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2022

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To:
The Government and the Knesset Finance Committee
Jerusalem

I am honored to hereby present the Bank of Israel Annual Report for 2022, pursuant to Section 54 of the Bank of Israel Law, 5770–2010.

The year 2022 was characterized by two main processes that began in 2021, in view of the rapid recovery from the effects of the COVID-19 pandemic: rapid growth, alongside increased inflationary pressures. The inflationary pressures began with international supply shocks, that were then joined by domestic demand pressures that increased during the year. As the negative effects of the pandemic subsided, other factors appeared that had a negative impact on the economy. These included the war in Ukraine.

GDP grew rapidly this year, by 6.4 percent, further to the high growth of 8.6 percent in 2021. The level of GDP during 2022 was higher than the level derived from its trend of the years prior to the COVID-19 crisis. This growth was based on the rapid increase in private consumption, exports, and investment—mainly in residential construction. In the area of private consumption, the rapid growth of services consumption was prominent, in view of the removal of all activity restrictions on the proximity services industries. The significant savings that households had accumulated since the beginning of the COVID-19 crisis did not erode this year. Such erosion would have led to an even greater increase in private consumption. The rapid growth of exports continued to rely mainly on the export of high-tech services, but in the last two years, there has also been strong growth in goods exports. The rapid growth was also reflected in the tight labor market, where the employment rate increased, the unemployment rate decreased, and both returned to their precrisis levels.

Inflation totaled 5.3 percent in 2022, exceeding the upper bound of the target range for the first time in the past decade. The acceleration of inflation began in 2021, following many years in which it was very low. Similar to what is taking place in many countries, the acceleration of inflation was influenced at first mainly by global supply constraints in view of the exit from the COVID-19 crisis. Those supply constraints were exacerbated during the year in view of the war in Ukraine, the effects of which were mainly felt in energy and food prices. During the year, the contribution of robust domestic demand to inflation also increased. However, inflation in Israel this year was lower than in most advanced economies—largely due to Israel's reliance on its own natural gas reserves, the prices of which are fixed in long-term contracts. Following a prolonged appreciation, the shekel depreciated by 4 percent during the year in terms of the nominal effective exchange rate—a process that has continued at the beginning of 2023.

With the exit from the COVID-19 crisis and the appearance of inflationary pressures, the Bank of Israel was among the first central banks in the world to taper its monetary accommodation in 2021, by halting the use of the special monetary tools that were applied during the crisis. At the beginning of the year, the interest rate was still kept low in view of the broad morbidity

of the Omicron wave and the uncertainty surrounding the decline of the COVID-19 pandemic, and in order to support the economy's recovery from it. It quickly became clear that economic activity was recovering at an accelerated pace, and that inflation was accelerating—increasingly due to demand pressures. Global inflation further accelerated when the war in Ukraine broke out in February, leading to a shortage of raw materials and a sharp increase in global commodity prices. The Monetary Committee therefore announced as early as February its assessment that the conditions would soon be ripe for a gradual increase in the interest rate. In April, the Committee began a rapid process of increasing the interest rate, from 0.1 percent to 3.25 percent at the end of the year—its highest level since 2010. The Committee has continued increasing the rate at the beginning of 2023. The rapid and determined increase in the interest rate, also similar to other countries, is intended to prevent the entrenchment of inflation at a high level.

The effect of the change in monetary policy has been noticeable in the financial markets. The interest rate on bank credit, both to business and to households (housing and nonhousing), increased during the year as the Bank of Israel interest rate increased. Over the course of the year, total credit in the economy increased rapidly, but while the sharp increase in credit continued in the first half of the year, the pace of that increase slowed in the second half. In the Israeli financial markets, asset prices declined this year, influenced both by the interest rate increases in Israel and by the interest rate increases and financial market declines abroad. The declines in the Israeli financial markets continued at the beginning of 2023, and were sharper than those recorded in most markets abroad. The capital raised by high-tech companies declined during the year from the peak levels of 2021, reaching levels at the end of 2022 that were similar to those from before COVID-19. However, the share of those employed in the high-tech sector continued to increase in 2022, and wages in the sector increased by a higher rate than in the rest of the business sector.

The end of the COVID-19 crisis and the increased economic activity led to a sharp improvement in the fiscal aggregates. There was a government budget surplus of 0.6 percent of GDP (compared to a deficit of 4.4 percent of GDP in 2021), and public debt declined to 60.7 percent of GDP, just slightly higher than its pre-COVID-19 level. The halt in support payments that were required during the crisis led to a sharp decline in public expenditure as a share of GDP, and public revenue grew, mainly thanks to a sharp increase in direct tax revenue. The moderation of the increase in public expenditure (excluding COVID-19 expenditures) in recent years was due in part to the delay in signing new public sector wage agreements. In addition to rapid economic growth, the rapid increase of tax revenues also reflected one-off factors such as increased cash flow to the high-tech sector and strong real estate activity.

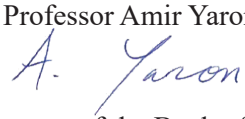
As stated, the high level of investment in residential construction contributed to rapid economic growth this year. Despite the expansion of the supply of dwellings and the high level of building starts in the past two years, home prices continued to increase rapidly throughout most of the year. However, toward the end of the year, the price increases moderated, and there were even declines in the prices of new homes. The moderation of the increase in home prices was also affected by the decline in transactions, which took place partly against the background of more expensive mortgages.

The growth of labor productivity in Israel, which is essential to ensure sustainable economic growth, accelerated in the past decade, and the gap relative to other OECD countries has started to narrow. However, labor productivity in Israel remains low compared to those countries, and

increasing it is one of the main challenges faced by the economy. To do so, we must act along a number of strategic paths, including the development of human capital, investment in physical infrastructure—mainly for public transit—and in digital infrastructure, promotion of the use of digital tools in the government's work, and advancement of competition and innovation in the financial system, while continuing to maintain its stability. The program that the Bank of Israel presented to the incoming government upon its establishment discusses these issues in detail, and also relates to dealing with other main challenges such as housing and the energy and climate issue.

The Bank of Israel Annual Report by its very nature surveys the year that has passed. At the same time, I find it proper to briefly refer to the developments in recent months. The current period, in which global and domestic economic conditions are changing, requires particularly responsible management of fiscal policy. As a matter of fact, at the end of February, the government approved a State budget proposal that is consistent with the tightening monetary policy during this period. The public sector wage agreements that were recently signed are also consistent with restraining inflation and returning it to the target range. At the same time, the government is advancing legislative amendments concerning the judicial system in Israel. The existence of strong and independent institutions is essential for the stability and prosperity of the economy over time, which is also shown by economic research literature. Those institutions become even more important in an era of globalization and in light of the characteristics of the Israeli economy. A number of developments in the financial markets, and the discussion by international economic entities of the legislative processes currently being debated in Israel underline the need to ensure the independence and professionalism of Israeli institutions, as well as the need for significant changes to be made by broad agreement.

Professor Amir Yaron



Governor of the Bank of Israel

CONTENTS

Chapter 1 The Economy and Economic Policy in View of Two Global Crises 1
1. The Global and Israeli Economies 2
2. Marcoeconomic Activity in Israel 5
Box 1.1: Demand for Workers in 2022 11
3. Monetary and Financial Developments in Israel 20
Box 1.2: How Does Public Attention to Inflation Affect its Nature? 24
4. The Energy Crisis in Europe and The Israeli Energy Market's Robustness 30

Chapter 2 Aggregate Activity: GDP and Employment 39
1. Main Developments 40
2. Aggregate Activity 43
3. Macroeconomic Developments in The Labor Market 53
4. The Current Account of The Balance of Payments 56
Box 2.1: Excess Savings in Israel orom the COVID-19 Crisis and How They May be Used 59
Box 2: No Longer An Island Economy? Growing Trade And Tourism Relations Between Israel and Middle Eastern Countries 64

Chapter 3 Monetary Policy and Inflation 71
Monetary Policy Targets 72
1. Inflation 72
Box 3.1: Breaking Down the Supply and Demand Effects at the CPI Component Level .. 84
Box 3.2: Breakdown of the Supply and Demand Effects Using a DSGE Model 85
2. Monetary Policy 89
3. The Monetary Base and Monetary Aggregates 95
Box 3.3: Analysis of the Increase in the Inflation Environment Using the "Inflation at Risk" Model 98

Chapter 4 Development of Sources of Financing for the Nonfinancial Private Sector 103
1. Main Developments 104
2. Raising Credit 107
3. Raising Capital 113
Box 4.1: IPOs and Aftermarket Performance 114
Box 4.2: The Pass-Through from Monetary Policy to Interest on Deposits in Israel 120

Chapter 5 Labor Productivity in Israel in the Past Decade 131
1. The Development of Labor Productivity between 2000 and 2019—Main Industries and Industry Aggregates 135
2. The Development of Labor Productivity between 2012 and 2018 in Industries that were Examined at an Expanded Detail Level 136
3. Conclusion 144

Chapter 6 The Public Sector and its Financing 147
1. Main Developments 148
2. Fiscal Aggregates in Israel from an International Perspective 152
3. Government Expenditures 156
4. Government Revenues 169
5. The Deficit 172
6. Public Debt and its Financing 173
Box 6.1: Landfill Levy and Cleanup Fund as Economic Tools for Handling Municipal Waste in Israel 177

Chapter 7 The Housing Market 207
Issue I: The Differences in Per Capita Disposable Income between Arabs and *Haredim* and Non-*Haredi* Jews 186
Issue II: The Occupational Distribution of University Graduates in Israel: Disparities between the Various Segments of the Population 198

Chapter 8 Welfare Issues 272
1. Main Developments in the Housing Market in 2022 208
2. Affordable Housing 222
Box 8.1: The Buyer's Price Program's Effect on the Housing Market 223

TABLES

Chapter 1 The Economy and Economic Policy in View of Two Global Crises

1.1 Main developments, 2017–22 4

Chapter 2 Aggregate Activity: GDP and Employment

2.1 Selected indicators of economic activity, 1995–2022 42
2.2 Sources and uses, 1995–2022 44
2.3 Domestic demand: Background conditions and main indicators of its development, 1995–2022 46
2.4 The supply of gross domestic and business sector product, 1995–2022 55
2.5 Principal labor market data, 1995–2022 56
2.6 Savings, investment, and the current account, 1995–2022 58

Chapter 3 Monetary Policy and Inflation

3.1 Main indicators of inflation and monetary policy, 2018–2022 73
3.2 Development of prices, by various components, 2018–2022 74
3.3 Effect of the interest rate gap and US equity prices on the US dollar exchange rate in a panel of countries 81
3.4 Sources of change in the monetary base, 2018–22 97
3.5 Rate of change in the monetary aggregates, 2018–22 98

Chapter 4 Development of Sources of Financing for the Nonfinancial Private sector

4.1 Distribution of nonfinancial private sector debt, 2020–2022 106

Chapter 5 Labor Productivity in Israel in the Past Decade

5.1 Labor productivity and the distribution of employees in selected business sector industries, Israel and OECD, 2012–2018 137

Chapter 6 The Public Sector and its Financing

6.1 The main components of the general government's revenue and expenditures, 2016–2021 149
6.2 Nominal growth of public expenditure in Israel, 2016–2022 157
6.3 Components of the net deviation from the original government budget for 2022 ... 158
6.4 Components of the increase in tax revenue, 2022 compared to 2019 172
6.5 Central government deficit, revenue and expenditures, 2016–2022 173
6.6 Components of the increase in the gross public debt, 2017–2022 174

Chapter 7 The Housing Market

7.1 Findings of linear multivariate analyses of Arab sector employment in 5 academic occupation groups, prime working ages (25–64), full-time, 2018–2022 205

Chapter 8 Welfare Issues

8.1 Selected housing market data, 2006–2021 208
8.2 Israel Land Authority Land Tender Amounts, 2021 and 2022 222

Chapter 1
The Economy and Economic Policy in View of Two Global Crises

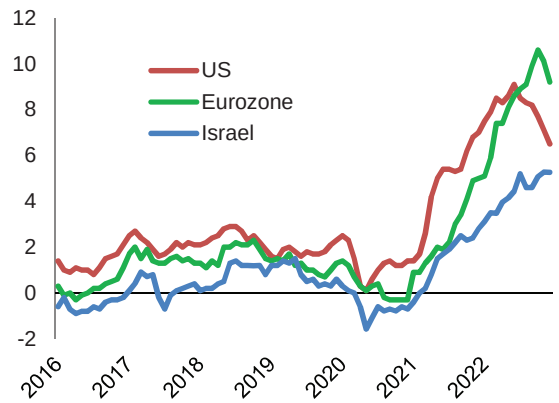
- GDP grew by 6.4 percent in 2022, which was higher than the long-term pace of growth. This followed the high growth rate in 2021, by the end of which the level of GDP had already converged with the precrisis growth trend.
- The labor market continued to tighten in 2022. The job vacancy rate was higher than in the period prior to the COVID-19 crisis, in parallel with an increase in the employment rate and a decline in the unemployment rate.
- Inflation increased during 2022, reaching 5.3 percent at the end of the year. At the beginning of the year, it was mainly influenced by disruptions in international supply due to the COVID-19 crisis and the war between Russia and Ukraine. During the year, high demand made an increasing contribution to inflation.
- Israel enjoys the independence of natural gas production for electricity generation, as well as prices and quantities ensured by long-term contracts. It has therefore been affected only moderately by the global energy crisis that broke out in the wake of the war.
- The shekel depreciated by 4 percent in terms of the nominal-effective exchange rate during the year, with high volatility.
- In the summer of 2021, the Bank of Israel was among the first in the world to stop the use of the monetary accommodation tools that it had used during the COVID-19 crisis. At the beginning of 2022, the Bank also halted its foreign exchange purchases.
- Following the high level of uncertainty that remained at the beginning of 2022 regarding the development of the pandemic and its economic impacts, in April, the Monetary Committee began raising the Bank of Israel interest rate. This followed seven years in which it ranged between 0.1 and 0.25 percent. By the end of the year, the interest rate had reached 3.25 percent, its highest level since the beginning of the previous decade.
- Inflation in most advanced economies was higher than in Israel. In view of the uncertainty at the beginning of 2022 regarding the recovery from the crisis and the impact of the war in Ukraine, the assessments of the major central banks were that inflation was due to temporary supply chain disruptions. As such, they began to raise interest rate only once inflation had increased considerably.
- In view of the increase in interest rates, bond yields increased and share prices declined. Accordingly, in the middle of the year there was a change in direction in the development of credit in all segments, and its growth rate slowed, sharply in some segments.
- Following the COVID-19 years, which featured large fiscal expansion, 2022 ended with a government budget surplus of 0.6 percent, and public debt fell to 60.7 percent of GDP—the environment in which it was prior to the COVID-19 crisis. Among other things, anomalous tax revenues, the delay in public sector wage agreements, and the acceleration of inflation all contributed to this.
- The construction and planning volumes in the housing market continued to increase in 2022, but the number of transactions declined from its 2021 peak. Home prices increased rapidly over most of the year, with the increases slowing toward the end of the year.
- The Israeli high-tech sector grew rapidly in 2022. However, the job vacancy rate in the sector, as well as fundraising by startup companies, declined relative to their peak levels of 2021, and the decline intensified during the year.

1. THE GLOBAL AND ISRAELI ECONOMIES

The most prominent macroeconomic development in the global and Israeli economies in 2022 was the continued increased in inflation.

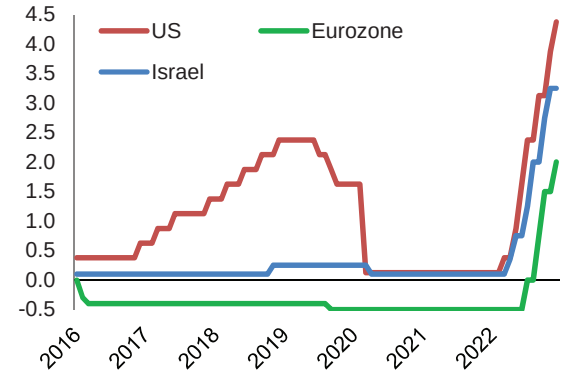
Following more than a decade of near-zero interest rates in view of low inflation, the most prominent macroeconomic development in the Israeli and global economies in 2022 was the continued increase of inflation, which began in 2021 and reached very high levels in 2022 (Figure 1.1). This development was influenced by how global economies exited from the COVID-19 crisis, as well as by the Russia-Ukraine war, and led to a turnaround in the policies of central banks around the world—particularly to sharp interest rate increases (Figure 1.2).

Figure 1.1
Inflation in the Major Economies and in Israel, Past 12 Months, Jan. 2016–Dec. 2022 (percent)



SOURCE: Based on Central Bureau of Statistics and Bloomberg.

Figure 1.2
Central Bank Interest Rates in the Major Economies and in Israel, Jan. 2016–Dec. 2022 (percent)



For the US - the middle of the range between the Federal Reserve's interest rate on loans and its interest rate on deposits.

SOURCE: Bloomberg.

Disruptions in international supply began in 2021 due to COVID-19. There were further disruptions in 2022 due to the war between Russia and Ukraine.

The global recovery from the COVID-19 crisis, which began in the second quarter of 2021, was accompanied by a rapid recovery of global demand—influenced by the removal of COVID-19 restrictions on activity, but also due to the monetary accommodation and fiscal expansion during the pandemic. At the same time, the global economy encountered difficulties in supplying goods to meet demand, due to remaining restrictions on activity, mainly in China, bottlenecks in maritime shipping, and other difficulties that were due to the need for rapid renewal of all economic activity. The global imbalance between the developments of supply and demand was reflected already in 2021 in delays in the supply of raw materials, consumer goods, and final investment products. Shipping disruptions led to sharp price increases in that field.

In February 2022, war broke out between Russia and Ukraine. The war and its effects led to further international supply disruptions in addition to those caused by COVID-19. A coalition of countries, led by the European Union and the United States, imposed economic sanctions on Russia, while Russia reduced the supply of natural gas to Europe and caused difficulties for wheat exports from Ukraine. These factors all had an impact on international shipping and trade, and led to shortages and to sharp increases in commodity prices— chiefly energy products (oil, coal, and natural gas), metals, fertilizers, and food (particularly grains and grain derivatives)—as well as instability in these prices throughout the year.

The interest rate increases in Israel and abroad began due to the continuation and intensification of inflation.

These developments added to the inflationary pressures that began in 2021, and motivated central banks to raise their interest rates following many years of low inflation and near-zero interest rates (Figure 1.2). The interest rate increases in Israel and abroad were preceded by a tapering, and then a complete halt, in the use of special accommodative tools that were used due to the COVID-19 crisis. In the summer of 2021, the Bank of Israel was among the first in the world to stop the use of these tools.[1] The interest rate increases in the advanced economies began only after inflation deviated from the target—in some economies to a significant extent. This can be explained by the high level of uncertainty at the beginning of the year regarding the COVID-19 pandemic, in view of the high morbidity rates at that time (Figure 1.3), the surprise of the war in Ukraine, and the gradual development of the causes for the inflationary outbreak and central bank assessments regarding it. When inflation began increasing in mid-2021, and at the beginning of 2022, most central banks attributed it to the effect of supply constraints that were the result of the COVID-19 crisis and later the war between Russia and Ukraine (even though there were other views, particularly in the US, which attributed the increase in inflation partly to the lagged effect of large fiscal expansion and monetary accommodation measures during the COVID-19 period.) At first, these factors were viewed as limited in duration and intensity. The interest rate increases in Israel and abroad began after inflation continued and intensified. This led to a change in view regarding the nature and persistence of the supply and demand factors that were at its root. The demand factors were prominent due to marcoeconomic activity that featured an accelerated expansion of consumption and a tightening of the labor markets. The latter was reflected in a sharp increase in the job vacancy and employment rates, and a decline in the unemployment rate.

The relatively low exposure of Israeli electricity prices to global energy prices supported the robustness of the Israeli economy during the energy crisis that broke out in 2022 as a result of the war between Russia and Ukraine.

A retrospective at the global crises of the past two decades—from the Global Financial Crisis of 2008, through the 2012 debt crisis, to the COVID-19 crisis and the war in Ukraine—shows that they generally had less of an impact on the Israeli economy than on other advanced economies. Each of these crises has its own story and explanation. In the 2008 and 2012 crises, the relatively small impact to the Israeli economy was partly due to the conservative and stringently supervised banking

[1] See the Bank of Israel's *Monetary Policy Report* for the second half of 2021.

Table 1.1
Main developments, 2017–22

	2017	2018	2019	2020	2021	2022
Population (yearly average, million)	8.7	8.9	9.1	9.2	9.4	9.6
Nominal GDP (NIS billion, current prices)	1290	1353	1435	1423	1578	1756
Per capita GDP (NIS thousand, current prices)	148	152	159	154	168	184
GDP (real rate of change, percent)	4.3	4.1	4.2	-1.9	8.6	6.4
Private consumption (real rate of change, percent)	3.6	3.6	4.0	-7.9	11.1	7.7
Fixed Capital Formation (real rate of change, percent)	3.4	6.6	3.6	-2.6	12.2	9.6
Public consumption (real rate of change, percent)[a]	3.9	4.0	3.0	2.6	3.7	1.0
Goods and services exports (annual rate of change, percent)[b]	7.0	5.5	5.1	0.2	11.8	8.9
Goods and services imports (annual rate of change, percent)[c]	6.3	5.9	2.7	-7.2	18.2	12.0
Current account of the balance of payments (surplus, $ billion)	13.3	11.2	15.0	22.7	21.4	19.8
Overall government deficit (percent of GDP)	2.3	4.4	4.6	11.5	5.5	1.6
Public debt (percent of GDP)	59.7	59.9	58.8	70.6	67.9	60.7
Employed Israelis aged 15+ (yearly average, thousand)	3825	3905	3967	3913	3957	4187
Nominal wage per employee post (yearly average, percent rate of change)	3.0	3.5	2.9	6.5	2.5	2.9
Unemployment rate, aged 15 and up (yearly average, percent)	4.2	4.0	3.8	4.4	5.0	3.8
Job vacancy rate (yearly average, percent)	3.8	3.7	3.5	2.4	4.5	4.8
Inflation (December compared to the previous December, percent)	0.4	0.8	0.6	-0.7	2.8	5.3
Bank of Israel interest rate (yearly average, percent)	0.1	0.1	0.25	0.1	0.1	1.25
Bank of Israel interest rate (last figure in the year, percent)	0.10	0.25	0.25	0.10	0.10	3.25
Real one-year interest rate (yearly average, percent)	-0.1	-0.8	-0.8	0.1	-1.9	-1.4
Real one-year interest rate (December average, percent)	-0.3	-0.7	-0.7	-0.2	-2.4	1.0
Nominal yield on 10-year government bonds (yearly average, percent)	2.1	2.2	1.6	0.8	1.2	2.6
Real yield on 10-year government bonds (yearly average, percent)	0.6	0.5	0.0	-0.5	-0.8	0.1
Real effective exchange rate (yearly average, percent rate of change)	-4.4	2.1	-2.5	-3.1	-3.9	-0.9
NIS/$ exchange rate (yearly average)	3.6	3.6	3.6	3.4	3.2	3.4
Tel Aviv 125 index[d]	6.4	-2.3	21.3	-3.0	31.1	-11.8
World trade (percent rate of change)	5.7	4.1	0.9	-7.8	10.4	5.4

[a] Excluding defense imports.

[b] Excluding diamonds and startups.

[c] Excluding defense imports, ships, aircraft, and diamonds.

system, a balanced housing market, and a successful economic policy.[2] During the COVID-19 crisis, the main contributing factors to Israel's success were the structure of the healthcare system, a demographic composition with a younger population than that of other advanced economies, and an industry composition that reduced its exposure to the crisis to some extent.[3] In 2022, during the energy crisis that broke out due to the war in Ukraine, Israel's low exposure to global energy prices for electricity production helped the country's economy.

2. MARCOECONOMIC ACTIVITY IN ISRAEL

a. Main developments

GDP grew by 6.4 percent in 2022, and per capita GDP grew by 4.4 percent (Table 1.1). By the end of 2021, GDP had already crossed the level that would have been expected according to the pre-COVID-19 trend. While GDP growth in 2022 was slower than in 2021, it remained rapid, and was supported by demand for Israeli exports of goods and services. While the level of private consumption as a yearly average remained lower than the pre-COVID-19 trend, it increased rapidly during the year, influenced by the increase in demand as the economic routine stabilized following the COVID-19 crisis. In contrast with Israel, GDP in the US and in Europe (average) remained lower than the pre-COVID-19 trend. The Israeli economy was pre-eminently robust relative to others, during a year of anomalous geopolitical developments, thanks to its lower dependence on the import of energy products for electricity production. This moderated the extent of Israel's exposure to the sharp fluctuations of global energy prices resulting from the war between Russia and Ukraine.

GDP growth was slower in 2022 than in 2021, but it remained rapid.

The rapid recovery of economic activity that began in the second quarter of 2021 continued in 2022 as people got used to living alongside COVID-19. The peak of the fifth wave of COVID-19 morbidity (the "Omicron" variant) was at the beginning of 2022 (Figure 1.3). This wave featured a jump in infection rates, serious morbidity, and mortality, while serious morbidity among vaccinated population groups was relatively low and vaccination was widespread. In view of this, the government chose not to tighten restrictions on activity, in contrast with the policy adopted during the first three waves. Accordingly, there was no need for broad fiscal assistance programs. As early as February, the government began removing COVID-19-related restrictions on activity, and most of them were removed by April. In parallel, the recovery of the labor market that began in 2021 continued, which was partly reflected in an increase in the employment rate (Figure 1.3). As the pandemic wound down, special budgetary support programs were also cancelled, and government expenditures on direct support payments returned to their precrisis rates. Figure 1.4 shows that the rate of those

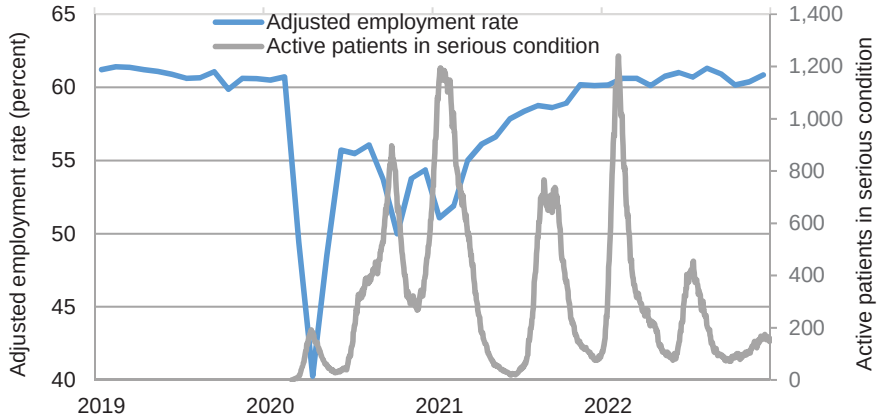
As the COVID-19 pandemic subsided, the special budgetary support was ended and government expenditures on direct support payments returned to their precrisis levels.

[2] For more information, see Bank of Israel (2011), *Israel and the Global Crisis, 2007–2009*; and Bank of Israel (2010), *Annual Report for 2009*.

[3] See Chapters 1 and 2 in the Bank of Israel *Annual Reports* for 2020 and 2021.

working remotely, the expansion of which supported businesses' operations during the crisis despite the restrictions, stabilized from the second quarter of 2022 at a level of about 14 percent of salaried employees (other than a seasonal fluctuation during the summer).[4]

Figure 1.3
Number of Active Patients in Serious Condition, and Adjusted Employment Rate, 2019–2022



The adjusted employment rate relates to those temporarily absent from work for economic reasons, such as the unemployed. It is shown as the quarterly average of monthly data, not seasonally adjusted. Morbidity data relate to the number of active patients in serious condition who are hospitalized.

SOURCE: Based on Central Bureau of Statistics and Ministry of Health.

From February onward, the war between Russia and Ukraine had significant geopolitical effects on the global economy.

Beginning in February, the geopolitical effects of the war in Ukraine were felt in the global economy. One of the main effects was a sharp increase in the global prices of energy products (which declined later in the year), food, and other raw materials. The war's impact on electricity production prices in Israel was limited (as analyzed in Part 4 of this Chapter), but the resulting disruptions did have some impact on Israeli economic activity in other areas. The contraction of Russian chemical exports due to the war led to an increase in global chemical prices and increased Israel's chemical exports. There were other effects due to the jump in oil prices (which declined during the second half of the year) as a result of the sanctions imposed on the exports Russian energy products. As a result, expenditure on the import of energy products increased in 2022, which led to a decline in the current account surplus.

The war in Ukraine led to a flow of refugees and migrants. Some of those came to Israel, and among them were people who were absorbed as immigrants. There were about 74,000 immigrants to Israel in 2022, more than double the number that was expected based on the immigration trend of the decade preceding COVID-19.

[4] The rate of salaried employees aged 25–64 who worked remotely at least 7 hours per week.

The vast majority of immigrants came from Russia, Ukraine, and Belarus.[5] While the absorption of such a large volume of immigrants does not have a macro effect on the labor market[6], it did contribute to increased demand for rental housing, which had already been increasing in recent years.

A number of factors increased demand for rental housing in recent years. These included an increasing need for temporary housing due to urban renewal projects in the central region. Demand for rentals has also been increasing in recent years as an alternative to purchasing a home, due to the increase in home prices. Another reason is the continued increase in the duration of new home construction and the need of those who purchase a home "on paper" to wait until construction is complete (including in government affordable housing programs). Some of those waiting live in rented dwellings in the meantime. Chapter 8, which discusses the housing market, elaborates on these issues.

The number of housing transactions declined sharply in 2022 relative to the previous year (which had an exceedingly high number of transactions), and the decline intensified during the year. Chapter 8 enumerates a number of reasons for the decline in the number of transactions:

- Higher mortgage costs;
- The sharp increase in the number of transactions by investors who wanted to bring their purchases forward to avoid the increase in the purchase tax rate at the end of 2021;
- The end of the "Buyer's Price" program in 2020, which led to a sharp increase in first-time home purchases on the open market in 2021 (by those who had previously waited to win lotteries in the program), and the resumption of lotteries in 2022 (the start of the "Target Price" program), which brought potential purchasers back into a waiting position.

b. Private consumption and savings

Private consumption increased rapidly in 2022, but its annual level was lower than the level that was expected according to the precrisis trend.

The rapid growth of private consumption in 2022, as shown by Table 1.1, is an expression of demand expansion in the economy. The removal of COVID-19 restrictions, which began in the second half of 2021 and expanded in 2022, led to increased demand for consumption, mainly of those services that were restricted during the pandemic. Private consumption therefore grew rapidly in 2022. Despite this, looking at the year as a whole, the level of private consumption was lower than what was expected according to the precrisis trend.

[5] These assessments are based on Central Bureau of Statistics data that appear in "Immigration to Israel 2021 and Immigration to Israel Due to the War in Ukraine, 2022" (Figure 1 and Figure 5), and "Israel's Population at the Beginning of 2023" (Table 3) (in Hebrew).

[6] One-quarter of the immigrants from Russia and Ukraine who immigrated between January and October were children under the age of 18, and about 12 percent were over the age of 66. This means that just two-thirds of these immigrants were of working age. (Source: Eliyahu (2022), "Data on Immigration to Israel from Ukraine and Russia in 2022", Knesset Research and Information Center.)

The relatively low level of private consumption in 2022 can be attributed to two factors—temporary and structural. The temporary factor is shown directly by the data, and attests to the gradual recovery of consumption, particularly of services that involve gatherings—transportation, restaurants, hotels, and art, entertainment and leisure—the consumption of which had been restricted due to COVID-19. Since consumption of these services was restricted at the beginning of the year due to the Omicron variant of COVID-19, the annual consumption of services, and therefore private consumption as a whole, was lower than what would have been expected according to the long-term trend. In this context, tourism services is prominent. Although the consumption of these services grew, it was lower than its pre-COVID-19 level. In particular, the export of tourism services (tourists' consumption in Israel) recovered less than Israelis' consumption abroad.[7]

Another temporary factor that delayed the recovery of consumption is the aggregate supply constraint in view of strong demand for exports that pushed GDP at the end of 2021 beyond the precrisis trend. Another possible explanation for the relatively low level of consumption, despite the rapid growth of demand, has to do with a factor that is structural in nature—changes in consumer preferences and behavior, for instance due to the broad adoption of technological changes. As of now, there are no clear indicators of such changes.

The low level of consumption between 2020 and 2022, and government support of household income during the COVID-19 crisis, increased the rate of savings as a share of disposable private income, particularly in 2020 and 2021 (Box 2.1). This savings rate declined in 2022, but remained slightly higher than in the years prior to COVID-19—potentially influenced in part by the marked increase in the interest rate during the year. As of now, it does not seem that the savings accumulated during the COVID-19 years was used for excess consumption in 2022.

c. The labor market

The labor market continued to tighten in 2022, and converged to a full employment environment.

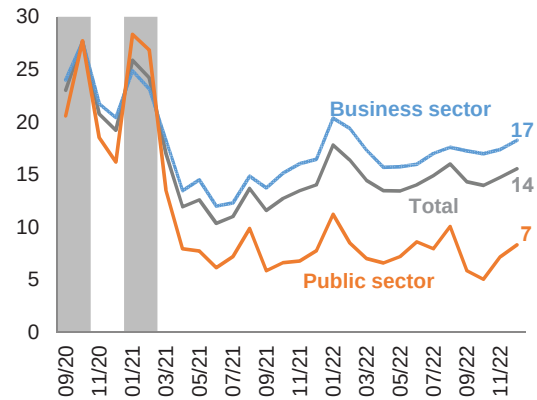
In 2021, when economic activity began to recover and the special assistance to the unemployed was discontinued, employment began to recover. This process continued in 2022 (Figure 1.5), and the expansion of demand in the economy was also reflected in the continued tightening of the labor market, as the annual average job vacancy rate increased, and unemployment declined (Table 1.1). These led the labor market to converge to a full employment environment, with the labor participation rate and the employment rate returning to their 2019 levels (Box 1.1).

The growth of the employment rate in parallel with the increase in the job vacancy rate characterized Israel and many other OECD countries in 2021 and 2022. This was a result of the removal of COVID-19 restrictions, which led to increased demand, due to which many businesses that had reduced their activity went back to hiring workers.

[7] The current account surplus totaled $19.8 billion in 2022—$1.6 billion less than in 2021. The reduction of the surplus was influenced, as stated above, by the increase in oil prices, but also by the fact that outgoing tourism increased more rapidly than incoming tourism.

Figure 1.5 shows that after the employment rate reached its precrisis level, there was some decline in the job vacancy rate, although it remained higher than it was before COVID-19. Box 1.1 analyzes this phenomenon in Israel. In view of the high demand for workers, nominal wages in the business sector increased by 3.9 percent[8], but the increase was not sufficient to compensate for inflation, such that real wages eroded.

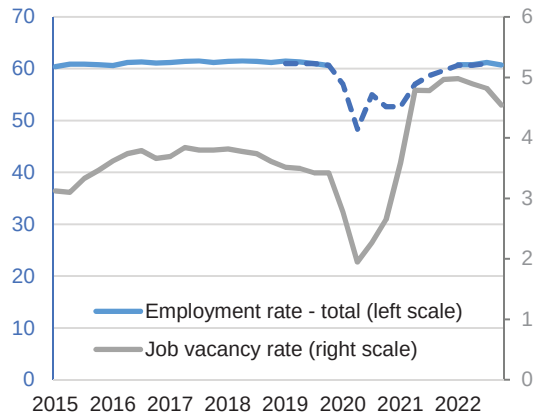
Figure 1.4
Rate of Employees Aged 25–64 Who Integrate Remote Work (percent)



Integrating remote work relates to those who work remotely 7 hours or more per week. The division into public and business sectors is according to the Central Bureau of Statistics definitions. The numeric labels note the averages in the last three quarters of the year. The shaded areas note lockdowns.

SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

Figure 1.5
The Employment Rate and the Job Vacancy Rate, 2015–2022



The broken line shows the adjusted employment rate during the COVID-19 period—the rate minus those absent for economic reasons. The employment rate is for those aged 15 and up.

SOURCE: Central Bureau of Statistics.

Chapter 2 of this Report shows that despite the high demand for workers, and despite the high increase in nominal wages per employee post (Table 1.1), the GDP labor share in the business sector declined in 2022. This is a process that began in 2019, before the outbreak of the COVID-19 crisis, and has continued consistently since then: an increase in the average real wage at a slower pace than the increase in average labor productivity.[9] This is despite the fact that in 2022, average labor productivity also declined, due to a change in the composition of employees that was a feature of the recovery of employment from the COVID-19 crisis. (In 2022,

In view of the high demand for workers, nominal wages in the business sector increased by 3 percent. However, the increase was not sufficient to compensate for inflation, such that real wages eroded.

[8] Nominal wages throughout the economy increased by 2.9 percent, and real wages declined by 1.5 percent (yearly average). Unlike inflation, which is calculated in terms of year-over-year December figures, the change in the average wage presented here is based on the change of the annual monthly average.

[9] The real wage that is relevant to the GDP labor share is the nominal wage minus the Output Price Index (not the Consumer Price Index).

hiring in the industries that were affected by the crisis was predominant. Wages and productivity in these industries are lower than average).[10]

One of the factors affecting the decline of the GDP labor share since 2018 is the development of wages in the government sector, which have an indirect effect on the development of wages in the business sector. Agreements to update wages in the government sector expired in 2018, and due to the COVID-19 crisis, negotiations between the government and the Histadrut to renew them were frozen.[11,12] The previous framework agreement was in force until 2018, and set out additional wage increments for wage creep having to do with tenure or sub-sector agreements in the government sector. The former agreement set out a pace of nominal wage increases that was in line with the low inflation during the period preceding the agreement. Since inflation after that was higher (mostly in the past two years), the average wage in the government sector (which encompasses about 20 percent of salaried positions) eroded not only in relation to business sector wages, but also in terms of purchasing power.

New wage agreements should balance the need to streamline activity in the government sector with maintaining its ability to attract employees.

Beginning in 2017, a gap opened between the two sectors in terms of the pace of wage increases. Wages in the private sector continued to increase in real terms, while real wages in the government sector barely changed. New wage agreements are necessary in order to balance the need to streamline operations in the government sector with the need to maintain its ability to attract appropriate employees.[13,14] The need to hire high-quality workers is particularly prominent when the government sector has to implement technological improvements (a topic discussed in Chapter 6 of this Report) and must hire workers in a competitive market. In the past decade, labor productivity in the private sector has increased rapidly, even compared with other OECD countries, particularly in some of the services industries (as documented and analyzed in Chapter 5 of this Report). Wages in that sector have increased accordingly.

[10] The comparison of wages in industries to the average wage is based on 2019 data. The change in the composition of employees is a technical development that is the opposite of what happened when COVID-19 broke out in 2020, and which then led to an increase in average wages and productivity. Due to the increase in the weight of employees in industries where productivity is relatively low in 2022, the growth rate of real GDP was lower than the growth of labor inputs. Thus, average labor productivity (real GDP per work hour) in the business sector declined by 1.5 percent. This development is anomalous relative to the growth of labor productivity in the business sector in recent years, which was also prominent relative to the other OECD countries (as analyzed in Chapters 2 and 5 of this Report).

[11] In some places, the reference is to the business sector relative to the public sector, and in others the reference is to the private sector relative to the government sector, based on the definitions in the data sources. There is a large overlap between the definitions of the entities belonging to the private or business sector (based on field of economic activity), and in the definitions of entities belonging to the government or public sector (based on how their activities are financed).

[12] An exception in this context is the wage agreement with teachers that was signed in August 2022. The lack of updated wage agreements is one of the reasons for the relatively low growth rate of government expenditure. These two issues are discussed in Chapter 6 of this Report.

[13] Hiring difficulties in the public sector are not reflected in job vacancy data, which relate to the business sector.

[14] At the beginning of March 2023, a new wage agreement was signed. This agreement is expected to narrow the wage gap between the public and business sectors to some extent.

BOX 1.1: DEMAND FOR WORKERS IN 2022

Increase in demand for workers with the exit from the COVID-19 pandemic

The total number of employees and job vacancies is an estimate of aggregate demand for workers in the business sector.[1] This total increased during 2022, thanks to growth in both of its components—the number of employees and the number of job vacancies. According to the estimation, demand in the third quarter of 2021 exceeded the 2019 average, and in the second quarter of 2022, it was in line with the 2015–2019 trend (Figure 1).[2] The job vacancy rate reflects the ratio between job vacancies in the economy and total demand for workers in the business sector. An increase in the job vacancy rate is an indication of increasing demand for new workers. It is therefore important for assessing the state of the labor market. In the first half of 2021, following the removal of activity restrictions, the supply of labor and the demand for workers expanded simultaneously. The expansion of supply was measured through an increase in the participation rate, which came close to its prepandemic level (Figure 2), and the expansion of demand for workers was reflected in the job vacancy rate, which jumped sharply (Figure 1.4 in the Chapter and Figure 3 in this Box).

The job vacancy rate declined slightly in 2022, after the employment rate had already increased to its pre-COVID-19 level, yet remained higher than in the past until the end of the year. Despite the high job vacancy rate, the unemployment rate—which declined rapidly following its peak in the second quarter of 2020—has been similar to its precrisis levels since the beginning of 2022. Figure 3 shows the Beveridge Curve, which describes the negative correlation between the job vacancy rate (the vertical axis) and the unemployment rate (the horizontal axis). It shows that the rapid recovery of the labor market in the second quarter of 2021 and the need to rapidly match the large number of workers with available jobs were reflected in some temporary impact to the quality of the correspondence between workers and jobs, meaning that they added to the difficulty in matching workers to jobs.[3] Such an impact is reflected in the movement of the Beveridge Curve, as a whole, upward and rightward.[4] It is likely that the upward movement, which mainly reflects concurrent growth of unemployment and the number of job vacancies in the first half of 2021, was due to two contemporaneous changes: the removal of restrictions, which led to a sharp increase in the number of job vacancies, and the cancellation of the furlough policy, which led to a temporary increase in the rate of job seekers.

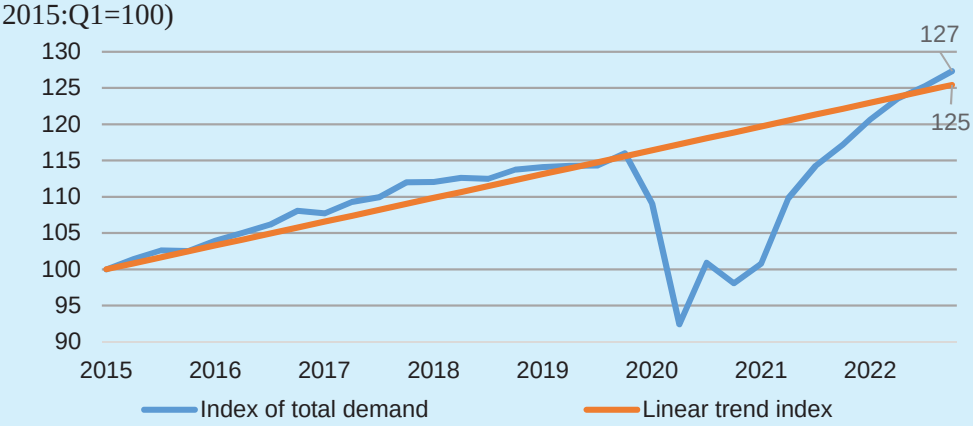
[1] Job vacancies are unfilled jobs for which workers are sought, or filled positions where firms seek to replace the employees. The population of the Central Bureau of Statistics job vacancy survey includes companies with 5 or more salaried employees. The survey does not include companies in the agriculture industry, the public sector, the diamond industry, out-of-state organizations or entities, or educational institutions from pre-school through secondary school.

[2] Aggregate demand for workers has been in an upward trend over time due to the increase in the population.

[3] In dynamic models that include labor market search and matching frictions, various shocks are generally reflected in movement along the Beveridge curve. A shock that hits the speed at which firms and workers find each other is unique, in that it leads to movement of the curve itself. This is partly reflected in a temporary increase in the structural unemployment rate. More on this topic appear in the study presenting such a model, which was developed at the Bank of Israel in recent years: A. Binyamini (2021). "A Structural Investigation of Israeli Labor Market Dynamics: A DSGE-Based Analysis", Bank of Israel Research Department Discussion Paper 2021.19.

[4] The quarters of 2020 featured a circular motion of the curve: a decline in job vacancies, which then led to an increase in unemployment. In the first half of 2021, when unemployment was still high and even increasing, the number of job vacancies jumped. This combination of a simultaneous increase in job vacancies and unemployment moved the curve upward.

Figure 1
Estimated Aggregate Demand for Workers in the Business Sector, 2015–2022 (forecast trend based on 2015–2019, and actual data; index: 2015:Q1=100)



The 2015-2019 trend was calculated using a linear forecast. The estimated aggregate demand is equal to the total filled and vacant positions, and is based on industries presented in the Job Vacancy Survey (for details see the Central Bureau of Statistics website).

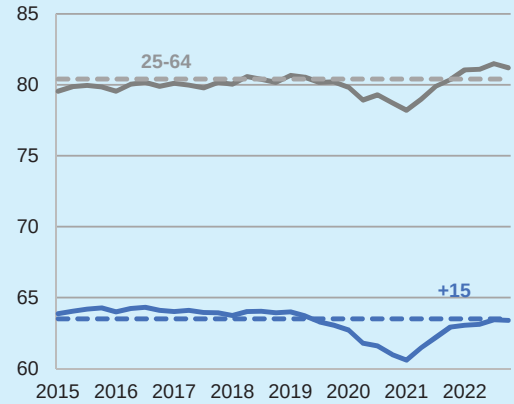
SOURCE: Based on Central Bureau of Statistics Job Vacancy Survey.

The high job vacancy rate should have raised the employment rate to a higher level, and should even have contributed to a decline in unemployment to below its precrisis level and to significant wage increases. These did not happen, and a possible explanation may be that the expansion of employment was accompanied by some growth in the supply of labor, as shown by the increase in the participation rate (aged 25–64) beyond the rate that was prevalent in the years prior to COVID-19 (Figure 2).

Figure 4 shows demand for workers and actual employment at the end of 2022, broken down by industry and compared to the 2015–2019 trend. The trend takes into account what should have been the number of employees had employment in 2020 and 2021 continued to grow at a fixed rate that was in line with the average growth rate in previous years. The trend was calculated separately for each industry. The Figure shows that not only the overall level, but also the industry composition, of demand for workers and of employment largely returned to the precrisis levels. Viewing them relative to the trend makes it possible to see in which industries employment continued to grow at a high pace during the COVID-19 period (the industries in which the blue row in the Figure reaches 1 or higher), compared with other industries in which the employment growth trend during COVID-19 did not continue from the precrisis years (where the blue row is below 1). The number of job vacancies in these industries, which is higher than in the past, indicates manpower needs at a lower level than the growth trend. This is shown by demand for workers, which is lower than the long-term growth trend (the orange rows that are lower than 1).

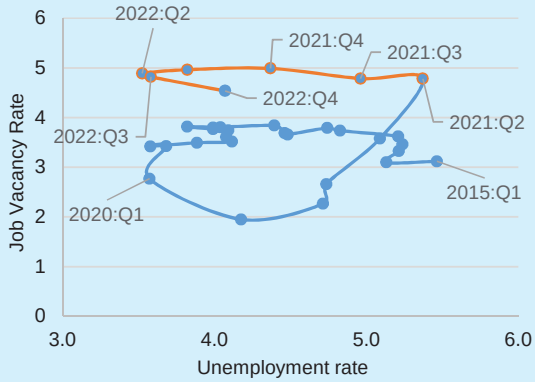
These developments of employment and demand for workers show that the period of COVID-19 and the recovery from it affected various industries differently. In some industries, the impact on employment was still felt in 2022, although it declined, just as it was felt in private consumption (Chapter 2). The rapid growth of employment was thus a feature of industries in which it was possible to work by remote (the information and communications industry, most of which is included in the high-tech sector, is a particularly

Figure 2
Labor Force Participation Rate, 2015–2022 (quarterly data, ages 15+ and 25–64)



The broken lines show the 2019 averages.
SOURCE: Central Bureau of Statistics.

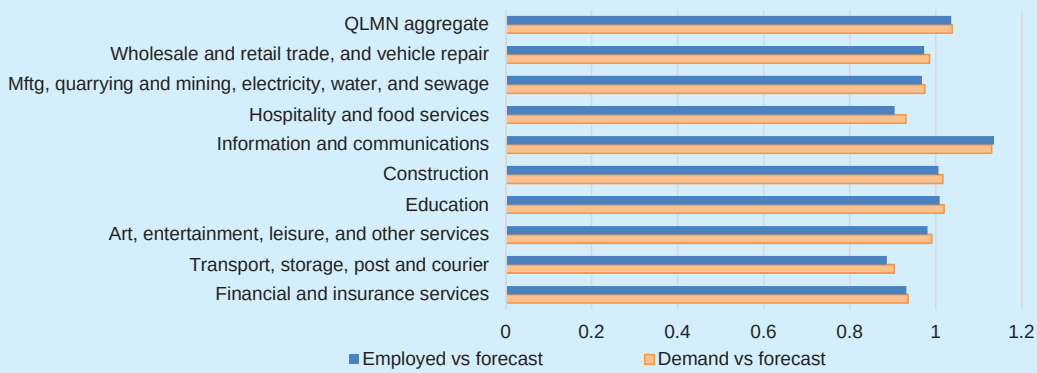
Figure 3
Beveridge Curve: Unemployment Rate (15+) and Job Vacancy Rate, 2015–2022 (quarterly data)



The orange line is the quarters since the start of the recovery from the COVID-19 crisis (2021:Q2 and onward).
SOURCE: Based on Central Bureau of Statistics.

prominent example), while employment contracted in industries where the consumption of services was restricted during the crisis due to their nature (such as the hospitality and food industry and the transportation, storage, post, and courier industry). The financial services and insurance services industry was an outlier. Employment in that industry is lower than its trend, even though it continued to operate without special restrictions during the COVID-19 period. This decline is explained by streamlining in some business in the industry during the COVID-19 period—an acceleration of the trend that had been taking place in those businesses prior to COVID-19.

Figure 4
Demand for Workers and Those Employed, 2022:Q4 Compared with Forecast (according to the 2015–2019 trend, by economic industry)



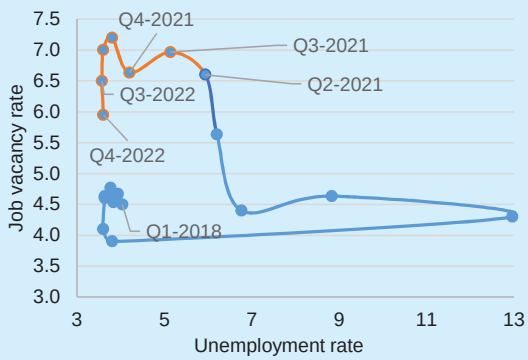
Demand for workers includes the employed and job vacancies. The long-term trend is linear based on the years 2015-2019. The QLMN aggregate includes real estate activity; professional, scientific, and technical services; other business services; and health, welfare, and long-term care services. Values higher than 1 mean that the actual figure is higher than the trend, while values lower than 1 mean that the actual figure is lower than the trend. The industries are listed in ascending order by weight among the employed (in the Job Vacancy Survey sample).
SOURCE: Central Bureau of Statistics Job Vacancy Survey.

The sharp increase in the job vacancy rate is not unique to Israel

A high job vacancy rate even after a decline in the unemployment rate was not unique to the Israeli economy. Figures 5a and 5b outline similar developments in the US and in the EU. This development, which is common to many countries, points to the uniqueness of the economic recovery from the COVID-19 crisis relative to previous crises.

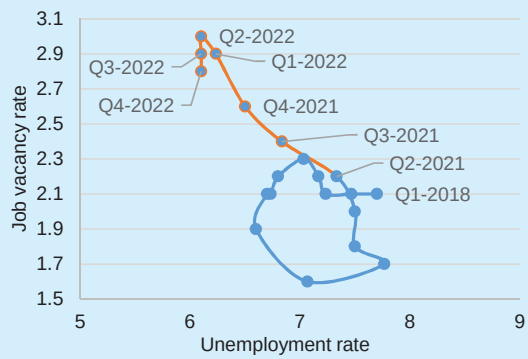
The OECD notes two main factors as possible explanations for the sharp jump in job vacancies in many countries following the peak of the COVID-19 crisis.[5] First, employee recruitment and employment mobility programs were pushed off until after the COVID-19 period. This built up the need not only to recruit, but also to replace workers. The delay of reorganization programs was affected not only by economic uncertainty, but also by special programs to support workers and the unemployment during the pandemic. Second, the recovery of demand for goods and services led to a sharp increase in consumption from the second half of 2021, following a period of "trapped demand". In some industries, there was even a need to expand employment beyond the precrisis trend. Some of the explanation for such a sharp increase in demand has to do with the expansionary fiscal policy adopted by many countries during the crisis, which enabled households to not only maintain their purchasing power, but also to increase it due to their increased savings as a result of lower consumption during the crisis (as a result of COVID-19 restrictions).

Figure 5a
US Beveridge Curve: Unemployment and Job Vacancy Rates, 2018–2022 (quarterly data)



The orange line is the quarters since the start of the recovery from the COVID-19 crisis (2021:Q2 and onward).
SOURCE: Based on BLS.

Figure 5b
European Beveridge Curve: Unemployment and Job Vacancy Rates, 2018–2022 (quarterly data)



The orange line is the quarters since the start of the recovery from the COVID-19 crisis (2021:Q2 and onward). Figures are the average of 27 European Union member countries.
SOURCE: Based on Eurostat.

[5] OECD (2022). "OECD Employment Outlook 2022: Building Back More: Inclusive Labour Markets", OECD Publishing, Paris. https://doi.org/10.1787/1bb305a6-en

d. The high-tech sector

The high-tech sector is considered the engine of the Israeli economy. It is growing rapidly, and is highly important to the economy.

The high-tech sector is considered the "engine" of the Israeli economy. It grows rapidly, and is very important to the economy. By international comparison, it accounts for a high share of Israeli employees—more than 10 percent. Due to the high labor productivity that it features, its share of GDP is even higher—about 16 percent. The high-tech sector is particularly prevalent in total exports of goods and services. In 2022, the sector's exports accounted for 49 percent of Israeli goods and services exports (excluding diamonds) and 56 percent of services exports. Accordingly, direct tax revenues from the sector are also high. [15] Israel is a significant participant in the venture capital market. Israeli high-tech companies received about 4 percent of total global venture capital investments in 2022, which is roughly ten times Israel's share of global GDP.[16] The sector employs Israeli workers whose human capital is high in a competitive global labor market.

The high-tech sector in 2022 showed some cooling in activity relative to 2021. The latter year was exceptional for the entire global technology sector, and particularly for Israeli high-tech.

The high-tech sector in 2022 showed some decline in activity relative to 2021. The latter year was exceptional for the entire global technology sector, and particularly for Israeli high-tech. Under the influence of high demand for technology products, and in view of the low interest rates in 2021, Israeli startups succeeded in raising very high volumes of capital, mostly venture capital, relative to the amounts raised in previous years (Figure 1.6). In the same year, a record number of companies were issued on the Tel Aviv Stock Exchange (Box 4.1 in Chapter 4), and their valuations were high.[17] In 2021, demand for workers in the high-tech sector grew rapidly, tax receipts from the sector were high, and high-tech exports (both goods and services) reached very high levels.[18]

Throughout most of 2022, the technology stock indices both in Israel and abroad were in a downward trend, and valuations of private technology companies were cut.[19] These developments had an impact not only on startup companies, the existence of which is greatly dependent on their ability to raise capital, but also on mature high-tech companies, which employ about 90 percent of the sector's employees in Israel. Financial developments during the year raised concerns over the lower availability of capital and its potential effect on the global technology sector's activity, including in

[15] The high wages paid to employees in the sector generate tax revenues, options to employees generate capital gains taxes, and the State also receives high tax revenues from corporate taxes and from exits.

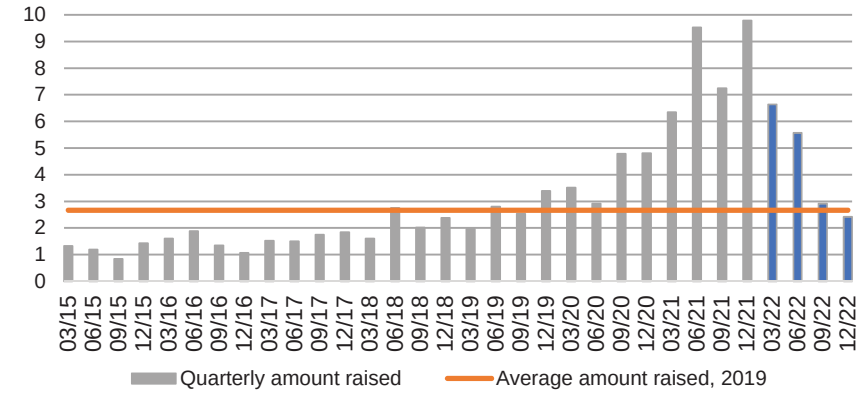
[16] This assessment of Israel's share in global venture capital raised in 2022 is based on data from crunchbase.com, IVC Analytics, and the World Bank. A similar assessment regarding 2019 appears in the issue "Financing Characteristics of High-Tech Companies in Israel" in the Bank of Israel Annual Report for 2019.

[17] Thirty-eight percent of the equity capital raised on the Tel Aviv Stock Exchange in 2021 was raised by high-tech companies. (SOURCE: Tel Aviv Stock Exchange (2023). Annual Review 2002, Table 4.)

[18] For more information, see Chapters 1 and 6 in the Bank of Israel Annual Report for 2021.

[19] E. De Malach, M. Haran-Rosen, Y. Friedman, and T. Ramot-Nyska (2022). "Assessing the Implications of the Declines in the Capital Market for the Stability of the Israeli High-Tech Sector", Bank of Israel.

Figure 1.6
Capital Raised by Israeli Startups, 2015–2022 (quarterly amounts, US$ billion)



SOURCE: Based on IVC Analytics.

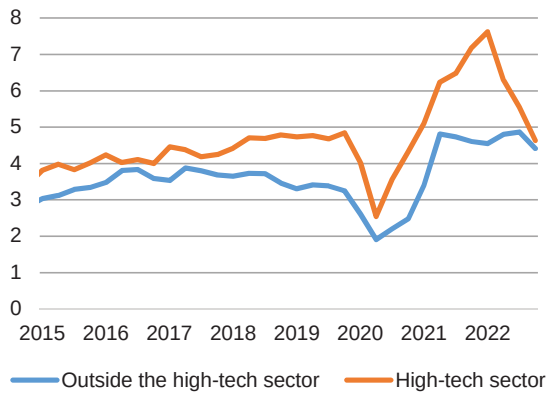
Israel.[20] There were additional concerns of a potential slowdown in real economic activity, which would reduce the global demand for technology goods and services. In view of this, the trend of growth in the job vacancy rate in the high-tech sector reversed at the beginning of 2022. The decline continued throughout the year, and was in line with the negative sentiment in the financial markets toward the technology sector. At the end of the year, the job vacancy rate in high-tech companies was similar to the rate before the COVID-19 pandemic, and to the rate among companies that are not in the high-tech field, which was still higher than in the past (Figure 1.7). However, compared with 2019, total demand for high-tech workers (the number of employees plus the number of job vacancies) increased more rapidly than the rest of the business sector (Figure 1.8).

Job vacancy and capital raising data for 2022 show that throughout the year, the Israeli high-tech sector cooled relative to 2021. However, activity remained at a high level that was similar to the period before 2021—a year that was exceptional. High-tech services exports remained a dominant component in services exports, which have been growing rapidly in Israel in recent years, and high-tech output great by almost 9 percent in real terms. Startup companies' capital raising, which dropped sharply throughout the year, was significantly lower than its high level of 2021, but was similar to its volume prior to the pandemic, while demand for workers remained high and continued to climb rapidly relative to the rest of the business sector's companies (Figure 1.7). The average wage in the high-tech sector also increased, by 5.2 percent (yearly average in current prices), which was much more rapid than in the rest of

[20] A decline in the availability of capital may affect both startup companies' ability to raise capital and companies' ability to make exits. Startup companies hold financing rounds once every two years on average. Therefore, if the need to raise capital is not immediate, some companies may prepare in advance for potential difficulties through streamlining, with the expectation that the difficulties in raising capital will persist.

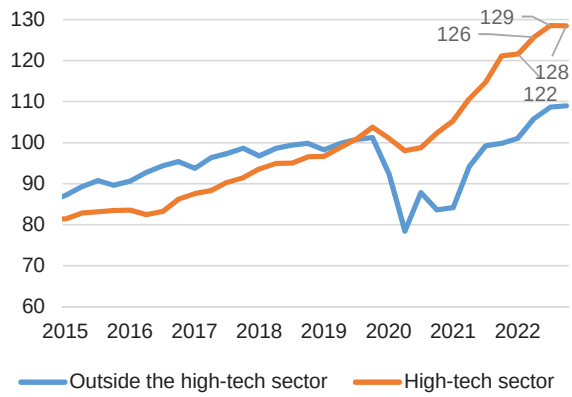
the business sector (1.7 percent). The slowdown in the expansion of employment in the sector may reflect caution, due to uncertainty regarding a potential slowdown of demand for the industry's products and a decline in financial sources in the industry.

Figure 1.7
Job Vacancy Rate in the High-Tech Sector and the Rest of the Business Sector, 2015–2022 (as a share of total vacant and filled positions, percent)



Shown as quarterly averages of original data.
SOURCE: Based on Central Bureau of Statistics Job Vacancy Survey.

Figure 1.8
Demand for Workers in the High-Tech Sector and the Rest of the Business Sector, 2015–2022
(index: 2019 average=100)



Shown as quarterly averages of original data. Demand for workers equals the total of filled and vacant positions.
SOURCE: Based on Central Bureau of Statistics Job Vacancy Survey.

e. Fiscal policy

Following two years in the shadow of the COVID-19 crisis, which featured fiscal expansion to an exceptional scale, 2022 was a year of tightening fiscal policy. The total deficit of the general government declined sharply, to just 1.6 percent of GDP, following two years of high deficits due to the pandemic (Table 1.1). There was a government budget surplus of 0.6 percent of GDP.[21] The decline of the deficit was mainly a result of a reduction in public expenditures as a share of GDP, due to the end of the assistance programs operated during the COVID-19 crisis, but it also reflected an increase in public revenue as a share of GDP. Accordingly, and with the rapid growth of GDP, public debt declined in 2022, to 60.7 percent of GDP at the end of the year (Table 1.1). This was close to the median level among advanced economies,

Following two years in the shadow of the COVID-19 crisis, which featured fiscal expansion to an exceptional scale, 2022 was a year of tightening fiscal policy.

[21] The general government is comprised of the government itself, the National Insurance Institute, the local authorities, and nonprofit institutions (the health funds, the universities, Yeshivot, etc.), the income of which comes mostly from the government and the national institutions (the Jewish Agency, the Jewish National Fund, and the World Zionist Organization). The general government's activity is measured in accordance with national accounting definitions, which differ from those used in the State Budget. The difference between the general government's deficit and that of the central government mostly reflects different accounting definiitions and not deficits of the other entities in the general government.

and around the level of the debt prior to the outbreak of the pandemic. The decline in the debt to GDP ratio was also due to the acceleration of inflation, which eroded the unindexed part of debt (which is about half of the government's debt) relative to nominal GDP.

As in the rest of the world, the general government's expenditures relative to GDP were exceptionally high by historic comparison during the pandemic, due to transfer payments to support businesses and workers, and due to additional expenditures related to dealing with the pandemic. In 2022, these payments were stopped, and government expenditures relative to GDP declined to a level slightly lower than they were prior to the pandemic. The end of the pandemic also saved the government expenditures that were allocated in designated budgets ("COVID-19 baskets") particularly for this purpose. Another reason for the moderation of the growth in current expenditures relative to GDP ion the past two years is the moderate growth of wage expenditures due to the lack of an updated framework agreement for public sector wages (Chapter 6).[22]

General government revenues relative to GDP increased to a level higher than the level prior to the pandemic. This growth reflected an increase in the weight of taxes, which was mainly due to an increase in direct tax revenues relative to GDP. Thanks to the recovery of activity, payroll taxes and corporate tax revenues increased. However, the high revenue was also affected by factors that do not necessarily go together with economic growth, such as capital gains taxes from the high level of activity in the high-tech sector. Exceptional revenue from real estate taxes this year are another example of this. These increased greatly, since home prices increased sharply and the average number of transactions during the year was high (even with the sharp decline relative to 2021). The decline in the number of real estate transactions in 2022 and the moderation of capital raising in the high-tech field are expected to moderate tax revenues in the coming years.

f. Israeli demography and its implications

The rapid population growth is eroding the per capita stock of all physical infrastructure in Israel.

The growth rate of the Israeli population, about 2 percent per year, is among the highest in the OECD. Average population growth in the OECD countries is only about 0.6 percent per year.[23] According to the Central Bureau of Statistics demographic forecast, the Israeli population, which is currently about 9.7 million (Table 1.1), will be more than 15 million in 25 years.[24] The rapid population growth is eroding the per capita stock of all physical infrastructure in Israel, including in the areas of transportation, housing, energy, and communications. It therefore requires high levels of investment just to answer the increase in population. But that is insufficient to catch up with the

[22] In 2021, the fact that the government operated for about half a year without an approved budget also contributed to this.

[23] SOURCE: OECD.stats

[24] Central Bureau of Statistics (2017), "Israeli Population Forecast to 2065".

international figures, taking into account the current low level of the per capital stock of capital by international comparison.

The demographic trends in Israel run contrary to those in many of the other advanced economies. The birth rate in Israel is much higher than in other countries, and the composition of the population is therefore younger than in many other countries (Figure 1.9).[25] Therefore, the rapid growth rate of the population also contributes to unique housing challenges. For demographic reasons only, an addition of more than 55,000 housing units is required each year[26] (a number that is equivalent in size to a city such as Ashkelon or Bat Yam). This puts into sharper focus the need to invest more than other economies in the development of physical infrastructure. In addition, the high rate of children in the population, and the importance of human capital as a factor that generates long-term growth, necessitate a high level of investment in high-quality education infrastructure, and providing quality education to all children.[27]

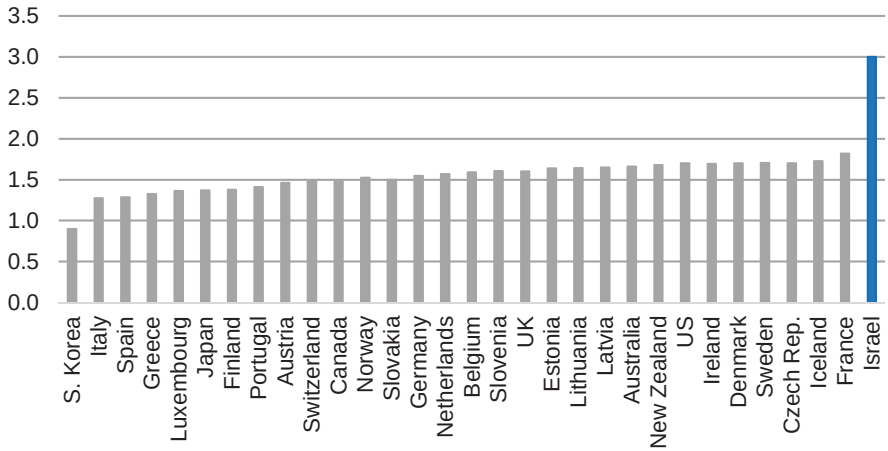
Chapter 7 of this Report shows that the main reasons for the differences in per capita income between Arabs, *Haredim* (ultra-Orthodox Jews) and non-*Haredi* Jews are low labor income in Arab and *Haredi* households, and the fact that those households are larger. Differences in education play a major role in the differences in earning capacity, since they influence both the scope and the quality of employment. In the Arab sector, and among non-*Haredi* Jews, changes have taken place that, over time, have increased the rate of those with academic degrees (particularly among women). Those changes are contributing to an increase in labor productivity and to processes socioeconomic mobility. At the same time, there is a reverse process taking place among *Haredi* men, which has led to a widening of the education gaps. Among *Haredi* women, the rate of those with academic degrees has risen, but only slightly, and much less than the increase among non-*Haredi* Jewish women. Taking Israel's demographic trends into account, the *Haredi* population's share is expected to increased, from about 13 percent currently, to about a quarter in 25 years (and to almost one-third by 2065). This illustrates the tremendous importance of learning subjects that are essential for integration into high-quality employment in education frameworks in Israel. Raising the quality of all parts of the education system will help adjust the abilities of future workers to the skills necessary in the labor market, and will thus contribute to narrowing wage gaps in all parts of Israeli society.

[25] In order to maintain a fixed population size, the birthriate must be slightly greater than 2 children per woman. In some countries with a birth rate of less than 2 children per woman, the population increased in any case, due to net positive migration to them. In Israel, the average number of children per woman is much higher than 2.

[26] A monitoring report (June 2021) on the National Economic Council's strategic housing program for 2017–2040 estimates that the economy's demographic needs in 2021–2025 are about 60,000 housing units per year.

[27] Bank of Israel (2019). "Research Department Special Report: Raising the Standard of Living in Israel by Increasing Labor Productivity"; Bank of Israel (2023). "Recommended Strategic Pillars of Action for the Government".

Figure 1.9
Average Number of Children per Woman (Total Fertility Rate), 2018–2020 average



The total fertility rate is the number of children a woman is expected to have during her lifetime. For details on the assumptions underlying the calculation, see Central Bureau of Statistics (2022), "Childbirth and Fertility in Israel, 2022".

SOURCE: OECD.stats.

The wage agreement signed with the teachers in 2022 reflects the implementation of a number of important measures to improve the quality of the education system. It improves the terms of employment, mainly for beginning teachers, increases incentives for excellence, and increasing administrative flexibility for school principals. However, a number of important issues were dealt with only partially in the agreement. These include reinforcing the compensation system for teachers of subjects where there are marked shortages and for teachers employed at weak schools or those in the periphery. Another important issue that the agreement touched on but did not provide any significant progress is synchronizing school vacations with those of working parents.

3. MONETARY AND FINANCIAL DEVELOPMENTS IN ISRAEL

a. The outbreak of inflation

In view of the increase in inflation, the Bank of Israel raised its interest rate during the year, following a number of years when the rate was kept near zero.

Inflation in Israel totaled 5.3 percent in 2022. The increase of inflation beyond the upper bound of the Bank of Israel target range (1–3 percent), for the first time in a decade, was a continuation of the process that began in 2021—when inflation climbed to 2.8 percent (Figure 1.1 and Table 1.1). In view of this, and after the cancelation in 2021 of the special expansionary measures taken during the COVID-19 period, the Bank of Israel raised its interest rate during the year, following a number of years when the rate was kept near zero (Figure 1.2 and Table 1.1). The interest rate increases began with the April 2022 decision. Before that, the interest rate was 0.1 percent, and

by the end of the year it reached 3.25 percent, its highest level since the beginning of the previous decade. The interest rate increases continued into 2023. The outbreak of inflation and the turnaround in monetary policy were global phenomena this year, and were even more pronounced in the US and in Europe (Figure 1.1). Accordingly, and after many years of monetary accommodation through near-zero interest rates and other tools, interest rates in the US and Europe began climbing sharply (Figure 1.2).

Until the beginning of 2022, the causes of the price increases were considered short-term.

Price increases encompassed both domestic services, which were influenced by domestic conditions, and tradable goods, which were influenced by supply disruptions in the global market as well as by the shekel's depreciation against the US dollar. The various difficulties in global supply were reflected in price increases already in 2021. Accordingly, accommodative measures and special monetary tools used in Israel during the COVID-19 lockdowns were tapered in 2021. Many central banks, including the Bank of Israel, viewed the causes of the price increases as temporary until the beginning of 2022, and therefore did not find it proper to act against them through aggressive monetary tightening.[28] At the beginning of 2022, inflation was influenced by a new development that had a marked impact on global economic activity and prices—the war between Russia and Ukraine, which led to a global energy and food crisis. Against this background, inflation in Israel reached higher rates in 2022 than was expected during 2021.

The structure of the Israeli energy market contributed to the relatively moderate increase of inflation in Israel.

An important part of the explanation for the relatively moderate increase in inflation in Israel is attributed to the nature of the impact of higher energy prices. Section 4 of this Chapter deals partly with the effect of the structure of Israel's energy market on how the country dealt with the global developments in 2022. The discussion there helps provide an understanding of why Israel's exposure to the sharp increases of global energy prices, particularly natural gas prices, was limited during the energy crisis that developed in early 2022. Israel generates its own natural gas, mainly from the Tamar and Leviathan gas fields. Domestic natural gas prices, as well as supply quantities, are fixed in long-term contracts between the natural gas partners and consumers, chiefly the Israel Electric Company.

The increase in inflation encompassed all CPI components.

With regard to the domestic conditions, the dwindling economic effects of the COVID-19 pandemic in Israel, as in other countries, was reflected in growing demand already in 2021, and that growth continued in 2022. Chapter 3 discusses its contribution to the increase in inflation. The growth in demand was reflected in an exceptional increase in demand for workers in Israel, as well as in many other OECD countries. Despite this, and further to with the discussion presented above regarding the moderate development of wages in 2022, a formal analysis of the contributions to inflation (Chapter 3) actually shows that wages are not included in the category of inflationary factors this year.

Many years of low inflation have turned it into an insignificant consideration in decision-making by firms and households—a phenomenon that is usually referred

[28] Chapter 3 shows the sharp jump in the supply chain stress index for Israel in 2021, and its decline in the second half of 2022, which was later than expected.

to as "rational inattention". However, a rapid and marked increase in the inflation environment may shift our attention to it as well. That attention induces feedback mechanisms that affect the dynamics of inflation itself. Box 1.2 explains how an increase in the level of inflation changes its nature as well. Such a change may have been one of the factors that intensified the increase in inflation in some economies, and due to it, inflation may have become more general and broadly reflected in rapid price increases in many components of the Consumer Price Index.

The government took a number of policy measures with the aim of reducing the burden of price increases on the public. These included reducing the excise on fuel and coal, reducing import taxes, and increasing support measures (increasing the earned income tax credit and providing additional income tax credit points). The cost of these measures totaled about 0.5 percent of GDP (Chapter 6). The measures may have reduced the burden for households during the year, particularly as price increases encompassed many consumption items (Chapter 3). However, the measures taken do not get to the bottom of the cost of living problem that affects price levels in Israel, which is a separate issue from inflation. In order to lower the cost of living, the government must continue implementing the reforms that have been started, for instance by increasing competition in the import of goods, and expand them to additional areas. In the longer term, labor productivity in the economy and the earning capacity of employees must be increased through investment in human and physical capital.

The pace of rent increases accelerated this year. Home prices increased rapidly, but the pace of increase was halted in the fourth quarter of the year.

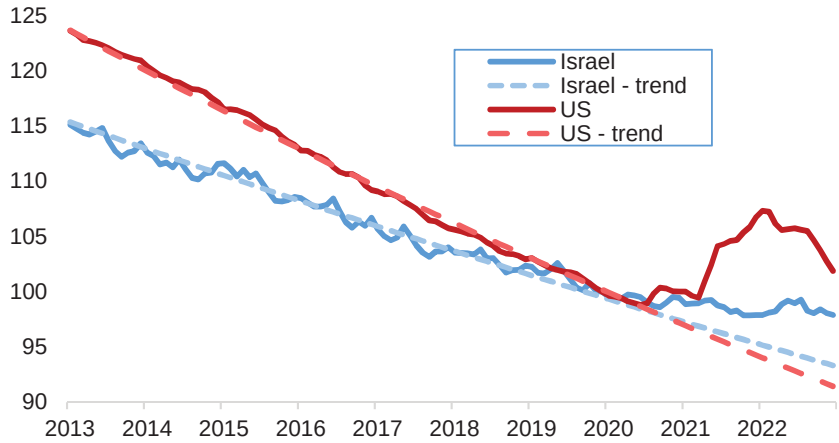
The pace of increase in rents accelerated steadily since the beginning of 2021, and in 2022 the increase totaled 6.3 percent. This followed a number of years before the COVID-19 pandemic in which the annual increase in rents was about 2 percent. While real estate prices are not included in the Consumer Price Index, they have a macrofinancial impact with implications for the inflation environment and monetary policy. Despite the increase in the interest rates and the decline in the number of housing transactions, and despite the marked growth in supply throughout the chain (permits, building starts, marketing), home prices increased sharply in the first three quarters of the year, with the increases coming to a halt only in the fourth quarter of the year. Over the year as a whole, home prices increased by about 14.6 percent. There were also significant increases in home prices in other economies during part of this period. In Israel, the increase in home prices is also influenced by supply considerations and by the rapid growth of the population, which is discussed in Section 2

The exchange rate was volatile, with a tendency toward depreciation of the shekel.

The nominal effective exchange rate was volatile during 2022, with a tendency toward depreciation of the shekel, following a trend of appreciation of the shekel that lasted about a decade. As Table 1.1 shows, the shekel-dollar exchange rate averaged NIS 3.4/$1 in 2022 (similar to its level in 2020, and after declining to NIS 3.2/$1 in 2021). Chapter 3 discusses this development and its contribution to inflation. Compared to 2021, the real exchange rate declined by just 0.9 percent (reflecting real appreciation), which was smaller than the sharp declines of previous years (Table

1.1). The real appreciation over the past few years reflects, in part, the growth of labor productivity in Israel which, in recent years, was more rapid than the OECD average (Chapter 5).

Figure 1.10
Ratio Between the CPI of Tradables and Nontradables, US and Israel (index: Dec. 2019 = 100)



All index readings, for Israel and the US, both tradable and nontradable, are excluding energy and food. For the US, the nontradables index is the index of services prices.
SOURCE: Based on BLS and Central Bureau of Statistics.

The COVID-19 crisis and the Russia-Ukraine war created bottlenecks in international shipping and a shortage of commodities, which affected different countries in different ways. Many tradable goods and services therefore became less tradable. Thus, in addition to the increases in their prices relative to those of nontradable goods and services—and contrary to the long-term trend in Israel and abroad (Figure 1.10)[29]—the prices of tradable goods and services developed differently in different countries. The variance between economies in the development of tradable goods prices was another, short-term, factor in the development of the real exchange rates this year.[30]

[29] The relative reduction in prices of tradable goods in the years prior to the COVID-19 crisis was more rapid in the US. This is consistent with more rapid growth of labor productivity there than in Israel during those years (since growth of labor productivity leads to a relative reduction in the prices of tradable goods). This is in contrast to the average growth of labor productivity in all OECD member countries, which was slower than the growth in Israel (Chapter 5).

[30] In general, differences between countries in the development of prices of nontradable goods and services have a dominant effect on the development of the real exchange rate. But in a period in which the development of prices of tradable goods also differs greatly between economies, this difference may be another important factor in the development of the real exchange rate.

BOX 1.2: HOW DOES PUBLIC ATTENTION TO INFLATION AFFECT ITS NATURE?

The term "inflation" refers to increasing prices of all goods, services, and assets. However, the change in the price level reflects, at any point in time, a mixture of two types of prices changes that differ in their underlying drivers and impacts: a contemporaneous change in all prices in the economy, which is reflected in erosion of the value of the currency, and changes in the relative prices of sector-specific goods and services (which may also have an impact on aggregate inflation).

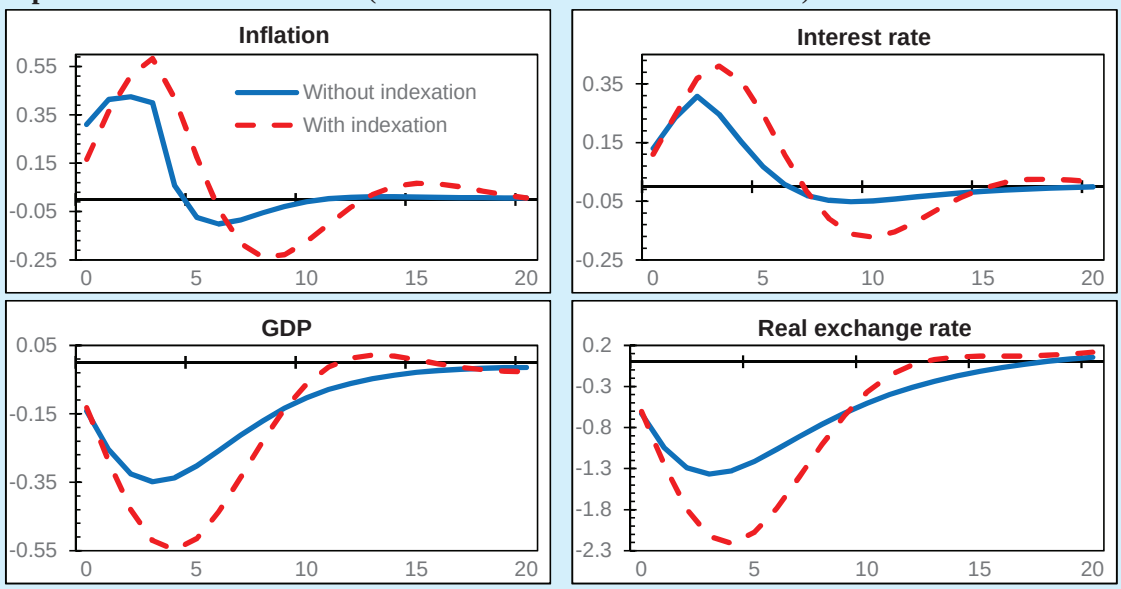
There are two main drivers of changes in relative prices, and they are also relevant for a low inflation environment. One driver is an industry-specific development that affects supply or demand in that industry—an "idiosyncratic shock" that generates a change in relative prices in response to real events (such as an increase in the price of oil due to a global shortage). The other driver is short-term price rigidity, which means that various prices are updated at different timings.

Inflation in which the dominant component is a broad change in prices tends to be more difficult to stabilize, since such inflation tends to be considered comprehensive and prolonged and is therefore reinforced by constant price revisions aimed at preventing their erosion. In contrast, inflation that mainly features relative price changes reflects industry-specific changes. In such a case, if expected inflation remains low, due to a proper monetary policy, relative prices will be stabilized once demand and supply converge to a new equilibrium. This will also stabilize inflation itself, after various prices adjust to economic developments.

When the change in the relative price takes place regarding a broad input such as oil, it will affect the prices of a variety of goods and services. However, the broad impact of such price increases will be accompanied by a restraint on activity, and will therefore not necessarily lead to widespread prolonged price increases. However, if inflation that begins as a reflection of a change in relative prices is accompanied by some impact to trust regarding the central bank's resolve to stabilize it, it may become prolonged.

The Bank of International Settlements (BIS) Annual Report (2022, Chapter II) distinguishes between the two types of inflation. In making this distinction, it discusses the behavioral differences that explain the difficulty in stabilizing inflation that reflects broad price changes: An increase in the inflation environment incentivizes the public and firms to use indexation mechanisms to hedge against it. The indexation mechanisms are means to update the prices of goods and services according to known inflation, meaning inflation from the previous period. The aim of the indexation is to prevent inflation from eroding the real value of goods, services, and assets. However, the use of such mechanisms also involves externalities that modify the inflation dynamics and may make it worse. Indexation amplifies the effects of a given shock on inflation, such that inflation that began as a technical reflection of a sector-specific change in relative prices may generate a chain reaction of changes to all prices in the economy. This leads to a feedback reaction that will be reflected in higher and more prolonged inflation. The indexation mechanisms, by their nature, will also be reflected in a relatively high synchronization of price changes. In view of this, Chapter 3 discusses the broad nature of the inflation increase in 2022.

Figure 1
Response to an Inflation Shock (with and without indexation mechanisms)



The Figure is based on the impulse response to an inflationary shock according to the Bank of Israel Research Department's DSGE model (Argov et al (2012)). The horizontal axis shows the number of quarters following the shock. The blue line shows the impulse response in a model without indexations. The broken red line shows the impulse response to an identical shock (in terms of duration and intensity) in a model that includes an automatic update of goods prices and wages to the inflation that took place in the previous quarter. Inflation is the rate of inflation during the past four quarters, in terms of deviation in percentage points from the midpoint of the Bank of Israel's inflation target range (2 percent). Interest rate is the deviation of the Bank of Israel interest rate, in percentage points, from the long-term interest rate. GDP is the GDP gap, in percent, from its long-term trend. Real exchange rate is the deviation of the real effective exchange rate, in percent, from its long-term trend.

Figure 1 illustrates the theoretical distinction between two extreme situations—one in which indexation mechanisms do not operate, and one in which all prices are fully indexed to inflation that has taken place (in addition to price updates from time to time in response to various events). Following an inflationary shock, the central bank raises its interest rate. As a result, activity slows, which restrains inflation. It also results in a real appreciation—both as a result of the increase in inflation and as a result of the nominal appreciation driven by the interest rate. Under indexation mechanisms, a shock of the exact same nature and intensity leads to more prolonged and stronger responses and greater volatility on the part of all of the described variables. Therefore, in an economy that features inflation hedging mechanisms, a greater loss of output ("sacrifice ratio") is necessary to stabilize inflation.

Following a long period with a low inflation environment, attention to aggregate price changes may subside ("rational inattention"). This is essentially one of the most important achievements of an inflation targeting regime, and has been a feature of the Israeli economy for many years. In contrast, when the inflation environment rises, attention to its existence and to its effects also increases. The increase in attention may lead, in turn, to frequent price and wage revisions that compensate for their real erosion. Such revisions, whether systematic or sporadic, weaken the inflation target's function as a nominal anchor, which makes the effects of various shocks more prolonged and stronger.

Such a dynamic of reinforced inflation was a characteristic of the Israeli economy during and after the high inflation environment in the mid-1980s. Indexation to past inflation was common in the credit market (mortgages and CPI-indexed bonds), and in housing and other services (the value of which was often denominated in dollars). Even after inflation stabilized around the target, these mechanisms were abandoned only gradually and partially (they are still common in the credit market today), and continued to affect the macroeconomic dynamic for many years even in the low inflation environment.

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Bank of International Settlements (BIS) (2022). "Inflation: A Look Under the Hood", Annual Economic Report, June 2022, Chapter II.

b. Transition from monetary accommodation to monetary tightening

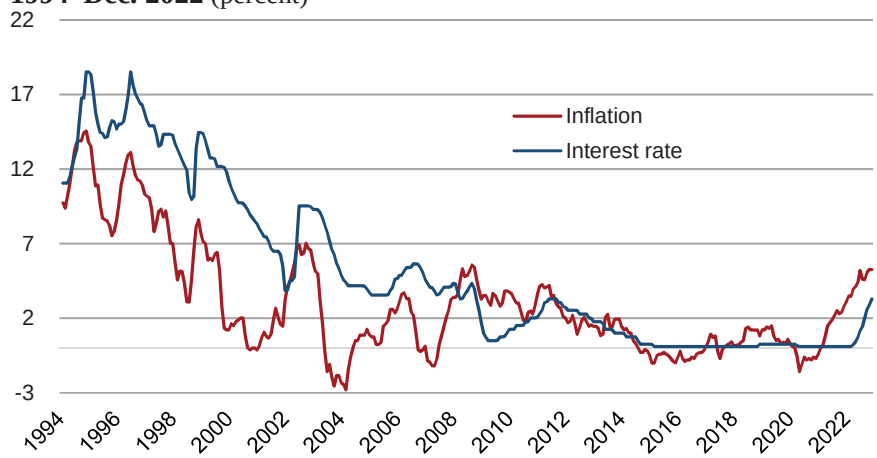
The increases in the Bank of Israel interest rate began once it became clear that inflation had started to exceed the upper bound of the target range.

In the summer of 2021, the Bank of Israel was among the first in the world to halt the use of the nonroutine accommodation tools that were used during the COVID-19 period. The February 2022 interest rate decision was made during the Omicron wave of morbidity and before the outbreak of the Russia-Ukraine war, but it already included an assessment that the process of raising the interest rate would begin soon. The interest rate began rising in the following decision—in April 2022. That decision was made after the wave of morbidity had subsided, and after inflation data were published showing that it was exceeding the upper bound of the target range (Figure 1.11 and Chapter 3). At that time, inflation in other economies was already much higher than their targets, and in most, the process of raising the interest rate had just begun (Figures 1.1 and 1.2). The deviation of inflation from the targets at that time, and the implications of the war in Ukraine, led central banks to increase interest rates rapidly.

The timing of the interest rate increases was also affected by the uncertainty that was prevalent at the beginning of the year.

The timing of the transition from monetary accommodation to monetary tightening reflects the caution that is necessary since monetary policy decisions are made under conditions of uncertainty. Since the effect of monetary policy is not immediate but delayed, it is necessary to make decisions when some of the relevant data are still unknown. Therefore, the response to an increase in inflation may turn out to be too early or too strong. Figure 1.11 indicates two periods in recent decades, during which the interest rate was significantly lower than the inflation rate. Both were periods of very large global crises. The first is the period of the Global Financial Crisis of 2008–2009, and the second is the period reviewed in this Report. The beginning of 2022

Figure 1.11
Inflation in the Past 12 Months and the Monetary Interest Rate, Jan. 1994–Dec. 2022 (percent)



SOURCE: Based on Central Bureau of Statistics data.

featured a high level of morbidity and mortality due to the Omicron wave (Figure 1.3), while the war in Ukraine was still not a factor (since it only broke out at the end of February). Although there was a high level of uncertainty regarding the continued development of the pandemic, the assessment was that the global supply chain disruptions would be solved within a short time. In order to avoid over-tightening, the Monetary Committee chose at the beginning of the year to hold off on increasing the interest rate. That enabled an examination of the development of inflation in view of the gradual cancellation of the use of the nonroutine accommodative policy tools that were used during the COVID-19 crisis—both in the monetary field (repo transactions with institutional investors, loan program to banks, and bond and foreign exchange purchases) and in the fiscal field (transfer payments and additional support payments due to COVID-19, which reached about 5.7 percent of GDP in 2020 and 3.7 percent of GDP in 2021).[31]

The timing of the transition from monetary accommodation to tightening—globally and also in Israel—was also partly due to the widespread approach to managing monetary policy: a flexible inflation targeting regime. In such a regime, alongside the commitment to the inflation target, central banks have additional policy goals—economic activity, employment, and financial stability. When this is the case, it is necessary to distinguish between inflation that reflects expanding demand and inflation that reflects restrained supply. Inflation due to expanding demand will be accompanied by growth in economic activity, while inflation that is due to restrained supply will be accompanied by a contraction of economic activity. Therefore, in

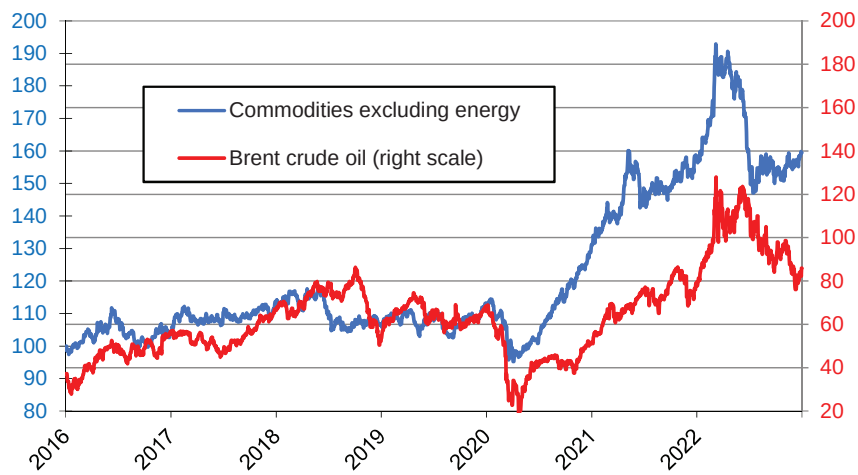
The timing of the interest rate increases was influenced by the Bank of Israel's other policy objectives, alongside the main objective of the maintaining the inflation target.

[31] According to the Bank of Israel Annual Report for 2021, Chapter 6: The General Government and its Financing.

a case where inflation reflects restrained supply, a slow and measured response is justified, relative to a response when inflation reflects expanding demand, since monetary tightening in response to supply shocks may have a negative impact on economic activity and employment targets.[32] At the beginning of 2022, inflation was attributed to global supply shortages, and there was therefore room to expect that it would have a restraining effect on real and financial activity. This was expected to contribute in turn to a restraint on inflation itself.

As stated, due to the nature of the causes underpinning the outbreak of inflation, these causes were at first perceived as not justifying rapid monetary tightening, since such tightening may turn out to be too early, particularly in view of the uncertainty regarding the robustness of real economic activity during the exit from COVID-19 (in Israel and even more so abroad). Figure 1.12 illustrates the sharp increases in global energy and commodity prices during 2021. These prices were expected to moderate after a short time (which would have a negative effect on inflation; this turned out not to be the case). But the increase in energy and commodity prices actually became more intense in the first half of 2022, following the outbreak of the war between Russia and Ukraine. These prices declined only in the second half of the year, and only after additional increases. The increase in the supply chain stress index (an index presented in Chapter 3) was also longer than initially assessed, and it began to subside only in the second half of the year.

Figure 1.12
Price of Brent Crude Oil (US$ per barrel) and Global Commodities Price Index Excluding Energy (Jan. 1/16=100), Jan. 2016–Dec. 2022



SOURCE: Based on Bloomberg.

[32] For more information on this topic, albeit in the context of inflation-restraining shocks, see the Bank of Israel Annual Report for 2018 (Chapter 1, Box 1.1: Monetary Policy in View of Supply Shocks).

During the year, inflation began to reflect an expansion of demand.

For a large part of the year, real yields on government bonds, in Israel and abroad, were negative. This was partly the result of the effects of the special accommodation measures adopted in response to the COVID-19 crisis—both fiscal and monetary—some of which had a prolonged effect on household income. Therefore, when the process of raising the interest rates began, some of the accommodative measures from the COVID-19 period were still having an effect. In addition, the effect of the tapering itself is gradual. Therefore, the increase in real yields, due to the transition to monetary tightening, was also gradual. Even though the change in policy in Israel already began back in the summer of 2021, the real yield on Israeli government bonds became positive, for all terms to maturity, only in the fourth quarter of 2022. While low real yields supported demand, the expansion of supply was slower because the nature of supply differs from that of demand. Supply involves the rehiring and reintegration of workers who were furloughed, the hiring and training of new employees, and the purchase of machines, equipment, and raw materials, as well as other adjustments. As these processes advanced throughout the year, the contribution of increased demand to inflation became more evident.

Once the process of raising the interest rate began, it was rapid.

Inflation in Israel increased later and more slowly than in other countries (Figure 1.1), and only after the nature and extent of the global phenomenon had become clearly evident and the conditions were already ripe for an increase in the interest rate. The process of raising the interest rate, once it began, was rapid—in Israel and in other economies alike. This was termed as "front-loading". The use of this term helped to communicate the circumstances that justified a rapid pace of interest rate increases.

The pass-through from the Bank of Israel interest rate decision to market interest rates works through a number of channels. In order to adjust the supply of *Makam* to demand for it, the Bank of Israel increased the pace of issuances in the fourth quarter of the year. The increase in the pace of issuances provided a response to the increasing demand for *Makam* in view of the interest rate increases, and is one of the transmission mechanisms to market interest rates. Increasing issuances made money market funds more attractive, and thereby contributed to a variety of alternatives available to the saving public. It also encouraged higher interest rates on deposits.

The various market interest rates responded to the increase in the Bank of Israel rate, but sometimes with a lag.

The increase in the Bank of Israel interest rate was reflected in a broad increase of interest rates on bank credit. However, as in most advanced economies, it translated only gradually to an increase in the interest rates on deposits at commercial banks. Box 4.2 in Chapter 4 explains why the pass-through to the interest rates on deposits tends to be weaker in an environment of low interest rates and excess liquidity, and strengthens only after a certain increase in the interest rate environment. The Box also shows that the pass-through in Israel was faster and stronger than in other countries.

The Bank of Israel's efforts to encourage an increase in the interest rate on deposits included the regular publication of the various banks' interest rates on loans and on deposits on the Bank of Israel's website. This was one of a collection of measures taken by the Bank of Israel in recent years as part of an over-all strategy to increase transparency and competition between the commercial banks. Among other things, that

strategy included the "one-click mobility" reform in 2021, the mortgage transparency reform in 2022, and the issuing of licenses to two digital banks, in 2019 and 2022.

The increase in the interest rate provides an incentive to minimize activity and to reduce the volume of cash and deposits held in current accounts. Chapter 3 points to a trend of reducing liquidity on the part of the public—reducing the volume of holdings in current accounts alongside a significant expansion of interest-bearing deposits (the volume of which almost doubled in 2022).

The increase in interest rates, in Israel and abroad, also had an impact on the costs of financing from nonbank sources. Equity prices declined and bond yields increased. Chapter 4 discusses these developments and their impact. Among other effects, the interest rate increases were reflected in truncating the wave of IPOs of 2020–2021, and in a turnaround in the development of credit. While the sharp growth of credit that began in 2021 continued in the first half of 2022, the expansion of credit from all sources (bank and nonbank) and to all segments (businesses and households) slowed in the second half of the year.

The increase in the interest rate influenced activity in the credit market.

The increase in the interest rates also raised the burden of loan repayments for businesses and households, including mortgage payments. This probably contributed to a downward trend in the number of home purchases in 2022 (Chapter 8).

Restraining inflation involves increasing the burden on the public—both due to the direct effect of raising interest rates that makes loans more expensive, and due to the indirect effect of restraining demand that may lead to harm to economic activity and to employment. However, such restraint is necessary, since without it, inflation may increase even more and make the harm even worse, particularly for the weaker population segments.[33]

4. THE ENERGY CRISIS IN EUROPE AND THE ISRAELI ENERGY MARKET'S ROBUSTNESS

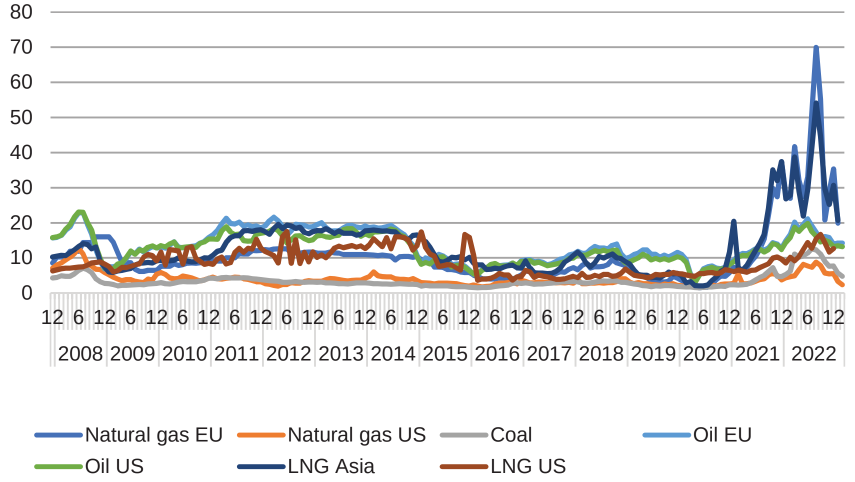
At the beginning of 2022, a global crisis broke out that was reflected in an increase in the prices of energy, chiefly natural gas.

Half a century after the global energy crisis of 1973, a new energy crisis broke out on a global scale in the first quarter of 2022. Global natural gas prices in general, and in Europe in particular, increased sharply to a level 11 times higher than the level prior to the COVID-19 crisis, reaching $70 per MMBTU in Europe (Figure 1.13). In contrast,

[33] One of the publications showing that inflation harms mainly the weaker population groups is S. Albanesi (2007), "Inflation and Inequality", Journal of Monetary Economics, 54: 1088–1114. This paper discusses empirical findings that show a positive correlation between inflation and inequality. The paper also presents a theoretical model that explains the correlation as reflecting a causality that runs from inflation to inequality. The model is based on three main assumptions, under which low-income households are particularly vulnerable to inflation. The first is that the entire population is characterized by "exogenous" inequality in labor productivity, which is driven by the socioeconomic and institutional characteristics of the economy, such as access to public primary education. The second is that low-income households tend to manage their liquidity less efficiently than higher-income ones. The third is that political decisions regarding the mix of government revenues are made in a way that is biased toward debt financing, implying higher inflation than a mix that is more weighted toward taxes.

the weighted recognized cost per MMBTU produced by natural gas in Israel, which was $4.63 in 2021, remained virtually unchanged.[34] The increase in energy prices also encompassed oil and coal, but at lower rates than that of natural gas. Even though it seems that the acute stage has passed in Europe and fuel prices haves returned to their long-term levels, the impact of the crisis on the global energy markets may continue for a long time. The increase in energy prices was also reflected in general inflation in many countries (Figure 1.14). In Israel, the energy component increased more moderately, mainly due to the structure of the electricity market and the policy measures adopted, as described below.

Figure 1.13
Prices of the Main Fuels Used in Energy Production in Various Regions of the World, 2007–2022 (US$ per mmbtu monthly average)



SOURCE: FRED and EIA data.

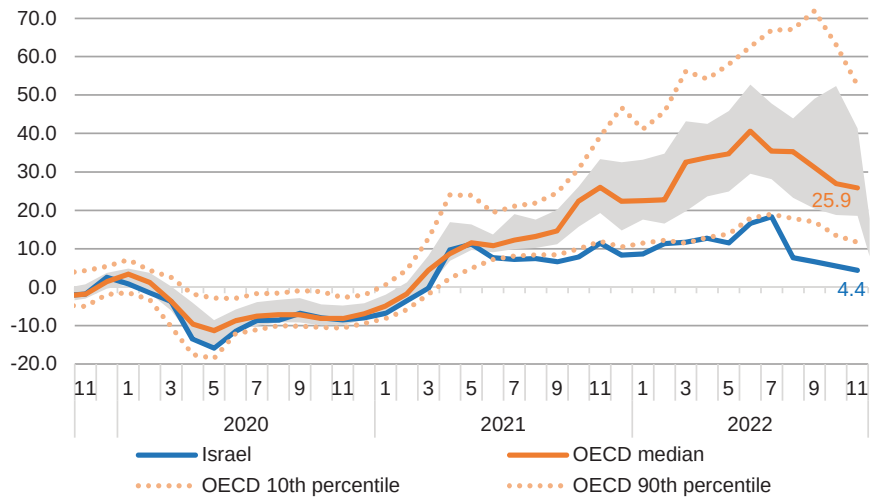
The price increases encompassed all types of fossil fuels (oil, coal, and natural gas), and spread from Europe to the rest of the world.[35,36] There were disruptions in the supply of energy mainly in Europe, and particularly in the supply of natural gas, which is considered relatively nontradable because trade in natural gas is conducted mainly through pipelines, which leads to a separation of its international markets. This leads to price differences between various regions. In contrast, with regard to

[34] SOURCE: Electricity Authority Report for 2021. The details of natural gas contracts are protected by trade secrecy considerations, and the recognized cost is presented to the public only by gap and average.
[35] The sharp increase in natural gas prices in Europe also affected the prices of renewable energy, which is an alternative energy source for electricity production, and the prices of solar and wind energy in Europe also increased sharply.
[36] The demand for natural gas in Europe and the price increase that it brought with it generated energy crises in many poor countries as well, including Thailand, Mexico, Pakistan, India, and Bangladesh.

The disruptions in the supply of energy were mainly in European countries, which receive natural gas through pipelines.

the prices of oil and coal, the shipping of which is not restricted only to neighboring countries, the differences between the various markets are mainly due to the quality of the fuel.[37] While the limited tradability of natural gas can be overcome by liquefying it (to LNG), this leads to higher prices due to the liquefying, shipping and gasifying process, and due to the high costs of the infrastructure necessary for the process. Since the planning and construction of this infrastructure also takes a long time, the capacity of the available infrastructure in the short term is rigid. As such, an increase in demand for natural gas may lead to a significant increase in its (regional) price. In the medium term, there is greater ability to increase the volume of this infrastructure. For instance, the energy crisis in Europe led to an acceleration of the construction of liquefying and gasifying facilities around the world, such as the facilities in Saudi Arabia and Qatar (liquefying) and in Germany (gasifying), which are expected to come on line this coming winter. However, even those possibilities are limited. In recent years, natural gas has accounted for about 15 percent of global consumption (about 500–600 BCM[38]) per year.[39]

Figure 1.14
Change in Energy Prices Based on Consumer Price Index, 2019–2022
(percent change relative to the same period in the previous year)



SOURCE: OECD.

Natural gas prices began increasing globally even in 2021, and after the war in Ukraine began, they jumped.

The increase in global natural gas prices began in 2021, before the Russia-Ukraine war, after disruptions in the supply of natural gas from Russia to Europe spiked the price in the EU to six times the average price from prior to the COVID-19 crisis.[40] In

[37] Before the crisis, the price of oil per energy unit was higher than that of natural gas or coal.
[38] Billion cubic meters.
[39] IEA, Gas market Report, 2022.
[40] The calculations here focus on the ratio between the price of an energy source at the end of 2021 and its average monthly price between 2017 and 2019.

the US, the price of natural gas increased by about 30 percent in 2021, and the global price of coal increased by about 90 percent, mainly since it is a tradable alternative to natural gas for producing electricity. The price of oil, which is less of an alternative to natural gas, increased by an average of just 20 percent globally relative to its 2017–2019 average.

Alongside disruptions in the supply of natural gas in Europe, there were also other significant supply and demand factors that contributed to the increase in global energy prices. These included the global economic recovery from the effects of the COVID-19 pandemic, which increased demand; disruptions in the production and shipping chains that led to increases in the global prices of coal and oil, similar to those of other commodities; low investment in the development of fossil fuel sources, out of feasibility concerns in view of international demands to transition to a carbon-free economy; and investors' demands for higher yields on their investments due to the wave of fossil fuel energy company bankruptcies during the COVID-19 period.[41] Following the Russian invasion of Ukraine in February 2022 and the sanctions that western countries imposed on Russia, the disruptions in the supply of natural gas from there worsened. At the peak of the crisis, in August 2022, natural gas prices climbed to a level 11 times higher than the average price in the years preceding COVID-19, which raised concerns over a deep economic crisis in Europe. In comparison, natural gas prices in the US increased by about 200 percent, and oil prices in the US increased by about 100 percent. The global price of coal increased fourfold. The increase in natural gas prices in Europe led to a transition to the use of other energy materials and to a diversion of LNG from global markets to Europe. This development, combined with a warmer-than-expected winter in Europe and energy-saving measures adopted there, moderated the increase in the price of natural gas and of energy in Europe and globally.[42]

Other than the disruptions in the supply of natural gas due to the war in Ukraine, there were other factors contributing to the increase in energy prices.

Israel and the crisis

In contrast with the sharp increase in global energy prices, and particularly those of natural gas in Europe, the higher global fuel prices had a relatively small impact on Israel. Since 2013, the government has adopted a series of policies to structure the domestic energy market. These have helped the economy contain the global shocks to natural gas prices, while maintaining orderly supply at low, and mainly stable, prices. Among the government's actions in the energy market, it is worth mentioning the formulation and implementation of the natural gas outline plan that ensures Israel a supply of natural gas from a number of separate fields. These fields today are responsible for more than two-thirds of Israel's electricity production. Moreover, the natural gas contracts signed between the domestic fields and the Israel Electric

A series of government actions to design the energy market since 2013 contributed to the fact that the energy crisis had a low impact on the Israeli economy.

[41] There were many other reasons for the increase in prices in 2021, including longer-than-expected maintenance disruptions at natural gas facilities in Norway, a colder-than-expected winter, and more.

[42] The fact that China, as a leading LNG consumer, was under broad lockdowns for most of the year due to COVID-19, helped this since it lowered Chinese demand for energy.

Company and private electricity suppliers are long-term contracts that are based on a fixed price formula that does not depend on global natural gas prices.[43] In addition, government decisions regarding natural gas exports from Israel ensured the supply of the necessary quantity of natural gas to the Israeli economy. That supply has also been further stabilized by advancement in the transition to zero-emission energy sources, which today account for about 8 percent of the country's electricity supply. However, it is important to note that price stability, which has helped the economy during the current crisis when global energy prices jumped, may lead to situations in which global natural gas prices are lower than prices in Israel. This has happened in the past.

Israel is currently connected to a number of natural gas reserves, which increases its competitive potential and its energy security.

In 2009, two large natural gas reserves were discovered in Israel. Today, they are known as the Tamar and Leviathan reserves. Later on, there were several additional smaller discoveries. According to commonly accepted assessments, Israel's natural gas reserves contain about 950 BCM. There are those who believe that Israel's territorial waters contain the potential for additional large gas discoveries. Production from the Tamar reserve began in 2013, and production from the Leviathan reserve began in 2020, some of which is for export to neighboring countries. At the end of 2022, production began from the smaller Karish and Tanin reserves, and Israel is now connected to a number of gas reserves. This increases the country's competitive potential and its energy security.[44] Natural gas production from these reserves totaled about 21 BCM in 2022, and according to assessments, production is expected to increase to about 45 BCM by 2030. For details on the tightening of economic ties between Israel and other middle eastern economies in general, and the energy agreements in particular, see the Box in Chapter 2.

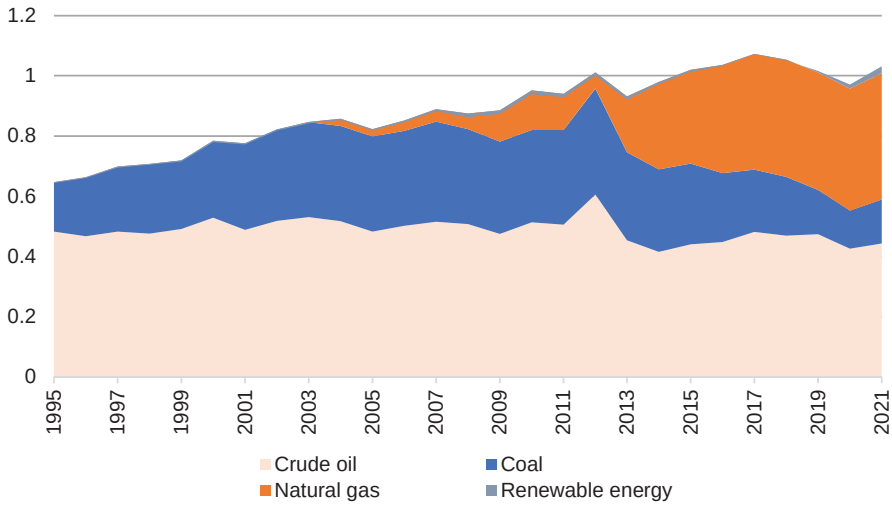
The main Israeli exposure to the energy crisis was due to the import of fuel for transportation and of coal for electricity.

Alongside the development of exports, Israel is still a net importer of fuels. Israeli exposure to the global energy crisis was due to fuel imports for use in transportation, and to the import of coal, which still accounts for about 23 percent of the mix of energy sources used to produce electricity (Figure 1.15). Coal is considered a highly polluting fuel per unit of energy produced. Reducing its use therefore has the potential to contribute significantly to reducing greenhouse gas emissions in Israel, and thereby to meeting Israel's commitments under international agreements on the matter. The natural gas discoveries in Israel, together with the government target of transitioning to a carbon-free economy, have led to a change in the mix of energy sources, and to a reduction in Israel's dependency on imported energy. The weight of coal in the mix of fuels used to produce electricity declined from a high of 60 percent before the discoveries, to about 23 percent in 2021, and according to the roadmap published by the Ministry of Energy, its use is expected to be eliminated completely by the end

[43] Some contracts do somewhat depend indirectly on global natural gas prices. These contracts include a component of indexation to the US Consumer Price Index. This index is influenced by energy prices, including natural gas prices in the US. The price of constructing facilities is also affected by global prices.

[44] There is also the possibility of a gasification boat which, although not necessary at this stage, will be able to add to Israel's energy security.

Figure 1.15
Consumption of Energy Products in Israel, 1995–2021 (billions of mmbtu)



SOURCE: EIA.

of 2025.[45] In parallel, the weight of natural gas in the production of electricity has increased from about 25 percent before the discoveries to about 70 percent, while renewable energy, which is also produced in Israel, and the production of which is also based on long-term contracts, currently accounts for about 8 percent of the mix.[46]

Gasoline prices in Israel increased by about 30 percent in 2022, similar to the rate in Europe and less than the rate in the US. This was due to taxes, which comprise a significant portion of the price in Israel and Europe, and which was reduced in Israel during the year as part of the government's response to price increases, as detailed below.

The excise on gasoline was reduced during the year, as part of the government's response to the increase in global fuel prices.

As stated, the energy crisis in Europe led to a sharp increase in global coal prices. The Israeli government's response to the increase in global energy prices helped reduce the increases in Israel. The cost of producing one kilowatt of electricity in Israel using coal reached 42 agorot in 2022, compared to 10 agorot in 2020 and 14 agorot when using natural gas. The latter remained constant thanks to long-term contracts on this energy source.[47] The Electricity Authority estimated that the higher cost of inputs justified an increase of more than 20 percent in electricity prices.[48] However, in order to moderate the impact to consumers, it decided not to roll over the entire price increase immediately, but to spread it out over a longer period of time. As Figure

[45] SOURCE: https://www.gov.il/he/Departments/publications/reports/energy_121021 (in Hebrew)

[46] However, the inputs for constructing facilities to produce renewable energy—wind turbines, solar panels, and energy storage batteries—are imported. When there is surplus demand globally for renewable energy, there may be difficulty in attaining them, and/or an increase in their price.

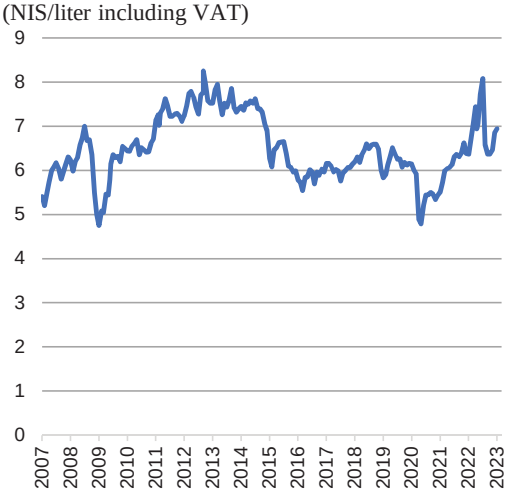
[47] See Noam Botosh, Review of the Electricity Market and the Factors Affecting Electricity Prices, 2023, Knesset Research and Information Center (in Hebrew).

[48] https://www.gov.il/he/departments/publications/Call_for_bids/shimshnati (in Hebrew)

In order to moderate the impact to electricity consumers, the Electricity Authority decided not to immediately roll the entire price increase over to consumers.

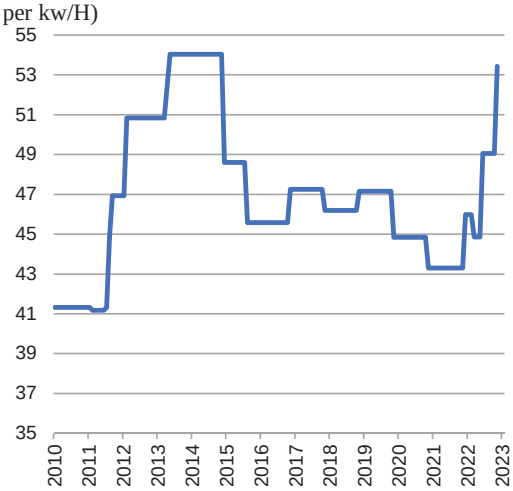
1.17 shows, the first increase in the price of electricity, 6.2 percent, was in February, and was partly offset by 2.4 percent in May due to a reduction in the excise on coal to near zero. The continued increase of global coal prices led to a further increase of 9.4 percent in August, bringing electricity prices close to their 2012 level, when they increased due to disruptions in the supply of natural gas from Egypt. The government recently extended the reduction in the excise, which moderated the increase in the price of electricity. Stopping the shock of the increase in electricity prices (an increase that later turned out to be temporary[49]) helped moderate inflationary pressures while taking a calculated risk on the basis of an assessment that the price increase in 2022 was largely due to temporary factors (See Chapter 3).

Figure 1.16
Price of 95-Octane Gasoline, 2002–2023
(NIS/liter including VAT)



SOURCE: Ministry of Energy.

Figure 1.17
Household Electricity Rates, 2010–2023 (agorot per kw/H)



SOURCE: Electricity Authority.

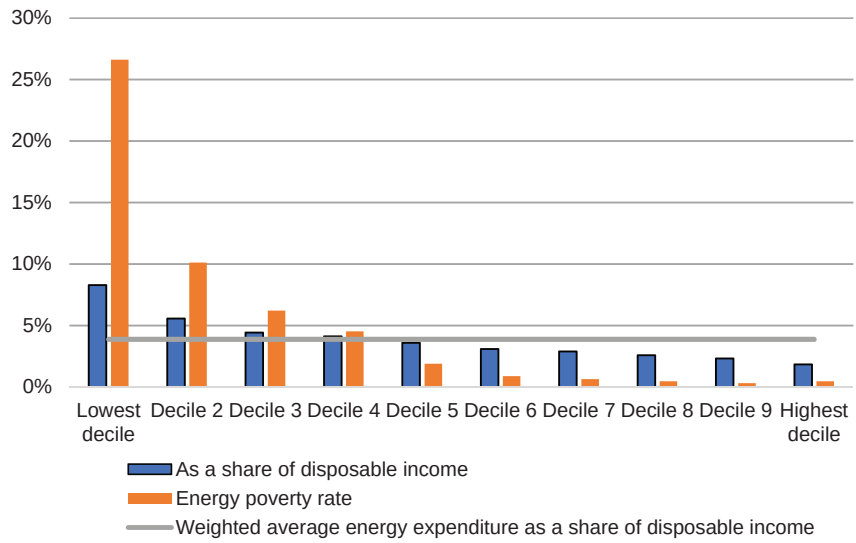
An increase of 20 percent in all energy prices could have increased household expenditures by almost one percent.

The direct effect of the increase in electricity prices in particular, and of energy prices in general, on households is relatively limited. Electricity prices in Israel are lower than in other countries, even though they include components that have to do with the reform in the Israel Electric Company, the financing of which is expected to end only in another three years. The weight of the entire energy market in Israeli GDP is about 3 percent. Expenditures on electricity as a share of disposable household income is about 4 percent. Of that, electricity accounts for about 2.5 percent of disposable income, which is similar to its weight in the Consumer Price Index. As such, an increase of about 20 percent in all energy prices, which is consistent with the Electricity Authority's assessments, would have directly contributed slightly less

[49] The average price of coal increased in 2022 to more than four times the average price from 2017 to 2019 and more than twice the price at the end of 2021. The price then declined sharply at the beginning of 2023. At the end of 2022, the price was similar to its level at the end of 2021, although it remained significantly higher than the 2017–2019 average.

than 1 percent to household expenditures and to the Consumer Price Index. By way of comparison, in Europe, the crisis led to an average increase of about 7 percent in household expenditures, and in some cases the increase reached about 20 percent.[50] Even though its average level is low, it should be emphasized that energy expenditures as a share of households' disposable income varies between income deciles—it is higher among the lower income deciles. Figure 1.18 shows these data, as well as an index of energy poverty. We classify a household as suffering from energy poverty if its expenditure on electricity exceeds 10 percent of its total expenditures.[51] The Figure shows that in the lowest decile, more than one-quarter of households suffer from energy poverty[52], so the price's impact on their expenditure decisions may be greater than in other households.

Figure 1.18
Energy Expenditures as a Share of Disposable Income, and Energy Poverty, by Income Decile, 2019



SOURCE: Based on Expenditure Survey.

Alongside the benefits of cancelling the excise for mitigating the shock from the crisis, the process does not come without damage, since the tax is intended to price in externalities that have to do with congestion and emissions of poisonous gasses

[50] https://www.imf.org/en/Publications/fandd/issues/2022/12

[51] We define energy poverty here according to the Ministry of Welfare's definition. The definition of energy poverty in the literature is not uniform. For instance, Hanin, Teshler, and Shapira (2022) use this term to describe households' consumption characteristics, such as direct connection to the national electricity grid, generators, and the use of more traditional energy sources. The term also refers to subjective assessments regarding a lack of security in the supply of energy, particularly electricity.

[52] Meaning about 2.5 percent of all households in Israel.

Cancelling the excise on fossil fuels is not without harm.

and greenhouse gases, and to incentivize the transition to a zero-emission economy. Moreover, the total excise constitutes about 11 percent of total indirect taxes in Israel. The cost of reducing the excise on coal in 2022 is estimated at about NIS 470 million. The cost of lowering it on gasoline is estimated about NIS 1.8 billion, and lowering it on diesel is estimated to cost about NIS 560 million.[53] The total amounts to about 0.2 percent of GDP. In addition, the government adopted a number of policy measures to help households, which were attributed to dealing with higher prices in the economy as a whole, including energy price increases. These totaled about 0.5 percent of GDP. (See Chapter 6 in this Report.)

Governments in Europe also worked to moderate the impact of higher energy prices on households and on the economy as a whole, but expenses there averaged almost four percent of GDP, and in some countries reached as high as 9.3 percent of GDP.[54]

The policy measures taken in recent years form the basis of the Israeli energy market's robustness, which was revealed during the recent energy crisis. Thanks to these measures, Israel now enjoys a functioning and competitive natural gas market and a robust energy market. Alongside this, the need to diversify and expand our energy sources, mainly the need to increase the share of renewable energy in the mix of energy sources in Israel, remains. The crisis this year clarified that advancing the transition to domestic natural gas in electricity production, while also gradually advancing renewable energy, contributed to Israel's energy independence and to the domestic energy market's robustness in the face of global price shocks. Europe's desire to disconnect from dependence on Russian gas and to divert European demand for energy to other sources raises the need to rethink the possibility of expanding the search for other energy sources. It also raises the need to examine the economic feasibility of establishing the Eastmed pipeline to transport gas to Europe and/or building natural gas liquefying facilities in Israel, while also keeping natural gas for the domestic market to ensure Israel's energy security.

The import of oil for transportation needs currently remains the main source of the energy market's exposure to external shocks. Further reducing Israel's exposure to imported energy sources and to fluctuations in the global energy market must be based mainly on transitioning from vehicles with internal combustion engines, which require imported oil, to electric vehicles, which consume energy from the mix of sources that are used to produce electricity. While this stage is still in its infancy, it is clearly gaining momentum, and its continued development will require a supportive government policy.[55]

[53] SOURCE: Calculations by the Ministry of Finance Chief Economist.
[54] For more details, see Chapter 6 of this Report.
[55] For details on the Bank of Israel's policy recommendations regarding the environment and energy, see: https://www.boi.org.il/en/communication-and-publications/press-releases/the-bank-of-israel-s-program-to-accelerate-economic-growth-recommended-strategic-pillars-of-action-for-the-government/

Chapter 2

Aggregate Activity: GDP and Employment

- Gross Domestic Product grew at a rapid 6.4 percent pace in 2022—on the heels of 8.6 percent growth in 2021—due to increases in private consumption, exports, and fixed capital formation.
- GDP exceeded its precrisis trend throughout the year, reflecting the resilience of the economy. The main contributors were exports of business services and of goods—supported by demand from abroad despite the global energy crisis—and residential construction. Private consumption and exports of tourism services dampened national output relative to the trend.
- Although private consumption increased rapidly in 2022, it did so from a relatively low base because it had been severely limited during the pandemic, particularly with regard to services. Therefore, its level remained below the precrisis trend and, for this reason, had a downward effect on GDP relative to the trend.
- Services exports remained the main growth engine in 2022 and goods exports also increased fairly rapidly, led by the computers and electronics industry and the chemicals industry. The trend changed direction in the second part of the year as exports of both services and goods declined.
- Private savings surged in 2020–2022 due to weak consumption and high private income relative to the precrisis levels of both, allowing excess savings of more than 10 percent of GDP to accumulate. As of 2022, the cumulative excess savings had not been drawn down.
- Employment returned to its precrisis rate and demand for labor surpassed its precrisis level by far. Employment growth outpaced GDP growth, causing labor productivity to fall to approximately the precrisis trend.
- Affected by the inflation rate and the tight labor market, nominal wages increased moderately and real wages fell. The GDP labor share declined, suggesting that the labor market was not the leading cause of the higher pace of inflation.
- The surplus in the current account of the balance of payments remained high at 3.9 percent of GDP, but dropped slightly due to higher fuel prices and an increase in the negative net tourism balance.

1. MAIN DEVELOPMENTS

GDP growth was brisk and the labor market was tight this year. The economy recovered almost fully from the COVID-19 crisis.

Gross Domestic Product increased rapidly in 2022, by 6.4 percent. Employment, participation, and job vacancy rates rose, nominal wages increased, the unemployment rate fell, and investments and exports grew vigorously and powered economic growth (Table 2.1). GDP surpassed its precrisis trend all year long.[1] These developments reflect the almost complete recovery of the economy from the COVID-19 crisis, which peaked in 2020 and waned from the middle of 2021 to early 2022. The recovery was manifested in rapid growth in the consumption of services, the level of which approached its precrisis trend. Residual effects on inbound and outbound tourism remained, but there was little harm left to other branches. Concurrently, the inflation rate began to climb and, accordingly, the Bank of Israel interest rate was raised after a decade of near-zero interest. All told, these factors are indicative of a strong domestic demand environment.

GDP surpassed its precrisis trend from late 2021 onward.

One reason for the vigorous growth in 2022 was the continued recovery from the effects of the pandemic crisis. GDP remained below the precrisis trend for most of 2021, but grew rapidly in the fourth quarter of that year, to a level that exceeded the precrisis trend. Once GDP attained this high level, its growth rate slowed to 2.6 percent in the course of 2022 (fourth quarter of 2021 to fourth quarter of 2022) (Figure 2.2).

Rapid growth in exports of goods and services contributed to the high level of GDP.

The factor that allowed GDP to exceed its precrisis trend throughout 2022 was the strength of exports, despite turbulence abroad that slowed the growth rate of world trade. Exports grew both in high-tech services and in goods, the latter expanding very rapidly in recent years for reasons including growing demand for the chemicals and high-tech products that Israel exports and a decline in the supply of chemicals from Russia.

The labor market was tight in 2022, but wages do not appear to have been a leadingfactor in the increase in inflation.

The labor market remained tight in 2022. Demand for labor began to increase in 2021, continued to do so in the reviewed year, and ended the year with the job vacancy rate[2] at a record level. The growth rates of employment and labor input outpaced GDP growth in 2022, causing labor productivity to decline.[3] The job vacancy rate was only slightly lower at the end of the year than at the beginning, notwithstanding the increase in the employment rate and the decline in labor productivity during the year. The brisk demand for labor despite the decline in productivity attests to strong demand for consumption as well as for investment and exports. In nominal terms, GDP grew more quickly than did work hours and nominal wages due to the high inflation rate. Thus, the GDP labor share—the cost of employing workers as a share of GDP—fell.

[1] In this chapter, the "precrisis growth rate" is the geometric mean growth rate of this indicator between 2014 and 2019. The "precrisis trend" is the level this indicator would have attained if it had continued to grow at the precrisis growth rate from 2019–2022.

[2] The number of vacant positions per 100 persons employed.

[3] Labor productivity = GDP per hour worked = GDP in constant 2015 prices divided by national labor input.

It appears, therefore, that despite the increase in nominal wages in 2022, the increase in demand and its corollary inflationary pressures were not driven by wage pressure.

Fixed capital formation, especially in residential construction, grew rapidly this year.

A decrease in the GDP labor share causes the return on capital to rise, which in turn increases the incentive to invest. Indeed, fixed capital formation continued to grow more quickly in 2022 than before the pandemic. The increase in investment, far outpacing that in most advanced economies, was one of the main components of Israel's GDP growth. In particular, it stimulated the ongoing and expanding investment in residential construction. (For elaboration, see Chapter 8 in this Report.)

Average labor productivity growth in 2020–2022 outpaced its prepandemic rate.

Between 2020 and 2022, starting with the onset of the pandemic crisis, average annual productivity increased by 2.2 percent, a faster pace than before the crisis (1.6 percent). The technological changes that were introduced during the pandemic may have contributed to the increase in productivity. However, a protracted and sustainable increase in productivity is not measured over only three years. Furthermore, some of these changes may not have found full expression yet because the crisis forced the entire economy to cope with extensive shocks, stimulating demand for improvements in technology and working methods. The growing openness to online shopping, for example, creates supply and demand opportunities for consumers and businesses.

The economy generated excess savings due to the COVID-19 crisis.

Sluggish consumption due to pandemic restrictions, and government transfer payments that aimed to cope with the crisis, induced a steep increase in the savings rate between 2020 and 2022. The excess savings, their use, and the timing of their use may have strong macroeconomic effects. As of 2022, the accumulation of excess savings appeared to be continuing.

The Israeli economy was in better condition in 2022 than those of most OECD countries, partly because the energy crisis had less of an impact in Israel.

In 2022, the Israeli economy was in a much better state than that of most other advanced economies (Figure 2.1). Israel's GDP grew more rapidly than before the crisis, which was unusual among the advanced economies (Figure 2.2). One reason for this was the differential damage that Russia's invasion of Ukraine in February 2022 inflicted. The sanctions that were imposed against Russia due to the war led to a decline in the supply of fuels and natural gas in global markets, triggering an energy crisis that affected Israel less than it did the United States and the European Union. (The reasons for this are discussed in Section 4 of Chapter 1 of this report—"The Energy Crisis in Europe and the Israeli Energy Market's Robustness".) The crisis affected the Israeli economy in several ways. Fuel prices rose steeply and were passed through to higher prices of motor-vehicle fuels and, to a smaller extent, higher electricity prices. In contrast, the sanctions reduced the supply of other goods that Russia exports, stimulating demand for Israel's chemical exports and aided the rapid growth of Israeli exports overall.

Table 2.1
Selected indicators of economic activity, 1995–2022

(annual change, percent)

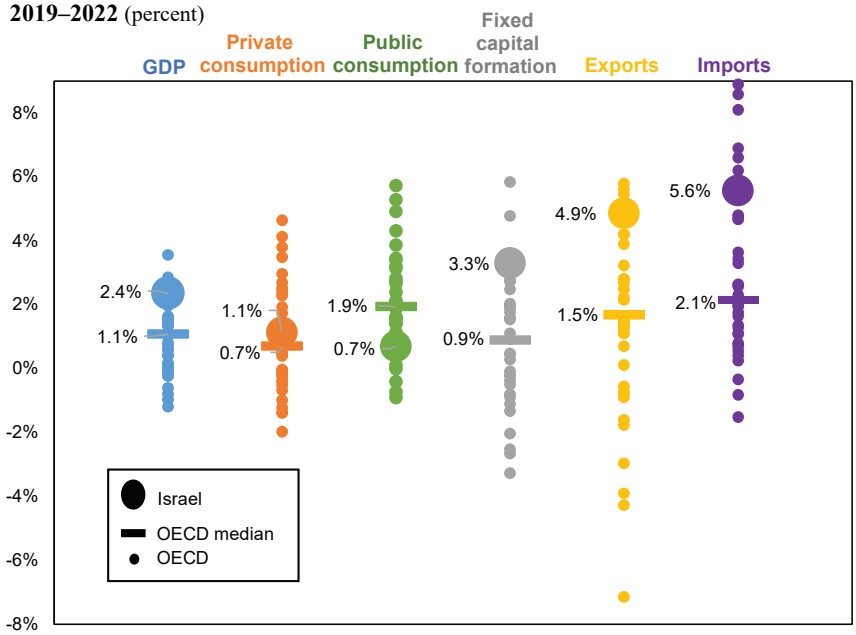
	1995–2017	2018	2019	2020	2021	2022	Average annual rate of change, 2019–2022
GDP	3.9	4.1	4.2	-1.9	8.6	6.4	4.3
Per capita GDP	1.8	2.1	2.2	-3.6	6.8	4.4	2.4
Exports excluding diamonds and startups	6.2	5.5	5.1	0.2	11.8	8.9	6.9
Domestic uses	3.6	4.3	4.1	-3.1	9.8	7.4	4.9
Unemployment rate (ages 25–64, level)	7.5	3.5	3.4	3.8	4.6	3.3	-
Real wage per employee post	1.1	2.7	2.0	7.5	0.7	-1.5	2.2
Current account surplus (percent of GDP)	1.1	3.0	3.7	5.5	4.4	3.9	-
Real effective exchange rate[a]	-0.3[b]	2.1	-2.5	-3.1	-3.9	-0.9	-2.6

[a] An increase means depreciation.

[b] The figure relates to the years 1999–2017.

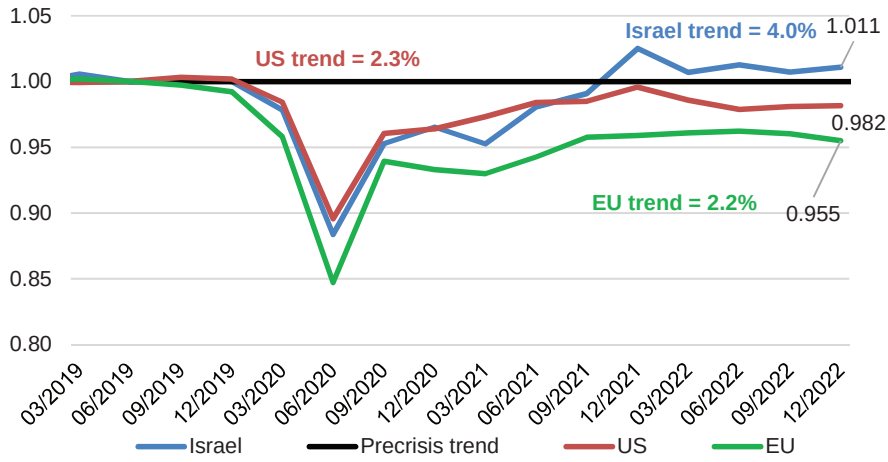
SOURCE: Based on Central Bureau of Statistics.

Figure 2.1
Growth of GDP and its Components (per capita per year), Israel and OECD[a,b], 2019–2022 (percent)



[a] In contrast with Table 1, this figure shows the average per capita change of various variables between 2019 and 2022.
[b] The figure includes the 37 OECD countries for which there are data in the organization's systems. Data on Israel for public consumption, investment, exports, and imports are adjusted to the OECD definitions for this figure.
SOURCE: Based on OECD and Central Bureau of Statistics.

Figure 2.2
GDP Relative to Precrisis Trend - Israel, US, and EU, 2020–2022 (1 = precrisis trend, fixed prices, quarterly, seasonally adjusted)



SOURCE: Central Bureau of Statistics and OECD.

2. AGGREGATE ACTIVITY

2022 was a year of rapid growth, chiefly supported by surging private consumption and investments, as well as exports.

Israel experienced strong growth (6.4 percent) in 2022, powered mainly by rapid increases in private consumption, investments, and exports (Table 2.2). The annual average GDP growth rate between 2020 and 2022 was 4.3 percent, slightly above the precrisis pace, and GDP growth surpassed its precrisis trend from the last quarter of 2021 onward (Figure 2.3). The main components that exceeded their precrisis trends in 2020–2022, thus contributing to the high GDP level, were exports of services (excluding tourism) and goods. In contrast, private consumption of nondurables, exports of tourism services, and public consumption were below their precrisis trends, pulling the GDP growth rate down. It is also evident that the positive and negative contributions of the various components have been declining over time, as one would expect during the recovery from the pandemic crisis and the return to normal levels of performance.

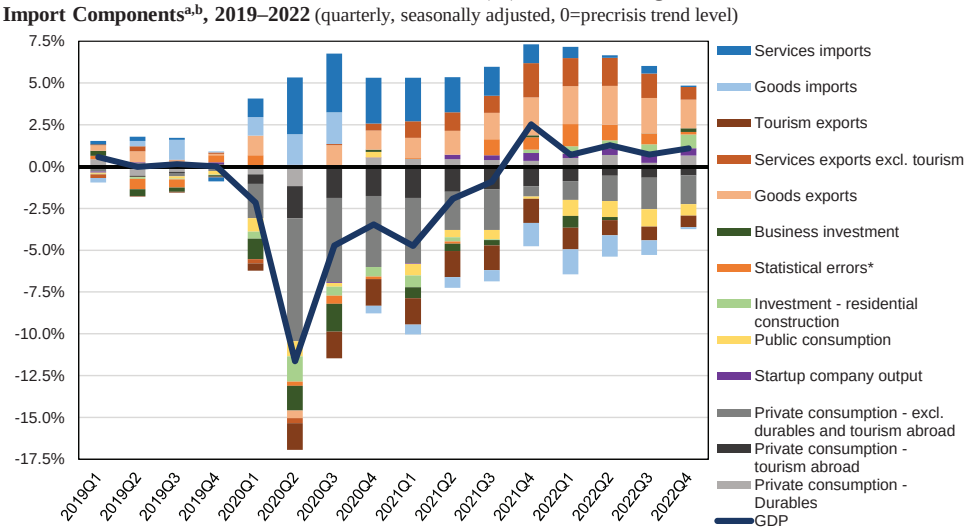
Table 2.2
Sources and uses, 1995–2022

(annual change, percent)

	1995–2017	2018	2019	2020	2021	2022	Average annual rate of change, 2019–2022	Annual trend, 2014–2019
GDP	3.9	4.1	4.2	-1.9	8.6	6.4	4.3	3.9
Imports (excluding ships, aircraft, diamonds, and defense imports)	4.7	5.9	2.7	-7.2	18.2	12.0	7.1	5.0
Domestic uses	3.6	4.3	4.1	-3.1	9.8	7.4	4.6	4.5
of which: Private consumption	4.1	3.6	4.0	-7.9	11.1	7.7	3.3	4.2
Fixed capital formation (excluding ships and aircraft)	2.9	6.6	3.6	-2.6	12.2	9.6	6.2	4.7
Investment in inventory (excluding diamonds and startups, percent of GDP)	0.4	0.2	0.1	0.1	0.0	0.3	-	-
Output of startup companies	13.0	10.6	29.6	12.3	33.4	23.0	22.6	17.6
Public consumption (excluding defense imports)	2.6	4.0	3.0	2.6	3.7	1.0	2.4	3.7
Exports (excluding diamonds and startups)	6.2	5.5	5.1	0.2	11.8	8.9	6.9	3.7

SOURCE: Based on Central Bureau of Statistics.

Figure 2.3
Deviation of the GDP Level from the Precrisis Trend (%) and Accounting Contribution of the Uses and Import Components[a,b], 2019–2022 (quarterly, seasonally adjusted, 0=precrisis trend level)



[a] When imports are lower than the trend, the contribution to GDP is positive.
[b] The components of uses and imports do not include diamonds, defense imports, ships and aircraft, or the sale of startup companies.
* Adjustments for components that are not included and for the aggregation of seasonally adjusted data with different seasonality.
SOURCE: Based on Central Bureau of Statistics.

a. Uses

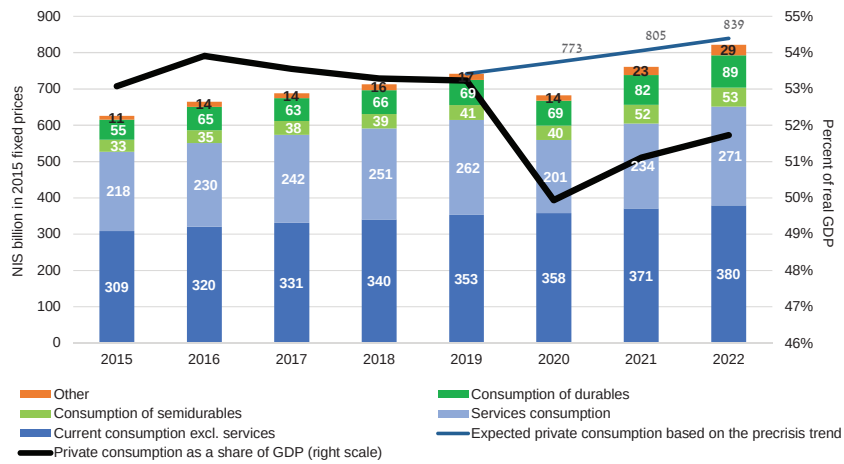
(1) Private consumption

Private consumption increased rapidly in 2022 but from a relatively low starting point due to the effects of COVID-19.

Private consumption increased by 7.7 percent in 2022. Notwithstanding this rapid growth, the annual average rate of increase during the entire COVID-19 period (2020–2022) (3.3 percent) was below the precrisis level (4.2 percent), leaving consumption in 2022 below the precrisis trend (Figure 2.4). Private consumption is composed of current consumption (including services—80 percent of the total) and consumption

of durable goods (10 percent) and semidurable goods (7 percent).[4] Consumption of durable goods (excluding motor vehicles)[5] and of semidurable goods[6] grew slowly in 2022, for two main reasons. First, they are relatively sensitive to interest rates[7], which increased during 2022. Second, consumption of durable and semidurable goods was only slightly limited during the COVID-19 period, if at all, and therefore showed only a small decline in 2020 and increased sharply in 2021. This steep increase apparently caused most components of this area of consumption to slow in 2022, since most durable goods purchased in one year remain in use the next year. Therefore, a rapid increase in purchases of durable and semidurable goods in one year is likely to result in slower growth in the succeeding year. In contrast, current consumption grew rapidly in 2022, powered by a swift increase in consumption of services (Table 2.3).

Figure 2.4
Real Private Consumption by Main Component*, Trend and As a Share of GDP, 2015–2022



* Durable goods includes furniture, jewelry and watches, electrical and other equipment, and vehicles. Semidurables includes clothing and footwear. Current consumption excluding services includes housing, fuel, electricity and water, food and beverages, and tobacco. Services consumption includes transportation, restaurants and hotels, education, healthcare, arts entertainment and leisure, communications, and social work activities. Other includes Israelis' consumption abroad minus nonresidents' consumption in Israel, plus expenditure on private nonprofits' consumption.

SOURCE: Central Bureau of Statistics.

[4] There are two additional small components: private consumption expenditure by nonprofit associations and net tourism consumption (consumption by Israelis abroad minus nonresidents' consumption in Israel). Together, they added up to 3 percent of private consumption in 2022.

[5] Vehicle purchases increased sharply at the end of 2022, apparently due to purchases being brought forward from the beginning of 2023 to avoid a tax increase on these goods at the beginning of the year. Consumption of durable goods net of motor vehicles declined in 2022.

[6] Semidurable goods are those that can be used repeatedly or continually over a period of longer than one year (clothing and footwear, home textiles, books, entertainment and leisure products, etc.). Their lifespan is often shorter and their prices are considerably lower than those of durable goods (such as vehicles, jewelry, and furniture). https://www.cbs.gov.il/he/subject/Pages/הוצאה-לצריכה-פרטית-הגדרות-והסברים.aspx

[7] See, for example, C. Erceg and A. Levin (2006). "Optimal Monetary Policy with Durable Consumption Goods." *Journal of Monetary Economics* 53(7): 1341–1359; T. Monacell (2010). "New Keynesian Models, Durable Goods, and Collateral Constraints." *Journal of Monetary Economics* 56(2): 242–254.

Table 2.3
Domestic demand: Background conditions and main indicators of its development, 1995–2022

(annual change, percent)

	1995–2017	2018	2019	2020	2021	2022	Average annual rate of change, 2019–2022	Annual trend, 2014–2019
Private consumption	4.1	3.6	4.0	-7.9	11.1	7.7	3.3	4.2
***of which*: Current consumption**	3.9	3.4	4.0	-8.6	10.4	7.6	2.7	4.2
of which: Semidurables consumption	5.0	4.0	4.4	-3.7	30.1	2.4	8.6	5.0
Services consumption	4.0	3.4	4.3	-23.1	16.3	15.9	1.2	4.7
Durable goods consumption	6.0	5.3	4.3	-0.6	19.4	9.0	8.9	4.8
Gross private disposable income from all sources	3.7	6.8	5.4	5.5	3.0	3.3	3.2	5.0
Credit to households	6.9[a]	5.1	5.2	4.4	8.4	14.8	9.1	5.8
of which: Nonhousing credit	3.5[a]	3.0	2.3	-1.9	3.4	11.9	4.3	4.6
Real 1-year interest rate (government bonds, level)	2.6	-0.8	-0.8	0.1	-1.9	-1.4	-	-
Value of the public's financial assets portfolio	10.5	4.6	6.3	5.1	15.0	3.9	7.9	4.8
Private savings	3.3	13.3	8.3	31.4	-7.9	-3.4	5.3	6.5
Consumer Confidence Index	3.8[b]	2.9	-0.4	-14.0	12.1	-4.7	-2.8	2.3
Fixed capital formation (excluding ships and aircraft)	2.9	6.6	3.6	-2.6	12.2	9.6	6.2	4.7
Credit to the business sector	4.1[a]	5.5	3.6	2.2	7.9	13.9	7.9	3.7
Real 10-year interest rate (government bonds, level)	3.4	0.5	0.0	-0.5	-0.8	0.1	-	-
Purchasing Managers Index (level)	50.9[b]	53.3	51.3	48.5	52.6	51.1	-	-
Public consumption excluding defense imports	2.6	4.0	3.0	2.6	3.7	1.0	2.4	3.7
Total taxes[c]	32.0	30.5	29.8	29.4	32.1	32.8	-	-
General government budget deficit[c]	4.7	4.4	4.6	11.5	5.5	1.6	-	-

[a] The figure relates to the years 2005–2017.

[b] The figure relates to the years 2002–2017.

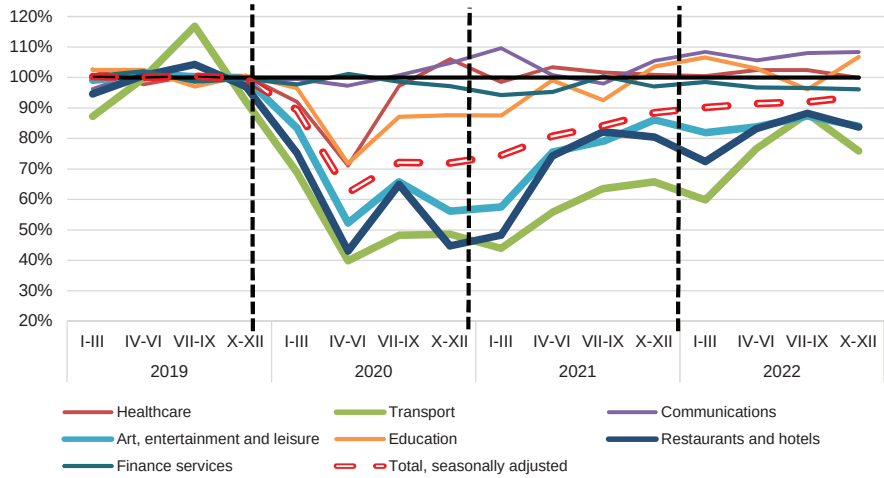
[c] Level, percent of GDP.

SOURCE: Based on Central Bureau of Statistics, and the Purchasing Managers Indices compiled by Bank Hapoalim and the Purchasing Managers Association.

Consumption of services (e.g., education, tourism, restaurants), which was badly affected by the pandemic, grew rapidly in 2022.

Consumption of services was the main contributor to the strong growth of private consumption in 2022, as well as to its negative growth in 2020. Comprised of education, healthcare, tourism, and communications, this class of consumption accounted for 35 percent of all annual private consumption in the past three decades. In 2020, due to the COVID-19 crisis and the many activity restrictions in high-contact ("proximity") service industries imposed due to the pandemic, it contracted by 25 percent. It began to recover in the middle of 2021 as the restrictions were lifted (Figure 2.4). The quarterly paths of growth in the services show the strong connection between consumption of various services and the pandemic's effects (Figure 2.5). Consumption of services in proximity industries (transportation services, accommodation and food, and art and recreation) declined steeply as the pandemic struck in 2020 and partially rebounded in 2021. Consumption of these services fell again in early 2022, apparently due to the Omicron wave of COVID-19, and surpassed the precrisis level only in the third quarter of the year. In contrast to proximity services, consumption of communication services, which attracted growing demand and faced no restrictions during the pandemic, grew in the past few years at a pace resembling, if not exceeding, that of the precrisis era.

Figure 2.5
Private Consumption of Services, 2019–2022[1] (fixed prices, not seasonally adjusted[2], 100=path according to the 2018–19 trend)



[1] The thickness of the line represents that component's relative share of average services consumption in 2019. A number of small components are not shown.
[2] The total is seasonally adjusted. All the other data are not.
SOURCE: Based on Central Bureau of Statistics.

Consumption of services remained below its prepandemic trend.

Clearly, then, it was the pandemic and its attendant restrictions that limited the supply of proximity services. Even though consumption of these services expanded when the restrictions were lifted, its level at the end of 2022 still remained far below the precrisis trend. In 2022 alone, the level was 10 percent below the trend, a gap of NIS 29 billion.[8] The ongoing difference between the level of private consumption and its trend contributed to a significant increase in excess private savings, discussed in Box 1 in this chapter below.

The possible reasons for the consumption of services remaining below the precrisis trend may be divided into temporary and structural. The temporary reasons on the demand side included a change in consumers' preferences resulting directly from the pandemic crisis (e.g., apprehension in regard to consuming proximity services); the increase in inflation, which may deter consumption altogether, particularly of items that people did without for a lengthy period of time; and the increase in interest rates, which incentivized savings. On the supply side, the temporary reasons were changes in occupation or industry due to restrictions on the provision of proximity services, particularly because some of the restrictions were applied for a two-year period; and partial switching to other employment that involves less service. The structural reasons include changes in preferences as a result of finding other areas of interest due to the crisis and its attendant restrictions, and changes in life and work settings that affect the public's consumption (such as the mass transition to working from home at least some of the time).

8 In constant 2015 prices.

Many factors, some temporary and others structural, may explain the low level of services consumption in 2022.

If the level of service consumption was affected mainly by the temporary factors, one would expect it to return to its precrisis trend. However, if individuals' preferences and/or settings of life underwent long-term changes, the service consumption trend probably changed as well, meaning that the growth rate of consumption in coming years is likely to be lower than before the crisis. For the time being, it is hard to know which of these factors actually had an effect, but it is clear that it may be a long time before supply increases broadly, particularly if skilled workers left the services industries and need to be lured back. Be this as it may, the mere fact that consumption in 2022 was below its precrisis trend does not make it possible to determine which of the aforementioned factors explains this outcome, because some of the restrictions remained in effect during much of the year.

(2) Public consumption

Public consumption grew slowly in 2022, and did not apply fiscal pressure on GDP growth.

Public consumption (excluding defense imports) increased by 1.0 percent in 2022 and by an average of 2.4 percent between 2020 and 2022, below the precrisis growth rate. Civilian purchases and civilian and defense wage expenditure crept up in 2022, and defense procurements declined. Tax revenues increased rapidly even in the previous year, bringing the general-government deficit to an especially low rate of 1.6 percent of GDP—without changes in tax rates. By implication, public consumption and the tax system did not create a fiscal push toward faster growth, and the automatic stabilizers—growth in tax revenues and a decline in transfer payments as the pandemic crisis waned—acted countercyclically to reduce the deficit and dampen demand. The increase in public savings (Table 2.6) supported continued growth in domestic investment and preservation of the current-account surplus despite the decrease in private savings as a share of national income.[9]

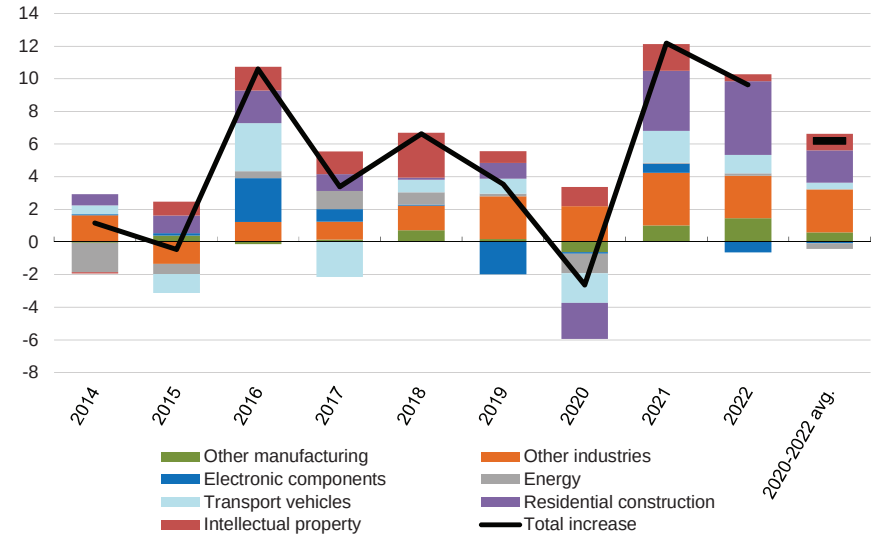
(3) Investment

Fixed capital formation—foremost in construction and particularly in residential construction—grew rapidly.

Fixed capital formation (excluding ships and aircraft) increased by 9.6 percent in 2022—one of the two main uses that grew and surpassed their precrisis trend, thus helping to propel output to a level above the trend. The main component of investment that increased was construction, which has accounted for slightly more than half of domestic investment for many years. In 2022, some 70 percent of the increase in investment occurred in the construction industry. Both components of construction investment—residential and nonresidential—increased rapidly, but the increase in residential construction investment accelerated in 2021–2022, to a 15 percent annual pace during those two years (Figure 2.6).

[9] For elaboration, see Chapter 6 in this Report.

Figure 2.6
Fixed Capital Formation (excl. ships and aircraft), Total Increase and Contribution of Components, 2014–2022 (percentage points)



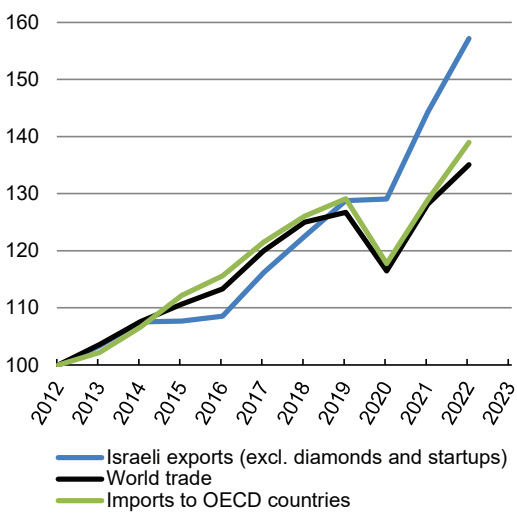
SOURCE: Based on Central Bureau of Statistics.

(4) Exports

Exports continued to grow rapidly in 2022, powered by both high-tech services and goods.

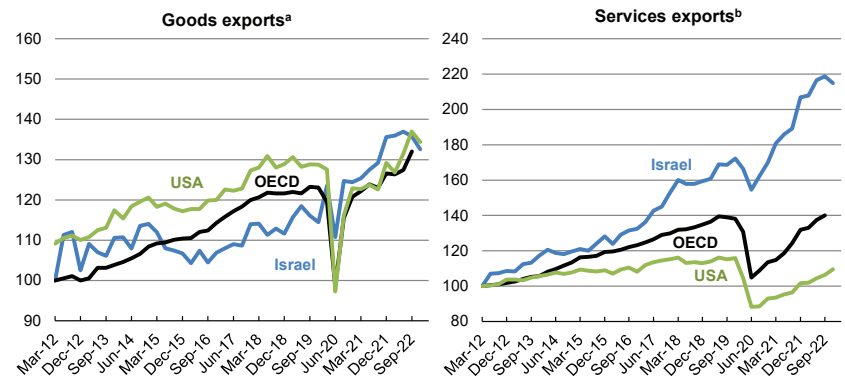
Exports continued to grow rapidly, far beyond the growth rate of world trade and of OECD imports (Figure 2.7). Exports (excluding diamonds and startups) increased at an average rate of 6.9 percent in 2020–2022, surpassing the 3.7 percent trend. The main contributor to the vigorous growth and to this differential was exports of services and, particularly, surging growth in high-tech service exports. From the beginning of 2021 onward, goods exports (excluding diamonds) also grew vigorously and, in a departure from the past, exceeded the OECD average. Services exports, however, declined in the last quarter of 2022 and goods exports fell in the last two quarters of the year (Figure 2.8).

Figure 2.7
World Trade, OECD Imports, and Israeli Exports, 2012–2022 (quantitative index, 2012=100)



SOURCE: Based on Central Bureau of Statistics and OECD.

Figure 2.8
Goods and Services Exports from Israel, the US, and OECD Countries, 2012–2022 (quantitative index: 2021:Q1=100, OECD until 2022:Q3)



[a] In Israel - excluding diamonds.
[b] In Israel - excluding the sales of startup companies.
SOURCE: Based on OECD and Central Bureau of Statistics.

Growth of high-tech and chemical exports led the increase in goods exports in 2021–2022.

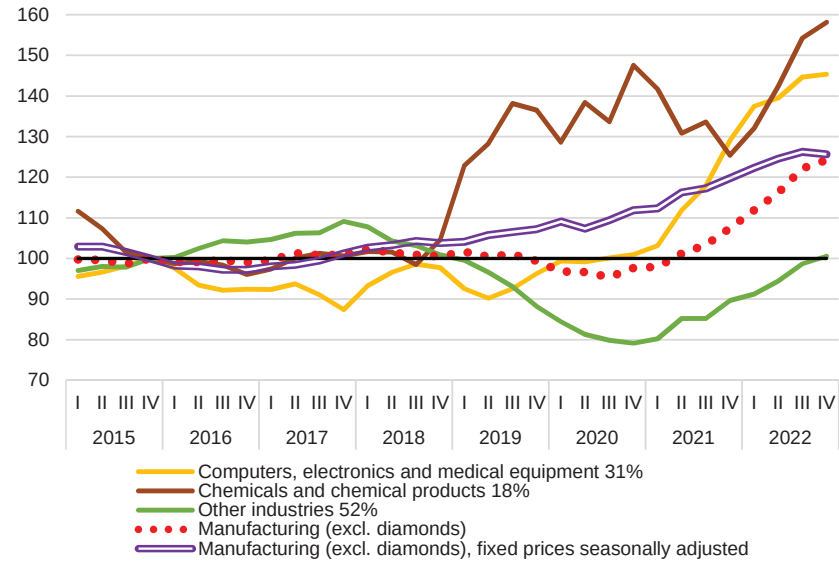
Goods exports (excluding diamonds) grew by 4.8 percent, slightly slower than the 2021 pace after years of sluggish growth. Several factors contributed to the increases in the past two years. One was an increase in chemicals exports that began back in 2019 due to stronger global demand for fertilizers (Figure 2.9). In the middle of 2022, due to the sanctions against Russia following its invasion of Ukraine, deliveries of chemicals from Russia contracted, forcing chemical prices up and helping Israel's chemical exports to rebound during the year. The second change was a steep increase in exports of high-tech goods that began in 2021, much of it originating in a US$ 3 billion increase in defense exports in 2021.[10] As a result of these changes, real exports of goods, which were almost unchanged between 2015 and 2021, increased considerably in 2021–2022. In the second half of 2022, however, they slowed at a pace that was similar to the downturn in global goods exports.

Exports of services, particularly high-tech services, have been one of the main sources of economic growth in recent years. Their expansion is seriously constrained by a shortage of trained personnel.

Services exports (excluding tourism) have been one of Israel's main growth engines in recent years—growing rapidly before the pandemic crisis (7.8 percent per year between 2014 and 2019) and not slowing even after the crisis began. Exports of tourism services plummeted due to the crisis, but growth in exports of high-tech services accelerated. The steep increase in demand for high-tech services, coupled with the negligible impact of the crisis on this sector's activity, pushed the growth rate of its activity and exports beyond the precrisis trend. The heightened activity in this industry, together with the slowing of activity in other industries, increased high-tech services' share of exports and output, and re-emphasized their importance

[10] A nominal increase from US$ 8.3 billion in 2020 to US$ 11.3 billion in 2021. Because this increase is tracked in current US dollars, it cannot be directly compared with the data reported in the figure. However, because defense export prices declined from 2019 to 2022, the gap between their real value and their nominal value is probably small. Source of data: the Defense Exports Division (SIBAT) of the Ministry of Defense.

Figure 2.9
Quantitative Exports of the Manufacturing Industries (excl. diamonds), 2015–2022 (fixed prices, four-quarter moving average, index: 2015=100)*



* Fixed dollar prices according to the Fisher index. Seasonally adjusted real manufacturing data are in shekels and taken from the national accounts for comparative purposes. The legend includes the name of the component and its share of manufacturing exports (excluding diamonds) in 2015.

SOURCE: Based on Central Bureau of Statistics.

as an engine of economic growth.[11] The upward path continued in 2022. Although it was somewhat less rapid than in the previous two years, and with a downturn in the last quarter, it exceeded the precrisis trend during the year as a whole. It is difficult to determine whether the strong global demand for high-tech services is permanent and whether the domestic sector will be able to continue growing and meeting the surging demand. As there is currently no significant demand constraint on high-tech services, their sustainable growth will require dealing with constraints to the expansion of supply—mainly, it seems, the available trained personnel.

Exports of shipping and transport services continued to grow rapidly in 2022.

Beyond high-tech exports, which have accounted for the greater part of services exports, exports of shipping and transport services have increased since the beginning of the pandemic crisis. Demand for maritime shipping services grew rapidly in 2021 and shipping prices skyrocketed. (For elaboration, see Box 1 in Chapter 2 of the Bank of Israel *Annual Report* for 2021.) Shipping prices declined over the course of 2022, but remained much higher than their precrisis level on average, as did exports of shipping services. Shipping services exports increased by 220 percent relative to their 2019 level, and accounted for a much larger share of Israel's exports (Figure 2.10). Due to the extent of activity in shipping and transportation services, the net exports of this industry were positive in 2021–2022, unlike the situation until 2020. The

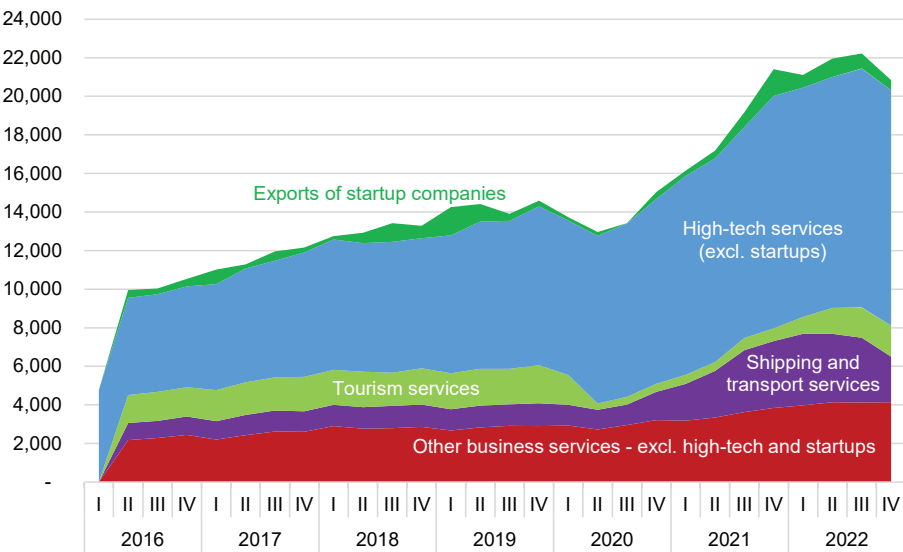
[11] High-tech output accounted for 16.3 percent of GDP in 2022—10.8 percent services and 5.5 percent goods. The sector's output growth was 25 percent of total GDP growth between 2020 and 2022.

industry's net exports increased by 20 percent in 2022 and came to US$ 3.2 billion, similar to its total exports in 2019.

The tourism industry remained the most badly affected by the pandemic crisis.

Among the business service industries that took a beating during the COVID-19 crisis, tourism was plainly the most badly harmed. Inbound tourism fell by 90 percent between 2019 and 2021 and tourism services exports declined at a similar pace. When the economies opened up in 2022, inbound tourism rebounded to 60 percent of its precrisis level, as did real consumption by tourists in Israel (exports of tourism services).[12] Real consumption abroad by Israelis and Israelis' departures to destinations abroad—outbound tourism—posted stronger recoveries, to 86 percent and 94 percent of their precrisis levels, respectively. By the end of 2022, tourists' consumption in Israel reached 75 percent of its precrisis level and Israelis' consumption abroad surpassed the precrisis level. Accordingly, the tourism industry is gaining strength but is still recovering from its bout with COVID-19.

Figure 2.10
Services Exports, 2016–2022 (quarterly, seasonally adjusted, US$ million)



SOURCE: Based on Central Bureau of Statistics.

b. Imports

Imports continued to grow even more vigorously than exports in 2022.

Import growth outpaced export growth in 2022, and on average between 2020 and 2022. The main determinants of the increase occurred in business services, including computer services, marketing services, and advertising and sales services; in raw materials for manufacturing; and in the faster recovery of outbound tourism than of inbound tourism.

[12] This export line contracted from 1.6 percent of GDP in 2019 to 0.9 percent of GDP in 2022.

3. MACROECONOMIC DEVELOPMENTS IN THE LABOR MARKET

The labor market remained tight in 2022, with low unemployment rates and high participation and employment rates.

The labor market remained tight in 2022, with a very low unemployment rate, a high employment rate, and a continued increase in the participation rate (Figure 2.11 and Table 2.5). In all these respects, the labor market in 2022 strongly resembled that preceding the pandemic crisis, attesting to its elasticity and resilience. In the first half of 2022, the unemployment rate fell in tandem with increases in the employment and participation rates. In the second half of the year, the unemployment rate rose in parallel with a downturn in the employment and participation rates (in the primary working-age cohorts), leaving all three above their prepandemic levels (Figure 2.11). High participation was the source of some of the increase in both employment and unemployment. That is, even though the unemployment rate edged upward in the last quarter of 2022, the state of the labor market in terms of employment was better than it had been before the crisis.

Demand for labor remained strong, exceeding its precrisis trend.

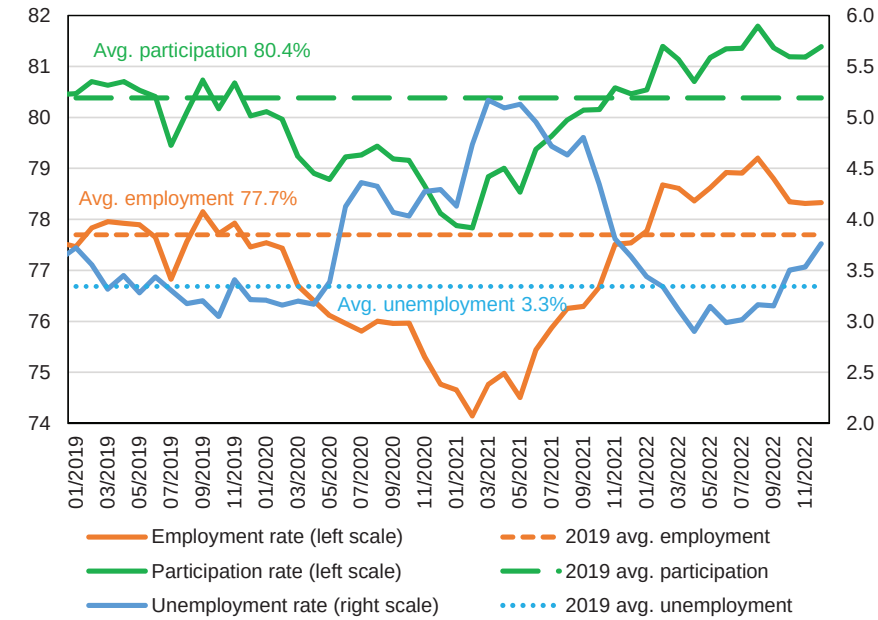
However, several phenomena typical of recent years are different from the previous situation, foremost the brisk and ongoing demand for labor—which was higher than the prepandemic trend. The job vacancy rate and the number of vacant positions increased in 2022 relative to their high levels in 2021 (Figure 2.5). The rates did decline somewhat toward the end of the year, but even then remained higher than the previous year and prior to the pandemic. This high demand encompassed many industries. The job vacancy rate in high tech also declined during the year, but resembled the precrisis situation at year's end. (For more information, see Chapter 1 in this Report.)

Nominal wages rose less than inflation, causing real wages to decline.

The second phenomenon that distinguishes the past few years from the precrisis era is inflation and its effect on wages. This may, of course, be a single combined phenomenon because inflation erodes real wages and incentivizes demands for wage increases, even as strong demand for labor, and the resulting wage increases, motivate businesses to raise prices (Figure 2.12). Wage increases may also generate greater demand for private consumption on the part of those who receive them. However, despite the inflation, the average nominal wage per employee post increased by only 2.9 percent in 2022, less than the precrisis rate (Table 2.5). What this means is that real wages fell by 1.5 percent in 2022, compared with an average annual increase of 2.6 percent before the crisis. It follows that the main impact of inflation on wages in 2022 was the decrease in real wages. While this transmission channel may create pressure for future wage increases, it does not generate direct and immediate demand pressures. At the same time, the GDP labor share fell by 2.2 percent, so that the increase in GDP[13] was routed more to an improvement in business profitability than to employees' income. On final reckoning, it appears that wages did not apply direct upward pressure on inflation in 2022 (Table 2.4).

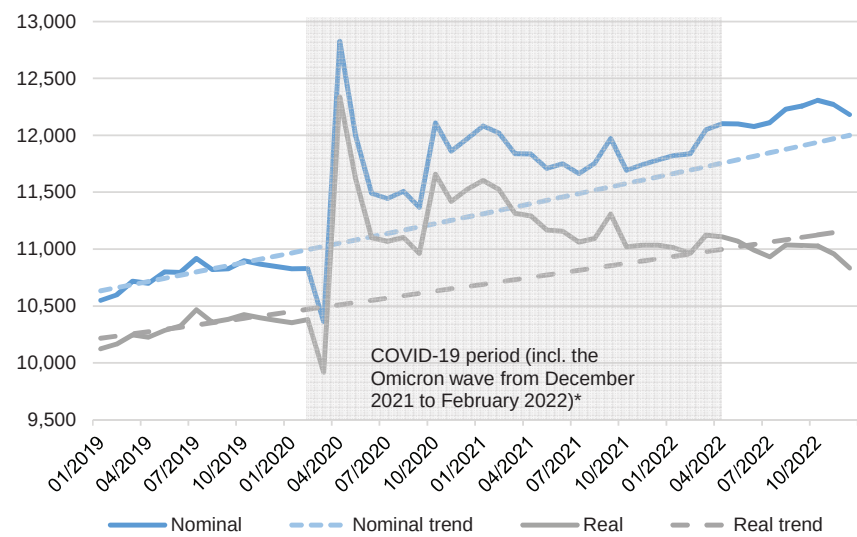
[13] GDP is composed of uses of sources minus imports. Therefore, the increase in GDP comes after subtracting the cost of imported raw materials, particularly the increases in their prices in 2022.

Figure 2.11
Labor Force Participation, Employment, and Unemployment Rates, 2019–2022 (aged 25–64, percent, not adjusted to COVID-19 definitions)



SOURCE: Based on Central Bureau of Statistics.

Figure 2.12
Average Wage Per Employee Post, 2019–2022 (NIS per month, seasonally adjusted, 2018-19 trend)



* Changes in the average wage during the COVID-19 period were greatly affected by temporary changes in the composition of employees in the economy, which were reflected in an increase in the average wage.

SOURCE: Based on Central Bureau of Statistics.

Table 2.4
The supply of gross domestic and business sector product, 1995–2022

(annual change, percent)

	1995–2017	2018	2019	2020	2021	2022	Average annual rate of change, 2019–2022	Annual trend, 2014–2019
Gross Domestic Product	3.9	4.1	4.2	-1.9	8.6	6.4	4.3	3.9
of which : Business sector product	4.3	4.5	4.8	-2.4	10.3	7.8	5.1	4.3
Output of public services	2.1	2.7	1.8	-2.6	5.1	2.7	1.7	2.6
Stock of physical capital	4.3	3.7	4.0	3.9	3.4	3.9	3.7	3.6
of which : Business sector	5.4	4.1	5.0	5.1	4.3	4.9	4.8	4.0
Labor force	2.5	1.9	1.4	-0.8	1.8	4.5	1.8	1.8
Total hours worked	2.7	1.3	0.9	-7.8	7.2	7.2	1.9	2.1
Total hours worked in the business sector	2.6	0.8	1.1	-9.2	7.3	8.9	2.0	2.0
Labor productivity (real GDP per hour worked)	1.1	2.5	3.1	6.6	1.2	-1.1	2.2	1.6
Labor productivity in the business sector (real GDP per hour worked)	1.8	3.4	3.6	7.7	2.9	-1.5	3.0	2.0
GDP per work hour (nominal)	4.2	3.7	5.6	8.0	3.1	3.8	4.9	3.2
GDP per work hour in the business sector	4.3	4.2	6.1	8.6	5.9	4.3	6.3	3.5
Labor compensation per hour worked (nominal)	4.0	4.7	4.1	6.6	1.7	2.5	3.6	3.7
Labor compensation per hour worked in the business sector	4.1	5.7	4.2	7.7	3.0	2.7	4.4	4.2
GDP labor share	-0.2	1.0	-1.4	-1.3	-1.3	-1.3	-1.3	0.5
GDP labor share in the business sector	-0.2	1.5	-1.8	-0.9	-2.8	-1.5	-1.7	0.7
GDP labor share (level)	55.8	55.3	54.5	53.9	53.3	52.6	-	-
GDP labor share in the business sector (level)	58.9	59.7	58.7	58.3	56.6	55.7	-	-

SOURCE: Based on Central Bureau of Statistics.

Labor input increased more rapidly than output in 2022, causing a decline in labor productivity.

The rapid increase in employment in 2022 resulted in an even faster increase in labor input, meaning that the average number of hours worked per employed person increased.[14] Because this growth rate surpassed that of GDP, productivity[15] declined by 1.1 percent. This decline in productivity means that newly hired workers were less skilled or less experienced on average[16]—a distinction that is consistent with the concentration of the increase in employment this year in the relatively low-wage proximity service industries. Despite the decline in productivity, demand for labor was strong during the year and remained so at year's end. This is evidence of high demand in the economy, since employers hired workers and increased their work hours even though the workers' output was below average. Be this as it may, productivity increased at a 2.2 percent annual pace between 2020 and 2022, exceeding the precrisis rate. Therefore, alongside the moderate growth of wages, the GDP labor share in the economy dropped from 54.5 percent in 2019 to 52.6 percent in 2022.

[14] The number of hours worked throughout the economy.

[15] In terms of output in constant prices per hour worked (see note 3).

[16] Output is a function of complementary factor inputs: capital and labor. Therefore, a faster increase in labor input than in capital stock may cause capital per worker to erode, possibly pushing labor productivity down. The effect of changes in the quantity each factor of production on GDP growth depends on the weight of each factor in the production function. In practice, capital stock grew by 4 percent in 2022, similar to previous years.

Table 2.5
Principal labor market data, 1995–2022

(annual change, percent)

	1995–2017	2018	2019	2020	2021	2022	Average annual rate of change, 2019–2022
Population in the primary working ages (25–64)	2.2	1.4	1.4	1.7	1.2	1.8	1.6
Labor force participation rate, primary working ages (level)		80.3	80.4	79.2	79.3	81.2	-
Employment rate, primary working ages (level)		77.5	77.7	76.2	75.7	78.6	-
Unemployment rate, primary working ages (level)		3.5	3.4	3.8	4.6	3.3	-
Job vacancy rate (level)		3.7	3.5	2.4	4.5	4.8	-
Employed persons (Including non-Israelis)	2.7	1.7	1.7	-1.7	1.5	6.4	2.0
of which: Employed in the business sector	2.6	0.8	1.5	-3.6	1.4	8.0	1.8
Employed in the public services	2.9	3.6	1.9	1.9	1.6	3.4	2.3
Total work hours (including non-Israelis)	2.7	1.3	0.9	-7.8	7.2	7.2	1.9
of which: Total work hours in the business sector	2.6	0.8	1.1	-9.2	7.3	8.9	2.0
Total work hours in the public services	3.2	2.9	0.4	-3.0	6.8	2.0	1.9
Hours per employed person (including non-Israelis) (level)	36.7	36.6	36.4	34.1	36.0	36.3	-
of which: Hours per employed person in the business sector (level)	42.1	42.3	42.1	39.6	41.9	42.3	-
Hours per employed person in the public services (level)	24.9	25.6	25.2	24.0	25.2	24.9	-
Employee posts (including non-Israelis)	2.8	2.5	2.0	-10.0	7.5	8.8	1.7
of which: Employee posts in the business sector	2.6	2.1	1.4	-13.7	8.4	10.3	1.0
Employee posts in the public services	3.2	3.4	3.2	-2.7	6.0	6.1	3.1
Nominal wage per employee post	3.8[a]	3.5	2.9	6.5	2.5	2.9	3.9
Real wage per employee post	1.1	2.7	2.0	7.5	0.7	-1.5	2.2

[a] Between 1995 and 1999, the nominal wage was affected by high inflation, and from 2000, the nominal wage has increased at an average annual rate of 2.5 percent.

SOURCE: Based on Central Bureau of Statistics.

4. THE CURRENT ACCOUNT OF THE BALANCE-OF-PAYMENTS

The current account surplus declined slightly.

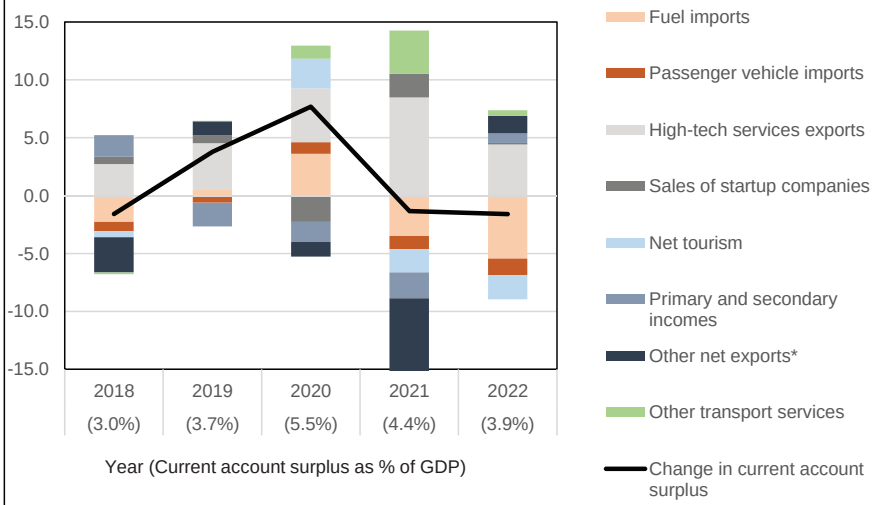
The surplus in the current account of the balance of payments was US$ 19.8 billion in 2022—US$ 1.6 billion less than in 2021 (Figure 2.13 and Table 2.6) due to the steep increase in fuel prices as a result of Russia's war in Ukraine and the faster recovery of outbound tourism than of inbound tourism.

The increase in fuel prices due to the war in Ukraine was one of the main factors in the decline of the current account surplus.

Expenditure on imports of energy products increased by US$ 5.7 billion in 2022, almost all (US$ 5.3 billion) due to the jump in fuel prices during the year. The upward trend in oil prices that began in 2020 continued in early 2022. Following Russia's invasion of Ukraine in February 2022, which triggered sanctions on these imports followed by an energy crisis, oil prices surged, remained high until mid-year, and then began to fall. Even with this continuing decline, oil prices were higher at year's end than from 2014 to the end of 2021.

Inbound tourism recovered considerably but the number of Israelis' trips abroad did so much more rapidly. The difference in the growth rates between outbound and inbound tourism narrowed the current account surplus by US$ 1.7 billion. Exports

Figure 2.13
The Change in the Current Account Surplus and the Contributions of its Main Components, 2018–2022 (US$ billion)



* Net exports of goods and services that are not detailed above.
SOURCE: Based on Central Bureau of Statistics (national accounts and balance of payments).

and imports of transport services (net of travel fares) increased by 21 percent and 12 percent, respectively, relative to 2021. Therefore, net exports of transport services grew by 50 percent and boosted the current account surplus by US$ 1.2 billion. The increase in prices of energy products and other goods that Israel imports, and the decline in shipping prices, weakened Israel's terms of trade slightly.

The balance of tourism lowered the current account surplus, while the balance of shipping services increased it.

Gross national savings increased to 30.1 percent of national income in 2022, but their composition changed. Due to the surplus in this year's government budget owing to an increase in tax revenues, public savings increased after two years of large expenditures in response to the pandemic crisis. The increase in domestic investment beyond that of national savings was reflected in a reduction of the current account surplus to 3.9 percent of national income, similar to the precrisis rate.[17] The combination of the ongoing current account surplus and strong domestic demand supported average real appreciation of the shekel during 2022 relative to the previous year. However, the forces for appreciation weakened during the year and even reversed, leading to real depreciation at year's end. The forces that underpinned this change of trend, foremost the interest rate and inflation spreads vis-à-vis other countries, are described in Chapter 3 of this Report.

National savings increased, as did the share of public savings in it.

[17] More than half of the increase in investments in 2020–2022 took place in inventory investment. Some 95 percent of inventory growth occurred in startup companies, and was the result of these companies not yet exporting their output. Sales of startup companies (exits) are recorded as exports and as a drawdown (negative investment) of the companies' inventory. When startup exits decline more than the companies' output grows (it grows in particular during the companies' development stages), the total inventory investment of high-tech companies increases.

Table 2.6
Savings, investment, and the current account, 1995–2022

(percentage of national income)

	1995–2017	2018	2019	2020	2021	2022	Change between 2019 and 2022 in percentage points
Gross national savings	24.7	26.2	26.7	29.0	29.0	30.0	3.4
of which: Public	1.1	0.7	0.2	-6.0	-0.7	3.2	3.0
Private	23.6	25.5	26.4	35.0	29.7	26.8	0.4
Gross investment	23.6	23.3	23.0	23.6	24.7	26.2	3.2
of which: In principal industries	16.6	16.3	15.9	15.8	16.4	16.5	0.7
of which: General government's investments[a]	7.0	6.0	5.8	7.0	5.9	5.7	-0.1
In housing	6.2	6.5	6.5	6.1	6.5	7.2	0.7
In inventory	0.8	0.5	0.7	1.7	1.8	2.4	1.8
Net current account	1.1	2.9	3.7	5.4	4.3	3.9	0.2
of which: Balance of goods and services	-0.7	0.9	2.2	4.4	3.9	3.3	1.1
Net income account	-2.2	-0.1	-0.6	-0.9	-1.5	-1.4	-0.9
Net current transfers	3.3	1.9	1.8	1.7	1.7	1.6	-0.1
Terms of trade[b]	0.1	-3.6	3.9	2.9	1.0	-0.6	
Real effective exchange rate[b,c]	-0.3[d]	2.1	-2.5	-3.1	-3.9	-0.9	

[a] Including investment grants.

[b] Rate of change in annual terms, percent.

[c] An increase refers to depreciation.

[d] The figure relates to the years 1999–2016.

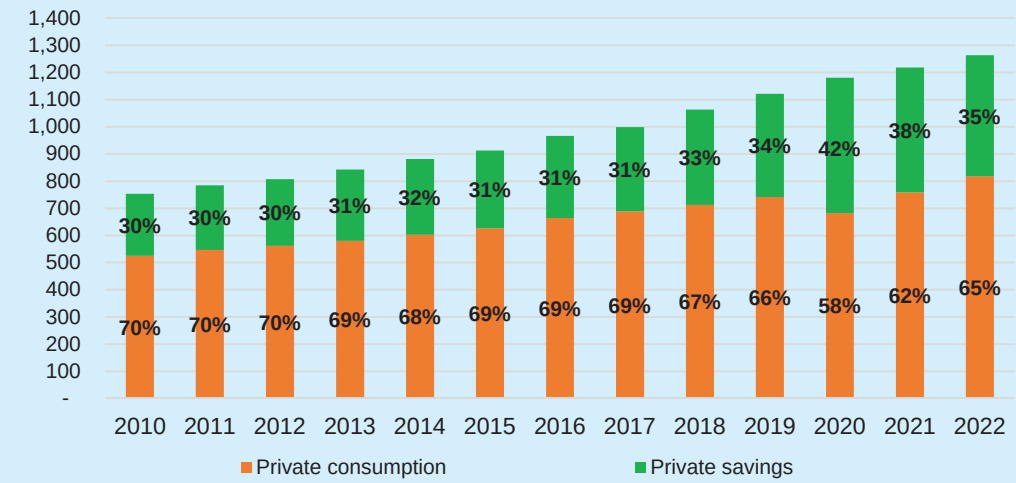
SOURCE: Based on Central Bureau of Statistics.

BOX 2.1: EXCESS SAVINGS IN ISRAEL FROM THE COVID-19 CRISIS AND HOW THEY MAY BE USED

Private savings in a given year are the difference between private disposable income and private consumption during that year.[1] In 2020, due to the COVID-19 crisis, the private savings rate (savings as a share of private disposable income) jumped as a result of two factors acting in concert. The first was a forced decrease in private consumption, primarily of services, and the second was an increase in private disposable income—despite the pandemic's adverse effects on national income—due to the transfer payments that the government distributed as part of its program for coping with the crisis. As a result of these developments, a sizable excess of private savings accumulated in 2020–2022. This box examines the development of the excess savings during that period and discusses various scenarios of the pace and extent of their future use for consumption.

The concept of "excess savings" is poorly defined in the literature. It requires a definition of "normal" savings, a deviation from which would be considered an excess. In this box, "excess savings" each year are defined as actual savings minus the amount that would have been amassed had the savings rate been identical to its 2018–2019 average ("normal" savings).[2] This definition is equal to the amount of disposable income above "normal" disposable income ("excess income") plus the amount of private

Figure 1
Private Consumption, Private Savings, and Their Shares of Disposable Income, 2010–2022 (NIS billion, fixed prices)



SOURCE: Based on Central Bureau of Statistics.

[1] Private disposable income is private income from labor and capital minus direct taxes plus transfer payments received. It is the total income that individuals may spend on consumption and savings.

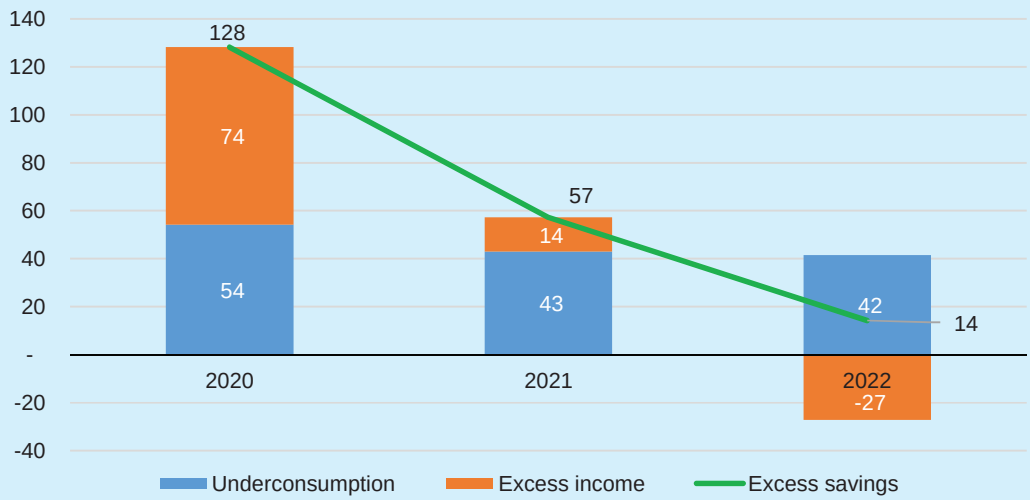
[2] All magnitudes used in the calculations are in constant 2015 prices. The average rate is as a share of national income from all sources—Gross National Product plus income tax from abroad and net current transfers from abroad.

consumption below "normal" consumption ("underconsumption").[3] "Cumulative excess savings" is the stock of excess savings from previous periods. It is natural that in each period, savings may deviate from its "normal" rate, so the important questions are what the size of the deviation is, and whether its direction persists.

Figure 1 shows actual savings, private consumption, and their share of private disposable income, from which consumption and savings are generated. The savings rate ranged from 30 percent to 34 percent of private disposable income in 2010–2019, shot upward in 2020 as the COVID-19 crisis evolved, began to decline in 2021, and continued falling in 2022, but remained higher than its prepandemic level. The flow of excess savings throughout this period can be deconstructed into a steep and protracted decline in private consumption (underconsumption, in blue in Figure 2), mainly in the consumption of services, and an increase in disposable income, supported by government transfer payments that were made in order to cope with the pandemic crisis (excess income, in orange). We see in Figure 2 that most of the excess disposable income accumulated in 2020, when most of the government relief programs were operative, whereas private consumption was and remained sluggish. Some 70 percent of the excess savings that accumulated was due to underconsumption and 30 percent came from excess income.

Cumulative excess savings in 2020–2022 totaled NIS 200 billion (12.7 percent of GDP). Specifically, excess savings in 2022 came to NIS 14.3 billion—NIS 41.5 billion in underconsumption and NIS 27.3

Figure 2
Composition of the Flow of Excess Savings, 2020–2022 (NIS billion, 2015 fixed prices)



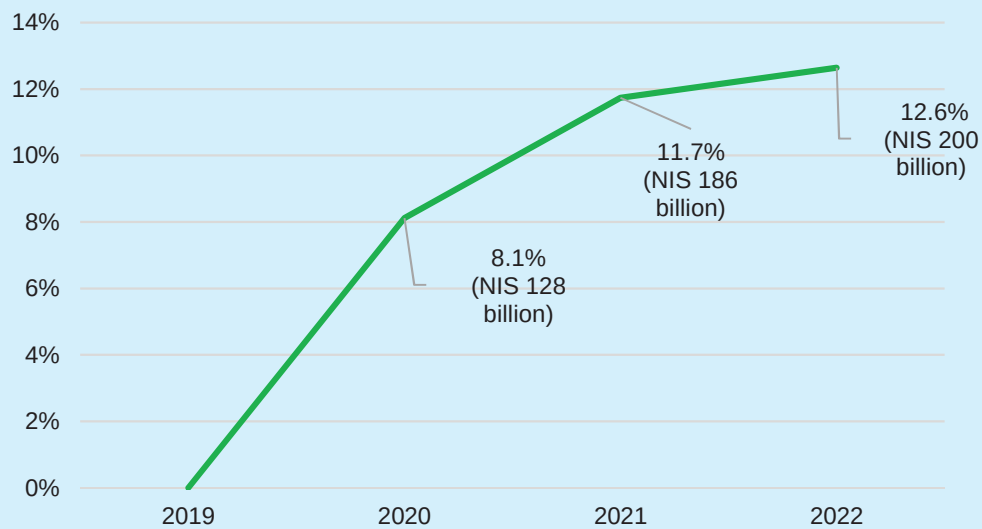
*Numbers are rounded.
SOURCE: Based on Central Bureau of Statistics.

[3] Normal private disposable income and normal private consumption are calculated the same way as normal savings and for the same period. The average rates of private disposable income, private consumption, and savings as a share of national income from all sources in 2018–2019 were 77.7 percent, 51.7 percent, and 26 percent, respectively.

billion in negative excess income.[4] An analysis of the outcomes shows that the excess savings, shown in Figure 3, have not been put to significant use thus far.[5]

In the United States, too, the savings rate climbed when the COVID-19 crisis broke out, for the same reasons as noted for Israel. A comparison of the path of Israel's excess savings with that of the US, however, reveals an interesting difference: In the US, the flow of excess savings declined almost uninterruptedly following the beginning of the crisis, and became negative in late 2021 (Aladangady et al., 2022). The reason is that underconsumption there steadily contracted and turned into excess consumption by the middle of 2021. In Israel, in contrast, underconsumption continued—primarily in services—and remained even at the end of 2022. (See the section on private consumption in the body of this chapter.) The difference may be due to the switching of some service providers in Israel to other industries, in which brisk growth led to strong demand. Therefore, when the restrictions were lifted for good, the supply and consumption of services returned to their ordinary levels more slowly. Another possible reason is that due to the size of the US economy, the lifting of restrictions created a broader range of consumption opportunities, including consumption of services, than the small Israeli economy offered. In developed economies, cumulative excess savings varied from country to country. In 2022, the rates were 5 percent of GDP in the US, France, and Germany; 9 percent in Italy; and 15 percent in Spain and

Figure 3
Aggregate Excess Savings, 2019–2022 (percent of 2022 GDP)*



* Assuming that excess savings was zero in 2019. The numbers in the parentheses are in fixed prices.
SOURCE: Based on Central Bureau of Statistics.

[4] Excess disposable income in 2022 was negative because disposable income as a share of national income from all sources was below its normal rate.

[5] An additional check based on the average "normal savings" in 1995–2019 (instead of 2018–2019) reinforces the conclusion that the savings have not been put to use. According to this check, sizable excess savings continued to accumulate in 2022.

the UK (Allianz Research, 2023). As of 2022, among these countries, only US consumers had begun to use their excess savings.

The key questions that this increase in savings raises are whether, when, and how Israel's excess savings will be put to use. Many variables may affect this process: how the excess savings are divided across the population and, in particular, between individuals who have a high marginal propensity to save and those with low propensity. What percent was used used to repay debts or buy assets? Will people use the excess savings to make up for forgone service consumption or will they go beyond? To what extent will the declines in the capital market reinforce the wish to save, thus encouraging individuals to conserve their excess savings?

Since none of these factors can be weighted and measured, we illustrate the possibilities by presenting two general scenarios, one of rapid decline and one of slow decline. In the rapid-decline scenario, the public uses a large share of its cumulative excess savings as quickly as possible in order to take advantage of the consumption opportunities that it was denied during the pandemic. In this scenario, 20 percent of the excess savings are used each year for four years, causing private consumption to increase by NIS 40 billion per year (2.5 percent of 2022 GDP) or 5 percent of private consumption in 2022. By comparison, the difference between actual consumption of services and its prepandemic trend was NIS 30 billion in 2022. The direct effects of the scenario would be steep increases in private consumption and in GDP and/or imports, and likely inflationary pressure.[6] A steep decline in the supply of savings is liable to trigger an increase in real interest rates (because real investors will have less savings on which to draw, making them costlier). This pressure may result in appreciation that will reduce exports, increase imports, and lower the current-account surplus because imports will satisfy the domestic demand that will be generated. The more the use of savings focuses on consumption of services, the smaller the direct effect of imports will be in the short term because most services (excluding tourism) are nontradable. If this consumption focuses on making up for consumption of services that did not take place during the crisis, upward pressure on prices will be stronger because one cannot import those services or accumulate an inventory of services until they are needed. This scenario resembles the "cut back" scenario in Attinasi et al. (2021), which assumes that 70 percent of the excess savings that accumulated in the United States, Japan, and the UK (7 percent of GDP) will be used within two-and-a-half years. In this scenario, private consumption increases steeply, boosting GDP over three years by 1.5, 2.6, and 1.8 percentage points, and increase inflation by 0, 0.6, and 1 percentage point respectively. According to them, some of the decrease in consumption's contribution to GDP in Year 3 will be due to an increase in imports of consumer goods.[7]

[6] This would happen if supply suffices to meet the excess demand. If a significant supply constraint exists, however—such as in a state of full employment—the increase in GDP would be smaller and the inflation caused by the rapid drawdown of savings would be higher. Inflation would be divided between an increase in domestic prices and appreciation, commensurate with the distribution of the increase in demand between consumption of tradable and nontradable goods. In this situation, employment might increase even beyond the full-employment level and would mitigate these effects. This is because wages would probably rise swiftly, incentivizing labor-market participation, and the increase in inflation would motivate households that have no excess savings to increase their supply of labor in order to avert an overly severe blow to their consumption.

[7] As mentioned in Note 6, if a significant constraint on labor supply exists in such economies, such as in a state of full employment, a rapid drawdown of savings will have a smaller downward effect on GDP and a larger upward impact on inflation and imports.

As of the time of this publication, this scenario seems improbable in Israel for several reasons. First, according to the consumption-smoothing approach and the permanent-income hypothesis, a nonrecurrent increase in assets is likely to boost individuals' immediate consumption only slightly because individuals are more interested in increasing their consumption over time and maintaining that higher level than they are in giving it a large but nonrecurrent upward push. Second, most of the decline in private consumption during the pandemic took place in the consumption of services, which is hard to defer "until the storm blows over" and then recoup in full. Consumption of services increased in 2022 but remained considerably below its prepandemic trend even though nearly all COVID-19 restrictions were repealed in the second quarter of 2022.

In the slow drawdown of savings scenario, 5–10 percent of the excess savings are put to use each year over a period of ten years. This scenario means an increase in private consumption of NIS 10 –20 billion per year over a decade. In the first years, this would increase private consumption by 1.25–2.5 percent per year and GDP by 0.6–1.2 percent. The effect on GDP of using the excess savings will subside over time as consumption and GDP increase and as the purchasing power of the excess savings erodes due to inflation. This scenario is more likely to occur because it is consistent with the consumption-smoothing approach and leaves people time to spend their savings on new consumption opportunities. Furthermore, the increase in real interest rates will encourage individuals to hold on to their excess savings instead of spending them. In this scenario, consumption may increase mildly over time and, therefore, is unlikely to generate demand or price-increase pressures.

The large stock of excess savings that formed during the pandemic will accompany the developed economies, including Israel, for years to come. The future development of private savings in Israel will be contingent upon the state of the economy, the expansion of consumption opportunities, price developments, and the time preferences of Israel's citizens.

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BOX 2: NO LONGER AN ISLAND ECONOMY? GROWING TRADE AND TOURISM RELATIONS BETWEEN ISRAEL AND MIDDLE EASTERN COUNTRIES

- Israel's trade in goods with Middle Eastern countries, long limited, has been growing rapidly in the past two years. Imports from Turkey are surging and so are imports from and via the United Arab Emirates following the Abraham Accords. Israeli exports to these two countries have increased, as have natural gas exports to Egypt and Jordan. Total goods imports from the region's countries exceed exports to them.
- Israeli tourism to the region's countries—mainly Turkey, Egypt, and the new destinations of the UAE and Morocco—expanded to more than 1.8 million visits in 2022 and increased relative to 2019 as well. The number of passengers flying to countries in the region (including back to Israel) was 3.9 million in 2022—about one-fifth of international air travelers through Ben-Gurion International Airport.

For decades, Israel developed as an "island economy", a market cut off from neighboring Middle Eastern countries with the exception of Turkey. Even peace agreements with Jordan and Egypt did not produce economic relations of macroeconomic significance. The Abraham Accords (September 2020), normalizing Israel's relations with the United Arab Emirates (UAE), Bahrain, and Morocco, and successor agreements such as the Israel–UAE free-trade agreement (May 2021), created expectations of the development of significant economic relations between Israel and countries in the region. These expectations are consistent with public willingness in the Gulf States to maintain relations with Israel, in contrast to disapproval of normalization with Israel in Egypt and Jordan.[1]

This analysis describes the widening of trade relations in goods and tourism[2] between Israel and regional countries in the two years since the Abraham Accords were signed. Whereas trade relations with the UAE have expanded swiftly in the past two years, the main increase in trade took place with Turkey. Concurrently, trade with Egypt and Jordan has grown to a limited extent, mainly as a result of Israeli natural gas exports. In addition, the lifting of COVID-19 restrictions on foreign travel by Israelis in 2021 brought about a rapid increase in the number of Israeli tourists visiting Turkey, the UAE, Egypt, and Morocco. The number of air passengers from Israel to Middle Eastern countries and, via them, to continuing destinations also grew. As a rule, imports of Middle East goods to Israel exceed Israeli exports to these countries, and Israeli tourism to regional destinations far surpassed Middle East tourism to Israel.

[1] Public opinion polls show that about 40 percent of the citizens of Saudi Arabia, the UAE, and Qatar favor relations with Israel, whereas only 10 percent of citizens of Jordan and Egypt do so, even though peace treaties between these countries and Israel were concluded decades ago. Source: Washington Institute for Near East Policy (January 19, 2023).

[2] This overview does not cover trade in business services—Israel's main export industry—and investment relations with Middle East economies due to incomplete data.

Trade in goods

In the decade preceding the Abraham Accords, most of Israel's trade in goods with regional markets was with Turkey. Trade with Jordan and Egypt, which have had peace treaties with Israel for decades, was limited despite agreements on encouraging this activity, such as the Qualified Industrial Zone accords.[3] Trade with the UAE added up to several tens of millions of dollars per year at the most. In the past two years, trade with the region's countries has been growing rapidly—particularly with Turkey and the UAE. Goods imports from the region to Israel in 2022 climbed to a record US$ 8.3 billion (7.7 percent of total goods imports) and exports to regional markets increased to US$ 3.2 billion (4.4 percent of goods exports) (Table 1). In addition, natural gas exports to Egypt and Jordan grew to 9.2 BCM.[4]

Table 1: Israel's goods trade with Middle Eastern economies, 2011–2022 ($ million in current prices)

	a. Imports to Israel by country of purchase						By country of production
	2011–15	**2016–18**	**2019**	**2020**	**2021**	**2022**	**2021**
Turkey	2,348	2,794	3,208	3,498	4,764	5,700	5,641
of which: Production inputs[a]	1,148	1,409	1,896	1,990	2,816		
UAE	15	31	-	116	837	1,891	632
of which: Excluding diamonds	15	31	-	76	440	1,374	
Jordan	287	314	293	210	392	469	105
Egypt	80	65	76	80	127	180	209
Morocco	8	14	10	10	11	18	117
Bahrain	0	-	-	-	3	11	3
Total	2,738	3,218	3,587	3,914	6,134	8,269	
Share of total goods imports	3.9%	4.6%	4.7%	5.6%	6.7%	7.7%	
	b. Exports from Israel						
	2011-15	**2016-18**	**2019**	**2020**	**2021**	**2022**	
Turkey	2,050	1,546	1,758	1,431	1,919	2,272	
UAE	25	17	11	74	354	670	
of which: Excluding diamonds	25	17	11.1	18.4	116.2	381	
Jordan[b]	134	60	99	39	64	67	
Egypt[b]	27	22	4	12	31	127	
Morocco	164	92	111	91	121	38	
Bahrain	0	0	-	-	4	2	
Total	2,400	1,737	1,983	1,647	2,493	3,176	
Share of total goods exports	3.7%	2.8%	3.4%	3.3%	4.1%	4.4%	

[a] Imports of manufacturing inputs from Turkey are listed by country of production.

[b] Excluding the export of natural gas to Jordan and Egypt, the volume of which increased between 2020 and 2022.

SOURCE: Israeli Central Bureau of Statistics and Comtrade.

[3] Agreements among the United States, Israel, and Egypt or Jordan that absolve goods produced in Israel, Egypt, and Jordan from American tariffs in order to promote cooperation among these markets. The agreement with Egypt continues to promote Israel–Egypt trade but the Israel–Jordan treaty has lost its importance due to the conclusion of a bilateral free-trade agreement between the United States and Jordan.

[4] Billions of Cubic Meters, the accepted unit of measurement for trade in natural gas.

Goods Imports

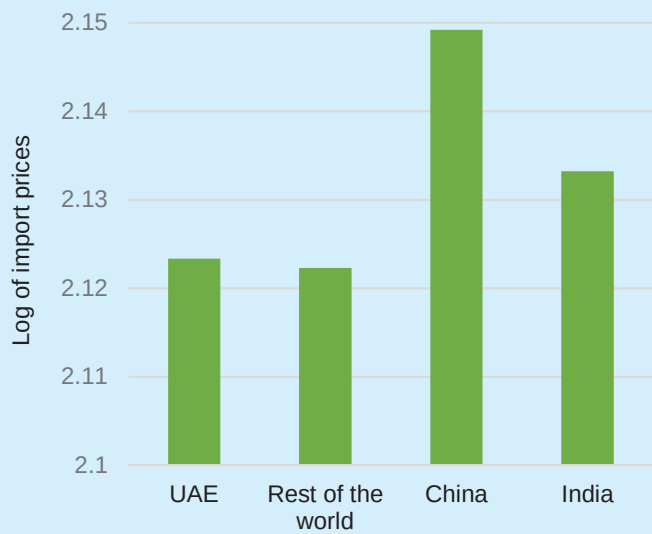
Most of the increase in imports from the region's countries in 2021–2022 was from Turkey and the United Arab Emirates. Israel also imports hundreds of millions of dollars worth of goods from Jordan, mostly goods produced in other countries. Imports of goods from Egypt and Morocco have grown as well. Much of the imports from Egypt and most of the imports of goods produced in Morocco were imported through other countries (Table 1, compare imports by country of production and by country of purchase in 2021).

The value of imports from Turkey (as the country of purchase) was US$ 5.7 billion, nearly twice the 2019 level. In addition, Israel imported more than US$ 800 million per year in goods produced in Turkey via other trade partners. Most of the increase in imports from Turkey was in production inputs, which grew from 4 percent of Israel's total import of production inputs in the previous decade to 9 percent in 2020–2021. In general, imports of production inputs from Turkey increased between 2020 and 2022, along with nominal and real growth in total imports of production inputs to Israel, due to the increased global supply chain pressures in the past two years. Goods imported from Turkey to Israel are mainly metals, machinery, plastics, cement products, textiles, and motor vehicles.

Recorded imports from the UAE have been developing rapidly since the Abraham Accords were reached (September 2020), and added up to US$ 1.9 billion in 2022. Imports from the UAE are expected to see further growth in coming years as the countries solidify their business relations and implement their bilateral free-trade agreement. Even if these imports double, however, they will still account for only a few percent of Israel's imports and an even smaller fraction of the UAE's exports.

The UAE is an important regional trade hub due to its position along maritime and air routes between Europe, Africa, and Southeast Asia. It provides a modern logistical and financial infrastructure for large-volume international trade, and some two-thirds of Emirati exports (excluding fuel) are goods that are re-exported after having been imported from other countries.[5] This phenomenon

Figure 1
Gross Import Prices of Goods Imported from the UAE and Other Countries, January–September 2022



SOURCE: Based on Central Bureau of Statistics import data reported to Comtrade (details in Footnote 7).

[5] In January–September 2022, 39 percent of Emirati imports originated in eastern Asia and 18 percent in Europe, and almost half of them were re-exported to other Middle East countries. Source: Emirati Federal Competitiveness and Statistics Authority.

stands out in particular in the Emirates' exports to Israel. According to Emirati data, 82 percent of the UAE's exports to Israel in January–September 2022 were re-exports of goods imported from elsewhere.[6] Goods imports via the UAE rather than from the countries of production indicates that this trade pattern streamlines the import process and/or lowers its costs, including those of insurance and shipping.

By comparing import prices from the UAE with those of parallel goods originating elsewhere, we can examine the advantages of trade via the Emirati trading hub. Gross import prices (including shipping and insurance) of goods (excluding diamonds) that were imported from the UAE in 2022 were 1 percent lower the import prices of the same goods from India, and 2.6 percent lower than from China, respectively. The import prices of the same goods from the rest of the world, however, were slightly lower than the prices of imports from the Emirates (Figure 1). Therefore, importing via the UAE may lower the cost of importing from Southeast Asia slightly but is unlikely to make overall imports to Israel much less expensive.[7] Imports from nearby trade partners, however, may make importation more efficient by shortening delivery times, allowing Israeli importers and manufacturers to maintain smaller inventories in Israel, particularly as the cost of maintaining inventory rises in tandem with the increase in interest rates.

Goods exports

Turkey is Israel's most important export destination in the region. Exports to Turkey recovered gradually in the last few years after contracting by around one-fourth due to bilateral tension after Operation Protective Edge (2014). Israeli exports to the UAE increased following the Abraham Accords (September 2020), but increased more slowly than imports. Furthermore, more than one-third of these exports are diamonds, which generate relatively little local added value. Reported Israeli exports (excluding gas and water; see below) to other Middle Eastern countries, particularly Egypt and Jordan, came to only several hundred million dollars in 2022, consistent with the negative public sentiment in those countries toward economic cooperation with Israel (see Footnote 1).

Gas and water exports to Egypt and Jordan

In addition to the exports reported above, Israeli exports of gas and water to Egypt and Jordan—Israel's current export destinations for these goods—have increased and are expected to continue growing in the years to come. Exports of Israeli gas to Jordan grew gradually from 2.1 BCM in 2020 to 2.9 BCM two years later, and gas exports to Egypt increased from 2.2 BCM to 6.3 BCM during those years. Gas exports

[6] Data: Federal Competitiveness and Statistics Authority. According to the Israel Central Bureau of Statistics, however, imports from the UAE of goods from other countries were only about one-fourth of Israeli imports from the Emirates. A misclassification of goods as products of the UAE may lead to future lenience in the importation of these goods under the Israel-UAE free-trade agreement. Re-exported goods from the Emirates to Israel originate in a wide variety of countries including Russia, China, Ukraine, and even Morocco and Brazil (CBS).

[7] We examine the effect of the expansion of imports from the UAE on import prices (including shipping and insurance) by comparing the specific prices (according to net weight in tons) of goods imported from the UAE (six-digit resolution in the HS code) with the corresponding prices of the same goods imported from India, China, and the rest of the world. The import prices were compared on the basis of data that the Israel Central Bureau of Statistics reported to Comtrade. The data pertain to January–September 2022 only. The weight of each good in the weighted average of import prices was determined on the basis of the share, in import value, of the same good to Israel in total goods imports to Israel in 2019 (on the eve of the COVID-19 crisis).

to these two countries together accounted for 45 percent of total gas produced in Israel's economic waters in 2022. The expansion and improvement of gas transmission infrastructure, from about 12.5 BCM per year in 2022 to about 22 BCM per year in 2026, is expected to facilitate higher gas exports to these countries.[8] Some of the gas that Egypt imports from Israel is liquefied there and re-exported to Europe. In June 2022, Egypt, the EU, and Israel signed a memorandum of understanding that paves the way to the expansion of Israel gas exports to Europe via Egyptian liquefaction facilities.

In addition to natural gas, Israel has been selling water to Jordan in the past two decades. In accordance with the bilateral peace treaty (1994), Israel undertook to sell Jordan 50 million cubic meters of water at a subsidized price. In October 2021, the two countries signed an agreement for the sale of an additional 50 million cubic meters over a three-year period. In 2021 and 2022, Israel, Jordan, and the UAE also signed memoranda of understanding concerning the Prosperity Project, which focuses on promoting the possibility of Israel's sale of up to 200 million cubic meters of water per year to Jordan and Jordan's selling 600 MW per year of electricity from renewable sources to Israel.[9] Imported water from Israel is increasingly important for Jordan, which consumes about 1 billion cubic meters of water per year and faces an ongoing decline in the available quantity of water per resident commensurate with population increase.[10]

Trade in services

Even though most Israeli exports are composed of services, mainly business services, there are so far no indications of sizable trade in services between Israel and other Middle Eastern countries, with the exception of visits by Israeli tourists. The development of trade in goods with and via the UAE, however, is expected to increase trade in transport and financial services that are associated with international trade. The limited scale of trade in nontourism services is typical of trade among most of the region's markets.

Israeli tourism to Middle Eastern markets expanded in 2022 to a record of more than 1.8 million visits, continuing the increase in visits that began in 2017–2019 and resumed in 2022 after the COVID-19 restrictions on outgoing tourism from Israel were lifted. On top of the growing scale of Israeli tourism to the veteran destinations of Turkey and Egypt, Israeli tourists flocked to new destinations such as the UAE and Morocco.[11] The number of Israeli residents who entered Jordan through the overland border crossings, however, has not yet returned to its prepandemic 2019 level and arrivals of citizens of other Middle Eastern countries remain minuscule.[12]

[8] Based on Ministry of Energy data, gas transmission infrastructure are expected to grow with the inauguration of a pipeline via Nitzana Crossing, projected to open in 2026, with a capacity of 3.5–6 BCM per year; expansion of capacity of the EMG pipeline to Egypt, planned for 2024, from 4.5 BCM to 7 BCM; and expansion of capacity of the gas pipeline to northern Jordan from 7 BCM to 10 BCM.

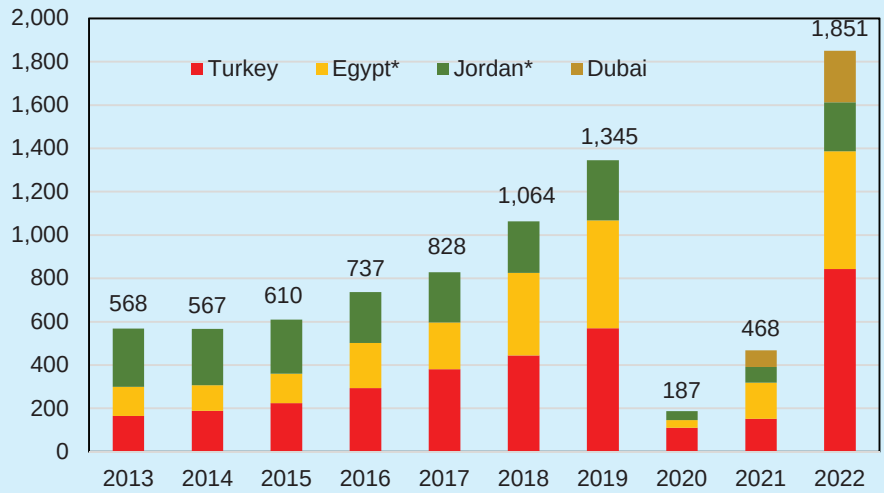
[9] Declaration of Intent between the Hashemite Kingdom of Jordan, the State of Israel, and the United Arab Emirates (November 22, 2022).

[10] Water sector overview at the U.S. International Trade Administration website (as of December 14, 2022).

[11] We have no official data on the number of Israeli tourists who visited Morocco, but one may estimate their number at more than 70,000 on the basis of the number of passengers on flights between these countries (Table 2) and the small number of Moroccan tourists visiting Israel.

[12] Incoming tourist arrivals in 2022 were 17,000 from Jordan, 8,000 from Egypt and Morocco combined, 1,400 from the UAE, and only 400 or so from Bahrain.

Figure 2
Israeli Visits to Other Middle Eastern Countries, 2013–2022 (thousand)



* Cross-border trips: Egypt (Taba) and Jordan (Arava, Jordan River, and Allenby), excluding Israeli tourists arriving in those countries by air.

SOURCE: Israeli Central Bureau of Statistics, Turkish Institute of Statistics, and Dubai Ministry of Tourism.

The Abraham Accords also brought with them the establishment of air transport relations between Israel and the UAE and Bahrain, resulting in approximately 1 million passengers among the destinations, as well as the resumption of flights from Israel to Morocco and Sharm el-Sheikh, Egypt. The rapid increase in air travelers to the UAE and via there to Eastern Asia appears to have come at the expense of travelers who land in Jordan and may continue to destinations in the East, which decreased steeply between 2019 and 2022. There were a total of 3.9 million air passengers to regional markets in 2022[13] (20 percent of international air passengers from Ben-Gurion Airport), compared with 2.5 million (11 percent of passengers on these flights out of Ben-Gurion) in 2019. At the beginning of 2023, Israeli airlines resumed service to Turkey and began to fly to destinations in the East over Saudi Arabian and Omani airspace, significantly shortening their air routes to Asia. The strengthening of Israel's aviation relations with the region's countries and the direct overflight permission given to Israeli airlines flying to the east are expected to help develop air tourism and freight relations not only with regional markets but also with those in Southeast Asia.

[13] A comparison of data on Israeli tourism to Turkey and the UAE with data on flights to these countries shows that about half of those flying to the UAE, and about one-third of those flying to Turkey, were Israelis on continuing flights or passengers without Israeli citizenship.

Table 2: Passenger movement from Ben-Gurion airport to and from Middle Eastern markets, 2017–2022 (thousand)

	2018	2019	2020	2021	2022
Turkey	2,113	2,325	514	643	2519
UAE			72	269	979
Morocco				15	152
Egypt	36	44	11	4	169
of which : to Sharm el-Sheikh				0.6	124
Jordan	159	180	31	6	77
Bahrain				4	27
Total	2,307	2,549	629	940	3,923
Share of total passengers	10%	11%	14%	15%	20%

SOURCE: Israel Airports Authority.

Chapter 3
Inflation and Monetary Policy

- The Consumer Price Index increased by 5.3 percent in 2022—above the inflation target of 1–3 percent. This increase continued the acceleration in the pace of inflation that began in 2021. As a result, the Bank of Israel increased the interest rate markedly—from 0.1 percent to 3.25 percent—during the year. The interest rate increases continued into 2023.
- Inflation in 2022 encompassed many CPI components. As in 2021, inflation in 2022 was influenced by supply limitations, including disruptions in global supply chains with the exit from the COVID-19 crisis. These were joined at the beginning of the year by supply disruptions in the energy and food markets due to the unexpected and prolonged war between Russia and Ukraine.
- In addition to the supply factors, the increase in inflation was also influenced by strong domestic demand, in view of the recovery from the COVID-19 crisis and the accommodative monetary and fiscal policies adopted during the crisis. Domestic demand's contribution to inflation increased during the year.
- One-year inflation expectations increased at the beginning of 2022, but remained around the upper bound of the inflation target range throughout most of the year. Expectations for between the first and third years crossed the upper bound of the target range during the year, but toward the end of the year they returned to within the range. Longer-term expectations remained anchored within the target range.
- Despite the acceleration of inflation, its rate in Israel remained lower than in other OECD countries. Some of this gap is due to the fact that the Israeli economy was not exposed to increases in the price of natural gas, and its exposure to shortages of energy products as a result of the war in Ukraine was limited. The increase in food prices in Israel was also more moderate than in the other OECD countries.
- In view of the increase in inflation, central banks, including the Bank of Israel, raised their monetary interest rates significantly during the year. The rapid increase in interest rates was intended to accelerate monetary tightening in order to deal with the risk of inflation becoming entrenched. Furthermore, the Bank of Israel was among the first central banks to stop the use of special monetary accommodation tools that were employed in recent years.
- Following a number of years in which the real interest rates in Israel were negative, they increased during the year to positive levels throughout the yield curve.
- In 2022, the shekel depreciated by 4 percent in terms of the nominal effective exchange rate, following a trend of appreciation that lasted for about a decade. The depreciation was supported by foreign exchange purchases by institutional investors due to the decline in equity prices abroad, as well as by the expansion of the monetary interest rate gap with the United States.

MONETARY POLICY TARGETS

According to the Bank of Israel Law, 5770–2010, the Bank of Israel has three objectives: (1) to maintain price stability as its central goal. The government determined that price stability means an annual inflation rate in the range of 1–3 percent. It was further determined that when inflation deviates from the target range, the Bank must adopt a policy that it believes will return it to the range within a period that does not exceed two years; (2) to support other objectives of the Government's economic policy, especially growth, employment, and reducing social gaps, provided that this support shall not prejudice the attainment of Price Stability over the Course of Time; and (3) to support the stability and orderly activity of the financial system.

Since October 2011, monetary policy is set by the Bank of Israel Monetary Committee. The concept whereby the central bank has a number of objectives, chiefly maintaining price stability, is referred to in the literature as "flexible inflation targeting". In such a regime, when inflation deviates from the target range, policy makers act to return it gradually to within the range. This gradual nature allows policy makers to also work to achieve the Bank's other objectives, while maintaining price stability in the medium and long terms. The Bank has a variety of tools available to help it achieve its objectives, and is independent in employing them.

This chapter analyzes the changes that took place in the inflation environment this year, and the monetary policy adopted by the Bank of Israel in response to those changes.

1. INFLATION

Inflation in 2022 totaled 5.3 percent, crossing the upper bound of the 1–3 percent inflation target range for the first time since 2011.

Inflation in 2022 totaled 5.3 percent, crossing the upper bound of the 1–3 percent inflation target range for the first time since 2011 (Figure 3.1). The upward trend of inflation began in 2021 with the recovery from the COVID-19 crisis. During these two years, the increase was influenced by price increases abroad as well as by strong domestic demand. This Section reviews the causes of the increase in inflation and quantifies their contributions.

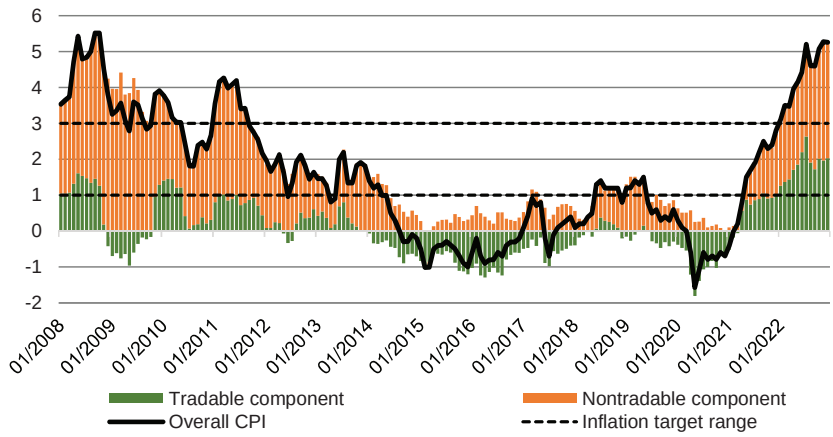
a. The causes of the increase in inflation

The increase in global inflation was due to supply-side contributions: supply chain disruptions that began during the COVID-19 crisis, and an increase in energy and food prices due to the Russia-Ukraine war.

(1) The global environment

The increase in global inflation, which began in 2021, continued in 2022. A significant part of this increase came from the supply side. At the beginning of the year, inflation was influenced by supply chain disruptions that began in 2021 with the recovery from the COVID-19 crisis. In addition, the global supply of several commodities was significantly impacted by the outbreak of war between Russia and Ukraine in February 2022. First, the export of agricultural commodities and food products from Ukraine and from Russia declined significantly, leading to price increases. Second, energy

Figure 3.1
Annual Inflation and Contribution of the Tradable and Nontradable Components, January 2008–December 2022
(cumulative change in the Consumer Price Index in the past 12 months, percent)



SOURCE: Based on Central Bureau of Statistics.

Table 3.1
Main indicators of inflation and monetary policy, 2018–2022

						2022			
	2018	2019	2020	2021	2022	Q1	Q2	Q3	Q4
A. Inflation (percent)									
1. Actual inflation[a]	0.8	0.6	-0.7	2.8	5.3	1.5	1.7	1.0	0.9
2. Seasonally adjusted quarterly inflation[b]						5.5	5.8	4.9	5.2
3. One-year inflation expectations derived from capital market[c]	1.0	1.1	0.0	1.9	3.1	2.8	3.4	3.4	2.8
4. Ten-year inflation expectations derived from capital market[c]	1.8	1.6	1.6	2.0	2.3	2.2	2.3	2.2	2.7
5. Forecasters' one-year inflation forecasts[c]	1.0	1.2	0.5	1.2	2.8	2.2	3.1	2.9	3.0
B. Yields (percent)[c]									
1. Bank of Israel declared interest rate	0.11	0.25	0.14	0.10	1.25	0.10	0.47	1.52	2.89
2. Real yield to maturity on one-year government bonds[d]	-0.8	-0.8	0.1	-1.9	-1.4	-2.5	-2.2	-1.3	0.5
3. Nominal yield to maturity on ten-year government bonds[e]	2.2	1.6	0.8	1.2	2.6	1.8	2.7	2.8	3.3
4. Real yield to maturity on ten-year government bonds[e]	0.5	0.0	-0.5	-0.8	0.1	-0.8	0.1	0.3	0.7
C. Change in the shekel exchange rate (percent)[f]									
1. Nominal effective	2.6	-8.0	-4.7	-7.9	4.0	1.3	3.4	-3.2	2.6
2. Vis-à-vis the dollar	7.1	-7.4	-6.6	-3.6	10.2	3.6	5.3	0.8	0.3
3. Vis-à-vis the euro	3.1	-9.6	2.3	-10.4	3.2	0.9	1.0	-5.2	6.8
D. Asset prices (percent)									
1. Overall yield on shares (general shares index, nominal)[f]	-3.9	17.8	-0.4	30.9	-15.5	1.6	-11.0	-0.5	-6.1
2. Rate of change in home prices	-0.8	4.2	4.0	13.1	14.6	4.3	5.2	4.0	0.5
E. The monetary aggregates (nominal rates of change)[f]									
1. M1 money supply	12.2	5.1	29.4	22.0	-10.3	5.5	0.2	-6.1	-9.6
2. M1 + SRO[g] + unindexed shekel deposits of up to one year	2.0	6.3	26.0	17.5	5.0	2.6	3.3	0.8	-1.8

[a] Change in CPI during the period.
[b] In annual terms, as calculated by the Central Bureau of Statistics.
[c] Period average.
[d] Based on the zero coupon yield curve. Period average.
[e] Gross yield, based on the zero coupon yield curve. Period average.
[f] Average of last month in period compared with average of last month in previous period. Minus sign refers to appreciation of the shekel.
[g] Self-Renewing Overnight Deposit (Current Credit Deposit) - a liquid daily deposit.
SOURCE: Bank of Israel, Ministry of Finance, and Central Bureau of Statistics.

Table 3.2
Development of prices, by various components, 2018–2022

	Consumer Price Index	Fruit and Vegetables	Food	Housing	Dwellings Maintenance	Furniture and Household Equipment	Clothing and Footwear	Education, Culture and Entertainment	Health	Transport and Communication	Miscellaneous	Energy Index[a]	CPI excluding energy and food	CPI excluding energy, food, and fruit and vegetables	CPI excluding energy, fruit and vegetables, taxation, and regulation	Nontradable component minus electricity, water, communication, food, and fruit and vegetables	Nontradable component minus electricity, water, communication, and fruit and vegetables	Seasonally adjusted CPI[b]
Component's weight in 2022	100.0%	3.3%	#####	24.7%	9.2%	3.6%	2.9%	11.2%	6.0%	18.4%	6.0%	5.1%	80.3%	77.0%		47.0%	54.7%	
Annual rate of change (end of period, percent)																		
2018	0.8	12.4	1.3	1.9	0.8	-1.2	-2.9	0.2	-0.1	-0.5	0.1	-1.5	0.9	0.5	0.7	1.5	1.5	
2019	0.6	-2.8	1.1	2.1	1.8	-2.5	-5.5	1.3	0.0	-0.2	-0.5	2.5	0.4	0.5	0.7	1.8	1.7	
2020	-0.7	4.4	-0.6	-0.2	-0.6	-0.1	-5.7	0.2	-0.6	-2.1	-0.4	-8.2	-0.1	-0.4	-0.4	0.1	0.1	
2021	2.8	-2.0	3.5	3.4	2.7	8.3	-7.3	3.2	1.5	3.3	1.7	7.5	2.4	2.5	2.4	3.4	3.4	
2022	5.3	3.1	4.9	6.3	5.7	0.1	-4.6	3.3	3.6	9.2	2.5	9.4	5.0	5.0	4.9	5.3	5.3	
Monthly rate of change, 2022 (percent)																		
January	0.2	1.4	1.3	0.1	-0.3	0.7	-5.0	-0.3	0.3	0.4	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.1	0.4
February	0.7	4.3	0.6	0.2	1.1	0.1	-2.6	0.1	0.4	1.7	0.1	4.3	0.5	0.3	0.4	0.2	0.3	0.5
March	0.6	-2.1	0.0	0.7	0.2	0.2	4.6	1.2	0.0	1.4	0.2	2.8	0.5	0.7	0.5	0.7	0.6	0.4
April	0.8	2.8	0.6	0.0	0.3	-0.2	2.1	0.9	0.1	2.0	-0.3	1.2	0.8	0.7	0.7	0.4	0.4	0.5
May	0.6	4.5	0.9	0.2	0.4	0.3	2.2	0.6	0.2	0.5	0.6	-0.8	0.6	0.5	0.6	0.3	0.4	0.4
June	0.4	-8.5	0.4	0.7	0.3	-0.4	-3.4	0.5	0.6	2.3	0.2	5.0	0.1	0.5	0.5	0.7	0.6	0.5
July	1.1	1.5	0.5	1.2	0.5	0.0	-4.0	0.8	0.5	3.0	1.0	3.0	1.1	1.1	1.0	1.0	0.9	1.0
August	-0.3	0.0	-0.1	0.8	2.2	0.3	-1.6	0.4	0.2	-3.5	0.4	-7.6	0.2	0.3	0.2	0.6	0.5	-0.2
September	0.2	2.2	-0.4	0.6	0.1	0.6	0.3	-0.1	1.0	-0.5	0.1	-1.3	0.4	0.2	0.1	0.4	0.3	0.4
October	0.6	3.2	1.0	0.6	0.4	-0.5	4.0	-0.3	-0.3	0.5	0.1	-0.1	0.5	0.4	0.5	0.3	0.3	0.4
November	0.1	-3.0	0.2	0.6	0.3	-0.3	0.1	0.1	0.1	0.2	-0.1	1.0	0.0	0.2	0.2	0.4	0.4	0.5
December	0.3	-2.3	0.0	0.6	0.2	-0.7	-1.0	-0.6	0.5	1.0	0.3	2.4	0.2	0.2	0.2	0.3	0.3	0.4

[a] The energy component includes vehicle fuels and oils, and household electricity, natural gas and diesel.

[b] As calculated by the Central Bureau of Statistics.

SOURCE: Based on Central Bureau of Statistics.

prices increased due to an intentional reduction in natural gas exports by Russia, and because various other countries adopted measures to reduce their dependence on Russian gas and pivoted to alternatives such as coal and oil.[1] The shortage of energy products and the increase in their prices also led to reduced production of other goods in some countries.

In addition to supply factors, some countries experienced an increase in inflation due to strong domestic demand. In these countries, demand increased with the recovery from the COVID-19 crisis in view of expansionary fiscal policy and accommodative monetary policy during the crisis. The stronger demand contributed to a tightening of the labor market, wage increases, and a resulting increase in inflation.

There are two main mechanisms through which the increase in global inflation can affect inflation in Israel. The first operates directly on the domestic consumption basket through price increases of imported tradable goods, which are influenced by the prices of those goods in foreign currency. The second mechanism works through price increases of imported inputs, which motivate domestic firms to raise their prices.

With regard to the first mechanism, Figure 3.1 shows that the upward trend in inflation in Israel began with the increase in prices of tradable goods. This increase was at first due to the higher dollar prices on imported products (including oil), while during 2022, it was more influenced by the depreciation of the shekel against the US dollar. The increase in inflation of tradable goods prices led to higher prices relative to nontradable goods and services, following a long trend of decline in the relative prices of tradable goods (See Figure 1.10 in Chapter 1).

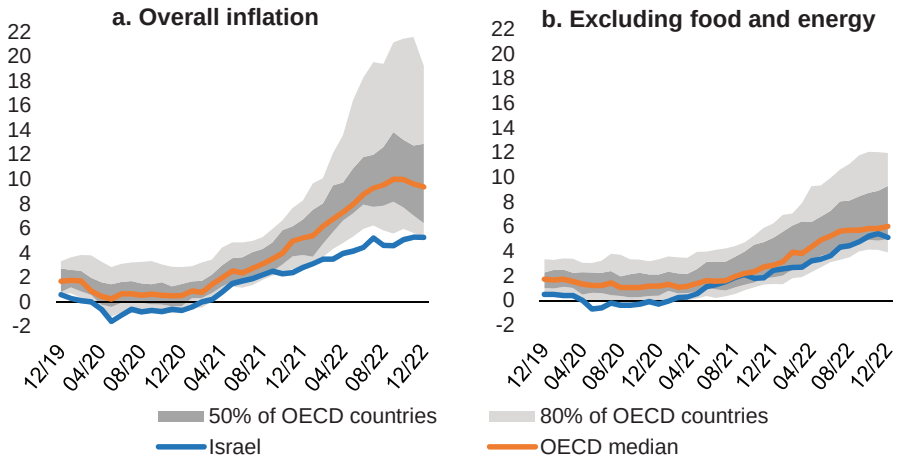
Energy prices in particular contributed to the increase in inflation abroad in the past year, but those prices increased more moderately in Israel for several reasons. First, the increase in global natural gas prices due to the war between Russia and Ukraine was not reflected in domestic prices, since those prices and supply quantities were set in long-term deals between electricity producers—primarily the Israel Electric Company—and the natural gas suppliers. Second, the Electricity Authority spread the increase in electricity prices derived from higher coal prices over several years, such that the price of electricity increased by a relatively moderate amount this year. Finally, the increase in global oil and coal prices was partly offset by a reduction in excise tax during the year. (For more information on the energy crisis's effects on the Israeli economy, see Chapter 1.) The increase in food prices in Israel was also relatively moderate. Thanks to the moderated increases in energy and food prices, the inflation rate in Israel was significantly lower than in other OECD countries (Figure 3.2a). Net of these components, inflation in Israel was closer to the OECD median (Figure 3.2b).

The increase in global energy prices had a relatively moderate effect on inflation in Israel, since the price of natural gas is fixed in long-term deals, and thanks to measures taken by the Electricity Authority and the government.

Food prices also increased relatively moderately in Israel. Thanks to the moderate increases in energy and food prices, the inflation rate in Israel was significantly lower than in other OECD countries.

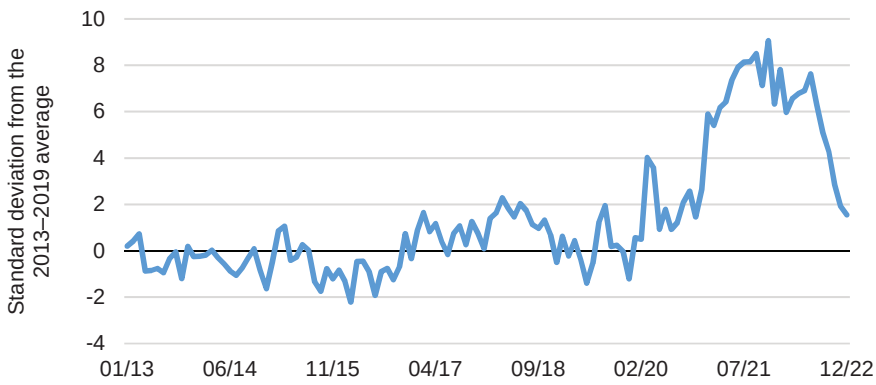
[1] For more information on the effect of the Russia-Ukraine war on energy and commodity prices, see: World Bank Group (2022), "Commodity Markets Outlook: Pandemic, War, Recession: Drivers of Aluminum and Copper Prices, October 2022", World Bank, Washington, DC.

Figure 3.2
Inflation in Israel and in OECD Countries, January 2019– December 2022 (percent)



SOURCE: Based on OECD data.

Figure 3.3
Supply Chain Pressure Index in Israel, January 2013–December 2022



SOURCE: Based on Bank Hapoalim Purchasing Managers Index and Bloomberg data.

The second mechanism for the effect of foreign inflation works through increases in the prices of imported inputs, which cause domestic firms to raise their prices. One of the causes of higher prices on imported inputs was, as stated, supply chain disruptions. Figure 3.3 shows the supply chain pressure index in Israel—the effect

of supply chain disruptions on the domestic economy.[2] The index shows that these disruptions increased significantly in 2021, but moderated during 2022. However, they were joined by an increase in global commodity prices, particularly energy prices, which contributed to higher prices on imported inputs over the course of the year.

(2) Strong domestic demand

In addition to supply factors, inflation in 2021–2022 was also influenced by the recovery of domestic demand with the exit from the COVID-19 crisis.

In addition to the global effects, inflation in 2021–2022 was also influenced by strong domestic demand. During those two years, the domestic economy recovered from the COVID-19 crisis, and domestic demand increased with support from the accommodative monetary policy and expansionary fiscal policy that were implemented during the crisis. In particular, domestic consumer demand recovered, as indicated by the high growth rate of private consumption during those years, even though its level relative to GDP remained lower than its precrisis level. (For more information, see Chapter 2.)

An increase in domestic demand can influence consumer prices in two ways. First, it enables producers to raise prices beyond production costs, which means an increase to their profits. Second, an increase in aggregate demand leads to an increase in the demand for labor, and thereby to an increase in workers' wages. Wage increases raise production costs for domestic producers, which leads to increased prices for consumers.

Below, this Chapter presents analyses that quantify the effect of domestic demand and show that it was a significant force for increasing inflation in Israel in the past two years. However, even though the increase in demand for domestic output also led to an increase in demand for workers, real wages increased only moderately, particularly in industries that produce for the domestic market. Thus, wage growth was not a dominant contributor to the increase in inflation. Chapter 2 shows that the GDP labor share declined in 2022—an indication of moderating inflationary pressures derived from wages and greater increasing profitability.

(3) The exchange rate

The shekel depreciated by 4 percent in terms of the nominal effective exchange rate, following a trend of appreciation in previous years.

In 2022, the shekel depreciated by 4 percent in terms of the nominal effective exchange rate (December 2022 average compared with the December 2021 average, see Table 3.1). The shekel depreciated by about 10 percent against the US dollar and by about 3 percent against the euro. The depreciation in 2022 took place following a trend of appreciation in previous years. (In the previous 5 years, 2017–2021, the shekel appreciated by an average of about 4.5 percent per year in terms of the nominal effective exchange rate.) Despite the depreciation during the year, the average level

[2] The supply chain pressure index is adjusted to the Israeli economy, and is based on a similar methodology to the one used by the Federal Reserve: Gianluca Benigno, Julian Di Giovanni, Jan Groen, and Adam Noble (2022), "A New Barometer of Global Supply Chain Pressures", Federal Reserve Bank of New York, January 4.

of the shekel in 2022 was stronger in terms of the nominal effective exchange rate than its 2021 average.

A recent Bank of Israel analysis shows that depreciation of the shekel by 1 percent against the US dollar contributes 0.1–0.2 percentage points to inflation[3], similar to previous estimations. According to this analysis, the change in the shekel-dollar exchange rate contributed 1–2 percentage points to inflation in 2022, while the euro had a near-zero effect. The importance of the US dollar exchange rate to the development of inflation sharpens the need to understand the forces that affected it this year.

The shekel depreciated by about 10 percent against the US dollar, influenced by the widening of the interest rate gap vis-à-vis the US and foreign exchange purchases by institutional investors.

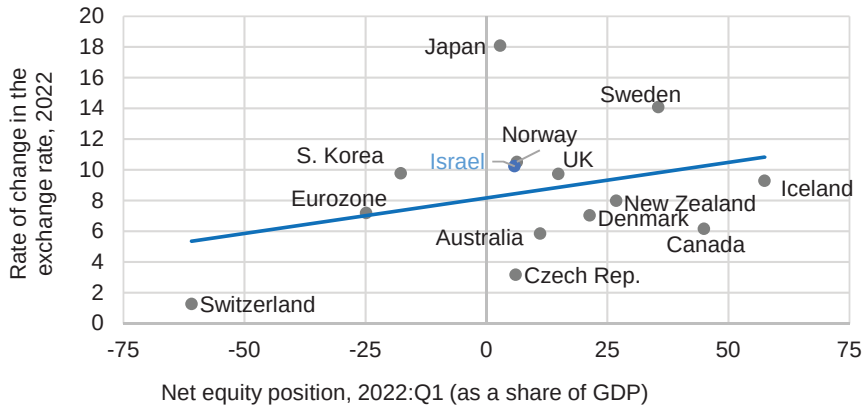
Many advanced economies experienced depreciation of their currencies against the US dollar in 2022, for two main reasons. First, the sharp increases in the monetary interest rate in the US expanded the interest rate gaps vis-à-vis a number of countries. In Israel, the gap widened by 1.1 percentage points during the year. Second, the decline in equity prices in the US (the S&P500 index declined by about 20 percent during the year) led institutional investors to adjust their asset portfolios and their hedging positions, which worked to depreciate domestic currencies.[4] Figure 3.4 shows that among the advanced OECD economies, those with higher net positions of portfolio investment in equities at the start of 2022 experienced a more significant depreciation during the year.[5] In Israel as well, institutional investors purchased foreign exchange this year, thereby contributing to the depreciation of the shekel against the US dollar (Figure 3.5).

[3] The pass-through from the exchange rate to prices is estimated using a regression of monthly inflation on the rate of change of the NIS/$ or NIS/€ exchange rate and common control variables (the change in import prices and the change in the dollar prices of oil).

[4] When foreign assets yield lower returns than domestic assets, institutional investors' exposure to foreign assets declines. In order to rebalance their portfolio, institutional investors buy dollars, use them to purchase foreign assets, and thereby increase their exposure to such assets. (For more information, see H. Hau and H. Rey (2004), "Can Portfolio Rebalancing Explain the Dynamics of Equity Returns, Equity Flows, and Exchange Rates?" *American Economic Review*, 94(2): 126–133.) In addition, declines in the values of foreign assets lead institutional investors to make swap transactions to purchase dollars in order to adjust the hedging in their investment portfolios. These transactions add to the depreciation pressure on the domestic currency in the spot market. Ben-Ze'ev and Nathan (2022) find evidence of this channel in Israel (Nadav Ben-Ze'ev and Daniel Nathan (2022). "Shorting the Dollar When Global Stock Markets Roar: The Equity Hedging Channel of Exchange Rate Determination". https://mpra.ub.uni-muenchen.de/115194).

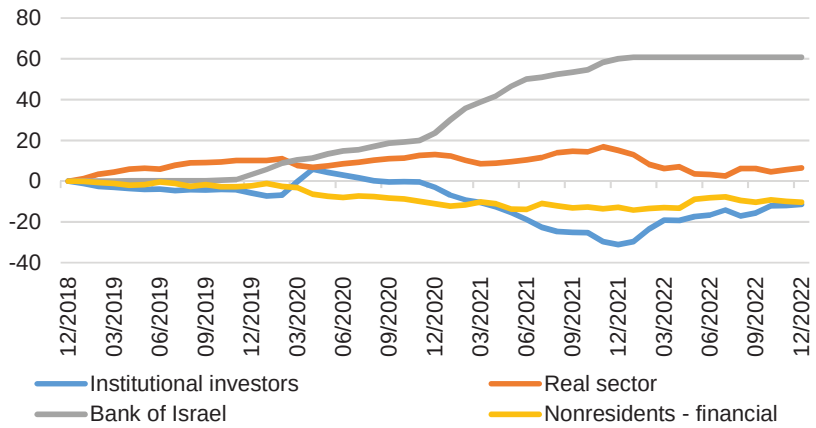
[5] The net position of financial investments in equities is the total of foreign equities held in the domestic market minus the total of domestic equities held by nonresidents. For the purpose of the analysis, central bank and government assets and liabilities were deducted from this balance, and the remainder was normalized by nominal GDP of each country. A study by the Federal Reserve found a link between the Net International Investment Position (NIIP) in the economy, which includes net equity holdings, and changes in the exchange rate during periods of significant volatility (G. Liao and T. Zhang (2020). "The Hedging Channel of Exchange Rate Determination", International Finance Discussion Paper 1283).

Figure 3.4
Equity Assets and Shekel Depreciation Against the Dollar, 2022



The sample includes the OECD countries defined as advanced by the IMF.
SOURCE: Based on IMF and Bloomberg data.

Figure 3.5
Cumulative Foreign Exchange Purchases (+) of the Main Segments, December 2018–December 2022
($ billion)



SOURCE: Bank of Israel.

In order to assess the effects of these two channels, we used a panel of countries. We estimated the change in the exchange rate that is explained by the change in the interest rate gap between them and the US, by the change in the S&P500 stock index,

and by the economy's net equity position as a share of GDP (Table 3.3).[6] According to this estimation, a one percentage point increase in the US interest rate beyond the domestic rate contributes an average of 1.0–1.7 percentage points to depreciation during that quarter (depending on the estimated model). A decline in the S&P500 index also contributes to depreciation of the domestic currency, and the effect is more prominent the greater the economy's exposure to foreign equities is.

For Israel, this means that out of a roughly 10 percent depreciation of the shekel against the US dollar, 1.1–1.7 percentage points are explained by the change in the interest rate gap vis-à-vis the US, and about 6–9 percentage points are explained by exposure to foreign equities, the changes in the S&P500 index, and the fixed effects in the regression.[7] However, the effect of changes in the S&P500 index this year may have been greater than what is captured in the regression, since during a significant part of the sample, the Bank of Israel purchased foreign exchange against sales by the institutional investors, thereby offsetting the effect of those sales on the exchange rate, whereas the Bank of Israel did not operate in the foreign exchange market in 2022 (Figure 3.5).[8]

(4) Housing prices

The housing component of the CPI, which measures the costs of housing services, accounts for about one-quarter of the Consumer Price Index. This component increased by 6.3 percent in 2022—more than in 2021 when it increased by 3.4 percent (Table 3.2). The owner-occupied housing services component accounts for about 70 percent of the housing component, and imputes the rent that home owners would have received on the rental market based on new and renewing rental contracts. In 2022, this component increased by 6.3 percent. The rents component, which measures rents for those renting their dwelling and accounts for about 25 percent of the housing

[6] The estimated model is: $\Delta S_{i,t} = \beta_0 + \beta_1 \Delta(r_{i,t} - r_{US,t}) + \beta_2 \Delta SP_t + \beta_3 Pos_{i,t} \Delta SP_t + \beta_4 Pos_{i,t} + \varepsilon_{i,t}$

Where $S_{i,t}$ is a log of the exchange rate of the domestic currency vis-à-vis the US dollar (where an increase indicates depreciation of the domestic currency), $r_{i,t}$ is the domestic monetary interest rate, $r_{US,t}$ is the monetary interest rate in the US, SP_t is a log of the S&P500 index, and $Pos_{i,t}$ is the net position of portfolio investment in equities by private investors relative to GDP. The model was estimated on data from 14 OECD countries that the International Monetary Fund defines as advanced, at a quarterly frequency between 2013 and 2022. While changes in the S&P500 index are correlated with changes in the US interest rate, the regression controls for this through the change in the interest rate gap. In addition, an estimation of a model with the US interest rate as a separate explanatory variable from the domestic interest rate generates a similar estimator for the S&P500's effect on the exchange rate.

[7] By way of comparison, the Bank of Israel Annual Report for 2020 contains findings that a 1 percent decline in the S&P500 index contributes about 0.2 percentage points to a depreciation of the shekel vis-à-vis the US dollar. According to this estimation, the decline in the index in 2022 contributed about 4 percentage points to the depreciation.

[8] Hercowitz and Friedman (2022) present evidence that the Bank of Israel's foreign exchange purchases between 2010 and 2021 offset the effects of foreign and institutional investors' flows on the shekel-dollar exchange rate. (Z. Hercowitz and A. Friedman (2022). "The Effect of Foreign Exchange Market Activity by Various Sectors and the Bank of Israel on the Exchange Rate", in Amir Yaron and Michel Strawczynski (eds.) *Monetary Policy In a Period of Price Stability*, Bank of Israel.)

Table 3.3
Effect of the interest rate gap and US equity prices on the US dollar exchange rate in a panel of countries

	Explanatory variable: Change in the US dollar exchange rate during the quarter (percent change, positive change marks depreication of the domestic currency)		
	(1)	**(2)**	**(3)**
Change in the interest rate gap vis-à-vis the US	-1.08*	-1.03**	-1.65**
	(0.59)	(0.51)	(0.67)
Change in the S&P 500 index	-0.24***	-0.24***	
	(0.02)	(0.02)	
Net equity position (balance, previous quarter) X change in S&P500	-0.002**	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)
Net equity position (balance, previous quarter)	0.01	-0.03	0.01**
	(0.01)	(0.02)	(0.004)
Constant	1.22***		
	(0.19)		
Currency fixed effect		V	
Quarter fixed effect			V
Number of observations	531	531	531
R^2	0.14	0.14	0.03

The sample includes the 14 OECD economies that are defined as advanced by the IMF.
* p<0.1; ** p<0.05; *** p<0.01. Standard deviations clustered by currency appear in parentheses.
SOURCE: Based on IMF and Bloomberg data.

index, increased by a lower rate of 4.6 percent. In both 2022 and 2021, the "other housing expenses" component, which is included in the housing component, increased significantly (by an average of about 18 percent). The increase in this component was influenced by higher purchase tax payments (both due to the increase in the tax rate for investors at the end of 2021 and due to the increase in home prices), and by increases in the costs of agency and contract preparation, which are indexed to home prices. Even though the weight of this component in the housing component is just 4 percent, its significant increase contributed 0.8 percentage points to the increase in the housing component, and about 0.2 percentage points to overall inflation in each of 2021 and 2022.

Compared to the increase in the CPI excluding housing (meaning in real terms), the housing component increased by 1.3 percent in 2022, and the owner-occupied housing services component increased by a similar rate. These are moderate real increases compared to the period before the COVID-19 crisis. In 2016–2019, the housing index increased by an average of about 2 percent in real terms, and the owner-occupied housing services component increased by about 2.5 percent.

b. The contributions of domestic and global supply and demand to the increase in inflation

Inflation originating on the demand side is characterized by an increase in activity, while inflation originating on the supply side is characterized by a decline in activity. Therefore, central banks' response to inflation derived from supply factors is more moderate.

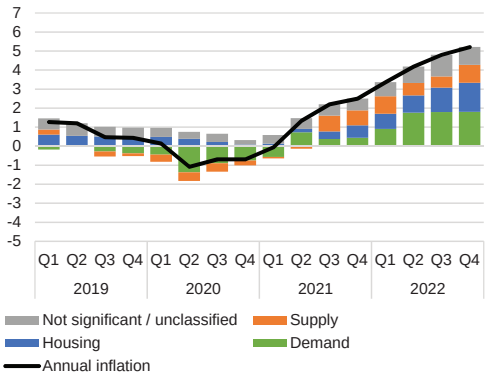
The increase in inflation in the past two years is, as stated, due to both global developments, which were largely on the supply side, and strong domestic demand. Identifying the sources for inflation increases and the distinction between supply-side and demand factors is essential for determining the suitable monetary policy response. Inflation that originates on the demand side is characterized by increased activity. As such, monetary tightening contributes to both stabilizing inflation and stabilizing activity. In contrast, inflation that originates on the supply side is characterized by a moderation of activity. As such, in dealing with it, central banks must balance restraint of prices with deepening the moderation of activity. Therefore, we examine below how much of the increase in inflation in the past two years can be attributed to supply factors, how much of it to demand factors, and what part of the supply factors originated abroad, and what part is domestic.

We identify the sources of inflation using two methods. The first analyzes prices and quantities at the level of CPI components (Box 3.1). The second is based on a structural macroeconomic model—the DSGE model developed by the Bank of Israel Research Department (Box 3.2). Both methods offer identifications of unexpected developments in the economy (shocks) by their effect on prices and quantities. As a rule, both methods identify a positive supply shock as a change that raises prices and lowers quantities, and a positive demand shock as a change that raises both prices and quantities. However, the first method is based on microeconomic data and imposes a few identification restrictions, while the second method is based on macroeconomic variables and a general equilibrium structural model with many identification restrictions.

Figure 3.6a shows a breakdown of annual inflation according to a CPI component-level analysis. According to this analysis, the increase in inflation over the past two years was due to both an increase in demand and supply factors, similar to the findings in other countries where analyses were conducted using similar methods.[9] However, in 2022, the contribution of demand increased. It should be noted that this method does not differentiate between domestic supply shocks and those originating abroad. (In this method, global price changes will be captured as supply shocks even if they originate in changes in demand abroad, because the Israeli economy is a small open economy that is influenced by foreign prices but does not influence them.)

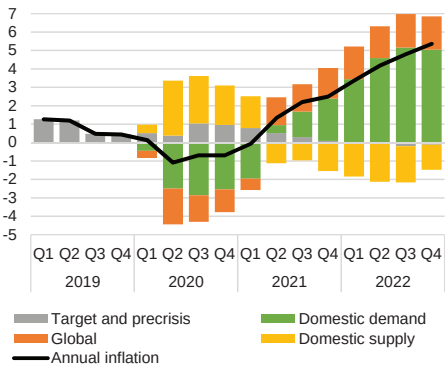
[9] See OECD (2022), "Box 1.1. Supply- and Demand-Driven Inflation in OECD Economies", *OECD Economic Outlook*, Volume 2022, Issue 2, No. 112.

Figure 3.6a
Breakdown of Inflation at the CPI Component Level, 2019–2022 (quarterly frequency, percent)



SOURCE: Based on Central Bureau of Statistics, StoreNext, and SHVA data.

Figure 3.6b
Breakdown of Inflation Using the DSGE Model, 2019–2022 (quarterly frequency, percent)



SOURCE: Bank of Israel calculations using the Research Department's DSGE model (Argov at al, 2012)..

Two different analyses show that the increase in inflation in the past two years was influenced by supply factors originating abroad, but also from the recovery of domestic demand, the influence of which increased during 2022.

Figure 3.6b shows annual inflation and the shocks that contributed to its development since the outbreak of the COVID-19 crisis, according to the DSGE model. This analysis makes it possible to distinguish between the effects of domestic supply and those originating in price changes abroad. First, the global factors contributed significantly to the increase in inflation in 2021. Second, the model shows that strong domestic demand began to contribute to the increase in inflation already in 2021, in view of the recovery from the COVID-19 crisis and the accommodative monetary policy and expansionary fiscal policy adopted during that period. (For more information, see the Bank of Israel *Annual Report* for 2021.) The model identifies an increase in domestic demand pressures during 2022, due to accelerated growth of domestic uses, particularly private consumption, which was accompanied by high growth of imports. (For more information see Chapter 2.) At the end of 2022, domestic demand became the predominant factor influencing inflation.

As stated, global factors and domestic demand contributed to increased inflation in recent years. Yet according to the model, the increase in inflation was less than would have been derived from these factors. The model attributes this to the slow adaptation of domestic prices and of wages to the inflation environment—an adaptation that is included in the group of domestic supply shocks. One of the most dominant such shocks is a shock that moderates workers' wages, which the model identifies according to the deterioration of real wages (see Chapter 2). A gradual adaptation of wages to inflation enables firms to partially and gradually absorb the higher costs of imported inputs, while rolling some of them over to workers' wages. These factors, which are reflected in the group of domestic supply factors, actually made a moderating contribution to inflation in the past two years. However, their restraining effect lessened at the end of 2022, such that inflation began responding more powerfully to the increase in domestic demand and to global inflation.

In conclusion, despite methodological differences between the methods, both show that the increase in inflation in 2021 was influenced by supply shocks (originating abroad) and by the recovery of domestic demand. In 2022, the effect of domestic demand increased, and according to the DSGE model, it even became the dominant factor in contributing to inflation.

BOX 3.1: BREAKING DOWN THE SUPPLY AND DEMAND EFFECTS AT THE CPI COMPONENT LEVEL

This box presents an estimation of the contribution of supply and demand factors to inflation, based on the work of Shapiro (2022a, b), a method that was implemented by the OECD regarding a number of countries (OECD, 2022). The method proposes an identification of unexpected changes (shocks) to prices and quantities of product groups. Shocks are classified as demand or supply based on the distinction of whether the changes in product prices were in line with an increase or decrease in the consumed quantity of those products. The identification is at the CPI subcomponent level, and is based on an estimation of supply and demand equations in a vector autoregression (VAR) model. The shocks in the model were classified as supply or demand shocks according to the direction of their effect on prices and quantities, but only if the effect was statistically significant. (The rest of the shocks were classified as insignificant.) For details on the estimated model, see Shapiro (2022a, b).

The database included price changes at the CPI subcomponent level, calculated by the Central Bureau of Statistics. These data were merged with changes in total expenditures on matching product groups according to credit card expenditure data from SHVA and data from StoreNext. The changes in consumed quantities were derived by deducting the change in the component price from the change in total expenditure on it.

The model was estimated on price and quantity data of 72 subcomponents in the CPI, the combined weight of which exceeds 90 percent of the CPI excluding housing. The housing component and a number of other subcomponents were not included in the analysis because we could not build a quantitative index for them using this method. A number of additional subcomponents were omitted because their prices are not set under market conditions by supply and demand factors (for instance, municipal tax and other payments, or products under price control). In total, the database covered the vast majority of the consumption basket excluding housing, and included information on price and quantity changes at the monthly level from January 2016 to December 2022.

Figure 3.6a shows the breakdown of inflation using this method, with the contributions converted to quarterly frequency in order to compare them with the breakdown of inflation from the DSGE model.

References:

Shapiro, A. (2022a), "A Simple Framework to Monitor Inflation", Federal Reserve Bank of San Francisco Working Paper, 2020-29.

Shapiro, A. (2022b), "How Much do Supply and Demand Drive Inflation?", *FRBSF Economic Letters* 2022-15 (June 2022).

OECD (2022), "Box 1.1. Supply- and Demand-Driven Inflation in OECD Economies", *OECD Economic Outlook*, Volume 2022 Issue 2, No. 112.

BOX 3.2: BREAKDOWN OF THE SUPPLY AND DEMAND EFFECTS USING A DSGE MODEL

The Bank of Israel Research Department's Dynamic Stochastic General Equilibrium (DSGE) model (Argov et al. 2012) is a macroeconomic structural model of the Israeli economy. The model enables an identification of the shocks that contribute to the development of inflation (historical decomposition), based on the common movements of many macroeconomic variables. The model chooses the combination of shocks that are most likely to have created the common movement of the observed variables, given the model's structure and the parameters estimated for it.

The model includes many shocks, but for the purpose of this analysis, they were classified into three categories. First, the shocks that affect global variables in the model were put into one group. Then, domestic shocks were put into supply or demand groups based on the response of domestic inflation and GDP to those shocks (the immediate effect according to the impulse response function). In particular, a shock that affects domestic inflation and GDP in the same direction was classified as a demand shock, while a shock that affects the two variables in opposite directions was classified as a supply shock. Figure 3.6b shows the total contribution of the shocks in each group to the development of inflation since 2020.

References:

Argov, Eyal, Emanuel Barnea, Alon Binyamini, Eliezer Borenstein, David Elkayam, and Irit Rozenshtrom (2012). "MOISE: A DSGE Model for the Israeli Economy", Bank of Israel Research Department Discussion Papers Series 2012.06.

c. The risk of persistence of high inflation

The increase in inflation began, as stated, with an increase in the tradable goods component due to global developments, and then spread to the nontradable components (Figure 3.1). Basically, inflation gradually became broader and encompassed a growing number of CPI components. As an indication of the broadness of inflation, Figure 3.7 shows a breakdown of the variance of inflation into two components: the variance of the CPI components, and their covariance.[10] The breakdown shows that the increase in inflation over the past two years was broad, and was due to price

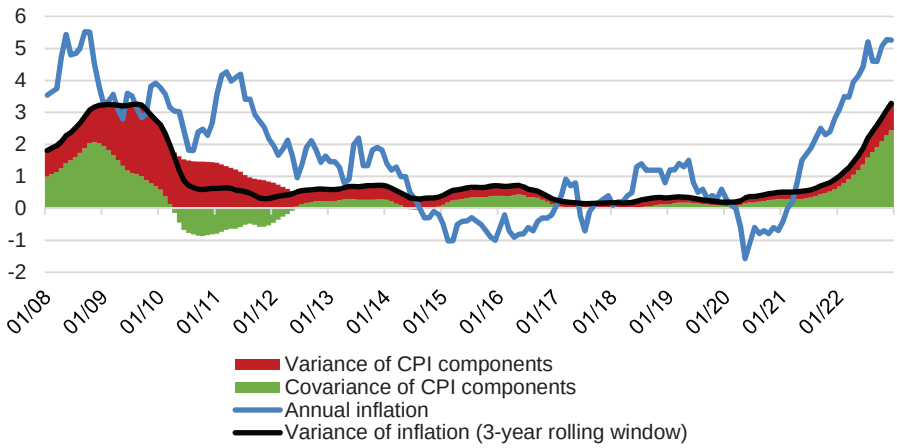
The increase in inflation in the past two years was broad, and encompassed many components.

[10] The variance of inflation was calculated on a three-year rolling sample, and broken down according to the following equation: $Var(\pi_t) = \sum_i Var(w_{i,t}\pi_{i,t}) + \sum_{i \neq j} cov(w_{i,t}\pi_{i,t}, w_{j,t}\pi_{j,t})$

where $\pi_{i,t}$ is inflation in component i in the three years ending in month t, and $w_{i,t}$ is that component's weight. The first part of the breakdown captures the variance of CPI components, and the second part captures their covariance. The analysis is based on the breakdown presented in a BIS report that also shows an increase in the covariance of inflation components in various countries. See Bank for International Settlements (2022), "Inflation: A Look Under the Hood", *Annual Economic Report*, Chapter 2, June 2022 (pp. 41–73).

increases in many components, as seen by the increase in the covariance of the CPI components.

Figure 3.7
Breakdown of the Variance of Inflation, January 2008–December 2022
(percent)



SOURCE: Based on Central Bureau of Statistics data.

An increase in inflation that encompasses many components may change the inflation dynamics and make it more persistent. Such a change could take place if, for instance, wages are indexed to inflation.

As inflation increases and becomes broader, there is greater risk that the high inflation will become more persistent, such that the cost of mitigating it (in terms of the impact on economic activity) will be higher. More significant price increases, encompassing more goods and services, may make businesses and households more aware of inflation. Businesses will be more likely to include inflation in the pricing of their goods and services, workers will include it in their wage demands, and landlords will include it in the rent that they demand. Thus, price increases that have already taken place will feed additional price increases, and inflation will become more persistent. (For more details, see Box 1.2 in Chapter 1.) Moreover, if individuals believe that inflation will remain high in the future, they may demand compensation for it in the present in order to minimize its future impact, thereby contributing to an acceleration of inflation.[11]

One of the main mechanisms through which the dynamic of inflation may change is, as stated, the response of labor wages. Price increases due to global factors, such as what happened in the past two years, erode households' purchasing power. To moderate that erosion, workers may increase their wage demands. From the standpoint of domestic firms, this means an additional increase in production costs, beyond the direct increase of imported input prices, such that the firms must further increase the

[11] Chapter 2 of the International Monetary Fund Report from October 2022 discusses the impact of the nature of inflation expectations (adaptive or rational) on the link between wages and inflation: See International Monetary Fund (2022), "Wage Dynamics Post-COVID-19 and Wage-Price Spiral Risks", *World Economic Outlook*, Chapter 2, October (pp.51–69).

prices of the goods and services they provide in order to maintain their profitability. Wage increases therefore feed increases in inflation, which then leads to further wage increases.

The risk in this feedback between wages and inflation is called the "wage-inflation spiral", and discussion of it has recently been renewed at several central banks and international institutions.[12] Wages may be indexed to inflation officially as part of wage contracts with indexation clauses, or unofficially by raising workers' wage demands. Either way, it affects the dynamic of inflation.

Wages did not contribute to the acceleration of inflation this year.

So far, it seems that in Israel, the risk of a wage-inflation spiral has not come to pass. Wages per employee post did increase in nominal terms, but the increase did not match the rise in consumer prices. Thus, on average, salaried employees were not compensated for the full increase in the price of the consumption basket. However, as explained in Chapter 5, the increase in the average wage varied between the private and public sectors. While wages in the public sector eroded significantly in real terms, the increase in private sector wages was similar to the increase in the Consumer Price Index, mainly due to wage increases in the export industries. The wage increases in these industries do not directly affect the costs of production for the domestic economy—and therefore have no direct impact on inflation. Moreover, from the standpoint of domestic producers, real wages increased less than labor productivity, such that the GDP labor share declined (see Chapter 2).[13] Wages are therefore not among the causes of accelerated inflation.

Inflation expectations from all sources and for all ranges increased this year, but for the most part they did not significantly exceed the upper bound of the inflation target.

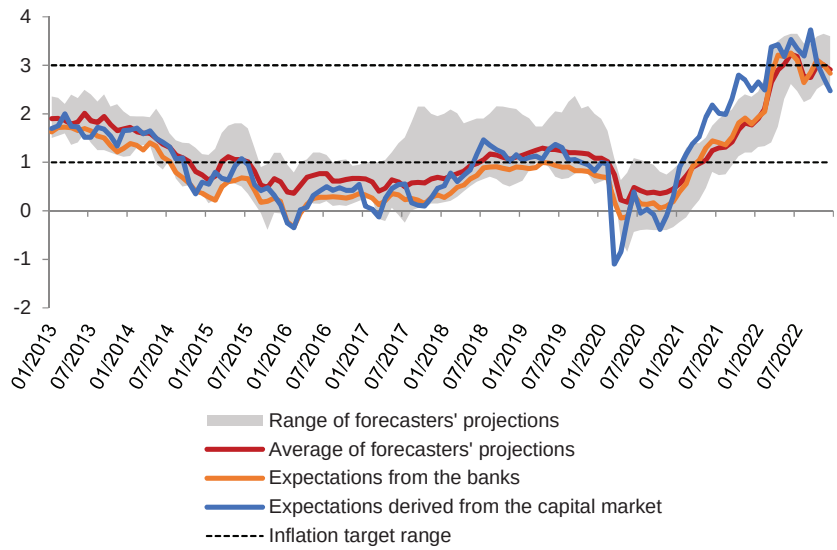
The development of inflation expectations provides strong evidence that high inflation has so far not taken root significantly. While one-year inflation expectations increased in the first half of 2022 to about 3–3.5 percent, they moderated to 2.5–3 percent later in the year, even though actual inflation increased to above 5 percent during that period (Figure 3.8).[14] Thus, despite the increase in the inflation environment, market participants maintained the assessment throughout the year that inflation would moderate and would return to around the upper bound of the target range (3 percent) within a year. Expectations for ranges between the first and second years, and between the second and third years, were also within the target range for most of the year, which also shows that the public did not perceive the increased inflation beyond the target range as persistent (Figure 3.9). Moreover, expectations for longer ranges remained anchored within the target range. The fact that expectations for all ranges are within the target range shows, among other things, that the public believed that the Bank of Israel would act to restrain inflation and maintain it within the target range.

[12] Bank for International Settlements (2022), "Inflation: A Look Under the Hood", *Annual Economic Report*, Chapter 2, June 2022 (pp. 41–73); International Monetary Fund (2022), "Wage Dynamics Post-COVID-19 and Wage-Price Spiral Risks", *World Economic Outlook*, Chapter 2, October (pp.51–69).

[13] However, in an open economy such as Israel's, the GDP labor share is only partly connected to the Consumer Price Index. While it includes the GDP labor share of the export industries, which does not directly affect the CPI, it is not directly connected to changes in import prices, which are included in the CPI.

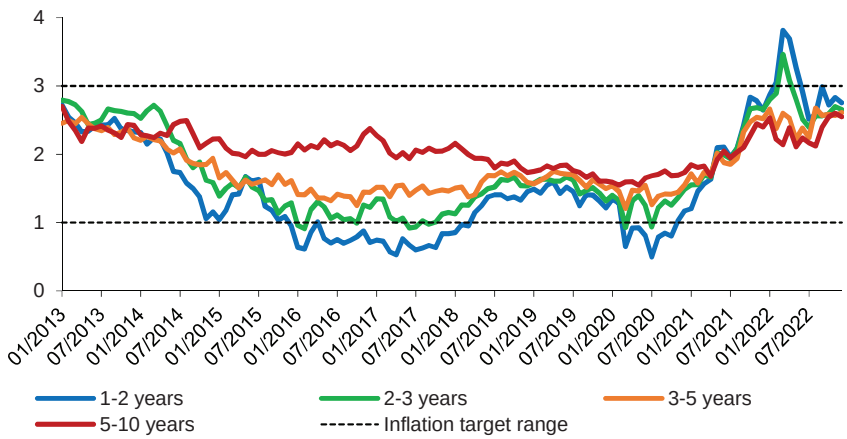
[14] For more details on estimations of inflation expectations, see Bank of Israel (2022), *Statistical Bulletin.*

Figure 3.8
One-Year Inflation Expectations from Various Sources, January 2013–December 2022 (monthly average, percent)



SOURCE: Bank of Israel calculations.

Figure 3.9
Medium- and Long-Term Inflation Expectations, January 2013–December 2022 (monthly average, percent)



SOURCE: Bank of Israel calculations.

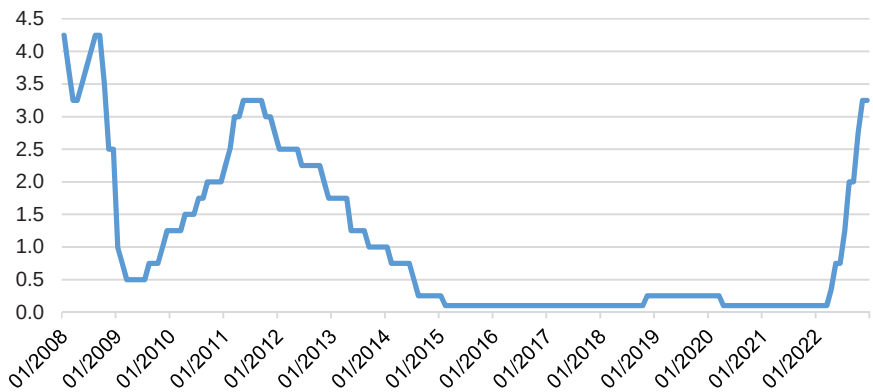
2. MONETARY POLICY

a. Policy measures

In 2022, the Monetary Committee raised the Bank of Israel interest rate significantly—from 0.1 percent at the beginning of the year to 3.25 percent at year-end.

During 2022, monetary policy dealt with an increase of inflation beyond the target range, in view of strong economic activity. In order to restrain inflation, the Monetary Committee raised the interest rate rapidly during the year. Until March 2022, the Bank of Israel interest rate remained 0.1 percent. At the beginning of April, it was raised to 0.35 percent. Since then, the rate was raised at each decision by 40–75 basis points, reaching 3.25 percent at the end of the year. (The interest rate increases continued into 2023.)[15] These interest rate increases came after about seven years in which the rate remained near zero, and brought the rate to its highest point since 2010 (Figure 3.10).

Figure 3.10
Bank of Israel Interest Rate, January 2008–December 2022 (percent)



SOURCE: Bank of Israel.

The interest rate increases in the first half of 2022 came after the Bank of Israel stopped using special monetary accommodation tools in 2021.

The interest rate increases in the first half of 2022 were further to the measures that the Bank of Israel adopted in 2021 to reduce monetary accommodation. During the COVID-19 crisis, the Bank of Israel operated special programs to support economic and financial activity. These were stopped gradually beginning in 2021, with the recovery of the Israeli economy from the crisis. The Bank of Israel was among the first in the world to stop using special monetary accommodation tools. Repo transactions with institutional investors were stopped at the beginning of 2021. Later in the year, the loan program to banks[16] was stopped, as were government and corporate bonds

[15] In parallel with the interest rate decision in July, the Bank of Israel widened the band around the Bank of Israel interest rate in the credit window and in the deposits window for commercial banks from ±10 basis points to ±50 basis points.

[16] In 2022, loans issued during the programs were not repaid, and the banks continued to provide collateral for them.

purchases later on.[17] Foreign exchange purchases continued throughout 2021, totaling about US$ 35 billion, and were stopped in 2022.

The measures taken to move away from accommodative policy, which began in 2021, were in response to rising inflation, which reached 2.8 percent at the end of 2021. The upward trend of inflation continued in 2022, but at the beginning of the year, the Monetary Committee decided to leave the interest rate at 0.1 percent, even when inflation reached the upper bound of the target range.[18]

At the beginning of the year, the Monetary Committee chose to conduct the monetary tightening process gradually, believing that the supply-side causes of increased inflation were temporary, and out of concern regarding the continued economic recovery from the COVID-19 crisis.

There were a number of reasons for the decision to leave the interest rate at its low level at the beginning of the year. First, even though the recovery from the COVID-19 crisis began in 2021, the Monetary Committee's assessment at the beginning of 2022 was that the economy had not yet recovered completely from the crisis. This assessment was supported by the outbreak of the "Omicron" variant of the disease in January, and indications of economic contraction in the first quarter of the year. Second, the assessment in Israel and abroad was that most of the increase in inflation was due to disruptions in the global supply chains and an increase in commodity prices—phenomena that were expected to moderate within a short time, which would reduce the inflationary pressures. Third, at the beginning of the year, the shekel was historically appreciated in terms of the nominal effective exchange rate, which created difficulties for the tradable sector. Increasing the interest rate before the major central banks (chiefly the Federal Reserve) did so would lead to a further appreciation of the shekel, and perhaps to a negative impact on economic activity. In view of doubts regarding the continued economic recovery, and in view of the perception that the increase in inflation was, until then, mainly due to temporary supply shocks, the Committee decided at the beginning of the year to be extra cautious and to implement monetary tightening gradually.

The assessment of the situation in the real economy changed during the year, as National Accounts data showed stronger activity than previously assessed. (See Chapter 2.) But the most significant change was in the nominal picture, with the outbreak of the war between Russia and Ukraine at the end of February. (Box 3.3 analyzes the changes in the inflation environment in 2022 relative to previous forecasts.) The war worsened supply disruptions, and particularly led to higher food

[17] During 2022, there were repayments of only small amounts on bonds purchased in previous years, since the program focused on relatively long-term bonds. As such, the repayments did not contribute significantly to monetary tapering.

[18] At the interest rate decision in February 2022 (the last one where the rate was set at 0.1 percent) the Monetary Committee was aware of the annual inflation figure for January (3.1 percent). One-year inflation expectations from the various sources ranged from 2.0 to 2.7 percent. Prior to the decision, the fourth-quarter growth figure for 2021 was received. It was higher than the previous assessment. In view of these developments, the Monetary Committee's stated assessment was that in the coming months, conditions would allow for the start of a gradual process of raising the interest rate. The first increase in the interest rate took place in April, when the Monetary Committee had the inflation figure for February, which was 3.5 percent annualized, and one-year inflation expectations were in the range of 3.0–3.5 percent. (See the press releases on the interest rate decisions of February 21 and April 11, 2022, and the accompanying economic data.)

and energy prices. As the war continued, there was growing concern among many central banks that continued supply disruptions would lead to a general change in inflation dynamics, particularly if a wage-inflation spiral developed. The concern was that there would be a transition to a dynamic of high and persistent inflation, in which changes in relative prices (such as an increase in commodity prices) would filter down to other prices, and inflation would remain high even after the basic force affecting the relative price would abate. (For more information, see Box 1.2 in Chapter 1.) This concern was particularly significant in economies that had experienced surplus demand, such as the US economy.

The outbreak of war between Russia and Ukraine at the end of February, and its continuation, made it clear to policy makers around the world that the supply factors were expected to influence inflation for a longer time. Therefore, an accelerated process of interest rate increases began in Israel and around the world in order to rein in inflation.

To nip these processes in the bud, many central banks began significant tapering and sending hawkish messages regarding their determination to return inflation to the target.[19] However, at this stage, inflation in many countries, led by the US, had already significantly exceeded the central bank targets. Many of them therefore chose to increase the interest rate rapidly—a process that became known as "front-loading". In Israel as well, the process of raising the interest rate that began in April was accelerated, even though inflation in Israel was lower than in other countries (Figure 3.2). The interest rate increases in Israel were at significant rates, mostly beyond market expectations, and were intended to quickly bring the interest rate to the level necessary to restrain inflation, according to assessments at that time.[20]

A rapid increase of the interest rate serves a number of purposes. First, it lowers inflation more rapidly than a gradual interest rate increase does. For instance, an analysis using the Bank of Israel Research Department's DSGE model shows that the rapid interest rate increase in 2022 is expected to restrain inflation by an aggregate of about 1.5 percentage points in 2022 and 2023, relative to a scenario in which the interest rate would be raised gradually to 3.25 percent by the end of 2023.[21] Thus, the accelerated increase of the interest rate contributes to anchoring inflation expectations and reducing the risk of an inflationary spiral developing. Second, a BIS study found that historically, rapid interest rate increases led to a "soft landing" of activity more than gradual and prolonged increases.[22] In contrast, a policy of raising interest rates rapidly also involves risks. Since there is a lag until the increase affects economic activity and inflation, the central bank may raise the rate to a level that would later turn out to be too high, leading to an economic slowdown beyond what was necessary to

[19] See, for instance, speeches by the Federal Reserve Chairman and the President of the European Central Bank: Jerome Powell (2022). "Monetary Policy and Price Stability", speech at the "Reassessing Constraints on the Economy and Policy" symposium, Jackson Hole, Wyoming, August 26, 2022; Christine Lagarde (2022). "Monetary Policy in the Euro Area", Karl otto Pohl Lecture, Frankfurt, September 20, 2022.

[20] See the Bank of Israel's *Monetary Policy Report* for the second half of 2022.

[21] The effect on inflation was estimated by comparing two scenarios. In the first scenario, the interest rate was raised in accordance with the actual pace of increase and left at 3.25 percent until the end of 2023. In the second scenario, the interest rate was increased more gradually from April 2022, reaching 3.25 percent only at the end of 2023.

[22] F. Boissay, F. De Fiore, and E. Kharroubi (2022). "Hard of Soft Landing?" Bank for International Settlements Bulletin (No. 59).

return inflation to the target. In addition, sharp changes in the interest rate contribute to volatility in the prices of financial assets and make it difficult for households and businesses to adjust their credit and asset portfolios.[23] In Israel, the acceleration of the interest rate increases was made possible, despite the macroeconomic developments abroad and the volatility in asset prices, due to the strong state of the economy and of the financial system.

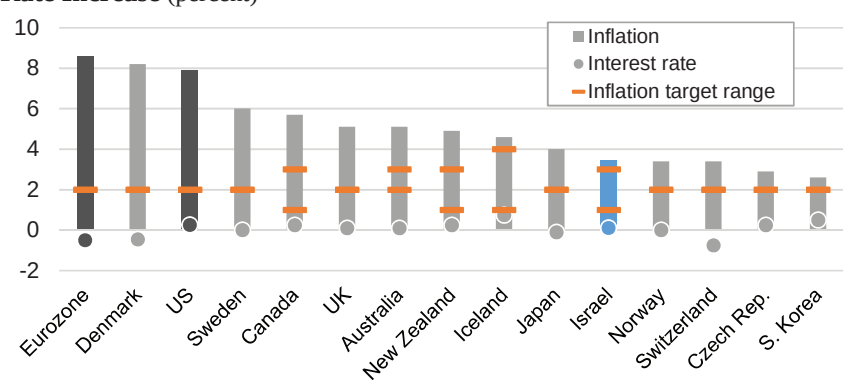
b. Monetary policy compared to other countries

In Israel, the interest rate was first increased in April, when inflation only slightly exceeded the target range, while interest rate increases around the world began when inflation significantly exceeded the central bank targets.

As stated, inflation increased in the past two years in many countries, which motivated the central banks to reduce the extent of monetary accommodation. Most central banks began raising their interest rates when inflation significantly exceeded the targets (Figure 3.11). Specifically, in the US and in Europe interest rate raises began when inflation was at about 8 percent. In contrast, the Bank of Israel started raising its interest rate when inflation exceeded the target slightly, at 3.5 percent.

Once the process of raising the interest rate began around the world, it was executed rapidly. The increases were led by the United States, which experienced a significant increase in inflation and strong domestic demand, reflected in a tight labor market. These factors led the Federal Reserve to accelerate the interest rate increases during the year, aiming to restrain surplus demand in the economy, and inflation together with it. In contrast, the state of economic activity in Europe was more fragile, due to the war between Russia and Ukraine that began early in the year and the sanctions imposed on Russia as a result. These led to a significant increase in inflation, mainly from the supply side.

Figure 3.11
Inflation and Interest Rate Levels the Month Before the First Interest Rate Increase (percent)



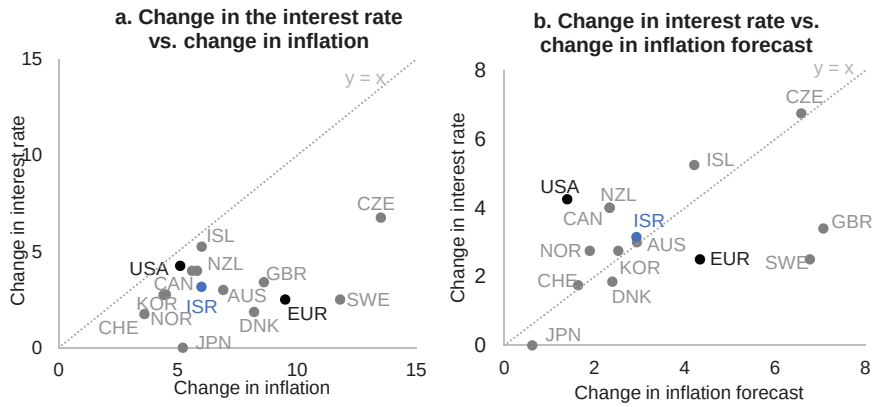
The interest rate in Japan was not raised until the end of 2022. The interest rate and inflation shown for Japan are for December 2022.
SOURCE: Based on data from the central banks.

[23] For a discussion of the advantages and disadvantages of front loading, see P. Cavallion, G. Cornelli, P. Hordahl, and E. Zakrajsek 92022), "'Front-Loading' Monetary Tightening: Pros and Cons", *Bank for International Settlements Bulletin*, (No. 63).

The central bank's reaction to the increase in inflation was more moderate in Israel than in the US, but stronger than in Europe.

Figure 3.12a shows the change in central bank interest rates in the advanced OECD countries in 2021 and 2022, compared to the change in inflation during the same period. Despite the significant interest rate increases in many countries, they did not catch up to the rise in inflation. However, monetary policy is forward-looking, and therefore reacts to changes in inflation expectations. According to the "Taylor Principle", central banks tend to raise the interest rate more than the change in expected inflation, in order to raise real interest rates and restrain inflation.[24] Figure 3.12b shows that in many of the comparison countries, the interest rate increases in the past two years were in accordance with this principle. The policy reaction in the US during the reviewed period was particularly strong relative to the change in expectations, because of the strength of demand in the US economy. On the other hand, the European Central Bank responded more moderately to the increase in inflation expectations, since in Europe, inflation increased mainly due to supply factors. In Israel, the policy reaction was moderate relative to the American reaction, but stronger than the European one, partly because the inflation level in Israel was lower than in the comparison countries throughout the entire year (Figure 3.2).

Figure 3.12
Change in the Central Bank Interest Rate Against the Change in Inflation and the Forecast for 2023, December 2020–December 2022 (percentage points)



The sample includes the OECD countries defined as advanced economies by the International Monetary Fund. Figure b shows the change in the IMF's inflation forecast for 2023 between October 2020 and October 2022.
SOURCE: Based on data from the OECD, the IMF, and the central banks.

c. The extent of monetary accommodation or tightening

As described above, the Monetary Committee raised the Bank of Israel interest rate significantly in 2022, from 0.1 percent at the beginning of the year to 3.25 percent at the end of the year. This was in addition to ending the special programs during 2021. In order to examine the extent of monetary accommodation or tightening derived from

[24] The Taylor Principle relates to the public's inflation expectations, but the Figure shows the International Monetary Fund's inflation forecasts, due to the availability of data on a broad sample of countries.

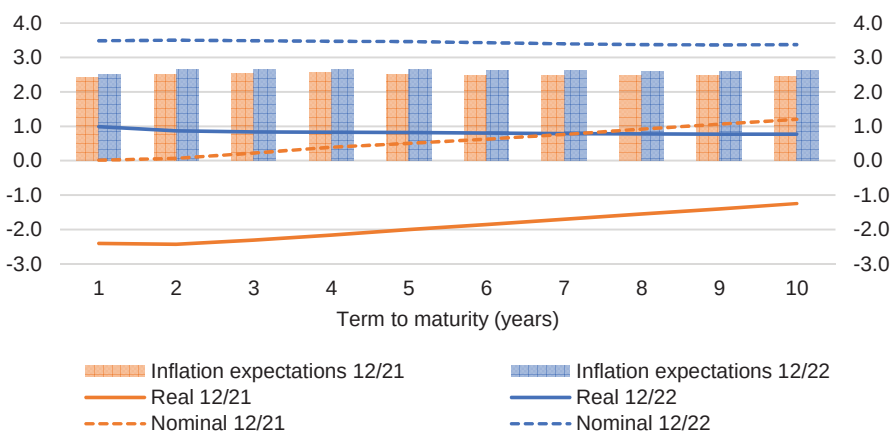
policy measures, it is common to look at the development of inflation expectations and yields in the short and medium terms, which are relevant to the public's consumption and investment decisions.

The real interest rate at the end of 2022 was positive throughout the yield curve, after it was negative throughout the curve in 2021.

Figure 3.13 shows that inflation expectations at the end of 2022 were similar to expectations at the end of 2021, at about 2.5 percent in the range of 1–10 years. However, at the end of 2022, the nominal and real yield curves were significantly higher than they were at the end of 2021.[25] In particular, the real interest rate at the end of 2022 was positive along the entire curve, after being negative along the entire curve in 2021. This means that the interest rate environment at the end of 2022 was tighter than in the previous year. In addition, the interest rate curves flattened. Since the nominal and real interest rates generally include a positive term premium, the flattening of the curves is a hint that, net of these premia, there is an expectation of future moderation of the interest rate. Such a moderation is consistent with a forecast of an economic slowdown, which will require a lowering of the interest rate later on.

Figure 3.14 shows that over time, the real five-year yield began to increase at the beginning of 2022, in parallel with the upward trend of yields in the US, which reflects the process of reducing the accommodative stance of monetary policy. However, the yield reached positive territory only in the fourth quarter of the year. The reduction in the accommodative stance began showing its effect mainly in the second half of 2022, in a slowdown in the growth of household and business credit (as described in Chapter 4) and in moderating surplus demand in the labor market (as described in Chapter 2).

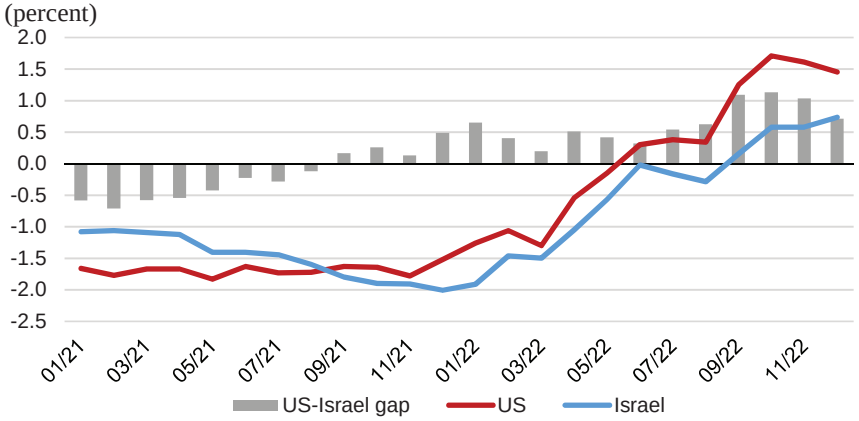
Figure 3.13
Spot Nominal and Real Yield Curves and Inflation Expectations
(percent)



SOURCE: Bank of Israel.

[25] The Bank of Israel's method of calculating the yield curves is detailed in Ana Brodesky and Nadav Steinberg (2011), "Improving the Yield Curve Estimation Model Implemented at the Bank of Israel", Periodic Papers 2011.01, Bank of Israel Research Division.

Figure 3.14
Real Five-Year Constant Maturity Yields, January 2021–December 2022
(percent)



SOURCE: Bank of Israel and FRED.

3. THE MONETARY BASE AND MONETARY AGGREGATES

Interest is the price of money—the alternative cost of holding liquidity. As such, changes to it, in addition to changes in economic activity, have an impact on the demand for liquidity. When the nominal interest rate serves as a policy tool, the central bank sets a completely flexible money supply at its declared interest rate, and the monetary base—the total of banknotes and coins in circulation plus the commercial banks' demand deposits with the Bank of Israel[26]—is determined by the demand for liquidity at the central bank's declared interest rate.

a. The monetary base

The Bank of Israel increased the pace of Makam issuances this year, thereby contributing to the improved pass-through from the monetary interest rate to alternatives available to the saving public.

The monetary base is affected by both flows that are not under the Bank of Israel's control, such as government accounts, and flows that are under its control, such as foreign exchange and bond purchases and *Makam* issues. The Bank of Israel absorbs or injects liquidity in order to meet the demand for the monetary base in accordance with the Bank of Israel interest rate. It adjusts the monetary base to the interest rate, taking into account the total of other flows, through interest-bearing deposits that it offers the banks by tender, which are not included in the monetary base, and by issuing *Makam.*

During 2022, the monetary base grew by about NIS 6 billion (Table 3.4)—growth of 3 percent relative to December 2021 (Table 3.5). While this growth was lower than it was in the past two years (growth of about 26 percent in 2020 and about 13 percent in 2021), it was similar to growth in the years prior to the COVID-19 crisis.

Government activity injected about NIS 24 billion in 2022, and against that the Bank of Israel absorbed about NIS 18 billion. As part of that absorption, the bank of

[26] The banks are obligated to deposit money in demand deposits at the Bank of Israel as part of their liquidity requirements.

Israel increased the pace of *Makam* issuances in the fourth quarter of the year. The volume of issuances was derived from demand for *Makam* in view of the interest rate increases, and it contributed to an increase in the pass-through from the Bank of Israel interest rate to the interest rate available to the public and for all tradable financial assets and alternatives available to the saving public.[27]

b. The monetary aggregates

In view of the increase in the Bank of Israel interest rate, the public reduced its demand deposits, while interest-bearing deposits were significantly expanded.

The M1 monetary aggregate—the amount of money—includes cash held by the public and the public's demand deposits at the banks. The M1 aggregate declined by about 10 percent in 2022, after consistent increases in previous years (Table 3.5). The decline in M1 is a result of the decline in the public's demand deposits, while cash continued to increase at a pace similar to the precrisis rate. (In 2020 and 2021, the volume of cash in the hands of the public increased exceptionally due to the COVID-19 crisis. For more details, see the Bank of Israel Annual Reports for those years.) In parallel with the decline in demand deposits, there was a significant expansion of 85 percent in interest-bearing deposits of up to one year in view of the increase in the Bank of Israel interest rate. In the near-zero interest rate environment that had typified the economy in previous years, it is reasonable that some of the public's savings would be kept in demand deposits. The increase in the monetary interest rate in 2022 led to an increase in the interest on deposits (a development that is analyzed in Box 4.2 in Chapter 4), making them a more attractive savings option than in the past, and particularly more attractive than demand deposits. Despite the change composition between demand deposits and interest-bearing deposits, the aggregate that includes M1 and unindexed deposits of up to one year increased at a similar pace to the precrisis years.

[27] In view of the increased issuances of *Makam* in the fourth quarter, the gap between the interest rate on the 1-year *Makam* and the interbank (Telbor) rate narrowed from 72 basis points in September 2022 to 20 basis points in December.

Table 3.4
Sources of change in the monetary base, 2018–22
(NIS billion)

	2018	2019	2020	2021	2022	2022 Q1	2022 Q2	2022 Q3	2022 Q4
1. Injections from the government and the Jewish Agenc	1.81	7.17	21.39	-6.54	24.16	-33.90	-3.53	28.71	32.87
of which : the government	1.81	7.17	21.39	-6.54	24.16	-33.90	-3.53	28.71	32.87
2. Foreign exchange conversions[a]	11.69	13.67	72.13	112.14	1.10	1.11	0.00	0.00	0.00
of which: Bank of Israel	11.67	13.68	72.14	112.14	1.11	1.11	0.00	0.00	0.00
3. Total (1+2)	13.49	20.84	93.53	105.59	25.26	-32.80	-3.53	28.71	32.87
4. Bank of Israel injections	-8.69	-16.33	-66.14	-78.22	-17.62	32.25	3.90	-16.02	-37.75
of which : Monetary loan	0.00	0.00	19.56	20.44	0.00	0.00	0.00	0.00	0.00
Makam	-15.77	-11.63	33.08	-27.97	-94.10	-10.93	-8.64	-10.20	-64.33
Swap	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bank term deposits	6.00	-6.00	-171.00	-109.00	71.00	43.00	12.00	-7.50	23.50
Interest[b]	0.21	0.44	0.36	0.41	5.04	0.11	0.46	1.55	2.93
Bond purchases	0.00	0.00	49.53	38.51	-0.32	-0.06	-0.11	-0.07	-0.08
Repo	0.00	0.00	1.50	-1.40	-0.10	-0.10	0.00	0.00	0.00
5. Total change in the monetary base	4.93	4.78	26.92	27.36	5.71	-0.48	0.39	10.55	-4.75

[a] This item includes, among other things, receipts (payments) in foreign exchange that the Bank of Israel and the government receive from (transfer to) the private sector, for instance income tax. These payments do not change the monetary base. They appear in the section on government injections, and in this section with the opposite sign.
[b] Excluding *Makam.*
SOURCE: Bank of Israel.

Table 3.5
Rate of change in the monetary aggregates, 2018–22 (percent)

	0	1	2	1+2=3	4	5	6	3+4+5+6=7
	Monetary base[a]	**Cash held by the public**	**Demand deposits**	**M1[b]**	**Term deposits up to 3 months**	**Term deposits of 3 months to 1 year**	**SRO[c]**	**Total[d]**
	(Average in December compared to average the previous December)							
2018	6.0	6.6	13.6	12.2	-15.6	-4.3	1.1	2.0
2019	2.9	1.8	5.8	5.1	-4.0	33.2	7.0	6.3
2020	25.8	23.3	30.7	29.4	24.7	12.2	25.9	26.0
2021	12.6	6.9	25.2	22.0	-3.6	12.6	23.8	17.5
2022	3.0	6.0	-13.2	-10.3	35.1	85.0	-7.2	5.0
	(Quarterly average compared with the average of the previous quarter							
2022								
Q1	2.1	0.2	5.9	5.0	-0.8	5.9	4.1	4.1
Q2	2.2	2.0	3.1	2.9	8.3	5.3	-0.5	3.0
Q3	0.2	1.7	-5.1	-4.1	6.3	34.6	-0.8	1.7
Q4	-0.6	0.8	-9.7	-8.1	14.6	18.6	-3.9	-0.7

[a] Total banknotes and coins in circulation and current deposits by the commercial banks with the Bank of Israel.
[b] M1 = cash and demand deposits.
[c] Self-renewing overnight deposit - a liquid daily deposit.
[d] M1+SRO+unindexed deposits of up to one year.
SOURCE: Bank of Israel and Central Bureau of Statistics data.

BOX 3.3: ANALYSIS OF THE INCREASE IN THE INFLATION ENVIRONMENT USING THE "INFLATION AT RISK" MODEL

Introduction

This box examines the development of the inflation environment in the past two years, as reflected in changes in actual inflation and one-year forecasts. In particular, it examines the development of the forecast obtained from the Inflation at Risk (IaR) model, which provides forecasts for a variety of inflation scenarios, and not just one main scenario as most forecast models do. The model thus allows for a more comprehensive assessment of changes in the inflation environment and in the risks to its development.

Forecasts for 2022 prepared using the model on the basis of data from 2021 showed upward movement in the inflation forecast distribution, with the higher tail widening. This means that the model identified an increase in the inflation environment and in the risks of high inflation. Actual inflation in 2022 came out in the higher tail of the model's forecast distribution. This means that the increase in inflation in 2022 was a realization of an unexpected event that was relatively anomalous in its intensity. The increase in

the likelihood of higher inflation, which the model reflected, and the realization of high actual inflation, were in line with similar assessment from other sources that formed a background for policy decisions, as discussed in this Chapter.

The forecast of inflation scenarios using the Inflation at Risk model

Most models provide a forecast of one main scenario for the development of inflation—either the most likely scenario or the average scenario. However, in practice, inflation may develop differently due to unexpected economic changes. The assessment of various inflation scenarios and the probability of their realization enables a broader view of the inflation environment and of the various risks to its development.

Therefore, the Bank of Israel Research Department developed an "Inflation at Risk" (IaR) model that provides forecasts of various possible inflation scenarios. Formally, the model provides a forecast in the form of the distribution of expected inflation in one year.

An earlier version of the model was presented by Gurkov and Zohar (2022b), who used a standard Phillips Curve model to forecast the distribution of future inflation using quantile regressions, similar to common models for other countries (Banerjee et al. (2020); López-Salido and Loria (2020)).[1] This box uses a similar method, but the explanatory variables were chosen to improve the quality of the model's forecast according to tests presented by Gurkov and Zohar (2022a, b). The current model estimates the distribution of one-year inflation forecasts, given three explanatory variables: actual inflation, the nominal effective exchange rate, and imported inflation (which weights inflation in the US and in Europe and the change in the prices of oil and of commodities excluding energy).

The IaR model's forecast and actual inflation

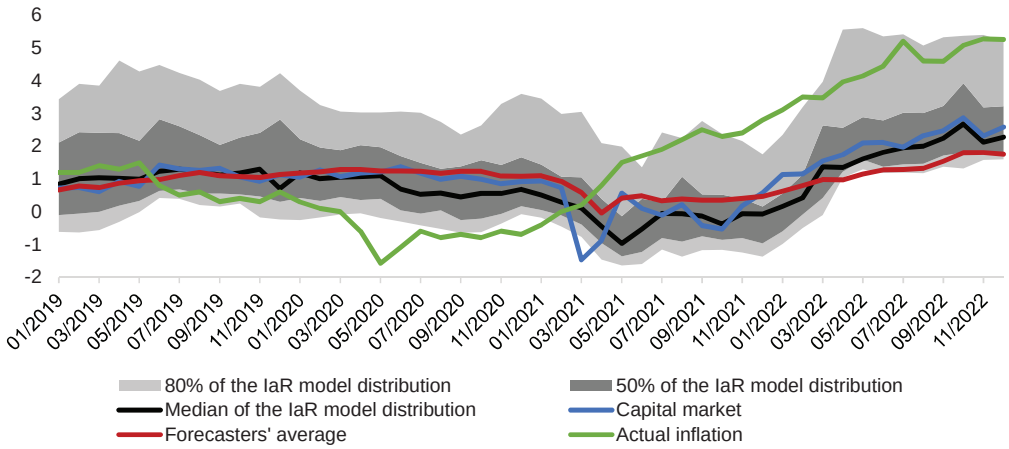
Figure 1 shows the median forecast of the IaR model, and shaded areas that capture 50 and 80 percent of the forecast's distribution.[2] By way of comparison, the Figure also shows forecasts from two additional sources: the capital market (forecasts derived from the Bank of Israel yield curve), and the average projections of professional forecasters. The forecast horizon of all the forecasts is one year ahead, and they are shifted one year back to be comparable with actual inflation.

The Figure shows that in the forecasts for 2022, which were prepared during 2021, the median of the IaR model increased, together with the increase in the distribution of the entire forecast. For instance, at the end of 2020, the model predicted an 80 percent probability that inflation in one year would be between -1.4 and 1.8 percent. At the end of 2021, the model attributed the same probability to a scenario in which inflation in one year would be between 1.6 and 5.2 percent. This means that the probability of high inflation scenarios increased. At the same time, the extent of uncertainty increased, reflecting an increase in the probability of high inflation scenarios, as seen in the widening of the upper shaded areas in the 2022 forecast. The changes in the forecast distribution from the IaR model during this period were mainly due to the increase of inflation abroad.

[1] A similar model that estimates the distribution of the GDP growth forecast given macrofinancial variables is brought in Gurkov and Zohar (2022a).

[2] Out-of-sample forecasts in an expanding window in which the model is estimated on a sample beginning in 2007 and ending in period t, which provides a forecast of inflation between period t and period t+12.

Figure 1
Annual Inflation Compared to 12-Month Forecasts Beforehand, January 2019–December 2022 (percent)



SOURCE: Based on Gurkov and Zohar (2022b).

Despite the changes in the forecast distribution, the main scenario from the model (the median of the distribution) indicated inflation of about 2 percent. This means that the model identified an increase in the inflation environment, but its assessment was that inflation would most likely be around the midpoint of the target range. Forecasts from other sources also increased but remained close to the midpoint of the target range during that period, since the inflation increase at that time was mainly attributed to supply pressures that were expected to subside within a short time. At the end of 2021, these assessments formed the background for the decisions to taper monetary accommodation by stopping the use of the special tools, but not to increase the interest rate at that stage.

However, the assessments of moderating inflation were proven wrong, and as Figure 1 illustrates, inflation in 2022 was higher than expected by all sources. This was partly due to the worsening supply disruptions due to the Russia-Ukraine war that broke out early in the year, which was obviously not expected when the forecasts were prepared. According to the IaR model, the unexpected developments in 2022 were anomalous and led to inflation at the extreme end of the forecast distribution (around the 90th percentile). In view of this, the Monetary Committee accelerated interest rate increases, as described in the Chapter.

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Banerjee, R. N., J. Contreras, A. Mehrotra, and F. Zampolli (2020). "Inflation At Risk in Advanced and Emerging Market Economies". BIS Working Paper (883).

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Chapter 4

Development of Sources of Financing for the Nonfinancial Private Sector

- In 2022, against rising inflation and interest rates in Israel and globally, there were significant declines in the financial asset markets. Equity prices declined sharply, and bond yields of public companies (which constitute approximately half of the economy's business sector debt) rose, resulting in higher costs of debt and capital raising.
- Interest rates on bank credit rose in response to the increase in the Bank of Israel interest rate in the second half of 2022. Interest rates for businesses rose for all business sizes and industries, while interest on credit for households rose with respect to both housing credit and nonhousing credit.
- In 2022, developments in the field of credit were not uniform. In the first half of the year, the sharp increase in the credit balance continued the trend that had begun in 2021, while in the second half of 2022 the credit supply contracted, with a slowdown in the growth rates of bank and nonbank credit to both businesses and households.
- The effect of tighter financial conditions and declining equity prices was evident in the IPO market, where the wave of IPOs that had begun in 2022 was cut off. The economic developments reduced high-tech firms' capital raised from venture capital funds both in and outside Israel.

1. MAIN DEVELOPMENTS

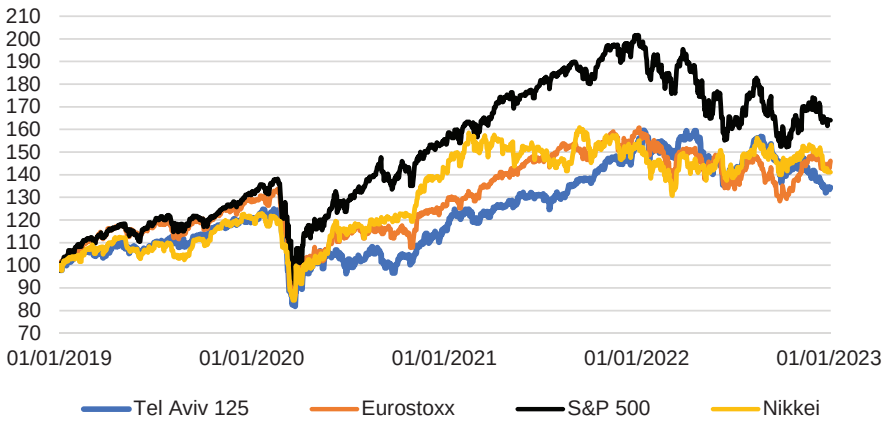
This Chapter describes the main developments in the sources and uses of financing for the Israeli economy in 2022 and links these developments to long-term economic trends. Private debt is used by households and businesses for consumption and investment, which explains its significance for economic activity. In 2022, inflation in Israel increased at an accelerated pace, and the Bank of Israel responded by increasing its interest rate from 0.1 percent in April to 3.25 percent at the end of the year. (For additional information see Chapter 3.) The rapid changes in the Bank of Israel's interest rate translated into an increase in credit suppliers' capital raising costs, which affected the economy's supply of financing sources. Both rising inflation and the monetary policy response, which was reflected in interest rate hikes, were typical of most advanced economies (as described in Chapter C), which triggered tighter financial conditions in Israel and worldwide. Since monetary policy gradually became tighter over the year, its effect on financial aggregates and credit is especially prominent when analyzing the developments during the year. Financial asset markets around the world recorded declines, in view of rising inflation and interest rates, as well as geopolitical concerns due to the Russian-Ukraine war. Israel's capital market also recorded declines in 2022. Equity prices dropped sharply and bond yields of public companies (which account for approximately half of the economy's outstanding business debt) rose, resulting in higher costs of capital raising and credit.

The effect of increasingly tight monetary conditions and declining equity prices (Figure 4.1) was evident in the IPO market, stemming the tide of IPOs that had begun in 2020 and continued strongly in 2021, when 133 new companies issued their shares to the public for the first time (compared to 245 companies in 2019–2020).[1] In addition, venture capital financing, which mainly finances the high-tech sector, contracted. In 2022, total investments in the high-tech sector declined sharply compared to the previous year (which was a record year from a historical perspective), interrupting the upward trajectory of recent years. In contrast to equity financing, there was no change in debt financing in 2022 compared to previous years. Bond issues proceeded, on average, at a similar pace to previous years. One partial explanation may be the high volume of maturities expected in 2023 relative to previous years, which new bond issues were intended to cover.

Increases in the Bank of Israel interest rate, which began in April 2022, were also translated into rising interest rates in the banking sector. Interest rates on loans increased, and interest rates on deposits also increased, but at a slower pace and at lower rates. Nonetheless, even if the pass-through from the monetary interest rate to deposits in Israel was incomplete, it was higher than in most countries, partly due to the Bank of Israel's actions to increase competition and transparency in the banking sector. (For additional information see Box 4.2.) The pass-through from the Bank of

[1] For an analysis of the wave of IPOs and their micro- and macroeconomic effects on the capital market, see Box 4.1 in this chapter.

Figure 4.1
Selected Global Equity Indices (in local currency terms)



SOURCE: Based on stock exchange reports.

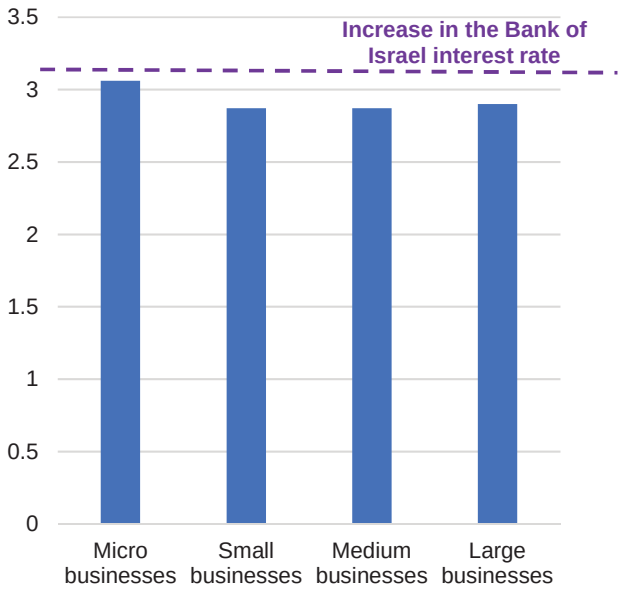
Sharp interest rate hikes by the Bank of Israel were translated into rising interest rates in the bank and nonbank sectors. In view of the rising interest rates, the growth of credit in the bank and nonbank channels slowed in both the business and household segments.

Israel's interest rate to the interest rates on banking credit was high, as illustrated by the increase in interest rates across the board: Interest rates on business bank credit rose for all businesses, irrespective of size, and in all industries, and interest rates on household credit rose for both housing and nonhousing credit. The increase in the interest rates on bank credit for businesses was similar to (and slightly lower than) the rise in the Bank of Israel interest rate, which is evidence of a strong pass-through rate from the monetary interest rate to the interest rates on business credit (Figure 4.2).

Outstanding business sector debt increased by 12 percent this year, while outstanding household debt grew by 11.5 percent— exceeding balances in previous years. Debt to both banks and nonbank lenders increased. The increase in business debt was largely due to bank loans to large businesses, and was concentrated mainly in companies in the construction and real estate industry, in in view of their continued high level of activity throughout 2022. Approximately 25 percent of the business debt is indexed to the CPI and approximately 21 percent is denoted in or indexed to foreign currency (mainly US dollars). The increase in the CPI and the depreciation of the shekel therefore also contributed to the increase in the balance of business sector debt. This increase was relatively rapid in the first half of the year, and slowed somewhat in the second half of the year.

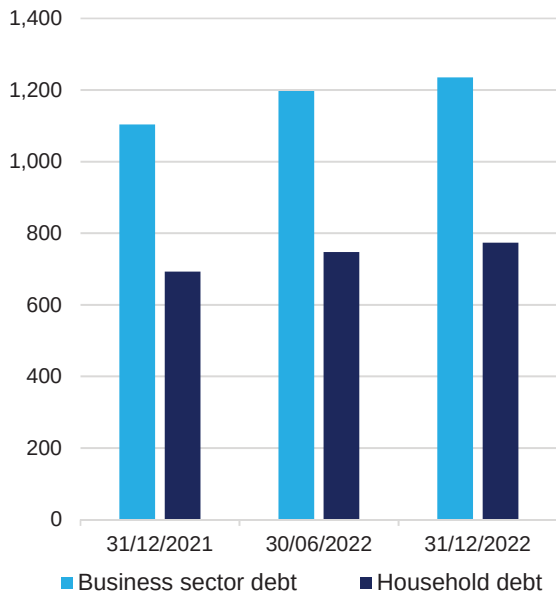
The increase in household debt was mainly due to an expansion of housing credit, and its dynamics over the year mirrored those of business debt: rapid growth in the first half of the year followed by a slower rate of growth in the second half of the year. A major portion of this expansion came from rising prices—32 percent of household debt is indexed to the CPI—although growth of the nonindexed portion of the credit also surpassed the average rate of the previous years.

Figure 4.2
Increase in the Bank Interest Rate to the Business Sector (percentage points)



SOURCE: Based on Banking Supervision Department data.

Figure 4.3
Outstanding Debt by Sector (NIS billion)



SOURCE: Based on Tel Aviv Stock Exchange and reports to the Bank of Israel.

Table 4.1
Distribution of nonfinancial private sector debt, 2020–2022

	End-of-period balance			End-of-quarter balance		
	2020	2021	12/2022	30/06/2022	30/09/2022	31/12/2022
Nonfinancial private sector debt (1+2)	**1,590**	**1,796**	**2,008**	**1,944**	**1,983**	**2,008**
1. Business sector debt	**979**	**1,104**	**1,235**	**1,197**	**1,218**	**1,235**
Credit from the banks	488	573	661	630	644	661
Tradable bonds in Israel	212	235	263	244	260	263
Nontradable bonds and nonbank loans	112	112	117	115	119	117
Domestic nonbank credit	324	348	381	359	378	381
2. Household debt	**611**	**692**	**773**	**747**	**766**	**773**
Housing credit	417	477	542	519	533	542
Nonhousing credit	194	215	231	228	232	231
	Rate of change relative to the previous period (percent)					
	Change during the period			Change during the quarter		
Nonfinancial private sector debt (1+2)	**3.0**	**13.0**	**11.8**	**4.3**	**2.0**	**1.2**
1. Business sector debt	**2.4**	**12.8**	**11.9**	**4.7**	**1.7**	**1.4**
Credit from the banks	6.4	17.4	15.3	4.2	2.2	2.6
Tradable bonds in Israel	3.8	10.8	11.9	4.2	2.2	2.6
Nontradable bonds and nonbank loans	-3.2	0.3	4.5	2.8	6.4	1.4
Domestic nonbank credit	1.3	7.2	9.5	2.9	5.3	0.6
2. Household debt	**4.0**	**13.3**	**11.6**	**3.6**	**2.5**	**1.0**
Housing credit	8.1	14.5	13.6	4.0	2.8	1.7
Nonhousing credit	-5.8	4.8	4.6	1.5	1.5	0.4

SOURCE: Based on Tel Aviv Stock Exchange and reports to the Bank of Israel.

The increase in credit in 2022 was concurrent with an increase in private consumption and a high growth in investments compared to previous years. Apparently the reduced credit supply and the moderation in its growth in the second half of the year had no adverse effect on investment, possibly due to significant private savings accrued in previous years (described extensively in Chapter 2 of this Report) and to companies' relatively high cash and cash-equivalent balances.

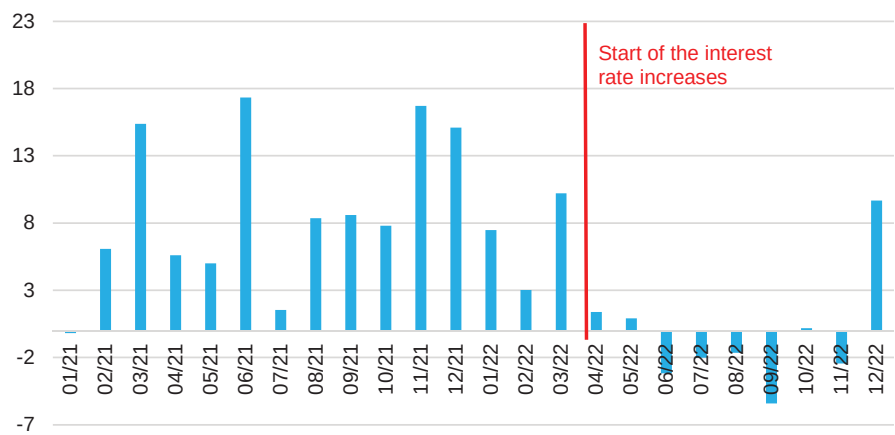
2. RAISING CREDIT

a. Bank Business Credit

In view of rising interest rates, there was net negative performance (credit issued minus repayments) in business credit from banks.

Bank credit to businesses grew by 15 percent in 2022, a rate slightly lower than the previous year, yet high from a historical perspective (compared to an average growth rate of 7.5 percent in the past five years). Here, too, growth was not uniform over the year: After the rapid growth of the previous year (17.5 percent) continued (and even accelerated) in the first half of 2022, growth slowed in the second half of the year, due to the start of interest rate hikes. An analysis of net credit issued (credit granted minus repayments) indicates that positive credit performance was recorded until March, at which point it was replaced by negative net credit granted (Figure 4.4). This change reflected a decline in the pace of lending, rather than an anomalous increase in repayments.[2]

Figure 4.4
Net Borrowing* of Business Sector Bank Credit (NIS billion)

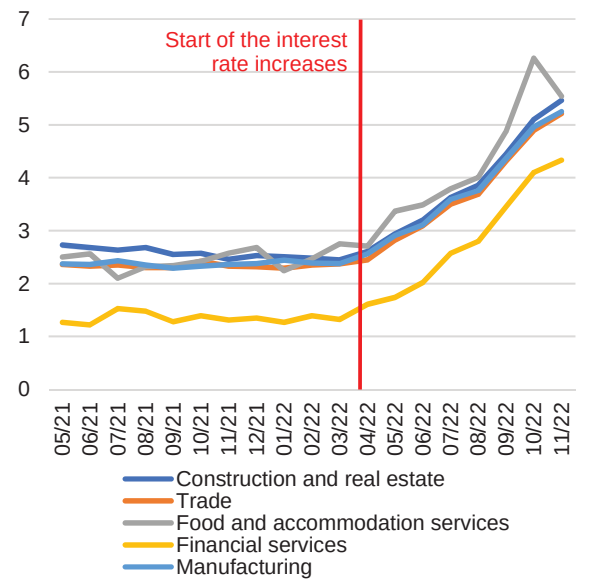


* Borrowing minus repayments.
SOURCE: Based on Banking Supervision Department data.

[2] The credit performance data in Figures 4.3 and 4.10 to not add up to the changes in balances shown in Table 4.1 due to differences in definitions and data measurements. The differences may be due to indexation differentials, exchange rate differentials, accrued interest, etc.

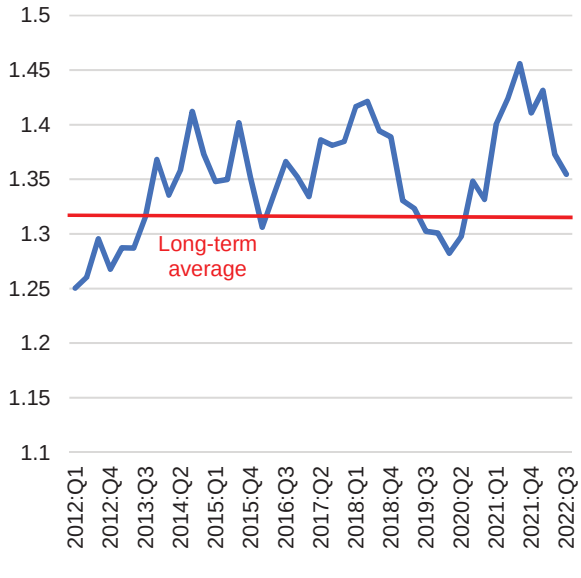
The slowdown in the growth of credit was typical of businesses of all sizes, but was especially prominent in the small and micro business segment. Net negative credit performance coincided with the rising interest rates for businesses in all segments, irrespective of size (Figure 4.5). Despite the contraction of supply, which was reflected to higher interest rates and a decline in credit granted, the Business Tendency Survey did not indicate an increase in the difficulty in obtaining bank credit. Moreover, only one-quarter of the businesses participating in the survey stated that they are significantly dependent on credit and were therefore affected by the increase in interest rates.

Figure 4.5
Interest Rate on Bank Credit by Industry
(percent)



SOURCE: Based on Banking Supervision Department reports.

Figure 4.6
Ratio of Current Assets to Current Liabilities
(median of all public companies)



SOURCE: Based on financial statements of public companies.

Companies can finance their investments by raising debt at the prevailing interest rate or by using the liquidity at their disposal. If a company is cash rich, we can presume that its demand for investment will be less sensitive to interest rates because its financing cost using internal sources is lower than the cost of debt financing. An examination of the current ratio[3] in public companies indicates that for the median company, this component was at a record high in early 2022, and although it declined over the year, it remained slightly higher than the long-term average (Figure 4.6). An industry analysis indicates that several industries typically had a high current ratio by historical comparison. This is especially true of companies in the real estate and construction industry, which accounts for the dominant share of business credit from the banks, and which are among the large and medium-sized companies. This finding may explain the low sensitivity to changes in interest rates.

[3] The ratio of current assets (cash and cash equivalents) to current liabilities.

b. Nonbank business credit

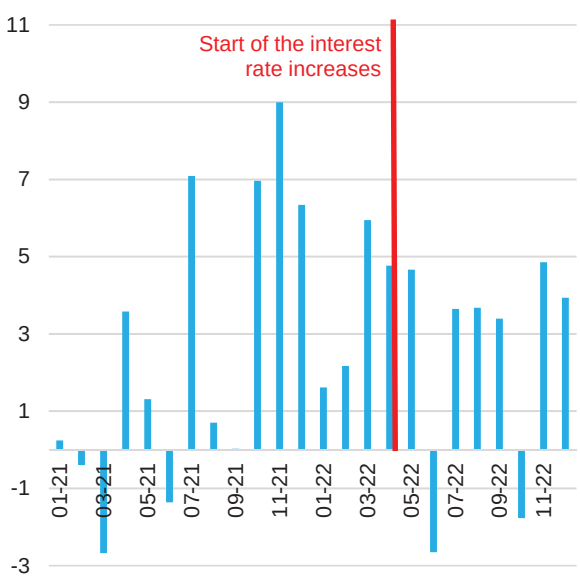
Nonbank credit is obtained through bond issuances, which were the main form of debt financing this year, and through loans from institutional investors, nonbank institutions, and nonresidents. In parallel with the increase in the Bank of Israel interest rate, bond yields rose sharply, similar to the rise in bank credit interest rates.

Bond issuances continued throughout the year, possibly due to the high amount of maturities expected in 2023.

Despite the increase in yields, which raises the cost of debt financing, bond issuances continued throughout the year (Figure 4.7a), in contrast to credit raised through bank and nonbank loans, whose pace slowed (and even declined) in the second half of the year. A partial explanation for the continued activity in bond issuances may be related to the high level of maturities expected in 2023 (Figure 4.7b) relative to maturities in previous years, and the new bond issues were intended to refinance these liabilities. An analysis of expected maturities by industry indicates that the expected maturities in the real estate and construction industry are higher than in other industries, a finding that supports this hypothesis.

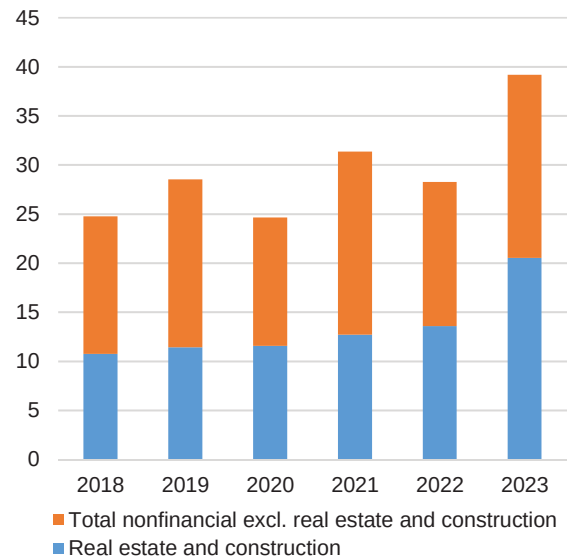
An analysis by industry shows that in several industries, bond issues even increased in comparison to previous years. In 2022, the construction and real estate industry, which accounted for a significant share of all bond issues, raised an average of approximately NIS 2.5 billion per month, compared to a monthly average of approximately NIS 2 billion in the years 2018–2021.[4] An analysis of net issues indicates that in the past

Figure 4.7a
Net Issuances of Corporate Bonds (NIS billion)



SOURCE: Based on Tel Aviv Stock Exchange reports.

Figure 4.7b
Nonfinancial Sector Bond Repayments, 2018–2022 and Expected in 2023 (NIS billion)



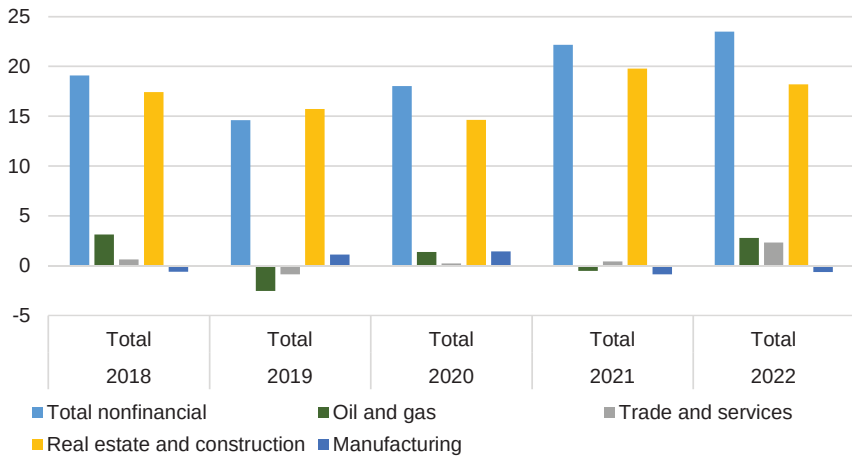
SOURCE: Based on Tel Aviv Stock Exchange reports.

[4] The construction and real estate industry's share of all issues is similar to its share in previous years.

An analysis of net issuances shows that in the past 5 years, the real estate and construction industry was the source of most of the increase in nonfinancial business sector debt.

five years, the construction and real estate industry has accounted for most of the increase in nonfinancial business sector debt (Figure 4.8). The quality of the issues was maintained, with an average of approximately 51 percent of all the monthly issues in 2022 rated AA- or higher, similar to the years 2018–2021 (when the average monthly share of bonds rated AA- bonds was 48 percent).

Figure 4.8
Annual Net Debt Raised in Israel, excl. Financial Companies (NIS billion)

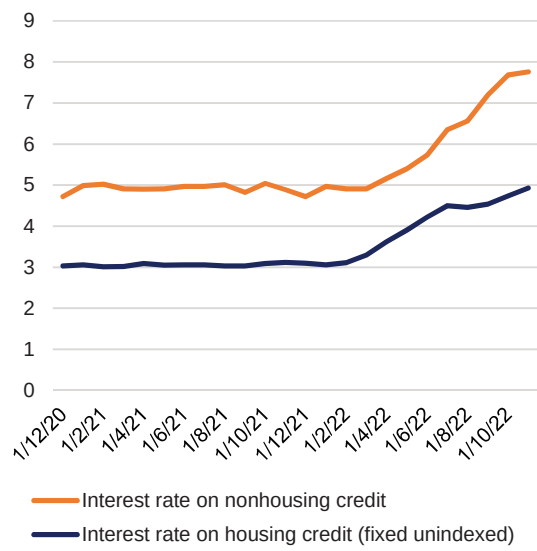


SOURCE: Based on Tel Aviv Stock Exchange reports.

c. Household Debt

Similar to business bank debt, household debt grew rapidly in 2022. While this growth was affected by rising inflation (since approximately one-third of all household debt is indexed to the CPI), the picture remains the same after controlling for inflation. Bank of Israel interest rate hikes increased interest rates on both components of household credit: housing debt and nonhousing debt (Figure 4.9). Due to these interest hikes, the sharp rise in credit in the first half of 2022 was replaced by a slowdown in the growth rate of new credit later in the year, and stability in the final quarter of the year.

Figure 4.9
Interest Rate on Household Credit (percent)



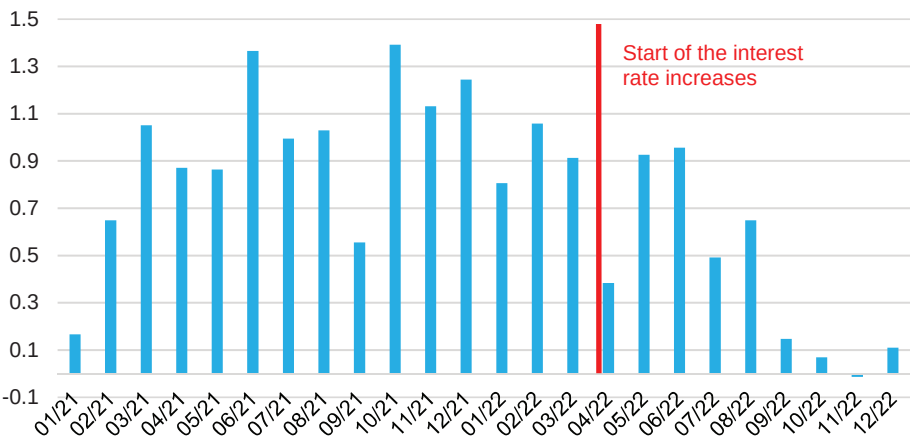
SOURCE: Based on Banking Supervision Department data.

(1) Nonhousing debt

Compared to the changes in business debt, the change in household debt was slower and more moderate. Figure 4.10 shows net consumer bank credit granted, and indicates that its rate of growth slowed in the final quarter of the year. An examination by lenders indicates that the most significant change occurred in the balance of consumer credit from institutional investors, which contracted in the final quarter of 2022.

Household credit granted by institutional investors is typically in large loan amounts taken out against collateral (such as a loan guaranteed by the individual's pension savings) and relatively low interest rates. These loans are typically taken out by borrowers of relatively high socioeconomic status. It is reasonable to assume that, due to their significant volume and relatively low cost, these loans may also be used to supplement financing for the purchase of real estate (See Chapter 4 in the Bank of Israel Annual Report for 2021). The decline in households' credit from institutional investors is consistent with the moderation in new mortgage borrowing (See section on housing debt).

Figure 4.10
Net Borrowing of Nonhousing Bank Credit by Households (NIS billion)



SOURCE: Based on Banking Supervision Department data.

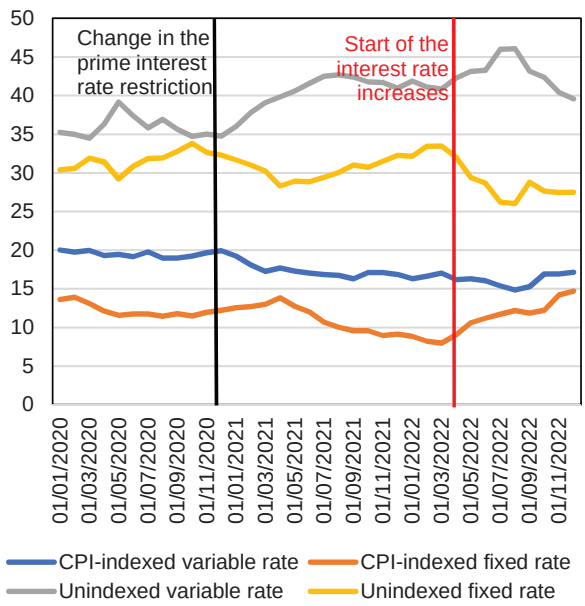
(2) Housing debt

Housing credit increased rapidly at the beginning of the year, and slowed in the second half in view of the increase in interest rates on all tracks.

The balance of housing debt increased at a high rate at the beginning of the year (further to the marked growth in the previous year) but the increase in mortgage interest rates in the second half of the year dampened this growth and affected all (indexed and unindexed) loan tracks. Interest costs also affected the composition of mortgages, as households began to reduce the variable rate unindexed share of their mortgages. In 2021, the Banking Supervision Department reduced the regulatory

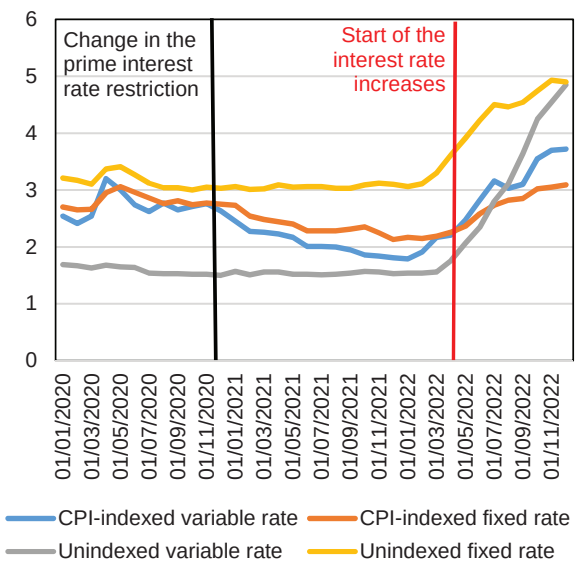
restriction on the percentage of mortgages that can be based on the prime interest rate, allowing the percentage to increase from one-third to two-thirds of a mortgage.[5] This allowed households to assume larger mortgages without increasing their monthly payments (at the interest rates at the time), and households responded by increasing the variable rate unindexed component of their mortgages (which is mainly based on the prime interest rate). However, households did not take full advantage of the relaxed restriction and they increased the share of the prime-based component of their mortgages to approximately 40 percent rather than to the permitted two-thirds (Figure 4.11b). The increase in share of the prime-based component, which continued until the second half of 2022, was halted and even reversed in response to the sharp rise in interest rates (Figure 4.11a). Households also responded to rising interest rates and high housing prices by extending their mortgages and increasing the share of their income devoted to mortgage payments. Segmentation of new mortgages by payment-to-income ratio and term-to-maturity indicates that the share of mortgages with a high payment-to-income ratio (30-40 percent) increased and that the average mortgage amount increased from NIS 890,000 in 2021 (annual average) to approximately NIS 1 million in 2022. The Bank of Israel launched the mortgage transparency reform[6] in 2022, designed to significantly improve customers' ability to compare banks' complex mortgage offers and select the best alternative.

Figure 4.11a
Mix of New Mortgages (percent)



SOURCE: Based on Banking Supervision Department data.

Figure 4.11b
Interest Rate on New Mortgages, by Track (percent)



SOURCE: Based on Banking Supervision Department data.

5 Directive on removing restrictions on the provision of housing loans at variable interest.
6 For additional information on the mortgage transparency reform, see: https://mash-boi.org.il

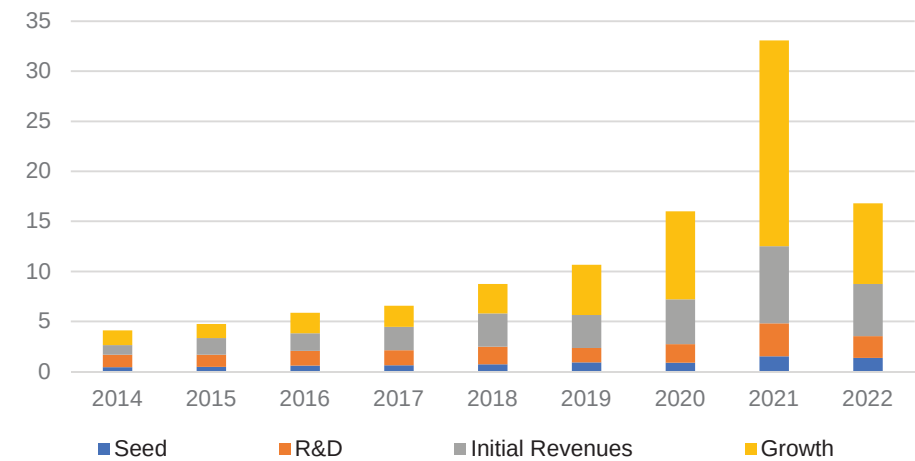
3. RAISING CAPITAL

The unprecedented wave of new issues in the previous two years subsided in 2022. This wave mainly featured young high-tech companies with no record of significant profitability, representing a higher risk than mature companies in traditional industries.

There was a a wave of IPOs on the Tel Aviv Stock Exchange in 2020–2022 that was unprecedented in the previous two decades. During this two-year period, 133 companies held IPOs. Although part of a global pattern of resurgence, activity in Israel was more intense than in other countries.[7] This wave subsided in view of the sharp drop in stock prices, and the TASE completed 2022 with a total number of IPOs slightly below its multiyear average. An examination of the industry composition of these IPOs shows that high-tech companies are prominent, especially early-stage companies that have yet to report significant profits, and which are therefore typically characterized by higher risk than more mature companies in traditional industries (For additional information, see Box 4.1). Stock performance data indicate that IPO shares generally underperform the market; that they make little if any contribution to liquidity and tradability—and consequently also to the TASE's functioning and resource allocation; and that many are subsequently delisted or become shell companies.

Tighter monetary and financial conditions reduced high-tech companies' capital raising from venture capital funds in Israel and abroad, which are the main source of financing for Israel's high-tech sector. After an extraordinary volume of capital raising by Israeli high-tech companies from venture capital funds in 2021, the capital raising activities of these companies dropped to their 2020 level, still higher than the historical average. An analysis of high-tech capital raising from venture capital funds by the stage in the firms' life shows that a significant source of the decline in capital raising activities in 2022 comes from late-stage profit-making companies.

Figure 4.12
Volume of Venture Capital Raised, by Investment Stage (NIS billion)



SOURCE: Based on IVC data.

7 "The percentage of new companies on the TASE is second in the world." TASE publications.

These companies are more sensitive to changes in short-term interest rates, which increased more sharply than the increase in long-term rates.[8] In contrast, long-term interest rates are more relevant for companies in earlier stages (seed and R&D) because these companies expect to generate proceeds only at a later date. In fact, the decline in the capital raising efforts of these early-stage companies was more moderate. For additional information on activities in the high-tech sector, see Chapter 1 of this Report.

BOX 4.1: IPOS AND AFTERMARKET PERFORMANCE

- There was a wave of IPOs on the Tel Aviv Stock Exchange in 2020–2022 that was part of a global pattern of resurgence in IPO activity. Activity in Israel was intense even compared to other countries.
- In the first five years post-IPO, equities issued in the primary market in Israel underperform other equities in the market.
- These equities make a limited contribution to market liquidity and tradability—and as a result, they are not included in TASE indices.

1. Main Findings

There was a wave of IPOs on the Tel Aviv Stock Exchange (TASE) in 2020–2022 that was unprecedented in the preceding two decades. During this two-year period, 133 companies held IPOs. A review of IPOs of new companies over time shows that IPO activity occurs in waves. A period of vigorous IPO activity shifts to a period of limited, even nonexistent, IPO activity. IPO activity is coordinated with market conditions: Activity is strong in a bull market, and decreases in a bear market (Figure 1).

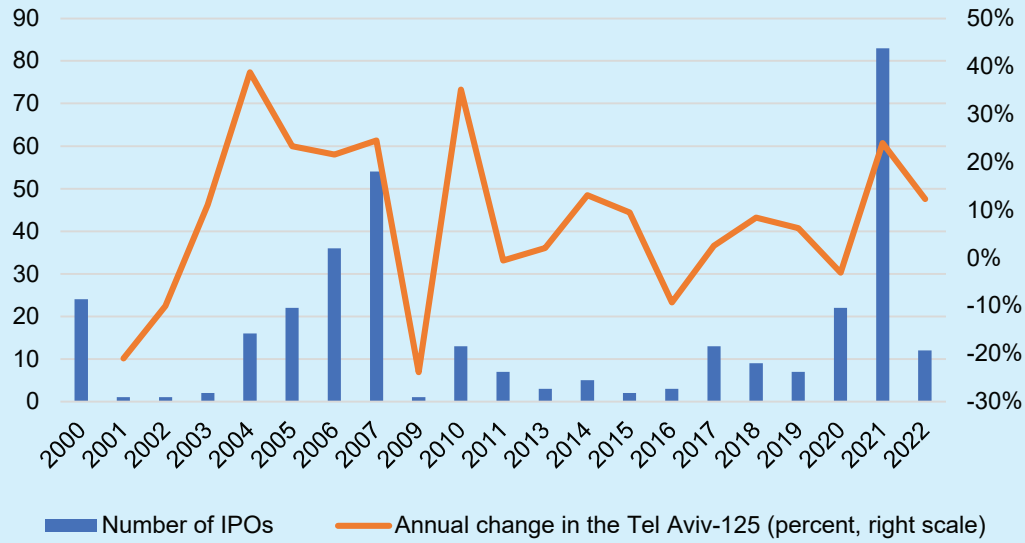
The wave of IPOs in Israel in 2020–2022 coincided with a global surge in IPOs, although activity in Israel was more intense than in other countries.[1] This Box studies the IPOs in the current and previous waves based on various parameters: loss-making IPOs[2] as a share of all issuing companies, and their aftermarket (long-term) share performance. Since companies included in the leading TASE indices are of higher quality (in terms of tradability, floating stock, etc.), we also examined whether companies that hold an IPO during such waves of intense IPO activity are subsequently included in TASE indices.

Findings show that the percentage of loss-making IPOs increases in line with the number of IPOs held in a given period, and that issuing companies (on average) deliver negative excess returns relative to the market. Furthermore, a high percentage of companies that are included in IPO waves are not eventually included in a TASE index.

1 "The number of new companies on the Tel Aviv Stock Exchange is second in the world." TASE publications.
2 Loss-making companies are companies that showed a negative profit in the year preceding their IPO.

8 In 2022, risk-free interest rates increased, which is reflected in the nominal government zero yield curve. The two-year interest rate increased from 0.23 percent to 3.5 percent and the 10-year interest rate increased from 1.44 percent to 3.38 percent.

Figure 1
Quantity of IPOs by Year, 2000–2022

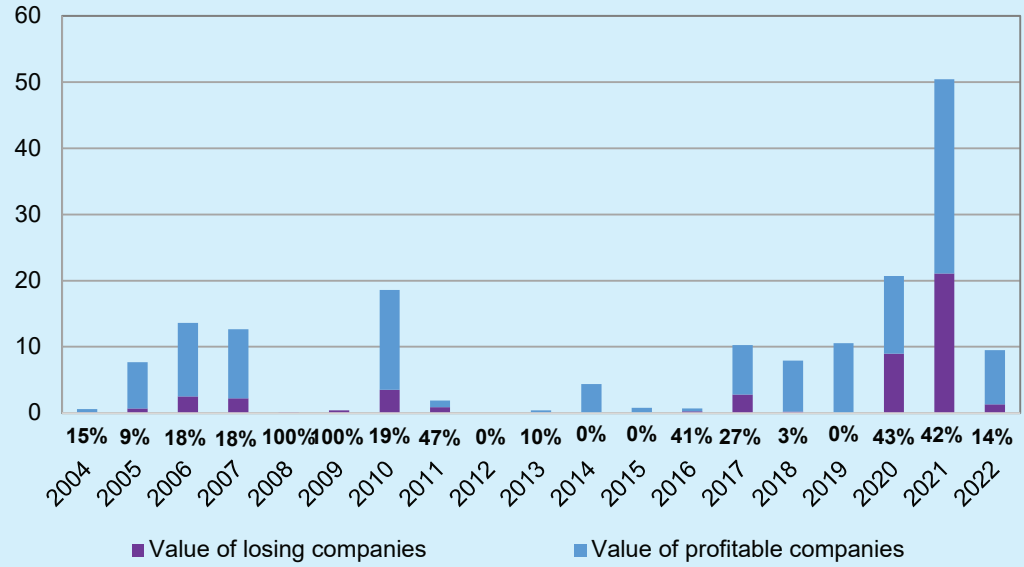


SOURCE: Based on Tel Aviv Stock Exchange reports.

2. Characteristics of IPO Waves

Based on the sample we examined (2000–2022), IPOs on the TASE occurred mainly in two waves. The first wave occurred in 2004–2007 and was interrupted in view of the Great Financial Crisis. The second wave occurred in 2020–2022, as the economy exited from the COVID-19 crisis. Activity in 2021 was unusually intense from the perspective of the past 20 years. This second wave was interrupted in 2022, as global financial conditions worsened and significant interest rate hikes were announced in Israel and around the world. An analysis of the characteristics of the companies in these two waves reveals several differences. The second IPO wave featured an unusually high percentage of loss-making companies compared to IPOs in previous years (Figure 2). One possible explanation is the composition of the companies. Issuers in the earlier IPO wave were mainly trade and service companies, while the second wave was primarily comprised of high-tech companies, which accounted for the majority (75 percent) of the loss-making companies in this wave. Profitless high-tech companies are considered to be relatively high-risk companies. They are typically early-stage companies that have yet to show profits, and therefore the uncertainty surrounding their future operations is greater than that concerning profit-making companies. As a result, the second IPO wave was characterized by a higher level of risk than the first wave.

Figure 2
Market Capitalization of Issued Companies Divided into Losing and Profitable Companies, 2004–2022 (NIS billion)



The purple color indicates losing companies (in the year prior to IPO) as a share of all companies issued in that year. **Market capitalization** is as of the last business day of the year.

SOURCE: Based on Tel Aviv Stock Exchange reports.

a. Aftermarket performance

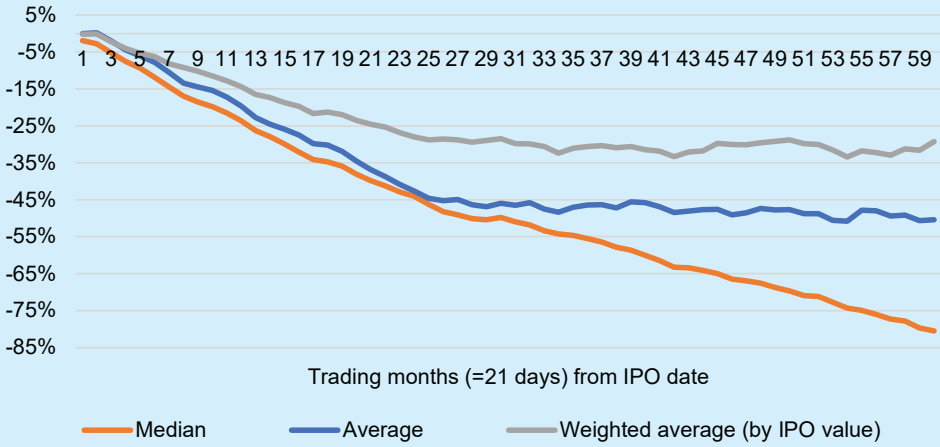
Studies on post-IPO performance showed that post-IPO shares generally underperform, which is reflected in negative excess returns relative to the market in general, and specifically compared to companies with a similar market value in the same industry.[3] In this Box, we calculated the cumulative excess returns (minus the returns on the TA 125 index) from the date of the IPO (Figure 3). These calculations show that their (median) cumulative returns become more negative over time, which implies that these companies deliver worse returns than the market after their IPO.[4] To address the fact that IPOs are not distributed uniformly over time, but instead occur in waves, for each issue year we calculated returns for a holding period of 36 trading months.[5] The results are presented in Figure 4, which shows that in most of the years examined, these shares underperformed, even during periods of strong IPO activity (the waves in 2004–2007 and the year 2020, which was part of the wave of 2020–2022).

[3] Coakley et al., 2008; Ritter, 1991; Ritter and Welch, 2002.

[4] Because companies may be delisted over time for various reasons, our calculation assumes that the money invested in delisted companies is reinvested uniformly in the shares of companies that continue to trade.

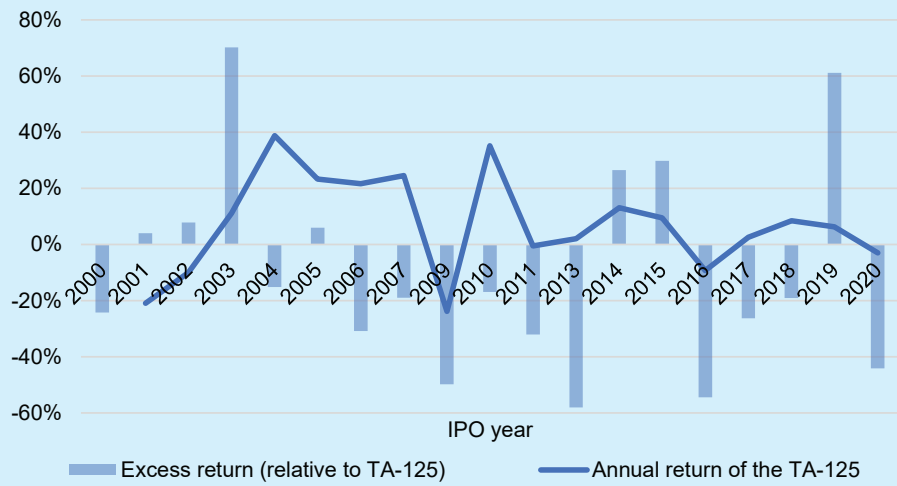
[5] A trading month is defined as 21 trading days. As a result, 36 trading months covers a period of approximately two calendar years.

Figure 3
Cumulative Excess Return on IPOs from Date of Issue (percent)



The cumulative return is calculated as the aggregate of monthly returns. The excess return is calculated as the difference between the cumulative return on a share and the cumulative return of the Tel Aviv 125 in the same period.
SOURCE: Based on Tel Aviv Stock Exchange reports.

Figure 4
Excess Return on IPO Holdings After 36 Trading Months, 2000– 2020
(percent)

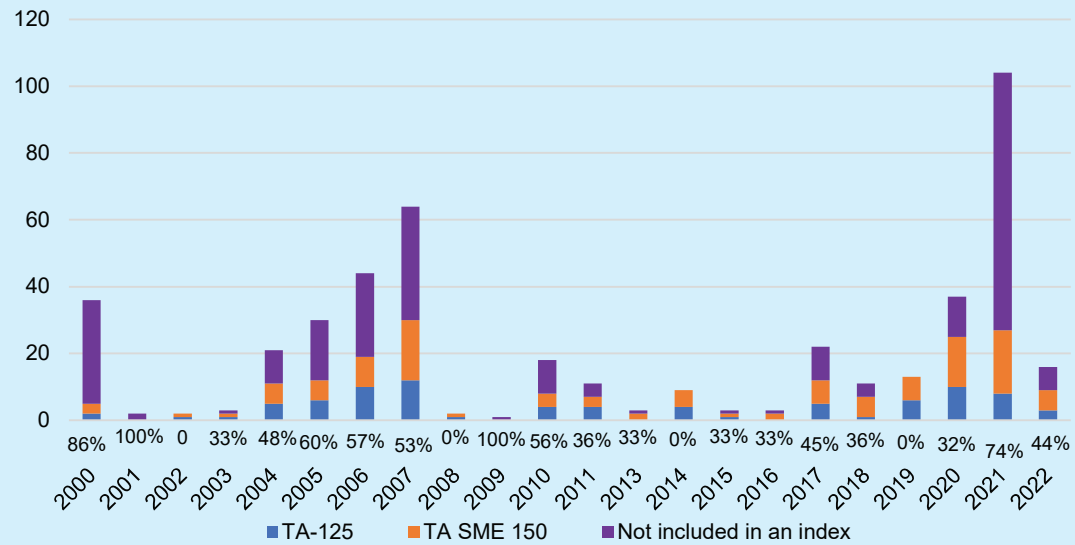


The return is calculated as the rate of change between the share price in the first trading month and its price in the 36th trading month. Trading month = 21 days.
SOURCE: Based on Tel Aviv Stock Exchange reports.

b. Inclusion in TASE indices

Trading frequency is a key factor in determining the quality of the secondary market on the TASE. The fact that most of the activity on the TASE is concentrated in a small group of companies that are included in its leading indices, while the remaining listed companies typically have lower trading volume, underscores the importance of a share's inclusion in these indices. Therefore, one criterion that may be used to examine the development of an issuing company is its inclusion in a TASE index. Inclusion in an index signifies success in two respects. First, inclusion in an index is conditional on criteria such as market cap, float amount[6], and tradability, which are determined by the TASE. As a result, joining a key index signals that the company meets the TASE's requirements and is considered a quality company. Second, inclusion in an index directs investors' attention to the company, which helps its business operations and future capital raising rounds, and even increases the trading volume of its shares. For these reasons we examined the percentage of issuing companies that were included in the TA 125 index[7] (formerly, the TA 100 index) as a benchmark of relatively large companies, and in the TA SME 150 index[8] as a

Figure 5
Tel Aviv Stock Exchange IPOs by Entry to Indices



SOURCE: Based on Tel Aviv Stock Exchange reports.

[6] Float amount is the number of shares registered for trade in the hands of the public (total outstanding shares minus shares held by parties at interest).

[7] The TA 125 index includes the 125 shares from the Rimon database with the highest market cap. The Rimon database comprises shares that meet several conditions: a minimum of 30% of the shares is held by the public, a minimum average market cap of public holdings is approx. NIS 100 million, minimum tradability (average daily trading volume) of approx. NIS 50,000 in the past half year.

[8] The TA SME 150 index includes the 90 shares with the lowest market cap in the TA 125 index, and the 60 shares with the highest market cap in the Rimon database that are not included in the TA 125 index.

benchmark of small companies. The findings, shown in Figure 5, indicate that both IPO waves had a high percentage of companies that were not successful in joining one of these indices in the post-IPO period. It is nonetheless important to note that it typically takes a company an average of 4.35 years of trading (the median figure is 3.54 years) before it is included in the TA 125 index, and 5.28 years (the median figure is 2.46 years) to be included in the TA SME 150 index. Therefore, in this respect, it is too early to assess the success of the companies that held an IPO in the second wave.

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Ritter, J. R. (1991). "The Long-Run Performance of Initial Public Offerings," *The Journal of Finance*,46(1): 3–27.

Ritter, J. R. and I. Welch (2002). "A Review of IPO Activity, Pricing, and Allocations," *Journal of Finance*, 57(4): 1795–1828.

BOX 4.2: THE PASS-THROUGH FROM MONETARY POLICY TO INTEREST ON DEPOSITS IN ISRAEL

- The increase in the interest rate on deposits in the past year only partially reflected the increase in the Bank of Israel interest rate, although the pass-through increased significantly in the final months of 2022. Incomplete pass-through was not exclusive to Israel, although the pass-through in Israel was higher than in most advanced economies.
- An empirical study of the pass-through from monetary policy to the interest rate on deposits in 30 OECD countries over two decades found that the pass-through tends to be especially weak in low interest rate environments. High liquidity surpluses and a concentrated banking system are also associated with low pass-through.
- Some of the differences between Israel and other countries, including the growth in pass-through in the final quarter of the year, may be explained by reduced liquidity and the return to a high interest rate environment, as part of a restrictive monetary policy, together with actions by the Bank of Israel to make it easier to compare bank interest rates, and a dynamic public discourse on this issue.

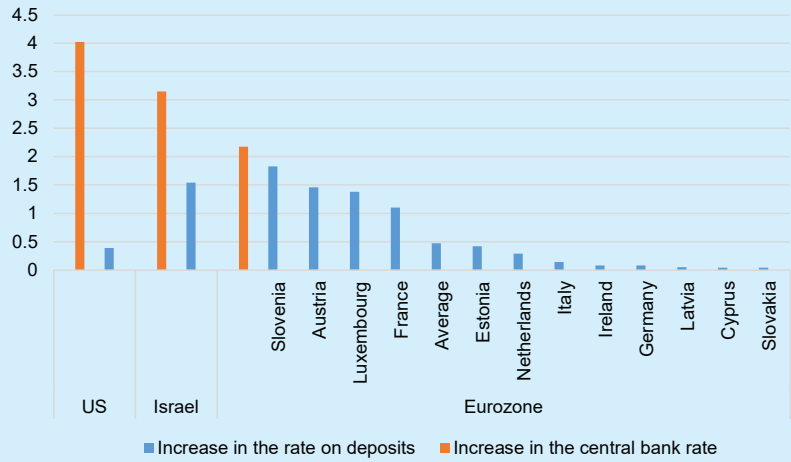
1. Background

In many countries, central bank interest rate increases in 2022 were only partially rolled over (passed through) interest rates on bank deposits. For example, Figure 1 shows the partial pass-through to interest rates on deposits in the US, the EU, and Israel, between January and December 2022—the change in central bank interest rate alongside the change in the average interest rate paid to households for new deposits of up to 3 months.[1] This Box examines several factors that potentially affect the pass-through from the central bank rate to the rate paid on bank deposits, and focuses on the effects of a low interest rate environment and banking system features, such as concentration and surplus liquidity, on the pass-through.

According to Figure 1, the pass-through from the central bank rate to the rate on deposits was close to 50 percent. In the US, the pass-through was a mere 9 percent, and in Europe the average pass-through was 21 percent. Only Slovenia, Austria, and Luxemburg had higher pass-throughs than Israel for this category of deposits during this period. The pass-through in Israel increased significantly over the course of the year. Figure 2 shows the cumulative change in the average deposit interest rate alongside the cumulative change in the Bank of Israel interest rate, and the ratio between them from April 2022 to December 2022. is the Figure clearly shows that the deposit rate increased more rapidly than the Bank of Israel interest rate. In the first four months of monetary interest rate hikes, the cumulative increase in the deposit interest rate was only about 25 percent of the cumulative increase in the Bank of Israel rate, but four months later the pass-through reached almost 50 percent.

[1] The interest rate on deposits is influenced by the time to maturity (the deposit interest rate is generally higher as time to maturity increases), the interest track and linkage, and occasionally by the deposit amount. Because the Bank of Israel rate reflects the short-term risk-free interest rate, we focused on the pass-through to interest rates on relatively short deposits of up to 3 months.

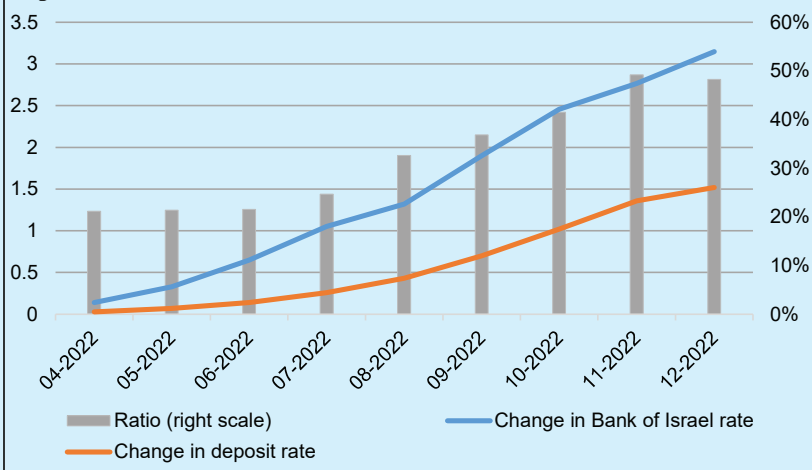
Figure 1
Change in the Interest Rate on Deposits vs. Change in the Central Bank Interest Rate, January–December 2022 (new deposits of up to 3 months, percentage points)



The change between the average central bank interest rate during the month and the interest rate on deposits in selected countries between January and December 2022. **In Israel** - The average interest rate for new unindexed fixed-rate term deposits of up to three months, total banking system, for households excluding private banking. **In the US** - The average interest rate for new fixed-rate 3-month CDs in all activity segments (households and businesses). **In Europe** - The average interest rate for new deposits in the household segment, redeemable at notice, up to three months). For eurozone countries not shown there are no available data on deposits of this type.

SOURCE: Bank of Israel, FRED, ECB.

Figure 2
Cumulative Monthly Change in the Interest Rate on Deposits and in the Central Bank Interest Rate, and the Ratio Between Them, April–December 2022



The average Bank of Israel interest rate in each month, and the average interest rate on new unindexed fixed-rate term deposits of up to 3 months, total banking system, households excluding private banking.

SOURCE: Bank of Israel.

2. Factors Affecting Pass-Through and the Situation in Israel

In this section we review three major factors that potentially affect the intensity of the pass-through from the policy rate to the rate on deposits. For each factor, we examined the situation in Israel and its potential effect on pass-through.

a. "Return to normal" – Weak pass-through in low interest rate environments

Short-term interest rates showed a significant global decline in recent years, and became negative in many economies. When central banks' interest rates declined to zero, the spread between the interest rate on deposits and the central bank rate was reduced because the banks did not apply negative interest rates to customers' deposits. Indeed, many studies from around the world found that in a low interest rate environment, changes in short-term market interest rates have a relatively weak impact on banks' interest expenses.[2] For this reason, the incomplete pass-through from the rising central bank interest rate to the rate on deposits may reflect a return to the same positive spread that existed before the zero-interest period.

Figure 3 presents the average interest rate on deposits of up to three months in Israel alongside the Bank of Israel interest rate, for the period from January 2004 to December 2015.[3] It is evident that the interest rate spread tends to diminish when the Bank of Israel interest rate approaches the zero lower bound (e.g., in 2009 and from 2015). These figures imply that historically, a decline in the central bank interest rate to a near-zero environment is associated with a diminishing spread in Israel as well, and that the opposite is also true: When the policy rate returns to a "normal" environment, the spread between it and the rate on deposits widens.

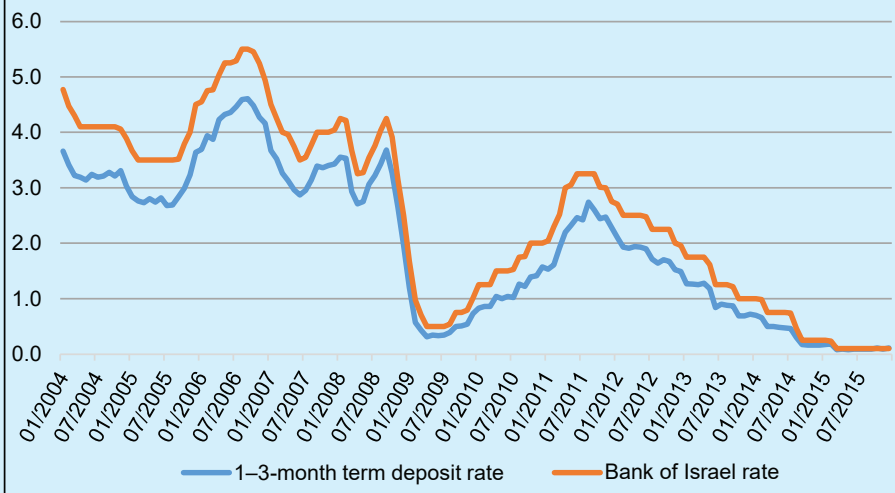
Figure 4 also illustrates the inverse association between the interest rate and the spread between the rate on deposits and the Bank of Israel rate. The negative linear relation in interest rate environments below 2 percent is especially prominent. When interest rates rise above 2 percent, the association remains negative yet is weaker, with greater distribution, which reflects increasing pass-through in high interest rate environments.[4]

[2] See for example: S. Claessens, N. Coleman, and M. Donnelly (2018). "'Low-For-Long' Interest Rates and Banks' Interest Margins and Profitability: Cross-Country Evidence," *Journal of Financial Intermediation*, 35: 1–16; N. Segev, S. Ribon, M. Kahn, and J. De Haan (2021). "Low Interest Rates and Banks' Interest Margins: Does Deposit Market Concentration Matter?" Discussion Papers Series 2021.16, Bank of Israel Research Department.

[3] The Figure does not continue after 2015 due to a change in the reporting instructions for deposit interest rates. We do, however, note that over the majority of the period from 2016 to April 2022 the deposit interest rate, like the Bank of Israel interest rate, was near-zero.

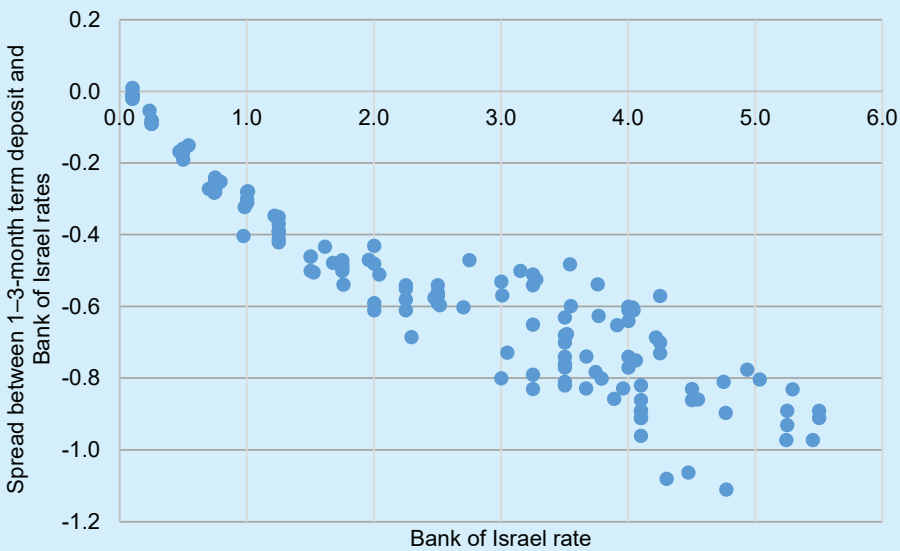
[4] Linear trajectories that are not shown in this figure indicate a slope of -0.3 in an interest rate environment below 2 percent and of -0.12 in an interest rate environment above 2 percent.

Figure 3
Average Interest Rate on Term Deposits and Bank of Israel Interest Rate, January 2004–December 2015



The Bank of Israel interest rate is the aveage daily rate in each month. The term deposit rate is the rate on unindexed fixed rate deposits of 1–3 months for the general public, total banking system.
SOURCE: Bank of Israel.

Figure 4
Ratio Between the Bank of Israel Rate and the Interest Rate Spread, January 2004–December 2015



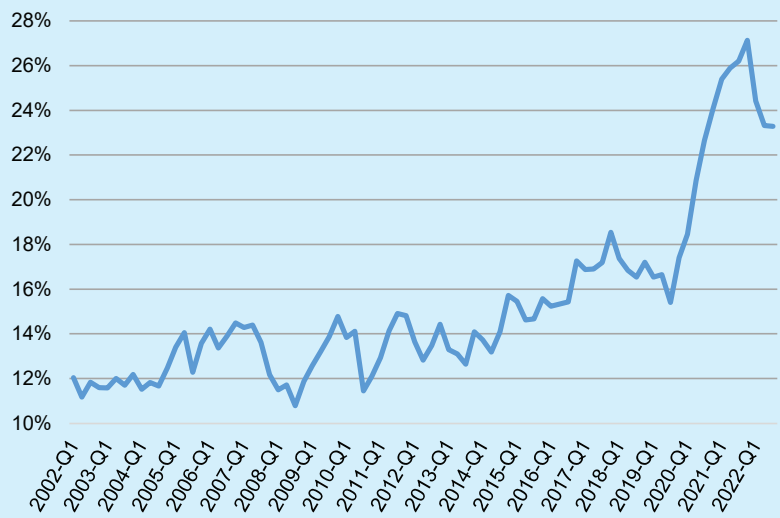
The average Bank of Israel interest rate in each month minus and the interest rate on new unindexed fixed-rate term deposits of 1–3 months, for the general public, total banking system.
SOURCE: Bank of Israel.

b. Surplus liquidity

The expansion of central banks' balance sheets since 2008 (and more intensely in view of the COVID-19 crisis) during an extended period of near-zero interest rates led to a significant increase in the reserves held by commercial banks. For example, Figure 5 shows the ratio between the banks' cash and deposits at the Bank of Israel and the total assets of the entire banking system, from 2002:Q1 to 2022:Q3.

A large liquidity surplus may reduce banking corporations' demand for deposits, thereby weakening the pass-through from the central bank interest rate to the deposit interest rate. This was the case at the beginning of the current series of interest hikes, when liquidity was at a peak. This figure also shows the decline in liquidity in 2022 in view of rising interest rates and restrictive monetary policy.[5] The decline in surplus liquidity in 2022 was also reflected in a decline in the banking system's liquidity coverage ratio, which returned to its precrisis level in the second half of 2022.[6] Although liquidity remains historically high, the growth in pass-through may have been caused by the rapid decline in liquidity and by the partial return of regulatory liquidity ratios to their precrisis levels.

Figure 5
Cash and Bank Deposits as a Share of Total Assets, Total Banking System, 2002:Q1–2022:Q3 (quarterly data)



SOURCE: Based on periodic reports from the banking system.

[5] Among other factors, the expansion of *Makam* issues (see Chapter 3 in this Report) contributed to the decline in liquidity rates.

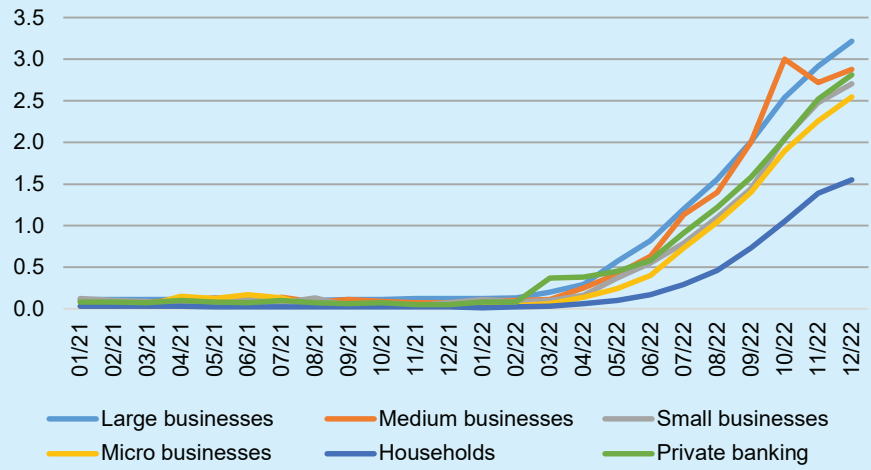
[6] For details on the calculation and the erosion of the liquidity coverage ratio, see p. 43 of the Survey of the Banking System, First Half of 2022.

c. Market power

Banks may generate value by selling product bundles to depositors, such as consumer credit and mortgages. Therefore, even banks that enjoy an adequate quantity of liquid assets and/or stable liabilities might be concerned by customers switching to other banks that pay higher interest on deposit. Banks' desire to maintain their customer base and/or attract new customers may therefore incentivize them to offer improved terms, including more attractive deposit interest rates. However, if increased deposit interest rates do not induce higher bank transition rates, this channel will weaken, and the pass-through from the policy rate to the deposit interest rate will also weaken.

The importance of this mechanism is illustrated in the differences in pass-through rates across activity segments, as shown in Figure 6. This Figure shows that the increase in the deposit interest rate was greater in the business sector than in the household sector. As noted above, the deposit interest rate is influenced by numerous factors including time to maturity, the interest track, and the deposit amount, and the differences between the sectors may therefore also reflect differences in the features of their respective deposits.[7] Still, it is reasonable to assume that the difference in deposit interest rate growth between sectors is also due to business customers' bargaining power and awareness, which exceeds those of households. For example, it is conceivable that business customers habitually compare prices and are more sensitive to differences in the terms offered

Figure 6
Average Interest Rate on Term Deposits of Up To 3 Months, by Segment, January 2021–December 2022 (monthly data)



The average interest rate on new unindexed fixed-rate term deposits of up to 3 months, total banking system.
SOURCE: Bank of Israel.

[7] Although the figure compares unindexed fixed-rate deposits of up to three months for all sectors, it is reasonable to assume that the deposits made by businesses are larger than those of households, the banks' business customers therefore benefit from higher interest rates on deposits.

to them, including differences in bank deposit interest rates. In addition, it is possible that the large revenues that businesses generate for banks, through their ongoing operations, makes them attractive customers, which increases businesses' bargaining power.

3. An Empirical Model – Change in Pass-Through Over Time in OECD Countries

The analysis in the previous section points to at least three mechanisms that can explain the weak pass-through from the central bank rate to the deposit interest rate that was recorded globally, including in Israel: a low interest rate environment, surplus liquidity, and market power. In this section we present a simple empirical analysis to examine whether these factors are indeed associated with pass-through intensity, based on two decades of bank data from OECD countries.

For this study we used data from the Fitch Connect database, which provides data on the balance sheets of banks around the world, and specifically in the OECD countries. The data include 144,216 observations for 9,828 banks in 30 countries between 2004 and 2019.[8] The empirical method is based on the estimation of a simple panel data regression with fixed effects for time and bank, which examines the association between the annual change in the short-term market rate and the change in the effective interest rate on a bank's liabilities:[9]

$$(1) \quad \Delta Y_{i,t} = \alpha_i + \gamma_t + \Delta r_{i,t} + \varepsilon_{i,t}$$

where $\Delta Y_{i,t}$ is the change in the effective interest at bank *i* between year *t* and year *t-1*, and $\Delta r_{i,t}$ is the change in the short-term market rate in the same period in the bank's operating country.[10] γ_t ו α_i and are fixed variables for bank and time, respectively.[11]

To examine the effect of interest rate, liquidity, and market power, we estimated the basic regression, including interactions between several variables. To assess the effect of a low interest rate environment we added a dummy variable that takes a value of 1 when the interest rate is below 1.25 percent.[12] In addition, to examine the effect of liquidity and concentration in the

[8] Eight OECD countries are excluded from the estimation due to a lack of data: Iceland, Estonia, Hungary, Turkey, Japan, Luxembourg, Chile, and Cota Rica.

[9] The effective interest rate is defined as total interest expenses divided by total interest-bearing liabilities. The use of this interest rate does not take into account differences in types of liability, but it is very common in the literature. See, for instance, J. A. Lopez, A. K. Rose, and M. M. Spiegel (2020), "Why Have Negative Nominal Interest Rates had Such a Small Effect on Bank Performance? Cross Country Evidence", *European Economic Review,* 124: 103402; A. Kang-Landsberg and M. Plosser (2022), "How Do Deposit Rates Respond to Monetary Policy?" *Liberty Street Economics,* November 21, 2022, Federal Reserve Bank of New York.

[10] Due to the differences between countries' definitions of "the central bank interest rate" and according to the literature, we use the short-term interest rate published by the OECD (see https://data.oecd.org/interest/short-term-interest-rates.htm).

[11] Following Lopez et al. (2020), who used a similar database to examine how negative interest rates affect banks' profitability, the basic regression does not include additional control variables. Nonetheless, the results are robust to the inclusion of lagged bank-level control variables of one period.

[12] The interest rate level that represents a low interest rate environment was selected according to the literature. For example, see the references in footnote 3, as well as C. Borio and L. Gambacorta (2017), "Monetary Policy and Bank Lending in a Low Interest Rate Environment: Diminishing Effectiveness?" *Journal of Macroeconomics*, 54: 217–231.

banking system, we also added interactions with the reserve to asset ratio in each bank and the Herfindahl–Hirschman index (HHI), which captures the concentration of the banking system.[13]

Table 1 presents the results of the regression estimate. The table presents only the coefficient of the change in interest rates and the interaction coefficients in order to focus on each variable's effect on the basic association between the short-term market interest rate and the banks' interest expenses.[14] The table is divided into columns, and in each column we added one of the variables that potentially affects pass-through intensity. The final column shows the results of the regression model that includes all the variables, which allows us to isolate the effect size of each variable. The table offers several insights. First, the basic association between the short-term market interest rate and the banks' interest expenses is positive and statistically significant, as expected. We stress that since the interest rate is calculated on the basis of the banks' total interest expenses relative to their liabilities, the association is influenced by the composition of those liabilities, and especially by their time to maturity (effectively, this is the percentage of deposits renewed during the year).[15] It is therefore important to view these primarily as theoretical results that offer an overall indication of the direction of the variables' effects and the relationship between them, and not as a precise predictor of pass-through intensity.

A low interest rate environment weakens the pass-through rate, which is evident from the negative coefficient of the interaction between the low interest rate dummy variable and the change in the short-term interest rate. It does appear that the relation between the short-term interest rate and the deposit interest rate tends to be stronger when the banking system is less concentrated, and for banks that hold less liquidity, which is reflected in the negative coefficient of the interaction term between these variables and the change in the short-term interest rate. The regression thereby indicates that structural features of the banking system, such as concentration, may affect the pass-through (which may be weakened by high concentration) and that dynamic factors that are affected by a restrictive monetary policy may also affect the pass-through (which may be weakened by a transition to a non-zero interest rate environment and decline in liquidity). In view of the historical data, the weak pass-through rate at the beginning of the recent series of interest rate hikes is not surprising, and may primarily reflect a return to pre-zero-interest-rate spreads and a reduction in surplus liquidity.

A comparison of the end-of-2021 data for banks in Israel and other countries in the sample indicates that the banking system in Israel was characterized by very high reserve ratios (the top decile of the distribution) and high concentration (the top third of the distribution). Because all the countries in the sample started their current series of interest hikes from a similar near-zero

[13] The HHI is calculated for the entire banking system each year. The index calculated by squaring the market share of the deposits in each bank, and then summing the resulting numbers.

[14] The remaining variables, such as HHI, the reserve ratio, and the dummy variable for low interest rate were calculated as part of the regression estimation but are not shown. HHI and the reserve ratio are continuous positive variables smaller than 1.

[15] Although the fixed variable for each bank should reduce the effects of the fixed differences across the banks, it is possible that in at least some of the banks experienced a change in the type of their financing sources over the period. Moreover, the data are annual and it is reasonable to assume that a significant portion of the deposits will renew each period, which should also reduce this bias.

interest rate environment, the starting point of the banking system in Israel at end 2021 apparently cannot explain the relatively high pass-through rate in 2022. We may therefore assume that the differences between countries are due to two possible factors. First, it is possible that the regression variables improved more rapidly in Israel than in the rest of the world. For example, liquidity ratios may have declined more rapidly in Israel.[16] Second, it is possible that the pass-

Table 1:
Results of the regression estimation

	Change in the effective interest rate on all liab			
	(1)	(2)	(3)	(4)
Change in short-term interest rate	0.2914***	0.2963***	0.3048***	0.2998***
	0.0059-	0.0062-	0.0047-	0.0053-
Change in short-term interest rate * low interest payments		-0.1491***		
		0.0103-		
Change in short-term interest rate * HHI			***0.1788-	
			0.0585-	
Change in short-term interest rate * reserves to assets ratio				***0.2511-
				0.049-
Bank fixed effect	V	V	V	V
Time fixed effect	V	V	V	V
Number of observations	144,216	144,216	144,216	144,216

This table shows the results of the estimation of Equation 1. Column (1) shows only the link betwe the short-term interest rate and the effective interest rate on liabilities. Column (2) shows the coe interaction with a dummy variable that obtains the value 1 in years in which the short-term interest r 1.25 percent. Column (3) shows the coefficient of the interaction with the deposit concentration which obtains a value of between 0 and 1 (median is 0.04). Column (4) shows the coefficient of with each bank's reserves to assets ratio, which obtains a value of between 0 and 1 (median is 0.03 shows the results when all additional variables are added to the regression together. An OLS estima and time fixed effects. The dependent variable is the change in the effective interest rate on all li annual interest expenses divided by the average interest-bearing liabilities). Standard deviations of g appear in parentheses. The sample period is 2004–2019. ***p<0.01; ** p<0.05; * p<0.1

[16] We could not test this hypothesis because balance sheet data as of end 2022 were not available for the vast majority of the banks in the sample.

through rate in Israel was strengthened through other variables that were not included in the regression. For example, the vigorous debate in the media on deposit interest rates, alongside the Bank of Israel's actions to increase the public's awareness of differences in interest rates between banks and improve the transparency of banks' interest rate data, contributed to competitive pressure and strengthened the pass-through, beyond the effects of the changes that occurred in the above explanatory variables.

4. Conclusion

The increases in the Bank of Israel's interest rate in 2022 were accompanied by a pass-through to the deposit interest rate that was partial yet higher than in other developed countries, and even increased in the final months of 2022. This Box examined several factors that may affect the pass-through and therefore may offer a possible explanation for differences in the pass-through between countries and for the changes in the pass-through intensity in Israel over time.

We found that the weak pass-through at the beginning of the current round of interest rate hikes can be explained by a return to the spreads that existed before the near-zero interest rate era, and by the large liquidity surplus in the banking system, among other factors. After leaving the near-zero interest rate environment and declining liquidity ratios, the pass-through began to increase. The analysis indicates that the differences between countries may also be due to these factors. For example, in Europe, the central bank started raising its interest rate at a later stage and interest rates remain relatively low. Consequently, the weak pass-through in Europe may reflect the effects of the transition from a near-zero interest rate environment. In contrast, interest rates in the US increased even more strongly than in Israel, but the liquidity surplus in the US banking system at the end of 2022 was significant.[17]

The analysis in this Box also shows the effect of the structural factors that characterize the banking system—especially concentration and competition—on the pass-through. It is conceivable that some of the actions to increase competition this year, such as increasing the public's ability to compare interest rates by increasing the transparency of banks' interest rates, as well as the vigorous public and media debate on this topic, also contributed to the increase in pass-through over the year.

[17] See for example: A. Kang-Landsberg and M. Plosser, (2022), "How Do Deposit Rates Respond to Monetary Policy?" *Liberty Street Economics,* November 21, 2022, Federal Reserve Bank of New York..

Chapter 5

Labor Productivity in Israel in the Past Decade

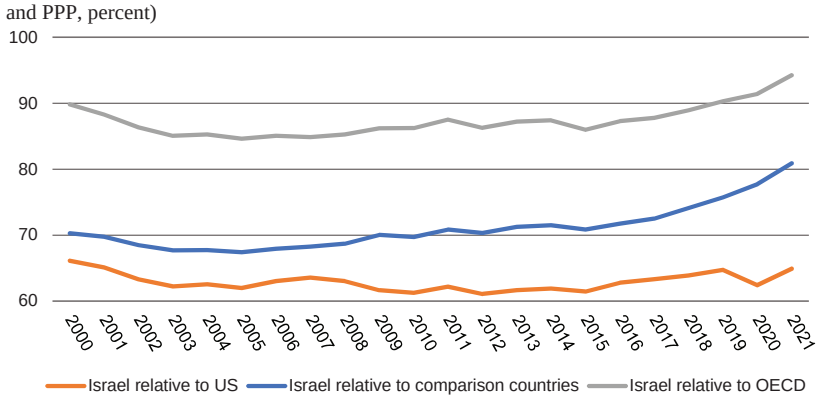
- The growth of GDP per worker (labor productivity) in Israel accelerated in the past decade, and the gaps relative to other OECD countries have begun to narrow. This trend intensified with the exit from the COVID-19 crisis.
- The growth of economy-wide productivity in the past decade was mainly due to an increase in industry productivity, particularly in the services industries. In contrast, the change in the distribution of employees among the industries made almost no contribution.
- By international comparison, the change in productivity in the Israeli services industries made a larger contribution than the OECD average, thanks to a greater increase in productivity in the Israeli services industries and due to their greater weight in GDP.
- The increases in productivity and employment in the services industries were not only due to the activity of the high-tech sector, but also encompassed additional industries. Productivity in the trade, communications, and banking industries increased due to streamlining as a result of reforms to encourage competition, as well as improved service through the implementation of online technologies.

Labor productivity (gross domestic product per worker or per work hour) that is lower than the OECD average has been one of the fundamental problems of the Israeli economy. The Bank of Israel's Research Department has attributed tremendous importance to the issue over the years, and has published comprehensive research studies about it, including various policy recommendations.[1] Labor productivity reflects the economy's production capacity through a given labor force—hence its importance. The more workers' output increases, the higher the country's standard of living (per capita GDP) is, and the higher real wages are. Understanding the processes and the factors that affect economy-wide labor productivity are essential for improving the standard of living and promoting sustainable economic growth.

In the past decade, the growth of labor productivity (GDP per worker) has accelerated, and the gap relative to other advanced economies has narrowed.

Following two decades in which the gap in labor productivity (GDP per worker) between Israel and other advanced economies remained steady or widened, the pace of increase in labor productivity in Israel accelerated in the past decade. At first, the acceleration was moderate, but in the second half of the decade, it was more rapid, and the gap relative to other advanced economies narrowed (Figure 5.1). The stronger recovery of the Israeli economy, and of labor productivity in Israel, following the COVID-19 crisis strengthened this trend. A similar conclusion is derived when looking at the changes in GDP per work hour (Figure 5.2).

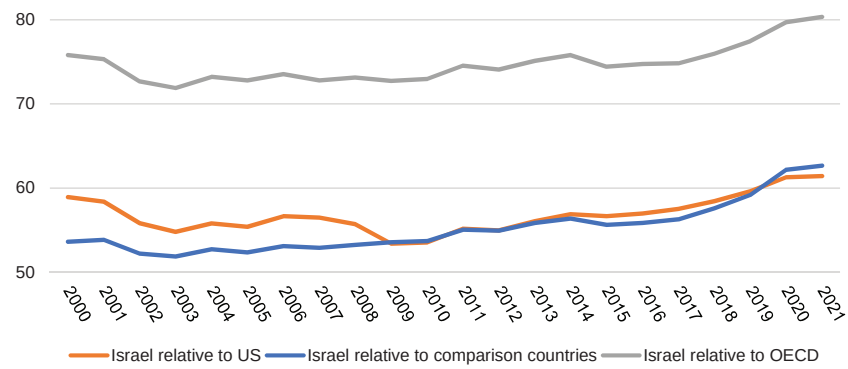
Figure 5.1
GDP per Worker: Israel and the OECD, 2000–2021
Development of Israel's GDP per worker compared with selected countries (in 2021 fixed prices and PPP, percent)



GDP per worker in Israel as a share of GDP per worker in selected countries. Comparison countries: Small and advanced economies—Austria, Belgium, Denmark, Netherlands, Sweden, and Finland.
OECD average and comparison countries average are the simple averages.
SOURCE: Based on OECD.

[1] See: "Research Department Special Report: Raising the Standard of Living in Israel by Increasing Labor Productivity" (2019); "Four Recommended Pillars of Strategic Government Action to Accelerate Economic Growth and a Fiscal Framework for Financing Them" (2021); and "Recommended Strategic Pillars of Action for the Government" (2023).

Figure 5.2
GDP per Work Hour: Israel and the OECD, 2000–2021
Development of Israel's GDP per work hour compared with selected countries (in 2021 fixed prices and PPP, percent)



GDP per work hour in Israel as a share of GDP per work hour in selected countries. Comparison countries: Small and advanced economies—Austria, Belgium, Denmark, Netherlands, Sweden, and Finland.
OECD average and comparison countries average are the simple averages.
SOURCE: Based on OECD.

In this Chapter, we examine the development of labor productivity (GDP per worker) in Israel over the past two decades compared with other advanced economies, looking at both industry productivity and the industry structure of the economy (distribution of employees among industries). Since economy-wide labor productivity is an average of the labor productivity of the various industries weighted by the rate of employees in each industry as a share of total employees in the economy, we distinguish the contribution of the improvement in labor productivity within the industries ("intra-industry contribution") from the contribution of the change in the industry structure of the economy—the change in the distribution of employees in the various industries ("inter-industry contribution").

Labor productivity in the economy is examined while distinguishing between the contribution of industry productivity and the contribution of the change in the distribution of employees between industries.

Empirical studies point to systematic differences between countries in how the industry structure and labor productivity develop in different industries. The process of structural change is similar among countries, but differs in timing and speed of occurrence. In advanced economies, the process is reflected in a decline in the share of manufacturing industries in favor of services industries. A number of explanations for the structural change process are offered. One explanation on the demand side is that the increase in the standard of living changes private consumption patterns in favor of higher consumption of services.[2] The effect of such a process on economy-wide productivity depends on the productivity of the services industries relative to that of manufacturing. On the supply side, one explanation states that the manufacturing industries' high exposure to international competition, technological changes, and streamlining processes leads to an increase in productivity, but also to a lower number

[2] See D. A. Comin, D. Lashkari, and M. Mesieri (2021). "Structural Change with Long-Run Income and Price Effects", *Econometrtica*, 89(1): 311–374, which analyzes the effects of changes in private consumption patterns.

of employees in those industries.[3] Another reason for the structure change is an increase in the labor force participation rate, which focused on professions in the services industries.[4]

The process of structural change does not necessarily contribute to productivity growth. The process makes a positive contribution to productivity growth only if the growing industries are based on more efficient firms.

This structural change may be an important source of economic growth if it improves the allocation of sources in the economy and includes the movement of workers from industries with low productivity to ones with high productivity. In other words: The transition may increase productivity if the growing industries are based on more efficient firms. However, since there are a number of reasons for employees' movement, the contribution of structural change to economy-wide productivity growth is not necessarily positive. Moreover, employee movement from one industry to another does not change the human capital they bring with them, which affects labor productivity. A structural change may also reflect changes in the supply of labor, such as an increase in the labor force participation rate, due to the entry of workers with low skills and low earning capacity—an increase that contributes to GDP but reduces average labor productivity.

This analysis examines productivity growth from an industry perspective, separating the contribution of structural change from the contribution of the change in GDP per worker in the industries themselves. For this purpose, we break down productivity growth into two components according to the following formula:[5]

$$\Delta Y_t = \sum_{i=n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=n} y_{i,t} \Delta\, \theta_{i,t}$$

where Y_t and $y_{i,t}$ relate to economy-wide and industry labor productivity (GDP per worker) respectively, $\theta_{i,t}$ denotes the rate of employees in industry *i* as a share of all employees in the economy, and represents the difference between the beginning and end of the period. The first expression in the equation reflects the contribution of the change in industry productivity, weighted by the share of employees in each industry at the beginning of the period. The second expression reflects the contribution of the

[3] There are a number of studies outlining these processes. One examines the function of human capital in the growth of GDP per worker in the services industries: F.J. Buera and J.P. Kaboski (2012). "The Rise of the Service Economy", *American Economic Review*, 102(6): 2540–2569. Another discusses how technological changes affect structural change: H. Herrendorf, C. Herrington, and A. Valentinyi (2015). "Sectoral Technology and Structural Transformation", American Economic Journal: Macroeconomics, 7(4): 104–133.

[4] Goldin (1995) examines the effects of women's increased labor force participation on the development of structural changes: C. Goldin (1995). "The U-Shaped Female Labor Force Function in Economic Development and Economic History", in T.P. Schultz (ed.) "Investment in Women's Human Capital and Economic Development", University of Chicago Press, pp. 61–90.

[5] Found, for example, in M.S. McMillan, D. Rodrik, and C. Sepulveda (2017). "Structural Change, Fundamentals, and Growth: A Framework and Case Studies", International Food Policy Research Institute, and World Bank, Washington DC.

change in the industry structure derived from the change in the distribution of workers among the industries, weighted by the industry productivity at the end of the period.

In the past two decades, the Israeli economy, as well as those of other countries, has been affected by various global processes that may have an impact on labor productivity. These include the global intensification of demand for digital services, which has increased the activity of the high-tech sector; the removal of limitations on imports; the advancement of regulatory leniencies to make it easier to do business; and the removal of barriers from the financial system, which has made it easier for foreign investors to enter Israel's financial markets and increased the availability of capital for businesses. Since these processes should affect industry labor productivity and the distribution of workers among industries in the Israeli and other economies in various ways, we examine how the state of the economy has changed during the period relative to other economies.

The database that is used includes data on employment and labor productivity, and is measured using value added per employee in dollars, in Israel and in about 30 other OECD countries. The analysis at the main industry level covers the years 2000–2019. Due to data limitations, the analysis at the two-digit industry level covers only 42 industries (which produce about 90 percent of business output), and relates to a smaller range of years (2012–2018). The source of the data on the other OECD countries is the OECD.stats database. Due to partial data on Israel in this database, the data at higher detail levels are taken from the Central Bureau of Statistics, and processed at the Bank of Israel. All value-added data are in fixed prices, and translated to US dollars by the PPP rate of general GDP for 2015.[6]

1. THE DEVELOPMENT OF LABOR PRODUCTIVITY BETWEEN 2000 AND 2019—MAIN INDUSTRIES AND INDUSTRY AGGREGATES

In the past two decades, the contribution of labor productivity in the manufacturing and agriculture industries to economy-wide productivity has declined, and the contribution of increased productivity in the services industries has grown. Structural change made almost no contribution to the increase in economy-wide labor productivity.

We first examine the long-term trends over the past two decades for the manufacturing, agriculture, and services industries in Israel compared to the OECD average, divided into two periods—2000–2010 and 2010–2019 (excluding the COVID-19 crisis of 2020–2021), presented in Figure 5.3.[7] The economy-wide labor productivity growth path in this Figure is in line with the path presented in Figure 5.1. Labor productivity growth in these industries in Israel was moderate at the beginning of the 2000s (8.6 percent), and strengthened over the past decade (22.4 percent), which is unlike the trend in the other countries (19.6 percent and 13.3 percent respectively).

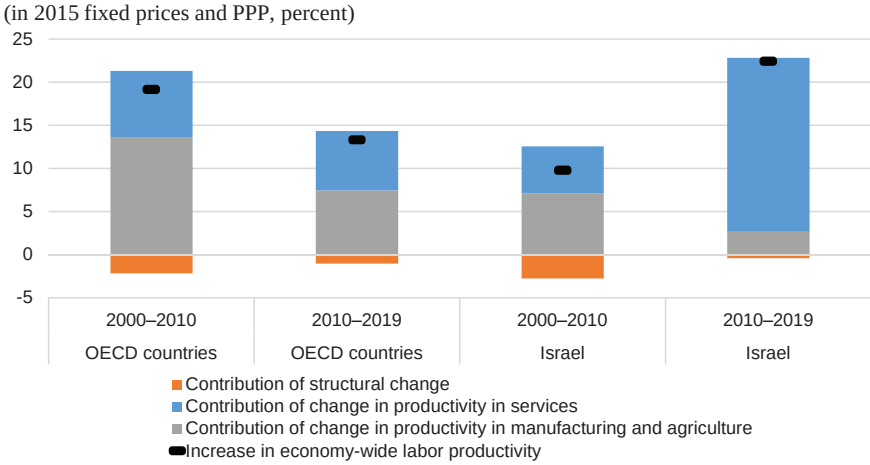
The Figure shows that the contribution of productivity growth in the manufacturing and agriculture industries to economy-wide productivity declined between the periods, both in Israel and in the OECD average. At the same time, the contribution

6 For more on the structure of the data, see Appendix A5.1

7 The services industries: trade; transport and storage services; accommodation and food services; information and communications; financial and insurance services; professional and scientific services; and management and support services. The manufacturing and agriculture industries also include the mining and quarrying industry and the electricity and water industry.

of increased productivity in the services industries grew in Israel, while the average contribution was stable in the other OECD countries. With regard to the industry structure of the economy, the rate of employees in the services industries relative to the manufacturing and agriculture industries, increased in Israel. This was in line with the long-term global trends documented in the economic literature. Since workers moved between industries with similar productivity levels at the end of the period (on average), the structural change made almost no contribution to the increase in economy-wide labor productivity.

Figure 5.3
Contribution of the Change in Industries' Productivity and Structure to the Change in Economy-Wide Labor Productivity, Selected Business Sector Industries, Israel Compared to the OECD Average, 2000–2010 and 2010–2019
(in 2015 fixed prices and PPP, percent)



The analysis does not include Turkey, Australia, Chile, Colombia, Canada, New Zealand, Japan, or South Korea due to a lack of data. The manufacturing and agriculture industries include the mining and quarrying and the electricy and water industries (B–E). The services industries include the trade, transport and storage services (G–I), information and communications (J), financial and insurance activities (K), and professional, scientific, and technical activities (M–N) industries. Economy-wide labor productivity includes all of these industries. The OECD average is the simple average of the countries included in the analysis.

SOURCE: Based on OECD.

2. THE DEVELOPMENT OF LABOR PRODUCTIVITY BETWEEN 2012 AND 2018 IN INDUSTRIES THAT WERE EXAMINED AT AN EXPANDED DETAIL LEVEL

In view of the above analysis, we try to understand why the change in the productivity of the services industries made a greater contribution by international comparison. Due to data limitations, the analysis at the higher detail level relates, as stated, to the years 2012–2018 only.

We first examine labor productivity and the rate of employees divided into the trade and services industries and the manufacturing industries (Table 5.1). At the end of the period, labor productivity in the services industries in Israel was similar to the OECD average (the ratio between labor productivity in Israel and in the OECD increased

from 92 percent to 100 percent). At the same time, productivity in the manufacturing industries was lower (the ratio declined from 102 percent to 89 percent). The rate of employees in the manufacturing industries in Israel, which was lower than the OECD average, declined even more, while the rate of employees in the trade and services industries increased.

Table 5.1
Labor productivity and the distribution of employees in selected business sector industries, Israel and OECD, 2012–2018

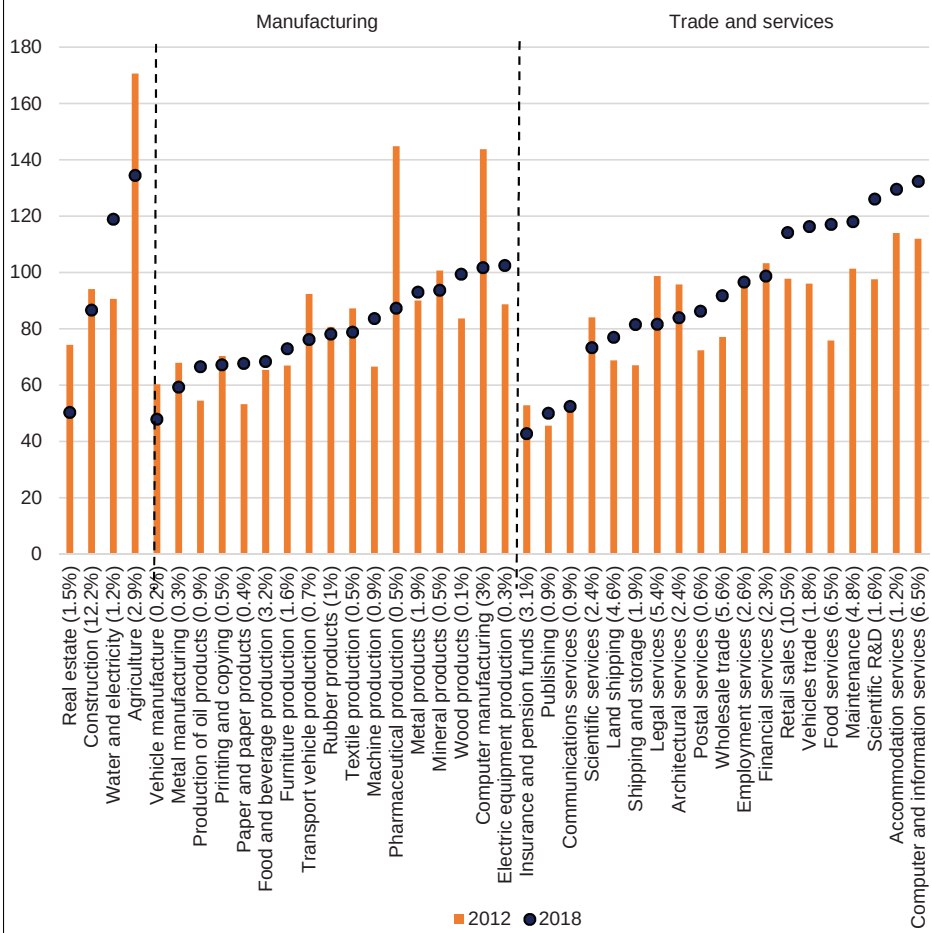
		Manufacturing		Trade and services	
		2012	2018	2012	2018
Israel	Percentage of employees	19.2	17.6	66.7	67.1
	Labor productivity ($ thousand)	89	88	65	77
OECD average	Percentage of employees	22.4	21.9	59.8	61.6
	Labor productivity ($ thousand)	87	98	71	77

The OECD average is the simple average of the countries included in the analysis. The analysis does not include Australia, Chile, Colombia, Costa Rica, Ireland, Japan, or Luxembourg. In some industries up to 2 additional countries were omitted due to a lack of itemized industry details. In some countries, up to 4 industries that appear in the analysis were omitted. All of the industries in the analysis cover about 90 percent of business sector output. GDP per worker is in fixed PPP for 2015.
SOURCE: Based on OECD and Central Bureau of Statistics.

Figure 5.4 shows the ratio of industry productivity in Israel—industry productivity compared to the OECD average—at the beginning and at the end of the sample period. We find that there are large differences in the industry productivity gaps between the Israeli economy and the OECD average, which were extensively documents in previous papers.[8] In general, the tradable industries, including the high-tech sector and the high and mixed-high technology manufacturing industries, enjoy a higher productivity ratio. Previous studies even found that in these industries, the rate of skilled workers is higher by international comparison, as is investment in physical capital as a share of GDP compared to parallel industries in other advanced economies.

[8] Studies that examined productivity in Israel relative to the average of the advanced economies are included in: Bank of Israel, Annual Report for 2012 (Chapter 2); Bank of Israel, Annual Report for 2013 (Chapter 2); and Bank of Israel, "Research Department Special Report: Raising the Standard of Living in Israel by Increasing Labor Productivity" (2019). Another paper examined the changes in the high-tech industry and their contribution to productivity: G. Brand (2017). "Why Does Productivity in the Start-Up Nation Remain Low?" Taub Center for Social Policy Studies in Israel, Policy Paper number 06.2017.

Figure 5.4
Industry Productivity Ratio, Selected Business Sector Industries, Israel Compared to the OECD Average, 2012–2018 (GDP per worker, in 2015 fixed prices and PPP, percent)



Industry GDP per worker in Israel as a share of industry GDP per worker in the OECD countries. The analysis does not include Australia, Chile, Colombia, Costa Rica, Ireland, Japan, or Luxembourg. In some industries up to 2 additional countries were omitted due to a lack of itemized industry details. In some countries, up to 4 industries that appear in the analysis were omitted. The mining and quarrying industry is included in the analysis but does not appear in the Figure. All of the industries in the analysis cover about 90 percent of business sector output. The numbers appearing alongside the industry names denote the percentage of employees in the industry as a share of the employees in the industries included in the analysis.
OECD average is the simple average of the countries included in the analysis.
SOURCE: Based on OECD and Central Bureau of Statistics.

A comparison of the change in industry productivity in Israel relative to the OECD average between the two periods indicates an increase in labor productivity in most of the services industries, and mixed trends in the manufacturing and

agriculture industries (Figure 5.4).[9] The growth in productivity of the computer and information services industry and of the information and development industry, which are included in the high-tech sector, was higher than in other countries. The same was true of growth in productivity of the accommodation and food services industry and the trade, finance, and insurance industries, where steps were taken in the past decade to increase competition and to increase online services.[10] In contrast with the improvement in these industries, a number of industries lost their relative standing. The decline in relative industry productivity was prominent in a number of manufacturing industries, including pharmaceuticals—perhaps in view of the crisis encountered by some companies in the industry—and the computers and electronics industry after it accelerated rapidly at the beginning of the decade due to the increase in production capacity of the microchip industry.

A comparison of the change in industry productivity in Israel between 2012 and 2018 to the OECD average indicates significant growth in relative labor productivity in most of the services industries, and mixed trends in the manufacturing and agriculture industries.

Figure 5.5 shows the change in the industry distribution of employment between 2012 and 2018 in Israel and in the OECD average. Most of the changes were in the services industries, while most of the manufacturing and agriculture industries shows moderate declines in the employee rates, both in Israel and in the other countries. Another finding presented in the Figure is that despite the correlation between the change in Israel's industry distribution of employees and the change in the other countries, the volume of transitions between the services industries themselves in Israel was higher.[11] It is interesting to see that employment in Israel increases not only in the computer and information services industry, thanks to increasing global demand, but also in the services industries that serve the domestic market, such as legal, accounting, and administrative consulting services, scientific and technical publication services, and architecture and engineering services. In contrast, employment in some of the manufacturing and service industries declined in view of the increase in the volume of online trade and services, streamlining processes, and reforms to encourage competition (in the computers and electronics, communications, financial and insurance activities, and retail trade industries).

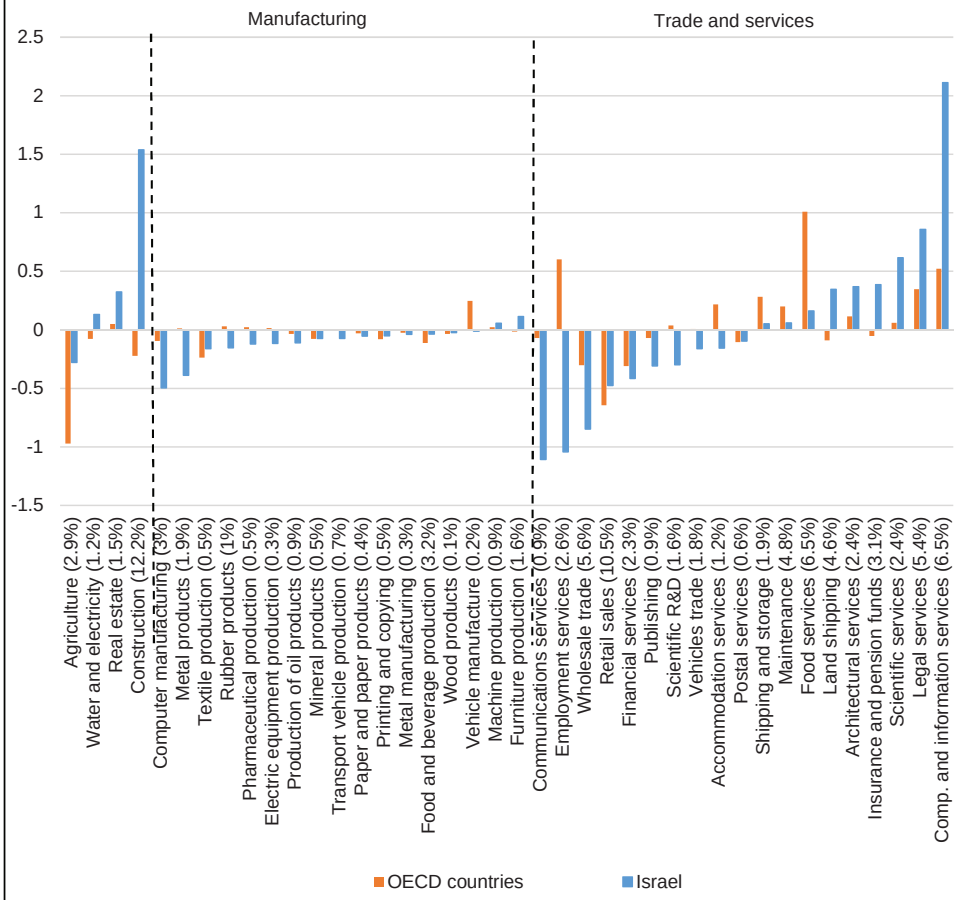
The main changes in the industry distribution of employment were in the services industries, while in most of the manufacturing and agriculture industries, the rate of employees declined moderately, like in the other countries.

[9] Regev and Brand (2015) examined the change in industry productivity and the change in the composition of workers between 1995 and 2012, and found that the nontradable industries with low productivity as well as a number of manufacturing industries that sell mainly to the domestic economy are responsible for most of the widening of the productivity gaps between Israel and the other OECD countries during the period. See E. Regev and G. Brand (2015), "Causes of the Widening of Productivity Gaps between Israel and the OECD: A Multiyear Industry-Level Comparison", State of the Nation Report: Society, Economy and Policy in Israel, 2015.

[10] Various steps were taken to increase competition since the social protests of 2011. Among other things, the law to increase competition and reduce concentration in the banking market was enacted (implementing the 2015 recommendations of the Strum Committee); a reform in the wholesale market was implemented (covering the 2014 recommendations of the Gronau and Hayek Committee); and a number of government committees were established to deal, among other things, with examining the cost of food (Trajtenberg Committee and Kedmi Committee in 2011 and Lang Committee in 2015). In addition, the use of online technologies increased in various fields, such as the use of digital means to make card-not-present payments and bank transactions (Bank of Israel Annual Report for 2021, Chapter 1).

[11] The variance in the change in the distribution of workers in the services industries in Israel was 0.08 percentage points, compared with a lower variance in the other countries.

Figure 5.5
Change in Industry Employment as a Share of Total Employment, Selected Business Sector Industries, Israel Compared to the OECD Average, 2012–2018 (percentage points)



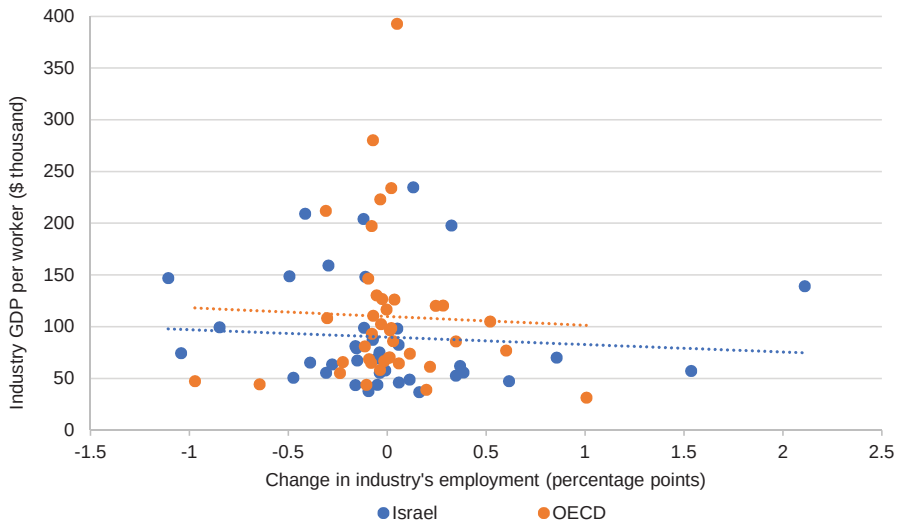
The analysis does not include Australia, Chile, Colombia, Costa Rica, Ireland, Japan, or Luxembourg. In some industries up to 2 additional countries were omitted due to a lack of itemized industry details. In some countries, up to 4 industries that appear in the analysis were omitted. The mining and quarrying industry is included in the analysis but does not appear in the Figure. All of the industries in the business sector cover about 90 percent of business sector output. The numbers appearing alongside the industry names denote the percentage of employees in the industry as a share of the employees in the industries included in the analysis.
OECD average is the simple average of the countries included in the analysis.
SOURCE: Based on OECD and Central Bureau of Statistics.

Despite the changes in the distribution of employees between industries, the entire contribution of the structural change to increased economy-wide productivity was small, with most of the change in industry-wide productivity coming from growth in industry productivity.

Despite the changes in the distribution of workers among industries (Figure 5.5), the contribution of the structural change to growth of economy-wide productivity was small, with most of the change in economy-wide productivity relaying on industry-level productivity growth. Economy-wide productivity growth between 2012 and 2018 was 10.7 percent, due to the positive contribution of increased industry productivity at an average rate of 12.6 percent, which was somewhat offset by the 1.4 percent negative contribution of the structural change. The reason for this negative

contribution is that the change in the distribution of workers between industries was not correlated with the change in industry productivity, as shown in Figure 5.6.[12]

Figure 5.6
Correlation Between the Change in the Industry's Employment and the Industry's Labor Productivity, between 2012 and 2018, Selected Business Sector Industries, Israel and Other OECD Countries



The analysis does not include Australia, Chile, Colombia, Costa Rica, Ireland, Japan, or Luxembourg. In some industries up to 2 additional countries were omitted due to a lack of itemized industry details. In some countries, up to 4 industries that appear in the analysis were omitted. The mining and quarrying industry is included in the analysis but does not appear in the Figure. All of the industries in the analysis cover about 90 percent of business sector output. GDP per worker is in fixed PPP for 2015.
OECD average is the simple average of the countries included in the analysis.
SOURCE: Based on OECD and Central Bureau of Statistics.

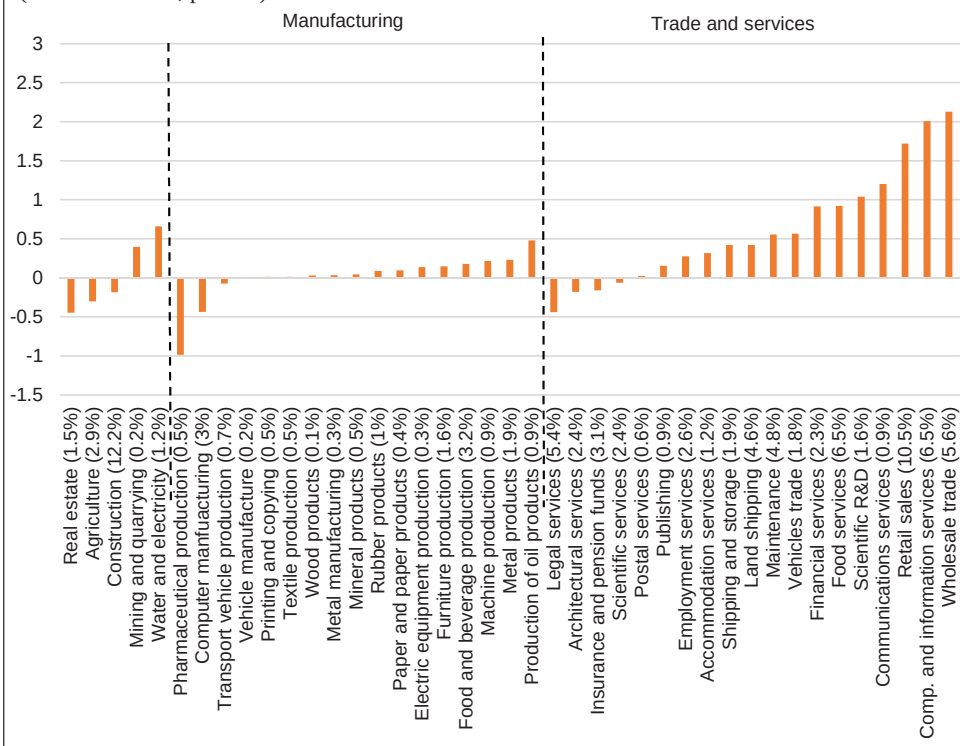
Figure 5.7 shows the contribution of the change in each industry's productivity to the growth of economy-wide labor productivity in Israel. The analysis concludes that the activity of the high-tech sector, including computer and information services and research and development, made a central contribution to the development of the services industry in Israel, from both an industry productivity perspective and in terms of employment growth. The global trend of intensifying demand for digital services and automation led to an increase in high-tech activity both in the Israeli economy and in the other advanced economies, but the Israeli economy succeeded in establishing its advantage in the field and in increasing it throughout the period.[13] Beyond the increase in industry productivity and in the number of employees in the sector, the expansion of Israeli high-tech activity was reflected in an increase in the export of information, computer, and communication services as a share of total exports, which

The activity of the high-tech sector, including computer and information services and research and development, made a central contribution to the development of the services industry in Israel, from both an industry productivity perspective and in terms of employment growth.

[12] Adding the mining and quarrying industry, which has a very low employment volume and an exceptionally high output per worker in Israel, does not change the conclusion arising from Figure 5.6.
[13] Chapter 2 of the Bank of Israel Annual Report for 2020, and Chapter 1 of the Bank of Israel Annual Report for 2021.

exceeded the other advanced economies, as well as an increase in investment in the information and communications industries as a share of total investment.[14] A number of additional indices show the strength of the Israeli high-tech sector and its growth over the past decade. These include the rate of expenditure on research and development relative to GDP, and broad capital raising and issuances of Israeli technology companies on the stock exchange.[15]

Figure 5.7
Contribution of the Change in Industry Productivity between 2012 and 2018 to Economy-Wide Productivity Growth in Israel, Selected Business Sector Industries
(Fixed 2015 PPP, percent)



The total contributions of all industries adds up to the contribution of the change in the industry's productivity to growth of economy-wide productivity in Israel. Some industries were omitted due to data restrictions. The mining and quarrying industry is included in the analysis but does not appear in the Figure. All of the industries in the analysis cover about 90 percent of business sector output. The numbers appearing alongside the industry names denote the percentage of employees in the industry as a share of the employees in the industries included in the analysis.

SOURCE: Based on Central Bureau of Statistics.

[14] The export of information, computer, and communication services increased from 13 percent of total services exports to 19 percent, compared with more moderate increases, from an average of 3 percent to an average of 4.5 percent, in other OECD countries. Investment in the information and communication industries increased from 5 percent of total investment to about 8.5 percent in Israel, compared with increases from an average of 5 percent to an average of 7 percent in the other countries.

[15] According to the Innovation Authority's annual report on the state of high-tech (2022), Israel is ranked highly on the Global Innovation Index, and even rose in ranking during the past decade.

The increases in productivity and employment in the services industries were not only due to the activity of the high-tech sector. Other services industries also played a role. Economic theory provides a number of explanations for this. One of the main explanations involves streamlining and technological improvements, which led to increased industry productivity in some of the services industries and made some of the manpower in those industries redundant. As stated, the implementation of online technologies in industries such as retail trade, communications, and banking made it possible to reduce the number of employees necessary to provide those services, without reducing output. These processes, alongside reforms to encourage competition, made a positive contribution to the growth of industry productivity. This explanation is supported by the fact that these developments were accompanied by a marked increase in investment rates in those industries. Investment in all services and trade industries as a share of investment in all industries increased (by 12.8 percentage points), while the share of investment in manufacturing declined. This is compared with a more balanced upward trend in the other countries. In Israel, this was driven by a pronounced increase in the share of investments in the retail and wholesale trade and shipping industries and in the transport and storage industries.[16]

The increases in productivity in the services industries were also partly due to the retail trade, communications, and banking industries, thanks to streamlining that resulted from reforms to encourage competition, alongside improved service due to the implementation of online technologies.

In contrast with the stated decline in the employment rates in some of the services industries, the rates increased in other services, such as legal, accounting, and consulting services; scientific and technical services; and architecture and engineering, even though productivity in those industries did not increase. One of the reasons for this is the increase in the standard of living and in disposable income, which enables the consumption of more services. Services consumption as a share of total private consumption did increase in the past decade (by about 2 percentage points), both in Israel and in the other countries, with most of the increase directed toward the consumption of leisure and culture services, financial services, and communication services. In Israel, the consumption of other services also increased—including legal, accounting, and consulting services—in line with the expansion of industry activity as described.[17]

The employment rates in a number of service industries, such as legal, accounting, and consulting services, scientific and technical services, and architecture and engineering services, increased, even though productivity in those industries did not increase. Employment in these industries grew in view of increasing domestic demand for service consumption, which was partly supported by an increase in the participation rate.

The growth in demand in these industries may be supported by the increase in the labor force participation rate, in addition to the transition of workers to them from other services industries.[18] The participation rates increased throughout the decade,

[16] According to the OECD database, investment in the trade industry as a share of total investment increased by 4.4 percentage points, and investment in the transport and storage industry as a share of total investment increased by 4.1 percentage points.

[17] According to the OECD database, the rate of consumption of these services as a share of total private consumption increased by about 2 percentage points during the period, both in Israel and in the OECD average, and by about 4 percentage points since the beginning of the century. The rate of expenditure on other services increased from 2 percent to about 3 percent in Israel, while the increase in the other countries was just slight—from 1.3 percent to 1.4 percent.

[18] An analysis of the changes in the participation rate of various population groups appears in Chapter 7 of this Report.

particularly among women.[19] The increase in women's labor force participation rates is a global trend, but its implications for the Israeli labor market were more significant than in other countries. Women's employment rate was always higher in the services industries, and this trend intensified in the past decade. The rate of women employment in the services industries in Israel increased from 89 percent to 92 percent, compared with a stable average rate of around 80 percent in the OECD countries.

3. CONCLUSION

In the past decade, labor productivity has increased in the Israeli economy, even relative to the OECD average. An industry-level examination shows that most of the growth in productivity comes from increases within the industries, particularly the services industries. The noticeable change in the structure of the industries did not contribute directly to the increase in average economy-wide productivity. The employment rate increased in the services industries, including in the high-tech sector, while it declined in some of the manufacturing industries. A long-term view shows that these trends are due to longer-term trends that have taken place in all advanced economies as part of the process of transitioning from production-driven economies to economies that increasingly tend to be based on services. In the Israeli economy, the change in the industry structure in the past decade was broader than in other countries, as was the contribution of increased productivity in the service industries to economy-wide productivity. An industry breakdown shows the high-tech sector's significant share in these developments, but the phenomenon is noticeable in a number of other services industries as well. Productivity grew in the trade, communications, and banking industries thanks to streamlining processes as a result of reforms to increase competition and improvement of service through the implementation of online technologies. In contrast, the growth of employment in other industries was not accompanied by changes in productivity, and took place in view of increasing domestic demand for service consumption, which was supported partly by an increase in the participation rates.

In order to support continued improvement of labor productivity in the economy, the government must help maximize the potential human capital of its citizens, accelerate the development of physical infrastructure that supports activity, continue to remove restrictions on imports and barriers to competition in the economy, advance structural changes in the financial system in order to increase the availability of capital to businesses, and streamline regulation and bureaucracy in doing business. In addition, it is important that government policy, particularly as part of the Capital Investment Encouragement Law, be balanced in its support of the various industries. Market failures must be dealt with, and the unique nature of some of the services

[19] Over the past two decades, the participation rates of women in Israel increased from 53.7 percent to 60 percent, compared with a more moderate increase in the other countries (from 51.1 percent to 53 percent).

industries must be considered in order to continue encouraging investments and the implementation of productivity-raising technologies in those industries.[20]

Initial signs indicate that the COVID-19 crisis intensified these productivity trends and the increased weight of the high-tech sector. (See Chapter 2 of this Report.) One reason for this is the increase in global demand for digital services and automation, which expanded due to the crisis and led to an increase in activity of the high-tech sector. Another reason involves the impact of the crisis on the consumer culture in favor of increased service consumption online. Supply chain disruptions may have also increased the relative price of certain goods, thereby contributing as well to increased service consumption. As stated, these developments are expected to continue and to increase both the supply of services in the economy and the demand for them.

Initial signs indicate that the COVID-19 crisis intensified a number of trends: Increased global demand for digital services, increased service consumption online, and an increase in the prices of some commodities due to supply chain disruptions. These are expected to continue increasing both the supply of services and demand for them.

APPENDIX A5.1

The data on the OECD countries were taken directly and without adjustment from the OECD STAN Database for Structural Analysis, 2020 Edition, ISIC rev.4, SNA08. The analysis does not include Australia, Chile, Colombia, Costa Rica, Ireland, Japan, or Luxembourg. In some industries, we omitted up to two other countries due to a lack of itemized industry detail. For some countries, up to four industries included in the analysis were omitted. The average labor productivity in the OECD did not include a country's industry in which productivity was more than four times higher than the industry average or below 0.25 percent of the average for the industry. In addition, a country's industry was excluded if its share of employment in that country was less than 0.05 percent. As a result of these restrictions, the industries included in the analysis include about 90 percent of business output.

The analysis did not include the public service industries, since these include the public sector where there is no direct measure of labor productivity. In addition, industries 34, 40, 48, 54, 57, 67, and 76, and industries R, S, T, U, and X were not included. Since a large part of the OECD data do not include most of the Israeli industries at a 2-digit level, the Israeli data are based on GDP/employment data from the National Accounts at the order level, and are segmented among subindustries at the 2-digit level according to the weight of the subindustries in the gross value added/job positions in the Economic Industry Survey and in the Manufacturing Survey. Price data at the two-digit level for Israel were weighted on the basis of the OECD database's order level data on Israel. A sensitivity test, using a similar analysis according to data on Israel and the other OECD countries included in the current price analysis, shows that the change in prices during the reviewed period does not significantly affect the findings. Furthermore, there were no large differences found when the prices were translated to current dollars using the exchange rate rather than PPP terms of overall GDP.

[20] For more detailed recommendations, see the Bank of Israel reports mentioned in footnote number 1.

Chapter 6
The Public Sector and its Financing

- In 2022, the general government[1] deficit declined sharply to 1.6 percent of GDP, from 5.5 percent of GDP in 2021. The central government[2] had a budget surplus of 0.6 percent of GDP.
- The surplus in central government operations, along with higher GDP and higher inflation, resulted in a sharp decline in public debt in 2022, by 7.2 percent of GDP, to 60.7 percent of GDP, similar to its pre-COVID-19 level.
- The decrease in the broad government deficit this year primarily reflects a sharp decrease, by 3.2 percent of GDP, in the weight of public expenditure as a percentage of GDP, which primarily reflects a decline in the COVID-19-related support required last year. Primary civilian expenditure, as percentage of GDP, fell to below its pre-COVID-19 level, and is among the lowest in the advanced economies.
- Public revenues increased by 0.7 percent of GDP this year, primarily due to sharply higher direct tax revenue. Some of the causes for this rapid growth are of a temporary nature, such as unusual income tax revenues and higher real estate tax revenues.
- One of the causes for the moderate growth in public expenditure in recent years (excluding COVID-19-related expenses) is the slow increase in wages in the public sector, due to the freeze imposed on negotiations for a new framework wage agreement during COVID-19. The new agreement, signed in March 2023, should gradually increase public expenditure.
- The wage agreement with the Teachers Union, signed in October, improved employment terms for new teachers, added incentives in the wage system, and somewhat increased schools' administrative flexibility. The cost of this agreement is NIS 4.9 billion per year, mostly applicable as early as the 2023 budget. However, this agreement provides only a limited resolution for key structural issues that may have an impact on the education system's achievements.
- During the COVID-19 pandemic, digitalization of government services was accelerated, in order to expand and improve the quality of such services. Improvements in Israel were more significant than in some other advanced economies, primarily reflected in the expansion of the range of online services. However, significant investment is still required to improve the public's technology literacy, in order to make these digital services also accessible to population groups that currently have difficulty using them.

[1] The general government consists of the government itself, the National Insurance Institute (NII), local authorities, nonprofits (HMOs, universities, *Yeshivot*, and so forth) that derive most of their revenues from the government, and national institutions (the Jewish Agency, the Jewish National Fund, and the World Zionist Organization). Its operations are measured in line with national accounting definitions, which differ from those used in the State budget. The difference in deficit between the general government and the central government mostly reflects different accounting definitions, rather than deficit of other general government entities.

[2] The surplus/deficit of the central government is the budget surplus/deficit – the difference between government cash revenues and expenses, in line with the definitions in the State budget.

1. MAIN DEVELOPMENTS

The overall deficit of the general government declined to 1.6 percent of GDP, primarily due to a sharp decline in public expenditure as percentage of GDP, along with increase in revenues as percentage of GDP.

In 2022, the overall deficit of the general government declined sharply by 3.9 percent of GDP, reaching 1.6 percent of GDP, following unusually high deficits in the previous two years due to the COVID-19 pandemic (Table 6.1).[3] The decline in the general government deficit is primarily due to the sharp decrease in public expenditure, by 3.2 percent of GDP compared to 2021, along with higher revenues as a share of GDP compared to previous years. The deficit reduction, rapid GDP growth, higher inflation, revenues from privatization, and funds raised in previous years, all contributed to the reduction of public debt by more than 7 percent of GDP. At end of 2022, the debt to GDP ratio reached 60.7 percent of GDP, close to its pre-COVID-19 level.

The decrease in public expenditure as percentage of GDP was mostly due to a decline in direct subsidies with the end of the COVID-19 pandemic.

The sharp decline in public expenditure as a share of GDP was primarily due to a decline in direct support payments to businesses and employees (furlough payments), which returned to their normal level (1 percent of GDP), with the conclusion of support payments from the COVID-19 pandemic period. However, total expenditure in 2022 (31 percent of GDP) was lower than its pre-COVID-19 level (an average of 40 percent of GDP in 2018 and 2019). The decrease in regular (non-COVID-19) expenses started in 2021, and was practically unchanged in 2022. The moderate expenditure was affected by high uncertainty regarding the macroeconomic and epidemiological situation when preparing the 2021–2022 budget, as well as by the government having no approved budget for most of 2021.

Tax revenues increased due to rapid GDP growth, the rally in high-tech, and anomalous and one-off factors, including real estate taxes.

Public revenues as a share of GDP increased further this year, following a sharp increase in 2021—due to the exit from the COVID-19 crisis and return to normal—thanks to increased tax revenues as a share of GDP, which reached a 15-year record level. Higher tax revenues were mostly due to direct taxes, with the increase ascribed to rapid GDP growth, the rally in high-tech, and unusual and nonrecurring factors, including real estate taxes which increased extraordinarily due to the housing market rally in 2021–2022.

[3] According to publications by the Central Bureau of Statistics, general government operations resulted in a surplus of 0.6 percent of GDP. The reason for the difference lies in fact that the Central Bureau of Statistics deducts the revenues from land sales from public investment, because the interpretation of international accounting rules regards the sale of land as a negative investment by the government. In most OECD countries, this deduction reflects activities such as sale of agricultural land improved by the government, or the purchase and refurbishment of public housing dwellings sold to eligible buyers. In Israel, by contrast, these are revenues from sale of land historically owned by the State, i.e. asset realization, which, in 2022, amounted to 1.9 percent of GDP. Given that asset realization is, in essence, a financing transaction, and in recent years these revenues increased significantly, we present public expenditure excluding this deduction, in order to reflect the macroeconomic effect of government activity, and we present the sale of land as a financing item that curbs the growth in debt.

Central government operations resulted in a budget surplus of 0.6 percent of GDP, due to high tax revenue.

Central government operations resulted in a budget surplus (0.6 percent of GDP[4]), compared to a planned deficit of 3.9 percent of GDP. The difference is mostly accounted for by tax revenues which were much higher than forecast in the budget, along with a lower than planned increase in government expenses. This was due to expenses under the economic assistance program, designed to address the ramifications of the COVID-19 crisis, being much lower than forecast in the budget, due to fading of the pandemic and its effects, as well as due to a slight under-performance in current expenses.

Table 6.1
The main components of the general government's revenue and expenditures, 2016–2021

(percent of GDP)

	2016	2017	2018	2019	2020	2021	2022
Total public revenue	**36.5**	**37.5**	**35.9**	**35.0**	**34.4**	**36.8**	**37.5**
of which : Income from property	0.5	0.5	0.5	0.5	0.4	0.5	0.5
Total taxes	**30.8**	**32.0**	**30.5**	**29.8**	**29.4**	**32.1**	**32.8**
Indirect taxes on domestic production	12.1	12.2	12.0	11.7	11.4	11.9	11.8
Indirect taxes on civilian imports	3.3	2.7	2.9	2.7	2.6	3.1	3.2
Direct taxes, fees and levies	10.2	11.9	10.4	10.2	10.2	12.0	12.7
National Insurance Institute revenue	5.1	5.2	5.2	5.2	5.1	5.0	5.1
Grants	1.5	1.2	1.2	1.1	1.1	1.0	1.1
Other[a]	3.7	3.8	3.7	3.6	3.5	3.3	3.2
Total public expenditure[b]	**38.8**	**39.8**	**40.3**	**39.6**	**45.9**	**42.3**	**39.1**
Current expenditure	36.1	36.9	37.3	36.8	42.4	39.4	36.1
Civilian expenditure on services and in-kind transfers	19.1	19.5	19.7	19.5	20.5	19.4	18.4
Domestic defense consumption	4.7	4.6	4.6	4.4	4.4	4.2	4.0
Defense imports	0.4	0.3	0.3	0.3	0.3	0.4	0.3
Direct subsidies	0.7	0.8	0.9	1.0	4.1	3.1	1.0
Transfer payments on current account	9.2	9.6	9.5	9.5	11.1	9.6	9.1
Interest payments[c]	2.1	2.1	2.4	2.1	1.9	2.8	3.3
Transfer payments on capital account[d]	0.5	0.6	0.6	0.5	0.5	0.6	0.8
Investments of the general government including investment grants[b]	2.1	2.2	2.4	2.3	2.9	2.3	2.2
of which : Net civilian investment	1.9	2.1	2.1	2.1	2.8	2.2	2.0
Primary civilian expenditure[b]	**31.4**	**32.6**	**32.8**	**32.7**	**39.0**	**34.8**	**31.3**
Total deficit of the general government[b]	**2.3**	**2.3**	**4.4**	**4.6**	**11.5**	**5.5**	**1.6**
Central government deficit (excluding provision of credit)[e]	2.1	1.9	2.9	3.6	11.3	4.4	-0.6
Current deficit of the general government	1.0	0.8	2.8	3.1	9.5	4.5	0.5
Total cyclically adjusted deficit using international definition[b,f]	2.1	2.3	4.7	5.0	9.1	5.7	2.9
Net public debt[g,h]	58.4	56.6	57.1	56.8	66.6	64.2	58.5
Gross public debt[g]	61.4	59.7	59.9	58.8	70.6	67.9	60.7

[a] Includes transfer payments from the public on the current and capital accounts, imputed pensions, civilian sales, capital transfers from abroad, and transfers from abroad to National Institutions and nonprofit organizations.

[b] Excludes the reduction of expenses financed by the sale of land. Beginning with the 2022 statement, the recording of defense investments was moved from defense consumption and imports to government investments. Depreciation of defense fixed capital is recorded in doemstic defense consumption.

[c] In 2018, the Central Bureau of Statistics revised the calculation for interest expenses from 1995 onward, and they are now calculated on a cumulative nominal basis plus indexation differentials on the public debt.

[d] Includes mortgage subsidies and transfers on the capital account to nonprofit organizations and businesses.

[e] The central government deficit is calculated based on various definitions.

[f] Based on the OECD estimate, adjusted to revised Central Bureau of Statistics Data. For more information see footnote d in Figure 6.3.

[g] Excluding municipalities' debts to the government.

[h] Net public debt equals the gross public debt minus active loans minus government deposits with the Bank of Israel.

SOURCE: Based on Central Bureau of Statistics data.

4 As noted, the difference in deficit between the general government and the central government mostly reflects different accounting definitions rather than deficit of other general government entities.

One of the reasons for the moderate increase in public expenditure excluding COVID-19-related expenses in recent years compared to the pre-COVID-19 years is the slow increase in wages in the public sector. This resulted from lack of a current framework wage agreement, mostly due to the negotiation freeze during COVID-19. The annual financial value of the gap created between wages in the private sector and in the government sector is estimated at 1.4 percent of GDP. In March 2023, a new public sector wage agreement was announced, which is expected to gradually increase public expenditure.

The wage agreement signed with the Teachers' Union improved employment terms for new teachers, added incentives to the payroll system, and somewhat improved schools' management flexibility.

In 2022, an agreement was signed with the Teachers Union, valued at NIS 4.9 billion per year, fully vesting in 2026, with most of this amount—NIS 4.5 billion per year—payable from 2023. This agreement improves employment terms for new teachers, adds incentives to the wage system and somewhat increases the administrative flexibility of school principals. However, the contribution of this agreement to aligning school schedules with work schedules is fairly minimal. Moreover, some issues such as increased remuneration for teachers of subjects in short supply, and for teachers employed by weaker schools and schools in outlying areas, were only partially resolved by adding an option for a limited number of individual employment contracts.

Comparing the evolution of the fiscal indices in the periods before and after COVID-19 shows that after the economy recovered from the COVID-19 crisis, these indices did not return to their precrisis levels (Figure 6.1). In 2022, public expenditure declined by 0.8 percent of GDP compared to the pre-COVID-19 period, while public revenue increased by 2.1 percent of GDP, resulting in a sharp decrease of 2.9 percent of GDP in the deficit.

Reduced public expenditures in 2022, reflected in the decrease in government deficit even net of the effect of the business cycle, brought about a fiscal tightening which counteracted the recovery as the pandemic subsided. Fiscal tightening has a cooling effect on aggregate demand in the economy, moderates inflationary pressures, and complements the restrictive monetary measures applied by the central bank in raising interest rates in order to curb inflation.[5,6] A low deficit also reduces the public debt to GDP ratio and its associated risk, helping to moderate interest expenses.

In 2022, the government applied direct and indirect measures to support the population, at a total cost of 0.5 percent of GDP.

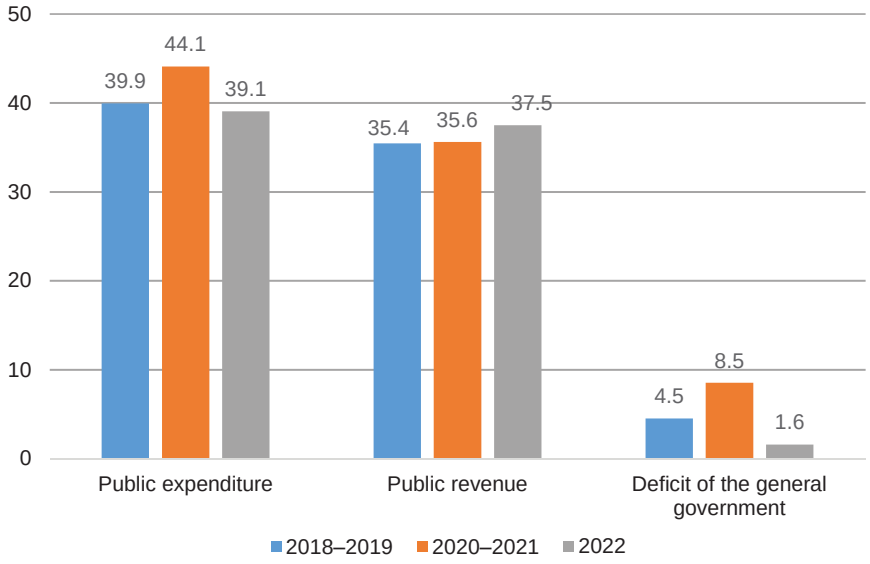
In 2022, as the pace of inflation increased, the government applied direct and indirect measures to support the population. In the energy field, these measures included reducing the excise tax on fuel and coal (used to generate electricity). The government also reduced customs duties, and increased support for working parents by increasing the earned income tax credit and

[5] See Adrian Tobias, Vitor Gaspar, and Francis Vitek (2022), "A Medium-Scale DSGE Model for the Integrated Policy Framework", International Monetary Fund.

[6] Conversely, an expansionary policy in a period of rising prices would require more aggressive interest rate increases to avoid accelerating inflation.

adding tax credit points for working fathers of children aged 6–12. The total cost of these measures amounted to 0.5 percent of GDP.

Figure 6.1
The Fiscal Indices Before, During, and After the COVID-19 Crisis
(percent of GDP)



SOURCE: Based on Central Bureau of Statistics.

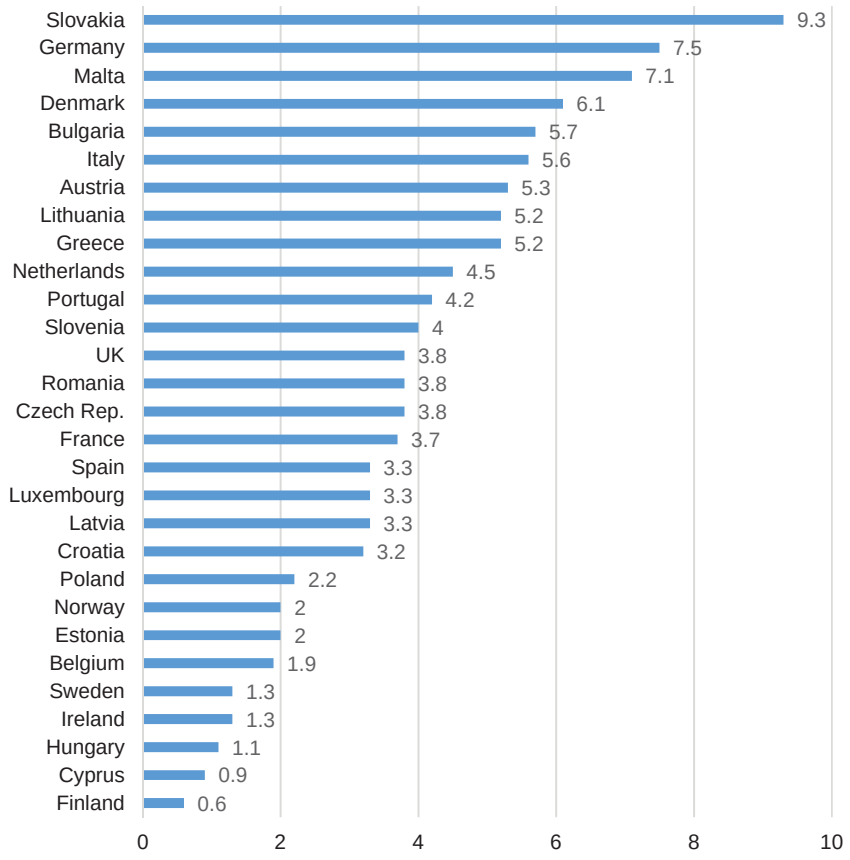
Measures for supporting the population and businesses were also applied by many countries in Europe, due to the sharply higher inflation in those countries that was partly the result of the sharp increase in energy prices.[7] In almost all of these countries, support payments are made to weaker population groups to compensate for higher prices. In addition, taxes have been reduced and caps have been placed on electricity and gas prices. Support measures for businesses have been applied in 79 percent of EU countries and in the UK.

To fund these measures, countries allocated significant resources (an average of 3.8 percent of GDP, Figure 6.2). The cost of these measures was partially funded by taxation of the surplus profits of energy companies which, due to higher prices, benefited from higher-than-normal revenues (such as in Spain, the UK, and Italy). In Israel, such intervention was applied to a lesser extent, because the economy has been relatively immune to the energy crisis.[8] (The reasons for this are described in Section D of Chapter 1 of this report).

7 For more information about global energy prices, see Chapter 1 of this report.

8 The Israeli definitions are not identical to those of the European Union, but an examination of policy measures that are similar to those used in calculations for those countries shows that budgetary assistance in Israel was about 0.5 percent of GDP.

Figure 6.2
Budget Allocations to Measures Supporting Households and Business Due to the Energy Crisis*, EU Countries and UK (percent of GDP)



* Including support of businesses and weaker population groups, price interventions, and tax reductions.
SOURCE: bruegel.org

2. FISCAL AGGREGATES IN ISRAEL FROM AN INTERNATIONAL PERSPECTIVE

Due to the sharp decline in deficit, for the first time in recent decades, Israel's deficit is now below the OECD median.

Thanks to the sharp decrease in the general government deficit, Israel's relative position compared to other advanced economies improved, when for the first time in decades, Israel's deficit (1.6 percent of GDP) dropped below the OECD median (3.5 percent of GDP; Figure 6.3). Concurrently, the deficit net of cyclical factors also dropped sharply in Israel, approaching the OECD median for the first time in recent years.

The low government deficit further reduced the public debt, following the sharp increase in debt during the COVID-19 outbreak, and the debt to GDP ratio in Israel reached the median for advanced economies. Public expenditure

The difference in public expenditure between Israel and the OECD median increased this year. Primary civilian expenditure in Israel is among the lowest for advanced economies.

in most OECD countries declined this year, but the median remained higher than before the crisis, due partly to support provided with respect to the energy crisis. In Israel, the decrease in expenditure this year was even sharper, with expenditure (as a share of GDP) dropping even lower than the pre-COVID-19 level. Consequently, the gap in public expenditure between Israel and the OECD median increased to 5.8 percent of GDP. In particular, primary civilian expenditure in Israel declined, and was among the lowest for advanced economies in 2022.

The development of fiscal aggregates in Israel following the pandemic, compared to the precrisis level, differs from evolution in other OECD countries. Figure 6.4a shows public expenditure as a share of GDP in 2022, compared to the precrisis average (for 2018–2019) in Israel and in OECD countries. Countries on the red line, which divides the chart into two halves (the 45˚ line) maintained expenditure as a share of GDP at the precrisis level. The light blue line, describing the correlation of public expenditure between these two periods, is above the 45˚ line, indicating that in most countries, expenditure after the pandemic remained higher than in the precrisis period. Compared to this trend, Israel is slightly below the red line, indicating that expenditure in 2022 was lower than in the precrisis period. Other than Israel, only three other countries have not returned to their precrisis expenditure level: Norway, Turkey and Ireland. A partial explanation for this phenomenon is that advanced economies were affected by the energy crisis. Energy prices in those countries rose sharply due to the war in Ukraine, and those countries increased expenditure, whereas the crisis had a more moderate impact in Israel. While the weight of public expenditures remains high in most countries, the weight of public revenues in those countries is very similar to its precrisis level, and most of them are on or close to the red line (Figure 6.4b). Israel is above the red line, indicating that public revenues in Israel increased beyond their precrisis level. With public expenditure higher than its precrisis level in most countries, and stable revenue weight, deficits and public debt to GDP ratios in developed nations increased relative to their 2018–2019 levels.[9] In Israel, the increase in the debt ratio was lower than in other countries, and it is below the correlation line (Figure 6.4c).

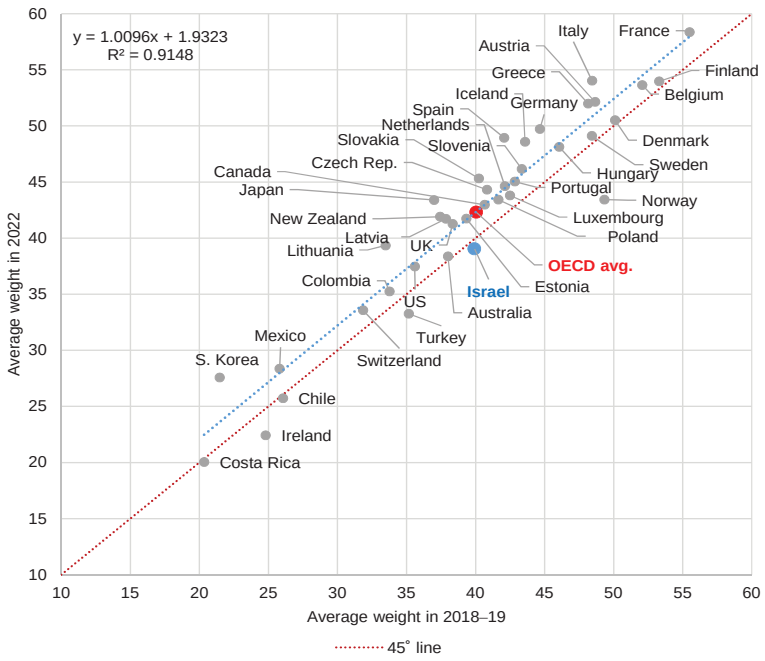
[9] In Figure 6.4c, the line denoting the correlation between public debt in 2022 and the 2018–2019 average is above the 45˚ line.

Figure 6.3
Israel's Fiscal Aggregates Compared to the OECD Countries[a], 2005–2022 (percent of GDP)

[a] Data for OECD countries are based on all member countries for which there are data.
[b] Cyclically adjusted deficit data for Israel are according to the accepted international definition and taken from the OECD systems.
[c] According to international definitions, excluding revenue from the sale of land. See discussion in Footnote 3 of this Chapter.
[d] The OECD estimates are as of March. In order to adjust the Israeli figure to the revised Central Bureau of Statistics estimates, the gap between the overall deficit according to the OECD estimate and the overall deficit calculated by the Bank of israel was deducted from Israel's cyclically adjusted deficit. This gap amounts to 1.3 percent of GDP.
[e] Due to a lack of up-to-date data, defense expenditures in 2021 and 2022 are equal to defense expenditures in 2020 for all countries except Israel.
[f] The graphs are presented up to the last year for which there are data in the OECD systems.
[g] Data are in line with the International Monetary Fund's definition, and are taken from the IMF systems.

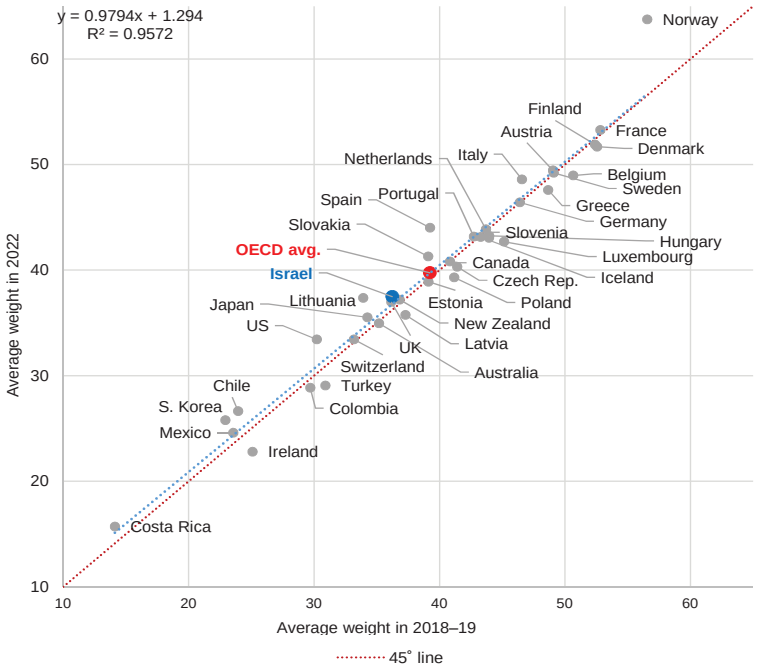
SOURCE: Based on Central Bureau of Statistics data, and OECD data (*Economic Outlook* 112, Nov. 2022, and Revenue Statistics, 2022) and International Monetary Fund.

Figure 6.4a
Weight of Public Expenditure Before and After COVID-19, OECD Countries, 2022 Compared with 2018–19 (percent of GDP)



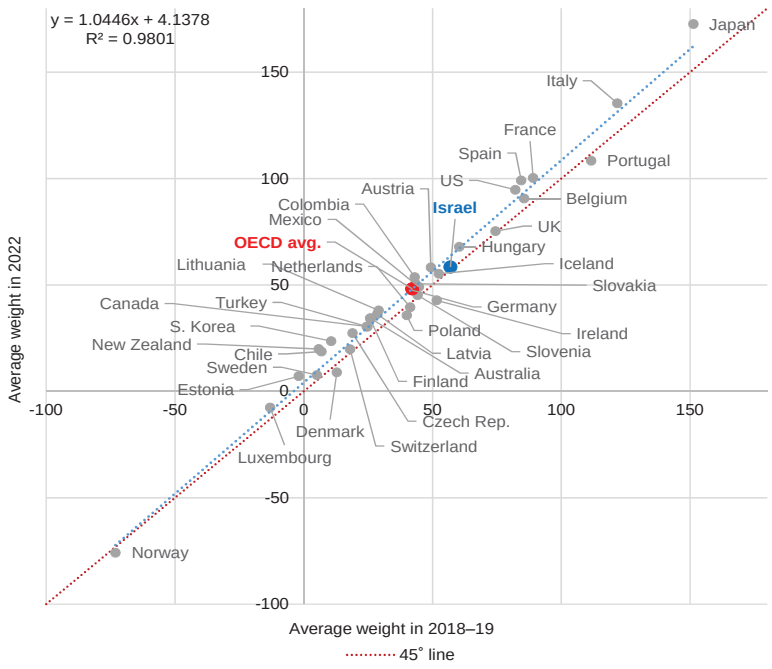
SOURCE: Based on OECD.

Figure 6.4b
Weight of Public Revenue Before and After COVID-19, OECD Countries, 2022 Compared with 2018–19 (percent of GDP)



SOURCE: Based on OECD.

Figure 6.4c
Weight of Net Public Debt Before and After COVID-19, OECD Countries, 2022 Compared with 2018–19 (percent of GDP)



SOURCE: Based on OECD.

3. GOVERNMENT EXPENDITURES

Public expenditure as a share of GDP declined sharply this year, by 3.2 percent of GDP, to 39.1 percent of GDP—its lowest level in five years. There was a similarly low level in 2014–2016 following implementation of the deficit reduction plan included in the 2013–2014 budget, but from 2017, public expenditure resumed its upward trend, to reach about 40 percent of GDP in the precrisis years.

Public expenditure as percentage of GDP declined sharply this year, to its lowest level in five years.

In 2022, public expenditure amounted to NIS 687 billion—a nominal increase of 2.8 percent over the previous year, while nominal GDP increased by 11.3 percent, so that expenditure as a share of GDP declined (Table 6.2). In 2022, interest payments increased in particular, by 33 percent, because more than half of the public debt is indexed to the Consumer Price Index, and due to devaluation of the shekel.[10] Excluding interest expenses, total public expenditure increased by only 0.7 percent in nominal terms.

In 2022, expenses of the general government declined by 4.7 percent, primarily due to a decline in expenses on support programs to deal with the ramifications of COVID-19 (Table 6.3). Expenditures attributed to decline with

Expenditure attributed to dealing with the ramifications of COVID-19 in 2020–2022 amounted to 10 percent of GDP.

[10] The main reason for the increase in interest expenses on public debt in 2022 is the sharp increase (about two-fold) in indexation differentials on debt that is indexed to the CPI, which accounted for about half of all interest expenses on debt in this year.

Table 6.2
Nominal growth of public expenditure in Israel, 2016–2022[a]

	2016	2017	2018	2019	2020	2021	2022	2022
	percent							NIS million
Total public expenditures	**5.6**	**6.9**	**6.2**	**4.4**	**14.8**	**2.4**	**2.8**	**687,046**
of which: Interest payments	6.1	7.8	15.7	-7.3	-6.7	58.0	33.3	58,338
Total public expenditures excluding interest payments	**5.6**	**6.9**	**5.6**	**5.1**	**16.0**	**-0.1**	**0.7**	**628,708**
of which: Current expenditures excluding interest	4.8	6.3	5.4	5.4	15.7	0.4	-0.4	575,758
Primary civilian expenditure	5.2	8.1	5.7	5.8	18.7	-0.6	-1.6	492,711
Per-capita healthcare expenditures	6.0	4.3	3.3	4.2	14.0	1.3	-1.2	10
Per-capita education expenditures	3.3	4.7	4.3	2.5	-1.9	15.3	5.9	13
Public consumption	5.1	4.5	5.9	4.8	4.3	5.5	5.5	352,684
Public consumption excl. defense imports	5.0	5.5	6.3	4.7	4.6	4.8	5.3	360,004
Civilian consumption	5.6	6.6	6.5	4.9	5.9	4.8	5.3	287,669
Per-capita civilian consumption	3.6	4.5	4.5	2.9	4.0	3.1	3.3	30
Domestic defense consumption	3.0	1.3	4.9	3.0	-0.8	5.2	5.7	70,249
Transfer payments on the current account	3.8	8.5	4.1	6.1	15.8	-4.5	5.4	159,496
Per-capita transfer payments on the current account	1.8	6.4	2.1	4.1	13.8	-6.1	3.4	17
Investments of the general government including investment grants	8.8	3.8	7.8	2.6	12.6	-2.9	7.9	90,979
of which: Land transport infrastructure	13.2	14.0	4.6	5.5	25.1	0.7	7.1	15,048
Change in the CPI (annual average change)	-0.5	0.2	0.8	0.8	-0.6	1.5	4.4	
Change in the business output price index	-0.1	-0.8	0.4	1.6	0.6	3.2	5.1	
Change in the public consumption price index	0.5	1.4	2.2	1.7	1.9	1.0	4.3	
Change in nominal GDP	4.9	4.2	4.9	6.1	-0.8	10.9	11.3	1,755,965

[a] Excludes the reduction of expenses financed by the sale of land. Beginning with the 2022 statement, the recording of defense investments was moved from defense consumption and imports to government investments. Depreciation of defense fixed capital is recorded in domestic defense consumption.
SOURCE: Based on Central Bureau of Statistics data.

the ramifications COVID-19 in 2020–2022 amounted to 10 percent of GDP. More than half of the total expenditure (5.6 percent of GDP[11]) was incurred during the first year of the pandemic, about one third (3.6% of GDP) was incurred in the second year, and only 0.4 percent of GDP was spent in 2022. Excluding COVID-19-related expenses, government expenditures increased by 5.7 percent in nominal terms, slightly lower than the planned increase in the budgeted (6 percent). The economic and administrative ministries recorded expenditures below budget.[12]

Normal expenditure (excluding COVID expenditure) dropped to prepandemic levels back in 2021, and remained stable in 2022.

A breakdown of total public expenditure into regular expenses and COVID-19-related expenses shows that regular expenses dropped below their precrisis levels in 2021, and remained stable in 2022 (Figure 6.5). The reasons for this include the restraining effect of economic and epidemiological uncertainty during preparation of the 2021–2022 budget, alongside the lack of an approved budget. The 2020 budget was never approved, and the 2021 budget was only approved in November 2021. Furthermore, the low expenses were also due to the wage freeze in the public sector, where wages are determined based on a set of framework wage agreements that apply to most public sector entities. These wage agreements expired in 2018, and due to the pandemic, negotiations

[11] Based on data from the Ministry of Finance. The Bank of Israel *Annual Report* for 2021 included an international comparison of COVID-related expenses, which showed a slightly different estimate for 2020, as the calculation also included adjustments for international comparison.

[12] The administrative ministries include the following: President of Israel, Knesset, Prime Minister's Office, Ministry of Finance, Ministry of the Interior, Ministry of Internal Security, Ministry of Justice, Ministry of Foreign Affairs, State Comptroller's Office, pension and severance payments, Ministry of Science, Culture and Sports, and Ministry of Environmental Protection. The economic ministries include the following: Ministry of Agriculture, Ministry of Energy and Water, Ministry of Economy and Industry, Ministry of Tourism, Ministry of Communications, and Ministry of Transportation.

between the State and the Histadrut regarding a renewal of these agreements were frozen, which significantly moderated wage increases.

Table 6.3
Components of the net deviation from the original government budget for 2022

(excluding conditional expenditures, current prices)

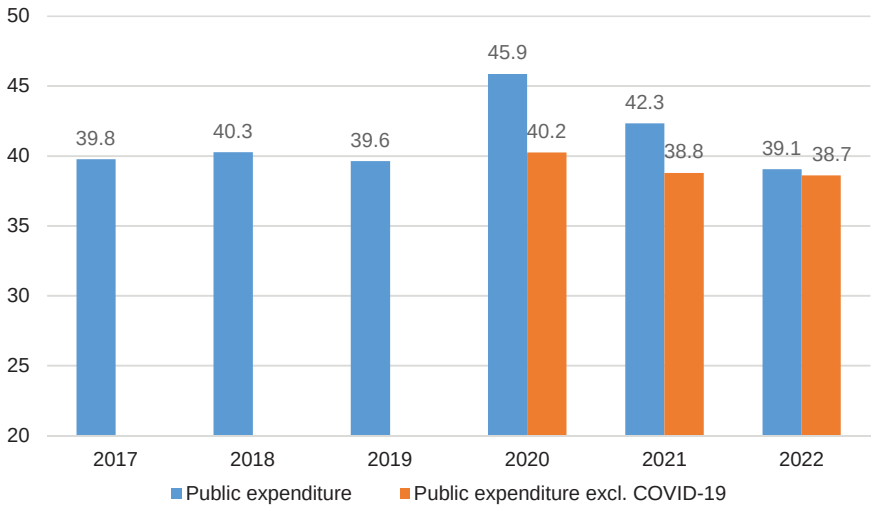
		2022		
	2021 performance	Original budget	Performance	Difference between budget and performance
	(NIS billion, net, excluding credit)			
Deficit (-)	**-68.7**	**-64.6**	**9.8**	**74.4**
of which : Domestic deficit	-60.7	-66.7	14.0	80.7
Deficit abroad	-8.0	2.1	-4.2	-6.3
Revenue	**412.9**	**396.9**	**468.5**	**71.7**
of which : Domestic revenue	410.7	395.3	465.4	70.1
Taxes[a]	384.8	372.4	437.2	64.7
Loan from the National Insurance Institute	20.8	19.2	22.4	3.2
Other revenue[b]	7.3	5.2	8.9	3.7
Expenditures[a]	**481.6**	**461.5**	**458.8**	**-2.7**
***of which* : Excluding COVID-19 expenditures**	**426.0**	**451.5**	**450.1**	**-1.4**
Domestic expenditures	471.4	462.0	451.4	-10.6
COVID-19 expenditures	55.6	10.0	8.7	-1.3
Domestic expenditures excluding COVID-19	415.8	452.0	442.7	-9.3
Expenditures abroad	10.2	-0.5	7.4	7.9
Defense	75.1	84.0	75.2	-8.7
Interest, repayment of principal to NII, and credit subsidies	55.2	57.7	57.6	-0.1
Civilian ministries and transfer payments	351.4	319.8	325.9	6.1

[a] Including VAT on defense imports.

[b] Revenue from interest, royalties and dividends, and other revenue.

SOURCE: Based on Accountant General, 2019 budget performance.

Figure 6.5
Public Expenditures Including and Excluding COVID-19 Expenditures, 2017–2022 (percent of GDP)



SOURCE: Based on Central Bureau of Statistics and Ministry of Finance.

a. Expansion of the gap between government sector and private sector wages[13]

For most advanced economies, the literature has found a long-term link between business sector and public sector[14] wages, as these two sectors compete for employees with similar skills in the country (Lamo et al., 2008).[15] For Israel, Mazar (2022) found that this link grew stronger from 1999, and the government and private sector wage trends were similar through 2017.[16] Figure 6.6 shows the evolution of wages per employee post in these two sectors over the past decade. After evolving with similar dynamics between 2012 and 2016, a gap has developed between the wage indices since 2017, due to more rapid wage increases in the private sector. The gap between these wage indices "artificially" soared in the COVID-19 outbreak year, because the average wage measured in the private sector increased sharply due to a change in employment composition, as employees with relatively low wages were terminated or put on furlough. However, the composition effect dissipated in 2022.[17]

Between 2017 and 2022, real wages in the private sector increased by 3.6 percent annually, compared to just 0.5 percent in the government sector.

Even after the economy returned to full employment, the gap between the wage indices in these sectors continued to grow wider. In 2022, as the pace of inflation increased, real wages in the private sector declined by 2 percent. The real wage in the government sector has been declining for two years in a row, for a total decline by 4 percent. Since 2017, when the gap in wages between these sectors emerged, real wages in the private sector increased by an annual average of 3.6 percent, compared to 0.5 percent in the government sector. One of the factors for the higher pace of wage increases in the private sector is the rapid development of the high-tech sector, particularly during the COVID-19 period, with growing demand for digital products and services. However, even excluding the high-tech sector, in recent years the pace of wage increases in the private sector has been significantly faster than in the government sector.

The gap created in Israel is wide by international comparison as well. Figure 6.7 compares the pace of increase in wages of employees in business sectors and in public service sectors in 2022 and in 2019, showing the gap between

[13] The government sector includes government ministries, the National Insurance Institute, the local authorities, the national institutions, and nonprofit organizations that have most of their expenses financed by government agencies. The private sector includes all entities that do not belong to the government sector.

[14] The public sector includes the government sector and other organizations that employ their staff in conformity with civil service laws.

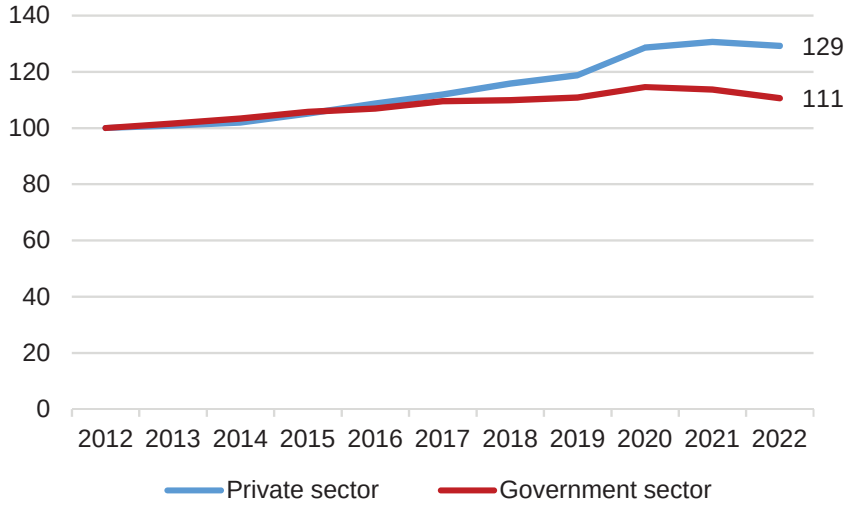
[15] Ana Lamo, Javier J. Perez, and Ludger Schuknecht (2008). "Public and Private Sector Wages: Co-movement and Causality", ECB Working Paper Series No 963.

[16] Yuval Mazar (2022), "Evolution of Public Sector Wages and the Links Between them and Business Sector Wages" (in Hebrew), in A. Yaron and M. Strawczynski (eds.) *Monetary Policy in a Period of Price Stability*, Bank of Israel.

[17] For more information please see the box in Chapter 2 of the Bank of Israel *Annual Report* for 2021.

them.[18] In Israel, the erosion of wages in the public sector, relative to the business sector, was greater than in most OECD countries.

Figure 6.6
Index of Real Wages in the Private and Government Sectors, 2012–2022 (2012=100)



SOURCE: Based on Central Bureau of Statistics.

In most advanced economies, business sector wages lead the change, and public sector wages react to them (Lamo et al., 2008) by way of wage agreements between labor unions and the State.[19] In Israel, the most recent "framework agreement" between the Histadrut and the State was signed in April 2016. It included an aggregate 7.9 percent increase over three years, as well as compensation for the 2013–2017 period.[20] The public sector wage agreement has not been updated since 2018—which explains the change in trend in wage gaps between the sectors. During the COVID-19 pandemic, special agreements were signed that mostly governed the employment of State employees and sought to limit the crisis's impact on their employment, with agreement to freeze discussions of wage increases. After the new government

[18] Due to data limitations, the comparison in this figure is between public service sectors and all other sectors. Public sector employees account for two-thirds of all employees in the public service industries.

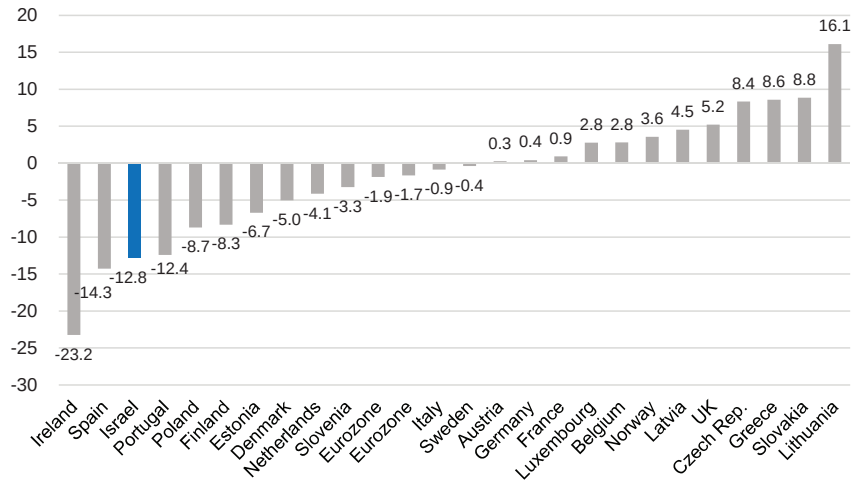
[19] Mazar (2022) showed that the framework agreements accounted for one-third of the total wage increase for public sector employees, and wages in the public sector were therefore aligned over time with wages in the business sector. The remainder of the wage increase for public sector employees is due to wage creep—promotion and seniority increments for long-standing employees.

[20] The framework agreement for 2013–2017 was signed in 2016 and was amended in August 2016, in January 2018, and in June 2018. The amendments refer to pay scheduling and amounts, with no change to the period for which wage increases were granted (2013–2017).

In early March 2023, a new framework agreement was signed. It is expected to reduce the gap in wage dynamics between the private and government sectors.

was formed, discussions started with regard to the new framework agreement, as well as to other agreements (with the high school teachers union, and with the defense establishment).[21] A simple calculation shows that had wages in the public sector increased over the years as they did in the private sector, the government's payroll expenses in 2022 would have been NIS 24 billion (1.7 percent of GDP) higher than they actually were.[22] In early March 2023, a new framework agreement was signed. It is expected to reduce the gap, while gradually increasing public expenditure. The moderate agreement gives the government more leeway in avoiding fiscal expansion that would increase inflationary pressures in the economy, while supporting partial elimination of the wage gap.

Figure 6.7
Change in the Gap Between Growth Rates of the Average Wage in the Public Services and Business Industries, Selected Countries, 2019:H1 vs. 2022:H1
(original data, percentage points)



SOURCE: Based on OECD.

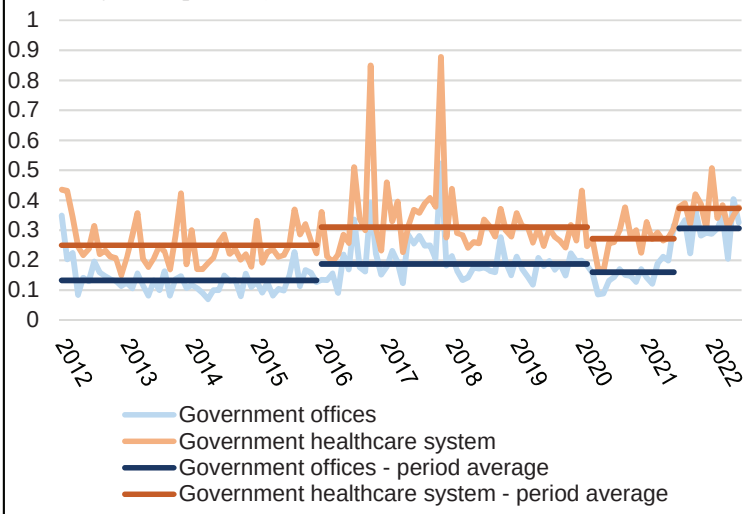
However, it should be taken into account that continued wage gaps may result, over time, in gradual erosion of the quality of employees who would join and/or remain in the public sector. Some indication of this, although by no means definitive proof, may be seen in the higher numbers of employees leaving the public sector in recent years, particularly in the government sector

[21] See discussion below in this chapter on the agreement with the teachers union, which represents elementary school teachers, some middle school teachers, and kindergarten teachers.

[22] The calculation of the annual cost for 2022 is as follows: increase in the average monthly wage in the government sector to the average ratio between 2007–2016, multiplied by 12 months, multiplied by the number of positions in the government sector.

(Figure 6.8) and in public entities (Figure 6.9).[23] In order to balance more moderate wage increases and preservation of the quality of labor in the public sector, it is important for the government to focus as much of the wage increase as possible in areas where challenges exist in high-quality staffing of positions, or where there is strong competition with the business sector.

Figure 6.8
Dismissal Rates in Government Offices and the Government Healthcare System*, 2012–2022 (original monthly data, percent)



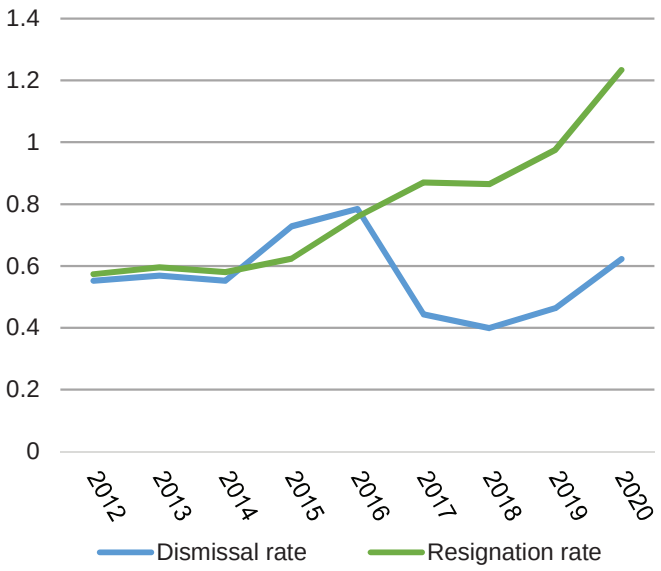
* The figure relates only to the public sector, due to a lack of parallel data on the private sector.

SOURCE: Ministry of Finance Budget and Wage Agreements Department.

Wage agreements provide an opportunity to make structural changes, designed to align public sector employment with the new world of labor. Such changes—for example, transition to individual employment contracts, increased mobility, and easier dismissal of employees in some cases—should contribute to increased efficiency in the public sector, but also reduce the nonmonetary benefits of working in the public sector, such as employment stability. This drives labor unions (in Israel and worldwide) to demand compensation for such changes. Therefore, wage agreements enable setting such changes in motion, along with compensation for employees. In recent years, wage agreements have tended to include agreements by both government and labor unions to make adjustments to government work in areas such as the adoption of technology and employee mobility. This is an important process, the success of which may contribute significantly to enhanced productivity in the economy.

[23] Due to a lack of suitable data, it is not possible to consider whether a similar trend also developed in the private sector.

Figure 6.9
Dismissal and Resignation Rates in Public Entities*, 2012–2020 (percent)



* The figure relates only to the public sector, due to a lack of parallel data on the private sector. Data are available only until 2020.

SOURCE: Ministry of Finance Budget and Wage Agreements Department.

b. Wage agreement with teachers

In October 2022, the government and the Teachers' Union signed an agreement that significantly improves teachers' employment terms. The total cost of this agreement involves a permanent additional expense of NIS 4.9 billion per year, fully vesting in 2026, with most of this amount—NIS 4.5 billion per year—payable from 2023. Implementation of this agreement in 2022 required an across-the-board budget cut in order to comply with the numerator—a budget feature that limits future government commitments in order to comply with fiscal rules.

In 2022, the government and the Teachers' Union signed an agreement that significantly improves teachers' employment terms. The total annual cost of this agreement will reach NIS 4.9 billion when fully vested in 2026.

A significant part of this cost is earmarked for improvement in employment terms of new teachers, whose wages are significantly lower than those of veteran teachers. This disparity results in one in five new teachers leaving the education system within the first 3 years. In recent years indices used to assess the quality of new teachers joining the education system have also trended downwards.[24]

[24] Based on grades on various tests, such as grades on matriculation tests and the SAT score. For more information about trends in new teacher quality and how teacher quality is measured, see: Bank of Israel (2019), "Government services: Evolution of the education budget and teaching quality in recent years", Bank of Israel report for 2018; Bank of Israel (2022), "Gaps between the Jewish and Arab education systems in scope and quality of educational inputs", Bank of Israel 2021 Report.

At the same time, there is higher demand for teachers, due to demographic changes and the reform designed to reduce the number of students per class. According to the new agreement, the base wage would be raised by 30 percent, to NIS 9,000 per month, starting in 2023[25], and after three years' work, teachers would be paid a retention bonus of NIS 10,000. Furthermore, the agreement enhances incentives by increasing the remuneration for educational roles and by providing bonuses for outstanding teachers. In order to reduce the shortage in teachers, the agreement stipulates that new teachers shall be employed at 80-percent scope of employment or higher.[26] Veteran teachers were given a monthly wage increase of NIS 500. This agreement improved the employment terms of management staff in educational institutions, by increasing the part of their wages that is based on the institution's size and reducing the number of hours they are required to teach in classrooms.

From the management aspect, the parties agreed to increase employment flexibility by employing specialists under individual employment contracts that are not subject to collective bargaining agreements. School principals were given management flexibility in approving positions with over 100 percent scope of employment, when deciding how to apply school activity hours (the agreement also increased the number of such activity hours by 4 hours per year). However, the agreement provides only a limited response to key structural issues which, if addressed, could help improve the education system's achievements. In particular, the agreement does not promote the creation of a teacher assessment system that would help promote the employment of outstanding teachers in return for financial remuneration. The agreement provides only a limited response for the need to enhance teacher remuneration in order to promote the employment of teachers in subjects where they are in short supply (math, English, and science), in weaker schools, and in schools in outlying areas. In the agreement no significant change was made to aligning vacation days in the education system with those of other employees, even though this gap is significantly greater in Israel that in other countries.[27]

This gap has a negative impact on parents' work routine, which in turn affects their labor productivity.[28] In Israel, the total number of school days is similar to that in other advanced economies, but they differ in their placement throughout the year. While the school week in Israel is six days long, in the great majority of advanced economies, children study five days a week (with

[25] Prior to this agreement, the base wage for a full-time position was NIS 6,900.

[26] As from September 2024. As from September 2023, a minimum of 70% would be required.

[27] Yossi Margoninski and Guy Segal, "Attributes of student vacation in Israel – economic cost and alternative policies", Research Department, Bank of Israel, November 2019; Kobi Braude and Yossi Margoninski, "Student vacation in Israel and its implications for the labor market", Bank of Israel, December 2020.

[28] "Raising the standard of living in Israel through increased work productivity", Research Department, Bank of Israel, August 2019.

Saturdays and Sundays excluded).[29] However, there are many vacations on holidays and during the summer months, on regular work days. Eliminating school on Fridays (which are only partial work days in Israel, while Sundays are normal work days) and adding other school days throughout the year would improve the alignment of school days in the education system with work days in general. The agreement only shortened the school vacation by two days (for which teachers were given two days off during the school year), and only slightly modified the vacation schedule (instead of three days' vacation for the days following major Jewish holidays, a "bridging vacation" was added between Yom Kippur and Sukkot eve).

c. Digital transformation in the public sector

The digital transformation of the government sector provides for improved quality, expansion, and transparency of public services in government activity.

One way to improve public sector operations is by through digital transformation—the increased use of computerization (computers, smart phones, Internet) and innovative technology in government entities. In recent decades, digital transformation in the public sector has been advanced in many countries under the title "E-Government". The digital transformation of the public sector includes the use of digital tools and data in order to make it more open, proactive, and focused on public needs.[30] It enables the public sector to better meet public needs, provide more diverse services, and enhance public satisfaction with the government, which may also have a positive effect on public trust in the government.[31] E-Government allows for improvement in resource allocation in the public sector through process automation, savings on work inputs, and the creation information repositories and using them for management. Digital transformation provides the conditions for improved quality of public services, service expansion, and transparency in government operations, all of which contribute to improved public sector efficiency.[32]

[29] The reason for this is a historical one – back in the day, the work week in Israel was six days long, and the education system was aligned with this.

[30] OECD (2020), "The OECD Digital Government Policy Framework", OECD Public Governance Policy Papers, No. 2, OECD Publishing, Paris.

[31] OECD (2020), "Digital Government Index: 2019 Results", OECD Public Governance Policy Papers, No. 03, OECD Publishing, Paris.

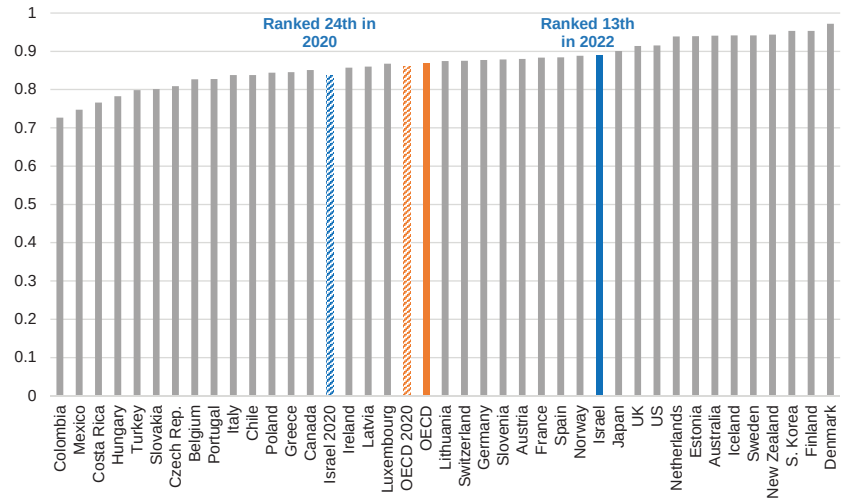
[32] Findings in economic literature confirm that digital transformation processes contribute to improved provision of public services, improve the quality of such services, and enhance transparency and trust in the government. See, for example: Eyob, 2004; Bertot et al., 2012; Reddick, 2006, 2009; and Lindgren and Jansson, 2013. One current claim is that digitalization improves the efficiency of the public sector, but this claim is hard to empirically validate. Typically, the topic of efficiency is studied by estimating the effect of various factors on efficiency of the public sector. Research is primarily focused on analysis of indices for public sector operations, by international comparison. However, given the considerable variance between countries (in cultural norms, policy measures, and so forth), the literature has yet to provide a definitive answer, other than the conclusion that a smaller public sector is correlated with greater efficiency.(Tanzi et al., 2007; Haner and Kyobe, 2010).

In Israel, the development of E-Government has been prioritized in the past decade when, in 2017, the government approved the National Digitalization Program. During the COVID-19 period, the digital transformation process was accelerated in order to mitigate the impact of pandemic-related restrictions on the provision of government services and public services. A similar process took place in most advanced economies. The E-Government Index, developed by the UN and published once every two years, offers insight into the extent of development of digital processes advanced by the government in Israel, compared to other advanced economies. During the pandemic in Israel, the use of new technologies was expanded in many areas, including education, healthcare, and government services.[33] A comparison of the E-Government Index over time—before and after the pandemic—makes it possible to compare the pace of progress in the development of digital tools during COVID-19 in Israel to the pace of progress in development of digital tools in other countries.

The digital transformation of government services was accelerated during the pandemic, and its advancement in Israel was more pronounced than in some other advanced economies.

According to the E-Government Index for 2020 (the index year is the year in which it was published by the UN, but in fact the index was created prior to COVID-19), Israel was ranked fairly low prior to COVID-19—24th of 35 OECD countries.[34] During the pandemic, Israel made significant progress in development of digital tools, at a faster pace than in some other advanced economies. Thus, in 2022 Israel was ranked 13th on this Index (Figure 6.10).

Figure 6.10
E-Government Index Before and After the COVID-19 Pandemic, OECD Countries, 2022



SOURCE: Based on UN eGovernment Survey.

[33] For more information about the use of online technology in select areas during the COVID-19 pandemic, see: Bank of Israel (2022), "Indications of COVID-19's Technological Footprint in 2021", Bank of Israel *Annual Report* for 2021, Chapter 1, pp. 21–38.

[34] For a comprehensive overview of Israel's relative ranking prior to COVID-19, see Ehud Beker, "Aspects of Promoting E-Government: A Comparative Overview", Knesset Research and Information Center, February 2020.

The index combines three sub-indices, each of which measures key components and use of digital tools: the Online Services Index (OSI), measuring accessibility of government services online (payment for services, submitting documents and forms, obtaining education- and employment-related services and so forth); the Telecommunication Infrastructure Index (TII), primarily measuring accessibility of broadband Internet and use of smart phones by the population; and the Human Capital Index (HCI), measuring the competency of the population in using digital tools (measured by the education level of the population, the percentage of young persons, and literacy of the population).

Improvements in digital government were primarily reflected in expansion of the range of online services.

A review of the changes in these sub-indices shows that the impressive improvement in Israel's E-Government Index rating during COVID-19 mostly reflects a marked improvement in the development of online services provided by government websites. In this index, Israel advanced from being ranked 30th prior to the pandemic to being ranked 15th (Figure 6.11a). During COVID-19, Israel invested in the development of infrastructure to allow the population to use the Internet (broadband Internet) and indeed, the number of Internet users, including on mobile phones, increased.[35] This improvement was large relative to some other countries, as reflected by Israel's higher rank in the TII, from 18th prior to COVID-19 to 15th (Figure 6.11b).

Significant investment is required to improve the public's technological literacy, in order to make these digital services accessible to population groups that currently have difficulty using them.

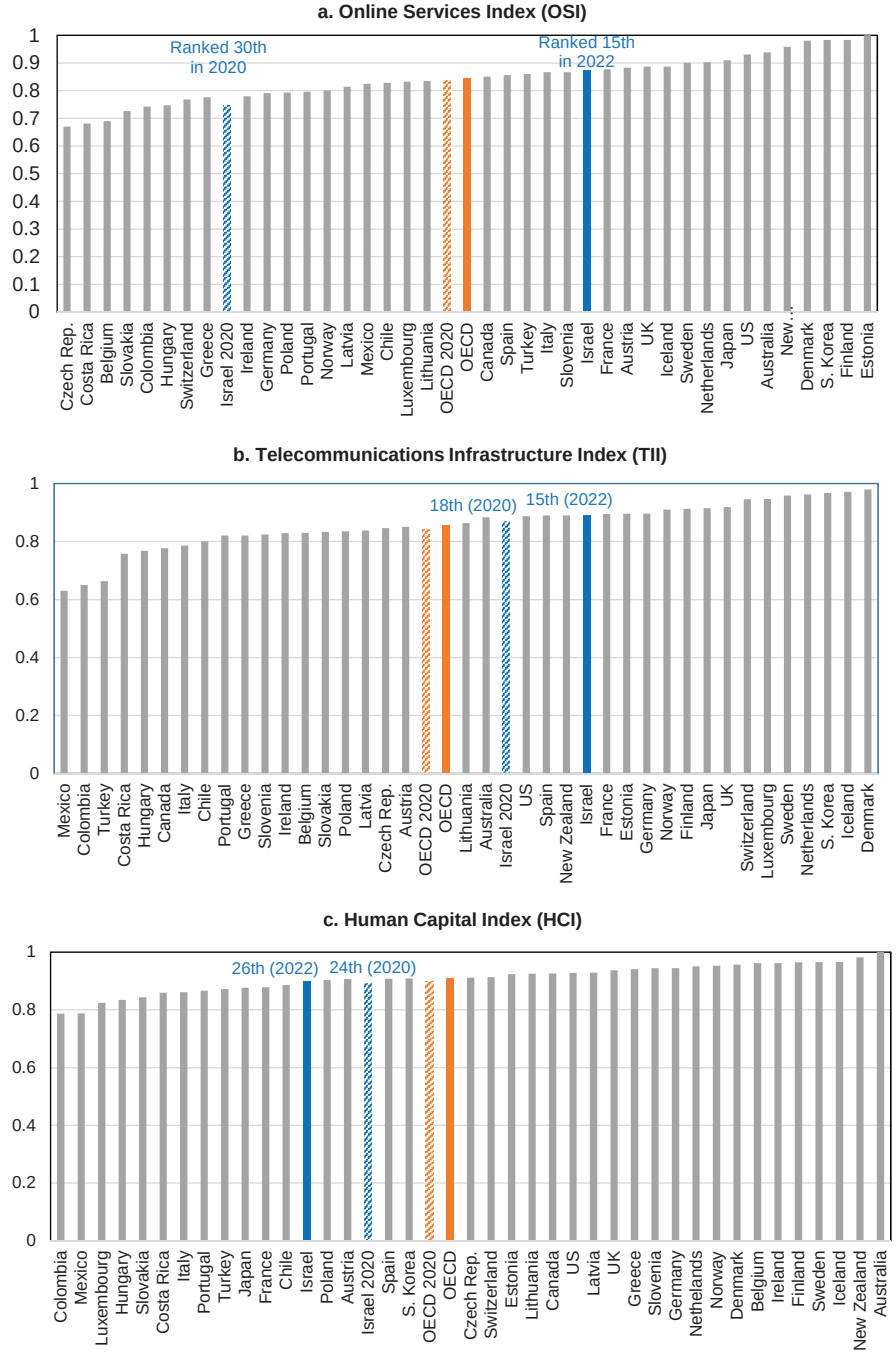
Using digital technology requires technological literacy. Israel's ranking on the third sub-index of the E-Government Index, the HCI, was low prior to the pandemic (24th) and dropped even further to 25th (Figure 6.11c). Evidence of Israel's relatively low ranking in knowledge of how to use a technological environment was also found in the PIAAC survey of adult skills, particularly in weaker population groups such as Arabs[36] and *Haredim* (the ultra-Orthodox).[37] In order to make digital public services accessible to the general population, it is important to allocate resources to digital education and to formulate a plan to support the use of digital tools by older demographics, those with low Hebrew fluency, and by disabled persons. Investment in improved usability of digital tools would enhance the citizens' capacity to engage with the authorities, as well as support for the digital transformation process.

[35] See Footnote 33.

[36] See publications on this topic: Marian Tehawkho, Hila Axelrod, and Chanin Matar (2021), "The Digital challenge Facing Arab Society in Israel", Aaron Institute for Economic Policy, Reichman University; Sefi Bachar (2021), "Readiness for Remote Schooling at the Student and School Level: Insights from PISA 2018 and Household Expenditure Survey", Bank of Israel Research Department.

[37] "Instilling Digital Literacy Over a Lifetime", Office of the State Comptroller, Annual Report 71B, 2021.

Figure 6.11
Sub-Indices of the E-Government Index: OECD Countries, 2022



SOURCE: Based on UN E-Government Survey.

4. GOVERNMENT REVENUES

Total public revenues increased by 0.7 percent of GDP this year, reaching 37.5 percent of GDP—2.5 percent of GDP higher than the prepandemic level.

In 2022, the general government's revenues totaled NIS 659 billion. As a share of GDP, total public revenues this year increased by 0.7 percent of GDP, reaching 37.5 percent of GDP—2.5 percent of GDP higher than immediately prior to the pandemic. This increase reflects a higher weight of taxes, which this year reached its higher level in 15 years. This year, revenue from direct taxes continued to increase, and the share of indirect taxes was stable.

The reason for the increase in revenues this year is a sharp increase in direct tax revenue, partially explained by factors of a temporary nature.

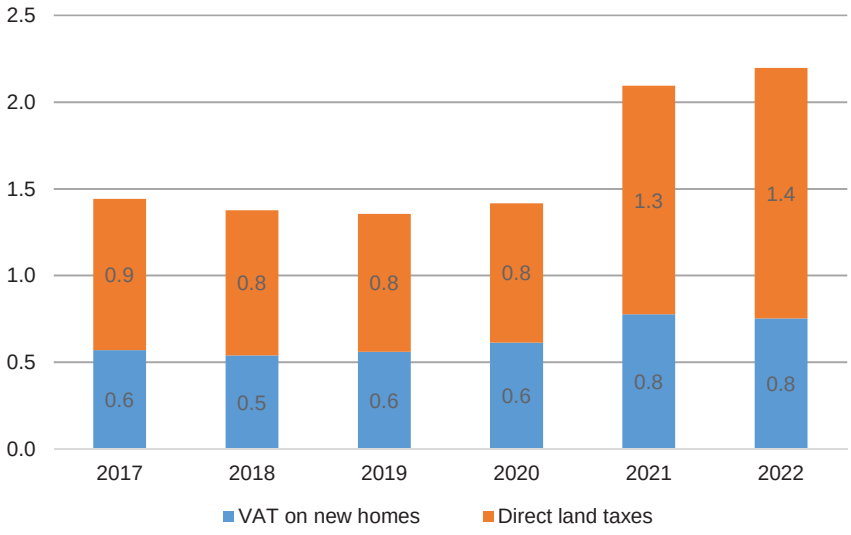
In 2022, tax revenues amounted to NIS 437 billion—a 9 percent increase, net of inflation. Direct taxes increased by 11 percent in real terms, and accounted for three quarters of the increase in total taxes. In 2022, indirect taxes increased by 4 percent in real terms, and accounted for one-quarter of the increase in tax collection, due to higher collection of domestic VAT. The sharp increase in direct taxes primarily reflects an increase in corporate tax revenue, which was sharply higher than the previous year. One of the reasons for the increase in tax revenues this year is further growth in activity of the high-tech sector, which is tax-intensive. The growth was reflected in a higher number of employees and in a higher average wage, although the pace of growth was more moderate than in 2021.[38] In general, tax revenues from wages increased this year, in view of the tight labor market. Some of the increase in taxes in 2022 can be attributed to revenues with respect to activity in previous years and to nonrecurring revenues.

This year, real estate taxes also contributed significantly to tax revenue growth.

This year, real estate taxes also contributed significantly to tax revenue growth. The number of residential transactions declined sharply in 2022, but prices continued to rise rapidly, by 17 percent.[39] The continued effect of the higher number of transactions in 2021, and of higher prices in 2022, jointly contributed to further growth in real estate tax revenues. Land tax revenue in 2022 totaled NIS 25 billion, compared to NIS 21 billion in 2021. These amounts reflect significant growth from a stable NIS 11 billion in the previous two years (Figure 6.12). In 2022, real estate revenues, including VAT payments for new dwellings, totaled 2.2 percent of GDP—0.8 percent of GDP higher than 2019. Real estate market activity in 2021 and in 2022 will continue to contribute to tax revenue in 2023 as well, because VAT payments for new homes depend on the payment schedule for the dwelling, based on construction progress, and the average duration of construction is about 3 years. However, due to the sharp decline in number of transactions in 2022 and early 2023, more moderate increases in home prices, and even the start of a decline in new home prices, this effect should be reduced.

[38] For more information about developments in the high-tech sector, see Chapter 1 of this report.
[39] For more information about developments in the housing market, see Chapter 8 of this report.

Figure 6.12
Total Revenue from Real Estate: Direct Taxes and VAT on New Homes, 2017–2022 (percent of GDP)



SOURCE: Based on Israel Tax Authority.

Excluding legislative changes, timing differentials, and anomalous revenues, total tax revenue increased by 7 percent in 2022. In order to explain the sources for tax growth this year, we divide this growth into several components: (1) the forecasted increase based on the tax model[40] under a "business as usual" scenario—in which the macroeconomic variables included in the model would have evolved in 2020–2022 in conformity with the multiyear trend of these variables between 2015 and 2019[41]; (2) the increase explained by deviation of the model variables that are usually correlated with the business cycle, from their multiyear trend[42]; (3) revenues due to unusual fluctuation in asset markets (equity markets, including the high-tech sector, and land), which may not necessarily be correlated with the business cycle; (4) legislative changes that increase or decrease total revenue for a given tax base, and nonrecurring revenues not related to economic activity (such as: an increase in payment of

[40] A. Brender and G. Navon (2010), "Predicting Government Tax Revenues and Analyzing Forecast Uncertainty", *Israel Economic Review*, 7(2): 81–111

[41] The explanatory variables in the model are: Nominal GDP net of the Consumer Price Index, in arrears by one quarter and five quarters; GDP growth rate, in arrears by two quarters; deviation of wages and consumer good imports from their long-term correlation with GDP; Bank of Israel interest rate; Tel Aviv General Equity Index in the same quarter and in arrears by one quarter; and the number of transactions involving new apartments, in arrears by three quarters.

[42] This factor is estimated by the difference between the model forecast based on actual data, and the model forecast based on data in the "business as usual" scenario. For more information about this calculation method, see Box 6.2 in Chapter 6 of the Bank of Israel 2021 Report.

corporate tax due to the trapped earnings program, or accounting adjustments to the budget with respect to diversion of part of the purchase tax to the Property Tax Fund); and (5) nominal increase in the tax base, correlated with revenue at current prices.[43]

Table 6.4 shows the nominal increase in actual tax revenue (based on definitions in the State budget) in 2022 compared to 2019, divided into the aforementioned components. Out of the NIS 119 million nominal increase in tax revenue in 2022 compared to 2019, NIS 21 million is explained by price increases from 2019 to 2022, with the remainder explained by real factors (Column 1). Some 40 percent of the increase in revenues is explained by the multiyear trend of macroeconomic developments; some 33 percent is due to deviation of macroeconomic factors from the business cycle (in particular, GDP growth beyond the expected trajectory and increase in imports of cars and other consumer goods); and 9 percent is due to the rally in asset markets. The cumulative effect of legislative changes and nonrecurring revenues is negligible compared to the increase in tax revenues, and the estimated effect of price increases explains 18 percent of the increased revenue (Column 2).

Dividing this period in two (2021 compared to 2019[44] and 2022 compared to 2021) shows that 55 percent of the increase in tax revenues, relative to 2019, occurred through 2021, and the remaining 45 percent occurred in 2022. In the first subperiod, deviation of economic activity from the multiyear trend accounted for 57 percent of the increase in revenue, whereas in the second subperiod, the share of this factor fell to 24 percent (Rows 2 and 3).[45] Conversely, in the first subperiod, the overall effect of legislative changes, nonrecurring revenues, and price increases was negligible, whereas in 2022, 9 percent of the increase in revenue was due to legislative changes (nonrecurring revenues that were more than offset by net tax reductions)[46] (Row 4), and 35 percent is explained by higher inflation between 2021 and 2022 (Row 5). Comparing the contribution of the different factors shows that the deviation of the macro variables from their multiyear trend continued to increase in 2022, and that revenues explained by the rally in asset markets remained near their high level of the first subperiod.

[43] The tax model is based on real variables, and therefore only includes the increase in revenue due, for example, to increase in real GDP, or in the number of transactions in the real estate market. The effect of price increases is estimated outside of the model, by multiplying actual revenue in the previous year by the average inflation rate for the current year (and not by the CPI at end of year, as is often presented). This estimate excludes the non-linear effects of the high inflation on actual revenue.

[44] Some of the increase in tax revenue in 2021 was a correction from the slow-down in economic activity and the sharp loss of revenues in 2020, due to the COVID-19 pandemic. We therefore present these two years as a single subperiod.

[45] Over the long term, the average contribution of these factors should be zero.

[46] In 2022, the government increased some taxes and reduced others. The total cost of these reductions was higher than the additional revenue from the increases, so the net result of legislative changes was lower tax revenues.

Table 6.4
Components of the increase in tax revenue, 2022 compared to 2019

	2022 compared to 2019		*of which* : 2021 compared to 2019		2022 compared to 2021	
	NIS billion	percent	NIS billion	percent	NIS billion	percent
	(1)	(2)	(3)	(4)	(5)	(6)
(1) Expected growth according to the multiyear trend of the variables included in the model	48	40	31	46	17	33
(2) Growth explained by deviation of the macro variables from the multiyear trend: GDP level, GDP growth, wages, import of consumer goods, Bank of israel interest rate	39	33	25	38	14	26
(3) Growth explained by anomalous volatility in the asset markets: Tel Aviv index and new home sales	11	9	12	19	-1	-2
(4) Legislative changes and one-off revenues	1	0	-4	-6	5	9
(5) Nominal change in the tax base	21	18	3	5	18	35
(6) Unexplained remainder	-1	-1	-1	-1	0	0
Total growth in taxes	**119**	**100**	**66**	**100**	**52**	**100**

5. THE DEFICIT

The overall deficit of the general government declined to 1.6 percent of GDP, compared to very high deficits during the pandemic years.

Central government activity resulted in a budget surplus of 0.6 percent of GDP, compared to a planned deficit of 3.9 percent of GDP. The difference is mostly explained by tax revenues, which were higher than forecasted in the budget.

In 2022, the overall the general government deficit declined to 1.6 percent of GDP, compared to the unusually high deficit during the COVID-19 pandemic years (5.5 percent of GDP in 2021 and 11.5 percent of GDP in 2020, Table 6.1). This low deficit resulted from a sharp decrease in expenditure as a share of GDP, which was even lower than before the pandemic, and from higher revenues as a share of GDP. Net of the effect of growth, the cyclically adjusted deficit also declined, to 2.9 percent of GDP this year, compared to 5.7 percent of GDP in 2021.The structural deficit, composed of the deficit adjusted for the effect of the business cycle and the effect of noncyclical anomalous factors, increased by 0.2 percent of GDP compared to 2019. Operations of the general government resulted in a budget surplus of NIS 10 billion, or 0.6 percent of GDP (Table 6.5).This compares to the planned deficit of 3.9 percent of GDP (NIS 65 billion) in the original budget. The great majority of this difference is due to tax revenues that were NIS 67 billion over the original budget estimate, and to expenses that were NIS 8 billion lower than budgeted (Table 6.3), such that the difference between the planned and actual deficit was NIS 75 billion.

The reasons for these large differences include macroeconomic developments that differed from original budget estimates, including GDP growth of 6.5 percent compared to forecast GDP growth of 4.7 percent, and inflation of 5.3 percent compared to a forecast of 2.0 percent. In its early stages, inflation typically reduces the deficit as a share of GDP. In early 2022, the estimated deficit was revised to 3.4 percent of GDP, and the difference between the revised estimate and the actual deficit was 4 percent of GDP. This difference is explained by excess revenues totaling 3.3 percent of GDP, COVID-19-related expenses that were 0.5 percent of GDP lower than budgeted, and nominal GDP that was 0.2 percent of GDP higher than expected.

Table 6.5
Central government deficit, revenue and expenditures, 2016–2022

(percent of GDP)

	2016	2017	2018	2019	2020	2021	2022
Total government deficit ceiling excluding credit granted	2.9	2.9	2.9	2.9			
Total actual government deficit excluding credit granted	**2.1**	**1.9**	**2.9**	**3.6**	**11.3**	**4.4**	**-0.6**
Actual government domestic deficit	1.6	1.6	2.6	3.3	10.9	3.8	-0.8
Total net revenues[a,b]	**25.2**	**26.1**	**25.0**	**24.2**	**22.4**	**26.2**	**26.7**
Taxes and imposts	23.0	23.9	22.8	22.2	21.9	24.4	24.9
Interest, profits, royalties, revenue from land sales	0.3	0.5	0.5	0.5	0.3	0.5	0.5
Loan from the National Insurance Institute (NII)	1.9	1.7	1.7	1.6	0.1	1.3	1.3
Total net expenditure[a]	**27.2**	**28.0**	**27.9**	**27.9**	**33.6**	**30.5**	**26.1**
Interest, repayment of principal to NII and credit subsidy	4.0	3.8	3.7	3.6	3.6	3.5	3.3
Net defense expenditure[b,c]	5.1	5.2	5.0	4.9	5.0	4.8	4.3
Total net primary civilian expenditure	18.2	19.0	19.2	19.4	25.0	22.3	18.6

[a] Excluding credit granted by the government and excluding credit repaid to the government.
[b] Excluding grants from the US government.
[c] Defense expenditure in this table is larger than defense consumption shown in Table 6.1 because the Central Bureau of Statistics records pensions and other payments by the defense establishment as transfer payments, while recording an imputation of compulsory service.

SOURCE: Based on the State Budget—Major Provisions of the Budget, Central Bureau of Statistics data, and State of Israel Financial Statements as of December 31, 2022.

6. PUBLIC DEBT AND ITS FINANCING

The debt to GDP ratio returned almost to its prepandemic level, and this year it was similar to the median ratio for advanced economies.

In 2022, the debt to GDP ratio declined sharply, to 60.7 percent of GDP, similar to the median ratio for advanced economies (Table 6.1, Figure 6.4). The debt to GDP ratio essentially returned to its prepandemic level, after soaring in 2020, to over 70 percent of GDP and then falling back to 67.9 percent of GDP in 2021.

The sharp decline in the debt to GDP ratio this year—7.2 percent of GDP—reflects both the budget surplus, which reduced debt by 0.6 percent of GDP, and the higher inflation (Table 6.6). As only part of the debt is indexed to the CPI (more than half), which increased by a rate similar to the Output Price Index, shekel-denominated debt was eroded relative to nominal GDP.[47] Revenues from privatization and outstanding issuances from previous years, which reduced the need for financing this year, together contributed 2.1 percent of GDP to debt reduction. The ratio of net debt[48] to GDP also declined, to 58.5 percent of GDP at end of the year.

Interest on public debt increased due to higher inflation, since interest expenses include partial indexation of the debt to the Consumer Price Index.

In the past two years, the interest on public debt increased to 3.3 percent of GDP, whereas the average cost for advanced economies increased slightly (Figure 6.13). The increase in the burden of interest payments in Israel is explained by the higher inflation, because interest expenses include indexation to the CPI for the linked portion of debt (as opposed to the budget definition, which only includes actual interest payments). In Israel, about half of the public debt is indexed to the CPI, whereas in other advanced economies, such

[47] In 2022, the Business Output Price Index increased by 5.1 percent, and the Consumer Price Index increased by 5.3 percent.
[48] Net public debt is the difference between gross public debt and active government loans and deposits with the Bank of Israel.

indexation is very limited. For example, in the USA, tradable indexed debt accounts for 6 percent of public debt. Of the twenty countries that issue CPI-indexed tradable bonds, in only four do those bonds account for a higher share of public debt than in Israel (South Africa, Chile, Brazil, and the UK).[49,50]

Table 6.6
Components of the increase in the gross public debt, 2017–2022

(percent of GDP)

	2017	2018	2019	2020	2021	2022
Debt at the end of the previous year	61.4	59.7	59.9	58.8	70.6	67.9
Nominal growth of GDP	-2.5	-2.8	-3.4	0.5	-7.0	-6.9
Net capital inflow	1.1	2.5	3.1	12.8	3.8	-2.7
of which : Government's cash deficit (excluding credit)	1.9	2.9	3.6	11.3	4.4	-0.6
Net repayment of credit by the public[a]	-0.1	-0.1	0.0	0.0	0.0	0.0
Privatization proceeds	-0.1	-0.2	-0.1	0.0	-0.9	-0.9
Funding beyond the financing deficit[b]	-0.5	-0.1	-0.4	1.6	0.4	-1.2
Revaluation of shekel-denominated indexed debt[c]	0.1	0.2	0.2	-0.2	0.8	1.6
Revaluation of foreign currency-denominated debt	-0.6	0.5	-0.6	-0.4	-0.4	1.0
Adjustment to issuance costs	0.0	-0.1	-0.2	-0.4	-0.2	0.1
Remainder[d]	0.1	-0.2	-0.1	-0.4	0.3	-0.3
Debt at year end	**59.7**	**59.9**	**58.8**	**70.6**	**67.9**	**60.7**

[a] Including the provision of credit and principal collection.

[b] Funding surplus.

[c] Effect of the increase in the Consumer Price Index during the year on indexed debt.

[d] As a result of roundings.

SOURCE: Bank of Israel.

In 2022, as the pace of inflation increased in Israel, capital raising by the government changed. The CPI-indexed portion of capital raised was reduced to 35 percent, compared to 45 percent in 2021. In particular, the nontradable indexed portion (Figure 6.14) was reduced, due to the cancellation of the issuance of earmarked bonds.[51] Along with the reduction in CPI-indexed borrowing, the government expanded its borrowing overseas, so that the portion of debt indexed to foreign currency grew to 16 percent of total borrowing this year, after declining sharply in 2021. The share of borrowing in foreign currency was relatively stable prior to the COVID-19 years, and it would appear that

[49] Velandia-Rubiano, David-Pur, and Cabral (2022). "What is the Role of Inflation-Linked Bonds for Sovereigns?", World Bank Group.

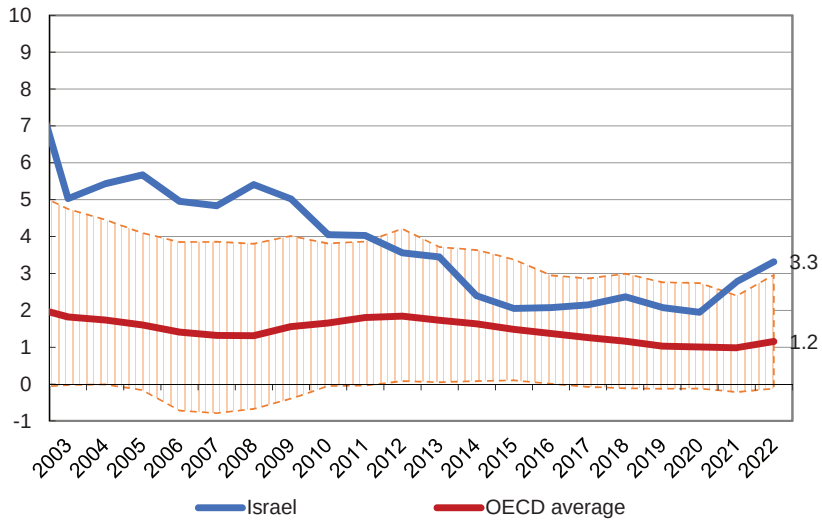
[50] There are available statistics only for tradable indexed debt, probably because nontradable indexed debt is not very common in other countries.

[51] The issuance of nontradable bonds ceased in October 2022, and was replaced by a government undertaking to ensure an indexed return of 5.15 percent for that share of the pension fund portfolio (30 percent) that until now had benefited from earmarked bonds. Should the fund's average annual return be lower than 5.15 percent (indexed to the CPI) over five years, a nonbudget fund would make up the annual return to 5.15 percent (indexed to the CPI), and in case of higher returns, the excess would be transferred to the fund.

after massive borrowing in 2020 and a sharp decline in 2021, the share of overseas borrowing returned to its precrisis level.

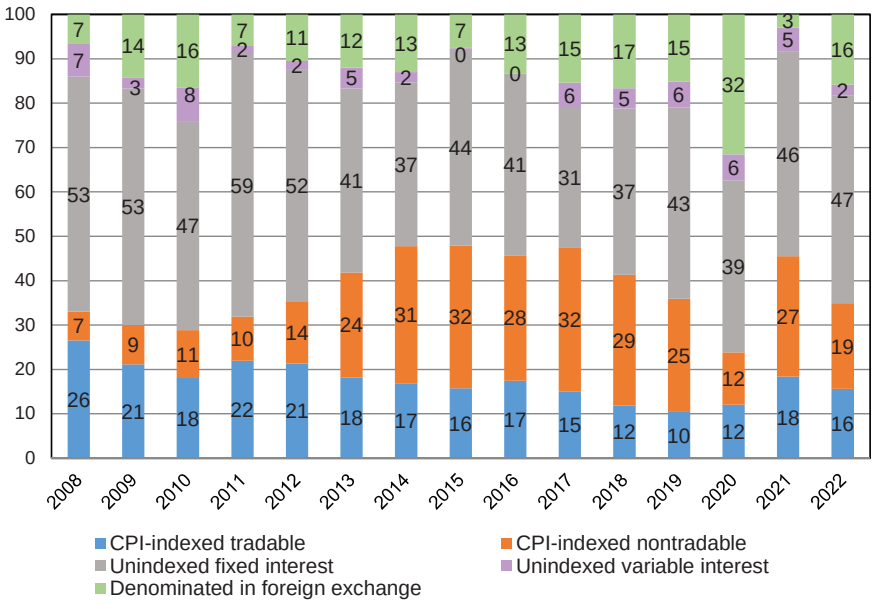
The composition of borrowing this year had a slight effect on the stock of government debt. Total government debt declined, with reductions in all borrowing channels (other than foreign currency), with the most significant reduction being in the unindexed fixed interest portion (Figure 6.15). About half of the public debt consists of CPI-indexed bonds, which makes it more costly to maintain this debt in periods of high inflation.

Figure 6.13
Burden of Interest Payments (Net) on Public Debt, Israel and OECD, 2003–2022 (percent of GDP)



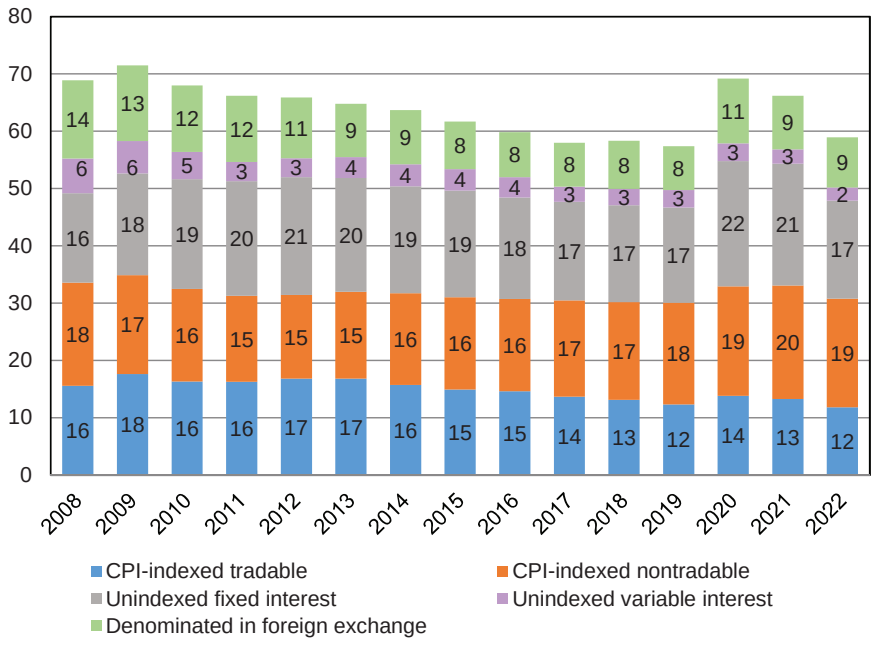
* The shaded area is the range between the burden of interest payments of the OECD countries.
SOURCE: OECD and Central Bureau of Statistics.

Figure 6.14
Composition of Capital Raised by the Gov't, 2008–2022 (share of total capital raised)



SOURCE: Based on Ministry of Finance.

Figure 6.15
Outstanding Gov't Debt by Component, 2008–2022 (percentage of GDP)



SOURCE: Based on Ministry of Finance.

BOX 6.1: LANDFILL LEVY AND CLEANUP FUND AS ECONOMIC TOOLS FOR HANDLING MUNICIPAL WASTE IN ISRAEL

- The percentage of total municipal waste in Israel that is sent to landfills—treatment resulting in local and global environmental hazards—is very high, and the percentage of advanced waste treatment is very low compared to other advanced economies.
- Since 2007, when the landfill levy was applied to municipal waste in Israel, the percentage of waste sent to landfills has declined very slightly. It would appear that in the absence of advanced alternatives for waste treatment, the levy by itself does not bring about a significant reduction in landfill use.
- There is a noticeable lack of incentives to residents to reduce waste as much as possible, whether by transition to direct payment by waste volume, or by requiring residents to separate waste into categories.

Reducing the volume of municipal waste and improving waste treatment methods are key environmental objectives. Achieving these targets involves the use of economic tools, as well as the use and enforcement of regulations. The importance of regulatory tools, as shown by experience from other advanced economies, is highly significant, and reflects social norms. However, this box is focused on economic tools alone.

In Israel, a levy of NIS 108 per ton is applied to municipal waste sent to designated landfills. This levy is paid by local authorities, which are in charge of waste disposal, and is the primary economic tool for internalizing the external impact of municipal waste in Israel. Revenues from this landfill levy are transferred to a cleanup fund at the Ministry of Environmental Protection (hereinafter: "MEP"). This fund is designated to serve as a source for financing the development of landfill alternatives.

This box provides an international perspective over time of how municipal waste is treated in Israel, in view of the landfill levy application since 2007.[1]

International overview

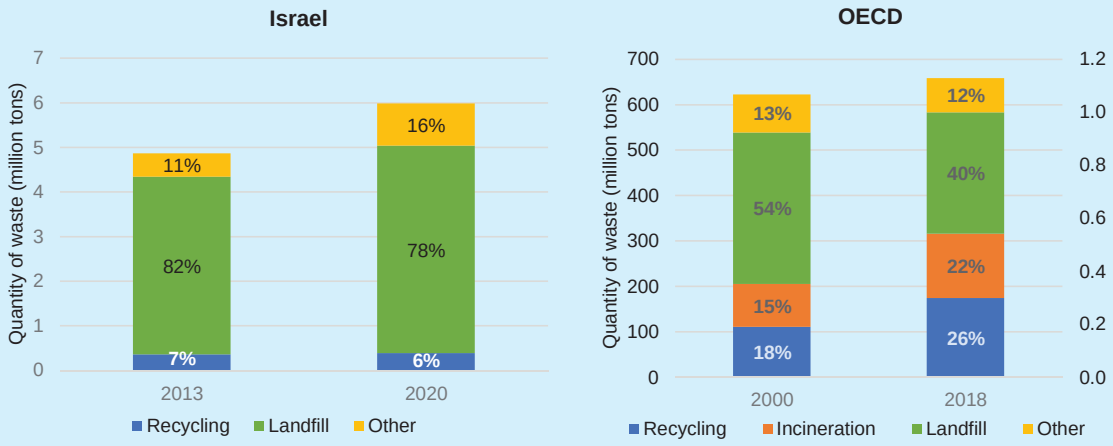
In the early 1980s, countries started to realize that environmental policy should focus on reducing the damage caused by municipal waste, in addition to encouraging and incentivizing a reduction in the production of such waste. This meant transition (to a varying degree from country to country) from burying waste in landfills to recycling and controlled incineration of

[1] The Bank of Israel *Annual Report* has addressed waste treatment policy in Israel on two occasions: in 2009, in the context of the application of the landfill levy in 2007 (Waste Disposal and the Landfill Tax, Bank of Israel *Annual Report* for 2009, pp. 360–365), and from a wider perspective in 2019 (Municipal Solid Waste: The Problem and Economic Tools to Deal with It, Bank of Israel *Annual Report* for 2019, Selected Issues, pp. 26–37). For analysis from a different perspective, see: S. Daskel and A. Ayalon (2020), "Treatment of Solid Municipal Waste in Israel: Roadblocks, Removing Them and Means of Acceleration", *Ecology and Environment* (4)11.

waste, generating energy from such incineration.[2] Thus, for example, the volume of municipal waste per capita in EU countries was practically unchanged from 1995 to 2020, while total waste continued to increase due to population growth. Waste sent to landfills, as percentage of total municipal waste, decreased in this period from 61 percent to 23 percent.

The volume of municipal waste treated at incineration plants doubled, while the volume of waste treated at recycling plants tripled.[3] The same essentially applies to the wider group of OECD countries: stable volume of municipal waste per capita, despite growth in per-capita GDP; a slight increase in total waste volume due to population growth; a decrease in waste sent to landfill, and increases in recycling and incineration to generate energy (Figure 1).

Figure 1
Handling of Solid Urban Waste



"Other" - Composting and incineration without generating energy.
SOURCE: Based on OECD.stat.

There are no "generally accepted" quantitative estimates of the financial cost of waste treatment by landfill, incineration with energy recovery[4], and recycling. The range of reported prices is fairly wide and dependent on the country, timing, type of technology, degree of economic development, and so forth, but it is possible to discern a ranking of costs. The cost of capital required for setting up waste treatment plants (per ton of waste) is lowest for landfill, higher for recycling plants, and highest for incineration plants.[5] The willingness of rich countries to bear the increased financial cost of municipal waste treatment due to the transition to recycling

[2] Mazzanti and Zoboli (2008). "Waste Generation, Waste Disposal and Policy Effectiveness", *Resources Conservation and Recycling*, 15: 1231–1234.
[3] Municipal waste statistics data from Eurostat.
[4] The MEP uses the term "energy recovery from waste".
[5] Silpa Kaza, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden (2018). "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050", Urban Development Series. World Bank.

and incineration, reflects the realization of the external cost of waste treatment, particularly the environmental damage caused by the use of landfills. Previously, local environmental impact has played a key role in motivating the reduction of waste sent to landfills, but currently, the key rationale for the transition to incineration or recycling of waste is the reduction of greenhouse gas emissions compared to sending waste to landfills. First, direct emissions generated due to the use of landfill are avoided. Second, waste incineration in facilities where energy is generated from waste saves on the greenhouse gas emissions that would have resulted from the use of fossil fuels (such as gas or coal) to generate the same energy. Furthermore, the recycling of waste components eliminates the need to manufacture such components, including the greenhouse gas emissions involved. In addition to these, transporting waste to landfills often involves long trips by heavy vehicles, which also result in greenhouse gas emissions. In fact, between 1995 and 2020, green gas emissions generated by waste in the EU declined by more than one-third, due to treatment of municipal waste.[6] A major milestone in the transition from using landfills to recycling in Europe was the EU Landfill Directive of 1999, which required EU members to gradually reduce waste disposal using landfills.[7] This and subsequent directives resulted from a conceptual change among EU policy makers.

The implementation of EU directives, i.e. how to reduce the use of landfills and expand advanced treatment, is country-specific and does not offer a common pattern. An analysis of municipal waste treatment policy across 32 European countries, for example, shows that nearly one-third of these have a nation-wide provision for collecting payment from residents based on waste volume and type; nearly one-third have such provisions in some areas of the country; and in the remaining countries, residents do not pay directly for waste treatment. The difficulty in pinpointing the common traits for countries in each group is shown by the fact that Ireland is in the first group of countries, but the UK, its neighbor, is in the third group. The same goes for Scandinavian countries, where Finland and Sweden are in the first group, Denmark is in the second, and Norway is in the third group. Another example has to do with the scope of upgrades to treatment of municipal waste. In most countries, the upgrades are nation-wide, but in seven countries (some small and some large), treatment upgrades only apply to some areas and are not nation-wide. The same is true for a range of criteria.[8] In general, the reduction in the use of landfills is attributed to a combination of prohibitions on using landfills, setting of recycling targets and standards, mandatory separation at source, taxation applied to the use of landfills, expansion of manufacturer warranty laws to packaging, and so forth.[9]

A study of payment arrangements for waste disposal and treatment in advanced economies and in emerging markets found many significant differences in such arrangements between countries (and often within the same country as well), with only partial linkage between the state of development of the country and collection of payment by waste volume and type. However,

6 Municipal waste statistics data from Eurostat.
7 Council Directive 1999/31/EC of 26 April 1999.
8 "Municipal Waste Management Across European Countries" (2016, updated 2022), European Environmental Agency.
9 "Waste Management and the Circular Economy in Selected OECD countries", OECD, 2019.

even in advanced economies, most often a uniform payment is collected from residents, rather than variable payment by waste volume and type.[10]

Israel

As noted, sending municipal waste to landfills is generally understood to be the worst solution in environmental terms.[11] At the national level, landfills take up land and cause damage to the outdoors, result in aesthetic and odor hazards, pollute soil and water reservoirs, and lead to air pollution due to the transport of waste to the landfill. At the international level, it involves significant greenhouse gas emissions (mostly methane): Methane accounts for 9 percent of all greenhouse gas emissions in Israel (in CO_2 emission equivalent terms), mostly (77 percent) originating from municipal waste landfills.[12] Moreover, such damage is permanent, or at least continues for many years after landfill operations have been completed. Therefore, using landfills as the primary waste treatment solution is considered non-normative in advanced economies.[13] In similar fashion, the percentage of waste sent to landfills in the country is considered a key criteria with respect to the country's environmental performance. In this regard, Israel is ranked very low (Figure 2), because the share of recycling in Israel is one of the lowest among advanced economies, and Israel has no waste incineration facilities for energy production (Figure 1).

The hierarchy of methods that are preferable, from an environmental perspective, to the use of landfills is: (1) Reduce the volume of raw waste at the source; (2) Separate organic waste from dry matter, including separation of paper, plastics, glass, etc. and recycling these as much as possible; and (3) Incinerate nonrecyclable waste while using the energy generated from such incineration. Landfills should be used only for the remaining waste. As noted, these methods are more costly over the short term—i.e. in direct monetary terms—than direct use of landfills.

In Israel, the primary tool used to reflect the cost of waste treatment and the cost of external impact of waste generation and use of landfills is the landfill levy. This levy is paid by local authorities, based on the volume of waste they send to landfills. Such a levy may result in realization of the overall cost of waste generation and use of landfills and in reducing the use of the landfills. This may come about either through reducing waste volume in the first place (such as reduced use of packaging if authorities impose the levy payment directly on businesses / manufacturers) and/or by separating waste (by residents) into different components and recycling them as appropriate. However, local authorities in Israel do not impose the landfill levy directly on residents and businesses based on the volume of waste they generate. Instead, the levy is included within the local authorities' general expenses, which are financed by property tax and other municipal taxes. This indirect application of the levy does not create a direct incentive

[10] Bruno Ribas Alzamora and Raphael Tobias de V. Barros (2020). "Review of Municipal Waste Management Charging Methods in Different Countries", Waste Management, 115: 47–55.

[11] Directive 2008/98/EC of the European Parliament and of the Council on Waste.

[12] Central Bureau of Statistics, Israel National GHG Inventory, 2021.

[13] When Israel joined the OECD, it undertook to promote environmental management of waste treatment facilities. Doron Lavie, 2020, p. 294.

for residents to reduce the volume of waste.[14] Apparently, a combination of the difficulty in enforcing restrictions on throwing away waste, especially in dense urban areas, and the low cost of this levy compared to alternatives to landfill, reduces the incentive for local authorities to act more diligently in this matter.

By law, the landfill levy payments are transferred to a cleanup fund for development of environmentally friendly alternatives to landfills.

Landfill levy—economic aspects

The rationale behind the landfill levy is obvious: internalizing the cost of the external impact of waste treatment, by those who generate it.[15] Channeling the levy proceeds directly to waste treatment is also based, apparently, on sound economic logic: remedying this external impact. The levy amount was gradually increased, and is currently about 10 times higher than it was in 2007, but is still low compared to the levy in other OECD countries (Figure 2).[16]

In terms of the levy's success rate in achieving its objectives, waste sent to landfills as percentage of total waste decreased by only five percentage points (from 82 percent to 77 percent) from 2014 to 2019, and it remained nearly double the OECD average percentage. Moreover, Figure 2 depicts the cost of using landfills vs. rate of landfill use in European countries and in Israel, and the trend line reflecting the link between the cost of using landfills and the percentage of waste sent to landfills.[17]

An examination of this trend line reveals that for the cost of using landfills in Israel, the percentage of waste sent to landfills is higher than "predicted" by the trend line. That is to say, the actual percentage of waste sent to landfills is far higher than expected based on the cost of using landfills. Moreover, the cost of using landfills is just one component of the cost of waste treatment for local authorities. Additional costs include collection and transportation to landfills, among others. This also explains the partial link between the levy amount and the percentage of waste sent to landfills. This examination supports the impression that the relatively low cost of using landfills in Israel is not the primary reason why the percentage of waste sent to landfills remains high in Israel. Therefore, apparently raising the landfill levy in the absence of advanced alternatives for waste treatment would not significantly reduce the use of landfills.[18]

[14] An analysis of the important interface between government and local authorities with regard to the treatment of municipal waste is beyond the scope of this box.

[15] Calculating the external impact of landfills is highly complex. Therefore, the levy amount in different countries primarily reflects the environmental perceptions and political forces in each country. See: "Strategy for a Sustainable Waste Economy, 2021–2030, 2020", Ministry of Environmental Protection, p. 94.

[16] OECD (2019). "Waste Management and the Circular Economy in Selected OECD Countries".

[17] Cost of landfill use for the landfill user = landfill levy + gate fee. The landfill levy is charged by weight, collected by the landfill site operators, and transferred to the Ministry of Environmental Protection. The gate fee reflects the cost of operation and profit for the landfill site.

[18] See Ministry of Environmental Protection (2020), "Strategy for A Sustainable Waste Economy, 2021–2030", p. 128, which contains a recommendation to increase the levy to NIS 173 per ton or higher, since this is the external cost of greenhouse gas emissions from landfill use. For an international overview of waste taxation based on the volume of waste produced, see ibid, pp. 97–98.

The failure of the pricing mechanism to reduce the volume of waste is due to the fact that waste producers—businesses and residents—do not pay by the volume of waste they generate, as the levy that municipalities pay to landfill operators is absorbed among all of the payments made by businesses and residents to the municipality. As there is no link between the waste volume and the amount of the levy imposed, one cannot expect a change in behavior that would reduce the volume of waste. From the economic aspect, what is called for is in fact a stronger link between the volume of waste generated by residents and the burden of treating this waste, whether by charging a payment or by requiring residents to separate the waste into different containers.[19]

The cleanup fund – economic aspects

The cleanup fund was established in 1986 and is administered by the Ministry of Environmental Protection. Its stated objective is to pool money to be used for waste treatment and for other targets. Some 90 percent of fund revenues are derived from the landfill levy.[20] The fund does not follow a predefined plan for use of this money, but rather works through ad-hoc transfers of funds to government ministries and by issuing tenders and calls for action.[21]

Since inception of the fund, only one-third of its revenues was used to upgrade waste treatment. This is due to existing barriers in planning, land allocation, and financing mechanisms, as well as the NIMBY[22] effect—all of which hamper the creation of waste treatment facilities. The mirror image of the use of the fund's money is the surplus accumulated in the fund – NIS 3.2 billion in 2020.

These emerging challenges to the operation of the cleanup fund are not unique. Global experience with dedicated taxation and dedicated funds shows that a precondition for the success of these funds is advance planning with regard to the timing of fund revenues and expenditures. Correct planning would allow, for example, the accumulation of money in a dedicated fund already in the project planning stage and prior to execution, so that the start of execution would not be delayed due to budgetary constraints. Moreover, accumulating money in the fund with no detailed plans as to its use may be wasteful and may unnecessarily make the budget limitation for other government actions more rigid. It is therefore important that further operations of the cleanup fund in Israel—and similar funds—be based on a clear and feasible multiyear work plan regarding the use of the revenues in accordance with the fund's specified objectives.[23]

[19] Furthermore, the high use of landfills may also reflect differences in the importance attributed to environmental protection by residents in Israel and elsewhere.

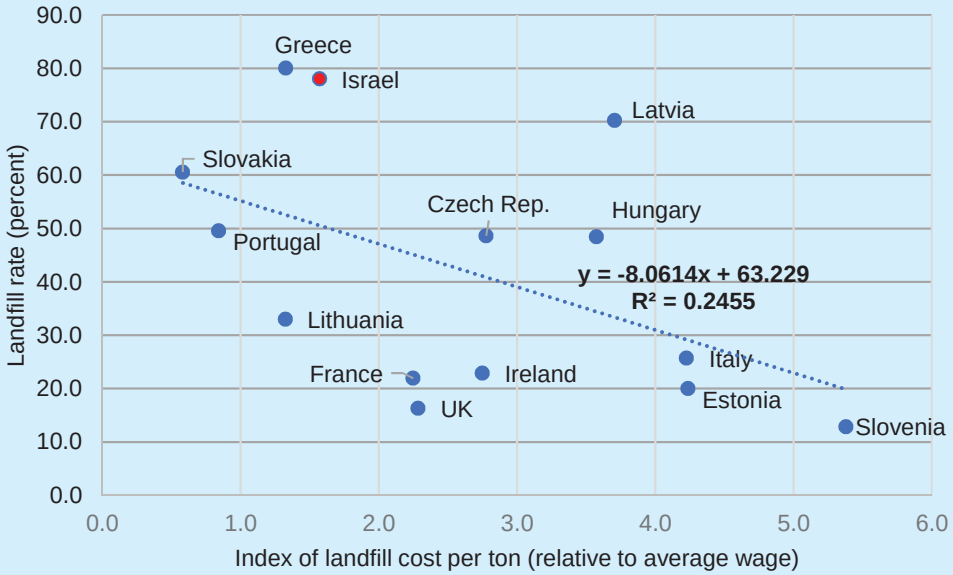
[20] These payments are managed in the landfill levy account. In addition to this account, there are also the general account, deposit account, and plastic bag account.

[21] For a detailed analysis of the fund's operations, see: "The Cleanup Fund—Financial Aspects", State Comptroller's Report, May 2022.

[22] Acronym: Not In My Back Yard, meaning objection by residents to having a public facility established near their residence.

[23] See Ministry of Environmental Protection (2020), "Strategy for A Sustainable Waste Economy, 2021–2030", p. 128, which contains a recommendation to establish a new fund to finance landfill rehabilitation. The Ministry of Environmental Protection's positive stance on establishing environmental funds is based on EU directives on this matter.

Figure 2
Landfill Rate and Cost in Various Countries



Landfill rates in 2017, landfill costs in European countries in 2013 and in Israel in 2017.
SOURCE: Based on Ministry of Environmental Protection.

Chapter 7
Welfare Issues and the Distribution of Income

- There are significant disparities in per capita disposable income between Arab and *Haredi* (ultra-Orthodox) households and non-*Haredi* Jewish households. The disparities between *Haredi* Jews and non-*Haredi* Jews are larger in the 25–44 age group than in the 45–64 age group, while the disparity between Arabs and non-*Haredi* Jews has narrowed in the younger group.
- The main causes of the gaps relative to non-*Haredi* Jews are low labor income in Arab and *Haredi* households and the fact that there are more members in those households. In the Arab sector, the gaps in labor income are primarily the result of the low labor force participation rates among women. In the *Haredi* sector, low labor income is primarily due to the difference in the proportion of university graduates and in employment rates among men.
- An examination of the trends in the older age group reveals a narrowing of gaps between Arab women and non-*Haredi* Jewish women both in education and in employment rates while among *Haredi* men the gap in education has widened while that in employment has narrowed somewhat.
- There are wage gaps between Arab and *Haredi* university graduates and non-*Haredi* Jewish university graduates. These gaps partly reflect a higher representation of Arabs and *Haredim* in occupations with low average wages, such as education, and underrepresentation in high-wage occupations, such as high-tech and managerial occupations.
- A high proportion of Arab university graduates are employed in occupations with a high percentage of positions in the public sector, particularly education and healthcare. In healthcare, significant proportions of Arab men and women are employed in the paramedical professions, which are characterized by a relatively low average wage. However, a high proportion of Arab men are employed in the medical profession, which is characterized by a high average wage.
- It appears that the geographic dispersion of the Arab population, which includes a significant concentration of population in the periphery, is not a major factor in the distribution of occupations among Arab university graduates.

ISSUE 1: THE DIFFERENCES IN PER CAPITA DISPOSABLE INCOME BETWEEN ARABS AND *HAREDIM* AND NON-*HAREDI* JEWS ON THE OTHER

There are significant disparities in per capita disposable income between Arab and Haredi households on the one hand and non-Haredi Jewish households on the other. The main reasons for these gaps is low labor income among Arab and Haredi households and the fact that they are larger.

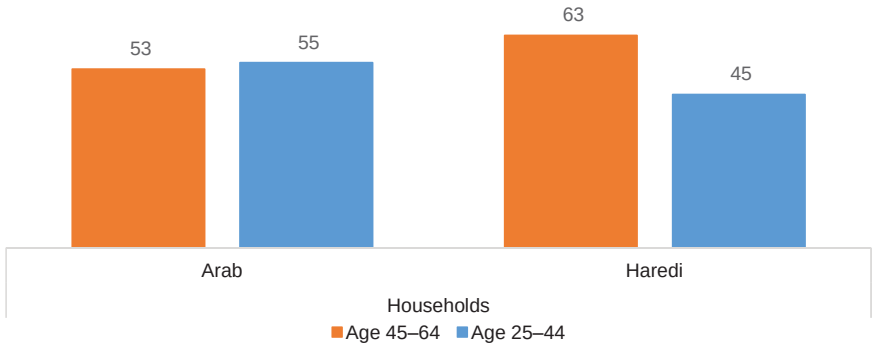
There are significant differences in standard of living—as measured by per capita disposable income—between the various population groups in Israel, particularly between non-*Haredi* Jews, Arabs and *Haredi* Jews. In 2019, the poverty rate was 37 percent among Arab households and 45 percent among *Haredi* households, compared to only 8 percent among non-*Haredi* Jewish households.[1] These differences have characterized Israeli society for many years. In order to determine whether there is a trend toward smaller income gaps between the groups among the younger generation or whether they are widening, we look at the difference in economic and demographic characteristics between younger households (aged 25–44) in the various groups. For some of the variables, we also examine the difference in parameters relative to the older age group (aged 45–64) in 2021 or in 2001 when the older group was young.[2]

Standardized per capita disposable income is a well-accepted index of income level. It reflects the quantity of resources available to the household while taking into consideration its relative size, and it is used to determine the poverty line, among other things. An examination of the differences in the index between the various population groups indicates that per capita disposable income among Arabs and *Haredim* is about half of that among non-*Haredi* Jews (the reference group) (Figure 7.1). As described below, the income gap between *Haredim* and non-*Haredi* Jews is primarily the result of low levels of employment and university graduates among *Haredi* men, alongside a larger number of children in *Haredi* families. In contrast, the main source of the gaps with respect to Arab households is the low employment rates among women and the low proportion of university graduates among men. A comparison between young and old households shows that the gap in disposable income between the young Arab population and the young non-*Haredi* Jewish population is somewhat smaller than among the old, thanks to the relative increase in economic income (labor, pensions and capital) alongside a decline in household size. In contrast, among *Haredim*, the gap among the young is larger than that among the old, due to the relative decline in income as well as the larger size of households.

[1] The calculation is based on the 2019 Household Expenditure Survey, because the National Insurance Institute's Poverty Report for 2021 has not yet been published. A household is considered to be poor if its standardized per capita disposable income is less than half of the median for all households.

[2] The identification of the *Haredi* and Arab populations in the 2021 data is according to self-reporting, while in the data prior to 2014, it is according to the administrative definition. The change in definition did not significantly affect the results. Age groups are determined according to the age of the head of the household. The analysis in this section does not include Arabs in East Jerusalem.

Figure 7.1
Ration of Per Capita Disposable Income Between Arab* and *Haredi* Households and Non-*Haredi* Jewish Households, by Age Group,** (percent)

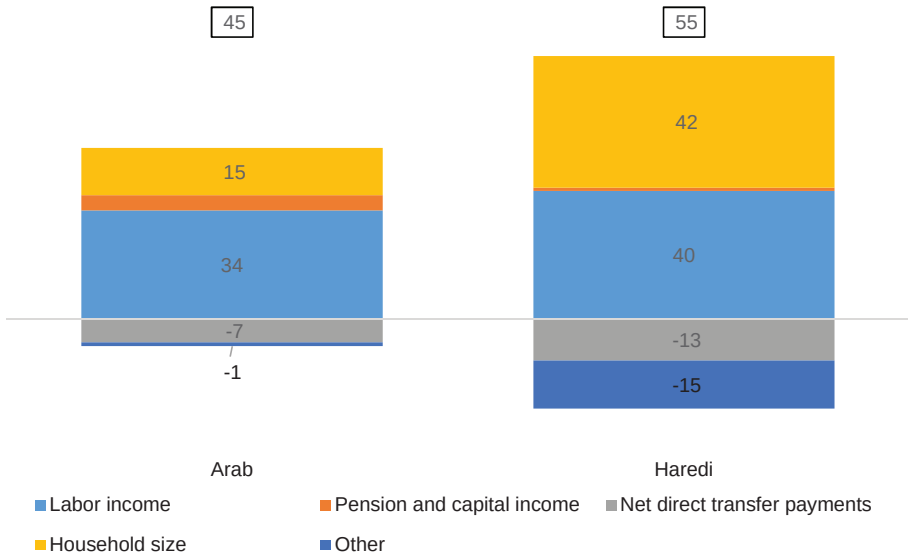


* Excluding Arabs of eastern Jerusalem.
** Grouped by age of the head of household.
SOURCE: Based on Central Bureau of Statistics Household Expenditure Survey for 2021.

Disposable per capita income is composed of the household's labor income (for both employees and the self-employed), income from capital, pensions, and net transfer payments (direct transfers from public and private sources minus direct taxes) divided by the standardized number of household members. In order to examine the contribution of the different variables to the income gaps between Arab and *Haredi* households and non-*Haredi* Jewish households, we made use of the Blinder-Oaxaca decomposition (Figure 7.2).[3] In 2021, the gaps in disposable per capita income were primarily the result of differences in labor income and household size, while net transfer payments and other factors, which cannot be quantified in the data (unobservable factors and the unexplained variance), tended to reduce the gaps. A comparison to 2019, in order to eliminate the effect of the COVID-19 period, yields similar results, although the gaps are larger in labor income and transfers make a larger contribution to narrowing the income gap. Later in the analysis, we discuss in greater detail each of the factors that affect these gaps (since we are considering a young population, pension income and capital income have a small effect and therefore we do not discuss them at length).

[3] This method enables a quantitative analysis of gaps between groups while differentiating between the gap due to a difference in the averages of the explanatory variables and that due to the difference in the estimates using a twofold decomposition. The dependent variable is standardized per capita disposable income, while the explanatory variables include household labor income (employees and the self-employed), income from capital, pension income, net direct transfers (transfer payments less tax payments) and number of standardized members of the household.

Figure 7.2
Contribution of the Factors in the Differences of Per Capita Disposable Income between Young Arab and Haredi Households and Non-Haredi Households



As a share of the total income gap in percent. "Other" is the gap derived from factors not observed in the data.
Households with a head of household aged 25–44, excluding Jerusalem Arabs.
SOURCE: Based on Central Bureau of Statistics Household Expenditure Survey, 2021.

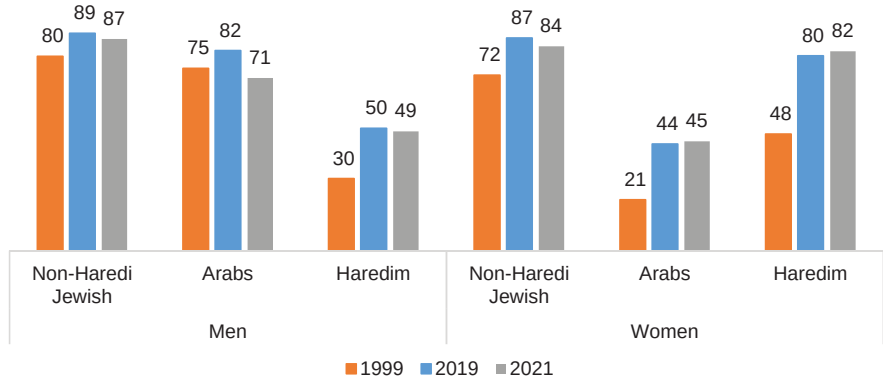
Labor income (employees and the self-employed)

Various economic and demographic variables may explain the gaps between the various population groups in terms of gross labor income (employees and the self-employed), rate of employment, number of work hours per employee, the educational characteristics of the household members, and the household's geographic location. Below, we discuss the differences according to the various characteristics.

Differences in rates of employment and work hours per employee

Labor input, as reflected in the rate of employment and work hours per employee, affects the gaps in labor income across population groups. A comparison of employment rates reveals gaps between young Arabs and young *Haredim* on the one hand and their non-*Haredi* Jewish counterparts on the other, both in 2021 and in 2019 (prior to the COVID-19 period) (Figure 7.3). The employment rates among Arab women and *Haredi* men are significantly lower than among their counterparts in the other groups. A comparison of employment rates between the younger age group in 2019 and the older one when they were young (in 1999) indicates that the employment level has risen in all groups in recent decades, although the gaps between the groups remain large.

Figure 7.3
Employment Rate by Gender and Population Group, (age 25–44, percent)



* Excluding Arabs of eastern Jerusalem.
Population groups were identified in 2001 by the administrative definition, and in 2019 and 2021 by self-definition. The change in definitions did not lead to a significant change in the results.
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

The employment rate does not reveal the entire picture, since the employees' work hours also play a role. A comparison of weekly work hours per employee indicates that *Haredi* men work 21 percent less per week than non-*Haredi* Jewish men of the same age, and that Arabs work a similar number of hours (Figure 7.4). The work hours of *Haredi* women and Arab women are lower by an average of 17 percent and 7 percent, respectively, than those of non-*Haredi* Jewish women. An examination of the trends indicates that the drop in weekly work hours, during a period when work hours declined overall in the economy, was the steepest among Jewish men, both *Haredi* and non-*Haredi*. Among women, the increase in the employment rate during the period was accompanied by stability in the number of work hours per employee.

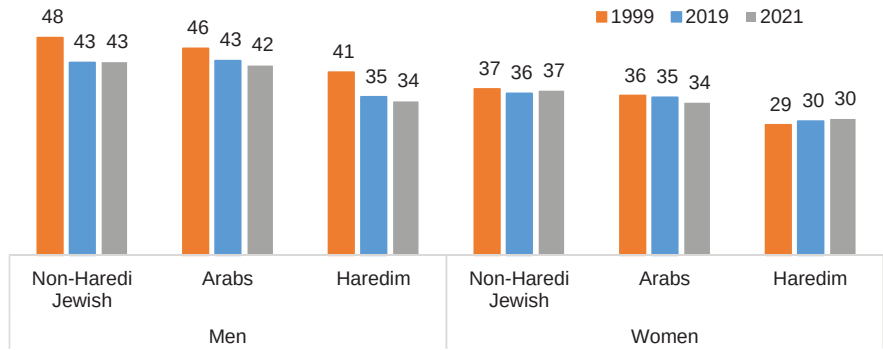
Differences in education

There is a clear downward trend in the proportion of university graduates among *Haredi* men.

The level of academic education has a large impact on individuals' earning ability with respect to both employment opportunities and hourly wages. Studies carried out in Israel have shown that the marginal return on a bachelor's degree relative to a matriculation certificate is about 30 percent.[4] A comparison by gender and population group shows that the proportion of university graduates is much higher among non-*Haredi* Jews aged 25–44 than among the other groups, with regard to both men and women (Figure 7.5). A comparison to the older age group makes it possible to examine the changes that have occurred in the proportion of university graduates over the years. The most significant

[4] Roni Frish (2009). "The Economic Returns to Schooling in Israel", *Israel Economic Review*, 7(1): 113–141; Yael Meltzer (2014). "The Return on Schooling: Inequality Between the Various Population Groups", Van Leer Institute. [Hebrew]; Michael Debowy, Gil Epstein, and Avi Weiss (2021). "Returns to Education and the Labor Market Experience in Israel". Taub Center for Social Policy Studies in Israel.

Figure 7.4
Weekly Work Hours per Employee by Gender and Population Group
(age 25–44, percent)



* Excluding Arabs of eastern Jerusalem.
Population groups were identified in 1999 by the administrative definition, and in 2019 and 2021 by self-definition. The change in definitions did not lead to a significant change in the results.
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

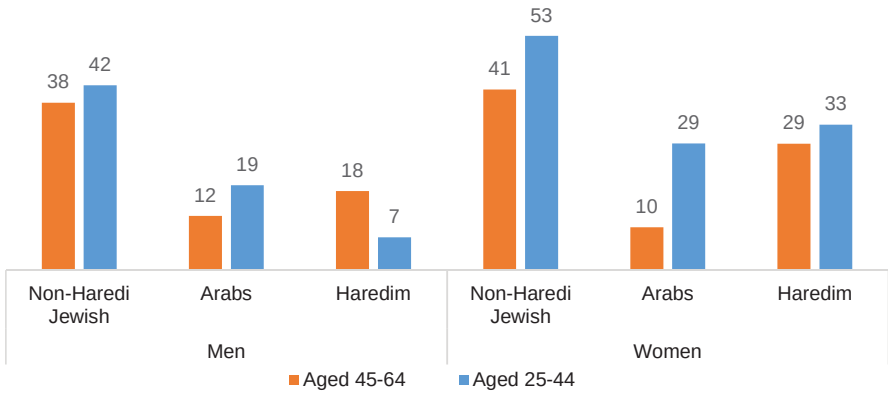
change in education level occurred among women, particularly Arab women, although the large increase in their proportion of university graduates only partially narrowed the gap in academic education relative to non-*Haredi* Jewish women. This is because the proportion of university graduates among the latter also rose significantly. With respect to *Haredi* women, the increase in the proportion of university graduates was less than among non-*Haredi* women, which led to a widening of gaps. Among men, the changes in the proportion of university graduates were more modest. The gaps between non-*Haredi* Jewish men and Arab men narrowed somewhat while those between *Haredi* men and non-*Haredi* Jewish men widened, as a result of the decline in the proportion of university graduates among *Haredi* men.

Different trends can be seen in the attainment of an academic education between the *Haredim* and Arabs. The limited scope of core subjects taught in *Haredi* schools is likely to constitute an entry barrier to higher education. *Haredi* boys study the core subjects to a limited extent up to Grade 8 but subsequently, on arriving in lower *Yeshiva*, most of them no longer learn any core subjects. According to the data on *Haredim* for 2018–19, only about 5 percent of boys and 22 percent of girls were eligible for a matriculation certificate.[5] In the absence of core studies, various tracks, such as *mechinot*, have been created for the integrating the *Haredi* population into higher education. However, there is a high dropout rate from these programs and from bachelor's degree programs[6], and among those who do graduate there is an over-representation

[5] Gilad Malach and Lee Cahaner. *Statistical Report on Ultra-Orthodox Society in Israel, 2021.* Israel Democracy Institute.

[6] Deganit Levi (2021), "Integrating of the Ultra-Orthodox Community in Higher Education". Jerusalem Institute for Policy Research.

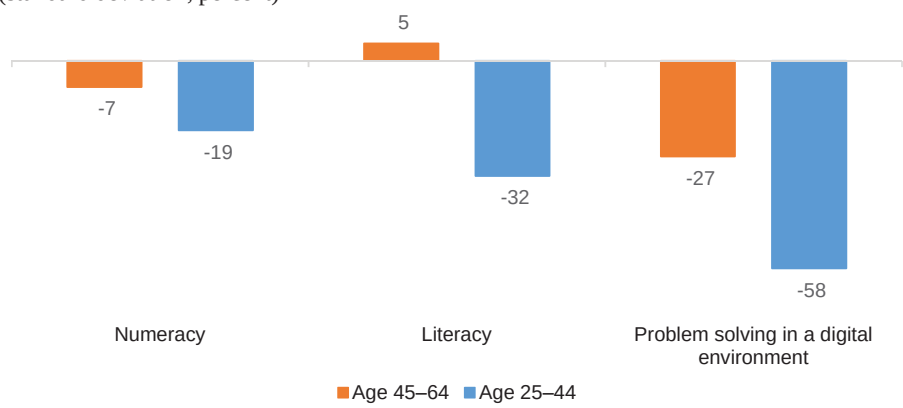
Figure 7.5
Rate of Those With Academic Degrees by Gender and Population Group
(percent)



Excluding Jerusalem Arabs.
SOURCE: Based on Central Bureau of Statistics Household Expenditure Survey, 2021.

in low-paying fields such as education and social work. These gaps in formal education are reflected in the 2014 PIAAC survey, which measures skill levels. An examination of the gap in skills between *Haredi* men and non-*Haredi* Jewish men by age group shows that it is wider among the younger group than among the older one (Figure 7.6).

Figure 7.6
Gap in Basic Skills Between *Haredi* Men and Non-*Haredi* Jewish Men
(standard deviation, percent)



SOURCE: Based on 2014 PIAAC Survey.

According to Perry-Hazan et al. (2023), the issue of core subjects—particularly in terms of the balance between the welfare of the child and his right to an education, the welfare of the parents, and the interests of the State—has led to conflict between religious schools (Jewish and others) and government

authorities in various countries (the US, the UK, Belgium, Canada, Singapore, and others).[7] The experience in most countries (with respect to *Haredim* and Muslims) indicates that coercion has only limited effectiveness in the case of core subjects due to the opposition of the relevant population group and the State's reluctance to use the means of coercion available to it, particularly the closing of schools. An exception is Belgium, where although independent subsidized *Haredi* schools have autonomy in deciding on their curriculum, they are required to produce graduates with appropriate skill levels (which are assessed by external testing), and they are closely monitored in this regard.[8]

In Israel, there is a policy of economically incentivizing the study of core subjects in the schools. However, according to the State Comptroller, the Ministry of Education does little to monitor the implementation of this policy in the schools. Furthermore, there is little likelihood of a school being closed or its budget being withheld for not meeting the requirement to teach core subjects.[9] Perry-Hazan et al. (2023) found a positive relationship between the level of a school's commitment to teaching boys the core subjects as part of the budget rules and the actual level of core subjects in the school, although there was variance between the subjects (relatively high compliance in Hebrew and math and low compliance in English and science) and across age groups (low compliance in Grades 7–8).[9] In view of the importance of formal education in reducing income gaps across population groups and raising the average level of income in the economy, efforts are needed in order to reinforce the teaching of core subjects in *Haredi* schools.

There is a clear upward trend in the proportion of university graduates in Arab society.

A different picture emerges in Arab society. In recent years, there has been an upward trend in the number of university students and graduates at all levels, particularly among women. In 2003, Arab students constituted only about 7.5 percent of those receiving bachelor's degrees while in 2021 that figure reached 15 percent.[10] A major barrier to the integration of Arabs in higher education is a lack of fluency in Hebrew, which is due to the fact that up until university, the vast majority of students learn only in Arabic and in an Arabic-speaking environment, while in higher education they learn in Hebrew and in a Hebrew-speaking environment. Furthermore, there is a mismatch between the Hebrew curriculum and the Yael test (a test of Hebrew knowledge for higher education) which constitutes a hurdle for Arabs wishing to enter university, even for those with high marks in 5 units of Hebrew. The alternative to Hebrew-speaking

[7] Lotem Perry-Hazan, Neta Barak-Corren, and Gil Nachmani (2023). "Noncompliance with the Law as Institutional Maintenance: The Case of Haredi Boys Schools' Decisions Regarding Core-Curriculum Regulations", Working Paper.

[8] Lotem Perry-Hazan (2020). "Regulation of Core Studies in Ultra-Orthodox Education from a Comparative Perspective". Law, Society and Culture A, 493–525. [Hebrew]

[9] State Comptroller (2020). *Annual Report* 70-b. *Ministry of Education – Ultra-Orthodox Education and its Supervision*. [Hebrew]

[10] Central Bureau of Statistics data on attainment of degrees in the years 2002–03 and 2020–21.

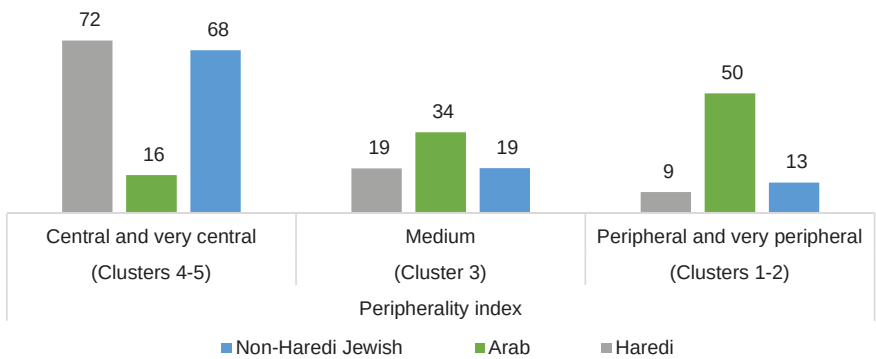
institutions for many in Arab society is Arabic teacher colleges in Israel or institutions in the Palestinian Authority or abroad.

An examination of the connection between the level of higher education and employment rates during the period prior to COVID-19 shows a positive and particularly strong relationship among Arab women and *Haredi* men. The employment rate among university graduates in both groups is 40 percentage points higher than among non-graduates, while in the rest of the groups the employment rates are only 10 to 15 percentage points higher than among non-graduates in the same group.[11] The connection between an academic education and employment is not necessarily causal, but is nonetheless indicative of the culturally motivated desire to integrate into the labor market, which leads to an increase in both attainment of an academic education and employment.

Differences by region

Another characteristic that might explain some of the disparities in household labor income is geographic location, particularly the overrepresentation of one of the groups in peripheral regions. The Central Bureau of Statistics (CBS) defines a peripheral region as one that is distant from markets, places of employment and healthcare services. A peripherality index was constructed on the basis of this definition, with the goal of characterizing localities according to their geographic location between the most peripheral region and most central region. An examination of the disparities between the groups shows a difference in peripherality level between Jews and Arabs. Only about 16 percent of Arab households are located in towns that are defined as central or very central according to the index, as opposed to the vast majority of Jewish

Figure 7.7
Distribution of Young Households by Resiential Locality's Peripherality Index and Population Group (percent)



Households with a head of household aged 25–44. Excluding Arabs of eastern Jerusalem.
SOURCE: Based on Central Bureau of Statistics Household Expenditure Survey for 2021.

[11] Based on Central Bureau of Statistics *Labor Force Survey* 2019. An examination based on 2021 data produced similar results.

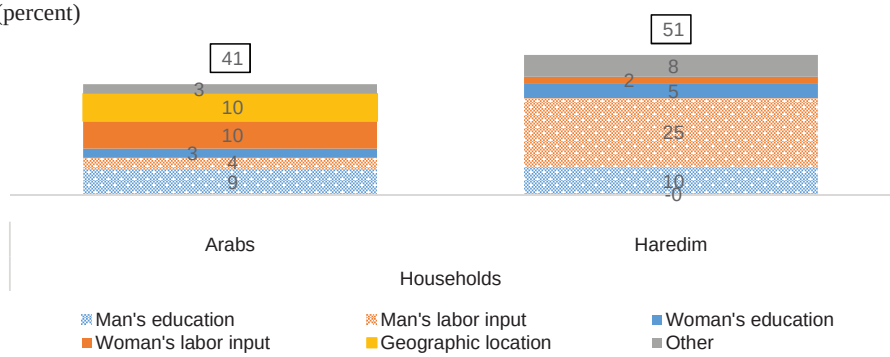
households (Figure 7.7). In 2021, the labor income of a university graduate—whether male of female—in the periphery was about 86 percent of that in the center, and in the case of a very peripheral location that figure was 81 percent. Here again the causality may be in both directions. It may be that individuals with high earning power tend to choose to reside in a central region, while residing in a peripheral region limits an individual's earning power.

A significant portion of the differences in labor income between the population groups is the result of education level and labor input.

The contribution of the variables to labor income disparities

In order to examine the contribution of the aforementioned variables to the gap in labor income between Arabs and *Haredi* Jews on the one hand and non-*Haredi* Jews on the other, we use the Blinder-Oaxaca decomposition.[12] The results are presented in Figure 7.8, which shows that the disparity in labor income between a *Haredi* household and a non-*Haredi* Jewish household is about 51 percent and most of that gap (35 of the 51 percent) is explained by differences in the proportion of university graduates and labor input among men. About 7 percent of the gap among women is explained by differences in these characteristics. In Arab society, the gaps are primarily the result of the difference in labor input of women, the gap in academic education among men, and the disparities in geographic distribution and concentration in peripheral regions (about 10 percent in each case). There remains an unexplained gap

Figure 7.8
Contribution of the Factors in the Differences of Household Labor Income between Young Arab and Haredi Households and Non-Haredi Households
(percent)



Households with a head of household aged 25–44, excluding Jerusalem Arabs. The base group is Jews excluding Haredim. The number in the boxes is the relative gap between the various groups and Jewish households minus Haredim. "Other" is the gap derived from factors not observed in the data.
SOURCE: Based on Central Bureau of Statistics Household Expenditure Survey, 2021.

[12] For further details on this method, see fn. 3. The dependent variable: household labor income (both employees and the self-employed). The explanatory variables: the proportion of male university graduates, the proportion of female university graduates, work hours per man (including the unemployed), work hours per woman (including the unemployed), and the peripherality index of the town (a continuous variable). The regression was based on data from the Household Expenditure Survey. There are some discrepancies in the employment data between the Labor Force Survey (which were presented in Figures 7.5 and 7.6) and the Household Expenditure Survey.

in the case of both groups and it is larger among *Haredi* households. This is likely to be the result of various factors, among them being the difference in occupational distribution among university graduates and their employment in low-earning occupations, as presented below in Section 3 of this chapter.

Transfer payments and taxes

Net transfer payments account for about one-fifth of the disposable income of a *Haredi* household.

Direct transfers and direct taxes are used partly as a policy tool for reducing inequality.[13] Figure 7.9a shows the contribution of net transfer payments—government support and private transfers minus taxes—to the household disposable income of the various population groups. Net transfer payments work in different directions in the various groups. They have a negative effect on non-*Haredi* Jews, the group with the highest income; a somewhat positive effect in Arab society; and a significant positive effect on *Haredi* households.[14]

While the difference in tax payments is relatively clear and is the direct result of the difference in labor income (an effect that was discussed in detail in the previous section), the gap in direct transfer payments is due to various factors (Figure 7.9b). Direct transfers to *Haredi* households are significantly greater than those in the other groups. An examination by source of the transfer shows that the gaps are primarily the result of allowances provided to *Haredim* by government institutions, particularly subsistence payments to *Yeshiva* students, which are conditional on them not working. Another disparity exists in National Insurance payments, where we compared the average payments prior to the COVID-19 pandemic and the increments provided in 2021. Prior to the pandemic, National Insurance payments were higher in the *Haredi* community, primarily due to the fact that they are determined by household size (child allowance) and the high rates of employment among *Haredi* women (maternity allowance). This disparity diminished somewhat in 2021, during which the National Insurance increments paid to *Haredi* households were slightly lower than in the two other groups. Another feature in the *Haredi* community is private support from households (such as ongoing support, gifts at events, etc.), a component that makes a much lower contribution among non-*Haredi* Jews and which is almost non-existent among Arab households. The net transfer ratio, i.e. the ratio of private support received to support given to other households, was 71 percent for young *Haredi* households, 42 percent for non-*Haredi* Jewish households and negative in Arab society.

[13] This section relates to transfer payments and direct taxes only. The calculation does not consider indirect taxes (such as VAT) or the provision of services in-kind by the government (such as education) or by the local authorities (such as discounts on municipal taxes).

[14] In 2021, there was a large increase in direct transfer payments due to the COVID-19 pandemic. However, only among households in Arab society did these changes lead to a reversal of trend. In the years prior to COVID-19, the ratio of net transfer payments to Arab society was somewhat negative.

Figure 7.9a
Net Direct Transfer Payments As a Share of Household Disposable Income, 2021 (percent)

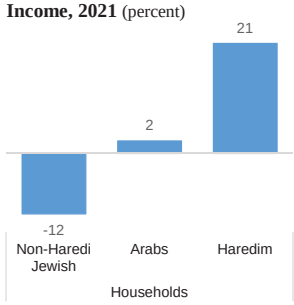
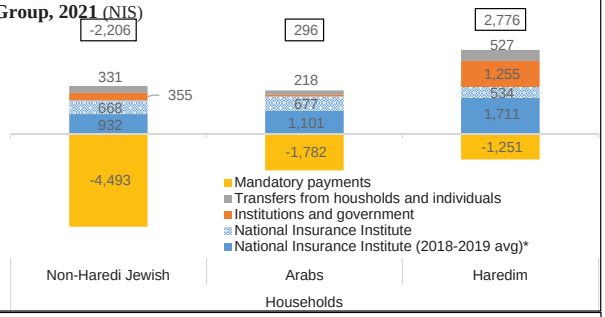


Figure 7.9b
Contribution of Net Direct Transfer Payments and Mandatory Payments to Young Households' Disposable Income, by Population Group, 2021 (NIS)



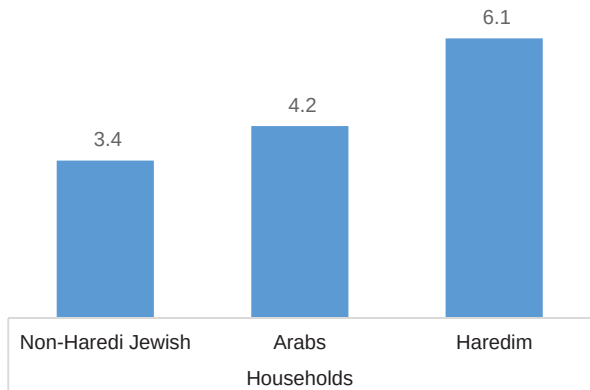
* Transfer payments from the National Insurance Institute increased in 2021, so an estimation was made relative to the average level in 2018–2019, prior to the COVID-19 period. The number in the frame in Figure 7.9b indicates total net transfer payments for each population group. Households with a head of household aged 25–44, excluding Arabs from eastern Jerusalem.

SOURCE: Based on Central Bureau of Statistics Household Expenditure Surveys, 2019 and 2021.

Household size

Household size is another factor that contributes to the explanation of disparities in disposable per capita income. In 2021, a young *Haredi* household had an average of 6.1 members, an Arab households had 4.2 and a non-*Haredi* Jewish household had 3.4 (Figure 7.10). An examination of total fertility according to population group shows a variety of trends. Between 2001 and 2021, the total fertility rate among Muslim women fell by 1.7 children and among *Haredi* women it fell by 0.77, while among non-*Haredi* Jewish women it rose by 0.29.[15]

Figure 7.10
Number of People per Household by Population Group (households with a head aged 25–44)



SOURCE: Based on Central Bureau of Statistics Household Expenditure Survey, 2021.

Conclusion and Discussion

We have examined the effect of economic and demographic factors on the disparity in per capita disposal income between Arabs and *Haredim* on the one hand and non-*Haredi* Jews on the other, and have examined the dynamic over time. The analysis indicates that most of the disparities in per capita disposable

[15] Central Bureau of Statistics data on birth and fertility in Israel, 2020, and "The Fertility of Jewish and Other Women in Israel by Religiosity, 1979–2021". [Hebrew]

income are due to gaps in labor income, which is affected by the proportion of university graduates and labor input per household in the various population groups. The gaps in those variables between *Haredi* men and Arab women on the one hand and other groups on the other are particularly noticeable. An examination of the trends shows a positive trend toward a narrowing of the gaps, which is reflected in an increase in the proportion of university graduates and employment rates, particularly among women. The upward trend in the number of university graduates in Arab society is expected to narrow income gaps between the groups in the future, which may contribute to social mobility in the long term. In contrast, the disparities between the *Haredim* and the other groups are widening, particularly due to the differences in labor input and the proportion of university graduates among *Haredi* men. As a result of the *Haredi* reliance on allowances, this population group is more exposed to the risk of changes in social welfare policy and support.

In order to maintain a similar standard of living to the OECD average, policy measures are needed in order to improve human capital and productivity in the Arab and *Haredi* sectors.

The disparity in fertility rates between the population groups emphasizes the macroeconomic aspect of this issue. The Central Bureau of Statistics population forecast (intermediate scenario) predicts that by 2065 *Haredim* will account for 32 percent of the population and Arabs will account 19 percent.[16] In order to maintain a similar standard of living to that of the OECD countries and to reduce inequality between segments of the population, it is necessary to adopt policy measures now that improve human capital that is relevant to the labor market and the labor productivity of these groups. Although above we decomposed the income disparities into their main factors, i.e. education, employment and fertility, it is important to mention that individuals' decisions with respect to these variables are dependent on one another. The choice to have a large family can make it more difficult to integrate within the labor market or obtain an academic education due to the burden of childrearing. In contrast, having an academic education increases earning power and in this way incentivizes the individual to realize that potential in the labor market. Therefore, the various factors need to be taken into account holistically when formulating policy; dealing with issues separately is not sufficient.

The Bank of Israel's plan to accelerate economic growth includes strategic policy measures the implementation of which is expected to bring about a narrowing of labor income disparities between population groups in the long term, based on encouraging the acquisition of human capital that is relevant to the labor market in these groups.[17] These include: expansion and improvement of the quality of education for ages 0 to 3 at low socioeconomic levels; increasing the scope of differential budgeting in the education system, particularly secondary education, in favor of schools with a low nurture index rating; strengthening the study of Hebrew among Arab students; and improving

[16] Central Bureau of Statistics (2017), "Forecast of the Population of Israel by 2065". [Hebrew]
[17] Bank of Israel (2023). "Recommended Strategic Pillars of Action for the Government".

skills that are relevant to the demands of the labor market among *Haredi* boys, by means of expanding the teaching of core subjects. These and other measures are expected to increase the number of university graduates, the level of labor input, and the earning power of workers, and thus reduce income disparities between populations in Israel and between Israel and the OECD countries.

ISSUE II: THE OCCUPATIONAL DISTRIBUTION OF UNIVERSITY GRADUATES IN ISRAEL: DISPARITIES BETWEEN THE VARIOUS SEGMENTS OF THE POPULATION

The wage gaps between Arab and *Haredi* university graduates on the one hand and non-*Haredi* Jewish university graduates on the other are partly a reflection of differences in occupational distribution.

In the previous section, we showed that one of the explanations for wage gaps between Arabs and *Haredim* on the one hand and non-*Haredi* Jews on the other is related to disparities in the level of schooling and the proportion of university graduates (Figures 7.5 and 7.8). However, if we focus only on university graduates, we also see wage gaps between the three populations. The average wage of non-*Haredi* Jewish university graduates is higher than that of Arab and *Haredi* university graduates. These disparities are partly the result of differences in field of study and in occupation. Figure 7.11 presents the breakdown of university graduates in high- and low-earning occupations according to gender and population group.[18,19] The graph shows that among Arab and *Haredi* university graduates the proportion of workers in low-earning occupations (such as education) is high while the proportion in high-earning occupations (such as high-tech and managerial occupations) is low. Thus, for example, among men, 64 percent of non-*Haredi* Jewish university graduates worked in the highest-earning occupations, (medical, managerial, and high-tech) between 2018 and 2022, while the proportion among Arabs was only 37 percent and among *Haredim* it was only 28 percent. Among women, the proportion of university graduates in the highest-earning occupations was 30 percent among non-*Haredi* Jews, while it was only 7 percent among Arabs, and 12 percent among *Haredim*. Another important point is the high proportion of Arabs in the healthcare professions. In particular, the proportion of Arabs in paramedical occupations, such as nurses and pharmacists, in which wages are relatively low, is higher than among non-*Haredi* Jews, among both men

[18] In order to optimally reflect the occupational distribution of university graduates in Arab society, and in view of the small number of observations, the academic occupations were divided into 7 groups according to their nature and average wage level.

[19] The graphs and the multivariate analysis in this section are based on the Labor Force Survey and Israel Tax Authority employee-employer files (for both employees and the self-employed) for the period 2018–2022, excluding the period between March 2020 and June 2021, during which the COVID-19 pandemic was likely to have had a significant effect on the occupational distribution. The analysis focuses on university graduates in managerial or academic occupations who reported working fulltime when they were sampled by the Labor Force Survey. The analysis in this section does not include Arabs in East Jerusalem due to their unique characteristics.

and women. Nonetheless, the proportion of male Arab university graduates employed in medicine, a high-earning occupation, is high relative to non-*Haredi* Jews. Furthermore, a high proportion of Arab men are employed in paramedical occupations (such as nurses and pharmacists), which among the Jewish population are characterized by a clear majority of women.

The integration of the Arab and *Haredi* sectors in employment, particularly in a high-quality profession, can serve as an important growth engine for the economy and a tool for the narrowing of social disparities. Understanding the reasons for the disparities in the occupational distribution of university graduates may help in identifying barriers that result in Arab and *Haredi* university graduates being employed in lower-earning occupations, and which may lead to a nonoptimal allocation in the labor market[20], unrealized potential for economic growth[21], and increased inequality. According to studies carried out in Israel, the low proportion of Arabs in high-earning occupations (such as those in high-tech) is likely to be related to disparities in educational level and quality between Jews and Arabs.[22] The disparities in education between Jews and Arabs are partly reflected in achievement disparities in national tests (Meitzav), international tests (such as PIAAC and PISA), the psychometric exam, and other tests.[23] Furthermore, it is possible that the high rate of Arab university graduates employed in education is related to the preference for working in an Arab environment and in the Arab language, particularly in view of the low level of fluency in Hebrew among a large proportion of Arab society.[24] The process in Arab society of "grouping" into particular occupations such as the healthcare professions, in which there are already a relatively large number of Arabs, as well as exposure to these occupations (by way of relatives, acquaintances and neighbors) and familiarity with employers in that field, may also increase the chances of successfully integrating into those occupations.[25] There may also be a concern in Arab society about discrimination or problems in finding employment in occupations which are at the moment less accepted

[20] Gilad Brand (2019). "Return to Skills in the Israeli Labor Market", Taub Center for Social Policy Studies in Israel.

[21] See C.T. Hsieh, E. Hurst, C.I. Jones, and P.J. Klenow (2019). "The Allocation of Talent and US Economic Growth." *Econometrica*, 87(5): 1439–1474.

[22] Z. Karill and N. Amariyeh (2019). "Barriers to Integration of the Arab Population in Higher Education", Ministry of Finance. [Hebrew]

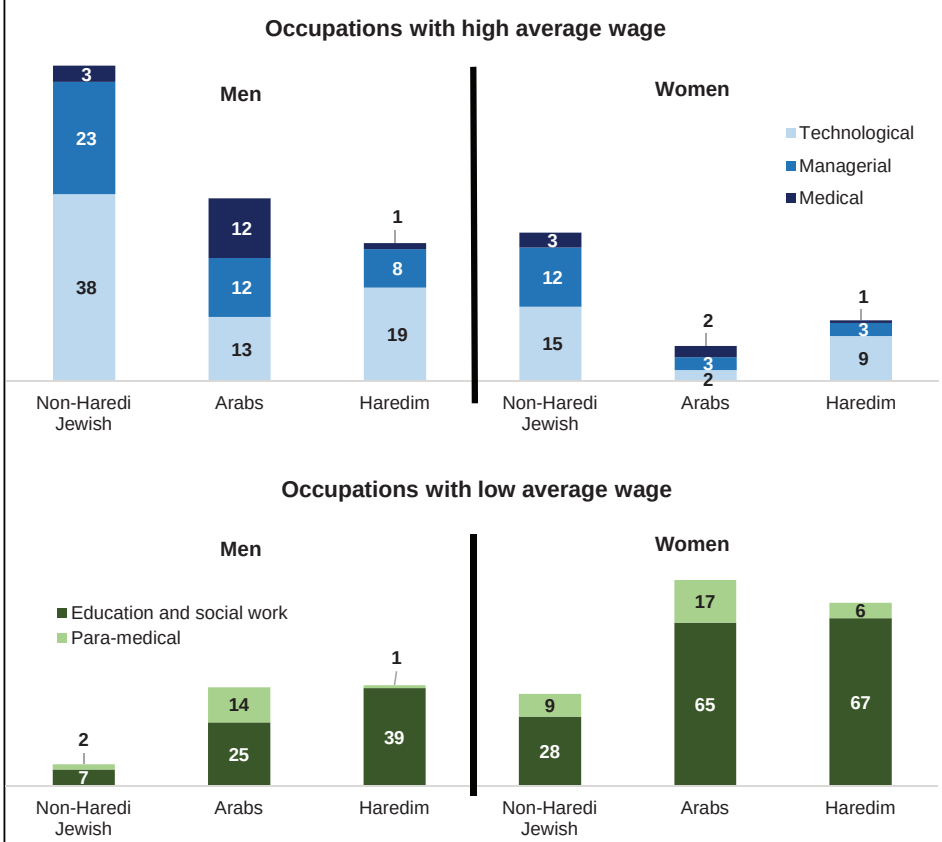
[23] Although the comparison presented here relates to the entire population and not just university graduates, it is likely that the average achievement of Arab university graduates on the various tests is lower than that of Jewish university graduates.

[24] Marian Tehawkho, Idit Kalisher, and Kiril Moskalev (2020). "The Return on Knowledge of Hebrew in Arab Society: Barriers to Language Learning and How to Remove Them", Aharon Institute for Economic Policy.

[25] N. Hadad, Haj Yahya, A. Sayif, N. Kaliner Kassir, and B. Farjoun (2021). "Education in Arab Society: Disparities and Signs of Change", The Israel Democracy Institute. [Hebrew]

in Arab society and in which finding work is largely dependent on connections in that field.[26]

Figure 7.11
Distribution of Occupations of Academic Degree Holders by Sector, Gender, and Average Wage Level, 2018–2022 (primary working ages (25–64), full time workers, percent)



In order to avoide a potential correlation between the rate of Arabs or Haredim in an occupation and the average wage level of that occupation, the average wage relates to non-Haredi Jews. Since data for 2022 were not available at the time this chapter was written, the average wages are based on data from 2019 - the final year before teh COVID-19 crisis. The average wages of doctors, executives, and those with technological occupations (the high-wage occupations) were about 260 percent, 170 percent, and 160 percent of the average wage in the economy, respectively. The average wages of those from the education and para-medical fields (the low-wage occupations) were about 86 percent and 95 percent of the average wage in the economy, respectively.
The percentages in the figure do not add up to 100 percent, since they do not include the group of professions with an average wage in the medium range (100-160 percent of the average wage in the economy).
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

A possible reason for the high proportion of *Haredi* and Arab university graduates employed in education is the high fertility rates in those sectors.

Another point that may partially explain the high proportion of Arabs and *Haredim* in educational occupations is their high fertility rates relative to non-*Haredi* Jews. The ratio between the number of children and school-age youth (0–18) and adults in the prime working ages (25–64) among non-*Haredi*

[26] E. Yashiv and N. Kaliner Kassir (2018). "The Economy of Arab Society in Israel", The Haredi Institute for Policy Studies. [Hebrew]

Jews was about 0.62 in 2022 (i.e. 0.62 children or youth aged 0–18 for every adult aged 25–64) while among Arabs it was 0.88 and among *Haredim* it was 1.82.[27] Assuming that in general teachers who teach children from a particular population group belong to that same group, it appears that the proportion of *Haredi* teachers needed is about three times that of non-*Haredi* Jewish teachers.[28]

Due to the small number of observations for *Haredi* university graduates in the Labor Force Survey during the relevant years, the analysis and graphs below do not include the *Haredi* sector. Rather they focus on disparities between Arabs and non-*Haredi* Jews.

Younger Arab university graduates—particularly men—have a greater tendency than older graduates to work in occupations with high earning potential.

Age group: Differences in occupational profile between young and old workers are likely to be an indicator of developing trends in occupational profiles in recent decades. A comparison of the younger generation (aged 25 to 44) to the older generation (aged 45–65), finds that the proportion of Arab university graduates in education and social work, which are low-paying occupations, has fallen significantly, while the proportion of both men and women in the paramedical occupations and the proportion of men in high-tech and medicine have increased.[29,30] These findings reflect an upward trend in the proportion of Arab university graduates in high-earning occupations, primarily with regard to men (Figure 7.12).[31] A study carried out by the Ministry of Finance Chief Economist's Office reached similar findings.[32] Nonetheless,

[27] The data are based on Central Bureau of Statistics (2017), "Forecast of Israel's Population until 2065", and Bank of Israel calculations. This is because the CBS Statistical Abstract does not include data on the *Haredi* sector. An estimate of the Arab population on the basis of the Statistical Abstract produced similar results.

[28] The calculation presented is an estimate, which does not take into account possible disparities between the populations in class size, number of weekly teaching hours, or other areas. Furthermore, teachers do not always belong to the same population group as their students. (It is reasonable to assume that there are more *Haredi* teachers in the State and State Religious education systems than there are non-*Haredi* Jewish teachers in the *Haredi* education system. Therefore, it is likely that a shift of teachers between the sectors will increase the disparity between the proportion of teachers among *Haredim* and the proportion among non-*Haredi* Jews).

[29] Since medical studies last about seven years, the relatively low rates of young Jews in this profession are partly related to military service, which delays the beginning of studies by several years and their completion to after the age of 25. A higher proportion of Jews in the medical profession was found among the 30+ age group. At the same time, since studies toward other professions are shorter, and based on the desire to present up-to-date data that reflect the trends in recent years, the graphs include workers from the age of 25 upward.

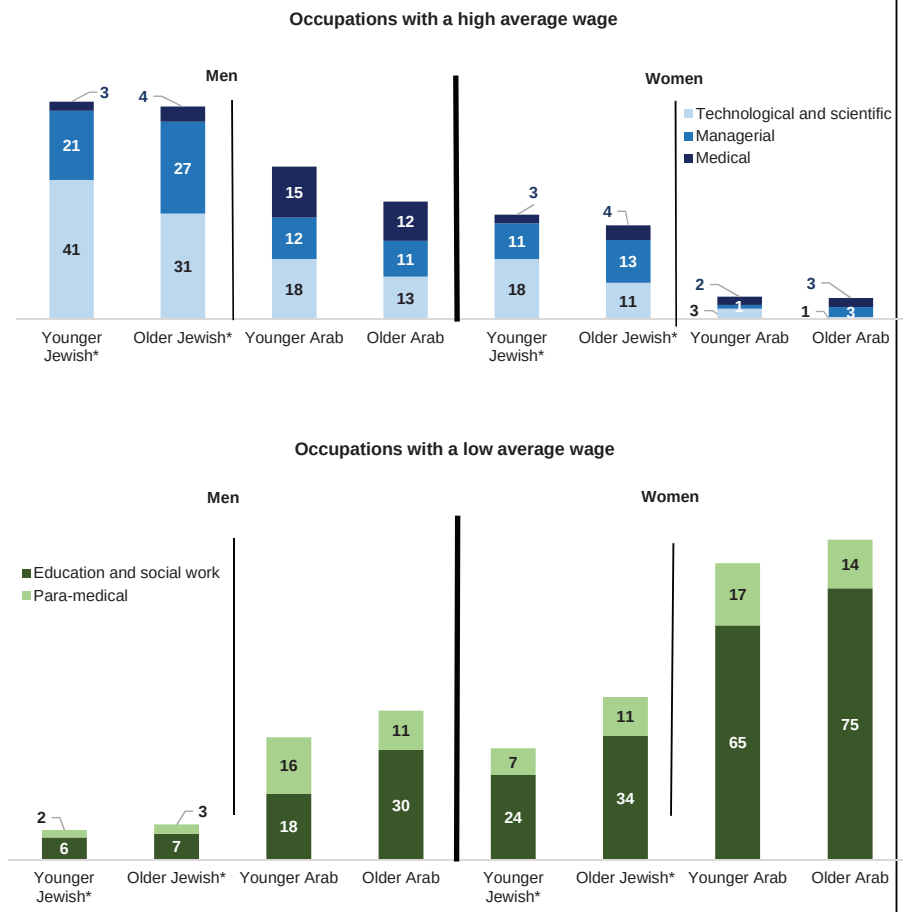
[30] In general, the number of teachers required in a particular population group depends on the number of school-age children in that population group. Therefore, the decline in the proportion of Arab university graduates in education may be partly related to the fact that the rate of growth in the number of university graduates in Arab society has in recent years been higher than that of school-age children.

[31] This may be consistent with disparities in achievement between younger and older Arabs on the PIAAC tests, where the scores of the former are higher than those of the latter.

[32] Z. Karill and N. Amariyeh (2019). "Barriers to Integration of the Arab Population in Higher Education", Ministry of Finance. [Hebrew]

there are still significant disparities between non-*Haredi* Jews and Arabs among young university graduates as well.

Figure 7.12
Distribution of Occupation Groups by Age Group (25–44 and 45–64), 2018–2022 (as a percentage of academic degree holders, full-time)



* Excluding the *Haredi* sector.
The percentages in the Figure do not add up to 100, since they do not include all occupation groups. Similar to Figure 7.11, the Figure includes occupation groups with a high average wage and those with a low average wage, but not those in between.
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

The analysis below focuses on two aspects of the issue, which are likely to be linked to the occupational distribution of Arab society and which have not been emphasized in Israeli research so far: (1) the geographic distribution of Arab society in Israel, which is characterized by a high concentration in the periphery; and (2) the high rates of public sector employment among Arab university graduates.

The geographic element: Is the geographic distribution of Israeli Arabs, which tends to be concentrated in the periphery, correlated with their occupational distribution?

A large proportion of the Arab population in Israel resides in the North and in other peripheral regions while a relatively small percentage lives in Tel Aviv and the Center. Furthermore, the Social Survey shows that mobility between cities and between regions is relatively limited in Arab society.[33] The question arises as to whether the geographic distribution of Israeli Arabs, which as mentioned tends toward the periphery, is correlated with the choice of an occupation in which the distribution of jobs is dependent on the distribution of the population, in contrast to occupations in which the jobs are concentrated largely in Gush Dan (the municipal area surrounding Tel Aviv) or in the vicinity of other urban centers in Israel (Jerusalem, Haifa, and Beer Sheva). More specifically, is the preference of Arab university graduates for healthcare and educational professions related to the fact that jobs in these occupations are more readily available in the periphery? Correspondingly, is the low proportion of Arabs in high-tech and managerial professions related to the fact that jobs in these professions are largely concentrated in the vicinity of Gush Dan, which is distant from regions in which the Arab population lives?[34]

In order to carry out a geographical analysis, university graduates were dived into categories by the degree of peripherality of their place of residence.[35] On the bases of this division, Figure 7.13 shows the occupational distribution of university graduates according to three groups: Arabs living in the periphery, Jews living in the periphery, and Arabs living in more central areas. The graph shows the gaps between Arabs from the Center and those from the periphery. A higher proportion of Arabs from the Center work in high-tech occupations and lower proportion work in the educational occupations. At the same time, the gaps between Arabs in the Center and those in the periphery are smaller than those between Arabs in the periphery and Jews in the periphery. This finding

[33] In the 2019 Social Survey, 91 percent of Arab men and 82 percent of Arab women reported having lived in the same city for the past 20 years. The same statistic among Jews was 52 percent, for both men and women.

[34] The issue of geographic location is primarily relevant with regard to Arab society, which is distributed differently than the non-*Haredi* Jewish population. In contrast, the distribution of the *Haredi* population does not significantly differ from that of the non-*Haredi* Jewish population (Figure 7.8).

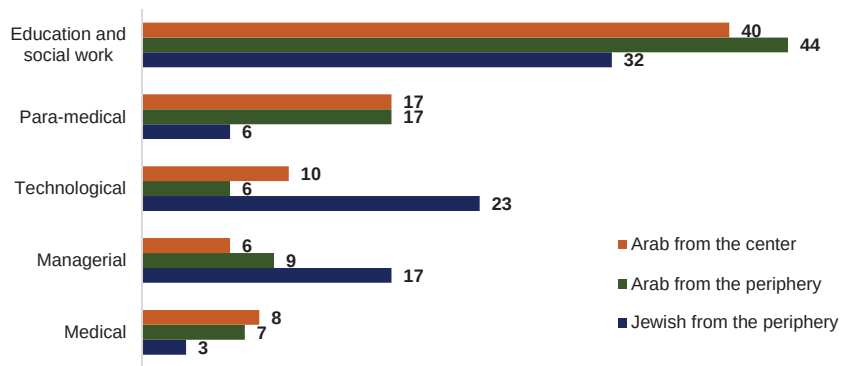
[35] The division into two categories is based on the Central Bureau of Statistics peripherality index for municipalities, which is based on two parameters: the distance from the municipality to the border of the Tel Aviv District and the weighting of the distances between the municipality and other municipalities and the population of those municipalities. The advantage of this index over a division by district or region is that the index weights not only the proximity to Gush Dan but also to other major cities. In view of the population distribution of Arab society and the limited number of observations in the Social Survey, clusters 1 to 4 were defined as peripheral areas while clusters 5 to 10 were defined as central areas. In view of the special characteristics of the Bedouin in the Negev and their concentration in remote peripheral areas, the data presented in Figure 7.13, as well as the multivariate analysis presented in Table 7.1, do not include residents of the South.

The tendency of Arabs to live in the periphery is apparently not one of the main reasons for the occupational distribution of Arab university graduates.

also emerges from the calculation of the segregation index, which shows that the distribution of occupations among Arabs from the periphery is closer to the distribution among Arabs from the center than it is to the distribution of Jews from the periphery (an index of 0.07 between Arabs from the Center and Arabs from the periphery and 0.30 between Jews from the periphery and Arabs from the periphery).[36] These descriptive findings may suggest that the geographic element is not one of the main variables explaining the disparities between Jews and Arabs in occupational distribution.

In order to examine the geographic factors based on other relevant variables, a multivariate analysis was carried out to examine the correlations between the degree of peripherality and other variables (age group, gender, and advanced degrees) on one hand and employment in five occupation groups in Arab society on the other. In general, the findings of the analysis do not show any clear or statistically significant trend with respect to peripherality, and it appears that according to the multivariate analysis as well the degree of peripherality is not a key variable in explaining the occupational distribution of Arab university graduates (Table 7.1).

Figure 7.13
Distribution of Occupation Groups by Population Group and Peripherality, 2018–2022 (as a percentage of academic degree holders, full-time, prime working ages (25–64))



* Excluding the *Haredi* sector.
The percentages in the Figure do not add up to 100, since they do not include all occupation groups. Similar to Figure 7.11, the Figure includes occupation groups with a high average wage and those with a low average wage, but not those in between.
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

[36] Segregation indices measures the degree to which two groups are separated from one another. The index measured here is based on the segregation index in Duncan & Duncan (1955), which measures the distance from an equal distribution. The range of the index is from 0 to 1 where 1 indicates that the groups are completely separated while 0 means that they have the same distribution. See O. D. Duncan and B. Duncan (1955), "A Methodological Analysis of Segregation Indexes", *American Sociological Review*, 20(2): 210–217.

Table 7.1: Findings of linear multivariate analyses of Arab sector employment in 5 academic occupation groups, prime working ages (25–64), full-time, 2018–2022

	Technological	Managerial	Education	Medical	Para-medical
Periphery (1=lives in a peripheral area)	-0.04**	0.036**	0.042	-0.013	0.008
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Gender, Master's or Ph.D. degrees, age group	V	V	V	V	V
Intercept	0.229***	0.095***	0.029	0.139***	0.23***
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)
Number of observations	1,066	1,066	1,066	1,066	1,066
Adj. R-squared	0.067	0.049	0.236	0.183	0.016

Standard deviation is in parentheses, ***p<0.01, **p<0.05, *p<0.1
The multivariate analysis presented here shows the findings of linear multivariate regressions that examined the correlations between a residential location's peripherality and other explanatory variables (gender, age group, and advanced academic degrees) and dummy variables that represent employment in the five occupation groups (separate regression for each occupation group). The analysis focuses on Arabs with Master's or Ph.D. degrees in the prime working ages (25–64) who worked full time.
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

The high proportion of Arab university graduates who work in the public sector

The high proportion of Arab university graduates in the public sector is primarily a reflection of their high rates of employment in healthcare and education.

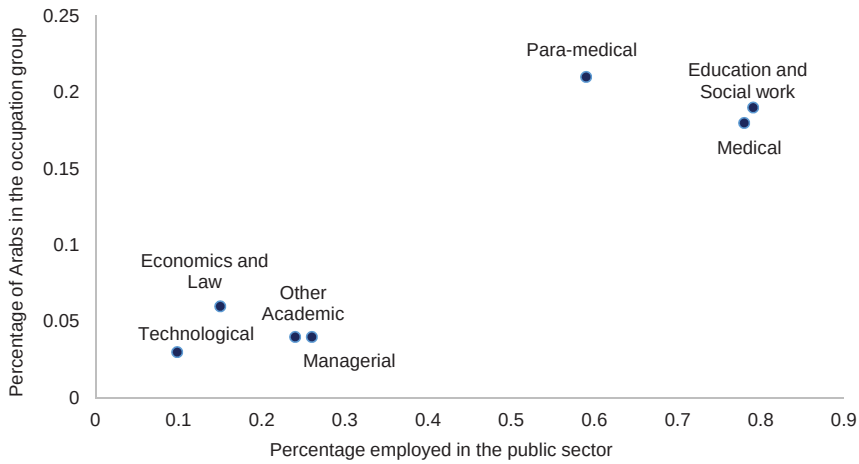
The proportion of public sector employees among Arab university graduates is significantly higher than that among their non-*Haredi* Jewish counterparts (63 percent vs 31 percent).[37] This gap is largely correlated with the differences in occupational distribution. There is a high proportion of Arabs in occupations that feature a high rate of public sector employment, such as education and healthcare, and a low proportion in occupations that feature a high proportion of jobs in the private sector, such as high-tech (Figure 7.14). An analysis of the proportion of employees in the public sector among Jews and Arabs in each occupation group separately shows that in some of the occupation groups (such as education and paramedical fields) the proportion of public sector employees is higher among Arabs, while in other groups (such as economics, law, and medicine) the proportion is higher among Jews. These findings are likely to be an indicator that the gap between Jews and Arabs in terms of public sector employment is largely the result of the difference in their occupational distributions and not necessarily the preference of Arabs to work in the public sector.

The division into age groups (Figure 7.15) indicates that the rate of public sector employment is lower in the younger group (25–44) than in the older

[37] The public sector variable in the Central Bureau of Statistics Labor Force Survey is based on a segmentation of the economic industry at a level of 4 digits. The way in which the variable is defined means that it should be treated with caution, because in some cases even a 4-digit level does not provide a precise segmentation of jobs in the public sector. Furthermore, the variable is based only on the individual's principal job. This becomes important in the case of physicians, for although most of them work in the public sector as their principal job, they work a considerable number of hours in private medicine.

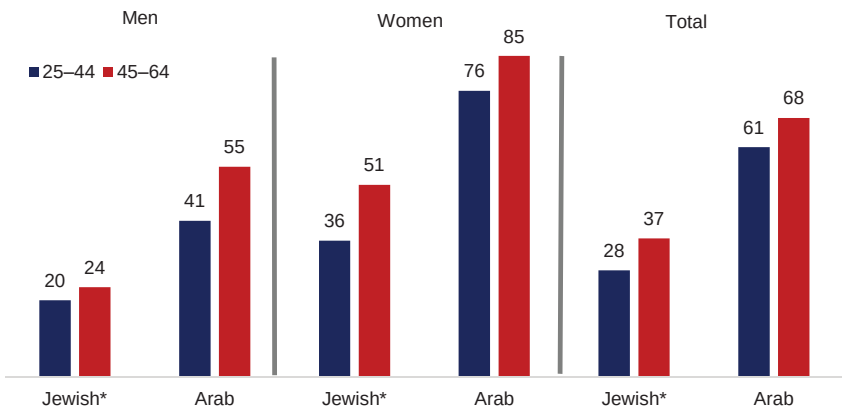
group (45–64), among both Jews and Arabs.[38] The trend in this gap between Jews and Arabs differs by gender. Among men, the gap between the old and the young has narrowed, while among women it has wide

Figure 7.14
Percentage of Arabs and Percentage of Public Sector Employees in Each Occupation Group, 2018–2022 (as a percentage of academic degree holders, full-time, prime working ages (25–64))



SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

Figure 7.15
Percentage of Public Sector Employees By Population Group, Gender, and Age Group, 2018–2022 (academic degree holders, full-time)



* Excluding the *Haredi* sector.
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

[38] The gap in rate of public sector employment between the old and the young may be partly the result of differences in occupational distribution (Figure 7.12) and perhaps also employment stability in the public sector, which leads to a higher rate of employees remaining until an older age.

Chapter 8
The Housing Market

- The supply of housing expanded in 2022 as a result of the growth in housing starts during the past two years, which followed a record number of building permits issued. The planning inventory and the marketing of land also continued to grow.
- Home sales declined in 2022 relative to the previous year, as a result of more expensive mortgages, the bringing forward of purchases by investors to 2021, and the renewal of reduced-price lotteries in 2022.
- The decline in home sales continued throughout the year. Nonetheless, relative to the period prior to the pandemic there was a high number of sales in 2022.
- Home prices continued to climb rapidly during the first three quarters of the year. However, in the fourth quarter the upward trend was halted. This was led by the decline in new home prices, which was due to the increased inventory of new homes that are intended for sale. That increase in inventory was a result of the growth in housing starts on the one hand and lower sales of new homes, on the other.
- The demand for rental housing continued to expand, as a result of the high rate of population growth and other factors, including the high proportion of new homes sold with a long period until the end of construction; the fact that some households have given up on the idea of buying a home and remained in the rental market; and the increased scope of urban renewal, which requires the demolition of the old buildings.
- In 2022, the price of land in Israel Land Authority tenders fell and the price increases in inputs for residential construction moderated.
- An analysis of home sales during the 2015–2022 period shows that the Buyer's Price program was beneficial to those eligible, since they were able to purchase a home at a discount of between 26 and 40 percent. Home buyers in high-demand areas benefited from the largest discounts. In addition, the prices of homes in the open market increased more in areas where there was a higher proportion of home sales that were subsidized by the government.

Table 8.1
Selected housing market data, 2006–2021

	2006–2015 average	2016	2017	2018	2019	2020	2021	2022
Factors of demand[a]								
General population (rate of change)[b]	1.9	2.0	2.0	1.9	1.9	1.8	1.6	2.0
Population aged 25–44 (rate of change)[b,c]	1.7	1.3	1.2	1.2	1.2	1.0	0.9	1.3
Average real wage per Israeli employee post (rate of change)[d]	0.7	2.9	2.9	2.7	2.1	3.1	4.9	-1.6
Average net real household income (rate of change)	2.5	2.7	4.6	3.7	2.4	-0.9	0.5	
Unemployment rate[d] among those aged 25–64 (annual average)	6.5	4.1	3.7	3.5	3.4	14.6	9.6	3.3
Weighted real interest rate on new mortgages (annual average)	2.2	1.5	1.9	1.7	1.5	1.1	0.8	1.6
Real per capita GDP (rate of change)	2.1	2.5	2.3	2.1	2.2	-3.6	6.8	4.4
Rate of those planning to buy a home in the next 12 months (annual average)[e]		7.6	7.3	8.4	8.3	7.4	7.8	6.6
Factors of supply								
Building starts (thousands of housing units)	41.0	56.9	55.9	55.4	56.5	56.4	63.7	67.1
of which: Dwellings not for sale under construction (thousands of housing units)	17.6	20.7	19.6	19.4	20.6	16.5	19.3	23.3
of which: Rental dwellings (thousands of housing units)		1.4	1.5	1.7	2.8	2.6	2.9	2.9
Building completions (thousands of housing units)	36.2	46.6	50.1	52.7	53.3	50.2	47.0	51.9
Stock of homes under active construction (end of year, thousands of housing units)	78.0	115.3	120.6	123.6	126.6	133.0	149.9	166.1
Building permits (thousands of housing units)	42.0	54.1	56.5	52.0	57.1	54.1	73.8	77.7
Real investment in residential construction (rate of change)	4.9	6.4	3.4	0.5	3.4	-7.8	13.7	16.6
Housing units approved in the district committees and in the VATMAL (thousands)[f]	47.4	110.9	127.2	151.6	140.6	95.4	108.1	158.0
Land marketed in ILA tenders (thousands of housing units)		35.9	46.3	43.1	38.9	26.3	63.4	80.6
Outcome data								
Housing transactions (thousands)[g]	89.7	98.0	88.0	91.2	101.1	101.5	150.4	113.4
of which: New homes sold (thousands)[g]	21.4	29.7	25.0	23.0	41.1	41.3	57.8	40.5
of which: With government support (thousands)		2.8	5.5	9.7	16.7	13.9	14.6	9.5
Home prices - nominal (rate of change during the year)	7.6	5.7	1.4	-0.8	4.2	4.0	13.1	14.6
Home prices - real (rate of change during the year)[h]	6.2	6.5	1.9	-1.3	4.1	4.8	10.4	9.2
Rents - nominal (rate of change during the year)[i]	3.8	1.4	2.6	1.9	2.8	0.2	3.3	6.3
Rents - real (rate of change during the year)[h,i]	2.5	2.2	3.1	1.4	2.7	1.0	0.8	1.3
Rate of households that do not own a home (annual average)	28.5	27.4	28.2	27.5	29.7	28.9	31.3	
Rate of households that own one home (annual average)	65.6	62.9	61.8	62.4	61.2	61.0	59.5	
Rate of households that own two or more homes (annual average)	5.9	9.7	10.0	10.1	9.1	10.1	9.2	
Rate of households with a head of household aged 25–44 that own one home (annual average)	58.6	59.2	58.6	58.0	57.0	58.2	55.0	
Length of time to sell home (annual average, days)[j]		194	173	221	218	211	199.1	177.5
Percentage of homes purchased by investors as a share of total purchases (annual average)		15.0	13.5	14.0	12.8	14.2	18.1	14.0

[a] Rates of change are shown as the average of the current year compared with the average of the previous year.
[b] The 2006–2015 average does not include 2009 due to a break in the data series.
[c] The figure for 2022 assumes that the growth of the population aged 25+ continued in accordance with its trend of previous years plus an estimate of the number of immigrants.
[d] A correction due to the COVID-19 crisis in 2020 and 2021: The real wage corrected for the composition of employees, and the broad unemployment rate (including employees temporarily absent for reasons having to do with COVID-19, and nonparticipants who stopped working after being dismissed or because their place of work closed during the
[e] The Central Bureau of Statistics Consumer Confidence Index. The rate of respondents who believe that it is quite likely or very likely that they will buy a home in the next 12 months.
[f] The multiyear average is for the years 2007–2015.
[g] Market transactions. Excluding transfers with no payment, among relatives, etc.
[h] Adjusted for the Consumer Price Index excluding housing.
[i] Rents in new and renewing contracts (the owner-occupied housing services item in the Consumer Price Index).
[j] Duration from the time the dwelling is put up for sale until the sale transaction is signed.
SOURCE: Central Bureau of Statistics, Ministry of Construction and Housing, Israel Tax Authority, Israel Land Authority, and Bank of Israel.

1. MAIN DEVELOPMENTS IN THE HOUSING MARKET IN 2022

a. Sales

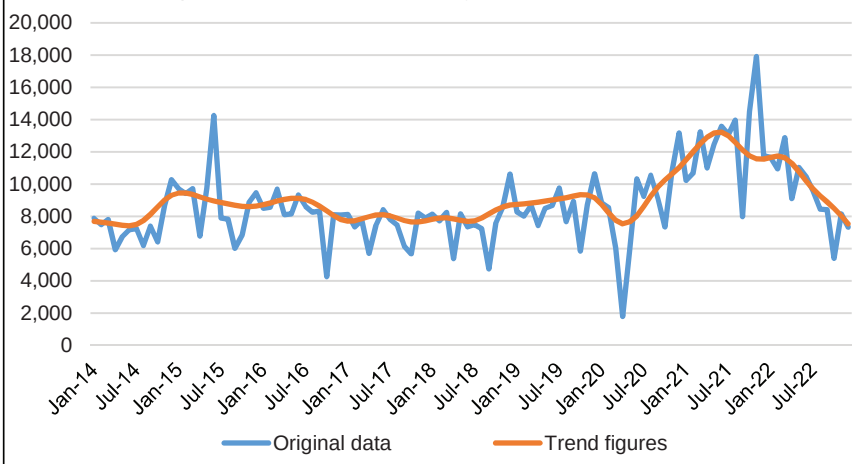
After a record number of home sales in 2021, activity in the housing market declined sharply in 2022, returning to prepandemic levels by the end of the year.

Following a record number of sales in 2021 (Table 8.1), activity in the housing market cooled off rapidly during 2022. By the end of 2022, it had returned to its prepandemic level (Figure 8.1). Nonetheless, on an annual basis, the number of sales in 2022 was higher than in the years prior to 2021.

Two factors in particular were responsible for the exceptional growth in home sales in 2021: a large one-off increase in purchases by investors in November, before the purchase tax on investment homes was increased (which went into

effect on November 28, 2021), and the discontinuation of lotteries that are part of the government-subsidized housing programs. The end of the Buyer's Price program in 2020 led to an increase in purchases by eligible buyers in the open market. The renewal of the lotteries in March 2022 worked in the opposite direction by distancing young couples from the open market and returning them to a waiting status. In 2022, there were four lotteries for the right to purchase more than 26,000 subsidized homes, in which more than 100,000 households participated. This is in contrast to only 2,186 homes that were allocated in lotteries in 2021, almost all of which were continuation lotteries (i.e. homes that were already offered previously but remained "on the shelf"). Another factor on the demand side that worked to restrain home sales in 2022 was the increase in mortgage interest rates during the year.

Figure 8.1
Total Housing Transactions*, January 2014–December 2022



* Market transactions only - excluding inheritances, transfers without payment, and so forth.
SOURCE: Based on Israel Tax Authority.

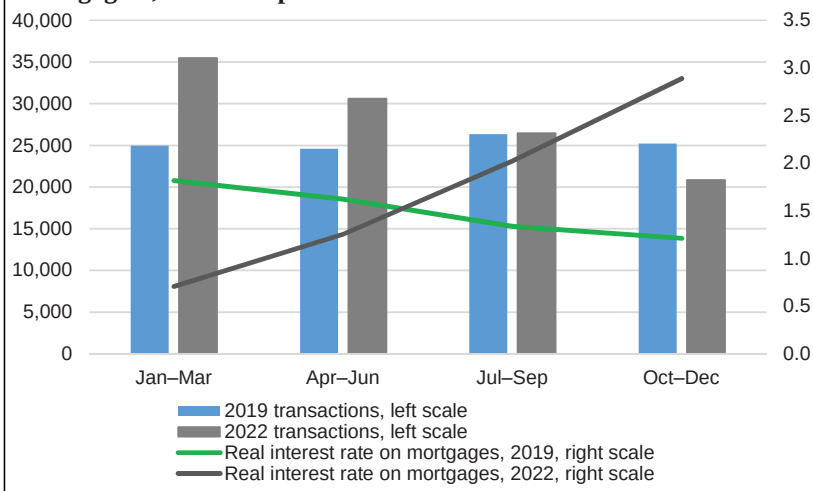
The years 2020 and 2021 were not conventional years in the housing market, due to the effect of the COVID-19 crisis. As such, Figure 8.2 presents a comparison of 2022 to 2019. Total sales in 2022 were 12.1 percent higher than in 2019. During this period, the 25–44 age group, which is the main source of net demand for homes (in contrast to repeat buyers, who are returning their previous home to the market when they buy a new one) grew by about 3.2 percent (Table 8.1). In 2019, the real interest rate on mortgages showed a modest downward trend and was historically low, while in 2022 it rose continuously. The Figure shows a somewhat negative correlation between the interest rate and home sales.

The factors leading to the moderation in sales in 2022 were the renewal of the lotteries for government-subsidized housing, purchases by investors being brought forward to 2021, and the increase in mortgage interest rates.

In 2022, the trends were similar in all buyer categories: first-time buyers, repeat buyers, and domestic investors (Figure 8.3). However, the decline

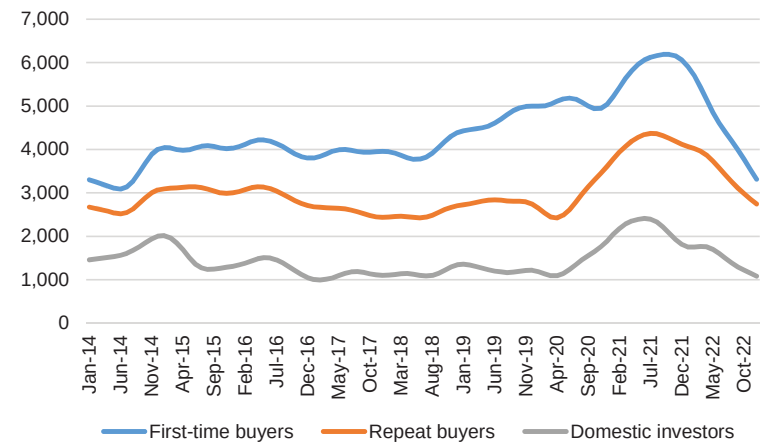
among first-time buyers was steeper, which was due to the lower number of government-subsidized homes sold in that year (Table 8.1) and the restarting of the lotteries, which kept first-time buyers out of the open market. The decrease among investors was the result of bringing purchases forward to November 2021, before the purchase tax was raised.[1]

Figure 8.2
Housing Transactions and Weighted Average Interest Rate on Mortgages*, 2022 Compared with 2019



* The weighted average interest rate is calculated assuming inflation of 2 percent.
SOURCE: Based on Israel Tax Authority and banks' reports to the Banking Supervision Department.

Figure 8.3
Housing Transactions by Groups of Purchasers, January 2014–December 2022 (trend data)



SOURCE: Based on Israel Tax Authority.

[1] Net purchases by investors, that is, purchases minus sales, were negative in 2022, with a decline of about 2,900, compared to an increase of about 5,200 in the previous year.

b. Prices

Home prices continued to increase rapidly during the first three quarters of the year. However, during the fourth quarter the trend began to level off.

Despite the rise in interest rates and the continuing increase in housing starts, housing prices rose rapidly during the first three quarters of the year. However, in the fourth quarter the trend began to moderate and prices in fact fell in the Southern, the Northern, and Tel Aviv districts (as well as in the Jerusalem and Haifa districts in December). The rate of increase in the 12-month Index of Home Prices was 14.6 percent in December 2022, compared to 20 percent in September 2022. The 12-month Index of New Home Prices also rose (by 17 percent), although since August it recorded a cumulative decline of about 1.5 percent.[2] What pulled the index downward was the decline in the prices of new homes in the open market. A Central Bureau of Statistics examination shows that the Index of New Home Prices excluding government-subsidized sales fell more sharply than the Index of New Home Prices. The decline in new home prices in the open market toward the end of 2022 is apparently the result of an accumulation of unsold homes by developers following the increase in housing starts[3] and the rising cost of holding an inventory of unsold homes as interest rates rise. Moreover, developers are experiencing increasing difficulties because of cash flow problems due to the low level of sales and because the sale of units in new projects is essential in order to receive bank financing.

The reaction of prices in the economy to the increase in interest rates appears to be slow. However, the housing market, which is characterized by a high level of inertia, needs time in order to adjust to changes. Although the Bank of Israel interest rate (which affects the cost of credit for developers) began to rise as early as April, its rate of increase was moderate. However, during the second half of the year it accelerated faster than earlier expectations.[4] The mortgage interest rate began to rise earlier (in February–March 2022) due to the rise in yields on the banks' bonds, which accelerated during the year. The interest rates on the various tracks rose cumulatively by 0.92 to 3.31 percentage points between January and December.[5] Unique factors may have delayed the response of new home prices to increasing interest rates and

[2] The share of new homes within total sales varies from year to year. It has grown in recent years thanks to the increase in housing starts and reached an average of 39.9 percent between 2019 and 2021. In 2022, it fell to 35.7 percent. The two indices, namely the Index of New Home Prices and the general Index of Home Prices, are each calculated in a different manner, with the former relating to all sales equally while the latter weights each sale by its share of the inventory of existing homes.

[3] According to CBS estimates, the inventory of new homes that remained for sale totaled about 53,500 at the end of 2022. This figure reflects an increase in unsold housing inventory of about 5,900 since the end of 2021.

[4] The Research Department's interest rate forecast was revised upward during the year. For further details, see the Bank of Israel's *Monetary Policy Report*.

[5] The main mortgage interest rate tracks are indexed fixed interest, unindexed fixed interest, indexed variable interest, and unindexed variable interest. In addition, there are foreign-currency-indexed interest rate tracks, although the share of those tracks within total new mortgages is negligible.

the contraction in sales. First, at the beginning of July 2022 a law went into effect that reduced the rate of indexation of new home prices to the Residential Construction Inputs Price Index to only 40 percent of the price of a house. It is reasonable to assume that developers who expected that the index would continue to rise increased prices in order to compensate. However, it was not possible to isolate the effect of the Index of New Home Prices. Nonetheless, an examination of the monthly change in the index shows that in July it in fact rose substantially (by 4.2 percent), compared to an increase of only 1.8 percent in the general Index of Home Prices. Second, the decline in the sales of new homes apparently led developers to first offer nonprice benefits, such as favorable payment arrangements, loans on convenient terms, payment of rent for a limited period, cancelation of indexation for the balance of payments, discounts on the price list for upgrades, etc. Only later did they offer price discounts, which were reflected in the recent index readings.

Historically, the last episode in which interest rates rose rapidly—though at a more gradual pace—was during the 2009–2011 period. During that period, the Bank of Israel interest rate was raised from 0.5 percent to 3.3 percent (between September 2009 and August 2011). The real weighted interest rate on mortgages rose during that same period from about 1 percent to the vicinity of 3 percent. The Housing Price Index continued to rise during that period, and only between August and December 2022 was there a decline in prices. However, it can be assumed that the decrease in the index during the second half of 2011 was primarily the result of the social protest, which began in the summer and led to a cooling off of the housing market. The continuing rise in prices despite the rise in interest rates was at that time the result of a significant housing shortage, particularly in high-demand areas, which was alleviated to a great extent in 2019 as a result of the growth in housing starts.[6]

A new study, which consists of a meta-analysis of 31 studies in 45 countries[7], shows that monetary policy has a relatively weak effect on home prices. The average reaction of home prices to a one percentage point rise in the monetary interest rate reaches a maximum decline of only 0.7 percent after two years. In other words, a 4 percentage point increase in the monetary interest rate is expected to lower home prices by only about 2.8 percent. Furthermore, the reaction of home prices to interest rate changes is not immediate. Thus, an increase in the interest rate is not felt at all in the subsequent quarter. In other countries as well, the rise in home prices continues despite the increase in interest rates. There are only a few countries that experienced a decline in nominal home prices (Denmark, New Zealand, Sweden, Canada, Germany,

[6] For further details, see Y. Yakhin and Y. Gamrasni (2021), "An Analysis of the Housing Market in Israel: Long-Term Connections and Short-Term Dynamics" [Hebrew] and the chapter on the housing market in the Bank of Israel *Annual Report* for 2021.

[7] See D. Ehrenbergerova, J. Bajzik, and T. Havranek (2021), "When Does Monetary Policy Sway House Prices? A Meta-Analysis", CEPR.

Italy and Finland) or price stability (the US and Norway) in the third quarter of 2022, although the rate of increase in prices did slow in most of the OECD countries.

c. The demand side

Israel's population grew at a relatively high rate in 2022 due to the increase in immigration, which came in addition to its high rate of natural increase. According to Central Bureau of Statistics (CBS) estimates, about 73,000 immigrants arrived in 2022, in contrast to only 33,200 in 2019.[8] Among those, Israel absorbed about 58,000 immigrants from Russia and Ukraine who left both because of the war and because of the political and economic situation in Russia.

The demand for rentals grew this year. This was reflected in an increase in rents, although at a slower pace than the increase in home prices.

The demand for rentals also increased as a result of a number of factors: 1) a high rate of new homes sold "on paper"[9], which means that buyers are forced to rent for several years; 2) some households chose to continue renting rather than purchase a home, in view of the high home prices, the decline in the value of the public's savings following losses on financial assets (which reduced their ability to finance the downpayment), and an increase in mortgage interest rates, which increased monthly payments; and 3) the increase in urban renewal projects, primarily in high-demand areas, which usually involves the prior demolition of an existing building (as part of the "vacate and build" programs and National Outline Plan Tama 38/2). According to CBS estimates, about 9,000 housing units were demolished during the last three years as part of urban renewal programs and the residents of those units entered the rental market. The increased demand for rentals was reflected in a rise in rents, although it was much less than the rise in home prices (Table 8.1).

Against the background of rapidly rising home prices, there was an increase in the demand for cheaper homes. Thus, in 2022, there were a record number of households (about 112,000) who were approved as being eligible to participate in the lotteries, in contrast to an annual average of about 41,000 during the 2016–2021 period. (There has not been any change in the conditions for eligibility.) The number of households who registered for each of the four lotteries held in 2022 was much larger than the number of homes offered.[10]

[8] As a result of the pandemic, Israel placed restrictions on the flow of international migration starting in March 2020. As a result, the number of immigrants arriving in Israel during 2020 and 2021 fell considerably to 19,700 and 25,500, respectively.

[9] A home sold "on paper" is defined as a new home that will be delivered more than two years after its purchase. More than 60 percent of homes the construction of which began in 2022 were sold "on paper", as opposed to about one-third during the 2010–2019 period.

[10] The four lotteries of subsidized homes took place in March (10,000 units, 120,000 participants), July (6,300 units, 113,000 participants), October (3,300 units, 57,000 participants), and late December (6,500 units, 90,000 participants).

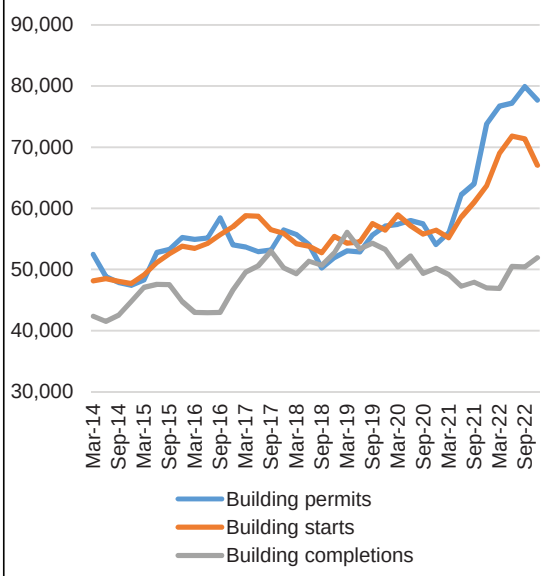
d. The supply side

1.Activity in the residential construction industry

Investment in residential construction continued to expand rapidly this year, which was reflected in a high level of housing starts and some increase in housing completions.

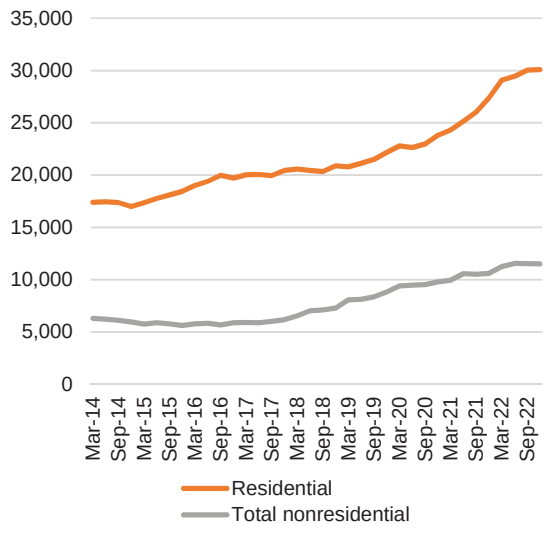
Investment in residential construction continued to expand this year at a rapid pace of 16.6 percent compared to 13.7 percent in the previous year. This growth was reflected in a high level of housing starts and in some increase in housing completions, although the gap between starts and completions remained high (Figure 8.4). The CBS explains the gap based on construction time.[11] Thus, according to CBS figures, average construction time reached 27 months in 2022 and construction time weighted according to number of apartments in the building reached 33.1 months, although the number of residential building completions was not in line with the number of housing starts three years earlier (Table 8.1).[12] An econometric analysis shows that the gap between the predicted number of housing completions and their actual number, which is a result of longer construction time, developed during the second half of 2020 and expanded in 2021. The result was a shortage of about 5,000 completed

Figure 8.4
Building Starts, Completions, and Permits, 2014:Q1–2022:Q4 (annual pace)



SOURCE: Based on Central Bureau of Statistics.

Figure 8.5
Building Area Under Active Construction, Residential and Nonresidential, 2009:Q1–2022:Q2 (thousands of sq.m, original data)



SOURCE: Central Bureau of Statistics.

[11] See the explanations in the press release "Building Starts and Completions Between July 2021 and June 2022", September 20, 2022 on the CBS site. [Hebrew]

[12] Average construction time is reported by the CBS based on data for the projects that have been completed, which do not include projects whose completion has been delayed. There have been recent indications of growth in the number of requests for renewal of building permits that have expired after a period of three years.

homes. It may be that the gap was the result of the pandemic and the war in Ukraine, which delayed the construction process primarily due to disruptions in the supply chain for construction inputs. (A discussion of the supply constraints appears below in this section.) The increase in residential construction did not come at the expense of nonresidential construction, which also continued to expand in 2022 (by 9.3 percent; Figure 8.5).

The National Economic Council's Strategic Plan for Housing for the Period 2017–2040 estimated the annual housing needs of the economy to be about 52,000 housing units during the years 2017–2020 and about 55,000 during the years 2021–2025, and those levels are expected to continue growing up to 2040.[13] An interim report published in 2021[14] stated that annual national demand for housing units was about 4,000 units higher than the estimate in the plan, although it appears that housing starts during those years were in line with the revised demand. However, building completions were far from meeting housing needs.

The growth in the planning inventory in recent years and the massive marketing of land during the last two years (Table 8.1) made it possible for developers to significantly increase the number of housing starts during 2021–2022. The level of housing starts shot up to a historic record in 2021, and it even exceeded that level in 2022. An econometric analysis shows a strong connection between the number of housing starts and the number of permits issued in the same quarter and in the previous one, a result that is consistent with the time limit on a building permit.[15] According to that same analysis, the number of housing starts during the second half of 2022 was over 8,000 units less than expected based on the econometric model. It may be that following the sharp decline in the sales of new homes (Table 8.1), some of the developers postponed construction even in projects that already have a building permit. In order to obtain bank financing to carry out a project, the developer has to sell a certain percentage of the apartments. This percentage is not uniform or fixed, and in a period of uncertainty and a possible reversal in the business cycle banks tend to demand a higher percentage of sold apartments. This is apparently the reason for the increase in the proportion of early home sales "on paper". In 2022, this percentage averaged 66 percent, as opposed to 55 percent in the previous year.

As a result of the sharp decline in new home sales, some builders may have delayed starting construction.

With respect to constraints on the expansion of activity in the industry (Figure 8.6), the drop in demand for housing is still not reflected in the construction companies' evaluations, despite the decline in new home sales. With respect to

[13] A. Raz-Dror and N. Coste, "The Strategic Plan for Housing for 2017–2040", National Economic Council, May 2017. [Hebrew]

[14] N. Brill, D. Schwartz, and A. Zofnik, "Monitoring of the Strategic Plan for Housing for 2017–2040", National Economic Council, June 2021. [Hebrew]

[15] A building permit is valid for three years and is conditioned on the developer starting to build not later than one year from its date of issue. Otherwise, he must again request a building permit.

In 2022, the constraints due to the shortage in equipment, raw materials, and available land became less severe and there were fewer delays in receiving approvals and permits.

manpower, the shortage of professional workers in "wet" works (including the skeleton of the building and the preparation of infrastructure for the building's systems) has worsened somewhat, which may explain the delay in housing starts. The shortage in equipment and raw materials, which reached a peak in the first half of 2022 as a result of the pandemic and the war in Ukraine, became less severe during the second half of the year. Accordingly, the rise in the Residential Construction Inputs Price Index slowed. Thus, the index rose by about 4.8 percent in 2022, which followed an increase of about 5.6 percent in 2021. Following a prolonged increase, the index leveled off starting in September.[16]

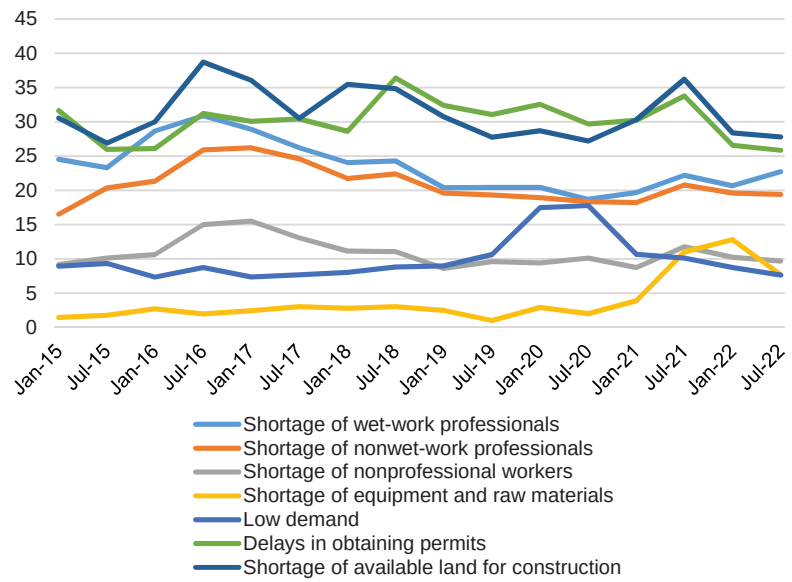
The scarcity of available land for construction became less severe in 2022, apparently as a result of the increased level of marketing during the previous two years. Furthermore, the constraint due to delays in receiving permits and approvals also became less severe. The Israel Land Authority (ILA) reported that it marketed land for the construction of about 63,000 housing units in 2021 and about 80,000 in 2022 (including rental housing, sheltered housing, student dorms, hotel rooms, etc.), by means of public tenders and exemptions from tender. Furthermore, the number of housing units approved by the planning committees and the National Planning and Building Committee for Priority Housing Areas (VATMAL), the stage prior to the marketing of land, continued to increase (Table 8.1). With respect to bureaucracy, there were two changes that are meant to streamline the planning and registration processes and to reduce the time to "produce" housing. First, the Planning Authority cancelled construction leniencies, including the addition of housing units (referred to as the "Sheves exemption"), the addition of building meterage and the addition of floors[17] (because the process of approving exemptions lengthens the time until the receipt of the permit). Second, the National Planning and Building Council approved a reform according to which two stages will be consolidated, namely the approval of the program by the planning committee and the receipt of a building permit, which as mentioned will significantly shorten the time

[16] However, the index rose by 1.2 percent in January 2023 as a result of a steep rise in the prices of materials and intermediate products, led by the prices of imported cement, mortar, finished products from wood and other materials, concrete elevators and blocks, "Ytong" (autoclaved aerated concrete) blocks, and plaster.

[17] This is part of Amendment 134 of the Planning and Construction Law: the revision of paragraphs 147(a) and 151 limits the power of the local committee to approve exemptions, except in cases that are defined in the regulations as not constituting a major deviation from the plan. The change will apply to all plans whose submission is decided on starting from January 1st, 2023. With regard to plans approved and submitted and those whose submission was decided on prior to that date, it will be possible to request an exemption according to the old regulations for a period of two years (i.e. until January 1st, 2025) with an option to extend for another two years at the discretion of the Minister of the Interior.

between the submitting of a plan and the start of construction.[18] The reform will be implemented in the first stage only in the case of urban renewal projects, but after an 18-month trial period it will be possible to extend it to other types of projects.

Figure 8.6
Rate of Those Reporting Serious Constraints in the Construction Industry, 2014:H1–2022:H2 (percent, semiannual averages)



SOURCE: Based on Central Bureau of Statistics.

2. Urban renewal

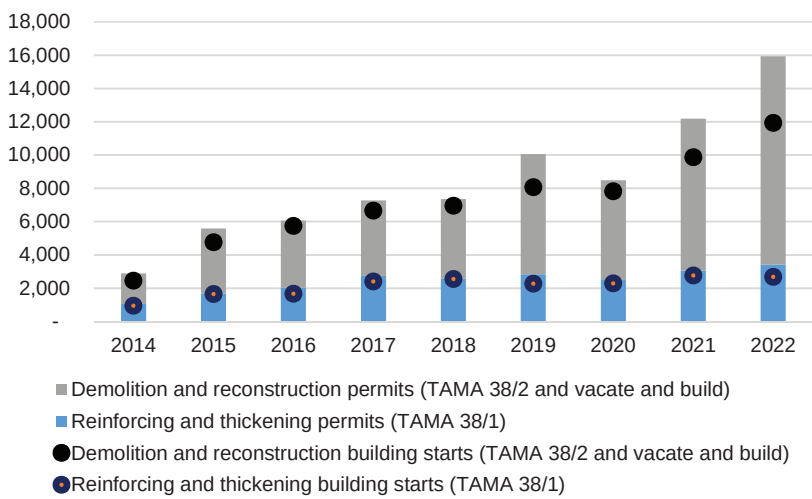
Urban renewal projects are advantageous for developers during a period of high or rising interest rates, since they do not require large amounts of credit to purchase the land.

The quantity of housing starts as part of the urban renewal programs ("vacate and build" and Tama 38) has grown over the years (Figure 8.7). Their share of housing starts reached 17.7 percent in 2022, and is likely to continue growing in years to come. Urban renewal projects are advantageous for developers during periods in which interest rates are high or rising, since the developers do not need a large amount of credit. This is because they do not need to purchase the land, and they incur the building costs and payments to the building rights holders during a period in which they can already sell the additional apartments. The growing scope of urban renewal is welcome since it increases the usage of land, which is in short supply in areas of high demand, and also because it

[18] This will consolidate several processes that take place in the local planning committees: examination of the plan, discussion of opposition and discussion of a permit request; and approval of the plan will essentially also constitute the building permit. The reform requires the approval of the Minister of the Interior.

improves the quality and safety of the existing housing stock. Nonetheless, the continued expansion of the program is accompanied by side effects that are less desirable. First, the residents of the old apartments, who must find alternative housing for several years, create additional demand in the rental market. The fact that the urban renewal projects are concentrated in high-demand areas leads to an increase in rents in those areas. Second, the large number of urban renewal projects is creating pressure on the bodies that provide approvals, which lengthens the process to obtain building permits. According to a report by the Urban Renewal Authority, the process of obtaining a permit, which took an average of about a year at the beginning of the previous decade, took three years in 2021 in the case of demolish-and-rebuild projects and even four years for projects involving reinforcement and thickening.[19] In 2022, the district planning committees and the National Planning and Building Committee approved a record 77,000 housing units in urban renewal projects. However, in order to start building, temporary housing solutions must be found for the residents of the apartments to be demolished, an investment must be made in the improvement of infrastructure, and the local planning committees, whose duties include issuing building permits, need to be expanded.

Figure 8.7
Urban Renewal Building Permits and Starts, 2014–2022



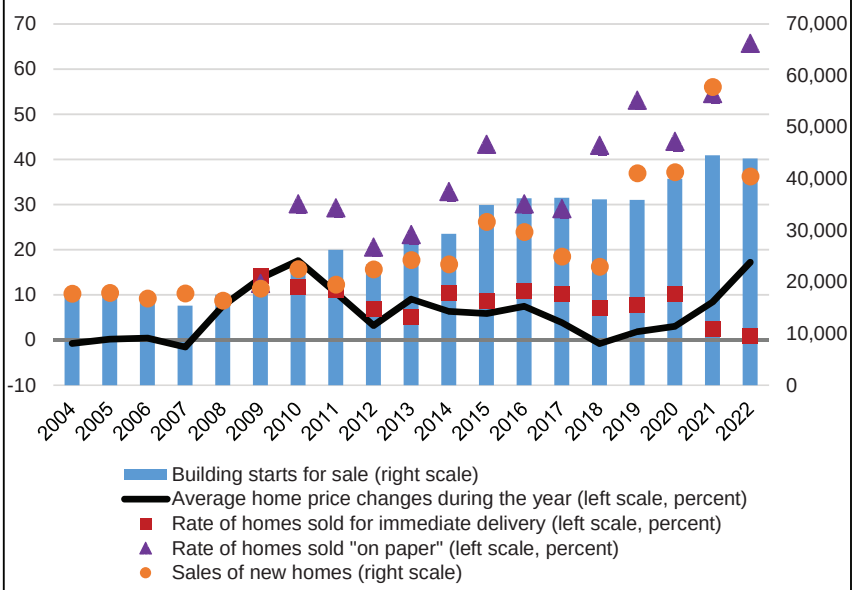
SOURCE: Central Bureau of Statistics.

[19] There is heterogeneity across cities: in most of the outlying cities, the time it takes to obtain a building permit is shorter than in the Center. The shortest time was recorded in Kiryat Ata (1.7 years) while the longest was reported in Ra'anana and Kiryat Ono (6.2 years).

3. Home sales vs housing starts

In 2021 new home sales significantly outpaced housing starts for sale only[20] (Figure 8.8). This was made possible because developers had an inventory of homes intended for sale that had been built in previous years. In contrast, the number of new homes sold in 2022 was smaller than the number of housing starts, and there was an increase in the inventory of new homes that remained for sale. A possible reason for the high rate of new homes sold "on paper" in 2022 is that developers did not have large inventories of homes intended for sale in advanced stages of construction, which meant that very few homes were sold for immediate delivery. In years in which the number of new homes sold was smaller than the number up for sale, home prices tended to rise more moderately or even to decline, while during periods in which the number of new homes sold was similar to or higher than that of homes up for sale, home prices tended to rise at a faster rate.

Figure 8.8
Building Starts Excluding Dwellings Not For Sale, Sale of New Dwellings, Rate of Increase in Home Prices, and Rate of New Homes Sold for Immediate Delivery and "On Paper", 2004–2022



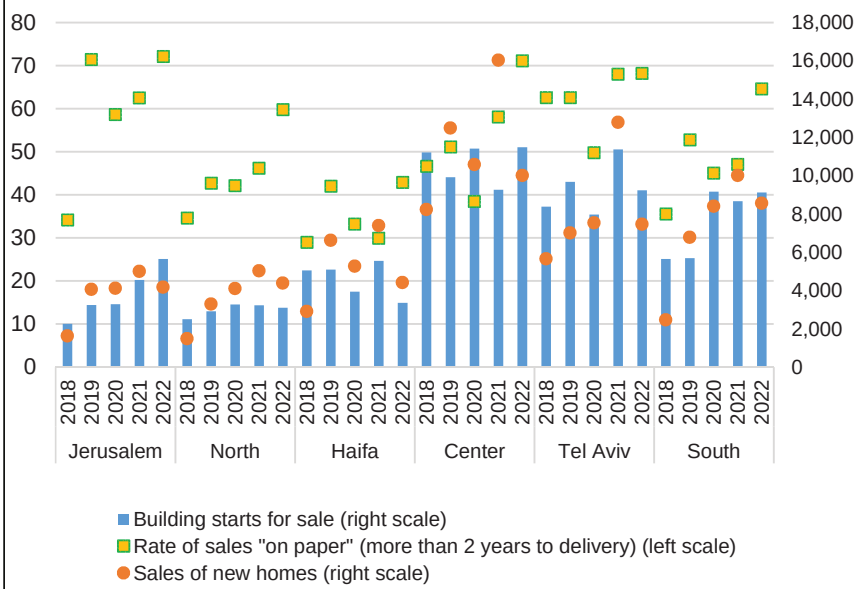
SOURCE: Based on Central Bureau of Statistics and Israel Tax Authority.

[20] The number of housing starts reported by the CBS includes all housing units for which construction has begun, some of which are not intended for sale (Table 8.1). This includes self-building, building for purchase groups, building for rental and a portion of the homes built as part of urban renewal projects (which are payment-in-kind for the building rights holders). Therefore, the potential sales of new homes is less than total housing starts.

In 2022, housing starts of homes for sale in the high-demand areas were higher than sales.

An analysis of new home sales on the national level does not provide a full picture due to the variance in demand across regions. A similar analysis on the regional level (Figure 8.9) shows that in 2021 the number of new homes sold was greater than the number of housing starts in all regions, such that the rate of sales "on paper" increased. In 2022, housing starts of homes intended for sale in high-demand districts (Central, Tel Aviv, and Jerusalem) were higher than sales, such that many new homes remained for sale in those areas.

Figure 8.9
Building Starts Excluding Dwellings Not For Sale, Sale of New Dwellings, and Rate of New Homes Sold "On Paper", by District, 2018–2022



SOURCE: Based on Central Bureau of Statistics.

4. Marketing of land

In 2022, ILA land tenders had lower success rates and land prices declined.

The boom in the housing market in 2021 was also reflected in the results of the ILA's land tenders. In the past, these tenders typically had relatively low rates of success (about 60 percent). However, in 2021–2022, most of the land that was offered was successfully sold.[21] Table 8.2 summarizes the data on land tenders for high-density residential construction (6 or more housing units), which indicate that the rate of success in 2021 was particularly high in both the regular tenders and the tenders for reduced-price housing. However, the rate of

[21] The rate of success is calculated based on the tenders that were already discussed, rather than tenders whose date of closing had not yet arrived.

success declined in 2022. The very high demand for land in 2021 is apparently explained by the low level of marketing in 2020, which was due to the onset of the pandemic, while the moderation in demand in 2022 was the result of massive marketing during the previous two years and the drop in sales of new homes.

There were an average of about 11.3 bids in the regular tenders during 2022, compared with 13.9 in 2021. In 2022, the average winning bid was 1.3 times the land's valuation and in only 54 percent of the lots was the winning bid higher than the valuation. In contrast, the average winning bid in 2021 was 2.4 times the valuation, and 78 percent of bids were higher than the land's valuation. The increase in interest rates is raising the cost of credit for the acquisition of land and is increasing the developers' cost of financing, which in turn is apparently having an effect on their willingness to offer high bids in ILA land tenders. Furthermore, in response to the increased rate of leverage on loans for the acquisition of land beginning in late 2020—in view of the low interest rates that prevailed then and the rapid increase in home prices—the Banking Supervision Department requested that the banking system adjust the group loan loss provision for the real estate and construction industry (during the second half of 2021) and that it allocate additional capital against highly leveraged land financing (in March 2022).[22] There is, however, an additional reason for the decline in the ratio of the winning bid to valuation in 2022. At the end of 2021, the ILA decided to reduce the monopolistic power of developers in "large" projects, in which several lots are marketed simultaneously, and even to divide the marketed land into a larger number of lots. Although a developer could make offers on all of the lots in the tender, he could not win more than one. As a result, in 2022 the amount of the winning bid was not necessarily the highest one given for the lot, which helped to moderate land prices.

[22] For further details, see Box 1.8 in Israel's Banking System, Annual Survey, 2021, Bank of Israel.

Table 8.2
Israel Land Authority Land Tender Amounts, 2021 and 2022

Year	Tender type	Number of dwellings published	Number of dwellings discussed[a]	Number of dwellings in tenders with winners	Success rate (as a share of those discussed)
2021	Ordinary public tender[b]	29,073	17,311	16,680	96.4%
2021	Reduced Price	5,860	5,860	5,603	95.6%
2021	Target Price	26,345	19,507	18,763	96.2%
2022	Ordinary public tender[b]	17,305	8,921	7,547	84.6%
2022	Target Price	46,036	15,616	11,923	76.4%

[a] Tenders in which the envelopes were opened. In addition, there are tenders that were published but did not yet reach their closure date. For instance, For Target Price tenders in 2022, tender closures and winner selections for 30,420 units will take place in the first half of 2023.

[b] Includes initiated tenders and tenders for nonspecific lots.

SOURCE: Based on Israel Land Authority.

Section II – Affordable Housing[23]

As a result of the steep rise in home prices that began in 2008 and the findings of the State Comptroller's Report (2015), which dealt with the housing crisis and was highly critical of the lack of affordable housing in Israel, the government presented a large-scale plan for subsidized housing in 2015 called Buyer's Price, which was aimed at households that did not own a home.[24] The program focused on the method of land marketing. Unlike conventional marketing, which is usually implemented by means of public tenders and in which the highest bidder wins, in the Buyer's Price tender the developers competed to offer the lowest price per square meter of housing and the winner acquired the land from the State at a subsidized price. The program was discontinued in 2020, but the results of the lotteries were not cancelled and the sale of homes that were already allocated in the Buyer's Price lotteries is still ongoing. At the end of 2020, the Buyer's Price program was replaced by a similar program called "Reduced Price Housing" in which the discounts to buyers were more limited. In September 2021, this program was replaced by the "Target Price 2.1" program, in which developers compete over the land price, while the price per built-up square meter is set by the State and the homes are meant to be sold at a discount that is 20 percent of that price though not more than NIS

[23] According to the Sixth Addendum to the Planning and Construction Law, 5725–1965, "affordable housing" is defined as either rental at a reduced price or long-term rental. We also include homes for sale that are subsidized by the government.

[24] For further details about the program, see the Bank of Israel *Annual Reports* for the years 2016 to 2019.

300,000.[25] Despite the differences between the programs, one thing remained unchanged: Due to the high demand for subsidized housing, the right to buy is decided by lottery among eligible candidates. As of the beginning of February 2023, about 102,900 households had won the right to purchase a home at a subsidized price and about 73,000 had already exercised that right. There are another roughly 261,300 households with certificates of eligibility who can participate in the lotteries.

BOX 8.1: THE BUYER'S PRICE PROGRAM'S EFFECT ON THE HOUSING MARKET

This analysis looks at the Buyer's Price program's effect on the prices of homes sold within the program as well as in the open market. It does so using a hedonic regression which is estimated using the Central Bureau of Statistics method[1] with some modifications. The analysis is based on data on the sale of housing units contained in the Real Estate Price Database (Karman), although we add an identifier for sales that were part of the Buyer's Price program (a dummy variable) which is taken from the Tax Authority's sales files.[2] This makes it possible to directly estimate the programs' effect on home prices. The estimation period is from January 2015 to September 2022[3] and the sample includes 915 Jewish and mixed localities, of which only 103 included housing units that were sold as part of the Buyer's Price program. There were a total of 57,300 sales with government subsidization in the sales files. For a full explanation of the estimation, see Equation (1) in the methodological appendix at the end of this chapter.

Table 1 presents the coefficients of Equation (1), which capture the effect of the program's sales on home prices in each district. The prices of housing units sold in the Buyer's Price program were between 26 and 40 percent lower on average than the prices of similar housing units sold in the open market, where the largest discounts were provided in the Central district. From a financial perspective, the estimated average discount implicit in the prices of government-subsidized 4-room housing units in 2022 ranged from only NIS 308 thousand in the Northern District to about NIS 1.2 million in the Tel Aviv District.

[1] For further details on the CBS method of estimation, see "Methodology for Calculating the Index of Home Prices and Average Quarterly and Annual Prices" [in Hebrew], Central Bureau of Statistics, May 14, 2020.

[2] An indicator for sales within the Buyer's Price program appears in the sales files starting only from August 2018, even though the sales began in the second quarter of 2016. Thus, we lose information on about 13,000 sales.

[3] The following are the factors taken into consideration in choosing the sample period: (1) The year 2015 is the basis for the calculations since it was the year in which the Buyer's Price program was announced, even though no housing units had yet been sold with government subsidization; (2) The calculations include sales in 2021 and 2022 even though the program was officially discontinued in 2020, since sales of housing units that were allocated in the lotteries were still ongoing.

[25] For further details, see the chapter on the Housing Market in the Bank of Israel *Annual Report* for 2021.

On the basis of the coefficients in Table 1, we calculated the program's cumulative contribution to the potential decline in prices in the housing market between 2015 and 2022. To do so, we multiplied the average discount on the district level by the weight of the sales that were part of the program by the total sales in the locality during the relevant period. The average cumulative weight of the sales of subsidized housing units as a share of total sales during the relevant period was 6.7 percent. In most of the localities in which the program operated, the potential contribution represented a reduction of only between 1 and 5 percent of the price level, in contrast to an overall increase in housing prices of about 47 percent during the relevant period. This contribution was more than 10 percent in only 8 localities, some of them small.[4]

Table 1
Average estimated discount in the "Buyer's Price" program, by district, 2015–2022

District	Jerusalem	North	Haifa	Center	Tel Aviv	South	Judea and Samaria
Coefficient	**-0.321*** **	**-0.262*** **	**-0.296*** **	**-0.404*** **	**-0.373*** **	**-0.255*** **	**-0.387*** **
Number of observations	56,720	69,360	110,744	184,269	123,051	123,397	20,886
Adj R ^{2}	0.660	0.816	0.782	0.792	0.726	0.839	0.813
Average discount calculated for a 4-room dwelling in 2022, NIS thousand	841	308	456	929	1,185	362	683

*** denotes statistical significance at the 1 percent level.

Despite the program's potential moderating effect on housing prices, an examination of the change in actual housing prices during this period shows that in all of the localities in which housing units were sold as part of the program, prices rose by a cumulative rate of between 8 and 90 percent. These data indicate that the price increases in the open market—both new and second-hand—overwhelmed the moderating impact of the Buyer's Price program. Therefore, in the second stage we examined the trend in home prices in the open market during the program and the association between those trends and the level of activity in the program on the locality level (i.e. the Buyer's Price program's proportion of total sales in that locality). This was done on the basis of the same equation estimated in the first stage but without the observations of sales within the program. We subsequently estimated a spatial regression, which examined the connection between the increase in housing prices in the open market and the proportion of Buyer's Price sales in that locality. (See the explanation of Equation (2) in the methodological appendix at the end of the chapter.) According to the estimation results (Table 2), there is a positive and statistically significant connection between the change in prices of homes sold in the open market and the proportion of Buyer's Price sales in the locality. This indicates that in the localities where a high proportion of sales were subsidized by the government, the prices of homes sold in the open market rose at a higher rate than in other localities. An increase of one

[4] The localities are as follows: Beit Yanai, Beit Dagan, Mevasseret Tzion, Midreshet Ben Gurion, Shoham, Gedera, Yavne, and Beit El.

percentage point in the proportion of Buyer's Price sales as a share of total sales in a locality is associated with an increase of 0.45 percentage points in the prices of homes sold in the open market in that locality.[5]

Table 2

Link between change in home prices in the open market and the rate of "Buyer's Price" transactions in the locality

Constant	32.73***
Effect of "Buyer's Price" weight	0.45***
LR test[a]	33.71***

*** denotes statistical significance at the 1 percent level.
[a] LR test shows the statistical significance of the effect of proximity between localities.

This result can be explained by the assumption that the Buyer's Price program increased demand in the areas in which it was implemented and perhaps even in the housing market as a whole; however the demand by groups of buyers who were not eligible to participate in the lotteries did not decline. The program, which was intended to assist first-time home buyers, essentially reduced the supply of new homes to other buyers (repeat buyers and investors). In most cases the latter were forced into the second-hand market (since only a small amount of the land marketed by the ILA was intended for the open market) or to projects being built on private land, which contributed to the increase in their prices. Some of the first-time home buyers who decided not to participate in the lotteries or participated but did not win were also forced to purchase homes in the open market. Builders who won the Buyer's Price tenders that included housing units for sale in the open market, primarily designated unique or expensive housing units to that market.

[5] It can be argued that this connection involves an endogeneity problem due to the existence of a factor that does not appear in Equation (2) and which influences both the change in home prices in the open market and the proportion of Buyer's Price sales. However, the likelihood of this is low since the marketing of land in the program is not aimed at specific areas but rather only the method of the tender was changed and the land that was marketed was what was available at the time. In order to estimate the bias resulting from endogeneity, we estimated Equation (2) using a two-stage method, while using two alternative instrumental variables: the change in home prices in the locality during the five-year period prior to the sale or the number of housing units allocated by lottery in the locality during the two-year period prior to the sale. The choice of the former is based on the finding that the changes in prices in a cross-section of the localities after the implementation of the program are not correlated with price changes in previous years, even though the price levels are correlated. The use of the instrumental variables makes it possible to forecast the proportion of Buyer's Price sales by means of a probit regression using panel data on the individual sale level, while controlling for year fixed effects and for repeated observations of the localities as a random effect. Both of the instrumental variables show a statistically significant effect in the probit regression at the 1 percent level. In the second stage, we used the predicted weight (instead of the actual weight) as an explanatory variable in the spatial regression (Equation (2)). In this regression, we obtained an elasticity of 0.33 when using the first instrumental variable and 0.35 when using the second, which is somewhat lower than 0.45—the elasticity reported in Table 2—though they are still statistically significant at a level of 1 percent.

Although a regulatory infrastructure to incentivize and regulate the institutional long-term rental market has been put in place over the years, the inventory of such housing units is still low relative to the economy's needs.

An alternative to purchasing a home is to rent, and in order to provide stability to households in their place of residence, even if they do not have the means to purchase a home, there is a clear need for institutional long-term rental. Over the years, a regulatory infrastructure has taken shape that is meant to incentivize and regulate the institutional long-term rental housing market, which includes tools for the allocation of land and its marketing by the ILA, the allocation of planning rights (under the National Planning and Building Committee for Priority Housing Areas Law) and the provision of tax benefits on a number of parallel tracks (accelerated depreciation, income tax exemptions or reductions, and reduced rates of VAT, purchase tax, and betterment tax) that apply to the various participants, including developers, REIT funds[26], and provident funds.[27] The Central Bureau of Statistics began reporting building starts for long-term rental housing in 2017. According to that data, there have been about 15,800 rental housing starts so far (Table 8.1).[28]

In 2013, it was decided to create a designated government company to promote rental housing (Government Decisions 770 and 796) called "Home for Rent". The company partners with the ILA in the marketing of land that is earmarked for long-term rental. It offers rental housing for a period of 10 years, some of which is subject to rent control in the case of an eligible tenant. According to the information on its site, the company has populated 12 projects so far, consisting of 2,562 apartments, and 5 additional projects totaling 831 apartments will soon be populated. In addition, 32 projects with about 8,900 apartments are in various stages of completion.

The relatively small number of rental projects that have so far been populated—despite the government's intention to market sufficient land for the construction of 10,000 housing units per year and the relatively long period of time that has elapsed since the establishment of "Home for Rent"—is explained by the small number of land tenders for rental construction up until two years ago. However, even in 2021–22 the marketing of land was sufficient for less than 6,000 housing units per year. The year 2021 was the most successful with respect to marketing. Tenders for the construction of 5,610 housing units were successfully completed (a success rate of 95 percent) and in most of them the winning bid was higher than the valuation of the land. In contrast, in 2022

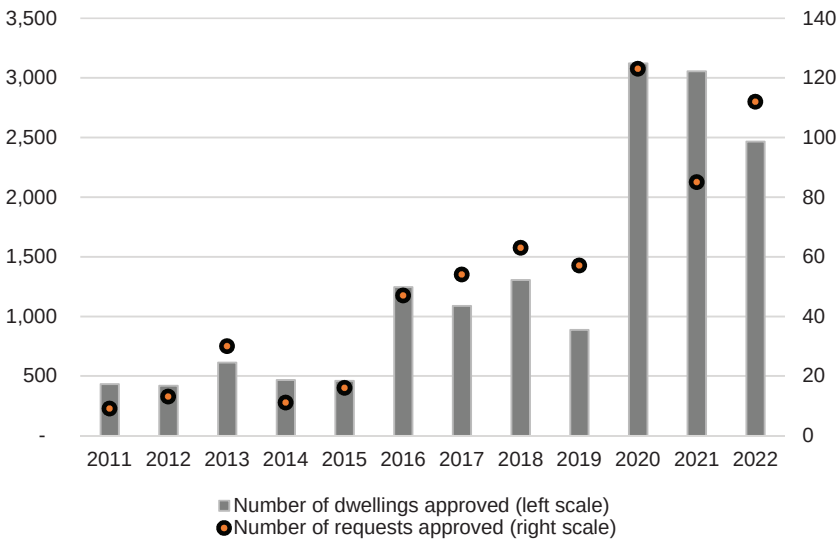
[26] In 2005, the Income Tax Ordinance defined an investment instrument called a Real Estate Investment Trust (REIT), a financial entity the purpose of which is to invest in trust in commercial property. A REIT fund can purchase commercial centers, office buildings, and residential apartment buildings with the goal of renting them out for the long term. It is traded on the stock exchange, which enables the public to purchase its shares. Income Tax Ordinance Amendment (no. 222), 5766–2016 established tax incentives for REITs to focus on investment in projects for residential rentals for periods of at least 15 years.

[27] For further details, see M. Rabinowitz and N. Ziv, "Long-term Rental in Israel: The Current Situation and an Assessment of Government Policy", Social Housing Policy Research and Development, Tel Aviv University, June 2021. [Hebrew]

[28] This number is negligible relative to the number of households that are renting (about 885,000 in 2021).

tenders were successfully completed for only 2,235 housing units (a success rate of about 70 percent) and in all of them the winning bid was lower than the valuation. Bids on tenders for 2,614 housing units from among those published in 2022 are expected to be discussed during 2023.[29] The low response in 2022 and the relatively low price bids are primarily the result of the increase in interest rates (both short-term and long-term), which reduce the profitability of long-term rental projects.

Figure 8.10
Number of Requests and Dwellings Approved for Long-Term Rental Construction as Part of the Capital Investment Encouragement Law, 2011–2022



SOURCE: Investment Authority, Ministry of Economy and Industry.

In addition to "Home for Rent", which is a government company, there are two private REITS in Israel that operate in commercial residential real estate (Megureit and REIT Azorim Living[30]). However, the number of apartments they rent is still small. According to their financial statements for the third quarter of 2022, these two REITS have 1,370 rented apartments, 1,777 apartments under development, construction, or renovation, and another 1,434 apartments under planning. In addition, construction companies are building long-term rental apartments that are eligible for benefits under the Encouragement of Capital

[29] In actuality, this number also includes housing units that are intended for sale in projects where it was decided to allow the sale of some of the apartments in order to improve the profitability of the project, particularly in outlying cities.

[30] There is another REIT that will soon be listed on the stock exchange called Aura REIT and another company called Rent It, which has started to purchase long-term rental housing, though it is not listed on the stock exchange.

Investment Law.[31] The number of apartments approved for construction on this track has increased in recent years, and overall about 15,600 apartments were approved between 2011 and 2022 on this track.

Methodological Appendix: An econometric explanation of the analysis in Box 8.1

In the first stage of the analysis, we estimated regressions in order to calculate the hedonic annual index on the locality level according to the following equation:

$$\log\left(P_{ijt}^{(d)}\right) = c_0^{(d)} + \sum_k \alpha_k^{(d)} X_k + \beta^{(d)} M_i + \gamma_{jt} FE_{jt} + \varepsilon_{ijt}^{(d)} \quad (d = 1, \dots 7) \qquad (1)$$

where the index *d* indicates the district and the indexes *i*, *j*, *k*, and *t* denote the transaction, the locality, the housing unit's characteristics and the year of the transaction, respectively;
P is the value of the transaction;
X represents characteristics of the housing unit, including the socioeconomic index of the statistical area[1], the age of the building, the type of home (including identification of nonstandard dwellings such as a garden apartment, a penthouse, a duplex, a semidetached dwelling, etc.), second-hand homes, a new home bought "on paper" outside of the Buyer's Price program, the meterage of the home, and the number of rooms;
M is a dummy variable that identifies the sale of a home built as part of the Buyer's Price program;
FE represents fixed effects, which are an interaction between a year vector (2015, … 2022) and a vector of localities that belong to the district;
$c_0^{(d)}, \alpha_k^{(d)}, \beta^{(d)}, \gamma_{jt}$ are the parameters to be estimated using maximum likelihood; and
ε represents random error.

In order to shed light on the spatial distribution of the program's effect, we estimated regressions on the localitylevel in separate panels for each of the seven districts, while weighting the sales according to the locality's population. The high spatial resolution of the analysis imposes a low frequency (i.e. annual) on the indices and the fixed effects in the district regressions are therefore defined as an interaction between year and locality. The outliers are filtered out using the CBS method, whereby sales with a value of less than 45 percent or more than 220 percent of the average value of a sale in that locality during the 18 months previous to the transaction are omitted. (The CBS uses an average of three months due to the low spatial resolution.)

[31] The benefits include a reduced corporate tax rate of no more than 11 percent compared to the regular rate of 23 percent, and accelerated depreciation at a rate of 20 percent per year. In November 2021, the rental period to be eligible for the tax benefits was lengthened from an average of five years out of the first seven years from the completion of construction to an average of 15 years out of the first 18 years from the completion of construction. However, the developer was given the opportunity to sell the project to a "continuing renter" who would replace him at the end of five years of rental. In that case, the "continuing renter" would pay a reduced purchase tax of only 0.5 percent.

The annual change (in terms of log differences) in the hedonic price in locality *j* derived from Equation (1) is given by:

$$\gamma_{jt} - \gamma_{j(t-1)}$$

In the second stage, we calculated the change in the Index of Home Prices only on the basis of sales in the open market. To this end, we estimated Equation (1) again, except this time without the sales that were part of the Buyer's Price program and without the βM component.

In order to test the association between the proportion of sales of housing units built as part of the Buyer's Price program as a share of total sales and the change in the prices of homes sold in the open market during those years, we estimated Equation (2) while taking into consideration the effect of spatial dependence, among other things:

$$\Delta\gamma_j = \alpha + \vartheta G_j + \rho \sum_l W_{jl}\, \Delta\gamma_j + \xi_j \qquad (2)$$

where:
$\Delta\gamma_j$ is the change in the hedonic price of homes sold in the open market (whether new or second hand) in locality *j* during the years 2018–2022;
G_j is the proportion of homes sold that were built as part of the Buyer's Price program within total sales in locality *j* during the years 2018–2022;
W_{jl} is the spatial weights between locality *j* and each of the localities in the sample that constitute row *j* in the spatial matrix *W* (195X195), which is calculated on the basis of the GIS method;
α, ϑ, ρ are the parameters to be estimated; and ξrepresents random error.

Due to the high degree of heterogeneity of the localities by size, we weighted the observations according to the cumulative number of transactions in each locality during the 2018–2022 period.

[1] If the socioeconomic index of the statistical area is not known, the calculation is made according to the average socioeconomic index of the statistical areas in the vicinity of the housing unit or according to the locality's average.