committee announced that a decline in the interest rate was possible in the future, and that additional policy tools may also be used.

In the past two years, the tightening of the labor market has apparently exhausted itself, which is consistent with the economy's full employment environment.

The labor market was characterized in 2019 by a full employment environment, due to the continued increase in the employment rate and in the participation rate, and decline in the unemployment rate.[7] Evidence of this is the downward trend of the ratio between the number of unemployed and the number of job vacancies in recent years (Figure 1.1). The stability of this ratio in the past two years apparently shows that the tightening process in the labor market has been exhausted, which is consistent with the stability of the economy in a full employment environment. The rate of expansion of the labor supply is moderating in view of structural changes in

Figure 1.1
The Employment Rate and the Ratio between the Unemployment Rate and the Job Vacancy Rate, 2014–2019



SOURCE: Based on Central Bureau of Statistics.

[6] For more information, see Chapter 4 in this Report.

[7] The decline in the low unemployment rate in recent years was also due to improved matching between job seekers and employers. (For more information, see Chapter 5.) The improved matching led to a decline in the natural unemployment rate. See, for instance, D. Elkayam and A. Ilek (2013). "Estimating the NAIRU Using Both the Phillips and the Beveridge Curves", Discussion Papers Series No. 2013.10, Bank of Israel Research Department.

Table 1.1
Main Developments, 2014–19

	2014	2015	2016	2017	2018	2019
Population (yearly average, million)	8.2	8.4	8.5	8.7	8.9	9.1
Nominal GDP (NIS billion, current prices)	1,108	1,165	1,225	1,272	1,331	1,408
Per capita GDP (NIS thousand, current prices)	134.9	139.1	143.4	146.0	149.8	155.6
Private consumption (NIS billion, current prices)	611.7	635.0	670.9	695.0	728.5	763.0
Gross domestic investment (NIS billion, current prices)	226.9	233.2	260.1	273.4	290.1	279.6
Public consumption (NIS billion, current prices)	251.7	261.8	274.7	288.4	306.3	322.2
Goods and services exports (NIS billion, current prices)[a]	321.1	333.6	328.7	334.2	358.9	379.5
Goods and services imports (NIS billion, current prices)[b]	295.6	291.7	305.4	318.2	351.3	353.4
GDP (percent rate of change)	3.8	2.3	4.0	3.6	3.4	3.5
Private consumption (percent rate of change)	4.1	4.1	6.3	3.4	3.7	3.9
Gross domestic investment (percent rate of change)	5.5	1.7	10.6	5.4	3.2	1.8
Public consumption (percent rate of change)	3.9	2.7	4.4	3.4	4.0	3.6
Goods and services exports (percent rate of change)[a]	3.7	-1.1	-0.7	6.2	5.1	5.7
Goods and services imports (percent rate of change)[b]	2.3	1.8	8.8	7.1	5.1	4.5
Current account of the balance of payments (surplus, $ billion)	12.6	15.5	11.4	8.3	9.5	14.3
Overall government deficit (percent of GDP)	2.5	1.4	1.9	2.1	4.3	4.5
Public debt (percent of GDP)	65.8	63.9	62.0	60.4	60.9	59.9
Employed persons in Israel (thousand)	3,556	3,644	3,737	3,825	3,905	3,967
Real wage per employee post (yearly average, percent rate of change)	1.1	2.9	2.8	2.8	2.7	2.0
Unemployment rate, aged 25-64[c]	5.0	4.5	4.1	3.7	3.5	3.4
Inflation (December compared to the previous December, percent)	-0.2	-1.0	-0.2	0.4	0.8	0.6
Bank of Israel interest rate[c]	0.60	0.12	0.10	0.10	0.11	0.25
Real one-year interest rate[c]	-0.65	-0.49	-0.12	-0.11	-0.77	-0.81
Nominal yield on 10-year government bonds[c]	3.10	2.18	2.00	2.11	2.16	1.59
Real yield on 10-year government bonds[c]	1.01	0.50	0.43	0.57	0.51	-0.01
Real effective exchange rate (yearly average, percent rate of change)	-1.3	0.4	-1.5	-4.4	2.1	-2.6
NIS/$ exchange rate (yearly average)	3.58	3.89	3.84	3.60	3.59	3.56
Tel Aviv 125 index[d]	6.7	2.0	-2.5	6.4	-2.3	21.3
World trade (percent rate of change)	3.9	2.8	2.3	5.7	3.6	1.1

[a] Excluding diamonds and startups.
[b] Excluding defense imports, ships, aircraft, and diamonds.
[c] Yearly average, percent.
[d] Nominal rate of change - the last day of December compared to the last day of the previous December.
SOURCE: Based on Central Bureau of Statistics and International Monetary Fund.

the economy, particularly the declining rate of the population in the primary working ages, the maximization of the effect of the increase in years of schooling, and the increase in the retirement age.[8] In addition, the rates of increase in the number of employed persons, employee posts, and wages are also moderating (Table 1.1), although the unemployment rate remains low—a sign of the labor market's elasticity. The increase in demand for workers in the information and communications industry, where there is high demand abroad for their products, and which leads exports, is the exception to the rule.

b. The inflation environment and the exchange rate

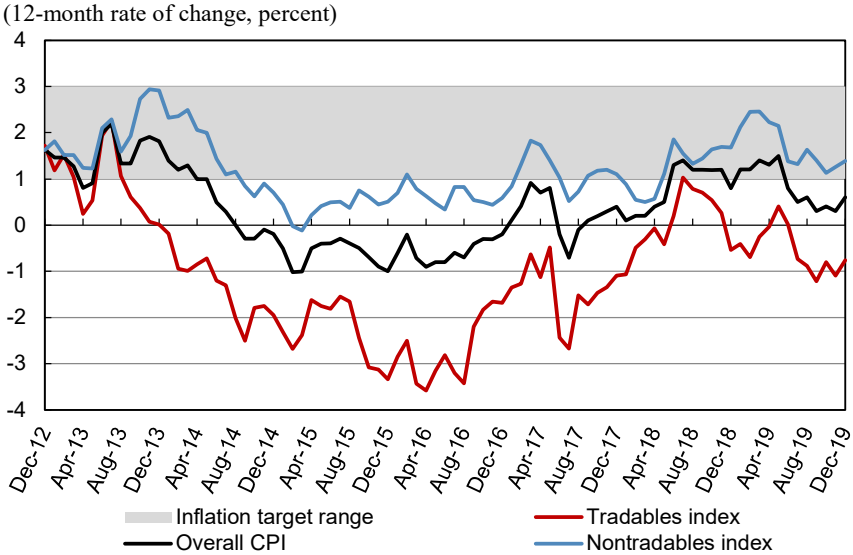
Despite the full employment environment and the continued expansion of domestic uses in 2019, similar to the rate of expansion in the previous year and to the potential

[8] Until the discussion of raising the retirement age for women is renewed, in view of the increase in life expectancy and the decline in interest rates.

The annual inflation rate moderated in the second half of 2019, ending the year at 0.6 percent.

growth rate, the annual inflation rate (inflation over the past 12 months) of the Consumer Price Index moderated in the second half of the year, with annual inflation at the end of the year totaling 0.6 percent, below the lower bound of the target range. In the past five years, annual inflation ranged below the lower bound of the price stability target range (1–3 percent) for most of the time (Figure 1.2).[9] The moderation of inflation in 2019 was mainly due to the appreciation of the shekel.

Figure 1.2
Inflation in the Overall CPI and in the Tradable and Nontradable Components, December 2012 to December 2019
(12-month rate of change, percent)



SOURCE: Based on Central Bureau of Statistics.

For about a year from mid-2018, actual inflation and inflation expectations according to various sources were stable, ranging slightly above the lower bound of the target range. However the Consumer Price Index readings for June and July 2019 declined surprisingly, and with them the inflation environment declined. Actual inflation fell below the lower bound of the target range, as did core indices that had ranged slightly below the lower bound for the past two years. Inflation expectations for ranges of up to 5 years also declined, with expectations for interest rate cuts and taxes increases in the future in order to reduce the government deficit.

The low inflation rate in recent years was mainly due to supply factors and the continued appreciation of the shekel in view of structural changes in the Israeli economy, and did not reflect a decline in domestic demand. The inflation rate is

[9] Policy is geared toward meeting the target range for up to two years forward, and not to meeting it at the end of a calendar year.

affected by inflation expectations (and affects them as well), economic activity, the prices of imported goods, the exchange rate, structural changes, and shocks to the economy.[10] The high level of activity in the Israeli economy, which was supported by accommodative monetary policy and expansionary fiscal policy, made a positive contribution to inflation. The process of tightening in the labor market was accompanied by a continued increase in wages beyond the increase in labor productivity, and also contributed to inflation. In 2019, the process of tightening was halted in view of the full employment environment and the increasing global slowdown. The growth rate of wages in the business sector[11] moderated, and the GDP labor share in the sector declined slightly following increases in the previous three years. Nevertheless, the continued expansion of domestic uses, particularly of all private consumption components, and the gradual increase in the nontradable goods price index (excluding housing, fruits and vegetables) attest to continued high domestic demand.

The low inflation rate in recent years has mainly been the result of structural changes in the Israeli economy, which supported the continued appreciation, and of supply factors.

Structural changes in Israel's foreign trade—particularly a reduction of imports of energy products, and recently also the export of natural gas, and the economy's specialization in high-tech services and their growth as a share of both economic activity and exports—made a major contribution to the increase in the surplus in the economy's basic account, and through it to the trend of nominal appreciation and the decline in inflation.[12] These contributions to the appreciation of the shekel explain the low inflation in Israel even by international comparison. A conservative estimate of the pass-through from the exchange rate to inflation implies that the nominal appreciation of about 8 percent in 2019 contributed significantly to the decline in inflation.

The decline in inflation in Israel was also due to a structural change in consumer behavior, in view of the social protest in the summer of 2011[13], which led to an increase in competition and declines in prices. This change was also supported by technological advances, which make it easier to search for products, compare prices, and purchase some goods online. In addition, the government took measures to lower the cost of living and increase competition in the economy[14], particularly by lowering customs and broadening imports (measures unique to the Israeli economy).[15]

[10] According to neo-Keynesian theory, which provides a broad foundation for macroeconomic models, the dynamic between inflation and the variables mentioned is outlined by the Phillips curve, and the dynamic of activity (output gap) is outlined by the IS equation. See, for instance: J. Gali and T. Monacelli (2005), "Monetary Policy and Exchange Rate Volatility in a Small Open Economy", *Review of Economic Studies* (72): 707–734.

[11] Public sector wage agreements remained unchanged in 2019, in the absence of an elected government.

[12] For more information, see Chapters 2 and 4 of this Report.

[13] For more information, see Bank of Israel Annual Reports for 2016 and 2017.

[14] For more information see Chapters 1 and 3 of the Bank of Israel Annual Report for 2017, and Chapter 3 of the Bank of Israel Annual Report for 2016.

[15] For more information see Box 1.1 in the Bank of Israel Annual Report for 2018.

The low interest rate environment and the narrow space for interest rate policy at the current time make it difficult to attain the inflation target, in view of the continued appreciation of the shekel and the decline in inflation expectations in recent years. One-year expectations declined slightly in 2019, following an upward trend that began at the beginning of 2017, and stabilized around the lower bound of the target range. Professional forecasters' projections of expected inflation beyond one year were similar, also below the midpoint of the target range, while some were even below the lower bound.

Despite the expected difficulty in returning inflation to the midpoint of the target in coming years, it seems that the credibility of monetary policy, and particularly the public's belief that it can return to the midpoint of the range within 5–10 years, has not been harmed.

One may ask what the meaning is of expectations being below the midpoint of the inflation target over time. The gap between nominal and real yields includes a premium component that is added to the nominal yield of the unindexed bond in respect of the inflation risk (a component that does not exist in the professional forecasters' projections), which must be deducted in order to calculate the estimate of inflation expectations. Since mid-2012, inflation expectations for terms of up to 5 years, minus the estimated inflation risk premium, declined gradually, and have been below the lower bound of the range since 2015. However, in the past two years, these expectations have increased, and in 2019 they ranged around the lower bound of the target range (3-year-forward expectations) or slightly above the lower bound (for 3–5 years). Estimated expectations for ranges of between 5 and 10 years, which also increased in the past two years, are slightly above the midpoint of the target range. This is because in recent years, the estimate of the long-term inflation risk premium (5–10 years) in the Israeli economy is negative. [16]A possible reason for the negative premium is low growth expectations, accompanied by low inflation (secular stagnation). In such a situation, unindexed bonds carry a higher-than-expected real yield (due to the low inflation). As such, investors are prepared to pay a premium for holding the bonds, over and above holding indexed bonds. Net of that premium, inflation expectations derived from the capital market range slightly above the midpoint of the target range, which apparently implies that the credibility of monetary policy has not been harmed in the past two years, particularly regarding its aim for the midpoint of the target range, despite the difficulty in attaining it in the short term.

c. Global developments[17]

The slowdown and the low inflation, with the increasing risks of moderation in economic activity, motivated many central banks around the world to enhance their accommodative policies in 2019 (Table 1.2), both by lowering the monetary interest rates during the year[18], and through other tools. (For a discussion of these tools, see

[16] For more information, see Box 3.1of the Bank of Israel Annual Report for 2018.

[17] This section outlines global developments in 2019. The developments at the start of 2020 due to the outbreak of the COVID-19 virus (the coronavirus) are outside the period discussed in this report, and we do not relate to them here.

[18] For more details, see Figure 13, *Monetary Policy Report*, second half of 2019, Bank of Israel.

Section 4). At the end of 2019, it appeared that these risks had declined—influenced by the policies taken, the calming of the trade war, and the increased probability that the UK would leave the European Union ("Brexit").

The slowdown in global activity in 2019 and the low inflation rate have led to enhanced monetary accommodation around the world.

The global growth rate in 2019 was the lowest since 2009, with declines in investments, industrial production, and world trade. Some of the slowdown was attributed to the risks in the global economy resulting from the increasing uncertainty surrounding the trade war between the US and China and its other trading partners, and surrounding Brexit. The uncertainty surrounding the terms of the Brexit and the date on which it would take place led to a replacement of the British prime minister in 2019, and to elections at the end of the year. The slowdown is also explained by mitigated monetary accommodation in 2018 in some countries, and the decline in demand, mainly in developing economies. The International Monetary Fund's outlook for global growth for 2019–2020 was revised downward a number of times, and was the lowest it has been since the Global Financial Crisis over a decade ago. The OECD also revised its forecast of world trade downward, out of concern that the trade war would have a negative impact on business sector investments in the US, the eurozone, Japan, and China, and would lead to a decline in world trade.

The global slowdown and the downward tendency in the balance of risks led some countries to change their policies during the course of the year. The recovery in the US economy continued in 2018, and the Fed raised its interest rate by one percentage point in total over four decisions. In the first half of 2019, the Fed left its rate unchanged (between 2.25 and 2.5 percent), in view of the strong state of the US economy, particularly employment, and the inflation environment, which ranged around the target of 2 percent. However, in view of the rapid deterioration in global developments, both actual and expected, and the decline in inflation in the US, the Fed lowered its rate at the end of July 2019, for the first time in a number of years, by 0.25 percentage points, and then lowered it again by the same amount in September, and again in October.

At the end of 2019, it seemed that the global risk balance had declined, and market assessments indicated that the decline in interest rates had exhausted itself. However, at the beginning of 2020, global real activity was severely impacted by the outbreak of the COVID-19 virus.

At the end of 2019, there was also a turnaround in monetary policy in the eurozone. Until September, the ECB interest rate remained unchanged, and was not expected to change at least until mid-2020. However, in the September decision, the interest rate on deposits by the commercial banks was lowered from -0.4 percent to -0.5 percent, and the bank announced a purchasing program of €20 billion per month to begin in November 2019. The bank also announced that the interest rate was expected to remain unchanged or to decline as long as inflation did not return to around 2 percent.

Growth in China slowed in view of the continuing trade war with the US, and the slowdown was expected to continue[19], due to regulatory measures intended to minimize financial risks.

At the end of the year, market assessments around the world indicated that the interest rate reductions in the US and Europe had been exhausted. The announcements by the heads of the central banks, and the reports regarding the upcoming signing of

[19] See International Monetary Fund, *World Economic Outlook*, October 2019.

Table 1.2

Economic indicators: International comparison[a], 2010–18

	2010–17 average				2018				2019			
	Israel	US	Eurozone	OECD	Israel	US	Eurozone	OECD	Israel	US	Eurozone	OECD
GDP growth rate	3.8	2.2	1.3	2.2	3.4	2.9	1.9	2.3	3.5	2.3	1.2	1.7
Per capita GDP growth	1.9	1.4	1.1	1.5	1.4	2.3	1.7	1.7	1.6	-	-	-
Per capita GDP ($ thousand, current prices)	35.6	54.1	39.8	37.8	41.7	62.9	46.2	40.4	42.8	65.1	-	-
Population growth rate	1.9	0.7	0.4	0.6	1.9	0.6	0.2	0.5	1.9	0.6	0.2	0.5
Civilian labor force participation rate, ages 25–64	78.9	77.3	79.0	76.7	80.3	77.8	80.5	78.1	80.4	-	-	-
Unemployment rate	6.1	6.8	10.7	7.4	4.0	3.9	8.2	5.3	3.8	3.7	7.6	5.2
Inflation rate (during the year)	1.1	1.7	1.3	1.8	0.8	2.4	1.8	2.6	0.8	1.8	1.2	2.0
Exports (percent of GDP)[b]	29.7	12.9	44.0	28.4	27.6	12.2	48.0	30.1	27.7	-	48.4	-
Gross investment (percent of GDP)	20.6	20.1	20.7	22.2	21.8	21.0	21.6	23.1	21.1	21.1	21.7	23.0
National savings (percent of GDP)	23.5	18.4	23.1	22.9	24.4	18.4	25.1	24.2	25.0	18.5	25.0	24.2
Current account (percent of GDP)	3.0	-2.4	2.5	-0.1	2.6	-2.4	3.6	0.3	2.4	-2.5	3.2	0.2
Public expenditure (percent of GDP)[c]	39.6	36.7	48.6	44.6	40.2	35.1	-	42.4	39.5	36.2	-	42.5
Tax revenue (percent of GDP)[d]	30.9	25.0	36.9	33.5	30.8	24.9	37.8	34.6	30.2	25.1	37.6	-
Gross public debt (percent of GDP)[c]	65.9	103.1	89.8	81.6	60.8	104.3	85.9	81.3	60.2	106.2	-	80.3

[a] Figures for the eurozone and OECD countries are weighted averages of the data for the countries in each group, as published in the OECD Economic Outlook.

[b] For Israel—exports excluding diamonds.

[c] Deficit and expenditure data for Israel are adjusted to the accepted international definition.

[d] Data for the eurozone and OECD countries are the simple averages of the data for the countries in each group. Data for the eurozone do not include Latvia, Malta or Cyprus.

SOURCE: Based on International Monetary Fund and OECD.

the first part of a trade agreement between the US and China (which was actually signed in January 2020), as well as the Conservative victory in the UK elections in December, which raised the likelihood of Brexit taking place in early 2020, supported these assessments.

d. Credit and the housing market

The growth rate of private sector debt was more moderate in 2019 than in the previous year.

Private sector debt (the nonfinancial business sector and households) increased by 3.1 percent in 2019, a more moderate increase than in the previous year. The acceleration of growth of housing debt continued (beyond the increase in GDP) in view of the revival of the housing market, while the growth rate of business sector debt moderated. The raising of debt abroad (which increased to one-ninth of nonfinancial business sector debt) increased quantitatively, but due to the appreciation, its shekel-value increased only moderately.

In the past five years, nonfinancial business sector debt as a share of GDP stabilized, following a significant decline in previous years, in view of structural and regulatory changes in the Israeli economy[20]: the increase of the high-tech sector's share of economic activity and the reduction of activity by holding companies, alongside the diversion of bank credit to households. The slower increase of business sector debt in 2019 was mainly due to the decline in issuances of tradable bonds, for the second consecutive year, and despite the low spreads on average business sector bonds.

In the past two years, the growth rate of bank credit to large businesses increased, while the growth rate of such credit to small and midsized businesses declined, in view of more lenient regulatory restrictions and reaching regulatory capital ratio requirements, which made it easier to provide credit to large businesses. This change in the composition of bank credit may have a negative impact on continued financing for small business activity.

The growth rate of housing debt continued and accelerated due to the revival of the housing market.

Household debt increased by 7.1 percent in 2019, beyond the increase in GDP, in view of the revival of the housing market and growth in housing credit as a share of total bank credit. This was a result of regulation that was intended to reduce risk in the financial system, while coordinating the credit supply between the various uses. After housing prices stabilized in 2017–18, for the first time in a decade, with high levels of building starts, building completions, and active construction[21] thanks to government measures in previous years, home prices again increased, by 3 percent in 2019. Most of the increase was in the second half of the year. The prices of homes in the "Buyer's Price" program, most of which are expected to be delivered to purchasers 2–3 years after purchase, include a significant discount. But the increase in prices of other homes indicates an increase in demand beyond supply. This comes against the background of increased uncertainty regarding government policy in the housing field due to greater political uncertainty during the year, and the decline in the

[20] For more information, see Chapter 4 of this Report and of the Bank of Israel Report for 2018.

[21] For more information see Chapter 9 of the Bank of Israel Report for 2018 and Chapter 8 of this report.

weighted interest rate on mortgages. The latter was affected by the global decline in yields. Rent prices[22] increased by 2.8 percent in 2019.

New mortgage volume increased, as did the size of the average mortgage. However, the payment-to-income ratio on mortgages did not increase. While the increase in the average wage was more moderate than the increase in home prices, the interest rate on mortgages declined, and the average repayment period was extended. In view of the increase in private consumption and the revival of the housing market, the volume of non-housing consumer credit increased relative to the previous year, but at a more moderate rate than the increase in consumption. The expansion of this credit reflected an increase in nonbank credit, while bank credit has stagnated for the past three years.[23]

Private sector debt relative to GDP is low by international comparison.

Despite the expansion of debt in the economy, the level of private sector debt relative to GDP is low by international comparison, and an analysis of the probability of default of public companies shows that it is stable and low from an historic perspective. Accordingly, the global credit rating agencies reaffirmed Israel's credit rating.[24]

2. ECONOMIC POLICY

a. Monetary policy

In November 2018, the Bank of Israel raised the interest rate to 0.25 percent. The rate remained at that level throughout 2019.

The monetary interest rate is the Bank of Israel's main policy tool. Following about four years in which the interest rate was at an historic low of 0.1 percent, the Bank raised the interest rate to 0.25 percent in November 2018, and left it at that level throughout 2019. This low level is intended to support the Bank of Israel in achieving its objectives. These objectives are the attainment of price stability, which is defined as annual inflation in the range of 1–3 percent; supporting economic growth and employment, reducing social gaps, and supporting the stability of the financial system.

The upward path of the expected interest rate at the beginning of 2019 became a downward path in the middle of the year.

The upward path of the expected interest rate (by the capital market and professional forecasters) at the beginning of 2019 became a downward path in the middle of the year. The reasons for the change in the expected path were an unexpected decline in the inflation environment in Israel, a significant slowdown in actual and expected global activity, and increasing political uncertainty in Israel and its implications for fiscal policy, both actual in 2019 and expected in 2020. Despite the expectations of a decline in the interest rate in the fourth quarter of 2019, it was decided (though not unanimously among the members of the Monetary Committee[25]) not to lower it. The decision was supported by the good state of the real economy, which was reflected

[22] According to the "Owner-Occupied Housing Services" component of the Housing Prices item in the Consumer Price Index, which reflects rental prices in new and renewing contracts.

[23] In April 2019, the "Credit Data Sharing System" was launched. This system, which was set up by the Bank of Israel together with the Ministry of Finance and the Ministry of Justice, should increase competition in the credit field, both within the banking system, and on the part of nonbank actors, and support the expansion of the supply of consumer credit in the economy.

[24] For more information, see Bank of Israel, *Financial Stability Report*, December 2019.

[25] See the Monetary Policy Reports for both halves of 2019.

in the high level of activity and the tight labor market, against the background of the interest rate's proximity to zero.

Forward guidance was actively used in 2019, and in the fourth quarter of the year, the Bank resumed its interventions in the foreign exchange market, with large volumes of purchases.

In parallel, the Monetary Committee actively used forward guidance with the interest rate decisions and in press conferences held in conjunction with the publication of the decisions. Thus, in the second half of 2019, the Monetary Committee added to its announcements that it may take additional steps to enhance monetary accommodation, while using additional tools as necessary. In the October decision, the Committee added that the interest rate may be reduced in the coming year.

In view of the resumption and intensification of the appreciation in 2019—following about two years of stability in the effective exchange rate—the Bank renewed its intervention in the foreign exchange market in the fourth quarter of 2019, and, for the first time in a couple of years, purchased $3.8 billion, in view of the assessment that the effective exchange rate had deviated from the "window" that the Monetary Committee viewed as consistent with proper economic activity and price stability.

Together with forward guidance, intervention in the foreign exchange market is one of various tools used by central banks in view of the near-zero interest rates. Section 4 of this chapter expands on the issue and analyzes the advantages and disadvantages of the various tools.

The one-year real interest rate, which is influenced by monetary policy (and depends on inflation expectations[26]), has been at a low negative level for most of the past decade, supporting investment and consumption. In the past year-and-a-half, the one-year real interest rate ranged around -0.9 percent.[27] During that period, the gap between the Israeli interest rate and the higher US interest rate, narrowed, to zero at the end of 2019, while the gap between the interest rate in Israel and the lower parallel rate in Europe increased.

A common indicator of the extent of accommodation or contraction of monetary policy on economic activity and prices (monetary stance) is the gap between the actual real interest rate and the natural rate of interest.[28] The natural rate of interest is a theoretical, unobserved real interest rate, which is consistent with price stability and economic activity at the potential level (zero output gap). In an open economy, another condition of such equilibrium is that the real exchange rate is at its fundamental level (see the discussion below). When the real monetary interest rate is lower than the natural rate, in other words when there is a negative interest rate gap, policy acts to expand activity and raise inflation, and vice-versa.

As the natural rate is unobserved, it must be estimated. Figure 1.3 presents a range of five different estimators of the natural interest rate in Israel that are calculated by

[26] The real interest rate in Chapter 3 relates to the monetary interest rate minus inflation—ex-post. In contrast, the real interest rate discussed here is the interest rate minus inflation expectations—ex-ante.

[27] The real interest rate was even lower for short periods, including in mid-2009.

[28] See, for instance: K. Holsteon, T. Laubach, and J. C. Williams (2017). "Measuring the Natural Rate of Interest: International Trends and Determinants", *Journal of International Economics*, 108, Supplement 1, S59–S75.

the Bank of Israel Research Department.[29] Similar to various estimations globally, the natural interest rate in Israel also declined, particularly following the Global Financial Crisis about a decade ago. One of the possible reasons for the decline is the decline in the domestic and global growth rates, both due to various shocks and in view of more prolonged demographic changes, particularly the aging of the population and the declining share of the population that is in the primary working ages (in Israel due to the exhaustion of the effect of the increase in the number of years of schooling and the increase in the retirement age, and the decline in demand for investments). The continued increase in life expectancy increases the rate of savings among the working age population due to the longer retirement period, increases the supply of credit, and thereby acts to lower the interest rate. Lowering the interest rate on its own enhances this effect and is enhanced by it. The decline in the estimates of the natural interest rate globally also supports the secular stagnation hypothesis, which states that an increase in the marginal tendency to save in parallel with a decline in investments leads to a decline of the real interest rate and moderation in growth and in price increases.[30]

Monetary policy was accommodative for most of the past decade (except for 2016–17).

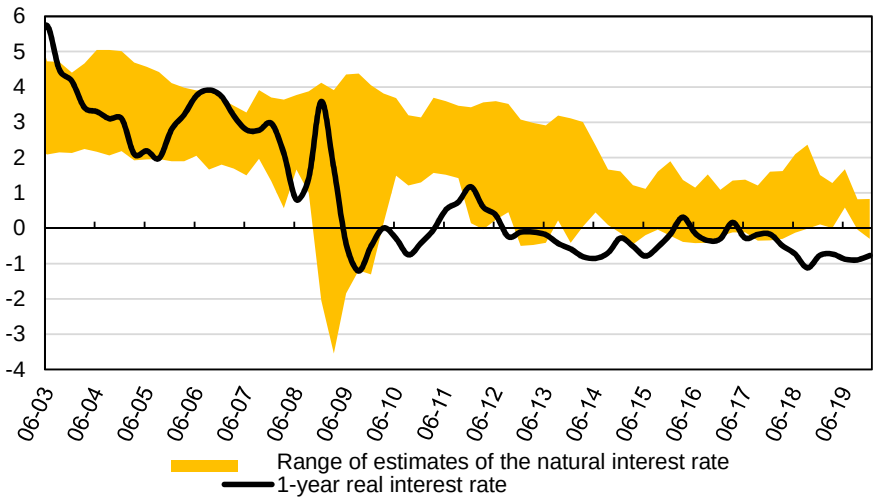
An estimation of the monetary stance in Israel is implied, as stated, from the gap between the real interest rate and the range of estimations of the natural interest rate[31] (hereinafter the interest rate gap). The interest rate gap indicates accommodative monetary policy over most of the last decade (other than 2016 and 2017), and particularly in the past two years, although policy may not have been sufficiently accommodative, as reflected in the inflation rate that was below the target range during this period. It seems that part of the explanation has to do with the nominal monetary interest rate being at what is considered the effective lower bound. From March 2015 until November 2018, the interest rate was left at 0.1 percent, despite the fact that the inflation rate was negative between 2014 and 2016, and only began moving toward the positive range and close to the lower bound of the target range in 2017.

[29] See: E. Argov, A. Barnea, A. Binyamini, E. Borenstein, D. Elkayam and I. Rozenshtrom (2012). "A DSGE Model for Analysis of the Israeli Economy (MOISE)", Bank of Israel Research Department, Discussion Paper 2012.06; M. Beenstock and A. Ilek (2010). "Wicksell's Classical Dichotomy: Is the Natural Rate of Interest Independent of the Money Rate of Interest", *Journal of Macroeconomics,* 32(1): 366–377; R.H. Clarida (2009). "Reflections on Monetary Policy in the Open Economy", In: *NBER International Seminar on Macroeconomics 2008*, J. Frankel and C. Pissarides (eds.), National Bureau of Economic Research, pp. 121–141; D. Elkayam and G. Segal (2018). "Estimated Natural Rate of Interest in an Open Economy: The Case of Israel", Bank of Israel Research Department, Discussion Paper 2018.05; R. Stein (2011). "Estimating the Natural Real Interest Rate Using a Yield Curve Model", Bank of Israel Research Department, Discussion Paper 2011.03. The estimation in Stein (2011), which is included in the range of estimations in Figure 3.3, is the one based on the real 10-year yield curve.

[30] See: L.H. Summers (2015). "Demand Side Secular Stagnation", *American Economic Review: Papers & Proceedings*, 105(5): 60–65.

[31] The extent of the monetary stance, which is reflected in the interest rate gap presented above, apparently also reflects the use of other monetary tools in addition to the interest rate, particularly forward guidance and intervention in the foreign exchange market. This is because the various estimations also reflect expectations, which are influenced by the additional policy measures (through signaling channels, see Section 4). However, estimates of the natural rate of interest are characterized by very high uncertainty.

Figure 1.3
The Real 1-Year Interest Rate and the Range of Estimates of the Natural Rate of Interest in Israel, June 2013 to December 2019 (percent)



SOURCE: Based on Central Bureau of Statistics.

Another indicator of the extent of monetary accommodation, which is not correlated to the interest rate gap presented above, is the link between real economic activity, the real exchange rate, and the real interest rate. According to neo-Keynesian theory, in an open economy such as Israel's the output gap is larger as the real exchange rate gap is larger and as the interest rate gap is smaller.[32] The prevailing assessment is that the Israeli economy has in recent years been characterized by a level of activity that is close to potential (an output gap of close to zero) and a negative exchange rate gap, meaning over-appreciation, which has even led to some of the Bank of Israel's interventions in the foreign exchange market. According to theory, these developments therefore support the assessment that the combination of the monetary interest rate and the use of forward guidance and foreign exchange purchases was actually accommodative in recent years—an assessment that is also in line with the interest rate gap mentioned above.

Inflation below the target range on its own does not necessarily imply that policy was restrictive because economic activity was near its potential rate, alongside appreciation of the shekel.

[32] Theoretical support for this is implied by the Eular equation, which is derived from an optimization of households. For example, see: A. Berg, P. Karam, and D. Laxton (2006). "Practical Model-Based Monetary Policy Analysis—A How-To Guide", IMF Working Paper 06/81; J. Galì and T. Monacelli (2005). "Monetary Policy and Exchange Rate Volatility in a Small Open Economy," *Review of Economic Studies* (72): 707–734.

b. Fiscal policy

Fiscal policy was expansionary in the past four years.

Similar to monetary policy, fiscal policy was also expansionary in the past four years. The changes in the structural deficit of the various governments in the past decade reflect the changes in policy from one government to the next. Due to the social protests of 2011, the government increased public expenditure and its share of GDP. As a result, the structural deficit—the deficit net of the effect of the business cycle and one-off revenues—increased greatly between 2011 and 2013. The government that took office in 2013 lowered the structural deficit, but the government that took office in 2015 accelerated public expenditure and enabled the continued improvement of public services, from a level that was low by international comparison. In 2016 and 2017, the government deficit was relatively low, thanks to unusual revenues, but in the absence of unusual revenues in 2018 and 2019, the structural deficit increased by a cumulative 2.6 percent of GDP to 4.3 percent of GDP in 2018 and 4.5 percent of GDP in 2019. However, despite the increase in the deficit, the debt to GDP ratio declined slightly, to about 60 percent of GDP, as a result of the rapid increase in nominal GDP, the appreciation of the shekel, and the decline in government balances at the Bank of Israel.

Even though the government in 2019 was a transition government, fiscal policy operated within an approved budget, thanks to the early approval of the budget in March 2018. At the time the budget was approved, the outgoing government increased the ceiling limiting expenditure beyond the expenditure rule.

In the absence of an approved budget for 2020, the government has been operating since the beginning of the year based on a continuation budget, which enables the government to spent 1/12 of the total previous year's budget each month. This means that fiscal policy is restraining. The outbreak of the corona crisis required the government to react in real time to developments with an increase in healthcare budgets and the use of policy tools to minimize the negative impact to the economy. At this stage, it is clear that dealing with the structural deficit must be delayed until after the crisis is over.

3. PER CAPITA GDP, INEQUALITY, AND LONG-TERM GROWTH

Per capita GDP in Israel is lower than in other advanced economies.

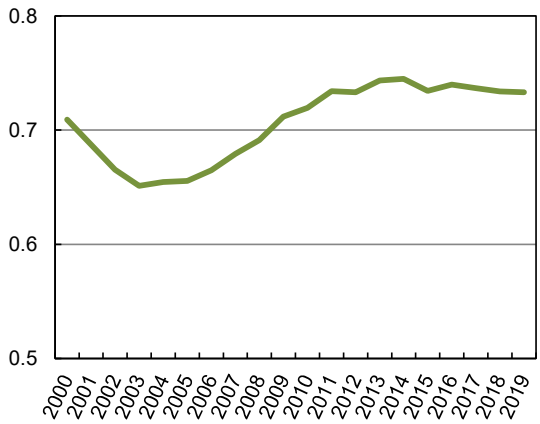
The level of per capita GDP in Israel is lower than in other advanced economies, and the gap has expanded slightly in recent years (comparison in terms of purchasing power parity (PPP), Figure 1.4). While the increase in the employment rate in Israel worked to narrow the gap, the gradual decline of the working-age population as a share of the total population (dependency ratio, which is relatively high in Israel), and the relatively low labor productivity (GDP per hour worked is about one-quarter lower than the OECD average) worked to expand it.

The Bank of Israel Research Department published a comprehensive report containing recommended measures in the fields of education, infrastructure, and

bureaucracy, the aim of which is to increase labor productivity and the standard of living in Israel.[33] The cost of the measures, which are recommended to be implemented gradually, is a permanent addition of about 3 percent of GDP per year, but our assessment is that the measures will lead to a much greater addition—about 20 percent—in the level of annual GDP over the long term.

As stated, some of the recommended measures are in the areas of infrastructure and transportation. The increase in the standard of living together with the growth in employment has led to a rapid increase in commuting by private vehicle, beyond the growth in investment in transport infrastructure. As a result, road congestion has increased. Studies by the Research Department propose easing the congestion by improving public transport, alongside making private vehicle travel more expensive. In particular, the measures include investment in the establishment of a metro service in the center of the country and other improvements in the array and accessibility of public transit, alongside the use of technological means to collect congestion tolls during peak travel hours and increasing the price of using private parking.

Figure 1.4
Per Capita GDP in Israel Relative to Other Advanced Economies[a], 2000 to 2019 (in PPP terms, ratio)



[a] The advanced economies according to the International Monetary Fund: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Macao, Malta, Netherlands, New Zealand, Norway, Portugal, Puerto Rico, San Marino, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Taiwan, UK, and US.

SOURCE: Based on International Monetary Fund, World Economic Outlook, October 2019.

The dimensions of poverty[34] and inequality have declined in Israel in the past decade (and stabilized in the past two years—the analysis relates to the period up to 2018), after increasing in the previous decade.[35] The increase in the employment rate and government measures such as the provision of an earned income tax credit to workers with low salaries, the increase in the minimum wage, and the gradual increase of benefit payments all contributed to this result. However, an analysis

The employment rate increased, but employment on its own has not been sufficient to extract a person from poverty.

[33] See: "Research Department Special Report: Raising the Standard of Living in Israel by Increasing Labor Productivity", August 2019."

[34] Poor households are defined as those with an equivalized disposable income of less than half the median income. This definition is relative to the general population.

[35] For more discussion, see Chapter 8 of this report.

of income distribution shows that the poverty rate among Israeli workers is higher than in other advanced economies, and that poor workers are mainly those who have worked for a prolonged period. These findings show that employment on its own is not sufficient to extract a person from poverty, and bring into sharper relief the importance of accumulating human capital that is appropriate for the labor market and enables stable employment at a decent salary. The dimensions of poverty in Israel are particularly high among the *haredi* (ultra-Orthodox) population and among Arab society, half of which are under the poverty line.

The income gap between the various population groups is also reflected in the proportion of households belonging to the middle class.[36] In Arab society, this proportion is markedly lower than in the rest of the population, while the proportion of more vulnerable households[37] is larger. The main characteristics that are correlated with the paucity of Arab households that are in the middle class are the smaller volume of employment (mainly due to the low employment rate among Arab women), a lower level of education and skills, larger households, and a greater weight of households in the periphery. In the past decade, the rate of Arab women with academic education has increased significantly, but the pace of that increase is lower than among women in the non-*haredi* Jewish population, such that the gaps have continued to widen.

4. ISSUE: UNCONVENTIONAL MONETARY POLICY TOOLS IN A NEAR-ZERO INTEREST RATE ENVIRONMENT

In view of the low inflation environment and interest rate level and the slowdown in activity in some countries in recent years, many countries have used a variety of tools, in addition to the interest rate, to conduct accommodative monetary policy. The Bank of Israel has in recent years been using forward guidance, as well as intervention in the foreign exchange market as necessary, as part of its accommodative policy. The following is a presentation and analysis of the advantages and disadvantages of the main tools used or considered by various central banks when interest rates are near zero. The tools reviewed are: intervention in the foreign exchange market, forward guidance, quantitative easing, and negative interest rates.

This discussion does not relate to the use of these tools in crisis or emergency situations. In terms of use during a crisis, we note that at the beginning of 2020, in view of the outbreak of the coronavirus and its dramatic ramifications on liquidity and yields in the markets, the Bank of Israel carried out swap transactions with the domestic banking system using foreign exchange in order to relieve the pressure for dollar liquidity. The Bank of Israel also acted in the open market and purchased government bonds of various types and for various terms to maturity in the secondary

[36] The middle class includes, as defined in the analysis presented in Chapter 8 of this report, households with equivalized disposable income that is between 75 and 200 percent of median income.

[37] Households with equivalized disposable income of between 50 and 75 percent of median income.

market in order to ensure the proper functioning of the government bond market, and made repo transactions with financial institutions using government bonds as collateral.[38,39]

a. Foreign exchange purchasing and/or setting a floor for the nominal exchange rate

In an inflation target regime, the interest rate is the main tool for attaining the target, while the exchange rate responds to market conditions and its development is taken into account by policymakers. However, significant intervention by central banks[40] in the foreign exchange market in an inflation target regime following the 2008 crisis, and as part of the currency war, contributed to the development of a new approach. Under certain conditions, the use of the interest rate tool and the foreign exchange market intervention tool in tandem would be optimal.[41] The exchange rate affects both activity (and is affected by it), through import and export volumes, nonresidents' investments in the domestic market and residents' investments abroad, and domestic inflation through its effect on the prices of tradable goods.[42] The central bank may influence the nominal exchange rate through signaling or through the asset portfolio. In the signaling channel, the bank influences the public's expectations regarding the future paths of the exchange rate and the interest rate. This effect depends on the bank's credibility and its ability to back up its declarations. In the asset portfolio channel, the bank changes the exchange rate risk premium through changes in the composition of the public's asset portfolio as a result of its intervention in the foreign exchange market.[43]

Various studies show that the efficacy of foreign exchange purchases by the central bank increase under these circumstances: when the purchases are accompanied

[38] For information published by the Bank of Israel due to the corona virus, see https://www.boi.org.il/en/Pages/CoronaUpdates.aspx

[39] We emphasize that the Issue is presented here as a survey of the knowledge and experience gained around the world, and does not reflect the positions of the Bank of Israel Monetary Committee.

[40] Even in a positive interest rate environment.

[41] For this approach, see, for instance: A. R. Ghosh, J. D. Ostry, and M. Chamon (2016). "Two Targets, Two Instruments: Monetary and Exchange Rate Policies in Emerging Market Economies", *Journal of International Money and Finance*, 60: 172–196; J. Benes, A. Berg, R. A. Portillo, and D. Vavra (2015). "Modeling Sterilized Interventions and Balance Sheet Effects of Monetary Policy in a New-Keynesian Framework", *Open Economies Review*, 26(1): 81–108; A. Korinek and L. Serven (2016). "Undervaluation Through Foreign Reserve Accumulation: Static Losses, Dynamic Gains", *Journal of International Money and Finance*, 64: 104–136. The worthwhileness of influencing the exchange rate by accumulating foreign exchange reserves is explained by the external effects of investments in the economy.

[42] For the various effects of the factors of change in the exchange rate and their effects on inflation, see the Box in the Monetary Policy Report for the second half of 2019.

[43] Changes in the exchange rate risk premium as a result of intervention in the foreign exchange market without a change in the interest rate require incomplete substitution between assets in domestic currency and assets in foreign currency, and also require that the government's assets and liabilities (and those of the central bank) are not part of the public's asset portfolio. See, for instance: K. M. Dominguez and J. A. Frankel (1993). "Does Foreign-Exchange Intervention Matter? The Portfolio Effect", *The American Economic Review*, 83(5): 1356–1369.

by accommodative monetary policy; when the domestic currency is appreciated compared with the fundamental rate[44]; with an increase in limitations on capital flows; and when the financial markets are not developed.[45]

The central bank can influence the nominal exchange rate by: 1. Committing to a declared exchange rate path and maintaining it through intervention in the foreign exchange market as necessary—in accordance with supply and demand in the market, but with no discretion. Such a policy was adopted in the Czech Republic, Denmark, and Switzerland; 2. Intervention in the foreign exchange market with no commitment to a particular path, as Israel has done by sterilized interventions, meaning while the bank absorbs the quantity of money in order to maintain the level of the monetary interest rate.

1. Announcing an exchange rate or exchange rate path that the bank will defend at all costs (against appreciation)

The central bank's ability to purchase foreign exchange with almost no limitations, and a declaration of a desired exchange rate level or environment strengthen the credibility of such a measure. However, it is difficult to determine the correct level of the "floor" that should be set, since it depends on many factors—terms of trade, the balance of payments, monetary and fiscal policies, the economy's risk premium, and more. Another problem in setting a floor for the exchange rate is that it lacks feedback from the state of the economy, meaning it does not change with the various developments in the economy.

History provides many examples of setting an exchange rate path that is declared and known in advance, but only a few examples of a central bank's commitment to an exchange rate when the interest rate was near zero.[46] The Swiss National Bank declared a flor rate in September 2011, while lowering the interest rate to zero. As a result, the foreign exchange reserves increased from about 50 percent of GDP to more than 80 percent of GDP by the end of 2014. However, when the floor policy was abandoned at the beginning of 2015, and despite the decline of the interest rate to negative territory, there was an immediate nominal effective appreciation of 10 percent relative to the floor rate. Denmark traditionally manages a fixed exchange rate policy relative to the euro. At the beginning of 2015, there was significant upward pressure

[44] G. Adler and C. E. Tovar (2011). "Foreign Exchange Intervention: A Shield Against Appreciation Winds?", IMF Working Paper WP/11/165, 1–29; P. Disyatat and G. Galati (2007). "The Effectiveness of Foreign Exchange Intervention in Emerging Market Countries: Evidence from the Czech Koruna", *Journal of International Money and Finance*, 26(3): 383–402.

[45] J. Benes, A. Berg, R. A. Portillo, and D. Vavra (2015). "Modeling Sterilized Interventions and Balance Sheet Effects of Monetary Policy in a New-Keynesian Framework", *Open Economies Review*, 26(1): 81–108; M. B. Devereuxand and J. Yetman (2014). "Globalisation, Pass-through and the Optimal Policy Response to Exchange Rates", *Journal of International Money and Finance*, 49: 104–128.

[46] When the interest rate is not near the zero lower bound, the central bank can use the interest rate to adjust the supply and demand of foreign exchange so that the exchange rate is set at the level it intends. This is basically the normal situation in countries with a fixed or managed foreign exchange regime.

on the Danish krona due to the cancellation of the floor in the Swiss franc rate, and as a result of the exchange rate policy, foreign exchange reserves increased by 15 percent of GDP within two months, to about 40 percent of GDP, accompanied by a reduction of the monetary interest rate to -0.75 percentage points. In the Czech Republic, where the central bank committed to an exchange rate environment, reserves increased from about 20 percent of GDP at the end of 2013 to about 70 percent of GDP in mid-2017, in parallel with a zero monetary interest rate.

2. Intervention in the foreign exchange market in order to reduce appreciation or create depreciation without declaring a binding policy

Discretionary intervention enables flexibility in the extent of the bank's intervention, but with volatility in the exchange rate. Many studies have found evidence that intervention under the conditions discussed here[47] influences the exchange rate, but the intensity and duration of the effect are unclear.

Ribon (2017) found that foreign exchange purchases by the Bank of Israel with a volume equal to the monthly average between September 2009 and December 2015 contributed 0.6 percent to depreciating the nominal effective exchange rate in the month of the intervention.[48] Ribon's estimations do not show the duration of the effect or the extent to which it accumulates. Regarding this question, Caspi et al. (2018) found that the effect of intervention in the foreign exchange market in Israel dissipates after 40–60 days.[49]

b. Forward guidance

The central bank's influence on the economy depends not only on the short-term interest rate, but also on the expected path of the interest rate in general. Information that the central bank issues to the public regarding future interest rates may therefore increase the efficiency of monetary policy. Forward guidance is commonly broadly defined in the monetary literature as all information provided by the central bank that influences expectations regarding the future path of the monetary interest rate.[50] However, there is also a narrower interpretation, that only messages that contain explicit reference to the monetary interest rate, or even to the bank's interest rate rule, are defined as forward guidance.

[47] This refers to intervention in the foreign exchange market when the interest rate tool has been exhausted, when the interest rate policy is not acting in the opposite direction to intervention, and that the intervention itself does not affect the short-term interest rate (sterile intervention).

[48] S. Ribon (2017). "Why the Bank of Israel Intervenes in the Foreign Exchange Market, and What Happens to the Exchange Rate" Bank of Israel Research Department, Discussion Paper No. 2017.04.

[49] The sample period is from 2009 to 2017, meaning an interest rate environment that is not zero, but that is close to it from March 2015 onward. See: I. Caspi, A. Friedman, and S. Ribon (2018). "The Immediate Impact and Persistent Effect of FX Purchases on the Exchange Rate", Bank of Israel Research Department, Discussion Paper No. 2018.04.

[50] See: E. T. Swanson (2017). "Measuring the Effects of Federal Reserve Forward Guidance and Asset Purchases on Financial Markets", National Bureau of Economic Research (No. 23311).

Campbell et al. (2012) make a distinction between two types of forward guidance—"Delphic" and "Odyssean".[51] In the former, the central bank provides direct or indirect information to the public regarding its forecast of the interest rate path. An example of this is the publication of a forecast conditional on the state of the economy regarding main economic variables, such as an inflation forecast or the output gap (indirect information), and sometimes also interest rate forecasts (direct information). The Odyssean forward guidance, which is more closely linked to the interest rate being at the zero lower bound, is subject to a clear commitment on the part of the central bank to an accommodative future interest rate path, which will deviate downward from the path that would have been derived from the "normal" interest rate "rule", but is not optimal at that time.[52] For instance, Eggertsson and Woodford (2003) and Jung et al. (2005)[53] showed that, subject to the zero lower bound on the interest rate, such a commitment leads to a decline in the real interest rate in the present and higher inflation in the future.

Hence, Odyssean forward guidance, if it is considered credible, is expected to incentivize economic activity by lowering short-term interest rate expectations, while the direction of influence of Delphic forward guidance is unclear. The information that the bank publishes regarding an expected moderation of economic activity, and resulting expectations of a lower interest rate path, may lower uncertainty among individuals, and may improve welfare, partly through lower premia on long-term yields. However, the very publication of negative information may lead to a decline in demand and a restrictive effect.

Since the Global Financial Crisis, the use of forward guidance has become more common, and the messages regarding the interest rate path have generally been issued as part of the notices on interest rate decisions by the central bank and at periodic press conferences. The messages have included general texts, time-dependent texts defining the period during which the interest rate will remain at a certain level, and state-contingent texts, for example regarding the unemployment rate and inflation. For instance, in December 2012, the Fed included in its guidance a transition from time conditions to quantitative (benchmark) conditions: "at least as long as the unemployment rate remains above 6.5 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored." The Bank of Israel used the texts: "accommodative for a long time" (October 2015), "the interest rate will not increase for a prolonged period" (August

[51] J. R. Campbell, C. L. Evans, J. D. Fisher, A. Justiniano, C. W. Calomiris, and M. Woodford (2012). "Macroeconomic Effects of Federal Research Forward Guidance" [with comments and discussion]. Brookings Papers on Economic Activity, pp. 1–80.

[52] Such a plan is referred to as a "time inconsistent plan".

[53] G. B. Eggertsson and M. Woodford (2003). "The Zero Bound on Interest Rates and Optimal Monetary Policy", BPEA, no. 1: 139–211; T. Jung, Y. Teranishi, and T. Watanabe (2005). "Optimal Monetary Policy at the Zero-Interest-Rate Bound", *Journal of Money, Credit, and Banking*, 37(5), 813–835.

2019), and "… it will be necessary to leave the interest rate at its current level for a prolonged period or to reduce it… additional steps to make monetary policy more accommodative." (October 2019)

In recent years, some studies have indicated the effect of forward guidance on the long-term yield curve. They have analyzed the effect in a short "window" (two days, daily, or intraday) around the interest rate decision to identify the immediate effect on the yield curve.[54] Swanson (2017) found a statistically significant effect to a range of up to 35 business days in the US. A study conducted by the Bank of Israel Research Department showed similar results regarding the Israeli economy, on both unindexed and real yields.[55]

c. Purchasing domestic assets (government or corporate bonds)

Since the Global Financial Crisis in 2008, various central banks purchased assets in domestic currency as an alternative to lowering the monetary interest rate, which had reached the zero lower bound, in asset purchasing programs or quantitative easing.[56] There are two main reasons for using asset purchasing. The first is to deal with failures of the financial markets and financial intermediaries, which are reflected in a liquidity trap and in the supply of credit. The second is the desire to adopt a (more) accommodative monetary policy when the interest rate is at its effective lower bound, while also influencing longer-term yields.

The central bank can influence the interest rate path to various terms by influencing expectations of short-term interest rates in the future, and by influencing the risk premium, and through them demand and the exchange rate—even when the monetary interest rate is at the lower bound. The main question is whether and under what conditions this can be done by purchasing assets, taking into account the current low level of long-term interest rates.[57]

[54] Gürkaynak et al. (2005) estimated the effect in the US while separating the short-term interest rate effect and the effect of FG. R. S. Gürkaynak, B. Sack, and E. T. Swanson (2005). "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements", *International Journal of Central Banking* 1(1): 55–93. Swanson (2017) expanded their method and estimated the effect of quantitative easing as well: E. T. Swanson (2017). "Measuring the Effects of Federal Reserve Forward Guidance and Asset Purchases on Financial Markets", National Bureau of Economic Research No, w23311. Brand et al. (2010) examined the effect in the eurozone: C. Brand, D. Buncic, and J. Turunen (2010). "The Impact of ECB Monetary Policy Decisions and Communication on the Yield Curve", *Journal of the European Economic Association*, 8(6): 1266–298.

[55] A. Kutai (2018). "Measuring the Effect of Forward Guidance in Small Open Economies: The Case of Israel" (work in progress).

[56] A few central banks also acted through loans to financial intermediaries. We do not relate here to these actions.

[57] The historically low level of the long-term interest rate acts not only to expand demand in the substitution channel, but also may lower demand due to uncertainty regarding the timing of a turnaround in the interest rate. Savers, particularly pensioners, are concerns that the interest rate will not be raised in the near future, and will remain with low income for a prolonged period, while those with nominal mortgages are concerned about an interest rate increase. Both respond to the continued low level of the interest rate in the same direction—by increasing savings and reducing consumption.

One can distinguish between two types of purchases: sterilized and nonsterilized. In the former case, the central bank sells a short-term asset (such as *makam*) to the public, and purchases a long-term asset (bonds) in exchange. In this case, policy acts to lower long-term yields without injecting liquidity, while changing the composition of credit—for instance if demand for long-term credit increases due to a narrower spread between short-term interest rates and long-term yields. Changing the yields for various terms depends on the extent to which the public changes its expectations regarding future monetary policy, and on the question of whether and to what extent the risk and liquidity premia demanded by the public for these assets change. Such a policy was adopted as part of the second stage of quantitative easing in the US (QE2), and in Israel in 2008 for about eight months. In a case of nonsterilized purchases, in addition to the effect on long-term yields, there is increased liquidity in the economy, which can serve as a source of financing for the expansion of credit.

1. Setting a yield ceiling

The central bank can act to lower yields by setting a maximum yield level on government bonds to a particular horizon, with a commitment that it will purchase any quantity necessary in order to ensure this (yield control curve – YCC).[58,59] However, such a commitment contains the risk of a significant impact on the central bank's balance sheet—in other words, its ability to meet its commitment and therefore to maintain its credibility—if prolonged large-scale intervention is required, similar to the difficulty in committing to an exchange rate floor. Credibility obviously also depends on the extent to which the future path of short-term interest rates that is consistent with long-term yields is possible.

2. Global experience

Prominent central banks that have adopted an APP policy in recent years include the ECB, the Fed, the Bank of England, and the central banks of Japan (which also adopted YCC), Sweden, Switzerland, and Mexico. A BIS report[60] summarized 37 studies that examined the effectiveness of APP in various countries. According to them, one can identify a decline in yields on government bonds and corporate bonds, although the variance of the obtained effect is large. However, large-scale asset purchases by the central bank may have negative effects such as a negative impact on the supply of assets of various types if the central bank's purchases are larger than the existing inventory in the market, and a negative impact to liquidity in the market if the bank

[58] This policy tool was already used in the US in the 1950s. Bernanke related to the possibility of using this tool in a speech in 2002: https://www.bis.org/review/r021126d.pdf. See also a short discussion from 2019 in L. Brainard https://www.federalreserve.gov/newsevents/speec/brainard 20190508a.htm

[59] Similar to setting an exchange rate floor and a commitment to purchase any amount of foreign currency, in contrast with setting a quantity of foreign currency they would like to purchase (even without a public commitment).

[60] BIS (2019). "Unconventional Monetary Policy Tools: A Cross-Country Analysis", Report prepared by the CGFS, October 2019.

does not commit to a short-term interest rate level. A main result of the widescale use of APP, which must be noted and is discussed in depth by the BIS, is the significant growth of the central bank's balance sheet.

In Israel, the central bank purchased government bonds in the secondary market in 2009 in order to moderate the slope of the yield curve by lowering long-term yields, deal with a liquidity crisis in the bond market, and moderate the increase of the risk premium on tradable debt.[61] With the announcement of the start of intervention, 10-year yields declined by 30–40 basis points, but it is difficult to estimate the extent to which the decline in yields persisted thereafter. The effectiveness of the purchases depends on the existing room to lower yields on government bonds, and on the decline of yields on corporate bonds beyond that by lowering the risk premium. The possibility of a negative yield, which already exists, slightly increases the potential operating space.

d. Negative interest rate

In recent years[62], the central banks in the eurozone, Denmark, Sweden[63], Switzerland, and Japan imposed negative interest rates (Figure 1.5). From a certain perspective, reducing the central bank interest rate beyond 0 seems to be a "natural" measure in order to deepen monetary accommodation, as a continuation of the use of the standard policy tool. But questions arise as to whether the transmission from the interest rate to the various markets, and from them to economic activity, is similar to the transmission when the interest rate is positive, and if there are unique costs or risks involved in a negative interest rate.

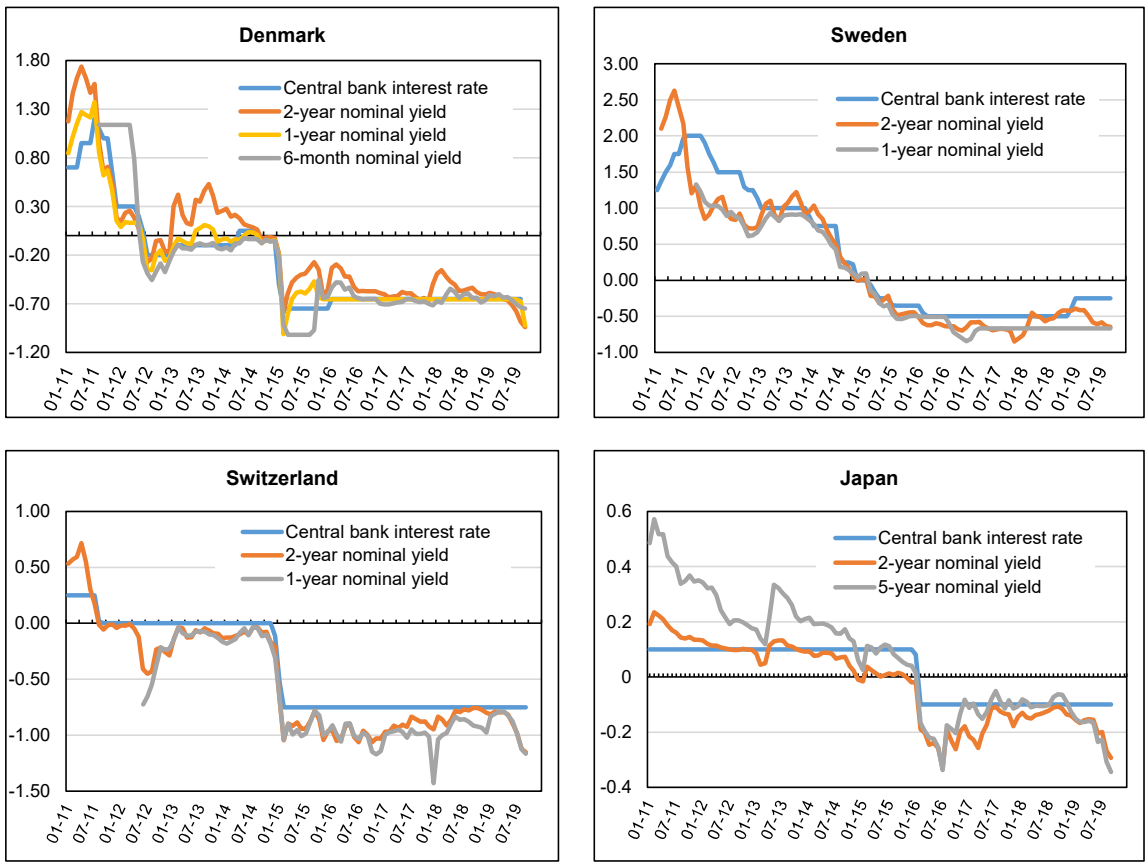
In a normal situation, the interest that the commercial banks receive on their deposits with the central bank is translated into the interest that the banks pay on the public's deposits with them (perhaps with some spread). The central bank's interest rate affects the cost of the banks' main sources for financing loans, and thereby the interest rate that they charge on loans. The friction involved in the transition to negative interest on the public's deposits with the banks is due to the fact that the interest on the public's deposits is blocked from below. In view of the possibility of holding cash when the nominal interest rate on it is zero, the maximal interest that the public is prepared to pay for maintaining its savings is the cost involved in holding cash (the cost of savings, risk of theft or loss, and so forth). As a result, the transmission from negative interest rates on the banks' deposits with the central bank to the interest rate on the public's deposits with the banks weakens (and even stops completely at some level) when the central bank's interest rate declines to low levels. Global experience shows that the interest rates on some of the public's deposits with

[61] The Bank of Israel intervened in the government bond market at the beginning of 2020 as well, against the background of the corona crisis.

[62] Sweden imposed a negative interest rate in order to fight appreciation in the 1970s.

[63] At the end of 2019, the Swedish bank increased the interest rate to zero.

Figure 1.5
Central Bank Interest Rates and Yields on Unindexed Bonds, 2011 to 2019



SOURCE: Websites of the quoted central banks.

the banks—particularly those of households—remained near zero.[64] If the deposits are the main sources of financing for bank loans, the transmission to the interest rate

[64] In a few countries (Switzerland, Germany, and Denmark), there were banks that set negative interest rates on deposits (mainly those of companies) beyond a certain amount. As the negative interest rate period continues, we can observe that additional banks will charge interest on certain deposits. Thus, a study found that "strong" or sound banks in the eurozone transferred the negative interest rates to commercial deposits without it causing a decline in their sources of financing, and the tendency to do so increased the deeper the negative interest rate became. On average, banks in the eurozone set a negative interest rate on about 5 percent of total deposits, and about 20 percent of commercial deposits, with various between the countries and between the banks in individual countries. See. C. Altavilla, L. Burlon, M. Giannetti, and S. Holton (2019). "Is There a Zero Lower Bound? The Effects of Negative Policy Rates on Banks and Firms", CEPR discussion paper.

on loans may weaken and have a negative impact on the effectiveness of the "bank loans channel" in monetary policy and monetary accommodation.

Based on experience thus far, the profits of the commercial banks have not been significantly impacted in the countries with negative interest rates. The direct effect of the negative interest rate on the profits of a commercial bank depends on the rate of that bank's assets held as reserves at the central bank. Therefore, in parallel with lowering the interest rate to negative territory, measures were taken to lower the extent of direct impact on the banks' profits, such as exempting some of the banks' reserves and surplus liquidity from negative interest rates.[65]

A low interest rate environment, and particularly negative interest rates, makes it more necessary to consider the financial stability ramifications of lowering the interest rate, including the impact on financial asset prices and home prices, and the level of household and company leverage. Accordingly, it may be necessary to use appropriate macroprudential tools in parallel with setting a negative interest rate.

[65] Such measures were taken by the central banks of Switzerland, Denmark, and Japan, and by the ECB. For instance, alongside deepening the extent of the negative interest rates by the ECB in September 2019 (lowering the interest rate on deposits from -0.4 percent to -0.5 percent), the bank announced the imposition of a two-tier system in which some of the surplus liquidity would be exempt from the negative interest rate. The interest rate on the exempt portion was set at 0 percent. The planning of the teir system in various countries depends partly on the volume of the banks' reserves with the central bank.