

Macroeconomic Trends: An Overview

Benjamin Bental and Labib Shami

The following survey provides a broad picture of Israel's economy and its trends during the past year, with a focus on seven main topics: processes of growth since the onset of the pandemic; the connection between these processes and the situation in the labor market; government activity and its effect on Israel's national debt; Israel's low labor productivity relative to countries with similar economic profiles; the low level of private and public capital, again relative to countries with similar economic profiles; the exceptional achievements of the high tech industry which highlight the problem of labor productivity in other industries; and finally the changes that have occurred in prices and their impact on households and the cost of living.

The national accounts

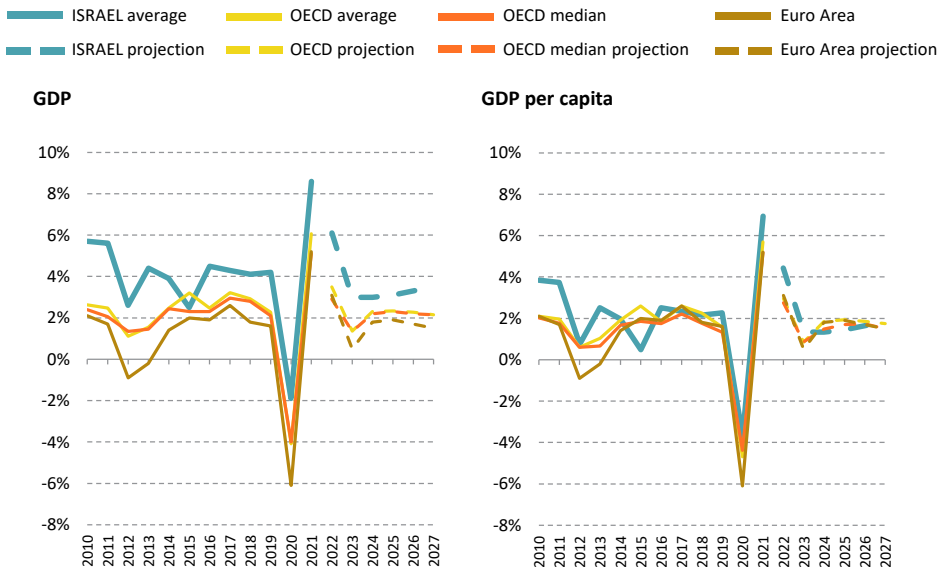
Since the onset of the pandemic, the course of events in the Israeli economy, as in other economies, has resembled a roller coaster ride. What is surprising is that like a roller coaster ride, at the end it appears that the economic systems have to a large extent returned to their original point of departure, though with some adjustments. The figures that follow illustrate this.

Figure 1 presents the annual GDP growth rate (left panel) and the annual GDP per capita growth rate (right panel) in Israel, the OECD countries, and the Euro Area. The left panel shows that there was less of an impact on Israel in 2020 and that Israel grew faster in 2021 than the OECD countries and the Euro Area countries. Furthermore, it appears that the war in Ukraine is having less of an impact on Israel than on other countries, particularly members of the Euro Area. However, according to the IMF forecasts for coming years, the rate of growth will return approximately to the pre-crisis level.

* Prof. Benjamin Bental, Principal Researcher and Chair, Economics Policy Program, Taub Center for Social Policy Studies in Israel; Professor Emeritus, Haifa University. Dr. Labib Shami, Senior Researcher, Taub Center; Department of Economics, Western Galilee Academic College; Department of Economics, Haifa University.

The right panel, which adjusts for the rate of population growth, shows even more clearly the similarity between Israel's rate of growth and those of the reference countries prior to the pandemic and according to expectations for the coming years. Following the growth in 2021, in both Israel and the reference countries, GDP per capita returned to roughly its 2019 level.

Figure 1. Annual growth in GDP and GDP per capita in Israel, the OECD, and the Euro Area



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

Figure 2 depicts the trends of the GDP components from the first quarter of 2020 until the third quarter of 2022 relative to the parallel quarter in 2019. Specifically, the graph presents the annualized seasonally adjusted growth rates of the variables (in constant prices) for each quarter relative to the same quarter in 2019, as implied by the levels of the respective variables in a given quarter relative to their level in the same quarter in 2019.¹ The calculation of the annualized growth rates makes it possible to determine the extent

1 The annualized growth rate is obtained as the solution for g in the equation $(1+g)^t X_0 = X_t$, where X_0 is the value of the variable in the base year (2019) while X_t is its value after t years.

to which the economy returned to its long-run growth path by 2022 — as if the pandemic had never occurred. For example, the actual GDP level of the third quarter of 2022 would have been achieved had the third-quarter GDP been growing at an annual rate of 4.3% in both 2020 and 2021 relative to the previous year. In reality, GDP declined by 0.9% in the third quarter of 2020 relative to the same period in 2019; in the third quarter of 2021, it grew by 8.2% relative to the same period in 2020; and in the third quarter of 2022, it grew by 5.8% relative to the same period in 2021.²

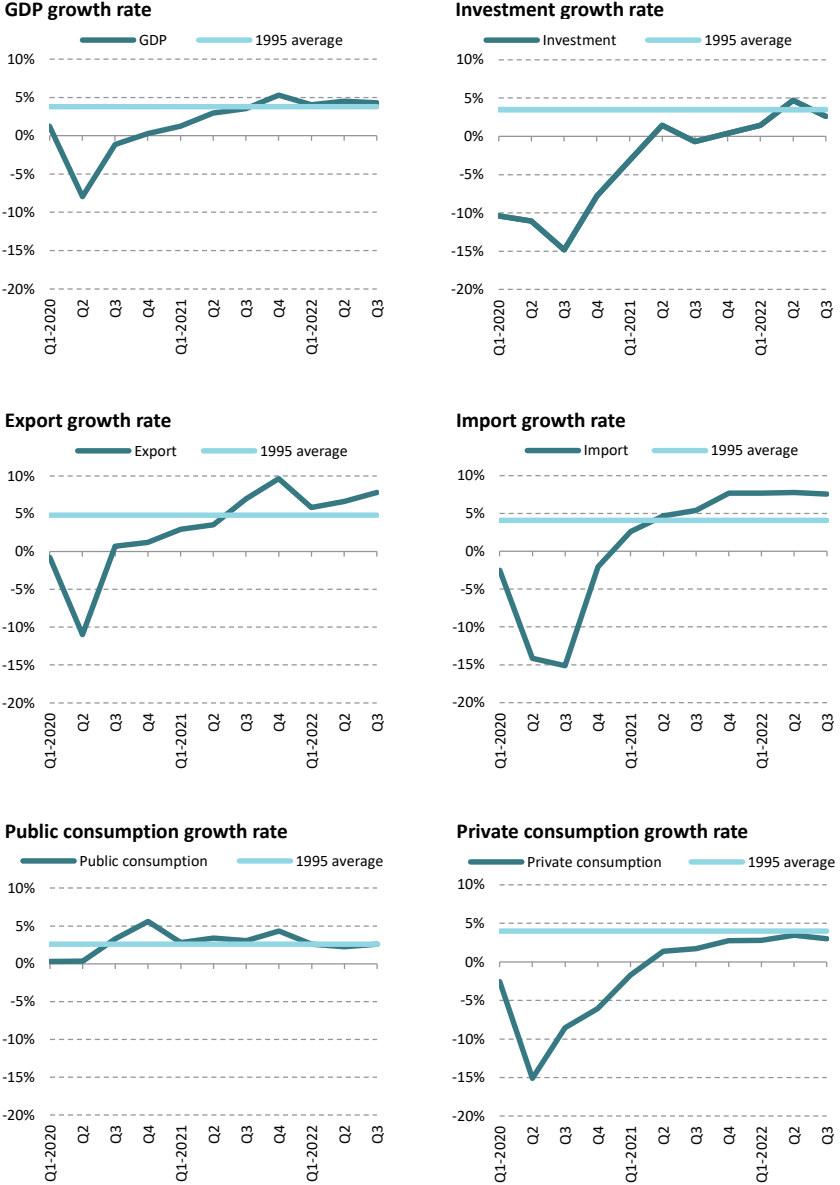
Figure 2 also presents the annualized growth rate of the variables between 1995 and 2019. It appears that, at least in the first half of 2022, the GDP growth rate (and correspondingly also GDP per capita) stabilized at an annual rate that is about 0.5 percentage points higher than the average long-run rate. This finding is in line with the forecast of the IMF for 2022 which is presented in Figure 1.³ The growth rates of imports and exports also stabilized at values higher than the long-run average and it appears that the investment growth rate is close to its long-run average, where the outlier in the second quarter of 2022 was the result of an unusually large investment in vehicles. It seems that the public consumption growth rate has stabilized at a long-term rate of 2.6%, somewhat lower than the long-run average.⁴ Finally, and despite the significant increase in 2021, the private consumption growth rate — on an annualized basis — is about 1 percentage point lower than its long-run rate, which is 4.0% per year. Accordingly, private consumption so far in 2022 accounts for about 51% of GDP, in contrast to 53.2% in 2019.

2 The war in Ukraine had only a minor direct effect on the Israeli economy. In 2021, exports to Ukraine and to Russia constituted 0.4% and 1.5% respectively of Israel's total exports (without diamonds). With respect to imports, the figures are 0.2% and 0.3%, respectively.

3 As of the beginning of 2020, GDP has cumulatively been about 2% lower than the level it would have achieved if the rate of growth had remained at its original level. Discounting at a rate of 3% reduces the loss to only about 1.5%.

4 This rate is consistent with the long-run decline in the share of public consumption within GDP from 29.4% in 1995 to 21.9% in 2019.

Figure 2. Annual growth rates of the GDP components since 2019



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

Changes in National Accounting

The Central Bureau of Statistic (CBS) has recently modified Israel's National Accounts system in line with globally accepted standards. The main change is in relation to goods that can be used by the defense sector for more than one year. These are now recorded as *investment in fixed assets* rather than *public consumption*. Clearly, this change increases the investment in the economy and reduces public consumption by the same amount. However, the depreciation of investments in the defense sector are now considered to be *public consumption* and that accordingly increases this item in the National Accounts. Furthermore, there was a change in the valuation of the contribution of the construction renovations sector and it too has led to an increase in the *investment in fixed assets* item. On the other hand, there was also a change in the imputation of housing services consumed by homeowners, which reduced this item and in turn private consumption.

Overall, these modifications tend to raise the measured values of GDP by an average of about half a percent on an annual basis and they also tend to somewhat raise the GDP growth rates (CBS, 2022a).

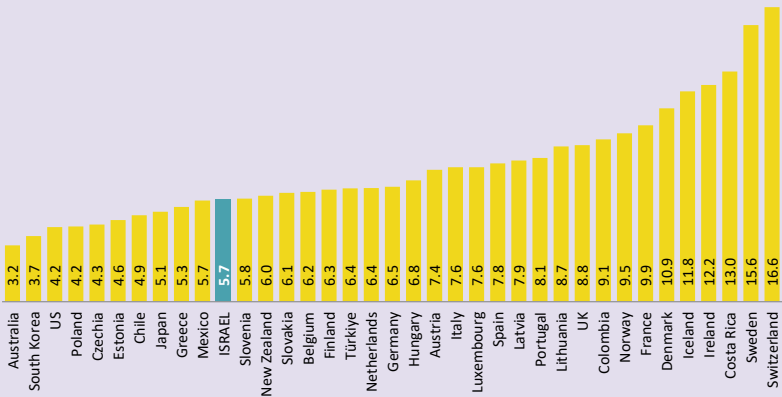
Economics of the Environment and the National Economy

The OECD provides indicators for monitoring the progress toward green growth with the goal of encouraging policies to preserve the environment.⁵ These indicators include indices for environmental productivity and resources, which can be used to determine whether economic growth has become greener, including more efficient usage of natural capital, and thus it relates to factors of production which are not usually included in economic models and accounting systems. Figure 3 presents one of the main indices which calculates *energetic productivity* as real GDP created per unit of carbon dioxide emitted during its production (dollars per kilogram). The calculation includes emissions from the burning of coal, oil, natural gas, and other fossil fuels. As shown in the graphs, Israel is among the lower third of OECD countries according to this index.

Air pollution involves an externality that reflects the monetary value of its negative effects on human health and the environment. According to estimates of the Ministry of the Environment, in 2021 this amounted to a cost of NIS 12.5 billion (for further details, see Ministry of the Environment, 2022).

5 See the OECD site: [OECD Environment Statistics \(database\), Green growth indicators](#).

Figure 3. Productivity in carbon-based production in the OECD measured as GDP per unit of energy-related CO₂ emissions, 2019 2015 prices



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

In response to the climate crisis, international targets were set for lowering emissions, to which Israel is committed. The transition to a zero-emissions economy is liable to erode economic activity in certain industries, due to, for example, regulation and the imposition of taxes on the emission of greenhouse gases. As a result, credit risk in the financial system may increase due to the reduced ability of polluting companies to service debt.

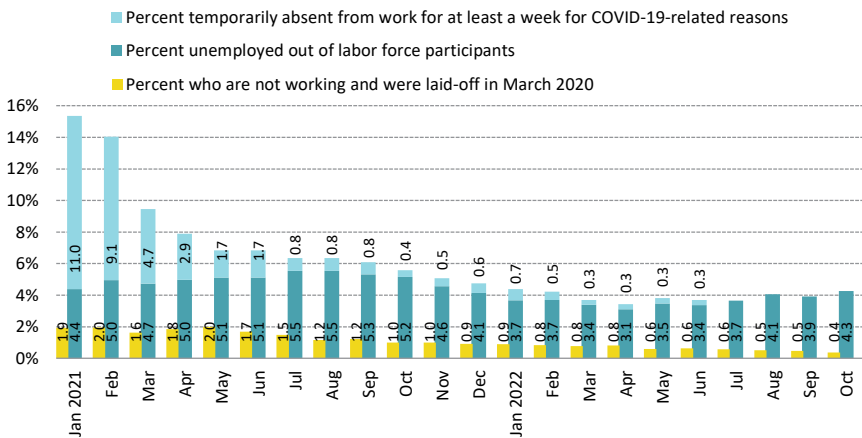
The Bank of Israel has analyzed the extent to which the banking system is exposed to large borrowers with high levels of greenhouse gas emissions (CO₂-equivalent emissions).⁶ The analysis indicates that at the end of 2020, the total gross quantity of credit to these borrowers was about NIS 19.1 billion. This represents an increase of about 57% relative to the end of 2019 and about 6% of the total credit to large borrowers in the banking system. This is a high proportion relative to the average for 2018–2019 (3.8%). According to the government decision to impose a tax on emissions in the future,⁷ the large polluting borrowers will bear a tax burden of about NIS 7 billion. This tax, which is about 37% of the total credit of the polluting borrowers as of the end of 2020, will create a heavy burden on them and will increase risk in the financial system.

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- 6 The IMF publishes a carbon footprint-adjusted loans to total loans (CFALTL) index which represents the relative amount of loans that involve carbon activity within total loans in each country. While the index is published for almost every country in the world, Israel is absent from the list. See the IMF site, [Financial and Risk Indicators](#).
- 7 See Government Decision 286 dated August 1, 2021.

The labor market and GDP

The trend in GDP reflects developments in the labor market. Figure 4 shows a steep decline in the proportion of workers absent from work due to circumstances related to COVID-19, beginning in the first half of 2021. At the same time, the classic rate of unemployment rose somewhat even into the summer months of 2021. However, since then, it has also been declining and essentially has returned to its rate prior to the pandemic. Only a small number of workers have not returned to the labor market (about 0.6% of the population aged 15 and over in Israel, or about 43,000 individuals).

Figure 4. Main characteristics of the labor market



Note: In July 2022, the CBS stopped publishing data on the temporary absence of workers from their jobs for reasons related to the pandemic.

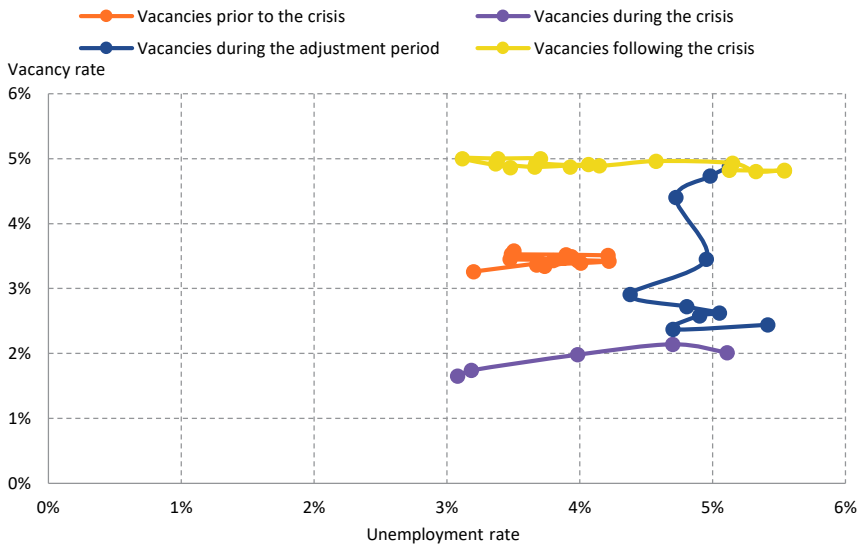
Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

The intensity of the recovery in the labor market can also be seen in Figure 5 which presents the Beveridge Curve.⁸ The curve represents the relationship between the job vacancy rate within total jobs in the economy and the unemployment rate. Intuitively, it can be hypothesized that when the unemployment rate is low employers have greater difficulty finding workers and filling job vacancies than when the unemployment rate is high. Accordingly, the Beveridge Curve is expected to decline from left to right. However, the situation in Israel paints

8 For the source of the curve’s name and a review of the initial studies based on it, see Yashiv (2006).

a different picture. Prior to the pandemic, in 2019, the curve was *flat* — in other words, while the unemployment rate changed from month to month, the job vacancy rate remained fixed (the orange curve, January 2019 to February 2020). The pandemic caused the curve to shift downward — in other words there was a sharp decline in the rate of job vacancies. However, a negative slope did not appear in the initial months of 2020 either (the purple curve, March 2020 to July 2020).⁹ As the pandemic progressed, the economy entered a period of adjustment during which there was no major change in the unemployment rate and employers began to search for workers (the blue curve, August 2020 to May 2021). In mid-2021, the situation changed: the unemployment rate began to decline, but the job vacancy rate did not, as could have been expected (the yellow curve, June 2020 to September 2022). In other words, with the drop in unemployment more and more job vacancies were added, so that the job vacancy rate remained much higher relative to its value prior to the pandemic.

Figure 5. The Beveridge Curve

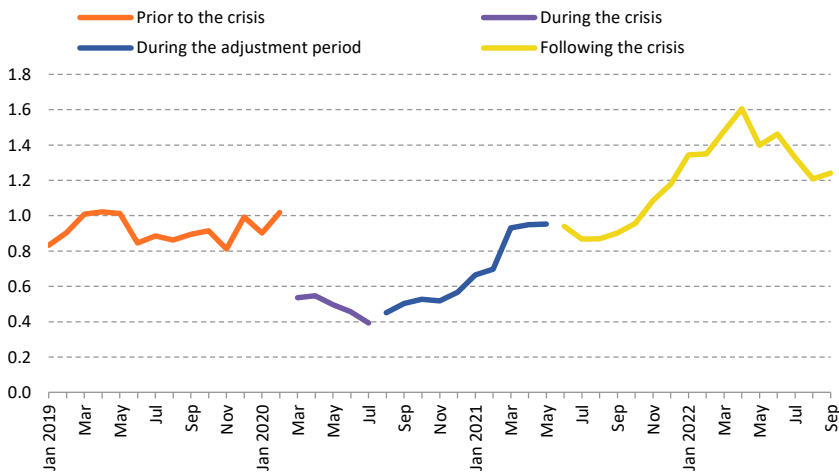


Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

9 The unemployment rate on the horizontal axis is the *classic* unemployment rate, based on the assumption that most of the workers on unpaid leave were not looking for work and hoped to return to their former jobs. Their employers did not relate to their jobs as vacant.

The ratio between the vacancy rate and the unemployment rate clearly shows the intensity of the change. As presented in Figure 6, the ratio was close to one prior to the pandemic while in July 2020 it sank to 0.4. Subsequently, the ratio shot up and in the spring of 2022 it reached 1.6. This development is consistent with a very tight labor market but also with a growing mismatch between the types of job vacancies and the skills of the unemployed.¹⁰ In the third quarter of 2022, there was somewhat of a weakening in the labor market, but the ratio between the job vacancy rate and the unemployment rate remained higher than prior to the crisis.

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

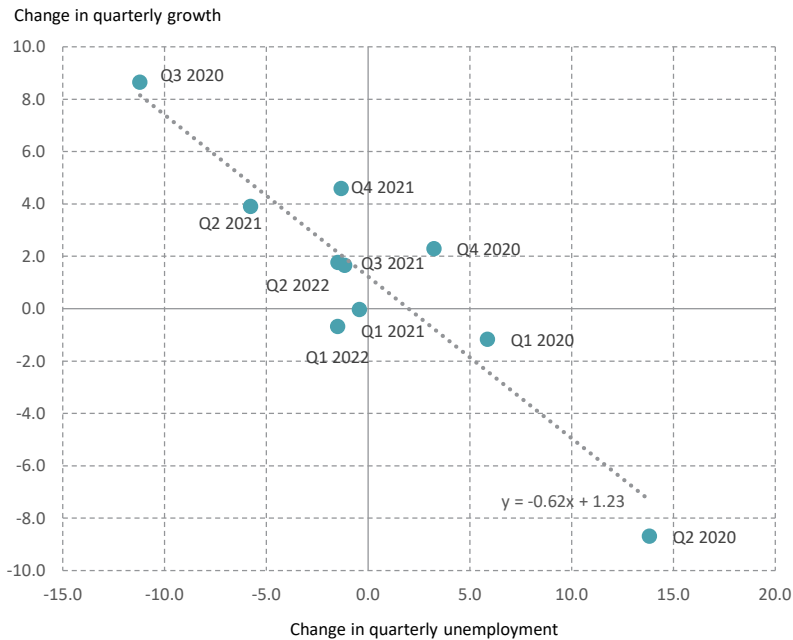


Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

¹⁰ See Blanchard et al. (2022). In the US, the behavior of the ratio between the job vacancy rate and the unemployment rate is very similar to that in Israel. In the US, the ratio was 1.2 prior to the pandemic and it rose to 2.0. The authors do attribute some of the increase to a worsening in the match between job vacancies and jobseekers. In their opinion, the natural rate of unemployment in the US rose by 1.3 percentage points from its level prior to the pandemic. Accordingly, they believe that the Fed's war on inflation will necessitate increasing the rate of unemployment and reduce the rate of job vacancies.

Finally, the connection between the changes in the unemployment rate and the economy's growth rate, which is known as Okun's Law and which we referred to last year (Bental & Shami, 2021), still holds. According to Figure 7, a decline of 1 percentage point in the unemployment rate from one quarter to its predecessor leads, on average, to a 0.6 percentage point increase in the growth of that quarter relative to the previous one. It seems, therefore, that as the unemployment rate has returned to its pre-pandemic level, it is likely that the GDP growth rate will also stabilize.¹¹

Figure 7. Changes in unemployment and quarterly growth



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

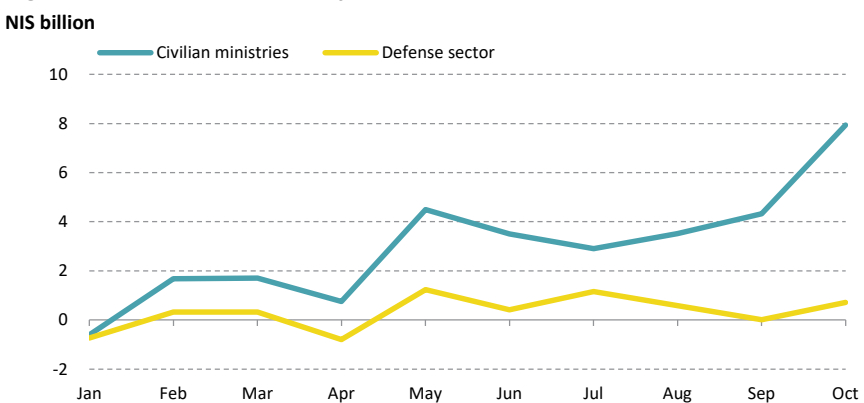
¹¹ In the US, it has been observed that a decrease of 1 percentage point in the quarterly unemployment rate raises quarterly growth by an annual rate of about 1.8 percentage points, as compared to about 2.4 according to the aforementioned results. In general, this connection is used to construct short-term forecasts, particularly in periods of economic recovery. For an international discussion of the connection between the unemployment rate and growth, see Lee et al. (2020).

Government activity

At the beginning of November 2021, the Knesset passed the State Budget Laws for 2021 and 2022 and the Arrangements Law. At that time, the Ministry of Finance predicted a budget deficit of 6.7% of GDP in 2021 and 3.9% in 2022 (Ministry of Finance, 2021). In actuality, the deficit was 4.6% of GDP in 2021 while during the first three quarters of 2022 there was a *budget surplus* of 2.6% of GDP.

Figure 8 presents the government expenditures in billions of shekels for the civilian ministries and the defense sector for the months of 2022 in comparison to the parallel months in 2019. According to the graph, during the initial months of 2022 government activity in defense was very similar (in nominal terms) to what it was in 2019 and higher by about NIS 1 billion in civilian activity. During the second quarter, there was an increase of about NIS 4 billion in civilian activity and about NIS 1 billion in defense activity. This constitutes an increase of 15%–20% relative to 2019, which is similar to the increase in GDP in nominal terms during the first half of 2022 relative to 2019. In the third quarter, defense activity returned to its level in 2019 while in October NIS 8 billion was added to civilian activity in nominal terms, an increase of about 40% relative to October 2019 and double the increase in nominal GDP in the third quarter relative to the same quarter in 2019. It appears, therefore, that the government ministries began to realize the 2022 budget only after an adjustment period that lasted several months.

Figure 8. Government activity in 2022 relative to 2019

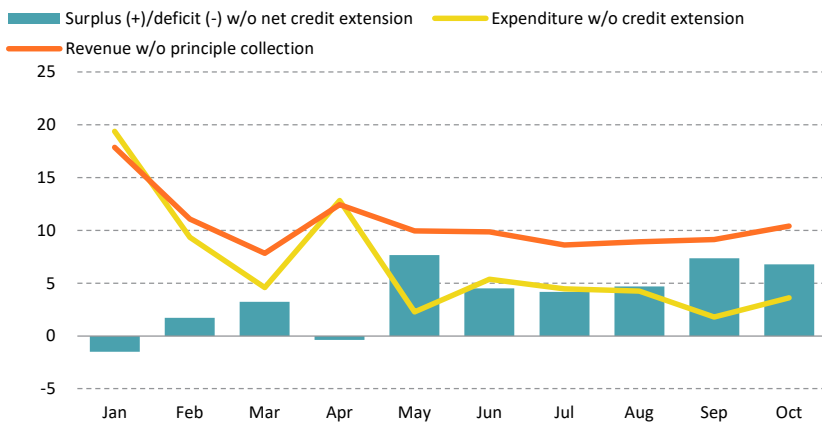


Source: Benjamin Bental and Labib Shami, Taub Center | Data: Accountant General Department, Ministry of Finance

Figure 9 presents the nominal gaps in government revenue and expenditure and in the monthly deficit in 2022 relative to the corresponding months in 2019. In January, government revenues were higher than in January 2019 by NIS 19 billion while expenditure was lower by about NIS 1.5 billion. Thus, the deficit of about NIS 800 million in January 2019 became a surplus of NIS 18.5 billion, a difference of more than NIS 19 billion. The balance was restored to a large degree during the course of the year but nonetheless in June, August, September, and October — months in which the government was in deficit in both 2022 and 2019 — the deficit was lower in 2022 than in 2019.

Figure 9. Government revenue and expenditure and the budget surplus, 2022 compared to 2019

NIS billion

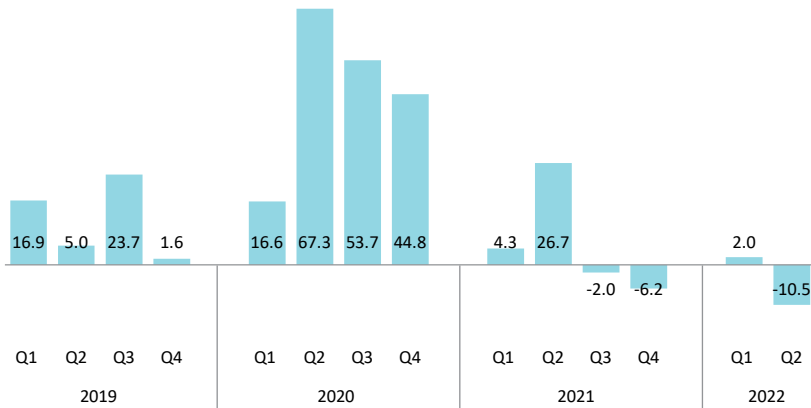


Source: Benjamin Bental and Labib Shami, Taub Center | Data: Accountant General Department, Ministry of Finance

The accumulated surpluses made it possible for the government to reduce the amount of capital it raised. Figure 10 shows a massive raising of capital during the pandemic required to cover the exceptional level of expenditure. Even so, the rapid growth of the economy, which began in the second half of 2021, and the associated increase in government revenue made it possible for the government to reduce its debt.

Figure 10. Net capital raised by the government

NIS billion



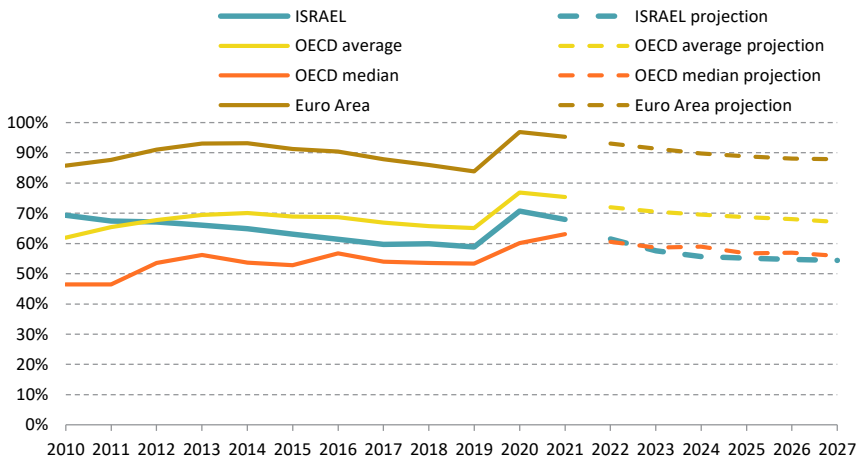
Source: Benjamin Bentel and Labib Shami, Taub Center | Data: Accountant General Department, Ministry of Finance

The results of the government's fiscal activity are reflected in the debt-to-GDP ratio which appears in Figure 11. Prior to the pandemic, Israel reached a ratio of 60%. Recall that this is the target agreed upon by the countries in the Euro Area as part of the Maastricht Treaty in 1992.¹² During most of the previous decade, the debt-to-GDP ratio in Israel was located between the median and the average of the OECD countries and was significantly lower than the average for the Euro Area. In 2020, all governments took measures to mitigate the economic effect of the pandemic and significantly increased their deficit and total debt. As a result, the debt-to-GDP ratio in Israel rose to a level similar to the average of the OECD countries, i.e., by about 12 percentage points. In the Euro Area the increase was even larger — about 14 percentage points. The rapid growth in 2021 made it possible for Israel to reduce its debt-to-GDP ratio by close to 3 percentage points, as compared to a bit less than 2 percentage points on average among the OECD countries and somewhat more than 1

12 This level was set on the assumption that it can be sustained over time alongside a primary surplus of 3% of GDP. This assumption is validated as long as the economy's growth rate is greater than the interest rate by a half a percentage point. For a discussion of the parameters of the Maastricht Treaty, see Priewe (2020).

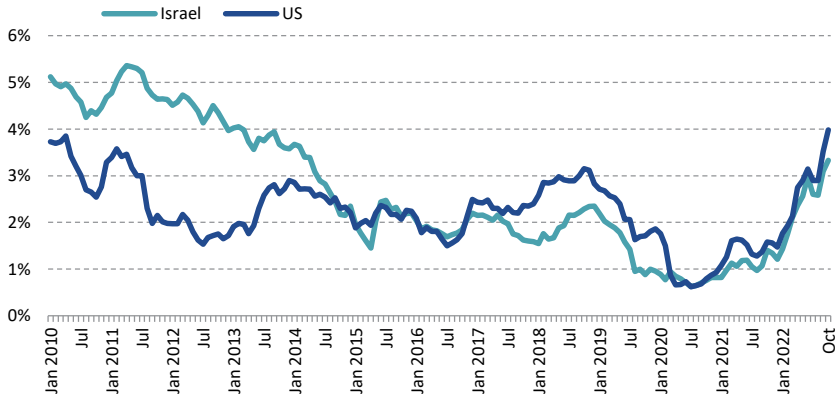
percentage point in the Euro Area. The IMF predicts that the downward trend will continue worldwide. According to its latest forecasts, the IMF expects that by the end of 2022 the debt-to-GDP ratio in Israel will be 61.5% and will even continue to drop to a level of about 55% toward the end of the decade. Thus, Israel's debt-to-GDP ratio will be similar to the median of the OECD countries.

Figure 11. The debt-to-GDP ratio in Israel, the OECD, and the Euro Area



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

The global market relates to the Israeli government's debt as a secure asset. Evidence of this can be found in Figure 12, which presents the long-term yields of 10-year Israeli government bonds and those of similar US Treasury bonds. These yields have been climbing consistently since the low of about 0.7% in mid-2020. The rise in yields accelerated at the beginning of 2022 and the gap in favor of Israel was closed, even though the rate of inflation in Israel was lower. Nonetheless, it should be remembered that the rate of inflation has only a minor impact in the case of a long-term asset, which primarily reflects expectations of the future. However, the very fact that the yields on Israeli government bonds are similar to those of the US government illustrates the level of confidence in global markets with regard to the Israeli economy.

Figure 12. Monthly yields on 10-year government bonds, Israel and the US

Source: Benjamin Bental and Labib Shami, Taub Center | Data: Federal Reserve Economic Data

Israel's credit rating has essentially remained stable, at least since the middle of the previous decade. Moody's ranks Israel as A1 (the fifth from the top) while Fitch rates it as A+ (again fifth from the top). S&P raised its rating from A+ to AA in 2018 (from the fifth ranking to the fourth).¹³ The costs of a Credit Default Swap (CDS) on Israel's five-year debt in recent months has ranged from 40 to 50 basis points. Based on the conventional assumption that insurance covers 40% of the loss caused by a debt default, this cost is equivalent to a market assessment that the probability of Israel not meeting its obligations in the next five years is 0.6%–0.8%.¹⁴ Thus, this indicator also provides evidence of international confidence in Israel's debt.

¹³ See [Trading Economics](#).

¹⁴ For purposes of comparison, the insurance contracts on US five-year debt are traded at 18 basis points, which is equivalent to a 0.32% probability of default; the debt of Spain and Portugal is traded at about 52 basis points (probability of default of 0.87%); the debt of Greece is traded at about 170 basis points (probability of default of 2.86%); and the debt of Russia is traded at 13,775 basis points (probability of default of 100%). See [World Government Bonds](#).

SPOTLIGHT

Bankruptcy

There were numerous changes in the area of bankruptcy in 2020, as a result of both the new Bankruptcy and Economic Rehabilitation Law, which went into effect in September 2019 (and replaced the Bankruptcy Ordinance), and the economic stress resulting from the pandemic which forced many citizens and businesses into bankruptcy.

According to the new law, bankruptcy is an economic situation in which the debtor is unable to service his debts or that the debtor's obligations exceed the value of his assets. The bankruptcy process starts with the submission of a request to issue an order to initiate the process. The request is usually submitted by the debtor himself, although the creditor can also do so. If the debts exceed NIS 150,455, the request is transferred to the district court by the Commissioner of Insolvency Proceedings. After a hearing, it is decided whether to issue an order to begin bankruptcy proceedings (which replaces the receivership order in the previous bankruptcy proceedings). Following that, a period of investigation begins with the goal of ascertaining the facts about the debtor's financial situation and the behavior that led to bankruptcy. In the next stage, a Financial Rehabilitation Order is issued, under which (according to the instructions in the Financial Rehabilitation Order) the individual's assets are sold or managed to repay his debt to the creditor. At the same time, the debtor is required to make periodic payments from their income towards the repayment of the debt.

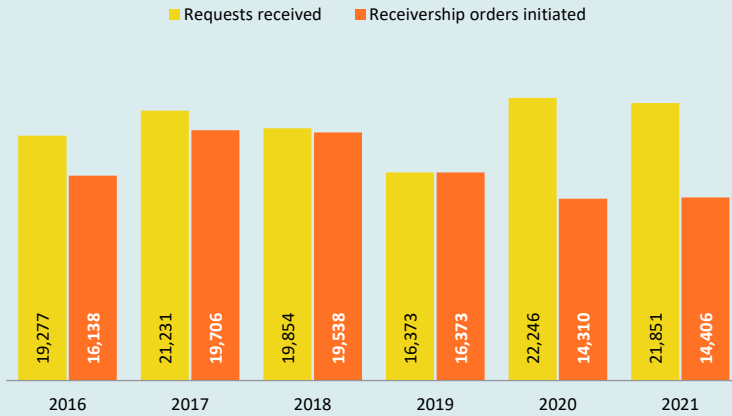
According to the language of the law, the bankruptcy proceedings allow the debtor to turn over a new leaf economically, to arrive at an arrangement with his creditors and to obtain a discharge (a directive that exempts him from his debt) at the conclusion of the process. Thus, the new law focuses on rehabilitating a debtor who is insolvent rather than punishing him. And indeed, as can be seen in Figure 13, the number of requests to initiate bankruptcy proceedings by individuals rose sharply in 2020 and 2021 relative to 2019 (36% and 33% respectively).¹⁵

We do not have the necessary data to isolate the effect of the pandemic and to differentiate it from that of the new law on the number of requests to initiate bankruptcy proceedings. Nonetheless, the data for the first quarter of 2020, i.e., prior to the pandemic, provide evidence of the new law's impact. During this quarter, 6,286 requests for bankruptcy were submitted as compared to only 4,401 in the same quarter of 2019, an increase of 42% after the new law went into effect prior to the pandemic. The continuing increase in the number of requests during 2020 and 2021 provides almost certain proof of the combined effect of the new law and the pandemic.

It is important to mention that in comparison to 2019, there was a sharp drop in 2020 and 2021 in the number of orders to open proceedings that were *actually* issued (-12% and -13%, respectively), despite the increase in the number of requests. This decline may be the result of the limited format in which the courts operated during the lockdowns in those years.

15 Relative to 2018, the number of requests by individuals to initiate proceedings fell in 2019 by about 18%. This decline may be the result of debtors waiting for the new law which seeks, to the extent possible, to rehabilitate the debtor economically (rather than punish him), to go into effect. It appears that the sharp increase in number of requests in 2020 supports that hypothesis.

Figure 13. Requests and orders for receivership and the initiation of proceedings for individuals



Source: Benjamin Bental and Labib Shami, Taub Center | Data: General Legal Guardian Office, Ministry of Justice

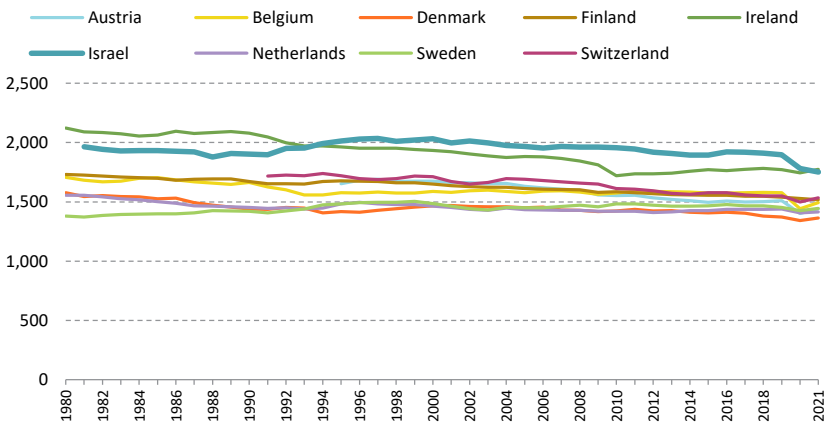
With respect to the liquidation and suspension of proceedings in the case of companies, there were 1,179 requests for the liquidation of corporations in 2019; 1,200 in 2020 (an increase of 2%); and 1,328 in 2021 (an increase of 13% relative to 2019). In actuality, 872 were approved in 2019, 900 in 2020, and 873 in 2021. Thus, despite the pandemic, there was only a negligible increase of 3% in orders to initiate proceedings in 2020 relative to 2019, and in 2021 there was essentially no change.

Labor productivity

Labor productivity is low in Israel. From among the many reasons for this phenomenon, we will focus in this section on private physical capital available to workers on the one hand and the public capital in the economy on the other.¹⁶ The comparison below is between Israel and a group of eight European countries whose population is similar to that of Israel: Austria, Ireland, Belgium, Denmark, Finland, the Netherlands, Sweden, and Switzerland.

Workers in Israel spend a lot of time at work, as can be seen in Figure 14. The average number of work hours of an employee in Israel is significantly higher than in the reference countries, apart from Ireland. In 2019, an Israeli worker worked 1,898 hours per year on average while in most of the other countries the average was about one quarter less. It can also be seen that the effect of the unpaid leave policy reduced the average by about 150 hours per year, which is much larger than the effect of the pandemic in most of the reference countries.

Figure 14. Average annual work hours in selected countries



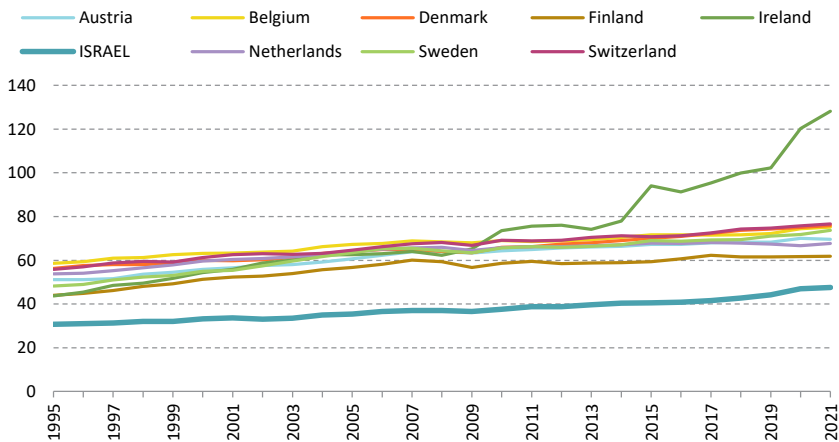
Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

¹⁶ The gaps in the workforce quality and their contribution to gaps in productivity have been studied extensively. See, for example, Brand (2017) and also Bank of Israel (2019).

However, the high number of work hours does not lead to correspondingly high output. Figure 15 shows that the output per work hour in Israel is significantly lower than in the reference countries. Moreover, the graph shows that the gap between Israel and the reference countries is widening. In 2021, the output of an Israeli worker was about \$48 per hour (in 2017 prices), while that of their counterparts in most of the reference countries was higher by about one quarter. This was particularly the case in Ireland — which is similar to Israel in average number of work hours — where there has been an impressive rise in labor productivity since 2009.¹⁷

Figure 15. GDP per work hour in selected countries

Dollars, 2017 prices



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

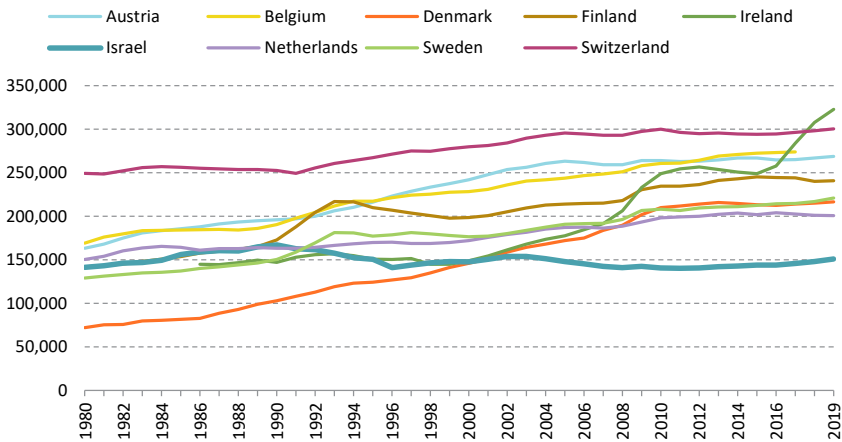
17 In Finland, GDP per work hour stopped increasing simultaneously with the prolonged crisis at Nokia. The National Accounts of Ireland are affected by the large presence of multinational companies which are located there for tax reasons and the ability to gain access to both the American and EU markets.

Private and public capital

Figure 16 presents the level of private capital (i.e., capital generated by private sector investments) per employee in Israel and in the reference countries in 2017 dollars.¹⁸ The graph shows Israel's increasing lag according to this parameter. Since 1980 *the amount of capital per employee in Israel has not risen* (and has even fallen somewhat), while in most of the reference countries, it rose by more than 50%. Denmark, in which capital per employee was lower than in Israel in 1990, raised it three-fold during this period. In Ireland, capital per employee grew by more than two-fold and in a shorter time. It appears, therefore, that businesses in Israel face distorted investment incentives, whether due to bureaucratic obstacles that reduce return or due to low wages which reduce the profitability of replacing labor with capital.¹⁹ According to accepted estimates, the elasticity of GDP with respect to private capital is about 0.3 (see also the Appendix). Accordingly, if capital per employee in Israel would rise to the level in Sweden, Denmark, or the Netherlands, GDP per worker would increase by about 13%. This would close about one-half of the gap in GDP per work hour between Israel and most of the reference countries.

Figure 16. Private capital per employee in Israel and selected countries

Dollars, in PPP terms, 2017 prices



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

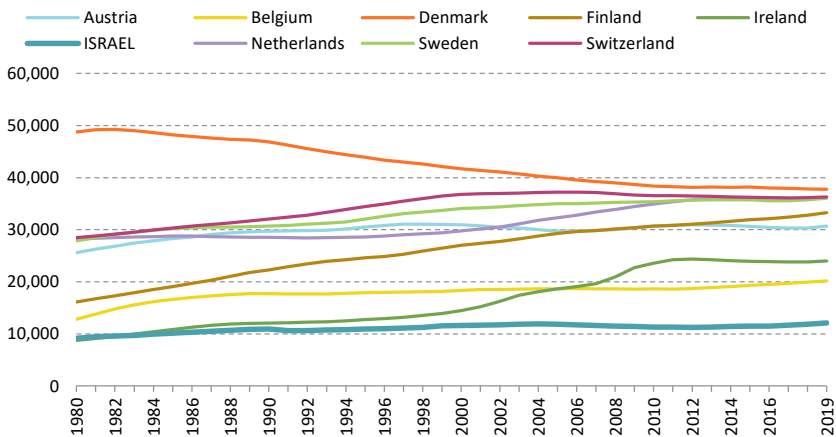
18 For an explanation of the calculation method, see Xiao et al. (2021).

19 The construction industry is a good example of both of these distortions.

Private capital is a factor of production that employees work with, and, therefore, it is directly related to labor productivity. Public capital, which includes various types of infrastructure such as roads, public transportation, communication, seaports and airports, and electricity, has an indirect effect. According to IMF data, the level of public capital per capita in Israel is drastically lower than that in the reference countries. Figure 14 shows that over a period of about 40 years, the level of public capital per capita in Israel remained unchanged. Since it was lower than in the reference countries (except for Ireland) to begin with, the gap has only widened. At the end of the period, public capital per capita in Israel stood at about one-third of that in the reference countries. According to the accepted elasticities of GDP relative to public capital in the literature, if public capital per capita in Israel were to increase three-fold thereby catching up to the reference countries, between 5 and 20 percentage points of the gap in output per employee would be closed.²⁰

Figure 17. Public capital per capita in Israel and selected countries

Dollars, 2017 prices



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

²⁰ In the US, which has a high level of public capital per capita, the elasticity is 0.05 (Ramey, 2021). The World Bank uses values between 0.1 for *general public capital* and 0.18 for transportation infrastructure (Devadas & Pennings, 2018). See also Eckstein et al. (2022). The estimate reported in the Appendix is even higher.

The high tech sector

Employment, productivity, and wages

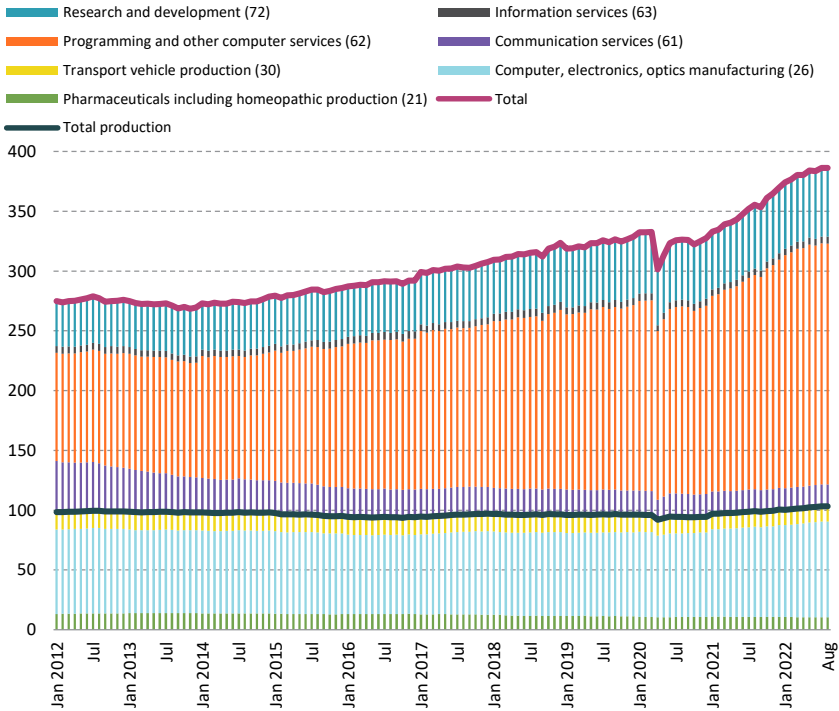
In 2021, the high tech sector in Israel employed about 10% of the workers in the economy and accounted for about 15% of GDP.²¹ The sector includes both manufacturing industries and service industries.²² Figure 18 presents the trend in jobs in the various high tech sectors and illustrates the rapid growth in services as compared to the stability in manufacturing. Thus, in 2021, a little more than two-thirds of high tech jobs were in services while the rest were in manufacturing. In the service industries, there was a particularly rapid increase in the number of jobs in programming and a decline in information services. The pandemic also had a relatively large effect on jobs in these two industries as compared to the relative resilience in other areas of high tech.

21 See the website of the [Innovation Authority](#). The CBS does not publish data that can be used to calculate the contribution to GDP on an ongoing basis. The latest CBS Manufacturing, Mining, and Quarrying Survey conducted in 2018 showed that the high tech sector was responsible for about 20% of added value (14% in services and 6% in manufacturing). The survey did not represent the entire economy; it included about 75% of the jobs and 61% of the gross added value. See CBS (2021).

22 The high tech sector in Israel is composed of three manufacturing industries and four service industries. The former include manufacturers of pharmaceuticals (industry 21), computers, electronic instrumentation, and optics (26), and planes (303), while services include communication services (61), programming (62), data processing (631), and R&D (72). See also the CBS website, [High Tech](#).

Figure 18. Monthly number of jobs in the high tech sector

Thousands

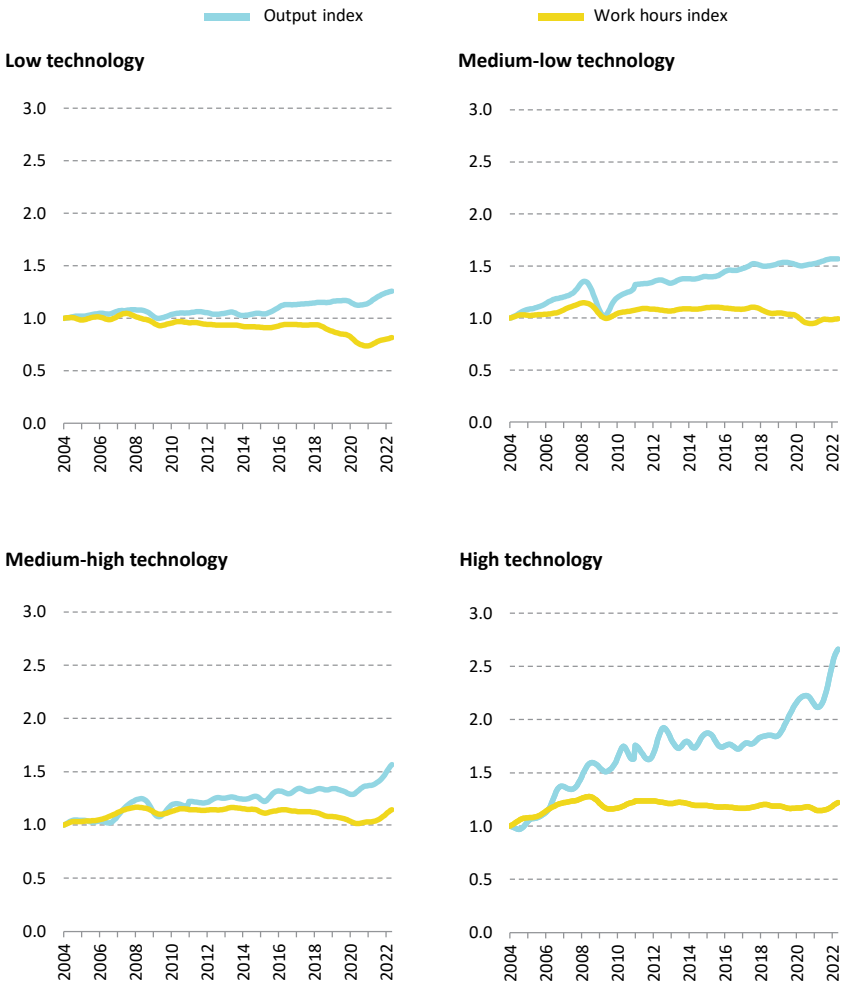


Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

As noted, the contribution of high tech workers to GDP is 50% higher than their proportion of the workforce in Israel. Figure 19 illustrates the large gap in productivity in the manufacturing industries. In traditional-technology manufacturing industries, output in mid-2022 was about one-quarter higher than in January 2004, but the number of work hours in these industries had declined by about 20%. The productivity in mixed-traditional and mixed-high tech manufacturing industries showed a similar increase. Thus, although output grew in these industries by about 50%, the number of work hours remained almost unchanged. In the high tech sector the picture is completely different: the number of work hours rose by about 20% (primarily during the

first decade of the century and since then it has stabilized in accordance with the number of employees, as described in Figure 18); however, output rose by about 170%.

Figure 19. Work hours and output by technology intensity

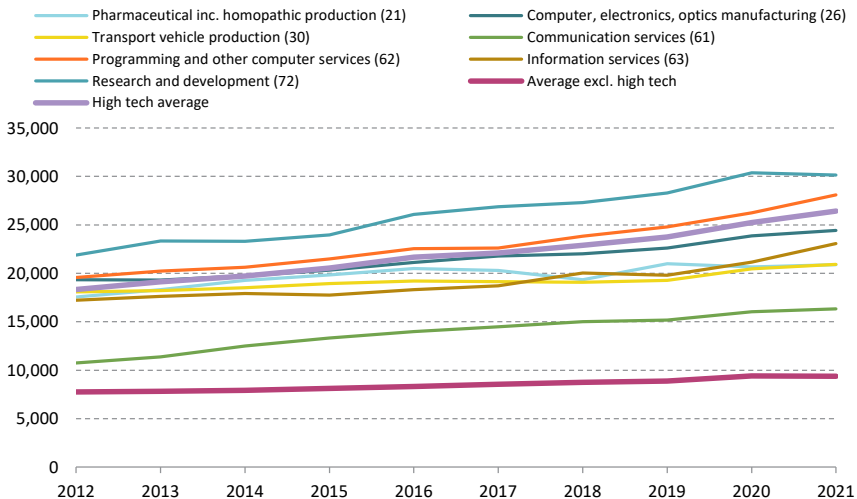


Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

As expected, the gaps in productivity are also reflected in large wage gaps, as shown in Figure 20. In 2012, the average monthly wage in the high tech sector was higher than for other employees in the economy by 2.3-fold. In 2021, the gap grew to a ratio of 2.8. This increase occurred as a result of the moderate increase in the real wage among other workers in the economy of 21% during that period, as compared to the increase of 44% in the high tech sector. Among the workers in the high tech sector, the wages of those engaged in scientific research and development are particularly high. The increase in their wages is similar to the average for the entire sector. They in general have advanced degrees in science and their number has grown relatively moderately, from about 38,000 in 2012 to about 51,000 in 2021. The number of programmers, whose monthly wage is NIS 4,000–5,000 lower (although the rate of growth in their wages is similar), has almost doubled — from 93,000 in 2012 to about 176,000 in 2021. The communication services industry is characterized by low wages within the group of high tech industries; however the rate of growth in their wages is higher than the sector average (about 50% during that period). On the other hand, the industry has shed more than 50% of its jobs — from 40,000 in 2012 to 18,000 in 2021.

Figure 20. Average monthly wage

NIS, 2021 prices

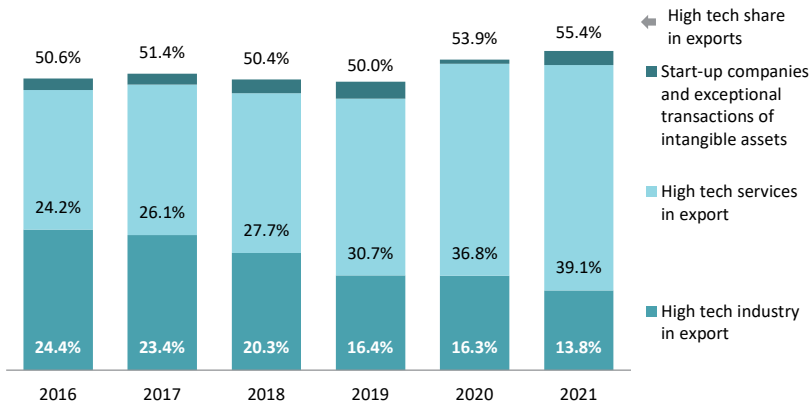


Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

The high tech sector and foreign trade

The high tech sector has a decisive influence on Israel's balance of payments, including both the current account and the capital account. Figure 21 describes its contribution to the export, which stood at about 50% prior to the pandemic and rose to 54% and 55% during the two pandemic years, respectively. Especially noticeable is the rapid drop in the share of high tech manufacturing by about 10 percentage points in contrast to the parallel increase in the share of services by about 15 percentage points. The various *exits* contributed another 2% approximately.

Figure 21. The contribution of the high tech sector to Israeli exports



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

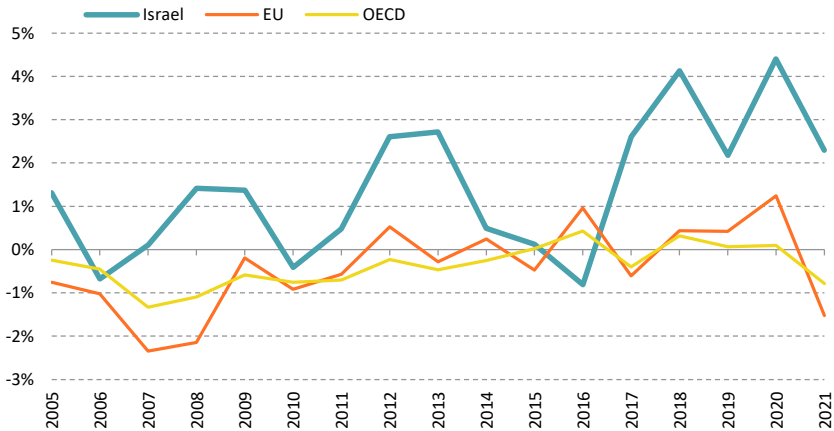
Finally, the high tech sector attracts foreign investment on a large scale. Figure 22 shows the size of net foreign direct investment relative to GDP in Israel as compared to the EU and the OECD.²³ The OECD estimate for 2021 as shown in the graph is 4.5% of GDP (i.e., about \$18 billion).²⁴ Particularly noticeable is the upward trend during the past decade, which began simultaneously with the trend of appreciation in the shekel (see Figure 29).²⁵

²³ The word *net* relates to the deduction of capital returning to the country of origin and repayment of loans.

²⁴ This estimate is significantly lower than that of the Start-up Nation Central organization, which is \$25.4 billion for 2021 or about 6.2%. See the site [Start-Up Nation Central](#).

²⁵ The outlier in 2006 was a result of the Iscar deal.

Figure 22. Direct investment as a percentage of GDP in Israel, the OECD, and the EU



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

Prices

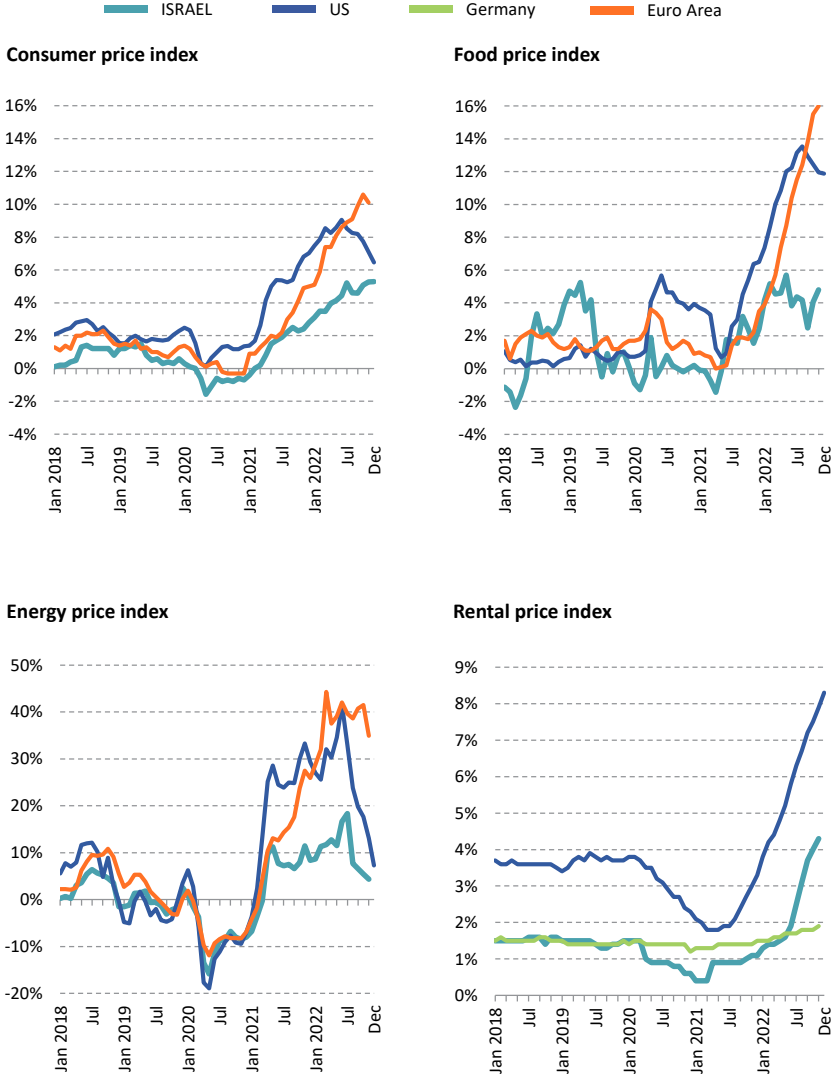
Inflation

The rate of increase in the prices of the consumption basket accelerated during the final months of 2022 in all the developed countries. The reasons are well-known. On the supply side, the world has still not fully restored the supply chain, which was adversely affected by the restrictions on international mobility during the pandemic. A large part of the difficulty in restoring the supply chain is the stringent COVID-19 policy adopted by the Chinese government. Russia's invasion of Ukraine in February 2022 led to additional disruptions, primarily in the supply of energy to Europe and the supply of grain to numerous countries (particularly in the Third World). The heat wave in Europe is drying up rivers and raising the price of transporting coal and commodities by land. On the demand side, equilibrium has not yet been restored. There is still a large surplus of liquidity, particularly in the US, which is the result of a highly expansionary monetary policy during the pandemic.

Figure 23 shows the rise in prices in Israel, the US, and the Euro Area, which began in early 2021. The upper left-hand panel describes the rate of increase in the CPI. As can be seen, this rate was significantly lower in Israel than in the US and the Euro Area. The gaps are even larger in the case of food and energy. In the US and the Euro Area, the increase in food prices was even faster than that of the index as a whole while in Israel they rose at almost the same rate as the index. In the US and the Euro Area, energy prices rose by about 40% while in Israel the rate of increase was about half of that (notice the scale of the vertical axis in this graph). Finally, although rent actually paid (without imputation for homeowners) in Israel recently rose somewhat more than in Germany (after a decline that continued for about 18 months), rents in the US have shot up by an annual rate of about 8%.²⁶

26 The OECD does not publish data on rent actually paid in the Euro Area. Germany was chosen as the representative country.

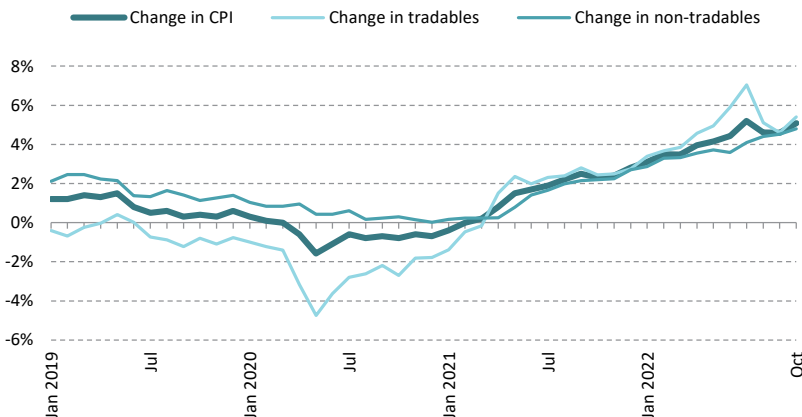
Figure 23. The increase in the CPI in Israel, the US, and the Euro Area



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

The rapid increase in prices in other countries on its own has an impact on the CPI in Israel. This can be seen in Figure 24, which presents Bank of Israel data distinguishing between tradable and non-tradable goods.²⁷ The graph shows that while in the past tradable goods moderated the rate of increase in the CPI, the rate of increase in their prices (whose weight in the CPI is about 37%) has been significantly higher than that of non-tradable goods (whose weight is about 63%) in recent months. In other words, Israel imports part of its inflation from abroad, despite the strengthening of the shekel. Nonetheless, it appears that the gaps between imported inflation and domestic inflation have recently narrowed to a large extent.

Figure 24. The rate of increase in the CPI, tradable and non-tradable goods



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

The impact of inflation on the various income quintiles

The data presented above related to the average for the economy as a whole. It is possible to differentiate the effect of price increases on the various income strata by computing the CPI based on the respective consumption of households as measured by the *Household Expenditure Survey* conducted in 2018–2019. During that period, the consumption profiles of households

27 For a list of tradable and non-tradable goods, see the [Bank of Israel website](#).

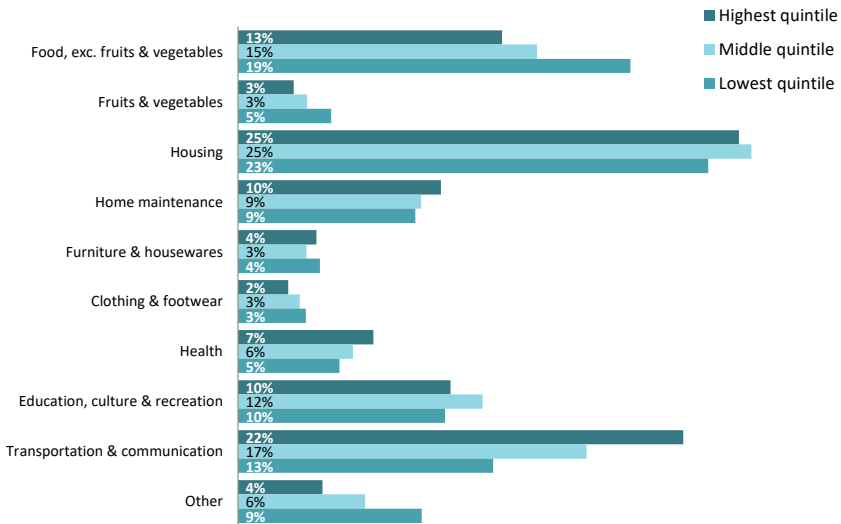
were aggregated according to quintiles of disposable income per standardized individual.²⁸ This enables a calculation of the CPI for the consumption baskets of households according to income quintiles and their rate of increase. The data below relate to consumption expenditure of the bottom, middle, and top income quintiles, each of which represent 20% of all households: those with the lowest income per capita (0 to 20th percentile), those in the center of the income distribution (40th to 60th percentile), and those with the highest income (80th to 100th percentile), respectively.

The weights of the goods and services that make up the CPI basket are determined for each income group according to the proportion of expenditure on those components relative to the total expenditure on consumption in that group and are differentiated across the average household in each income quintile. Indeed, there are significant differences in consumption patterns across the various income groups, as can be seen in Figure 25. Thus, for example, the proportion of expenditure on home maintenance, healthcare, and transportation and communication within the total consumption of a household in the top quintile is higher than in the lower income quintile. In contrast, in the case of expenditure on food (not including fruit and vegetables), fruit and vegetables and miscellaneous, the highest proportion is to be found in the lowest quintile. There are differences among households by income quintile also in the weights of secondary groups that make up the basket of goods and services in the CPI (not presented in the graph). Particularly noticeable is the large gap in the proportion of expenditure on cigarettes and tobacco within total expenditure of a household belonging to the bottom income quintile (almost five times the proportion in the top quintile). In contrast, the proportion of expenditure in a household in the top quintile on other housing expenditure, such as a real estate agent, the drawing up of contracts and insurance, is almost seven-times what it is for a household in the bottom quintile. This is also the case for the proportion of expenditure on household help, for which a household in the top quintile spends close to 8-times more than a household in the bottom quintile.²⁹

28 For details, see CBS, [Monthly composition of consumption expenditure, by sub-groups, in selected years, Table 1.2](#). The CBS does not publish data for the second and fourth quintiles.

29 For further details, see CBS, [Weighted first and second main consumption expenditure groups in the CPI, Table 1.5](#).

Figure 25. Proportion of expenditure within total expenditure by main groups included in the CPI, selected income quintiles



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

Figure 26 presents the cumulative rate of change in the CPI for the main consumption groups that make up the CPI basket for each of the income quintiles. The graph relates to 2020 as the base year and differentiates between an increase in prices in 2021 and the cumulative increase up to July 2022.³⁰ Particularly noticeable is the high rate of increase in the expenditure on transportation and communication in all three income quintiles (close to 16%). In the housing component (mainly *consumption of housing services* which is closely related to rent), there was a higher rate of increase for the top quintile than for the bottom one. The opposite is the case for the furniture and home appliances component where households in the bottom quintile spend 3.6 times more than those in the top quintile on fixing kitchen appliances and 30% more on disposable plates, cups, and cutlery, which became significantly more expensive following the imposition of a tax on these items. In contrast, the clothing and footwear component fell steeply, by more than 14%

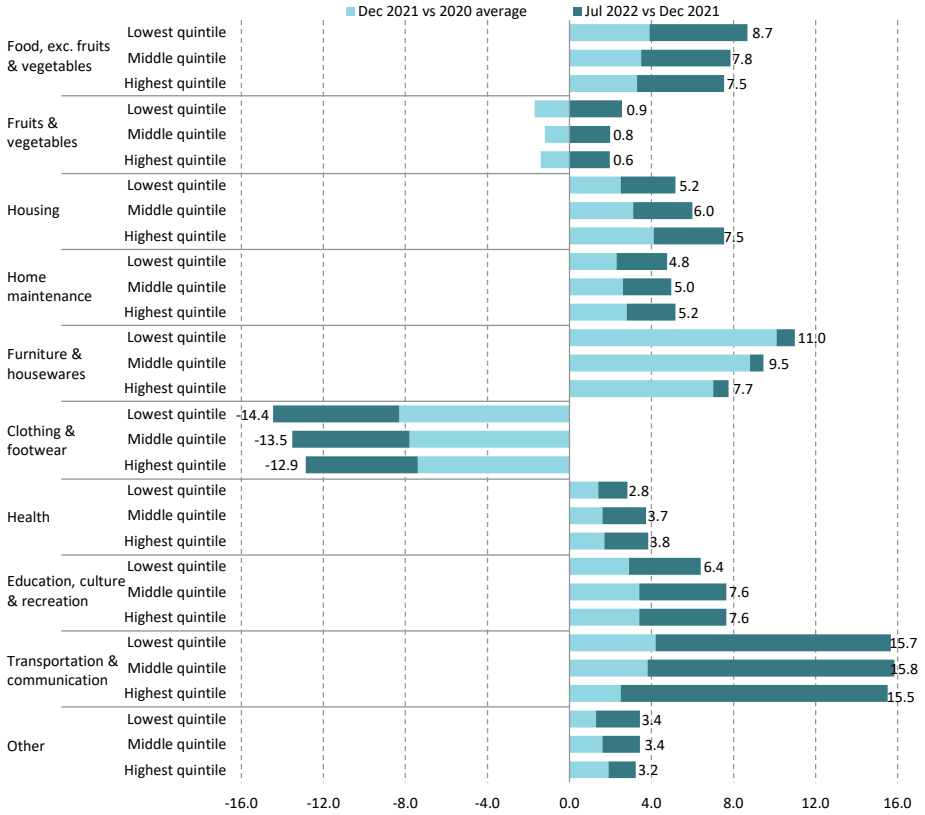
³⁰ For further details, see CBS (2022c), Table 4.7.

among households in the bottom income quintile and by about 13% among households in the top quintile. The differences in the rate of increase in the CPI between the various quintiles are usually not very large; however, because of the differences in income there are large differences in their impact on expenditure relative to income. Overall, the total change in expenditure in July 2022 relative to the average for 2020 for households in the top quintile was NIS 1,856, for the middle quintile it was NIS 1,118 and for the bottom quintile it was NIS 705. These amounts reflect an increase of about 8% in total expenditure for the top quintile, about 7% for the middle quintile, and about 6.4% for the bottom quintile. In terms of 2019 income, the ranking is reversed: up to July 2022, these additions to expenditure reflect an additional cost amounting to 10.2% of gross income for the households in the bottom quintile; about 6.5% for the households in the middle quintile, and about 4.6% for the households in the top quintile.³¹

Figure 27 shows that the impact relative to income was larger in the bottom quintile in all components of expenditure, except for clothing and footwear. For example, the representative household in the bottom quintile was forced to give up 2.7% of its income due to the increase in food prices while the figure for the top quintile was less than 1%, a fact that is reflected in the larger weight this component has for households in the bottom quintile. Transportation and communication, on the hand, has a higher weight in the top quintile and the increase in the price of that component is translated into an increase in expenditure of about 3.2% of gross income for a household in the bottom quintile, as compared to 2.5% for a household in the middle quintile, and about 2% for a household in the top quintile.

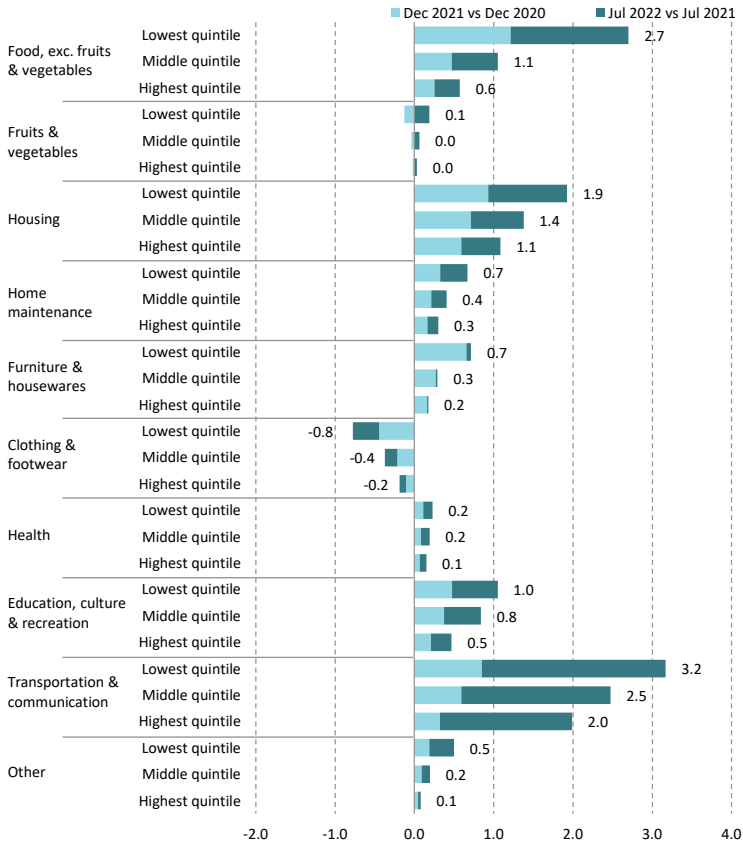
31 The most recent figures for household income in Israel are for 2019. In that year, gross monetary monthly income in the bottom quintile was NIS 6,883; in the middle quintile it was NIS 17,275; and in the top quintile it was NIS 39,988. For further details, see CBS (2022b).

Figure 26. Rate of change in the CPI, July 2022 relative to the average for 2020 and the contribution of each year to the rate of change



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

Figure 27. Total rate of change in expenditure as a percentage of income, July 2022 relative to the average for 2020 and the contribution of each year to the rate of change



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

The level of prices

Figure 20 illustrates Israel's relatively favorable position with respect to inflation. Nonetheless, the absolute level of prices in Israel is perceived as being very high relative to other countries.

The comparison between price levels in various countries is based on the *Law of One Price*, which was developed in France during the second half of the 18th century. The gold standard prevailed during that period, and it was possible to compare the prices of goods between countries on that basis. Accordingly, if the price of a good in terms of gold in Country A was lower than in Country B, then it was worthwhile for merchants in Country B to transfer gold to Country A and buy the goods there. According to the theory, these transfers would increase the amount of gold in Country A and reduce it in Country B, a process that would raise the prices of goods in Country A in terms of gold and reduce their prices in Country B. At the end of the day, prices were meant to equalize. The modern-day equivalent of this process is based on the demand and supply of foreign currency. If at a given exchange rate it is cheaper to buy goods in Country A than in Country B, merchants in Country B will prefer to exchange the currency of their country for that of Country A and buy the goods there. This pressure in the foreign currency market causes a depreciation in the exchange rate of country B relative to country A or, in other words, its currency weakens. As a result, the goods in Country A for merchants in Country B become more expensive and the goods of Country B become cheaper for merchants in Country A and a *one-price* equilibrium is achieved.

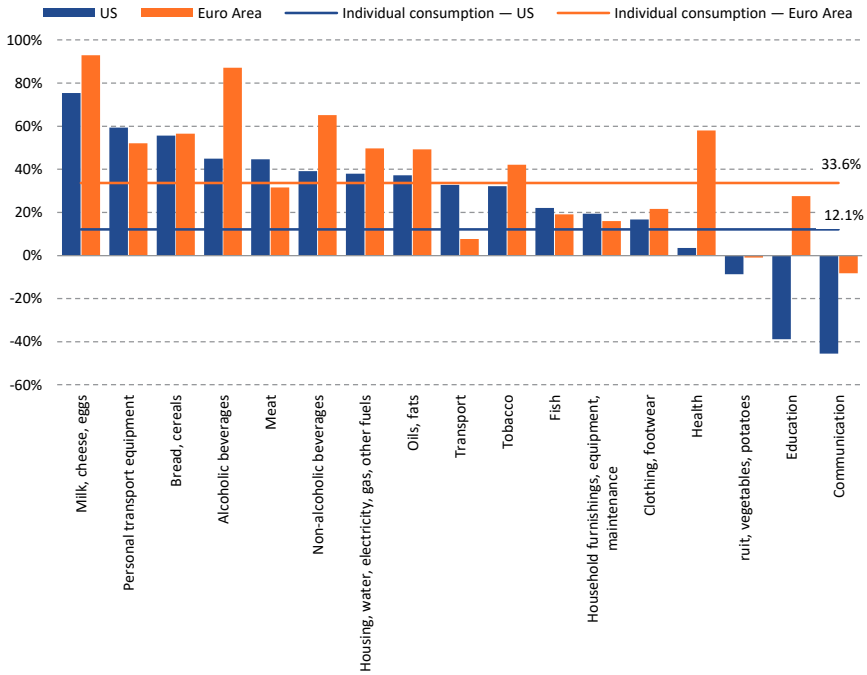
These hypothetical mechanisms are subject to failures in reality. The most important of them are transaction costs and the involvement of governments in the foreign currency market. This is particularly true in the case of non-tradable goods, where the transaction costs are essentially infinite. For example, it is not possible to transfer an apartment from Tel Aviv to Berlin nor is it possible to buy housing services in Berlin for use in Tel Aviv. In other cases, it is possible to buy similar services in both Tel Aviv and Berlin, such as a haircut or catering services; however, this involves an expensive trip from one city to the other. Nonetheless, it is conventional practice to compare the prices of a basket of uniform goods in different countries in terms of the local currency and to calculate the exchange rate at which the costs of the baskets equalize. This exchange rate is known as Purchasing Power Parity (PPP). International organizations calculate this exchange rate and compare it to the exchange rate prevailing in the market. This makes it possible to estimate the extent to which

the local currency is overvalued relative to other currencies (which *raises* the prices in that country relative to the reference countries) or undervalued (in which case the country's prices are *low* relative to other countries).

The OECD constructs a uniform consumption basket every few years and gathers data from the member countries in order to carry out a comparison of price levels.³² Unfortunately, the most recent one was carried out in 2017. Figure 18 reflects the cost of living in Israel relative to the US and the Euro Area. The gap is measured according to the rate at which the PPP of a selected group of goods is differentiated from the average exchange rate prevailing in the market in 2017, with respect to both the dollar and the euro. The graph also shows the gap relative to these currencies for the actual individual consumption basket. On average, the shekel was overvalued by 33.6% relative to the euro and by 12.1% relative to the dollar. In other words, according to the exchange rate that prevailed in 2017, Israel was more than one-third more expensive than the Euro Area countries, and about 10% more than the US. An examination of the consumption basket shows particularly large outliers. Milk and egg products were almost double in price relative to the Euro Area and 75% more relative to the US. These goods are characterized by high levels of concentration and intervention by production councils and they enjoy almost complete protection against competing imports. Another outlier is non-alcoholic beverages, a market which is particularly concentrated in Israel (their price in Israel was almost two-thirds higher than in Europe and almost 40% higher than in the US). Goods that were cheaper than in the reference countries were fresh produce, education (particularly in comparison to the US), and communication (prices in Israel were about one-half of those in the US). Recall that the communication market underwent a far-reaching reform (the Kahlon Reform) which led to particularly intense competition in this market.

32 The most recent comparison carried out by the OECD was in 2017. The basket that it constructed for the comparison is not identical to the basket of goods used to calculate the CPI in the different countries. For further details, see the OECD site, [EUROSTAT-OECD Methodological manual on purchasing power parities \(PPPs\)](#).

Figure 28. The cost of living in Israel relative to the US and the Euro Area
 Selected groups of goods, 2017



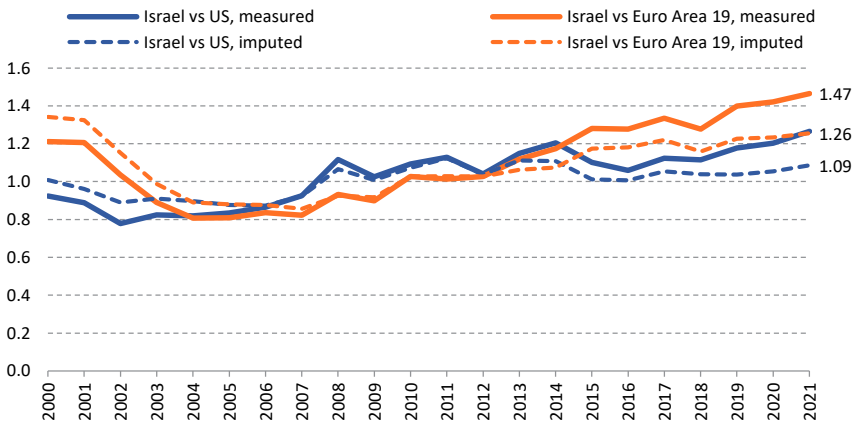
Source: Benjamin Bental and Labib Shami, Taub Center | Data: CBS

Figure 29 tracks the increase in prices in Israel over time according to the calculated gaps between the hypothetical exchange rate of the shekel that maintains the PPP of actual individual consumption and the average market exchange rate in that year. The graph also presents the gaps that emerge from a calculation based on the CPI in Israel, the Euro Area, and the US.³³ The large increase in the cost of living implied by the graph relative to the euro is the result of the trend in the shekel’s exchange rate relative to the euro

³³ The calculation is based on the fact that in 2012, the exchange rate in the market closely reflected PPP. It subtracts the rate of change in the exchange rate that was *justified* according to the difference between the change in the CPI in Israel and that in the comparison country from the change in the market exchange rate.

(see Figure 30) and the trend in the exchange rate of the dollar relative to the euro. In particular, the weakening of the dollar (until recently) is the reason that the price increases relative to the euro are much larger. The graph also shows the significant gap between inflation calculated from the comparison of the actual individual consumption basket according to the OECD calculations and the calculation that compares the cost of the (different) consumption baskets upon which the CPI is calculated in the various countries. In this calculation, Israel was only about 10% more expensive than the US in 2021, as compared to 26% more expensive according to the OECD calculation, and 26% more expensive than the Euro Area countries, rather than 47%. In other words, the international comparisons are very sensitive to the baskets of goods being compared and they represent, in the best case, very broad averages.³⁴

Figure 29. Cost of living in Israel relative to the US and the Euro Area

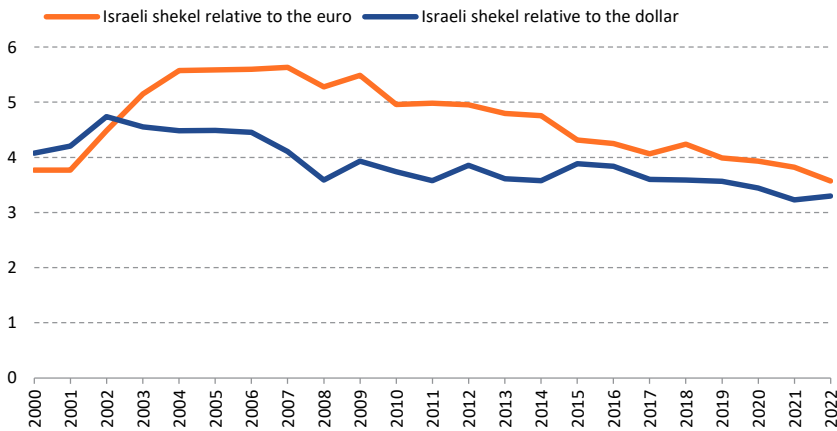


Source: Benjamin Bental and Labib Shami, Taub Center | Data: OECD

34 *The Economist* developed a PPP exchange rate for an especially standard good: McDonald's Big Mac. According to this index, the shekel was overvalued in January 2021 by 9.4% and in July of that same year by 4.7%. In July 2022, the shekel was undervalued. The exchange rate that would equalize the price of a Big Mac in Israel and the US was NIS 3.30 to the dollar when the exchange rate in the market was 3.44. In other words, the price of a Big Mac in Israel was lower by 4% than its price in the US. See *The Economist* website, [The Big Mac Index](#).

As noted, Figure 30 shows the strengthening of the shekel to be the main factor determining the relative price levels in Israel and the reference countries. The strengthening of the shekel began in the mid-2000s and it is reflected in the growing gaps between the cost of the basket of consumption goods in Israel and those in the reference countries in Figure 29.

Figure 30. The shekel annual average exchange rate relative to the euro and the dollar



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

The massive global capital flows undermine the basis for the *one price* assumption. The exchange rate does not reflect only the relative prices of goods traded between countries, as assumed by economic theory; rather, in reality, and as we see on a day-to-day basis, exchange rates are affected primarily by the short-term considerations of investors in the capital market who are highly sensitive to even small gaps in interest rates. In Israel, the shekel is strengthening as a result of the surplus in its current account and the large inflow of capital, primarily due to foreign investment in the high tech industry, which we described in Figure 21 and 22. The foreigners who invest primarily in the high tech sector do so on the basis of long-term considerations and the expectation of very high returns. Their considerations are not affected by fluctuations in the exchange rate and in particular not by gaps in the cost of living. If anything, they benefit from the strengthening of the shekel which makes it possible for them to repurchase foreign currency at a low price.

Accordingly, it can be assumed that the shekel will remain a strong currency over time. This fact will continue to overshadow the cost-of-living calculations in Israel relative to other countries and the implied gap between the exchange rate in the market and that which maintains PPP.

Conclusion

As in other countries, the Israeli economy also experienced an upheaval as a result of the pandemic. However, the recovery was rapid both in Israel and in most of the developed countries and it roughly made up for the loss in GDP resulting from the pandemic. On the other hand, Russia's attack on Ukraine has offset this positive outcome to some extent, particularly in Europe. The attack has led to a sharp rise in energy prices, which is in addition to factors related to the pandemic that led to a surge in inflation throughout the industrialized world. The pressure on prices is felt also in Israel, although to a lesser degree. The inflation is forcing central banks to raise their interest rates sharply, which is increasing the fear of a slower rate of growth and negative developments in the real system, particularly during the coming year.

Alongside the problems in the short term, the fundamental failures that have characterized the Israeli economy for so long should not be ignored. Despite the success of the high tech industries, there remains a large gap between labor productivity in Israel and in other developed countries. It is the result of, among other things, the low levels of private and public capital in Israel. Correcting this situation will require the elimination of distortions in the range of incentives that face the private sector and a significant increase in public capital. At the same time, the cost of living in Israel remains high relative to the developed countries, even though the rate of inflation in Israel is lower. In part, the cost of living is partially explained by the strength of the shekel, a phenomenon that results to a large extent from the success of high tech. Nonetheless, the price system in Israel is characterized by serious distortions resulting from regulation, import barriers, and a lack of competition. The Arrangements Law of 2021 began the work of solving these problems. It can only be hoped that this process will continue in the future.

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Appendix

Labor, private capital, public capital, and GDP

Appendix Table 1 presents the results of panel regressions for the reference countries. The dependent variable is logged GDP in constant prices while the independent variables include logged employment and logged private capital, with or without logged public capital. Accordingly, the regression coefficients can be interpreted as the elasticity of GDP with respect to the aforementioned factors of production. All the regressions were run with country fixed effects and year dummies. All the coefficients are significant at a level of $p < 0.001$.

Appendix Table 1. Panel regressions

	Coefficient	95% confidence interval	Coefficient	95% confidence interval
In (employment)	.472 (.048)	.377–.567	.602 (.068)	.505–.710
In (private capital)	.355 (.048)	.261–.449	.454 (.053)	.350–.559
In (public capital)	.303 (.034)	.235–.371		

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

In the panel that does not include public capital, the coefficients of logged employment and logged private capital sum to approximately 1 (a Cobb-Douglas function with constant returns to scale). On the assumption that there is perfect competition in the market for factors of production, the share of labor in GDP according to the coefficients is 60% and the share of capital is 40%. However, the confidence intervals of the coefficients include many combinations of the two coefficients that add up to 1. When public capital is included, the coefficients of the other two inputs are reduced. The estimated elasticity of public capital is 0.3, which is significantly higher than what is reported in the literature. Nonetheless, the result hints at the role of public capital as a factor that raises the productivity of the two private factors of production, i.e., capital and labor. According to the results of this panel, the external effects of public capital on the two private factors of production are very similar and lead to an increase of about 30% in the elasticity of GDP with respect to each of them.

