

The Israeli Economy on the Eve of the October 7, 2023 War: A Macroeconomic Review

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This paper appears as a chapter in the Singer Annual Report Series
State of the Nation Report: Society, Economy and Policy 2023

Taub Center for Social Policy Studies in Israel

The Taub Center was established in 1982 under the leadership and vision of Herbert M. Singer, Henry Taub, and the American Jewish Joint Distribution Committee. The Center is funded by a permanent endowment created by the Henry and Marilyn Taub Foundation, the Herbert M. and Nell Singer Foundation, Jane and John Colman, the Kolker-Saxon-Hallock Family Foundation, the Milton A. and Roslyn Z. Wolf Family Foundation, and the American Jewish Joint Distribution Committee.

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Benjamin Bental and Labib Shami

Introduction

The recovery from the COVID-19 pandemic continued into 2022. Employment was full, GDP grew at a rate of 6.5% in real terms relative to 2021, and GDP per capita grew by 4.4%. The rapid growth increased the government's revenue and allowed it to finish the year with a budget surplus of 0.5% of GDP. The year 2023 began with political turmoil, which created a high level of uncertainty in the Israeli economy, leading in turn to, among other things, the weakening of the shekel relative to other leading currencies in the world. Nonetheless, and as will be shown in this chapter, the economy was on a long-term growth path on the eve of the outbreak of the October 7th War. The fundamental problems have also not changed: although there has been an improvement, labor productivity in Israel remained low relative to other high-income countries, Israel lags far behind in national infrastructure, and the cost of living remains high. This chapter, as in previous years, deals with these issues.

* This chapter was written before the horrifying events of October 7, 2023. Accordingly, it relates, for the most part, to Israel's economy up until that point. For an assessment of how the war will affect the Israeli economy, see the special chapter at the beginning of the book.

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The national accounts

Figure 1 presents the annual GDP growth rate and its components: private consumption, public consumption, investment, exports, and imports. The calculation was made on a quarter-on-quarter comparative basis, with the reference point being the same quarter in 2019, i.e., prior to the COVID pandemic.¹ The light line is the average annual rate of growth for each variable between 1995 and 2019.

As can be seen, despite the COVID-19 pandemic, the rates of growth in the various components returned to their long-term trends. Of particular note is the correction following the pandemic, which characterizes the growth in imports on the one hand, and the growth in exports on the other. Both series are the result of the same phenomenon: during the pandemic, there was a sharp decline in economic activity, particularly in private consumption and investment, both in Israel and worldwide. This led to a drop in aggregate demand for imported goods and for Israeli goods abroad. Making up for the shortages is what created the exceptionally high rates of growth for a number of quarters following the end of the pandemic, until the trend returned to its long-term path. Public consumption, which also grew at an exceptionally high rate as a result of government expenditure dealing with the pandemic, returned to its long-term path by the beginning of 2022 as these effects disappeared.

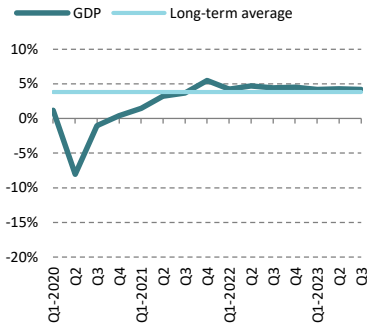
These trends are presented in Figure 1. Following the pandemic, GDP rose somewhat faster than its long-term rate, while the growth in private consumption remained somewhat lower than its long-term trend. Figure 2 shows the effect of this finding on the level of GDP per capita and private consumption per capita (in fixed prices) relative to the hypothetical path they would have taken had the pandemic not occurred. The graph shows the rapid growth in GDP, particularly in the fourth quarter of 2021, compensation for the effect of the pandemic. During the second quarter of 2023, per capita GDP was about 2% higher than its hypothetical value. In contrast, private consumption was about 10% lower than its hypothetical value. In other words, private consumption's share of GDP dropped by about 2 percentage points, from 53% in 2019 to less than 51% in the final three quarters shown in the graph.²

1 The graph shows the rate of growth g that fulfills $(1 + g)^t X_{2019} = X_t$, where t is the number of years since 2019 and X is the name of the variable.

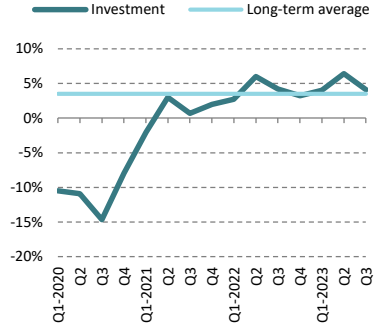
2 The main drop in the share of private consumption occurred in 2020, during which its share was only 49% of GDP.

Figure 1. GDP growth and its components

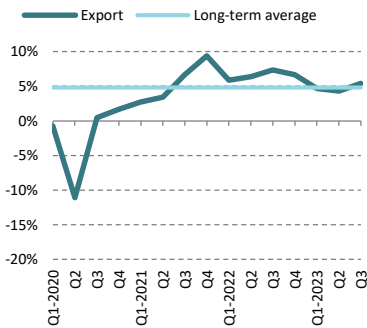
GDP growth rate



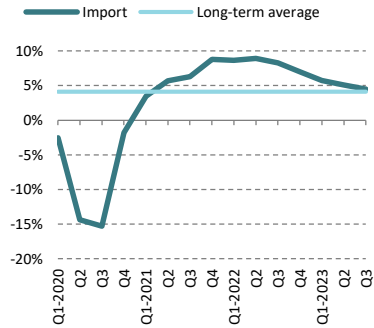
Investment growth rate



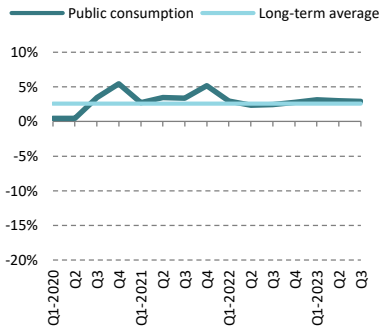
Export growth rate



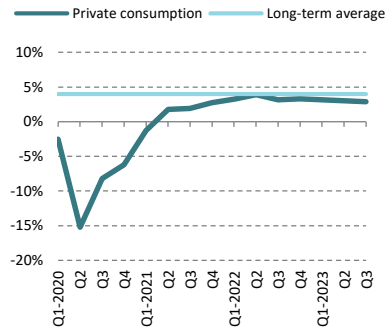
Import growth rate



Public consumption growth rate

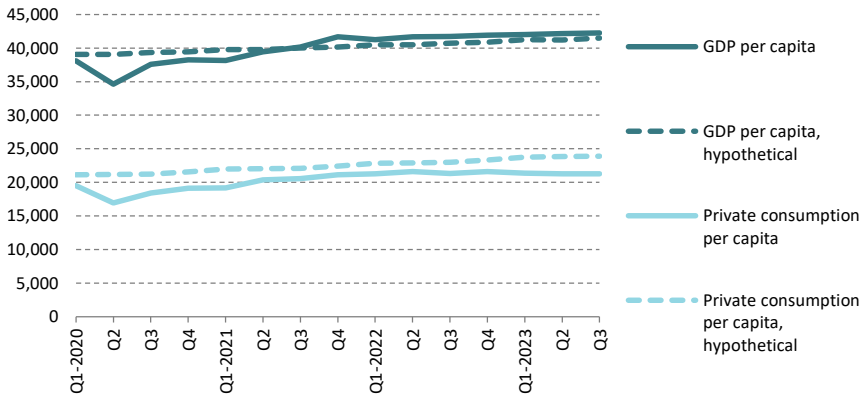


Private consumption growth rate



Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

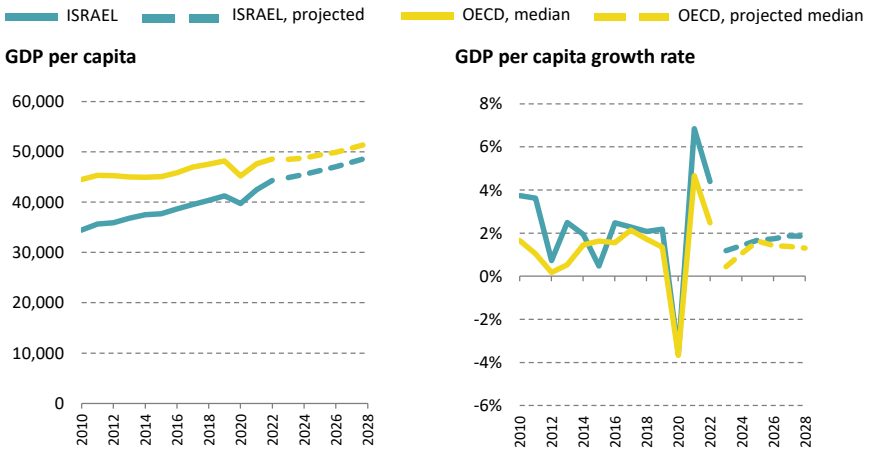
**Figure 2. GDP per capita and private consumption per capita
NIS, 2015 prices**



Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

Figure 3 provides an international perspective on Israel's situation relative to the OECD median, for both GDP per capita and the GDP growth rate. As seen in the graph, Israel is below the OECD median in terms of GDP per capita. Nonetheless, it is worth emphasizing that the gap has narrowed significantly over the past decade. Thus, GDP per capita in Israel was lower than the median by about 30% in 2010 (Finland and France were close to that level as well), while in 2022 it was only 10% lower (like Finland and Canada). Moreover, according to IMF forecasts made prior to the outbreak of the war, the gap would have continued to narrow during the current decade. This is the result of a GDP per capita growth rate that was higher than the median rate for the OECD, and was expected to remain that way in the coming years.

Figure 3. GDP and GDP per capita annual growth rates, Israel and the OECD
 PPP dollars, 2017 prices

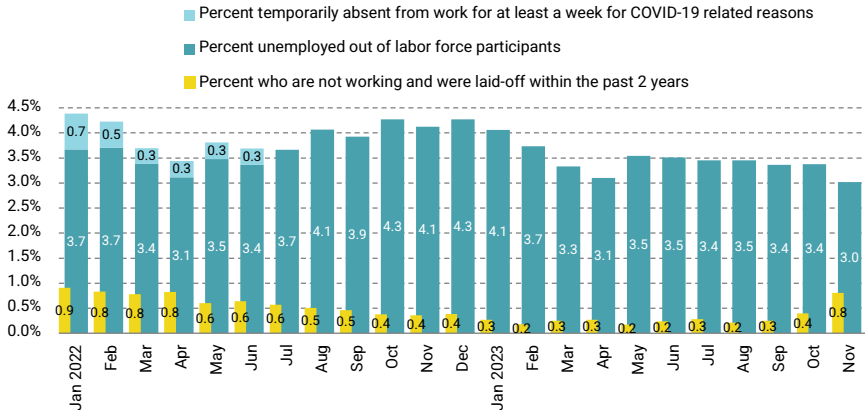


Note: In 2010, OECD median countries were Finland and France; in 2022, they were Finland and Canada.
 Source: Benjamin Bental and Labib Shami, Taub Center | Data: IMF

The labor market

Figure 4 reflects the situation of the economy with respect to the unemployment rate, the rate of those laid off since March 2020 (the peak of the COVID-19 pandemic in the Israeli labor market), and of those who have not returned to the labor market. The graph includes the CBS (Central Bureau of Statistics) reports of those workers who were absent from work for reasons related to the COVID pandemic. With the tapering off of the pandemic, these reports ended in mid-2022.

In general, the rate of unemployment is stable with seasonal fluctuations around an average rate of 3.8% unemployed jobseekers out of those participating in the labor force, which accounts for about 63% of Israel’s population aged 15 and over. The rate of those leaving the labor market out of the population aged 15 and over, fell during the period being reviewed by about half a percentage point (from 0.8% to 0.3%), and in absolute numbers from about 61,000 to about 20,000.

Figure 4. Rates of unemployment and non-participation in the labor market

Source: Benjamin Bentall and Labib Shami, Taub Center | Data: CBS

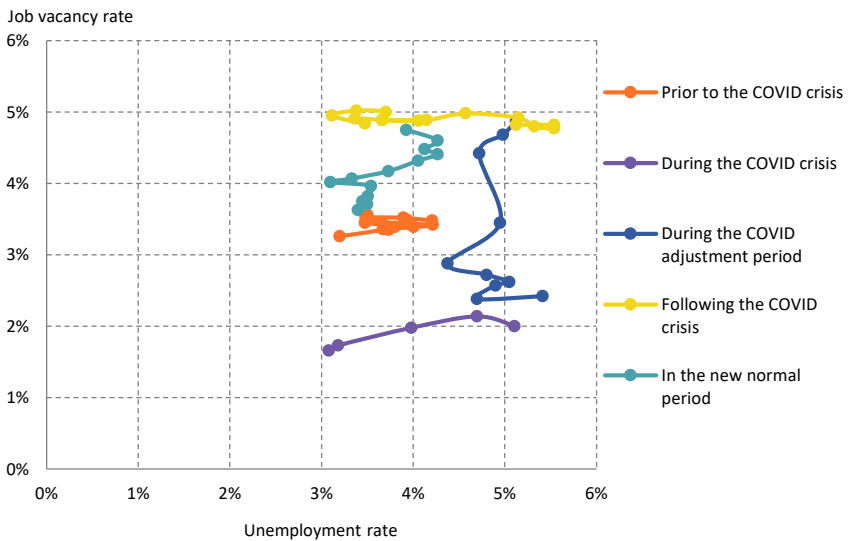
An accepted method of determining the *tightness* of the labor market is to look at the relationship between the unemployment rate among labor force participants and the job vacancy rate out of total jobs in the economy. This relationship is represented by the Beveridge curve, where the vertical axis shows the job vacancy rate and the horizontal axis shows the unemployment rate.³ In general, the Beveridge curve is expected to slope downward from left to right: as the market tightens, the unemployment rate is expected to decline and the rate of job vacancies to increase. This relationship, if it is realized, makes it possible to determine the stage of the business cycle at any point in time. At times, the curve can shift upward or downward, with the same rate of unemployment becoming consistent with a higher or lower job vacancy rate. The former type of shift is evidence of increased friction in the labor market, which is the result of employers having a hard time finding individuals who meet their needs, while the latter is evidence of decreased friction.⁴

3 The curve is named after Lord Beveridge who played a key role in Britain's social welfare policy in the 1940s. The curve was first presented in Dow and Dicks-Mireaux (1958).

4 For a discussion of shifts in the Beveridge curve following the COVID-19 pandemic, see, for example, Rodgers and Kassens (2022).

Figure 5 presents the relationship between the unemployment rate and the job vacancy rate in Israel on a monthly basis since 2019. The points are connected in chronological order.

Figure 5. The Beveridge curve, January 2019–November 2023



Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

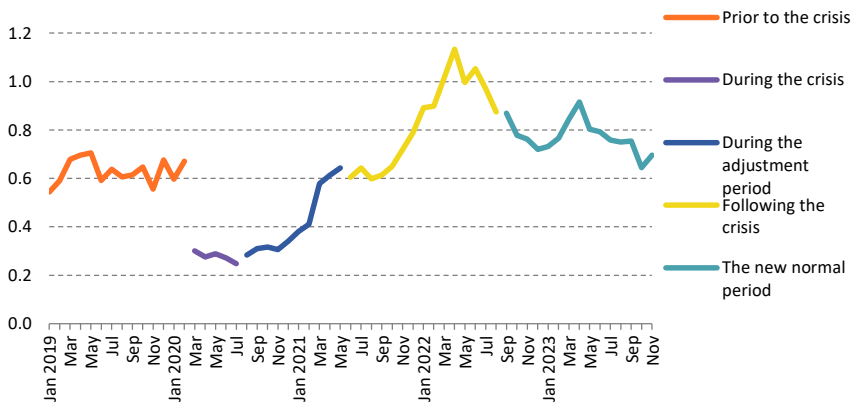
In contrast to the classic curve, the curve in the graph does not slope downward from left to right and, therefore, there is no evidence of the relationship described between the unemployment rate and the job vacancy rate in Israel. Nonetheless, the graph shows turning points in the labor market over the reviewed period. In 2019, the job vacancy rate did not vary with the moderate changes in the unemployment rate. The outbreak of the COVID-19 pandemic reduced the job vacancy rate at each unemployment rate by about 1.5 percentage points.⁵ As the pandemic progressed, the economy entered an adjustment period. This period, which included approximately the last two quarters of 2020 and the first two of 2021, was characterized

5 The unemployment rate relates only to workers who are actually searching for a job and does not include workers on unpaid leave as a result of the COVID-19 pandemic.

by an unemployment rate that remained constant while the number of job vacancies rose rapidly. This phenomenon is evidence of the increasing difficulty of employers in finding workers who met their needs. During the second half of 2021 and the first half of 2022, the economy entered a stage in which the job vacancy rate remained about 1.5 percentage points higher than in 2019, again despite the fluctuations in the unemployment rate. Since then, it appears that the labor market is undergoing the opposite adjustment to that seen during the COVID pandemic. Thus, the job vacancy rate has fallen to the level that prevailed in 2019, this time in parallel with a downward trend in the unemployment rate. It appears that the process of finding workers is becoming more efficient and there is less friction in the labor market, perhaps due to digitalization and the creation of websites such as the Ministry of Labor's *Avodata*.

Another way of looking at the data is by calculating the ratio between the number of job vacancies and the number of unemployed workers. Note, though, that ratio ignores the suitability of workers' skills and the characteristics of the job. Figure 6 presents this ratio.

Figure 6. Ratio between the job vacancy rate and the unemployment rate



Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

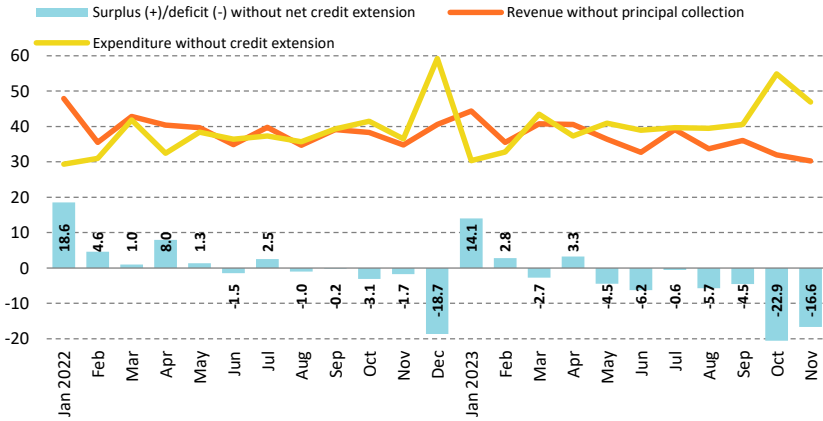
The graph shows that in 2019 the number of those unemployed was approximately one-third greater than the number of job vacancies. The COVID-19 pandemic drastically reduced the ratio of job vacancies per unemployed worker, but the recovery in the labor market, which began in the third quarter of 2020 and continued until the end of the first quarter of 2022, led to the opposite situation, in which the number of job vacancies exceeded the number of the unemployed. Since then, the number of job vacancies per unemployed worker has declined and it appears to have stabilized at 0.8, which is still higher than the ratio prevailing in 2019. In view of the fact that the unemployment rate has returned to its pre-pandemic level, this points to a relatively high level of demand for workers, which characterized the labor market for most of 2023.

The government

As noted, 2022 ended with a budget surplus of 0.5% of GDP; this did not continue into 2023. Between the second quarter of 2022 and the first quarter of 2023, the deficit shrank to an almost negligible level of 0.2% of GDP, but between the third quarter of 2022 and the second quarter of 2023, it grew to 1.1% of GDP (the pre-war budget for 2023 was based on a deficit target of 0.9% of GDP). Figure 7 indicates the reason for the change in trend. The year 2022 began with a large revenue surplus. That high level of revenue reflected the high level of economic growth in the final quarter of 2021 (Figure 1 above), while the expenditure of the new government (which was formed in June) had not yet adjusted to the budget. The large surplus accumulated in January 2022 was balanced by the deficit in December of that same year, which was the result of a particularly large increase in expenditure (perhaps due to a final burst of budget utilization), but the year finished with a surplus. The expenditure of the new government, which was formed at the end of 2022, was also low relative to revenue at the beginning of its term. This situation changed in the second and third quarters of 2023, during which time the deficit began to accumulate, up to 0.3% of GDP for the first three quarters of the year. It was expected that the deficit would reach 1.5% of GDP by the end of the year. It goes without saying that the war significantly changes the picture of government activity.

Figure 7. Government revenue, expenditure and the budget surplus

NIS billion



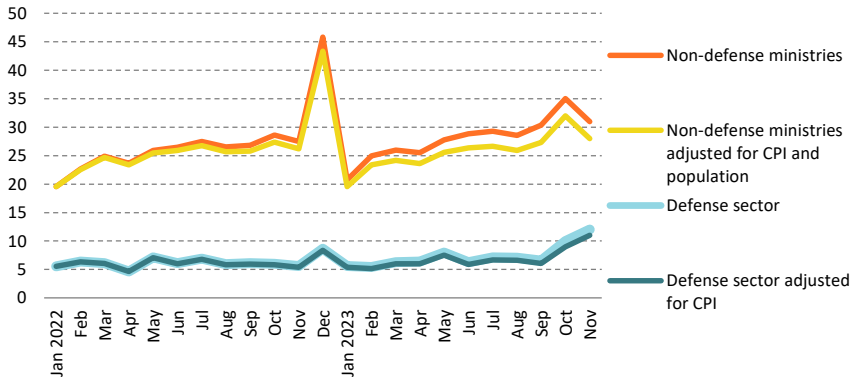
Source: Benjamin Bental and Labib Shami, Taub Center | Data: Ministry of Finance, Accountant General Department

Figure 8 presents the division of government expenditure between non-defense and defense-related outlays. The data are presented in nominal terms and adjusted for inflation using the CPI (Consumer Price Index) relative to January 2022, with non-defense expenditure also adjusted for population growth since January 2022.⁶

6 The difference in the method of adjustment reflects the assumption that defense is a classic public good that serves the entire population regardless of its size, while non-defense government services such as healthcare, education, and infrastructure are divided among the country's residents.

Figure 8. Defense and non-defense expenditures

NIS billion



Source: Benjamin Bental and Labib Shami, Taub Center | Data: |Ministry of Finance, Accountant General Department

The graph shows the stability in defense expenditure up to the October 7 crisis.⁷ Following the dramatic rise in the expenditure of the non-defense ministries in December 2022 (perhaps as part of an attempt to use up the 2022 budget), non-defense expenditure (corrected for the CPI and the rate of population growth) returned to almost exactly its level in the same months a year earlier.⁸

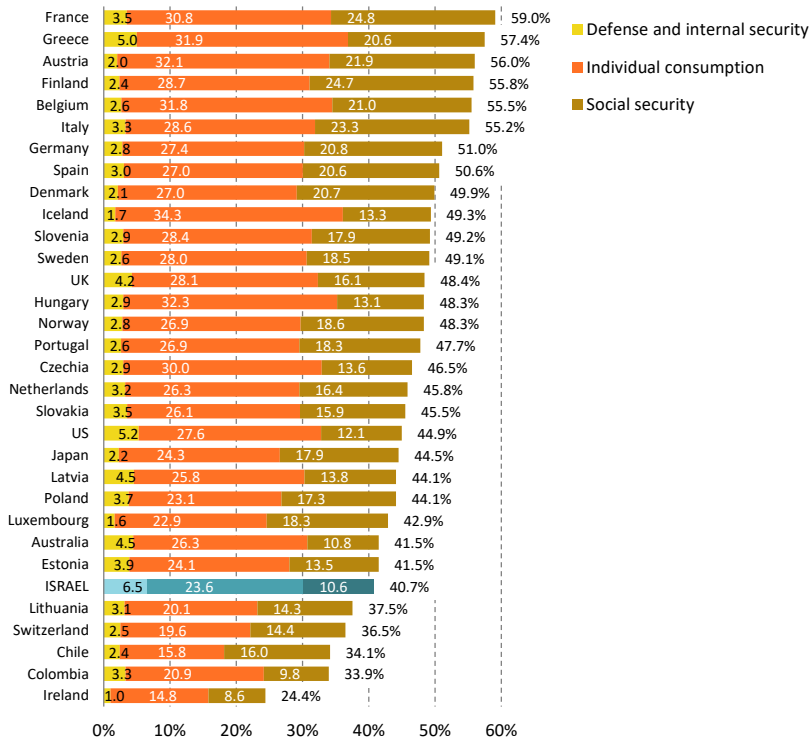
Figure 9 compares Israel to the OECD countries with respect to the level of public expenditure out of GDP and its breakdown using 2021 data, distinguishing between defense and internal security outlays, expenditure due to individual consumption, and social security expenditure. Israel belongs to the group of countries with low public expenditure. Nevertheless, even in 2021, expenditure on defense and internal security in Israel was the highest among the OECD

7 As a result of the war, there will, of course, be a significant increase in defense expenditure, and it is likely that even afterward there will be a permanent increase in defense expenditure of about 1% of GDP.

8 The close similarity between the path of the previous government’s expenditure and that of the present government is evidence of fiscal stability that has characterized Israel for some time. In other words, despite changes in priorities with changes of government, budgetary frameworks have remained stable.

countries, with the component of defense within this aggregate (about 5%) being the outlier. The gap in expenditure on individual consumption out of GDP between Israel and the median of the 32 OECD countries (including Israel) is 3 percentage points, which is close to the gap (in the opposite direction) in relative defense expenditure. Accordingly, the gap between Israel and the OECD median in total public expenditure relative to GDP is mostly the result of the gap in expenditure on social security.

Figure 9. Government expenditure relative to GDP, Israel and the OECD, 2021

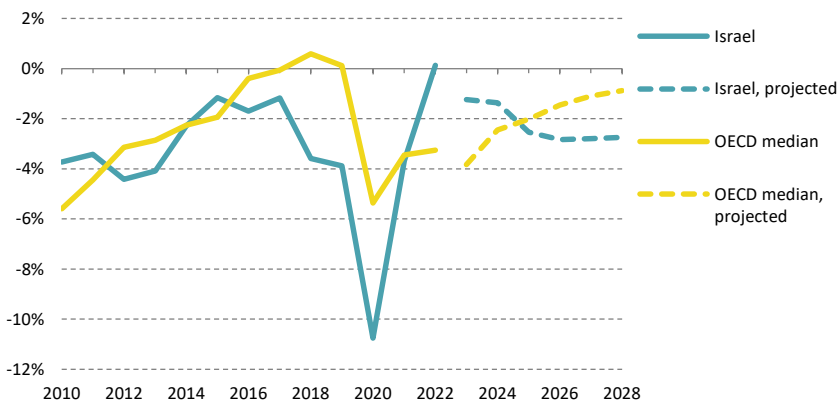


Note: The OECD median country is Portugal.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

The government's budget discipline, which is reflected in the deficit statistics for the past two years, did not necessarily characterize the budgets in the years prior to the COVID-19 pandemic. Figure 10 illustrates the trends in Israel relative to the median of 31 OECD countries (the median country changes from year to year). In particular, the graph shows the deviations from total expenditure and the deficit targets in 2018 and 2019.⁹ According to the IMF forecast issued prior to the war, the deficit was expected to be 1.2% of GDP in 2023 (which is significantly lower than the OECD median) with an expected increase in the coming years to 2.7% (which is significantly higher than the OECD median), primarily due to the relative decline in the rate of GDP growth in Israel (Figure 3 above). The IMF has not yet revised its forecasts as a result of the war and it is unclear when it will do so.¹⁰

Figure 10. Deficit relative to GDP, Israel and the OECD median



Note: The OECD median country changes from year to year.

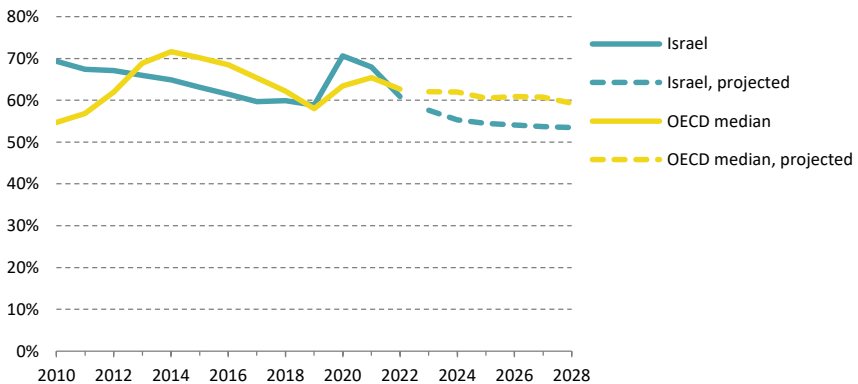
Source: Benjamin Bental and Labib Shami, Taub Center | Data: IMF

9 See Bental and Brand, 2018; 2019. In principle, the *expenditure rule* determines an expenditure ceiling for the government. According to a 2012 law, this ceiling is positively dependent on population growth and negatively dependent on the gap between the ratio of public debt to GDP and the target for this ratio (60%), provided the gap is positive. A different law sets the deficit target, which changes from time to time. For details on the fiscal rules in place in Israel, see Millard and Agmon, 2014.

10 Prior to the outbreak of the war, the Bank of Israel forecasted a deficit of 1.3% of GDP for the current year and 1.5% in the coming year.

Israel's rapid economic growth made it possible to lower the public debt to GDP ratio consistently and rapidly. Figure 11 shows a drop of 10 percentage points during the 2010s and an increase — though only a brief one — of 10 percentage points during the COVID-19 pandemic. As a result of the rapid economic recovery, GDP returned to the level it would have attained had it not been for the pandemic (Figure 2 above), and, already by 2022, the debt-to-GDP ratio was about 60%. According to the IMF forecasts made prior to the war, the ratio would have continued to decline, reaching about 54% toward the end of the current decade.¹¹ Thus, Israel was expected to be well inside the lower half of the OECD countries.

Figure 11. Ratio of public debt to GDP, Israel and the OECD median



Note: The OECD median country changes from year to year.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: IMF

11 Before the war, the Bank of Israel expected the debt-to-GDP ratio to be 60% at the end of the current year and 59% at the end of 2024. The impact of the war on the debt-to-GDP ratio is discussed in the chapter on the effects of the war in this book.

SPOTLIGHT

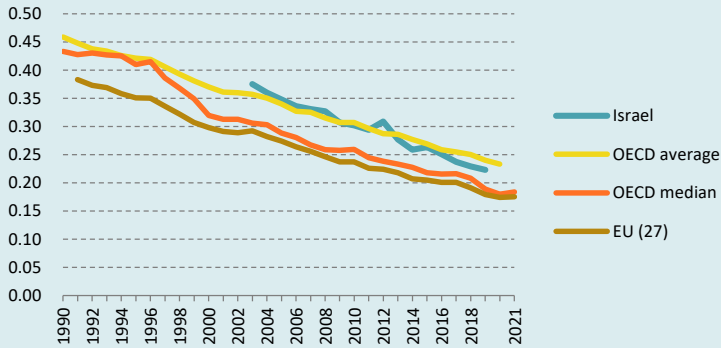
Use of Natural Resources from an Economic Perspective

The global efforts in the area of climate change are intensifying based on a deep concern for the future of life on Earth. This fact is also reflected in the chapter on the environment and health in this book. The main source of concern is the emission of greenhouse gases, which are responsible for global warming and the change in climate that we are experiencing.¹² On the macroeconomic level, the reduction in greenhouse gas emissions is reflected by a reduction in gas emissions per unit of GDP. Figure 12 shows the consistent improvement in this parameter in Israel. Relative to 38 OECD countries, Israel's performance is similar to the average, though substantially worse than the median (the Netherlands), and much worse than the leading countries in the climate control efforts in Europe.

12 The main greenhouse gases are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), high-fructose corn syrup (HFCS), perfluorochemicals (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).

Figure 12. Greenhouse gas emissions per unit of GDP, Israel, the EU, and the OECD

Kilogram to dollar GDP

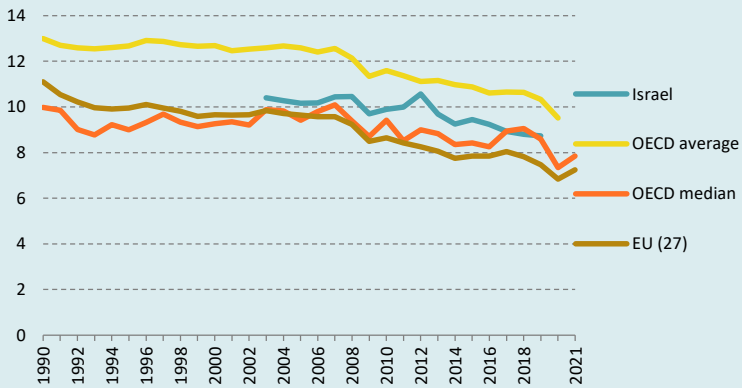


Note: The graph for Israel is limited by the lack of complete data. The median OECD country for most of the survey period was the Netherlands.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

The lackluster performance of Israel with respect to the ratio of greenhouse gas emissions to GDP is explained to a great extent by Israel's relative weakness in GDP per capita (Figure 3 above). This can be seen in Figure 13, which presents the per capita emission of greenhouse gases in Israel relative to the OECD countries. According to this index, Israel is located between the average of the 38 countries and the median (Portugal). Had Israel's labor productivity been higher at the existing level of emissions, its performance with respect to emissions per unit of GDP would be better, putting it on the level of the high-income economies.

Figure 13. Greenhouse gas emissions per capita, Israel, the EU and the OECD
 Kilogram per capita



Note: The graph for Israel is limited by the lack of complete data. The median OECD country for most of the review period was Portugal.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

SPOTLIGHT

The Political Controversy, the War, and Economic Uncertainty

At the beginning of January 2023, the government announced its intention to introduce legislation in the Knesset involving the judicial system and the relations between the government, the Knesset, the legal advisers, and the Supreme Court. Public reaction to the planned measures led to deep controversies. As a consequence, the economy as a whole entered a state of uncertainty. In their assessments, global credit rating agencies related to the effect of the political situation in Israel on the standing of its economy. At this stage, they have not changed Israel's credit rating, although all of them expressed concern about negative implications in the future. For example, on August 14th, 2023, the Fitch rating agency stated the following, among other things: "Fitch believes the changes may have a negative impact on Israel's credit metrics if the weakening of institutional checks leads to worse policy outcomes, to sustained negative investor sentiment, or to weakened governance indicators."¹³

The willingness of the rating agencies to leave Israel's credit rating unchanged was consistent with the situation of the economy as illustrated in Figures 1, 2, and 4, which show that, at the time of the announcement, there was no deterioration in the performance of the Israeli economy. Nonetheless, the concerns about the future (prior to the disaster on October 7) led to shocks in the financial markets that were likely to have a negative effect on Israel's credit rating in the future.

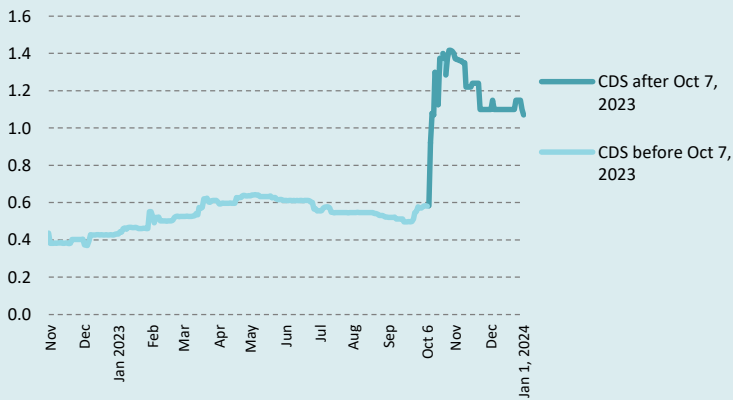
13 See the [Fitch site](#).

One of the indices that is used to assess an economy's risk is the credit default swaps (CDS) premium. These swaps are carried out between the holder of a bond issued by some entity (a government or commercial company), that is seeking to insure itself against the possibility that the entity will not be able to redeem its debt, and a third party that is willing to take on the risk in exchange for a premium. That party commits to redeeming the debt, in full or in part, if the issuer of the bond does not meet its obligations. The higher the perceived risk of default, the higher will be the premium. Figure 14 presents the premium required in the market to insure the risk implicit in five-year bonds issued by the State of Israel. In the late months of 2022, the premium stood at about 0.4 percentage points, and, as can be seen from the graph, it rose to about 0.65 percentage points during the first third of 2023, stabilizing at a level of about 0.55 percentage points later in the year.¹⁴ The October 7 disaster raised Israel's risk dramatically and its risk premium rose to 1.4

14 Under simplifying assumptions, the probability that the market attributes to default at any point in time from the moment the transaction is carried out until the date of maturity is $P = 1 - \exp((-S*t)/(1-R))$ where P is the probability of default per unit of time (a year), S is the price of the CDS (in percentage points), t is the period to maturity in years and R is the amount of the insured debt. Accordingly, and on the assumption that the CDS remains constant and the widely accepted assumption that the share of the insured debt is 40%, the risk that was attributed to default of Israeli debt within five years was 3.3% at the end of 2022 when the premium was about 0.4 percentage points. At the beginning of October 2023, the calculated likelihood of default within five years was 4.6%. In mid-October 2023, the risk premium jumped to 1.4 percentage points and with it the calculated probability jumped to 11%. Israel's credit rating according to the S&P rating agency was AA-. For the sake of comparison, the CDS premium on five-year US bonds was 0.42 percentage points and the US credit rating was AA+; that of Germany was 0.22 percentage points and its rating was AAA; and that of Greece was 0.9 percentage points and its rating was BBB-. Mexico was similar to Israel with 1.3 percentage points and a rating of BBB.

percentage points. Toward the end of November, the market calmed down a bit, and the risk premium fell to 1.1 percentage points.

Figure 14. CDS premium for five-year State of Israel debt
In percentage points



Source: Benjamin Bental and Labib Shami, Taub Center | Data: Reuters

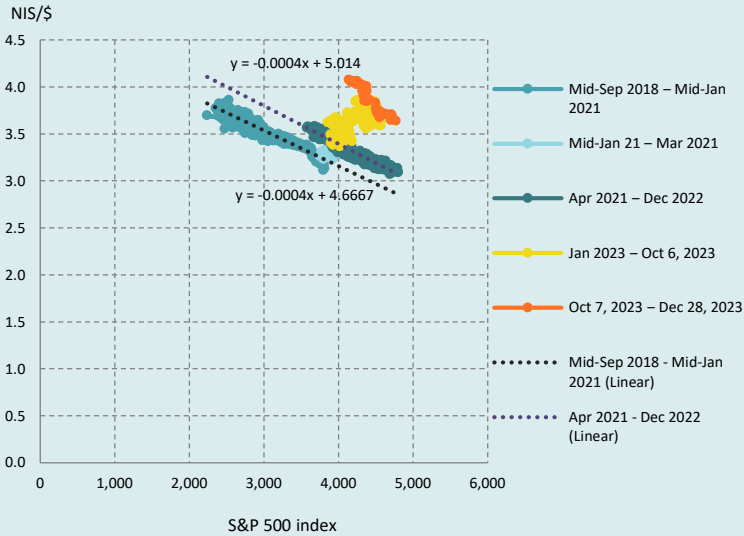
Another indication of the increasing uncertainty in the market is the significant increase in the shekel's exchange rate against foreign currencies. Figure 15 shows the chronological relationship between the shekel's exchange rate relative to the dollar and the S&P 500 index and illustrates its impressive past regularity.¹⁵ The graph shows that, in general, an increase in the S&P 500 index was linked to an appreciation of the shekel and vice versa. This strong relationship is apparently the result of the behavior of institutional investors who seek to maintain a balance between

15 The regularity was exposed by Ater et al. (2023).

their dollar assets and their shekel assets. For example, when the value of dollar assets rises, these investors sell part of their foreign portfolio in order to buy shekel-denominated assets, which results in an appreciation of the shekel. The graph also points to the intervention by the Bank of Israel in mid-January 2021 when the exchange rate of the shekel reached the vicinity of 3.10 to the dollar.¹⁶ Following the intervention, the tight relationship between the exchange rate and the S&P 500 reappeared for an additional year.¹⁷ At the beginning of January 2023, with the government's announcement of its program of judicial overhaul, the relationship has broken down and the shekel rate became decoupled from the fluctuations in the S&P 500. In particular, the rate began to rise without any decline in the S&P 500. Following the outbreak of the October 7 War, the rate of the shekel's depreciation accelerated even faster. As a result of the diminished fears of an immediate conflagration on the northern border, the intervention of the Bank of Israel, the rise in share prices in the US, and the weakening of the dollar in global markets, the exchange rate returned to its pre-war level.

16 See the Bank of Israel site, [Exchange Rates](#).

17 The fact that the slope of the regression line remained identical is worth mentioning. The curve shifted upward by about 37 agorot.

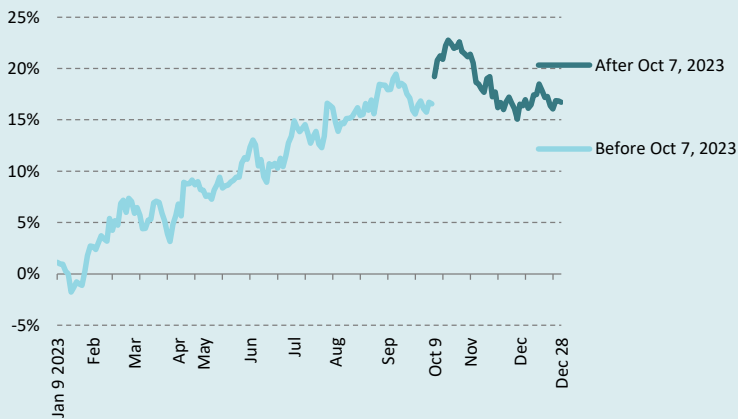
Figure 15. Shekel to dollar exchange rate and the S&P 500 index

Source: Benjamin Bental and Labib Shami, Taub Center | Data: Bank of Israel; S&P 500

The regression line can be used to calculate the difference between the exchange rate that would have prevailed if the regularity had remained throughout 2023 and the actual exchange rate. Based on the results, presented in Figure 16, we can, with the necessary caution, say that the excess depreciation can be attributed to the uncertainty caused by the political discord. Prior to the war, the excess depreciation reached about 50 agorot or about 15% of the expected exchange rate had the

link to the S&P 500 continued.¹⁸ The October 7 break raised the exchange rate to a level of 4 shekels to the dollar and above, and, thus, the excess depreciation increased to about 20%. As noted, toward the end of November 2023, the shekel/dollar exchange rate returned to its pre-war level. With the rise in the S&P 500 during that month, the excess depreciation also returned to its pre-war level, that is, about 15%.

Figure 16. Excess depreciation in the shekel exchange rate



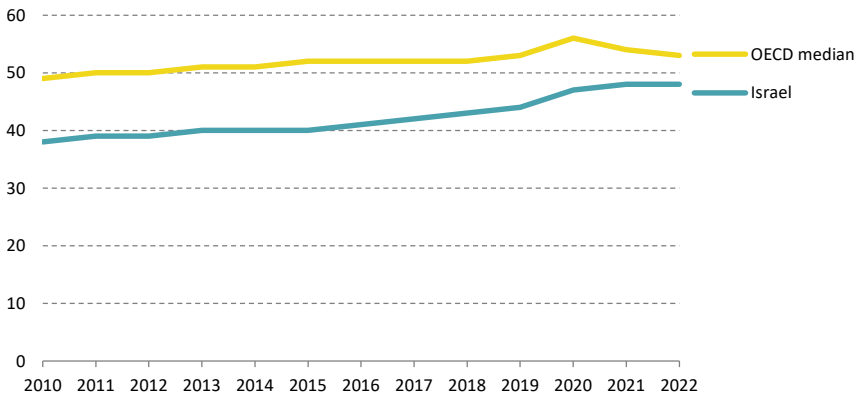
Source: Benjamin Bental and Labib Shami, Taub Center | Data: Author's calculations

18 The Governor of the Bank of Israel used the term *excess depreciation* in his [lecture at the Eli Hurvitz Conference on the Economy and Society](#) on May 30, 2023. On the basis of the connection between the shekel exchange rate relative to the dollar and the NASDAQ index, Prof. Yaron estimated that the excess depreciation was about 10% (which is consistent with the number presented in Figure 16 at that point in time) and that it contributes about 1 additional percentage point to the rate of inflation in Israel. The Bloomberg company reported on a JP Morgan memo that also relates to the decoupling of the shekel exchange rate from the US share market. See Karakaya, 2023.

Labor productivity

The gap in GDP per capita between Israel and the OECD, as shown in Figure 3, is an indicator of labor productivity. The picture is sharpened in Figure 17, which shows GDP per work hour. The gap in this index between the median of 35 OECD countries (Canada and Spain are the median countries) and Israel was 30% at the beginning of the last decade and fell to about 20% by the end of the decade. The narrowing of the gap is the result of the accelerated growth in Israel's GDP per work hour, which began in the middle of the previous decade. During the pandemic year (2020), there was an unusual increase in labor productivity both in Israel and in the OECD countries as a result of many non-essential workers being put on unpaid leave (or suspension in other countries). However, while labor productivity in the OECD countries declined as a result in 2021 and 2022, in Israel, the level remained high. This fact narrowed the gap in labor productivity relative to the median OECD countries (still Canada and Spain) to only 10%.

Figure 17. GDP per work hour, Israel and the OECD median
PPP dollars, 2017 prices

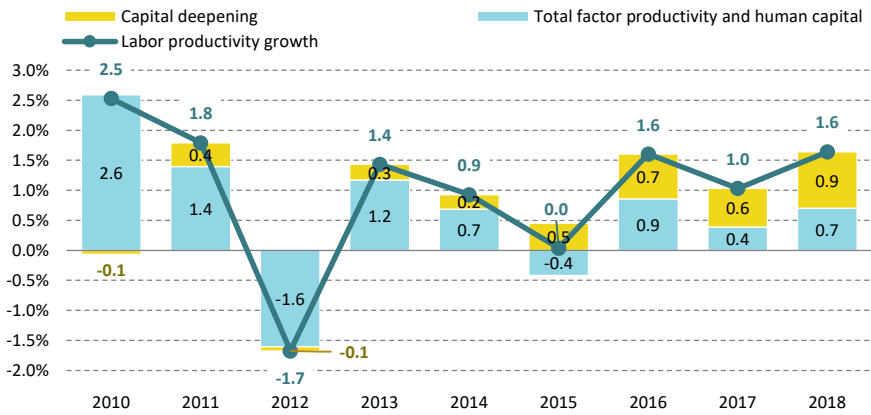


Note: In 2010 and 2022, the median OECD countries were Canada and Spain.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

A possible source for the accelerating increase in labor productivity in Israel can be seen in Figure 18. The graph differentiates between the contribution of capital and that of other factors (human capital and total factor productivity — TFP) to the increase in labor productivity (in terms of GDP per worker).¹⁹ The graph shows that in the middle of the previous decade, there was an acceleration in the rate of growth in labor productivity, which was related to the increase in the amount of capital available to each worker.

Figure 18. Sources of growth in labor productivity in Israel



Source: Benjamin Bental and Labib Shami, Taub Center | Data: World Bank

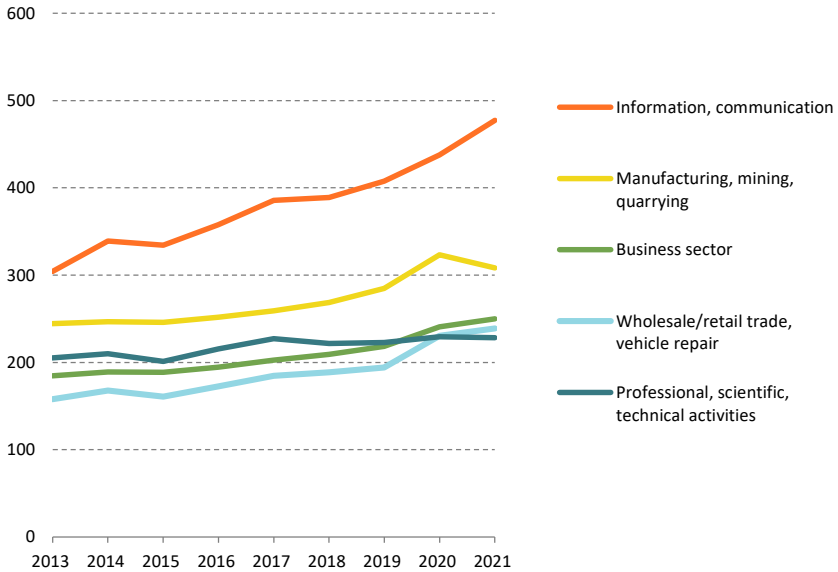
Figure 19 presents the productivity per work hour between 2013 and 2021 in four sectors that are responsible for about 55% of the business sector’s productivity over time: manufacturing, mining and quarrying (whose share of the business sector dropped from 20% to 17% during the reported period); information and communication (whose share rose from 10% to 17%); wholesale and retail trade and vehicle repair (whose share is 14%); and the professional, scientific, and technical services sector (whose share is 10%). As can be seen, not only is productivity per work hour in information and communication almost double the business sector average, the rate of increase in its productivity per work hour is the highest among the four sectors.

19 For an explanation of the methodology, see Dieppe et al., 2020.

However, manufacturing, mining and quarrying have also been characterized by an increase in productivity per work hour over most of the period reviewed.

Figure 19. Productivity per work hour by industry

NIS, 2013 prices

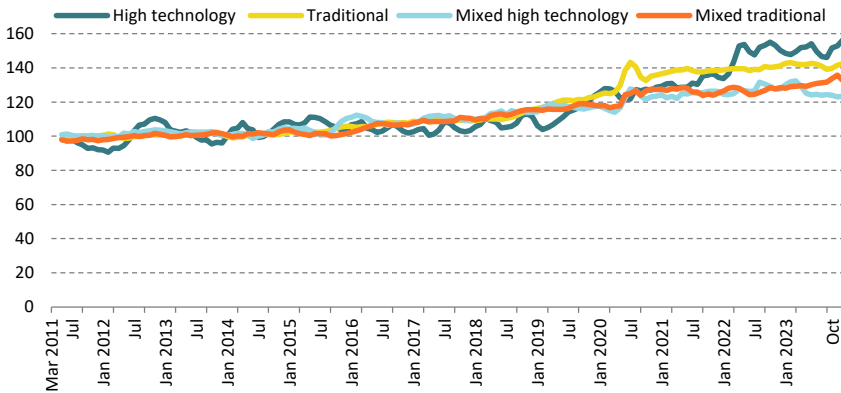


Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

Further evidence of these processes is obtained by calculating productivity per work hour when dividing the manufacturing sector by technological intensity. Figure 20 shows that productivity per work hour in the high-tech sector increased by about 50% since 2011. This increase occurred in two separate jumps — the first in 2019 and the second in 2022. Traditional technology also shows an impressive increase of about 40% in this index during the period, and primarily in 2018.

Figure 20. Productivity per work hour by manufacturing sector and technological intensity

January 2011 = 100



Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

The World Bank data make it possible to examine the productivity of various sectors (with a slightly different aggregation) in an international context. Figure 21 facilitates not only a comparison to the median of 35 OECD countries, but also a comparison of worker productivity among the sectors (the scale of the vertical axis is identical for all sectors, except for mining where Israel is an outlier, apparently because of phosphate mining). In most of the sectors, there is no gap between productivity per worker in Israel and that of the median country (which varies from industry to industry). In public services and government services, there is a significant gap to the detriment of Israeli workers and, in a comparison between sectors, the productivity of government service workers in Israel was the lowest. The productivity per worker in agriculture, trade, and construction is very similar. The productivity of manufacturing workers is somewhat lower than that of their counterparts providing information, finance and insurance services. The productivity of basic services workers is higher, but it is still far from that of mining and quarrying workers.

Figure 21. Annual worker productivity, Israel and the OECD median
PPP dollars, thousands, 2017 prices

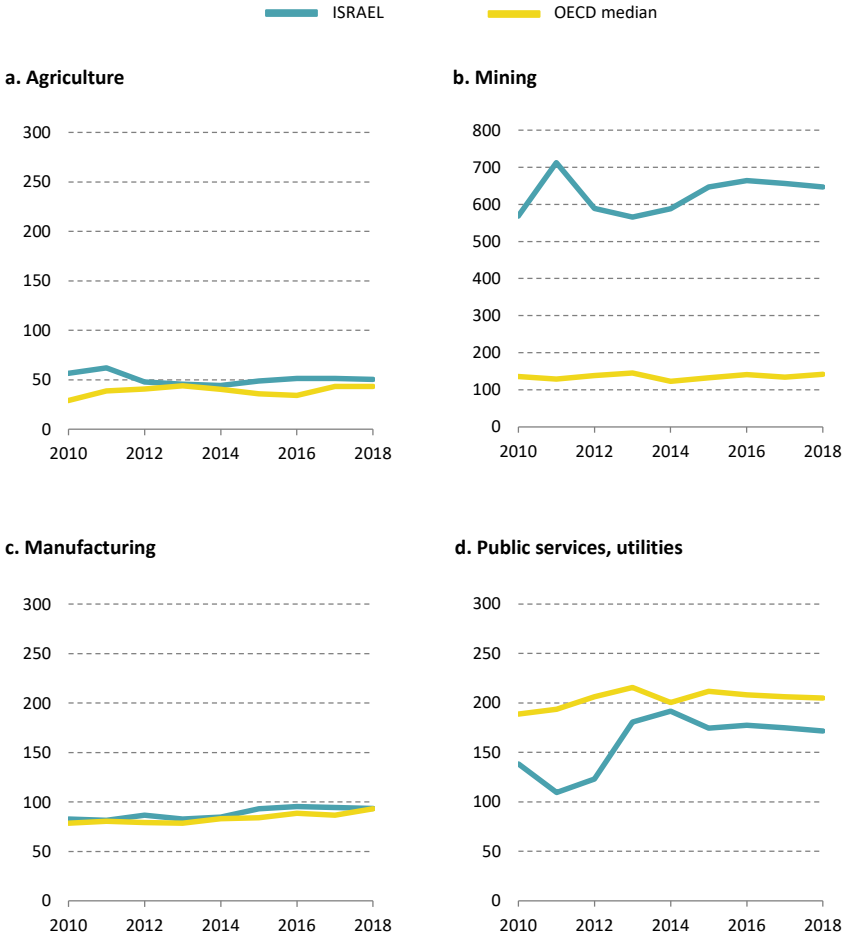
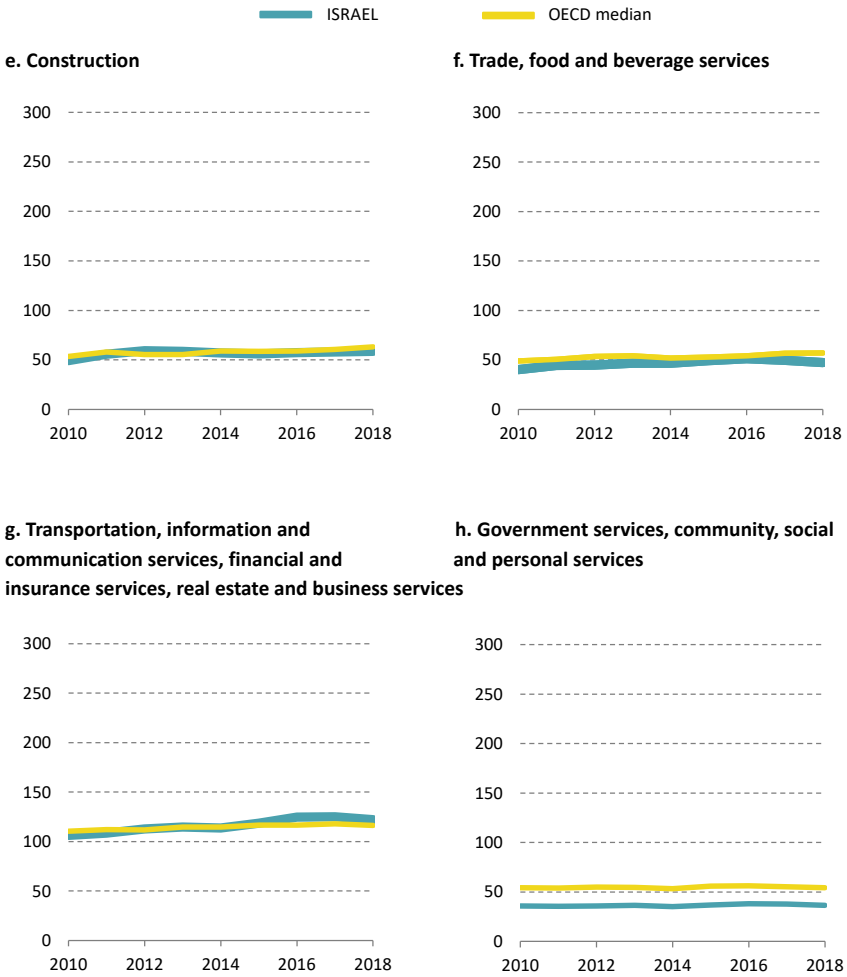


Figure 21 (continued). Annual worker productivity, Israel and the OECD median

PPP dollars, thousands, 2017 prices



Source: Benjamin Bental and Labib Shami, Taub Center | Data: World Bank

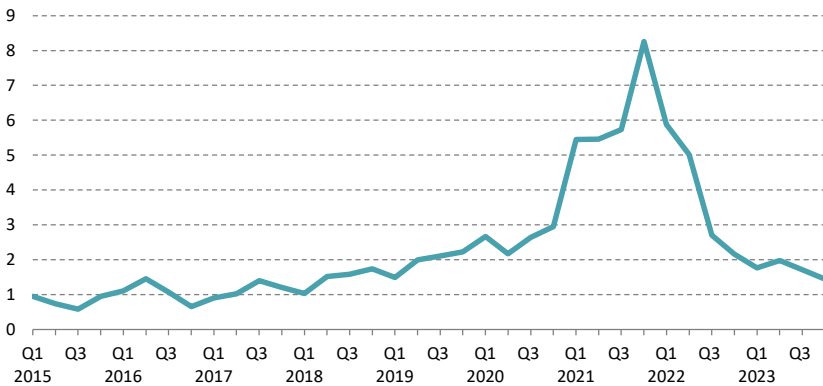
The high-tech sector

As reported in last year's review, the high-tech sector was responsible for about 18% of GDP in 2021 and about 12% of employment in the economy (Bental & Shami, 2022). In addition, the sector accounted for more than half of Israel's exports in that year. These data have no parallel in other countries. Nonetheless, high tech in Israel faced major challenges in 2022, and even more so in the first three-quarters of 2023.

Figure 22 shows the dramatic increase in investment in high tech in 2020–2021, and particularly the investment during the last quarter of 2021, which was four times the investment in 2019. Since then, investments have been declining consistently and, during the first three quarters of 2023, they returned to near their 2019 level.

Figure 22. High tech investments in Israel

Billion dollars

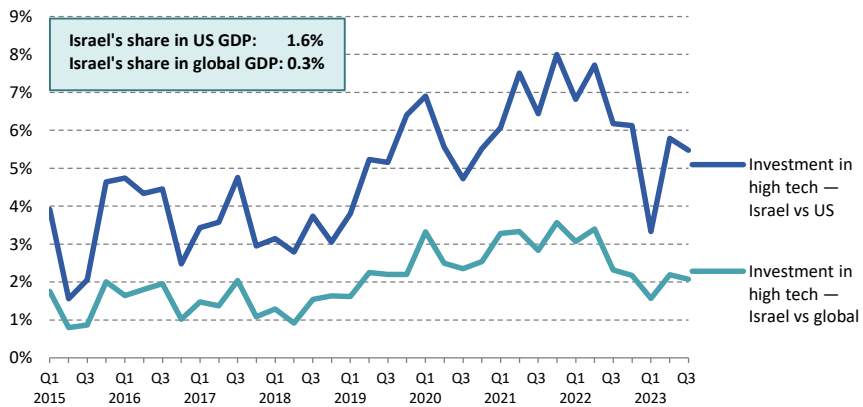


Source: Benjamin Bental and Labib Shami, Taub Center | Data: IVC

These data, to a great extent, reflect the trends in the high-tech sector in the US and worldwide. The drop in interest rates during the COVID-19 pandemic and the lack of investment opportunities in other areas led to a peak in high tech investment in the fourth quarter of 2021. Following the end of the pandemic and the increase in interest rates, global investment returned to near its 2019

level. However, in the US and globally, the increase relative to 2019 was lower than that in Israel, having increased by a multiple of about 2.5. This can be seen in Figure 23, which shows the rate of investment in Israeli high tech relative to high tech in the US and worldwide. The rate increased from 3%–4% of investment in the US in 2019, to 7%–8% in 2021, and from 1.5%–2.5% of global investment in 2019 to 2.5%–3.5% in 2021. This is spectacular given the relative size of the Israeli economy, which constitutes only about 1.6% of the US economy and about 0.3% of the global economy.

Figure 23. Investment in Israeli high tech relative to the US and worldwide



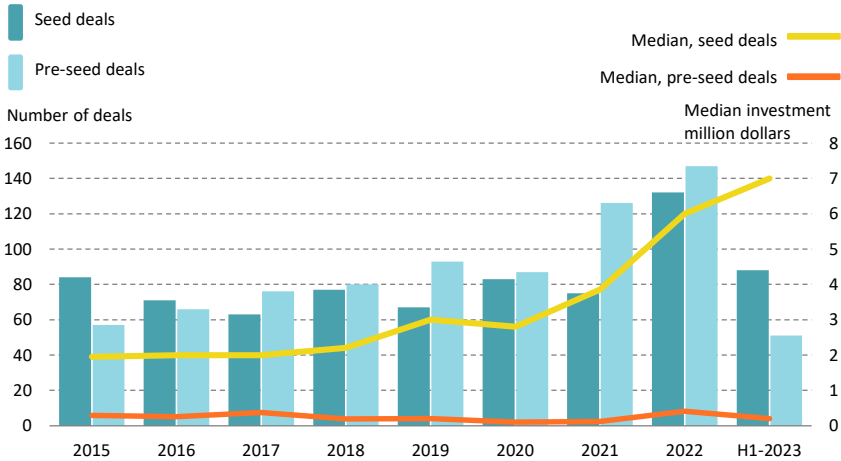
Source: Benjamin Bental and Labib Shami, Taub Center | Data: Dealroom.co; Ernst & Young

Naturally, data for three quarters are not sufficient to make projections of future processes. The large investments in recent years provided high tech companies with resources to operate for some time to come. The significant weakening of the shekel also helps the industry. Nonetheless, even though the amount of median investment in young companies, in particular in the seed stage as shown in Figure 24, grew significantly, the decline in the number of investments is likely to mean a major decline in Israeli exits over the next few years.²⁰ It is worth noting that the impact of the war is especially felt by young

20 The seed or pre-seed stage is the stage in which start-up companies are created. In general, this stage includes investment by a venture capital fund to finance the development of the basic idea up to the point at which it becomes a commercially viable product.

companies, and government intervention will be required in order to ensure that they rebound and continue operating after the war.

Figure 24. Number of seed and pre-seed deals and the median level of investment

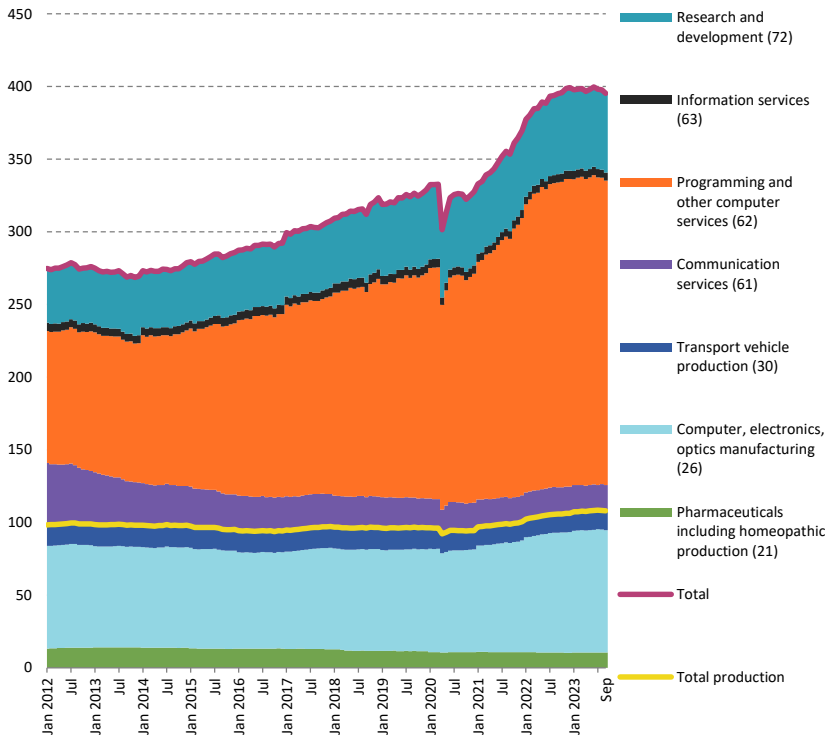


Source: Benjamin Bental and Labib Shami, Taub Center | Data: IVC

The labor market in the high-tech sector is at the moment characterized by a halt in the rapid increase in the number of employees. Figure 25 shows the number of employees in high tech, while differentiating between the manufacturing industries, in which there has been only a moderate increase in employees over the past two years, and the service industries, in which there was a larger increase. The largest industry in this group, by a wide margin, is computer programming and consultation. The employment in this industry was the most sensitive to the COVID-19 pandemic and is mainly responsible for the halt in the growth of employment that began in 2022.

Figure 25. Monthly number of jobs in the high-tech sector

Thousands

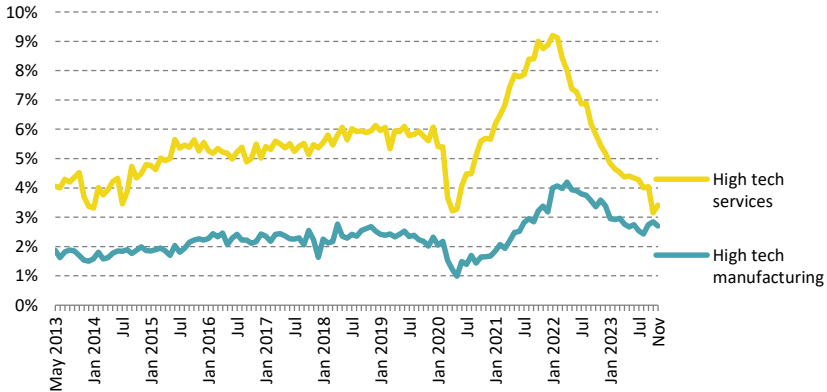


Note: The number in parentheses is the industry code.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

Additional evidence of the slow-down in demand for workers in high tech can be seen in Figure 26. The graph shows the sharp rise in the job vacancy rate in this sector, which reached a peak in the first quarter of 2022, in parallel with the large increase in investment in high tech. This increase leveled off quickly with the drop in investment in high tech.

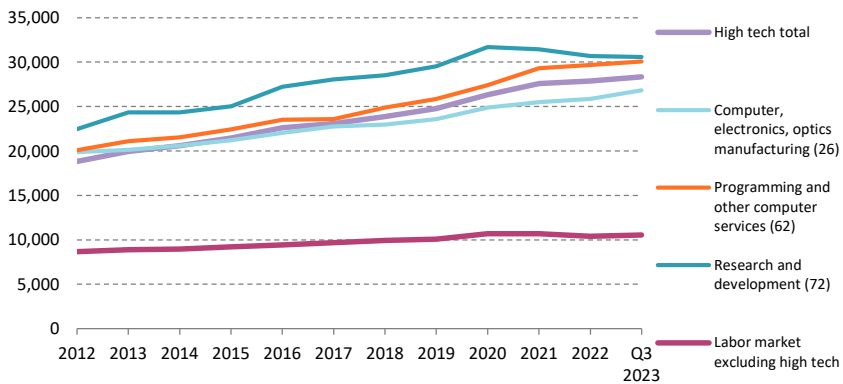
Figure 26. Share of job vacancies in the high-tech sector out of all job vacancies



Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

The drop-off in excess demand in high tech has not had an effect on salaries. Figure 27 shows the salaries of employees in the production of computers, electronics, and optic equipment, who account for almost three-quarters of the workers in high tech production; employees in computer programming and consultation, who account for about two-thirds of the workers in high tech services; and employees in research and development, who account for about 20% of the workers in services. The graph shows that even in the first half of 2023, real wages rose in high tech. The 4% increase in real wages in high tech as a whole exceeds the average 3% increase in real wages in the rest of the economy's sectors. Consequently, the average wage gap between the high-tech sector and other sectors has risen somewhat, to a level of 170%.

Figure 27. Monthly wage in the high-tech sector and the other industry sectors NIS, 2022 prices



Note: The number in parentheses is the industry code.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

Inflation and the cost of living

Over the past few years, prices and the cost of living have been high on the public agenda in Israel. This issue is composed of two main components: the rate of change in the prices of the basket of goods (inflation) and the level of prices of the basket of goods in Israel relative to other countries.

The Central Bureau of Statistics is responsible for tracking price changes in Israel. The index is based on the price of a consumer basket that consists of a variety of goods and services. The composition of the basket of goods and the level of average expenditure on the basket as a whole is updated from time to time; however, between those updates the weight of each component remains constant. The CBS publishes the change in expenditure on each component of the basket and weights the changes according to the weight of the component in the basket as a whole. The CPI represents the price of the basket each month relative to the base basket. Therefore, it is possible to derive the change in the CPI each month or the change between a given month and the same month in the previous year. This change is the annual rate of inflation reported to the public.

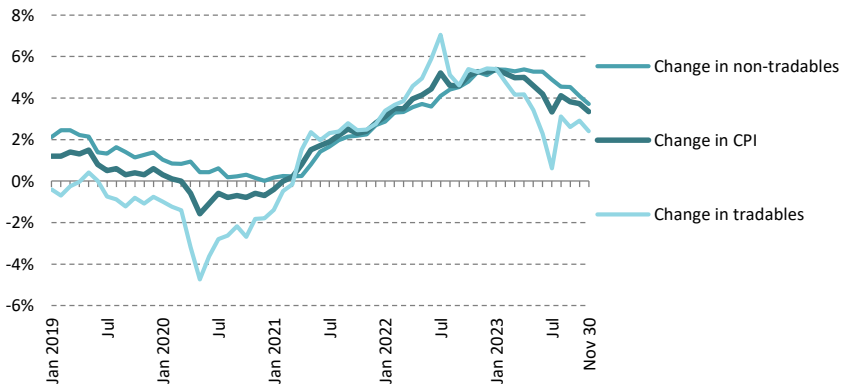
The Bank of Israel differentiates between the components of the basket according to their degree of tradability in international markets. Housing services in Israel, for example, cannot be imported from abroad. In contrast, shoes and clothing are traded on international markets. The weight of tradable goods in the basket is about one-third while that of non-tradable goods is about two-thirds. This differentiation makes it possible to create a rough distinction between imported inflation and local inflation.²¹ Figure 28 presents the annual inflation in the prices of the basket of consumer goods bifurcated into its two components, namely tradable and non-tradable goods. Clearly visible is the wider range of variation in the prices of tradable goods. In particular, it can be seen that, since the beginning of 2019 and up to mid-2021, the prices of tradable goods in general declined, which contributed directly to bringing down the inflation rate in Israel. In the subsequent period, the prices of tradable goods tended to rise at a faster rate than non-tradable goods; however, this trend reversed towards the end of 2022. The drop in the inflation rate is, to a large extent, due to the decrease in prices of tradable goods, in spite of the exceptionally large depreciation in the shekel (Figure 15 and 16 above).²² In August 2023, the trend reversed again, and the rise in prices of tradable goods raised the annual rate of inflation somewhat, despite the decline in prices of non-tradable goods.

21 The prices of tradable goods indirectly influence the prices of non-tradable goods, both because they are often a component in the prices of non-tradable goods (such as the imported scissors used by a hairdresser) and due to competition between similar goods, some of which are tradable while others are non-tradable (such as imported cheese and local cheese).

22 It should be recalled that the Bank of Israel raised the interest rate significantly during 2022 and 2023 and that the increase had a moderating effect on demand. It may be that this development had an impact on tradable goods in particular, although this requires further study.

Figure 28. Inflation in Israel

2022 prices



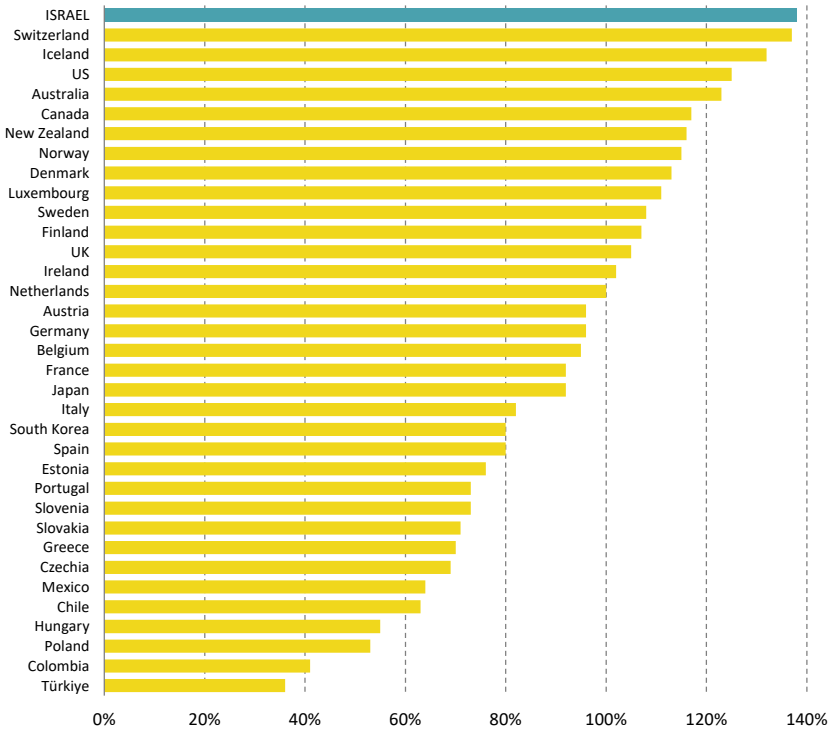
Source: Benjamin Bental and Labib Shami, Taub Center | Data: Bank of Israel

During the entire period being discussed (from the beginning of 2019 to mid-2023), the rates of inflation in Israel were significantly lower than the OECD average. The gap was about 5 percentage points during 2022, which fell to about 2 percentage points in recent months. In view of this, it is difficult to explain the high cost of living in Israel relative to that in the OECD countries (Figure 29). The graph is based on the ratio between two shekel exchange rates — the market exchange rate and the hypothetical exchange rate that would equalize the shekel cost of the basket of goods in Israel to its cost in another country in that country's currency (known as Purchasing Power Parity).²³ The calculation indicates that relative to the average in the OECD countries, the gap was close to 40% in 2022.

23 *The Economist* compares the price of a Big Mac across various countries. According to its data, at the beginning of August 2023, a Big Mac cost NIS 17 in Israel on average. In the US, its price was \$5.58. In order to equalize those prices, the exchange rate would need to be NIS 3.05 per dollar. In actuality, the exchange rate was NIS 3.66 per dollar. Therefore, someone coming from the US who exchanges \$5.58 into shekels can buy a Big Mac in Israel and have change leftover. This implies that at least this product is cheaper in Israel!

Figure 29. Cost of living in Israel and the OECD countries, 2022

2022 prices



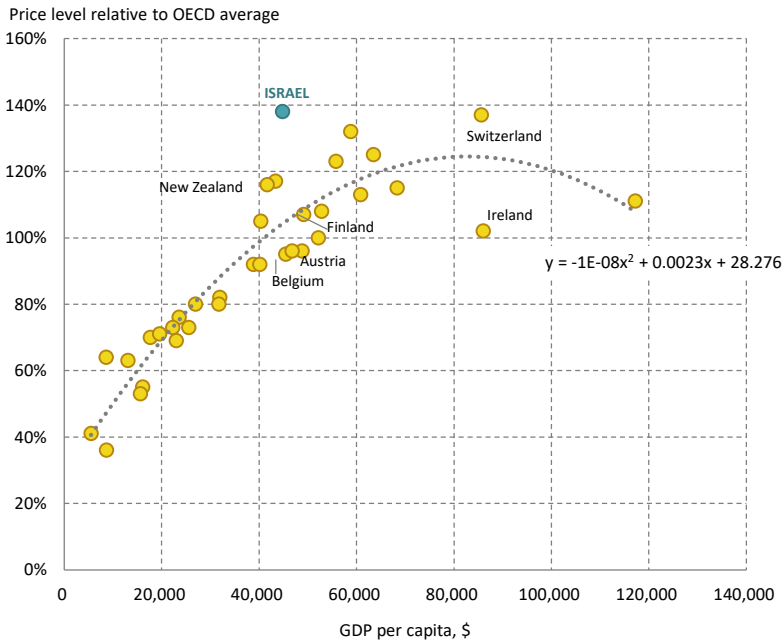
Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

It has long been known that the level of prices in wealthy countries is higher than that in poor ones.²⁴ Although Israel is not the wealthiest country in the

24 This topic was discussed as early as the 1960s, in articles by Balassa (1964) and Samuelson (1964). Their explanation of the gap in prices is based on the relatively higher efficiency in the production of tradable goods in wealthy countries, which raises the relative prices of their non-tradable goods. Another explanation is based on the higher ratio of capital per worker in the wealthy countries, which raises the marginal productivity of labor and wages, and thus leads to higher prices of non-tradable goods (Bhagwati, 1984). A third explanation focuses on the demand side. It claims that there is a higher income elasticity in the case of luxury goods, which tend to be non-tradable (such as housing), thus raising prices in wealthy countries (Bergstrand, 1991).

OECD, countries that are characterized by a particularly low cost of living are clearly those with a lower GDP than Israel and, therefore, they are poorer than Israel. Figure 30 illustrates the relationship between GDP per capita in dollars and the relative cost of living that appears in Figure 29.²⁵ It also presents a regression line that includes GDP per capita and its square as explanatory variables.²⁶ According to this regression, prices in Israel in 2022 were 31% higher than the level predicted by its GDP per capita.

Figure 30. Relative price levels and GDP per capita, Israel and the OECD countries, 2022



Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

- 25 Since the left-hand-side variable depends on the PPP exchange rate, we preferred to calculate GDP in terms of the market exchange rate.
- 26 We would note that we also ran a regression of the relationship between relative cost of living and GDP per capita in dollar terms over the past five years with dummy variables for each year. The result was almost identical to that based only on 2022 data and presented in Figure 29.

From what we saw above, there appears to be a contradiction between the dynamic development of prices in Israel relative to the OECD countries and the gap in the level of prices, with no single satisfactory explanation (Gronau, 2023). Some of the gap is related to the shekel exchange rate, which is affected to a great extent by capital flows into Israel and the current account surplus (accordingly, the excess depreciation itself technically lowers prices in Israel relative to other countries). A different part of the gap is related to phenomena unique to Israel, and in particular the *kashrut* requirements and the shorter work week due to the Sabbath.²⁷ Low labor productivity in Israel, particularly in the service sector, also contributes to higher prices. In addition to these factors, it appears that the most important factor is the relatively high price of housing services in Israel, which is reflected in the large weight of the housing component in the consumer basket.

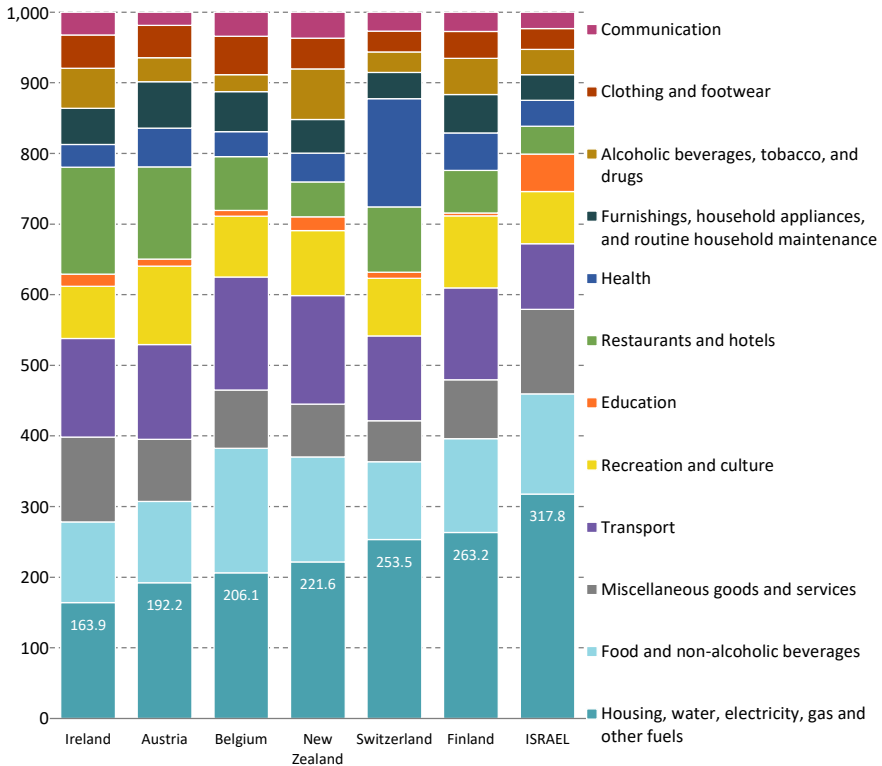
In order to illustrate this point, Figure 31 presents the weight of the main components of the consumer basket in Israel and several other countries.²⁸ Finland is similar to Israel in size and per capita GDP and is very close to the regression curve shown in Figure 30. Belgium and Austria are also similar to Israel in size. New Zealand joins the list of countries that are similar to Israel in size and in being also an island state. Finally, two countries were chosen whose per capita GDP is particularly high: Switzerland and Ireland, which are nevertheless to be found on opposite sides of the regression curve in Figure 30. In Israel, the weight of housing services is the greatest,²⁹ and it is also the country farthest away from the regression curve. In Austria and Belgium, whose GDP per capita is close to that of Israel, the weight of this component is lower. In contrast, in New Zealand, which also has a similar GDP per capita, the weight of housing services in the basket is relatively large and it is located above the regression curve. The same relationship was found between the two wealthy countries. In Switzerland, which is located above the regression curve, the weight of housing services is large while in Ireland, which is below the curve, the weight is low.

27 With regard to the effect of *kashrut*, see Israel Competition Authority, 2020. With regard to the effect of *kashrut* and the number of workdays, see State Comptroller, 2021.

28 The weights of the basket components in each country sum to 1,000.

29 The relatively heavy weight of housing services in the Israeli consumer basket is related to the continuing crisis in the housing market. According to the CBS data, between 2014 and 2022, 292,000 homes were added to the housing market in Israel; however, 355,000 households were added at the same time. This shortfall is in addition to the already existing one from previous years. It appears, therefore, that a significant part of the high cost of living in Israel is the result of the crisis in the housing market.

Figure 31. The weight of major components in the consumer basket, Israel and selected countries, 2022



Note: The weight of the components sum to 1,000.

Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

Conclusion

The Israeli economy was in an excellent position at the end of 2022. Growth was high, inflation was relatively moderate (compared to other countries), the economy enjoyed high international confidence, the debt-to-GDP ratio reached 60%, and there was full employment. In contrast, even prior to October 7, 2023 was a difficult year for Israeli society and the Israeli economy. During the

first nine months of the year, Israel experienced deep political discord over the future of its political regime. The resulting rift created in society caused concern among senior economists regarding the threat to the economy's performance. In the high-tech sector, negative signs began to appear (such as the registration of new companies in Denver, Colorado rather than in Israel). Investments in the sector during the first three quarters of the year were significantly lower than at their peak in 2021 (although this process was, to a large extent, in parallel with global developments in high tech). Finally, Israel's CDS risk premium rose as reflected in business swaps and the warnings issued by the global rating agencies.

The feared effects of the political discord on the stability of the economy were in a moment swept aside by the deep shock of the events on October 7. Since then, the Israeli economy has been on a war footing, with numerous casualties and terrible destruction in the South, hundreds of thousands of reservists called up, and hundreds of thousands of citizens evacuated from their homes in the North and South. The war, which is imposing heavy direct and indirect costs, will affect the economy's growth in the current year and will require far-reaching modifications in the State budget.³⁰ Despite the relative resilience with which the economy entered the crisis, the damage is severe. The first chapter of the book, which deals with the effects of the war in various areas, describes this in greater detail.

Apart from the effects in the immediate and intermediate terms, Israel's economy suffers from a number of fundamental problems, which may worsen. One is the low labor productivity that still characterizes many industries in the economy. Another, which is also partially related to low productivity, is the high cost of living. On the one hand, the dramatic weakening of the shekel will paradoxically reduce the gap between the level of prices in Israel and that in other countries. On the other hand, the relative prices of services and certain goods in Israel are particularly high. These problems will require solutions in parallel with the rehabilitation of the economy and the renewal of growth.

30 The amendment to the 2023 budget at the beginning of December did not change the order of preferences. There remains the hope that the 2024 budget will be fundamentally reorganized so as to allocate resources to the war effort and those who have suffered from the war, whether physically, emotionally, or financially.

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