Chapter 1
The Economy and Economic Policy Alongside COVID-19

- GDP grew by 8.2 percent in 2021, and per capita GDP grew by 6.4 percent. In the fourth quarter of the year, GDP reached a level consistent with its precrisis growth trend.
- At the end of the year, the employment rate almost reached its precrisis level, the broad unemployment rate declined significantly, and the number of job vacancies was high.
- Israel's vaccination rate led the world, at least until the middle of the year. Activity restrictions were less stringent in 2021 than in 2020, and also by international comparison.
- The ramifications of the COVID-19 pandemic on activity and on economic policy over the year remained substantial. Starting at the end of the first quarter, the high vaccination rates allowed the government to adopt a policy that focused on restricting economic activity in certain industries. This occasionally included distinctions between vaccinated and unvaccinated individuals.
- The pandemic's effect on activity was not uniform across industries. Activity in the transportation, food and hospitality, and art and entertainment industries remained lower than it was prior to the crisis.
- The approval of the budget, by the government during the summer and by the Knesset toward the end of the year, after the government operated over 2 years without an approved budget, reduced uncertainty in the conduct of fiscal policy.
- The economy's gradual return to activity, and the rapid improvement in employment, made it possible to gradually remove most special intervention measures that were implemented at the start of the crisis—broad fiscal support and the use of special monetary policy tools.
- The recovery of activity during the first half of the year made it clear that the time was right to return to dealing with long-term issues in the economy. When the new government was formed, the Bank of Israel submitted a program to it that included recommendations for dealing with strategic core issues in the economy, which would contribute to long-term growth.
- Despite the increase in inflation, it remained within the target range, reaching 2.8 percent at the end of the year.
- In the second half of 2021, the Bank of Israel decided to end the special programs it began in 2020 due to the COVID-19 crisis. Concurrently, in order to continue supporting economic activity, and taking into account that the factors behind the increase in inflation included temporary components, the Monetary Committee continued to conduct an accommodative monetary policy during the year. The interest rate remained at 0.1 percent, government bond purchases continued until December, and the Bank purchased about $35 billion to moderate the appreciation trend.
- Most industries were able to raise credit similar to the precrisis levels. The recovery of real activity and the increase in asset prices raised demand for credit. The stock market featured price increases and a significant volume of IPOs.

- Home prices increased by 13.0 percent in nominal terms in 2021, while rents increased by 3.3 percent. The number of housing transactions increased, after dropping at the beginning of the COVID-19 crisis. Demand increased mainly on the part of first-time home buyers in view of the cancellation of the "Buyer's Price" program, and on the part of investors due to changes in the purchase tax that is applicable to them.
- During 2021, international agreements were reached on reducing carbon emissions and on taxation of multinational corporations and digital platforms. It is important that policy in Israel prepare for the implications of these agreements.
- Technology, particularly telework, moderated the pandemic's impact on the economy, and enabled continued economic activity despite restrictions on gatherings. The rate of teleworking among employees varies across industries and occupations, and depends on additional employee characteristics that are correlated with labor productivity.
- The high-tech industry's importance to the Israeli economy was particularly prominent this year. Its share of total exports increased, and it generated high tax revenues. The increase in its activity was reflected in a rapid increase of demand for workers. Wages and the number of employees in the industry increased, and the number of job vacancies surged. The industry was also characterized by an increase in capital raised and an increase in IPOs by Israeli technology companies.

PART ONE: THE ACCLIMATION OF MACROECONOMIC ACTIVITY TO THE COVID-19 REALITY[1]

a. Government policy in view of the COVID-19 waves

The COVID-19 pandemic's impact on the economy and on routine activities remained substantial in 2021. However, during the year, the economy recovered markedly, as GDP grew by 8.2 percent (per capita GDP growth was 6.4 percent), and the employment rate drew close to its precrisis level. Accordingly, the need for broad policies to support activity in the credit market, businesses, and household income that the Bank of Israel and the government began conducting in 2020 subsided, and such policies were tapered during 2021. The State Budget, which was approved toward the end of the year, dealt with structural issues that require long-term handling, but because of the uncertainty that remains due to the pandemic, it also included the allocation of a general reserve for 2022 for COVID-related expenses. Accordingly, the budget frameworks approved for 2021 and 2022—deficit target and expenditure limit—were also expanded relative to the fiscal rules that were included in the law prior to the crisis. This was in order to avoid fiscal tightening that could have slowed the economy's recovery from the COVID-19 crisis, while also avoiding an increase in the structural deficit to an extent that would make it difficult to conduct fiscal policy in the future.

The COVID-19 pandemic's impact on the economy and on routine activities remained substantial in 2021. However, during the year, the economy recovered markedly. Accordingly, the need for broad policies to support activity subsided.

In 2021, Israel experienced three waves of morbidity (Figure 1.1). The third wave of the pandemic reached its peak in January–February 2021; the fourth wave reached its peak in August–September; and the fifth wave began in December but was mostly felt in January–February 2022. These waves were also the peaks of interruption to economic activity and of uncertainty. They differed in the nature of the morbidity and in the vaccination level of the population, in the stringency of the restrictions imposed by the government, and in the public's response (businesses and consumers). As such, their effect on activity was not uniform.

Toward the end of December 2020, vaccination of the Israeli population against COVID-19 began, and it progressed rapidly in 2021. By April, 70 percent of the population aged 15 and over had been vaccinated, earlier than the comparison countries, which reached similar rates 2–3 months later (Figure 1.1). Israel was the international leader in vaccination rates until the middle of the year, and then remained in the upper portion of the global distribution of vaccination rates. The vaccination rates of young people, including children, were lower.[2] Even though vaccinations were free for all health fund members, vaccinations rates (according to Ministry of Health data) were higher in economically well-established residential localities. This

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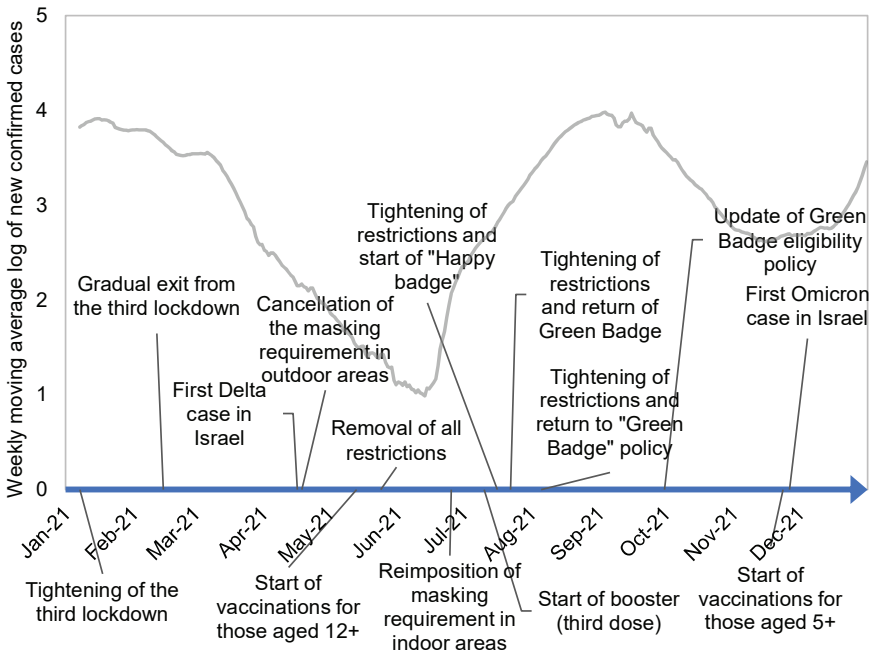
[1] International comparisons will relate to the group of OECD countries that are also defined as "advanced" by the IMF (31 countries). In places where this is not the case, it will be explicitly noted. Information to accompany this Section appears in Figure 1.1 and in Table 1.1

[2] Ministry of Health, COVID-19 dashboard: https://datadashboard.health.gov.il/COVID-19/general, as viewed in December 2021.

is partially explained by the higher morbidity among populations living in statistical areas with a low socioeconomic ranking[3], since during part of the period, those who had recovered from the virus were considered immune.

Figure 1.1
Main COVID-19 Policy Events, 2021



SOURCE: Based on "COVID-19 in Israel - General Picture (Dashboard)", Ministry of Health.

The third wave of morbidity was a direct continuation of the two waves from 2020 in terms of the policy response and its effect on economic activity. During the third wave, from the beginning of January until mid-February, the government imposed a lockdown that included the closure of schools and a move to remote learning, travel to work places was limited, and gatherings, such as at shopping centers, cultural activities, and events, were restricted. During this period, vaccinations continued and the government instituted the "Green Badge"—an approval in principle to consume activities and services, which was dependent upon a valid vaccination or confirmation by an authorized party of a negative COVID-19 test. From the end of February 2021, those holding a "Green Badge" were able to freely partake in cultural activities,

[3] COVID-19 morbidity in 2020 was higher in statistical areas with relatively low socioeconomic rankings. Statistical areas in *Haredi* (ultra-Orthodox) and Arab localities generally have low rankings, and COVID-19 morbidity was particularly rampant among these population groups in 2020. (Data on the link between population characteristics and the frequency of morbidity appear in the Bank of Israel *Annual Report* for 2020, Chapter 7, Box 7.1, and in Report number 7 of the Advisory Committee to the National Security Council.)

sporting events, leisure activities, and hospitality. This marked a turning point in economic activity. The improvement in the state of morbidity during the second quarter enabled the continued opening of the economy and the easing of restrictions, to the point of full removal of the remaining restrictions. However, that removal turned out to be short-lived, as the fourth wave of the pandemic began toward the end of June and led to the imposition of new restrictions.

Morbidity at the peak of the fourth wave—during August and September–featured a higher number of daily confirmed cases than in the previous waves, as well as a jump in the number of seriously ill patients (Figure 1.2), although the ratio between them and the number of confirmed patients was lower than in the third wave. With the high vaccination rate, the government expanded the scope of considerations in its decision-making in view of the increased morbidity, which was supported by policy that distinguished between vaccinated and unvaccinated individuals. Accordingly, the government adopted a policy of targeted restrictions, avoiding a general lockdown, alongside efforts to expand vaccinations. Israel became the global pioneer in issuing third inoculations (the "booster shots"), instituted the broad use of the "Green Badge", and periodically revised individual restrictions. The "Green Badge" policy, and the imposition of the cost of COVID-19 testing on those who were able to get vaccinations but chose not to, served to encourage vaccination. In addition, the isolation period set for those who were not vaccinated was longer than for those who were.

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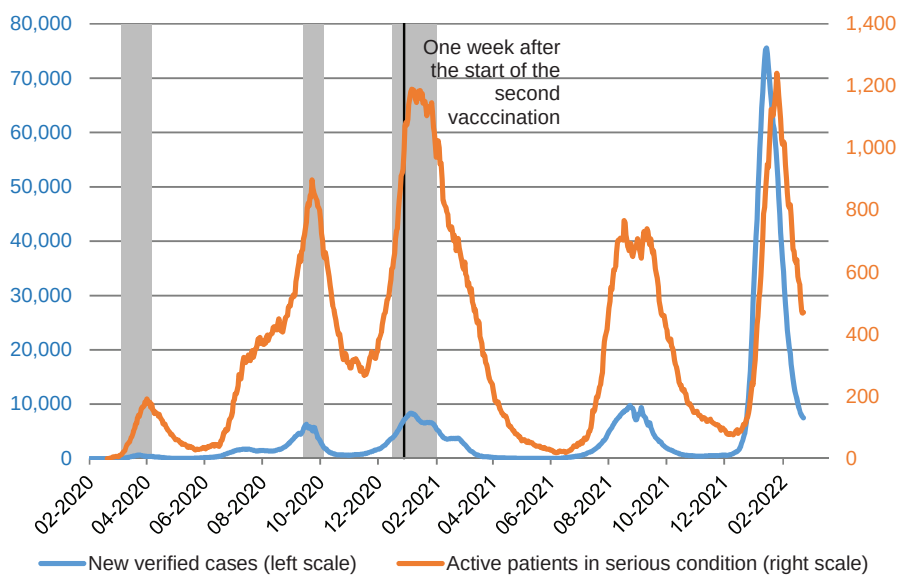
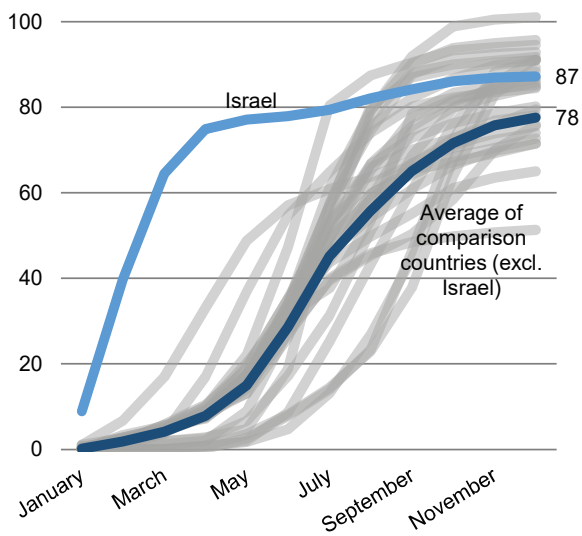
Figure 1.2
New Confirmed COVID-19 Cases and Active Patients in Serious Condition



The shadowed areas indicate the lockdown periods.
New cases: Weekly moving average of daily data; Active patients in serious condition: daily data.
SOURCE: Based on "COVID-19 in Israel - General Picture (Dashboard)", Ministry of Health.

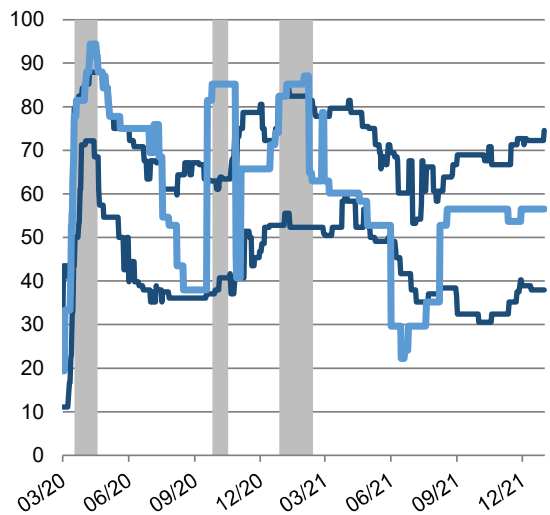
At the peak of the fifth wave—the "Omicron wave", most of which took place in 2022—, the number of seriously ill patients was slightly higher than during the third morbidity wave, and the number of confirmed cases climbed to dimensions that were not seen beforehand (Figure 1.2). However, many of the patients suffered from light morbidity. The policy of targeted restrictions lingered during the fifth wave, based on the assessment that the healthcare system was able to deal with the morbidity. In practice, this policy focused the pandemic's interruption on activity in certain fields. It decreased, but did not prevent, the consumption of services, particularly in the areas of culture, leisure, and hospitality, and reduced the labor input of workers throughout the economy, but only if they or those dependent on their supervision were in quarantine or if they belonged to industries where activity was limited. Accordingly, the activity of businesses was also affected, mainly in the services fields. All in all, COVID-19 restrictions in Israel were less tight in 2021 than in the previous year, and when compared to other countries (Figure 1.4). These features of the economy and of policy in 2021—vaccination of the population and a policy of targeted restrictions alongside the acclimation of businesses in Israel and abroad to activity in the face of COVID-19—supported the economy's recovery during the year.

Figure 1.3
Vaccination Rate During 2021, Equivalized to the Population Aged 15+ (percent)



Luxembourg and Netherlands were omitted due to lack of data. The rates are the ratio between the monthly average of fully vaccinated individuals and the population aged 15+ (in 2020).
SOURCE: Based on "Our World in Data", OECD.stat.

Figure 1.4
COVID-19 Restrictions Stringency Index, Israel by International Comparison, March 2020–December 2021 (100=highest stringency)



Dark blue: the 20th and 80th percentiles among the comparison countries. Light blue: Israel. Lockdowns are in gray.
SOURCE: Based on Oxford COVID-19 Government Response Tracker.

b. Macroeconomic activity

Gross Domestic Product grew by 8.2 percent in 2021. Thanks to the rapid growth in 2021, by the fourth quarter GDP reached the growth trend path that was expected based on past data, after having been below the trend since the beginning of the pandemic.

Gross Domestic Product grew by 8.2 percent in 2021, after contracting by 2.2 percent in 2020 as a result of the COVID-19 crisis. Thanks to the rapid growth in 2021, GDP reached the growth trend path that was expected based on the data for the six years prior to the crisis (2014–2019), after having been below the trend for almost the entire 2020–2021 period. The increase in GDP in 2021 was also reflected in a 6.4 percent increase in per capita GDP, which reached NIS 166,000 in 2021 after falling by almost 4 percent in 2020. GDP growth in 2021 was greatly affected by the extent and nature of the restrictions imposed on activity due to COVID-19 morbidity. The first quarter was a direct continuation of 2020 in terms of morbidity and activity, and GDP contracted by about one percent during that quarter.[4] In the second quarter, the trend reversed. GDP surged by about 15.8 percent, a direct outcome of the easing of restrictions on activity, up to their complete removal at the end of the quarter. There was also relatively rapid growth (7 percent) in the third quarter because, despite the fourth morbidity wave, which took place during the quarter, the targeted restrictions policy described above had already been started. In the fourth quarter, GDP grew by 17.6 percent. Toward the end of the fourth quarter, with the start of the fifth ("Omicron") wave, morbidity jumped and restrictions were tightened—a policy that continued into 2022.

Goods and services imports increased by 18.4 percent in 2021, led mainly by goods imports, which increased throughout the entire year—particularly in the fourth quarter—while outgoing tourism remained low as a result of restrictions on Israelis traveling abroad, mainly around the morbidity waves in the first, third, and fourth quarters.

Growth during the year was widespread. It relied on growth of the main uses: large increases in goods and services exports (excluding diamonds and startup companies) (10.8 percent), thanks not only to increases in goods exports but particularly in services exports during the entire year; fixed capital formation (11.4 percent); and private consumption (11.7 percent)—mainly thanks to high growth in the consumption of durable and nondurable goods, while consumption of services remained low. Public consumption (excluding defense imports) increased by 3.3 percent in 2021, similar to its increases in recent years (Table 1.1).

Goods and services exports moderated the crisis's impact on the economy in 2020, and contributed to the economic recovery in 2021, even though incoming tourism remained very limited, and despite the interruptions in international trade due to international shipping difficulties (which are outlined in Chapters 2 and 3). Goods and services exports other than the high-tech sector declined at the start of the pandemic, but resumed their rapid increase as early as the second half of 2020. High-tech goods and services exports, which account for more than half of Israel's total exports, were very dominant in the past two years, partly due to the increasing global

[4] Quarterly data are in annual terms.

Table 1.1
Main Developments, 2016–21

	2016	2017	2018	2019	2020	2021
Population (yearly average, million)	8.5	8.7	8.9	9.1	9.2	9.4
Nominal GDP (NIS billion, current prices)	1,225	1,279	1,342	1,418	1,401	1,556
Per capita GDP (NIS thousand, current prices)	143	147	151	157	152	166
GDP (real rate of change, percent)	4.5	4.4	4.0	3.8	-2.2	8.2
Private consumption (real rate of change, percent)	6.2	3.6	3.5	3.9	-9.2	11.7
Gross domestic investment (real rate of change, percent)	11.8	6.3	7.0	3.8	1.0	10.4
Public consumption (real rate of change, percent)[a]	4.2	4.2	4.7	2.6	2.7	3.3
Goods and services exports (annual rate of change, percent)[b]	0.4	7.4	4.8	5.4	1.1	10.8
Goods and services imports (annual rate of change, percent)[c]	8.8	6.3	5.5	2.9	-7.3	18.4
Current account of the balance of payments (surplus, $ billion)	12.1	12.8	10.6	14.3	22.2	22.5
Overall government deficit (percent of GDP)	2.1	2.0	4.3	4.5	11.5	5.5
Public debt (percent of GDP)	62.0	60.2	60.4	59.5	71.7	68.9
Employed Israelis aged 15+ (yearly average, thousand)[d]	3737	3,825	3,905	3,967	3913.4 [3522.5]	3957 [3838.9]
Real wage per employee post (yearly average, percent rate of change)[e]	2.3	3.2	3.6	3.0	7.1 [4.4]	2.0
Unemployment rate, aged 15 and up (yearly average, percent)[f]	4.8	4.2	4	3.8	4.4 [15.7]	5 [10.1]
Inflation (December compared to the previous December, percent)	-0.2	0.4	0.8	0.6	-0.7	2.8
Bank of Israel interest rate (yearly average, percent)	0.1	0.1	0.1	0.3	0.1	0.1
Real one-year interest rate (yearly average, percent)	-0.1	-0.1	-0.8	-0.8	0.1	-1.9
Nominal yield on 10-year government bonds (yearly average, percent)	2.0	2.1	2.2	1.6	0.8	1.2
Real yield on 10-year government bonds (yearly average, percent)	0.4	0.6	0.5	0.0	-0.5	-0.8
Real effective exchange rate (yearly average, percent rate of change)	-1.5	-4.4	2.1	-2.5	-3.1	-3.8
NIS/$ exchange rate (yearly average)	3.84	3.60	3.59	3.56	3.44	3.23
Tel Aviv 125 index[g]	-2.5	6.4	-2.3	21.3	-3.0	31.1
World trade (percent rate of change)	2.3	5.7	3.6	1.0	-9.6	9.7

[a] Excluding defense imports.

[b] Excluding diamonds and startups.

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

[d] The figures in brackets for 2020 and 2021 are employees excluding temporary absentees for reasons having to do with COVID-19 (which are included in broad unemployment).

[e] The figure in brackes is the average rate of change for 2020-2021 in the nominal wage, adjusted for changes in the composition of workers as a result of many employees leaving their jobs during the COVID-19 period (mainly under furlough arrangements). More information on the calculation (according to the direct method) appears in Box 2.2 of this Report.

[f] The figures in brackets for 2020 and 2021 are broad unemployment, which include the unemployed (normal definition), temporary absentees for reasons having to do with COVID-19, and nonparticipants due to COVID-19.

[g] Nominal rate of change - the last day of December compared to the last day of the previous December.

SOURCE: Based on Central Bureau of Statistics and International Monetary Fund.

demand for technological products and services created by the domestic high-tech industry, and because a significant part of advanced high-tech services exports is done electronically, without depending on the international shipping system. The third part of this chapter discusses the rapid development of goods and services exports in the high-tech sector and in the economy as a whole.

Israel's services exports continued to increase in 2021, further to the impressively strong upward trend by international comparison (Chapter 2). As stated, services exports were particularly affected by the high demand for technological services exported by the Israeli economy. These grew during the COVID-19 period, which strengthened the upward trend of the proportion of business services exports, a trend that has continued for several years. As a result, "other business services" exports (which are almost completely high-tech services) as a share of GDP increased by about 1.5 percentage points between 2019 and 2021, to 12 percent (5.5 percentage points higher than in 2009). In contrast, tourism services exports as a share of GDP contracted to about 0.3 percent (from about 1.7 percent in 2019).

The consumption of services accounts for about one-third of private consumption. Its development throughout the year was in line with the extent of the weakening of restrictions on economic activity, and reflected activity in areas where effective restrictions remained in force even when the rest of the economy functioned normally. The COVID-19 restrictions, even when they were at their weakest, had an impact on the consumption of "proximity services"[5]—transportation, tourism, restaurants and hotels, and art, entertainment and leisure (Figure 2.5). The restrictions that were imposed, concern over infection, or changes in preference due to the pandemic motivated consumers to reduce activity that requires physical proximity. As such the consumption of services in 2021 was about 13 percent lower than in 2019. The gap was focused on the consumption of the proximity services mentioned above, in all of which consumption was significantly lower than in 2019. In contrast, private consumption of durable and partly durable goods jumped by about 19 percent relative to 2019—partly thanks to the partial replacement of services consumption with goods consumption, and the development of online commerce—which partially compensated for the decline in the consumption of services.

The development of services consumption throughout the year was in line with the weakening of restrictions on economic activity, and reflected activity in areas where effective restrictions remained in force even when the rest of the economy functioned normally.

c. The labor market

The recovery of macroeconomic activity during 2021 was reflected in an impressive increase in employment, as a result of which most of the gap in the employment rate created during the crisis was closed by the end of the year. The employment rate (adjusted to COVID-19 definitions as explained below) increased by about 9 percentage points during the year, alongside a marked increase in the number of job vacancies in the economy. The COVID-19 crisis led to an unprecedented

[5] See the definition of this term in the Bank of Israel *Annual Report* for 2020, Chapter 2, Box 2.1. The consumption of some of the proximity services defined as such in 2020 recovered completely in 2021, so we note the industries among the proximity industries that are relevant to our discussion.

By the end of the year, most of the gap in the employment rate created during the crisis was closed, and the broad unemployment rate declined significantly. The comprehensive and rapid recovery in the labor market strengthened the understanding that the COVID-19 crisis did not leave any "scars" in the functioning of the Israeli labor market.

increase in the number of absentees from work in 2020 and the beginning of 2021. This was partly due to furlough arrangements, which employers used to reduce their workforces while maintaining their attachments (as opposed to dismissals), and which allowed furloughed employees to receive unemployment benefits for a prolonged period.[6] Therefore, the number of employed people is presented in Table 1.1 using two definitions. The normal definition relates to those temporarily absent from work as part of employed persons, and under that, employed persons excluding those absent from work due to COVID-19-related reasons—a definition that is more in line with the situation during the COVID-19 period, when the number of absentees increased greatly and some were absent for a prolonged period. Accordingly, the unemployment rate is also presented using two definitions. One relates to the standard definition of unemployed (the "narrow definition"), and the one below it relates to "broad unemployment", which includes those absent for reasons having to do with COVID-19, as well as nonparticipants for the same reasons.[7] During 2021, the gap between the number of employed persons under each definition narrowed, and the unemployment rate adjusted to the COVID-19 definitions declined significantly.

During the lockdown that was imposed during the third morbidity wave in January and February, many employees were furloughed, in addition to those that were already on furlough from 2020. In addition, the number of absentees for reasons connected with COVID-19 increased. However, already at the end of the first quarter, the macroeconomic recovery process was also reflected in the labor market, and this gathered steam in the final three quarters of 2021. The number of absentees for reasons related to COVID-19 declined.[8] The employment rate grew persistently since the lockdown that was imposed at the beginning of the year, by about 9 percentage points (from 51.1 percent to 60.1 percent), and toward the end of the year it came close to its 2019 rate. The unemployment rate at the end of the year was 6.1 percent according to the broad definition, and 4.1 percent according to the normal definition. These rates are far lower than the average unemployment rates during the year—10.1 percent according to the broad definition and 5 percent according to the normal definition—a gap that reflects the variance in the state of the labor market over the course of the year.

The comprehensive and rapid recovery in the labor market despite the high number of workers who were unemployed at the start of the year strengthened the understanding that the COVID-19 crisis did not leave any "scars" in the functioning of the Israeli labor market—from an overall perspective according to macro indicators (unemployment, employment, and participation), including those that relate to various

6 See the Bank of Israel *Annual Report* for 2020, Chapters 1, 2, and 5.

7 This definition includes labor force nonparticipants who stopped working due to dismissal or closure of their work place since March 2020; nonparticipants who stopped working for other reasons or did not work in the past, who are interested in working now and did not search for work in the past month due to COVID-19; employees who were temporarily absent from work for an entire week for reasons having to do with COVID-19; and the unemployed. The normal definition includes only the unemployed.

8 This number increased slightly in the final months of the year due to the fifth morbidity wave.

segments of the population, age groups, and education levels. However, in certain industries, activity—including employment—remained low, and we discuss this later in this chapter and in Chapter 2. Already in June, when morbidity was low (Figure 1.1) and employment grew rapidly, the government decided not to extent the special unemployment eligibility leniencies that were put in place for the COVID-19 period.[9] This decision was supported by the perception that the arrangements should be cancelled in order to increase the labor supply by encouraging furloughed COVID-19 absentees to return to the labor force. Beginning in July, the furlough arrangement was cancelled for workers below age 45, and in October it was cancelled for those 45 and over. The special arrangements intended to support unemployed workers over the age of retirement were also cancelled. Chapter 5 of this Report shows that after the cancellation of the furlough programs, the unemployment rate declined slightly more among the age groups for which they were cancelled—those aged 45 and under—than for the older age groups, for whom payment had not yet been stopped.

In the years preceding the COVID-19 crisis, labor income accounted for an increasing share of working-age household income among the lower income quintiles. One of the concerns that arose during the crisis was that the prolonged unemployment periods would result in a long-term impact to labor inputs, and as a result to labor income. An analysis of labor inputs by household in Chapter 8 shows that at the end of 2021, the distribution of the number of wage-earners per household among the general population, and their extent of employment (full-time vs part-time), were similar to their 2019 levels. There was some prolonged decline in the number of wage-earners and in their extent of employment in households in the Arab society, where households without any wage-earner and households where there was one wage-earner holding a part-time job accounted for a greater share at the end of 2021 than at the end of 2019, and where households with a single wage-earner holding a full-time job accounted for a smaller share. In the absence of income data at the household and individual levels for 2021, it is too early to assess the continuing impact of the COVID-19 period on the total income of these households.

The recovery of the labor market was also reflected in a marked increase in demand for workers. Alongside the growth in the number of employed persons, the number of job vacancies in the economy increased rapidly. In the second quarter it crossed the 2019 average, and it was also higher than previous levels. The question arises as to whether this situation attests to a decline in the matching between worker characteristics being sought by employers and the characteristics of the unemployed. An analysis presented in Chapter 5 shows that at the end of the year, the level of mismatch between the qualifications of the unemployed and those being sought by employers was similar to the precrisis level. Thus, with the return to low unemployment, the ability to respond to the large demand for workers in relevant professions, represented by the number of job vacancies, depends on the ability to attract new population groups to employment and to train new and veteran workers for the required positions.

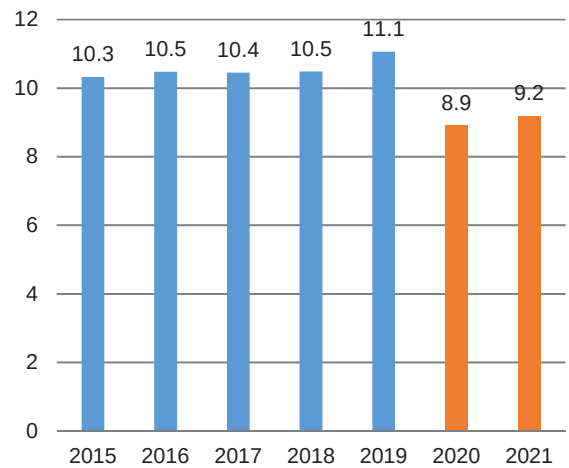
The recovery of the labor market was also reflected in a marked increase in demand for workers. Alongside the growth in the number of employed persons, the number of job vacancies in the economy increased rapidly.

[9] At the outset, these arrangements were set out until the end of June 2021.

During the COVID-19 period, employment declined in industries where wages (productivity) are relatively low, as did employment among workers with low productivity. As a result of this sharp change in the composition of employed persons, the average wage per employee post increased in 2020. This increase was not due to an increase of workers' wages for ordinary reasons such as improved productivity and demand for workers or an increase in inflation expectations. Understanding the development of the average wage in 2020 and 2021 is important in identifying inflationary pressures reflected in the labor market (a subject that is discussed in Chapter 3), understanding the ratio between demand for and supply of workers, and formulating policy. An analysis of the development of wages, presented in Chapter 2 (Box 2.1), was conducted by correcting the changes and wages in respect of the changes in the composition of employed persons. The analysis, using two different approaches, shows that the average wage per employee post (in current prices) increased by an average of about 4.4 percent in 2020–2021, similar to the trend of annual growth prior to the crisis, and despite a decline in demand for workers in 2020, the rapid increase in demand in 2021, and the increase in inflation expectations during the latter year.

The uncertainty in the development of industry activity also left its mark on the labor market. (A discussion of the differential developments by industry appears in Chapter 2.) The services industries that were harder hit during the crisis—the "proximity industries" described above—continued to suffer in 2021 from the ramifications of the restrictions on gatherings, and this was reflected in GDP data and in labor market data. The industry variation of activity patterns during 2021 led to a change in the industry distribution of employment, which is also discussed in Chapter 2. While the weight of employment in some industries, such as information and communications and health, increased relative to their 2019 rates, it remained relatively low in other industries, particularly those where activity has not yet

Figure 1.5
Employees in Selected Proximity Industries* as a Share of Total Employees, November–December, 2015–2021 (seasonally adjusted, percent)



* Proximity industries as defined in Box 2.1 of the Bank of Israel *Annual Report* for 2020. According to Chapter 2 of that Report, consumption in these industries declined between 2019 and 2021: Transportation, storage, postal, and courier services; food and accommodation services; art, recreation, and leisure.

SOURCE: Based on Central Bureau of Statistics.

recovered. Accordingly, the employment share of the proximity industries, where consumption declined sharply during the COVID-19 period and had not yet recovered by the end of 2021, declined (Figure 1.5). Some of the change in the distribution of workers among the industries may have been due to temporary factors, such as the increase in the number of workers in the health industries, or those in professions that are connected to dealing with COVID-19, compared with other industries, such as those in the information and communication fields, where the increase in the number of workers reflects factors of a prolonged nature.

"Teleworking" became one of the characteristics restraining the impact on employment during the COVID-19 period. It supported business continuity even during periods when there were restrictions on movement and gatherings, but it added to the gap that the pandemic and its restrictions created between employees who could and could not make use of it. The option was mainly a feature of industries with high productivity that, before the pandemic, had used technology in their work. Those industries are generally characterized by a relatively low need for physical proximity, and were therefore less hard-hit in any case during the crisis, and the acceleration of their activity began already in 2020. Box 1.1 discusses the characteristics of telework, and analyzes its status up to the end of 2021.

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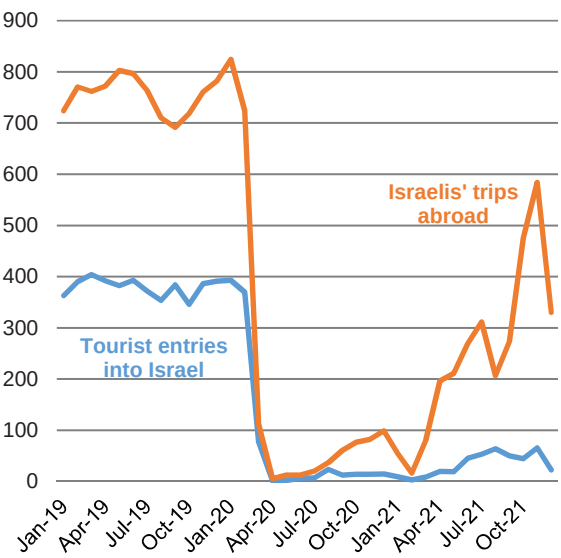
d. Tourism

The tourism industry's share of Israeli GDP was relatively low before the start of the pandemic. This feature restrained the impact to economic growth in Israel, in the face of the broad impact to global tourism during the pandemic. In 2021, following contraction during the COVID-19 period, the export of tourism services accounted for 0.3 percent of GDP, compared with 1.7 percent in 2019. There were many restrictions on tourist entries to Israel throughout the entire year, and these remained even when the restrictions on activity in other areas were reduced. For most months of the year,

Figure 1.6
Tourist Entries into Israel and Israelis' Trips Abroad, January 2019–December 2021
(seasonally adjusted, thousand)



SOURCE: Based on Central Bureau of Statistics.

the government allowed Israelis to travel abroad, but there were periodic restrictions imposed on this as well, and for some periods the skies were effectively almost closed, even without a declared policy, partly due to restrictions imposed on travel to certain destinations. As a result, the number of tourist entries to Israel in 2021 was only 9 percent of its level in 2019, and the export of tourism services was only 16 percent of its 2019 level. Israeli travel abroad also declined, totaling about one-third of its 2019 level (Figure 1.6).

The decline in Israeli travel abroad reduced private consumption through various channels—a decline in the consumption of tourism services abroad, and a decline in the purchase of flight tickets from foreign companies. These two factors are imported services, such that their impact on domestic demand was much smaller than on private consumption. In contrast, the decline in the purchase of flight tickets from Israeli companies also sharply reduced domestic demand. The fact that many Israelis increased demand for domestic tourism due to fewer options for vacations abroad partially compensated for the lack of incoming tourists. Israelis filled some of the occupancy space in hotels, and their number of overnight stays was 6 percent higher than in 2019, although the total number of overnight tourist stays was about 90 percent lower. At the most popular destinations for incoming tourism (such as Jerusalem, Tel Aviv, the Dead Sea, and part of the northern district), hotel occupancy remained lower than in 2019, and other services consumed by incoming tourists were also hard hit.

e. Fiscal policy

With the improvement in economic activity, the need for support to households and businesses declined, and tax revenue increased. The passage of the State Budget, after more than two years without an approved budget, increased stability and reduced economic uncertainty.

Fiscal policy played a key role in moderating the economic effects of the COVID-19 crisis. The policy response focused on a marked increase in government expenditures, mainly on transfer payments and the provision of state-backed loans to businesses (the immediate budgetary cost of which was small), alongside a marked increase in healthcare expenses. Alongside these increased expenditures, state revenue shrank and GDP declined, all of which led to a jump in the budget deficit and in the debt-to-GDP ratio. The government's fiscal policy changed in 2021, due to improvements in two areas. First, the vaccinations reduced the uncertainty inherent in dealing with the pandemic, which was reflected in improved economic activity and the concomitant decline in the need to support households and businesses, as well as an increase in government tax revenue. Second, the passage of the State Budget, after more than two years without an approved budget, increased stability and reduced economic uncertainty. As a result of the presence of a transition government from December 2020 to June 2021 and the approval of the State Budget by the Knesset only in November, the government operated for almost the entire year on a continuance budget. This budget was restraining, and the ability of government ministries to initiate contractual associations with new entities, and even to exhaust the budgetary coverages permitted by law, under such conditions was limited. (For more discussion of this, see Chapter 6.)

In the background to these developments, the focus of public expenditure to finance dealing with the COVID-19 crisis changed during the year. Expenditures on the safety net that was intended to support businesses and households declined significantly in the second half of the year, but expenditures on public health remained high. These included the financing of the vaccination campaigns and testing, and a budgetary increase to help the over-encumbered healthcare system function. Public expenditure on healthcare thus totaled 6.1 percent of GDP in 2021, compared with 6.2 percent in 2020 and 5.4 percent in 2019. Due to the uncertainty regarding morbidity and its impact on economic activity, including on government revenue, the budget approved by the Knesset in November included the allocation of a general reserve of NIS 10 billion for COVID-19-related expenses.

Government revenue increased by 2 percent of GDP in 2021 relative to 2019, so that the increase in revenue this year more than compensated for the decline in 2020. (Relative to 2020, revenue increased by 2.3 percent of GDP.) The increase in revenue at the beginning of the year compensated for the low revenue—due to low activity—in 2020, while consumption accelerated and the employment gap narrowed. The recovery of economic activity and the anomalous growth of revenue from land taxes (on real estate transactions) and capital gains taxes (in respect of corporate debt issuances, IPOs, and mergers, as well as purchases in the high-tech sector) during the year led to a further significant increase in tax revenues compared with 2020. The increase in tax revenues in 2021 was also prominent relative to other countries. This was particularly true regarding direct taxes, but also regarding indirect taxes. The unusual tax revenues in Israel are not explained only by improved macroeconomic activity, but also by an exceptional increase in the export of high-tech services and by increased activity in the housing market. These effects of these factors on tax revenue may be temporary, so caution must be exercised in interpreting them as long-term factors that increase revenue. Table 6.1 contains more information on this issue.

Thanks to the reduction in expenditures and the increase in income, the central government's budget deficit declined from 11.4 percent of GDP in 2020 to 4.4 percent of GDP in 2021.[10] The debt-to-GDP ratio declined from 71.7 percent at the end of 2020 to 68.9 percent at the end of 2021, and the net debt ratio reached an even lower level—65.1 percent of GDP. This is in contrast with the expectations at the beginning of the year that the debt-to-GDP ratio would increase.[11]

The recovery of activity during the first half of the year made it clear that the time was right to return to dealing with issues related to sustainable growth. When the new government was formed, the Bank of Israel submitted a program to it that includes a variety of recommendations regarding long-term actions to deal with the fundamental issues related to productivity in the economy in four areas:

[10] The deficit of the broad government in 2021—5.5 percent of GDP—was significantly lower than it was at the end of 2020 (11.5 percent of GDP).

[11] For instance, in the Bank of Israel *Annual Report* for 2020, the debt-to-GDP ratio forecast for 2021 was 77 percent. The Ministry of Finance published an identical forecast during that period (Multiyear Budget Plan for the Years 2022–2024, p. 29, March 2021).

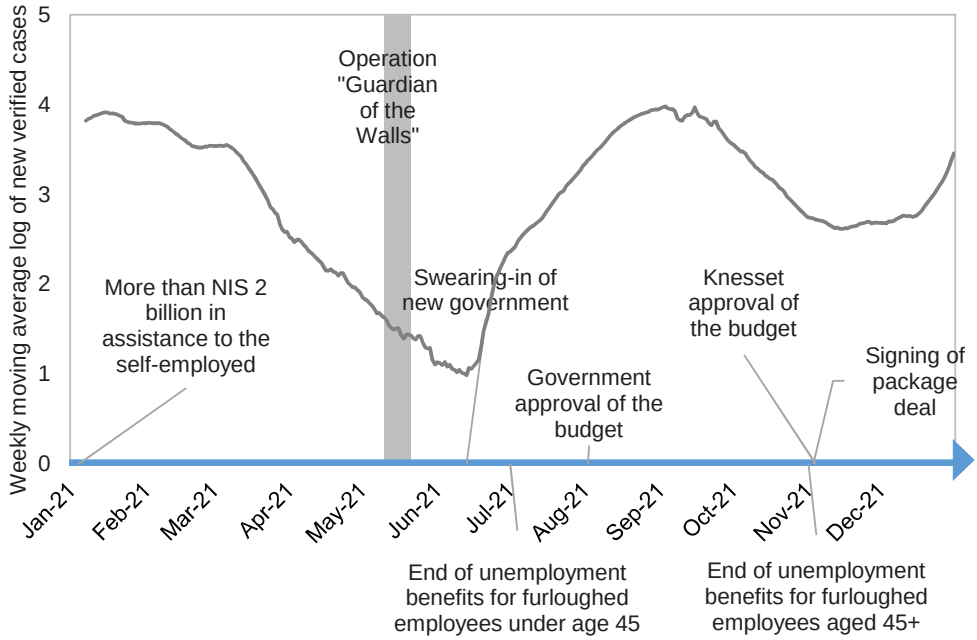
development of human capital; investment in physical and technological capital and in infrastructure; development of the financial system; and optimizing regulation and the use of technology to make the government's work more efficient. The program included a fiscal framework for financing the recommended measures. Most of the measures and courses of action included in the program are not new. Rather, the program provides a concentrated excerpt of recommended actions to support the development of the economy, presented by the Bank of Israel in its role as economic advisor to the government, in broad consultation and cooperation with various entities in government ministries. Most of the measures recommended as part of the program appear in Chapter 6 of this Report, where we note the measures that have already found expression in the current budget.

The budget frameworks that were approved for 2021 and 2022—deficit target and expenditure limit—were expanded relative to the fiscal rules that were in the law prior to the crisis, to levels that were intended to avoid fiscal tightening—other than the abatement of direct expenditures to deal with the COVID-19 crisis that could have slowed the economic recovery—while also avoiding an increase in the structural deficit that would have made the conduct of fiscal policy in the future more difficult. Compared with the budget for 2019—the last year for which a budget that was not influenced by COVID-19 was approved—the 2022 budget reflects a decline in the defense budget as a share of GDP, continuing the multiyear trend, alongside a marked increase in the budget for infrastructure investment, as a result of the maturation of programs that were advanced in recent years. The budget, which was approved by the Knesset in November, contains additional measures supporting sustainable growth and increased productivity, including a five-year plan for Arab society, and measures to develop public transit, improve the quality of the education system, and optimize government regulation. In addition, the Economic Arrangements law includes measures with long-term implications for the budget of the broad government—raising the retirement age for women, and replacing earmarked bonds with a yield-guarantee mechanism for the pension funds. (For more information on this topic, see Chapter 4.)

The budget frameworks that were approved for 2021 and 2022—deficit target and expenditure limit—were expanded relative to the fiscal rules that were in the law prior to the crisis. The budget, which was approved by the Knesset in November, contains measures supporting sustainable growth and increased productivity.

In November, a "package deal" was signed between representatives of the government, labor, and employers. Among other things, it contained a gradual increase in the minimum wage to NIS 6,000 a month by 2026. The minimum wage is being increased after having remained at NIS 5,300 a month for the past four years, following an increase pursuant to the previous package deal and not through its normal increase mechanism that is based on the average wage. Starting in 2026, the minimum wage will return to its update mechanism pursuant to the law—47.5 percent of the average wage. Despite the agreed increase, it is expected—according to the analysis in Box 5.1 of this Report—that during the agreement period, the minimum wage will erode relative to the average wage, as influenced by the expected recovery of activity in nontradable industries that suffered from restrictions. As such, its increase is not expected to hamper employment.

Figure 1.7
Main Fiscal Policy Events, 2021



SOURCE: Based on "COVID-19 in Israel - General Picture (Dashboard)", Ministry of Health.

f. Inflation and monetary policy

The Consumer Price Index increased by 2.8 percent in 2021, the highest increase in the past decade, after declining by 0.7 percent in 2020. Despite the increase, inflation remained within the target range, and was low by international comparison (Chapter 3). The increase in inflation in Israel, and more so in many other countries, has to do with both domestic and international processes that are related to the recovery of economic activity from the COVID-19 crisis. Throughout the crisis, government support through fiscal policy and Bank of Israel support through monetary policy moderated the impact on household income. As such, once the restrictions on activity were removed, there was a rapid increase in demand for nontradable goods and services, including for those whose consumption was particularly interrupted by the pandemic, and in demand for tradable goods. The increase in demand varied across industries, and also over time since it was affected by periodic restrictions that led to irregularities in its development. (For more information on this, see Chapters 2 and 3.) The supply of tradable goods was interrupted by production difficulties around the world that resulted from the pandemic, as well as by severe interruptions in international shipping that also led to price jumps. These led to shortages of raw materials and to price increases for oil and other commodities, which were mainly rolled over to the tradable components of the Consumer Price Index. The shekel's

The Consumer Price Index increased by 2.8 percent in 2021, the highest increase in the past decade, but inflation remained within the target range, and was low by international comparison.

appreciation during the year moderated the increase in inflation in Israel through its effect on import prices.

The emphases of monetary policy changed over the course of the year, in accordance with developments in the domestic and international economic environment.

The emphases of monetary policy changed over the course of the year, in accordance with developments in the domestic and international economic environment. The policy that was conducted at the beginning of the year emphasized support for economic activity and maintaining the proper functioning of the credit market, in view of the high morbidity level and the tremendous uncertainty at that time. The programs operated during the COVID-19 period in 2020, which were intended to ease the terms of credit in the economy, continued in the first half of 2021, although at a slower pace. These included government bond purchases—a program that began in 2020 with the aim of moderating bond yields in the market and easing the costs of long-term credit for firms and households; and the provision of long-term loans to the banking system for the provision of credit to small and micro businesses that were hard-hit by the crisis. In the second half of 2021, the Bank of Israel decided to end these special programs.

The Monetary Committee's assessment throughout the year was that the forces working to increase inflation included temporary components. Inflation in Israel remained within the target range during the year, as did short-term and longer-term inflation expectations.

Similar to other central banks, the Bank of Israel Monetary Committee's assessment throughout the year was that the forces working to increase inflation included temporary components. However, in contrast with other countries, inflation in Israel remained within the target range despite its increase during the year, as did short-term and longer-term inflation expectations. Eight interest rate decisions were made during the year, and in all eight the Monetary Committee left the interest rate unchanged at 0.1 percent. Other monetary policy tools, mentioned above, were also used. In view of the inflation expectations that increased, monetary policy was reflected in a sharp decline of real yields.

In mid-January, in view of the increase in unemployment influenced by the third lockdown, and the negative inflation at that time, the Monetary Committee announced a program to purchase bonds at an unprecedented volume of $30 billion, with the aim of moderating the appreciation of the shekel, mainly in order to support export and import-alternative industries, and through them economic activity. The program ended in October, but due to the continued appreciation and in view of a further wave of morbidity toward the end of November, the Bank continued purchasing a further $4.8 billion until the end of the year. During 2021, the shekel appreciated by 7.9 percent in terms of the nominal effective exchange rate, by about 3 percent against the US dollar, and by about 11 percent against the euro. These rates of appreciation were high by international comparison against many currencies (Chapter 3). The appreciation was supported by a continued large current account surplus (Table 1.1), significant capital raised in the high-tech industry (which is discussed in Section 3 of this Chapter), and a marked increase in the value of the institutional investors' asset portfolio abroad, which led to adjustments in the composition of that portfolio (Chapter 4).

g. Credit, the financial system, and the housing market

The ability to raise credit returned to its precrisis level, other than in industries that have not yet recovered from the crisis.

Private debt (of households and businesses) increased in 2021 by a high rate compared with previous years. According to the Central Bureau of Statistics Business Tendency Survey, the ability to raise credit returned to its precrisis level in most industries, other than those that have not yet recovered from the crisis such as the hotels industry. This industry continued to experience difficulties in raising credit during the year, and was also prominent in terms of its requests for assistance from State-backed funds that were operated during the crisis. The recovery of real activity and the increase in asset prices led to increased demand for credit during the year, alongside the tapering of the special programs operated during the COVID-19 period—State-backed funds and the Bank of Israel's monetary loans to the banks, which were intended to reduce the costs of credit to small businesses. In parallel, the balance of deferred debt approved during the COVID-19 period declined during the year, partly due to the end of the approved deferral period. Large businesses led the raising of business credit both through the banks and through nonbank channels.

Equity prices increased, which led to a swelling wave of IPOs that began in 2020. A record 93 companies held IPOs on the Tel Aviv Stock Exchange, raising a total of about NIS 10.5 billion. The total volume of capital raised (new issues and traded companies) reached a record high of about NIS 26 billion. The rapid growth of demand for technology and the low interest rate environment supported the capital-raising of companies in the high-tech industry, which comprised about 65 percent of the new companies raising capital on the Tel Aviv Stock Exchange. (For more information on the link between capital issues and activity in the high-tech industry, see below in this Chapter.) This is a new development, as in previous years, Israeli high-tech companies tended not to issue shares on the Tel Aviv Stock Exchange. However, even at the end of 2021, the total capital they raised in Tel Aviv remains lower than the total raised in the US.

Transactions in the housing market accelerated in 2021, further to the awakening of the market that began in the second half of 2020. So did housing prices: Home prices increased by 13.0 percent, and rents increased by 3.3 percent. The acceleration in the number of transactions following a drop at the beginning of the crisis and a number of years when the trend was rather static. An analysis presented in Chapter 9 of this Report shows that the main factors in the increase in prices in 2021 were increased demand by first-time homebuyers, which moved to the open market following the cancellation of the "Buyer's Price" program[12], and investors, who were influenced by the reduction in the purchase tax imposed during the second half of 2020 and by the announcement of the expected cancellation of the reduction toward the end of 2021. In view of the acceleration of housing prices and of the number of transactions, households' housing debt increased sharply, with an increase in average mortgage

[12] And its replacement with two new housing programs, "Reduced Price" and "Target Price 2.1", which also support the increase of home ownership through intervention on the supply side, but do so through a more progressive mechanism.

size. The construction and real estate industries had a particularly high growth rate of outstanding bank and nonbank debt, and this increase in their debt was a significant part of the increase in business credit.

h. Global processes

In 2021, there was increasing international attention to processes that require global cooperation, such as reducing carbon emissions and international taxation as a response to the challenges derived from the globalization and digital transformation of the economy.

International cooperation is necessary for handling challenges that concern many countries. Individual countries don't necessarily internalize the effects of these issues, and their particular considerations may actually lead to isolated action that may harm the global interest. One example of an international issue where the interests of individual countries actually coincided with the global interest was the need for international cooperation in learning about the COVID-19 pandemic, its effects, and how to stop its spread. The importance of such cooperation was proven, for instance, in the process of approving vaccinations by the pharmaceutical authorities and the accumulation of scientific experience following their use, and less so regarding the increase in vaccinations rates in emerging countries. In this context, the long-term investment in scientific research and development, and the cooperation of research institutes and health authorities from different countries, proved their importance. In contrast, the process of obtaining a sufficient amount of vaccinations for each country was characterized by individual behavior.

In 2021, the United Nations Climate Change Conference (COP26) was held in Glasgow, Scotland, to discuss reducing global carbon emissions. The international handling of the climate crisis exposes the tension that exists in a small country such as Israel, where the impact of the climate crisis is minor, between taking part in the implementation of international guidelines and the risks to energy security and the costs inherent in it. This tension is serious in Israel, because the only source of renewable energy that is available in the country using existing technology is solar energy, and broadly relying on solar energy poses a challenge for energy security since it requires the use of energy storage technologies. The existing storage technologies are problematic since they do not enable large volumes of storage for prolonged periods (for instance from one season to another), and the economic and environmental costs of storage are high. The reduction of energy consumption in Israel is also particularly challenging due to the rapid growth of the population. An analysis of climate issues in Chapter 7 shows that Israel can expect complex challenges on the road to meeting the emission reduction targets it took on. One of the tools that can help achieve this goal efficiently over time is a carbon tax. Such a tax can correct the market failure in the energy field, be beneficial for the renewable energy industries, and encourage the market to reduce emissions in the most efficient manner, including through investment in the development and implementation of new technologies.

In July 2021, 134 countries responsible for more than 90 percent of global GDP reached a historic agreement on an international taxation reform. The agreement is intended to provide a response to tax challenges derived from the globalization and digital transformation of the economy, partly through the imposition of a minimum

global tax on the profits of large multinational corporations. Tax collection ability was significantly harmed in recent decades due to the expansion of the use of digital infrastructures and intangible assets. These processes create greater incentives and more options for tax-payers, particularly multinational corporations, to engage in tax planning through the international transfer of resources and profits in order to minimize their total tax liability. There are two pillars to the tax agreement. The first concerns the issue of international distribution of business profits, mainly those connected with digital activity, and the second is intended to ascertain the payment of a minimum tax in every field in which multinational corporations operate. Box 6.3 discusses the agreement, its international significance, and its impact on Israel.

PART TWO: INDICATIONS OF COVID-19'S TECHNOLOGICAL FOOTPRINT IN 2021

a. Technology's advantages for the economy

The use of technology moderated the impact of COVID-19 in some industries, by allowing economic and social activity to continue, at least partially, despite government-imposed restrictions. The education system's transition to a remote learning framework, the expanded use of telemedicine in the healthcare services, the expansion of telework arrangements, businesses' use of the Internet, and the expanded availability of online government services, which were used to communicate with the public during the pandemic, are all examples of this. Insofar as technological assimilation persists and expands, it may have deeper long-term effects on labor productivity, on the way various services are provided, and on consumers' well-being. In this section, we present indications of the extent of acceleration in the use of online technologies during the COVID-19 period and its persistence in selected fields up to the end of 2021.

The use of technology moderated the impact of the pandemic by allowing economic and social activity to continue, at least partially, despite government-imposed restrictions.

The widespread use of online technologies advances innovation, growth, and the well-being of the population. Basic economic models for long-term growth attribute a significant part of the explanation for growth to technological advances that may substantially improve overall productivity.[13] Based on this theory, studies have found that introducing broadband infrastructure contributes to economic growth[14], as industries that rely more on information and communications experience greater growth.[15] The use of broadband Internet connections at workplaces was found to be a complementary factor that improves the labor productivity of skilled workers

[13] R. M. Solow (1956). "A Contribution to the Theory of Economic Growth", *The Quarterly Journal of Economics*, 70(1): 65–94; P. M. Romer (1990). "Endogenous Technological Change", *Journal of Political Economy*, 98(5), Part 2, S71–S102.

[14] M. Mings (2015). "Exploring the Relationship between Broadband and Economic Growth", *World Bank*.

[15] J. Kolko (2012). "Broadband and Local Growth", *Journal of Urban Economics,* 71(1): 100–113

in nonroutine jobs, and substitutes for unskilled workers.[16] Technology may also improve consumers' resource allocation (time and money) and expand the variety of products, services, and interactions, thereby contributing directly to the well-being of the population. A fast and stable Internet infrastructure is essential for expanding the use of these technologies in a variety of fields, and a broader and more high-quality infrastructure network will benefit a broader share of the population. In this context, it is worth noting the deployment of fiber-optics that is being advanced in Israel as per Amendment 74 to the Communications Law, which was passed in January 2021, under which there will be at least one license holder in each area who is obligated to deploy an advanced communications network.[17]

Table 1.2
Internet use - Main data by population and age groups

2020 data, as a share of the population in that rubric

	Age	Non-*Haredi* Jews	*Haredi* Jews	Arabs
Internet users by computer or mobile phone	25-64	98	66	92
Have a connection at home	25-34	95	43	71
	35-44	94	45	79
	45-54	96	46	73
	55-64	91	42	70
Internet users by mobile phone	25-34	98	31	98
	35-44	98	28	95
	45-54	97	38	88
	55-64	91	41	78
Proficient in Internet use in their day-to-day lives	25-34	95	51	84
	35-44	93	51	72
	45-54	87	41	52
	55-64	74	38	36
Believe that digital skills are life skills	25-34	89	53	91
	35-44	92	56	91
	45-54	93	55	74
	55-64	86	56	71

SOURCE: Central Bureau of Statistics Social Survey, 2020.

[16] A. Akerman, I. Gaarder, and M. Mogstad (2015). "The Skill Complementarity of Broadband Internet", *The Quarterly Journal of Economics*, 130(4): 1781–1824

[17] According to the program outline, Bezeq was allowed to choose the areas in which it would deploy and operate an advanced network. According to Ministry of Communications data, Bezeq chose areas in which about 82 percent of households in Israel live, while a designated fund to encourage the deployment was established for the deployment in the rest of the country—mostly among Arab communities.

Social Survey data show that a high proportion of the Israeli population used the Internet for various needs in 2020—about 92 percent of Arabs aged 25–64 and almost all non-*Haredi* Jews in that age range (as well as 66 percent of *Haredim*). However, in terms of how connection type—which has an impact on its stability and speed—there are differences between the population groups in the end-user equipment they use to access the Internet and in the extent to which they perceive digital skills as basic, which has an impact on the special importance they attribute to digital skills. Table 1.2 shows the differences between the population groups according to age breakdown, using these dimensions. The gaps are partly due to disparities in the quality of the communications infrastructure deployed in residential areas and to differences in the public's ability to conduct activity remotely ("the digital divide") due to language and digital literacy difficulties that differ across age and population groups. These reduce the assimilation and universality of online services relative to offline activity.[18] During the COVID-19 period, these gaps were reflected in the ability to consume social services provided remotely—for instance education[19] and healthcare[20] services.

b. Selected use of online technologies during the COVID-19 period and up to the end of 2021

The use of online technologies was already prevalent in certain fields before COVID-19, and in others it accelerated during the pandemic.

The use of online technologies was already prevalent in certain fields before COVID-19, and in others it accelerated during the pandemic. Below we present the trends in the use of online applications in 2020 and in 2021 in three fields: credit card use and banking—where digitalization was quite widespread before the COVID-19 period; the government identification system and the government services website—where activity accelerated due to the expanded governmental use of Internet services during the pandemic, continuing a preexisting trend; and telemedicine—a field that was small in scale before the pandemic and expanded during the lockdowns. Box 1.1 expands the discussion on telework, which restrained the pandemic's impact on the labor market and on businesses, and became a major issue in labor arrangements in 2021.[21]

The use of digital means to make credit card payments (card-not-present payments) and to make banking transactions through "direct channels" that do not require the involvement of a teller was considerable even before the pandemic. The broad use

[18] Chapter 8 provides an in-depth analysis of the differences between population groups in the use of financial and banking applications.

[19] S. Bahar (2020), "Special Analysis by the Bank of Israel Research Department: The Education System in Israel". This addendum to the Bank of Israel *Annual Report* for 2019 contains three articles: "Remote Learning Readiness at the Student and School Level—Insights from PISA 2018 and the Household Expenditure Survey", "Achievement Gaps Between Hebrew-Speaking and Arabic-Speaking Students", and "Who Are the Students Who Aspire to be Teachers in Israel: Insights from PISA Tests".

[20] N. Penn, R. Goldwag, and M. Laron (2021). "Use and Barriers to the Use of Remote Health Services among the Arab Population in Israel", Research Report, Myers JDC Brookdale.

[21] For instance, the Package Deal that was signed in November included an agreement in principle regarding the promotion of telework in the public sector as a permanent arrangement.

of electronic means of payment, including credit cards, is one of the objectives of the reform to reduce the use of paper-based means of payment (cash and checks). The reform, which has been promoted for a number of years by the Bank of Israel's Payment and Settlement Systems Department together with others, is intended to reduce the unreported economy and to increase the level of security and innovation in the payment systems.[22] As such, there was a continuing upward trend in the use of digital means of payment, including credit cards, even before the pandemic, and expenditures using such means increased by an average of about 8 percent per year between 2017 and 2019—higher than the increase in expenditure on private consumption in those years (Table 1.1).

During the period of lockdowns, the upward trend in card-not-present transactions[23] as a share of credit card transactions accelerated (Figure 1.8). Online commerce and phone transactions replaced payment at the merchant's premises, and made it possible to conduct commercial activity despite the closure of businesses to customer reception. In the second half of 2021, the expenditure in card-not-present transactions as a share of all credit card transactions stabilized at a higher level than in the second halves[24] of 2018 and 2019, which reflects an annual growth rate similar to that between 2018 and 2019.[25] An international study[26] that does not include Israel found patterns similar to those we found regarding Israel in the rate of card-not-present transactions: During 2021, the intensity of the shift to online purchases abated relative to the peak restrictions period. The study indicates two interesting findings. First, during the lockdowns, the rate of online purchases increased more in countries where it was higher to begin with. Second, the decline in the rate of online commerce when mobility restrictions were removed differed between industries, with the high rate of such purchases remaining in place in industries where activity remained restricted.[27]

Banking activity through "direct channels"—websites, mobile applications, automatic self-service stations, and phone service—already accounted for more than half of all banking transactions in 2019. This trend was partly due to the expanded availability of options for conducting such activity, and to the reduction in the number of bank branches. Figure 1.9 shows that while the upward trend in the use of direct channels was significant even before the pandemic, the use of such channels

[22] Bank of Israel (December 2021). *Overview of the Payments System in Israel*, Payment and Settlement Systems Department.

[23] Card-not-present payments include cases where the payment data do not come from the card itself: phone transactions, Internet transactions (on Israeli sites), and payment by standing order.

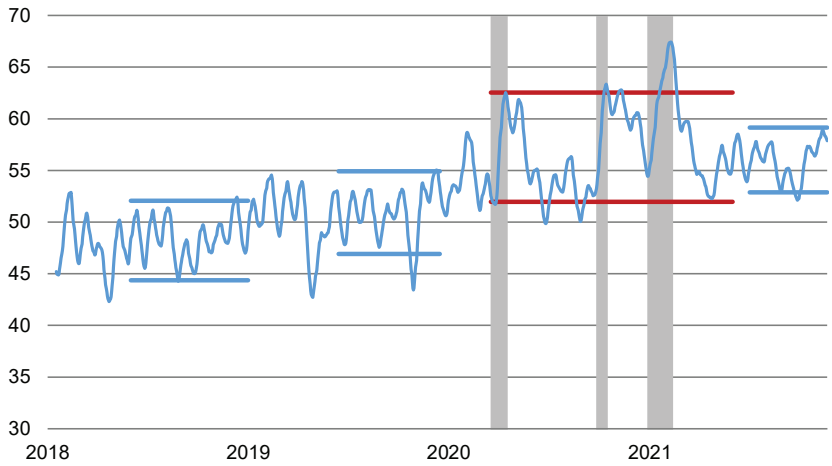
[24] Credit card usage data divided by card-present or card-not-present are not seasonally adjusted since the series is too short. In order to overcome this statistical issue, we compare parallel periods in different years.

[25] The increase between 2018 and 2019 was 5.3 percent, and the increase between 2019 and 2021 reflects annual growth of 5 percent.

[26] J. Alcedo, A. Cavallo, B. Dwyer, P. Mishra, and A. Spilimbergo (2022). "E-Commerce During Covid: Stylized Facts from 47 Economies", National Bureau of Economic Research No. w29729.

[27] The data that we used for the analysis do not present an industry distribution of purchases with or without the card being present, so that we cannot assess whether the development of the composition of expenditure and of the use of remote payment technologies differ between industries.

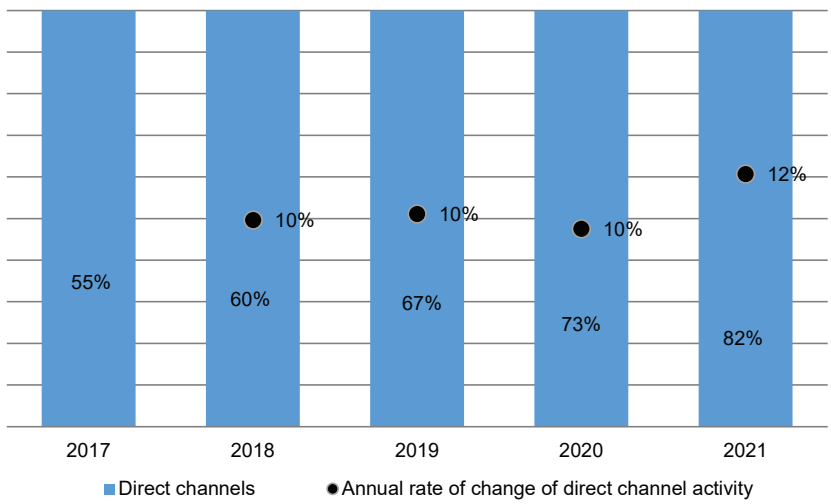
Figure 1.8
Card-Not-Present Transactions as a share of Total Credit Card Transactions*, 2018–2021 (percent)



* Settlement in Israel (including tourists' payments in Israel, and excluding Israelis' expenses abroad, including over Internet sites). The share of transactions shown is the 14-day moving average of the original series. The horizontal lines indicate the 10th and 90th percentiles of the series values: The blue horizontal lines indicate those percentiles for the second halves of 2018, 2019, and 2021. The red lines mark those percentiles from March 17, 2020 (start of the first lockdown) until May 30, 2021. The gray shading indicates the lockdown periods. Card-not-present transactions include phone transactions, online transactions (in Israel), and standing orders.

SOURCE: Based on SHVA.

Figure 1.9
Household Banking Activity Through Direct Channels and at Branches as a Share of all Banking Activity*, 2017–2021 (percent)



* "Direct channels": Websites, smartphone applications, automatic self-service stations, and telephone call centers (including phone response by a teller at the branch). Activities: transfers, check deposits, ordering checkbooks, credit issued, deposit/withdrawal of deposits, purchase and sale of securities.

SOURCE: Reports by the five largest banks to the Banking Supervision Department.

increased even more between 2020 and 2021, reaching about 80 percent of all banking transactions by the end of 2021. At this stage, the data do not allow us to examine whether the expanded use of direct channels included population groups that were not accustomed to using such channels, such as the Arab population. (A discussion of this topic appears in Chapter 8.)

During the COVID-19 period (2020–2021), the use of government ministry websites increased significantly. The government services and information website (gov.il) served as a leading channel for government provision of information and services to the public on various issues having to do with the COVID-19 pandemic, including unemployment benefits, COVID-19 reporting to the Ministry of Health, Israel Tax Authority grants to the self-employed and to employers, and State-backed loans. During the period, the number of enquiries (by phone and via the Internet) to the site's support center doubled—attesting to the marked increase in its use even among population groups that were not accustomed to doing so beforehand.[28] This was reflected in a sharp increase in the number of people using the personal and business areas of the site in 2020 and 2021, and in an accelerated increase in the number of people registered in the national identification system—a trend that began between 2018 and 2019 (Figure 1.10).[29] The growth in the use of the government Internet services was also affected by the expansion of services offered over this platform, which was partly due to the continued transfer of content from government ministry websites to the gov.il website.

The increased digitalization of healthcare was tagged a few years ago as a strategic issue for the Israeli healthcare system.[30] Digital innovation is integrated into various aspects of medicine for the optimal management of the system's resources: advanced monitoring and communications equipment; information management, sharing, and analysis for research, morbidity forecasting, and preventive medicine; improved organizational infrastructure; changing the methods of medical care, and so forth. One of the components of this process is remote medicine, or telemedicine[31]—doctor-patient interactions that are not conducted in physical proximity. Using technological means that are already in use to some extent, telemedicine may increase the accessibility of medical services to people who live in distant locations, expand the operating hours of medical services, and save manpower and other resources.

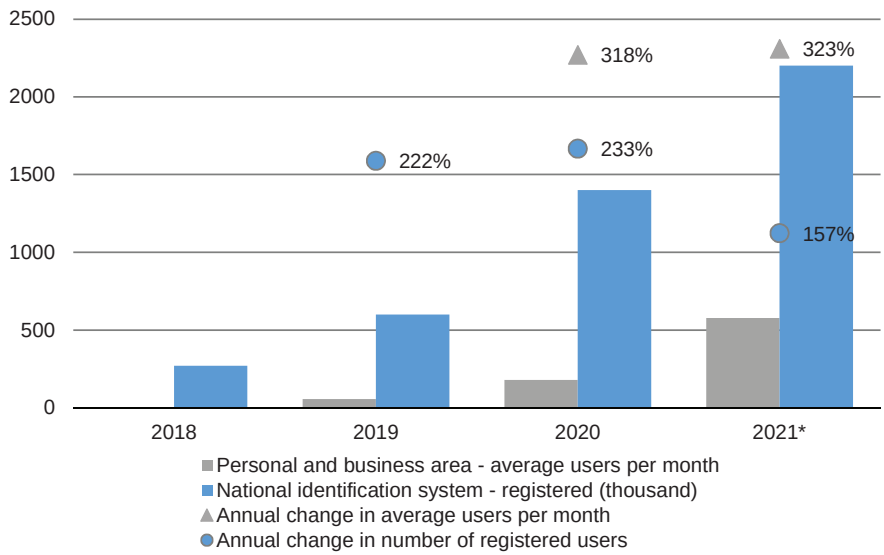
[28] Ministry of Cyber and Digital Matters, Government ICT Authority (2021), "Government ICT—Overview of Activity in 2020", p. 30. The ICT Authority's activity essentially supported every computerized aspect of government ministries during the COVID-19 period, including the organization and distribution of information, support for telework at the various government units, and the operation of websites, online forms, and more.

[29] This system enables the operation of government services by online means after identification with a high security level, including services that are enabled only by identification before a clerk, and the use of the "citizen's personal area". These all enable the provision of client-tailored services and the presentation of all citizen interfaces with the government in one place.

[30] Ministry of Health (2017). "Digital Health—Strategy".

[31] For more information on the nature of telemedicine and the trends prior to the pandemic, see Glazer (2021).

Figure 1.10
Those Registered in the National Identification System, and Those Using the Personal and Business Areas on Gov.il Platforms, 2018–2021 (thousand)



* The data for 2021 are until the end of November.
SOURCE: Based on Government ICT Authority.

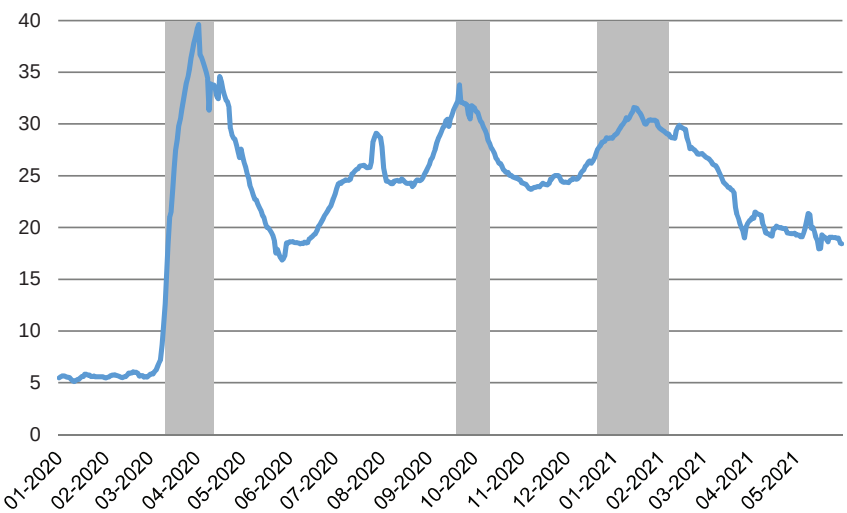
These technologies also help the healthcare system deal with large changes in demand for medical services resulting from the aging of the population and increased chronic morbidity, and in the preferences of healthcare service consumers. However, telemedicine may give rise to concerns, such as harm to the quality of the diagnosis and the medical treatment, and the exclusion of population groups with low digital literacy. In addition, the operation of telemedicine requires organizational changes and comprehensive handling of regulation, including the definition of what services are considered telemedicine, regulating legal responsibility, and setting payment arrangements for the services. Other concerns that must be dealt with have to do with increased burdens on the healthcare system due to increasing "moral hazard", which may be reflected in a greater use of healthcare services that will become more accessible, and "adverse selection"—the service providers' preference of digital consumers, who may be younger and healthier.

The use of telemedicine as an integral part of public healthcare services was quite modest until the first quarter of 2020, prior to the start of the pandemic. In March 2020, the Ministry of Health instructed the health services organizations to give preference to the remote provision of medical services over physical visits to the clinics. With the start of the pandemic, the healthcare system was required to turn strategic plans into work plans within a short timeframe. The use of telemedicine tools was accelerated,

making it possible to examine the changes necessary to make it a broad arrangement, and indicating the growth potential of this technological field.[32]

A study conducted using data from Clalit Health Services[33] shows the use of telemedicine in Israel during the COVID-19 period.[34] The study shows that in the first months of 2020, only 6-7 percent of initial visits to the doctor were "remote" visits—generally by phone or video. During the first lockdown period, in March–April 2020, this rate climbed to 30–40 percent, and during the second quarter of 2021, it stabilized at about 20 percent. The dramatic increase in the rate of those having initial appointments remotely during the first lockdown in Israel made it possible to examine[35] the quality of remote medical treatment and its usage patterns. The ability to refer to telemedicine was found to have slightly increased the rate of those going for initial appointments, but those appointments were offset by the shorter duration

Figure 1.11
Remote Appointments as a Share of Total Appointments with Pediatricians and Family Physicians*, 2020–2021 (percent)



* The blue line represents the moving average rate of remote visits as a share of daily visits to family physicians and pediatricians among "Clalit Health Services" subscribes. The gray areas indicate the lockdown periods (periods in which there were other restrictions are not indicated).
SOURCE: Based on Zeltzer et al. (2021).

[32] K. Glazer (2021), "Implications of the COVID-19 Pandemic for Telemedicine—Challenges and Opportunities", *Innovations in Management* (8), Collar Faculty of Management, Tel Aviv University.

[33] D. Zeltzer, L. Einav, J. Rashba, and R. D. Balicer (2021). "The Impact of Increased Access to Telemedicine", National Bureau of Economic Research working paper No. w28978.

[34] Another source that shows the increase in the number of phone consults with pediatricians in the Maccabi health fund during the COVID-19 period is Z. Grossman, G. Chodick, S. M. Reingold, G. Chapnick, and S. Ahskenazi (2020), "The Future of Telemedicine Visits After COVID-19: Perceptions of Primary Care Pediatricians", *Israel Journal of Health Policy Research*, 9(10): 1–10.

[35] This is only a preliminary examination—first because it is not adjusted for the effect of sorting of service providers to those that enable telemedicine and those that do not; second because it focuses on the short-term effect; and third because the means of telemedicine that the examination takes into account are relatively poor—telephone and video use only.

of treatment, such that the total cost per insured client dropped slightly.[36] A survey conducted among the Arab population in Israel (excluding the Beduin communities and Arabs from eastern Jerusalem) regarding the use of telemedicine during the COVID-19 period found that the main barrier to the use of remote healthcare services was a lack of awareness that the services existed (Penn et al., 2021).

BOX 1.1
TELEWORK BY EMPLOYEES IN 2021

- Telework, which expanded greatly during the COVID-19 crisis, moderated the pandemic's impact on employment and on economic activity. It is therefore of great importance during this period.
- Telework during COVID-19 was widespread in industries that had not been accustomed to it beforehand, for instance the public sector. This made it necessary to overcome a lack of equipment, improve infrastructure, and change work methods.
- From the second quarter of 2021, the rate of employees who engaged in telework declined in all industries. The extent of telework was higher than average in the high-tech, professional, scientific, and technical services, financial services, and insurance industries. Beyond occupation and economic industry, those with academic education, women, parents with children up to age 10, Jewish (compared to Arab) workers, and those living in the center of the country generally had higher shares of teleworking.
- The change in telework possibilities and its extent following the COVID-19 period may change the geographic dispersion of economic activity, including in distances between such activity and employees' residential locations, and in the spatial distribution of commercial activity.

The benefits of telework and its function during the COVID-19 period

The expansion of telework that took place in many OECD countries during the COVID-19 lockdowns and restrictions in 2020 and 2021 enabled business continuity in many workplaces (Ker et al., 2021). The transition to telework was mainly suitable for workers who use technological means, such as computers, in doing their jobs, and workers with greater autonomy. The transition was made easier by previous experience and the prior adoption of technologies enabling telework, such as cloud services, communication networks, and supporting legislation (OECD, 2020).[1] Economic industry, occupation, education, and the employee's contractual attachment to the employer were found to be correlated with

[1] Such legislation existed, for instance, in England even before the pandemic (Ker et al., 2021). In Germany before the pandemic, some firms adopted a Trust-Based-Work approach that gives employees greater flexibility in work hours and in measuring productivity based solely on output (OECD, 2020). Before the pandemic, Denmark, the Netherlands, and Belgium led in the rate of salaried employees who integrated telework on a regular basis (Pabilonia and Vernon, 2021).

[36] It is important to note that the cost calculation was done in a situation where there was no change in how doctors are paid due to the transition to telemedicine. As such, it appears not to reflect the full savings that may be achieved through these means.

the extent of telework (Adams-Prassl et al., 2022). Telework moderated the pandemic's impact on employment and on economic activity, which gave it great economic importance during this period.[2] Businesses whose activity was not considered essential during the COVID-19 period and that could not enable telework, such as some manufacturing industries, transportation, trade, and culture, operated on partially throughout the period, and their operation, including employment, were completely shut down periodically. Thus, the variation in teleworking ability led to differences in how the crisis affected employees and employers who had this option and those who did not (Box 2.1, Bank of Israel Annual Report for 2020).

The advantages of telework were particularly prominent during the pandemic, but they are quite numerous during routine times as well. Despite this, there was relatively little implementation of telework arrangements prior to the crisis, even though the technology existed. Telework may expand labor markets to geographically more distant areas, increase labor force participation among population groups with low participation, including people with disabilities, and improve matching opportunities between employees and employers. It reduces traffic during peak hours, but insofar as commuting to work is replaced with travel for other purposes, its overall impact on distances traveled is unclear. Telework may also improve the allocation of employees' time between work, household tasks, and leisure activity, since it saves time on getting to work and enables flexibility in time allocation during the day. In this context, expanding telework possibilities may contribute to narrowing gender gaps in the labor market. An empirical study (Arntz et al., 2019) found that the possibility of working from home increases the supply of work hours of mothers relative to fathers. Findings from time-use surveys in various countries further show that telework saves time that would have been allocated to commuting. Fathers who work from home devote more time to childcare, but regarding the impact of their involvement in household tasks, the findings are not unequivocal (Pabilonia and Vernon, 2021).

Another potential effect of telework is developing the local economy in residential areas. Barrero et al. (2021) found that a high rate of work from home may lead to a decline in the consumption of services in city centers and their replacement with consumption in residential areas. Telework may also strengthen community connections, since workers would spend more time at their place of residence. Empirical findings show that potential benefits of telework are reflected in employees' willingness to "pay" in terms of wage for an employment agreement that includes telework (Mas and Pallais (2017); Barrero (2021).

Telework also has disadvantages. It may enhance management problems and make workplace communication—which is important for exchanging knowledge between employees and for employee satisfaction—more difficult. This may eventually harm firms' productivity.[3] In this context, it is worth noting that social contacts created at workplaces are also important for employee well-being. Telework, mainly from employees' homes, may also make it difficult to separate employees' time devoted to work from their time devoted to other pursuits. Cybersecurity is another important consideration against expanding telework.

[2] Based on the findings of surveys in England, the US, and Germany, Adams-Prassl et al., (2020) found that the ability to do a large share of work tasks remotely correlates negatively with the extent of the impact to employment and wages during the COVID-19 period in 2020. Ker et al. (2021) show a positive connection in France between the rate of telework and the volume of activity relative to the normal situation.

[3] A survey of sources on the labor productivity advantages and disadvantages of telework appears in OECD (2020).

Many employers implemented telework practices for the first time during the pandemic. It took effort to enable telework while reducing the negative impact on productivity by providing communications infrastructure, end-user equipment, and technological applications, as well as adapting work methods, organizational communication, and management. Under the circumstances, many employers adopted telework arrangements even with low-productivity employees, and dealt with technological barriers such as poor communications infrastructure and a lack of end-user equipment[4], and with incompatible organizational and administrative systems. In addition, some workers also had to care for children—an environment that is detrimental to telework.[5] Based on Central Bureau of Statistics ad-hoc surveys among employers during the COVID-19 crisis, the Bank of Israel (2021)[6] concluded that for some employers, telework was viewed during the crisis as a necessity that had a negative impact on activity, and they intended to reduce its scope once the crisis was over, but still to leave it higher than it was prior to the crisis.

The scope of telework in the last three quarters of 2021

Studies that used data from other countries indicate a close connection between employee characteristics, economic industry, and occupation, and the percentage of their work tasks that can be done remotely (Adams-Prassl, 2020; Barrero et al., 2021). These studies focus on data from the months in which the restrictions on activity were tight in 2020—a period in which telework was the only way for employees whose work was not deemed essential to perform their jobs. Moreover, Barraro et al. (2021) provide the assessment that following the COVID-19 period in the US, about 20 percent of labor input in terms of days was done through telework, compared with about 5 percent beforehand. It is interesting to examine the volume of telework and the individual and employment characteristics that affect its persistence from the beginning of the second quarter of 2021 until the end of the year—a period in which the COVID-19 restrictions were less tight.

In September 2020, the Central Bureau of Statistics began collecting data on those working engaged in telework at least one hour in the week prior to being surveyed, and we use these data in our analysis.[7] The easing of the COVID-19 restrictions, which took effect following the first quarter of 2021, enabled

[4] The State Comptroller (2021) notes the lack of end-user equipment and defective network characteristics in telework at government ministries during the COVID-19 period.

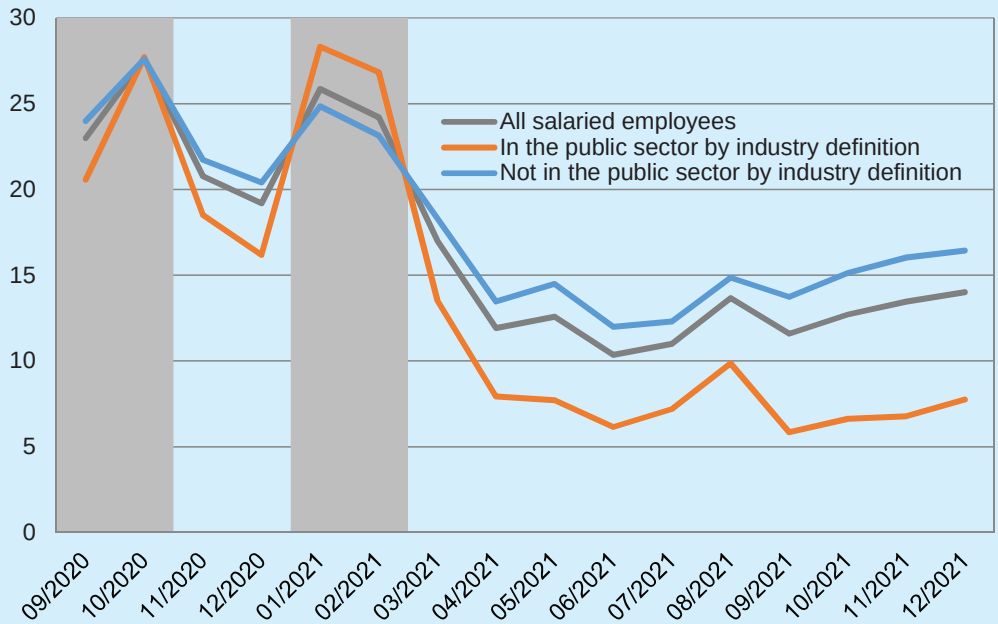
[5] An Israel Democracy Institute survey in April 2020 showed that workers without children managed to work more efficiently from home than those with children. (Israel Democracy Institute (2020), "The COVID-19 Crisis: Working From Home", https://ww.idi.org.il/blogs/special-economic-survey/march-april-2020/31797)

[6] Chapter 1, Section 5: Working from Home During the COVID-19 Period and its Ramifications.

[7] We do not have a proper assessment of telework during the period prior to September 2020. The social survey asked about work from home even before 2020, but the questions had to do with work generally done from home—which apparently account for a small part of employees during routine times, and are mainly relevant to self-employed workers. This analysis focuses on volumes of work that are equivalent to at least one work day per week. The Social Survey data show that in 2019, about 4.5 percent of Israeli workers generally worked from home—22 percent of the self-employed and 1 percent of salaried employees. In the fourth quarter of 2021, according to CBS data, these rates were 27 percent and 9 percent respectively (and 19 percent and 4 percent when considering those who worked entirely from home). However, the questions were formulated differently in the two cases, so that the rates are not necessarily comparable.

activity that included physical proximity and lowered the need for online activity, including telework. The data show a division into two periods (Figure 1): Between September 2020 and February 2021, the rate of salaried employees who teleworked to at least some extent was higher than the rate in previous months, while during the lockdown periods it reached 28 percent. In contrast, from April 2021 onward, together with the increase in employment rates and the expansion of economic activity, the rate of workers who integrated telework declined to an average of 12 percent—14 percent of those employed in the private sector, and 7 percent of those employed in the public sector[8]—and it remained there until the end of the year.[9,10] The extent of telework after the first quarter of 2021, mostly using the hybrid model that combines telework and on-site work[11], reflects a balance of the advantages and disadvantages in telework for employers and employees, while activity in most industries stabilized alongside COVID-19.

Figure 1
Rate of Salaried Employees Aged 25–64 Who Integrate Telework (percent)



"Integrating telework" relates to those who engaged in telework for 7 or more hours in the week that preceded the survey. Distribution into public and private sectors is according to the Central Bureau of Statistics definition.

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

[8] The classification as public sector is based on the Central Bureau of Statistics industry definitions. Employers outside the public sector industries are classified in this box as the private or business sector.

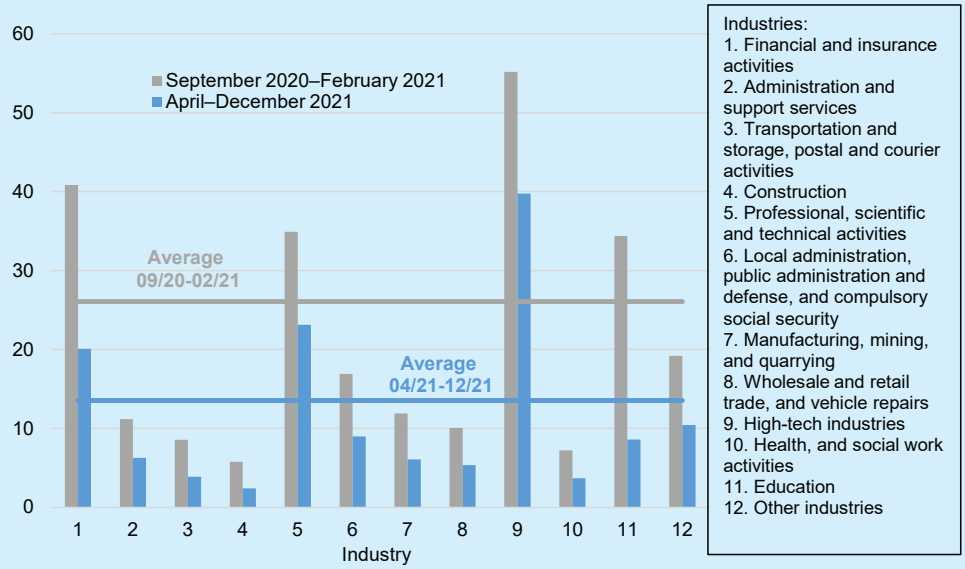
[9] According to Public Service Commissioner data quoted in the State Comptroller's Report (2021), in May 2021 (during the Purple Badge period), 13 percent of work hours in government ministries were from home, and 67 percent of State employees worked from home at least one day during the month.

[10] There was some expansion during the period of security tension in May and during the increase in morbidity in August.

[11] The median number of weekly work hours from home among salaried employees who combine work from home was 18.6.

The data reflect differences between the industries in their tendency to maintain telework arrangements after the peak COVID-19 period (Figure 2), and reflect three things: (1) The volume of telework during the lockdowns in all industries was apparently greater than the optimum (for employers, and perhaps also for employees); (2) Even when telework is not essential, the norms of telework are maintained as part of the terms of employment, apparently because employers benefit from the advantages of telework, including the impact on employee well-being; (3) Telework continued to be used after the lockdowns as a means of regulating crowding at work places in view of the state of pandemic (to wit—the rate of telework increased in August and December, when morbidity rates rose).

Figure 2
Rate of Those Who Integrate Telework by Industry[a,b] (percent)



The analysis relates to those aged 25–64. Self-employed and observations with a missing industry were omitted. "Integrating telework" relates to those who engaged in telework for 7 or more hours in the week that preceded the survey. The industries are presented in ascending order from left to right, according to their weight in employment in 2019.
[a] The high-tech industries include Industries 21, 26, 303, 62, 631, 720, and 721 in the Central Bureau of Statistics Industry Classification.
[b] "Other industries" includes Agriculture, Forestry and Fishing (A), Electricity (D), Water (E), Accommodation and Food Service (I), Information and Communications (J, minus high-tech), Real Estate Activity (L), Arts, Entertainment and Recreation (R), Other Service Activities (S), Households as Employers (T), Extraterritorial Organizations (U), and unknown (X).
SOURCE: Based on Central Bureau of Statistics Labor Force Survey.

The geographic variation in the volume of telework is reflected in Figure 3, which shows the rates according to the Central Bureau of Statistics peripherality index.[12] Low index values reflect a high level of

[12] The index weights the extent of proximity to the Tel Aviv district, which is the business and employment center, and the value of the potential accessibility index. For details on the methodology, see Central Bureau of Statistics (2019), "Peripherality Index of Localities and Regional Authorities—2015",

peripherality, and generally feature relatively low rates of telework. It seems that telework arrangements during the COVID-19 period did not contribute to reducing geographic gaps between the center and the periphery, apparently due to regional differences in the characteristics of employees and firms, which were reflected in the ability to implement such arrangements during the period.

Figure 3
Telework According to the Residential Locality's Peripherality Index

The analysis relates to those aged 25–64. "Integrating telework" relates to those who engaged in telework for 7 or more hours in the week that preceded the survey. The peripherallity index relates to the individual's residential locality. Higher values reflect a lower extent of peripherality.

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

Using regression analysis, we estimated the partial effects of salaried employee characteristics and employment industry in the business sector on their likelihood of integrating telework during the period when the rate of telework stabilized—April 2021 to the end of the year. Table 1 presents the estimation results: Columns 1–4 show the estimation results when the outcome variable is the probability of teleworking, and Column 5 shows the results when the outcome variable is telework hours as a share of total work hours. Holding the other main individual characteristics fixed, women tend to integrate telework by about 2 percentage points more than men. Being a parent of children up to age 10 is estimated to increase the likelihood of teleworking is about one percentage point, while it was estimated

to contribute more to mothers' likelihood of teleworking (relative to fathers), though this result is less statistically significant. Those aged 55–64 tend to engage in telework slightly less than other age groups (by about one percentage point), but when also controlling for education, the differences between age groups disappear. Telework is about 5 percentage points more widespread among those with an academic education (Bachelor's degree or higher) than among those with lower education levels.

In terms of residential district, even after controlling for all salaried employee characteristics, including employment industry, profession, and education, the likelihood of teleworking declines among those living outside the Tel Aviv and Center districts, and is lowest among residents of the North and South districts. This result is maintained even when controlling for the employment district (which is not shown). Moreover, after controlling for all individual characteristics, Jewish employees are about 3 percentage points more likely to integrate telework than Arab employees. The lower probability of teleworking for those living outside the center of the country and for Arab employees may reflect unobserved factors that are not controlled in the regression and are correlated with geographic location—and not necessarily those characteristics themselves.[13] This also shows that telework helped reduce traffic congestion during peak travel hours mainly in the center of the country—where this problem is most evident—and less so in other areas. The differences are maintained even when the sample encompasses all salaried employees (both in the business and public sectors—results that are not shown here). It should also be noted that when controlling for all these characteristics, it was found that women teleworked a greater percentage of hours than men did, particularly among mothers with children under age 10. This differs from the findings of a survey conducted in the US and the UK (Adams-Prassl et al., 2022), and hints that telework was an important part of the working conditions of mothers during the period when activity stabilized alongside the pandemic's effects.

Conclusion

The COVID-19 period led to a revolution in the extent of telework, which was critical in moderating the effects of the lockdowns on business activity and the financial state and well-being of households, and therefore on macroeconomic activity as well. During the last three quarters of 2021, the rate of those integrating telework stabilized at a level lower than during the lockdown periods, but the combination remained a significant work arrangement, particularly in industries and among employees with high productivity. In addition, it enabled flexible employment arrangements in view of the high morbidity that was still prevalent and the restrictions resulting from it. For example, it was an important part of the working conditions of women, particularly mothers with young children.

The differences in telework patterns partly reflect gaps in labor productivity between those who can benefit from this option and those who cannot, and these are correlated with geographic location. Changes in the geographic structure of economic activity, including in the distances between it and employees' places of residence, and in the spatial dispersion of commercial activity, may take a long time. The option

[13] For instance, the level of communication infrastructure or the firm's level of digitalization. It was found that in the northern and southern districts, the latter is lower than in the center or Tel Aviv in the services industries (Be'ery and Esperanza, 2021). A study in the US found the level of digitalization to be positively correlated with the transition to telework during the COVID-19 period, and to be important mainly in non-high-tech industries (Bai et al., 2021).

Table 1: The probability of integrating telework and the volume of telework—estimation results

Business sector employees, aged 25–64, April–December 2021

	(1)	(2)	(3)	(4)	(5)
	The probability of integrating telework				Telework hours as a share of total work hours
Woman	0.022***	0.022***	0.022***	0.020***	0.013***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Has children under age 10	0.010**	0.010*	0.012**	0.012**	0.004
	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)
Woman x **Has children under age 10**	0.015**	0.012*	0.013*	0.012*	0.010*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.005)
Age group (compared to 35–44)					
25–34		-0.002	-0.001	0.000	0.002
		(0.005)	(0.005)	(0.005)	(0.004)
45–54		-0.008*	-0.007	-0.006	-0.005
		(0.005)	(0.005)	(0.005)	(0.004)
55–64		-0.011**	-0.009*	-0.009	-0.003
		(0.005)	(0.005)	(0.005)	(0.004)
Jewish		0.039***	0.028***	0.029***	0.020***
		(0.003)	(0.003)	(0.003)	(0.002)
Residential district (compared to Tel Aviv and the Center)					
Jerusalem and Judea & Samaria			-0.018***	-0.016***	-0.006
			(0.005)	(0.005)	(0.004)
Haifa			-0.032***	-0.032***	-0.017***
			(0.005)	(0.005)	(0.004)
North and South			-0.049***	-0.046***	-0.026***
			(0.004)	(0.004)	(0.003)
Education (compared to those with a Bachelor's and above)					
Up to 12 years of schooling				-0.053***	-0.030***
				(0.005)	(0.004)
Matriculation or nonacademic diploma				-0.050***	-0.027***
				(0.005)	(0.004)
Constant	0.181***	0.158***	0.187***	0.225***	0.143***
	(0.010)	(0.011)	(0.011)	(0.012)	(0.009)
Economic industry fixed effect	V	V	V	V	V
Occupation fixed effect	V	V	V	V	V
Number of observations	39,909	39,909	39,909	39,909	39,909
R^2	0.230	0.231	0.234	0.237	0.199

The self-employed were omitted from the analysis. All the models include controls for main economic industry with one digit, occupation with two digits, and fixed effect per month. The business sector includes those who are not employed in the public sector, as classified by the Central Bureau of Statistics industry definition. *p<0.1; **p<0.05; ***p<0.01; Standard errors are in parentheses.

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

of telework became more effective during the COVID-19 period, and its implementation increased the supply of quality jobs for those living in areas where such supply is low. As a result, the possibilities of narrowing regional gaps in the labor market increased. If those gaps are in fact narrowed, it could help narrow regional gaps in other areas as well.

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PART THREE: THE HIGH-TECH SECTOR—ACTIVITY AND MACROECONOMIC CONTEXTS IN 2021

a. Activity of the Israeli high-tech sector in 2021[37]

The Israeli high-tech sector, which is tremendously important to the Israeli economy, demonstrated a high level of activity in 2021.

The Israeli high-tech sector, which is tremendously important to the Israeli economy[38], demonstrated a high level of activity in 2021. While the COVID-19 pandemic did have a slight impact on companies in the sector, that was mainly at the beginning of the crisis.[39] Still in 2020, the activity of most high-tech companies increased, particularly those involved in the software fields, where demand grew. The growth of those companies continued in 2021. The high-tech industries' share of Israel's total goods and services exports in 2021—about 52 percent—was about 5 percentage points higher than in 2019 (Figure 1.12), thanks to the rapid growth during the period.

Demand for workers increased in 2021. The number of employees, the number of job vacancies, and wages increased more rapidly than in the other business sector industries. The sector also featured large amounts of capital raised and a high number of IPOs by Israeli companies.

The sector was characterized in 2021 by a jump in demand for workers. This was reflected in a sharp increase in the number of job vacancies (Figure 1.13), which was in addition to the increase in the number of employees (Figure 1.12), as well as in high wage increases[40] relative to other business sector industries (Figure 1.14). The increases in high-tech sector employees as a share of total salaried employees, in their wages, and in the export of high-tech services were among the factors that particularly contributed to the increase in tax revenues in 2021. (See Box 6.2 of this Report.) The immense capital raised enables an acceleration of activity in the sector, and reflected the increasing demand for its products and services. The strong activity in the sector was also reflected in the record number of IPOs by Israeli technology companies. The following analysis examines how the trends in high-tech in 2021 are reflected in the macroeconomic variables. The broad economic implications of these developments will also be discussed.

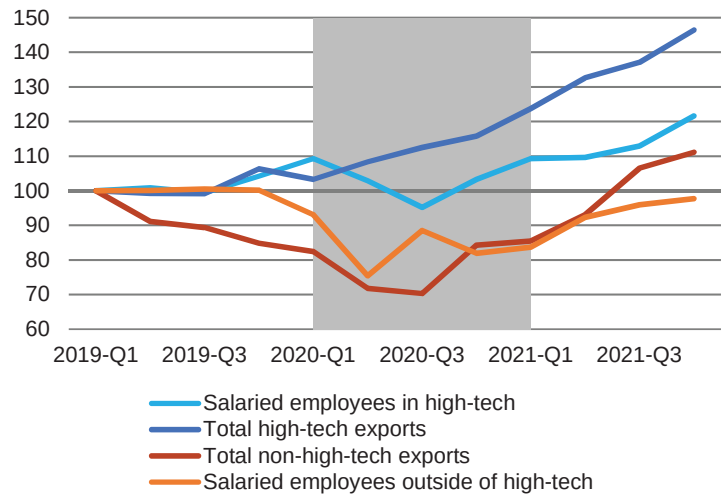
[37] On matters where 2021 data are not available, we relate to the most recent available data. Similar to the Bank of Israel *Annual Report* for 2020, high-tech is defined as the group of the following industries, according to the Central Bureau of Statistics classification (2011): Manufacture of pharmaceutical products, including homeopathic preparations (21); Manufacture of computer, electronic, and optical products (26); Manufacture of air and spacecraft and related machinery (303); Computer programming, consultancy, and related activities (62); Data processing, hosting and related activities, and web portals (631); and Research and development in engineering and natural sciences (720, 721). In places where another definition is used, it is clearly noted.

[38] High-tech accounted for 16 percent of GDP in 2021 (compared with 12 percent in 2016). That share is high by international comparison. Box 2.2 of the Bank of Israel *Annual Report* for 2020 shows that Israel is one of the three leading countries (together with Ireland and Switzerland) in terms of high-tech's share of GDP (2015 data). High-tech output grew by 5.2 percent in real terms (10.3 percent in nominal terms) in 2021.

[39] The Bank of Israel *Annual Report* for 2020, Chapter 2, The Israeli Innovation Authority, and Start-Up Nation Central (2021). "Report on Human Capital in the High-Tech Industry, 2020".

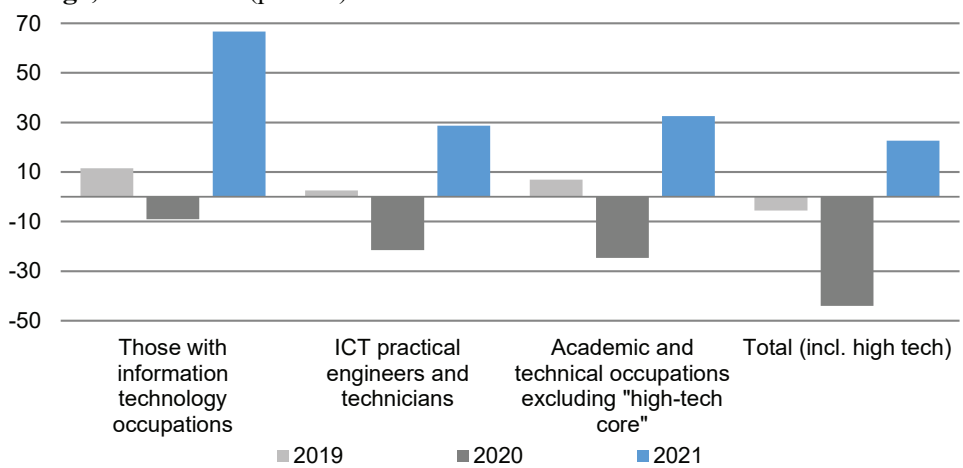
[40] The information and communication industry. In places where it is noted that this industry was used, the industry serves as an approximation of the high-tech industries, since original data do not allow for a better identification of these industries.

Figure 1.12
Exports and the Number of Salaried Employees in the High-Tech Sector and in Other Areas*, 2019:Q1–2021:Q4 (index: 2019:Q1=100)



* The gray area indicates the COVID-19 period until the vaccination campaign.
SOURCE: Based on Central Bureau of Statistics data.

Figure 1.13
Job Vacancies in Selected Industries, Change Compared to the 2018 Average, 2019–2021 (percent)

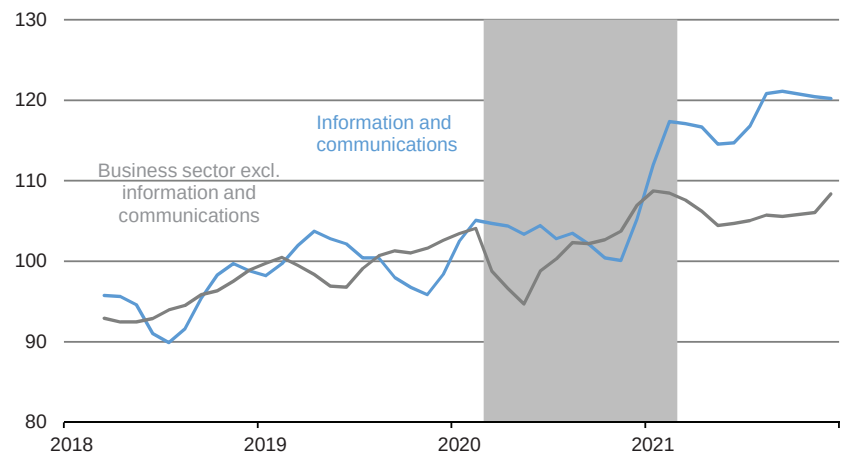


* "High-tech core": ICT practical engineers and technicians (35 in the classification), and those with information technology occupations (25 in the classification).
SOURCE: Based on Central Bureau of Statistics data.

b. Employment

The high-tech sector employs slightly more than one-tenth of all salaried employees in Israel, and about 15 percent of business sector employees. The average wage per employee post in the information and communications industry in 2021 was about NIS 26,000—about 2.2 times the average wage of Israeli employees in the economy. This is partly thanks to the relatively accelerated increase in wages in the industry during the year (Figure 1.14). Thanks to their high income, Brand (2018) estimates that high-tech employees were the source of about one-quarter of income tax payments in 2017, considerably higher than their share of employment. Since the beginning of 2021, the increase in the number of job vacancies in the "core of high-tech"—technical and academic occupations in the information technology field—accelerated, similar to the accelerated increase in the number of job vacancies geared toward those with academic degrees or with technical occupations in the overall economy. However, there is marked variance in the demand for workers in the occupations that we included in the "core of high-tech" (Figure 1.13). The Figure shows the increase in the number of job vacancies in a normal year—2019 compared with 2018—and it seems that the jump in 2021 (compared with 2018) in the information technology (academic) industries reflects a greater increase than in a normal year. This increase was also prominent when compared with the increase in the number of job vacancies in other industries.

Figure 1.14
Estimated Index of the Average Wage Compared with the 2019 Average, 2018–2021 (adjusted for the change in the composition of workers*; three-month moving average; index: 2019 average=100)



* "During the COVID-19 period, the average wage increased as a result of people with low wages leaving the labor force while those with high wages remained. The series in this Figure represent an estimation of the change in the average wage, adjusted for the change in the composition of workers. Details on the methodology appear in Box 2.2 of this Report.

SOURCE: Based on Central Bureau of Statistics.

c. Financing and company characteristics

The accelerated activity in the high-tech sector—thanks to the high demand for technology—was also reflected in the level of capital raised by startup companies[41] (Table 1.3). The low interest rate environment, which supports increased investment in these companies, was also a contributing factor to the increase in raised capital. These investments have high risk levels that may generate high returns, mostly for foreign investors, and the significant amount of capital raised supports high valuations for the companies. In 2021, there was an exceptional upward trend in capital investment (mostly through venture capital[42]), which totaled about $30 billion. This upward trend is a powerful continuation of the trend that characterized the sector in recent years. Total capital raised in 2021 was double the 2020 total, and more than three times higher than the 2018–2019 average.

The proportion of startup companies transitioning to advanced stages as independent companies has increased in recent years.

The funding growth pattern also reflects a structural change that has been taking place in recent years in the composition of companies in the industry. The proportion of startup companies transitioning to advanced stages as independent companies has increased, which is also reflected in the constant growth of capital raised in follow-on financing rounds (those that are not the company's first financing round) in recent years. A reflection of this process from another direction is the decline in the flow of new companies (the number of new companies being established). According to data from IVC Analytics, the number of startup companies opened per year in Israel increased persistently until 2014, reaching 1,400 at its peak. From that year onward, however, the annual number declined steadily. The trend continued in 2019, in which year fewer than 1,000 new companies were launched.[43]

The decline in the pace of establishing new companies, and the slowdown in the trend of seed financing, may indicate a decline in the growth rate of technological innovation, since new companies are established partly on the basis of innovative ventures and the identification of technological trends in their infancy, but this conclusion is not necessarily the case. The Israel Innovation Authority found that the downward trend in the number of issuances and the increase in funding amounts of seed-stage companies are not unique to Israel, and that they may also indicate increasing professionalism of entrepreneurs and investors operating in the field, who can better identify business and technological potential. As such, they may indicate positive selection on the part of the companies. The entrepreneurs come to the

[41] Explanations of how startup companies are financed appear in Box 4.1 of the Bank of Israel *Annual Report* for 2014, and in the "Selected Studies" addendum to the Bank of Israel *Annual Report* for 2019, "Financing Characteristics of High-Tech Companies in Israel".

[42] Venture capital funds are financial agents providing financing to promising companies that, due to the risk element in their operations, would have difficulty raising capital in other ways. The financing contracts between startup companies and venture capital funds differ from regular financing contracts in that they enable the funds to efficiently supervise the companies. For further details and explanations, see Box 4.1 of the Bank of Israel *Annual Report* for 2014.

[43] In 2020–21, the number was lower. The reference is to 2019 because the data during that year were not affected by the COVID-19 crisis.

financing stage in a relatively advanced state, thanks to the nature of the technological environment[44] and better support from investors, which reduce development costs in the initial stages and enable financing rounds to be delayed. The number of financing deals may also show an increasing trend of establishing innovation centers within existing large corporations, which attract more entrepreneurial and more talented labor, partly due to the high wages that these companies can offer.[45] Another possible explanation for the decline in the number of startup companies being opened each year is the change in technological fields that are at the forefront of innovation, which creates selection of the companies being established, due to the greater amount of capital required to establish companies in the fields that are newly at the forefront.

Table 1.3
Capital raised by Israeli startups, 2018–2021

	2018	2019	2020	2021
Total capital raised ($ billion)	9	11	16	31
of which: Venture capital (percent)	68	75	66	83
Average amount of financing deal ($ million)	7	9	12	26
Seed stage average amount per deal ($ million)	1.1	1.4	1.4	2.5
Number of seed stage deals	583	555	497	323
Percentage of capital raised in follow-on rounds	92	93	96	97
Number of mergers and acquisitions	134	157	130	172
Number of IPOs	8	9	20	75

Data accessed in February 2022.
SOURCE: Based on IVC Research Center.

d. Macroeconomic interconnections of the high-tech sector in 2021

The activity of the high-tech sector in recent years, and particularly in 2021, has broad implications for general economic activity. The following relates to a number of these implications in the real economy[46], and discusses their connection with the future expansion of the sector and its impact on other industries.

(1) Competition for particularly highly skilled manpower—within the high-tech sector and against other industries—and its effect on wages

The strong demand for skilled high-tech works, particularly those with higher technological education, was reflected in a sharp increase in the number of job vacancies and in marked wage increases in 2021. These reflect competition between companies over human capital, together with an increase in the number of employees.

[44] For instance, cloud computing.
[45] Israel Innovation Authority (2020), "Innovation Report 2019".
[46] The discussion does not relate to financial aspects.

The sector is skills-intensive and attracts highly-skilled individuals. One of the potential sources of growth for it is to attract individuals from other industries, but this may only be possible to a relatively small scale. The distribution of skills of those employed in the high-tech sector, as measured in international the PIAAC survey in 2014–15, was more extreme than among those employed in other fields in Israel, and is also exceptional by international comparison. According to an analysis by Brand (2018)[47], almost one-quarter of the employees in the upper skills quintile in Israel (the most talented 20 percent in Israel) were already working in the high-tech sector in 2015—a very high rate by international comparison. The same study estimated that the potential growth of the rate of those employed in high-tech through the transition and retraining of workers from other industries is low, since most of them are already working at high-paying jobs.[48]

The growth of the number of Israeli companies that were issued on the stock exchange in 2021, the growth in capital raised, and the expanded hiring of technological manpower apparently make it necessary to increase the amount of manpower working in surrounding administrative fields such as finance, contracts, and human resources to enable firms to grow. The high-tech sector's ability to pay high salaries, which is increasing with the rapid and exceptional growth relative to other industries during the exit from the crisis, may also have to do with attracting excellent workers from other industries to the surrounding positions, and not just "core" workers. This may give rise to somewhat of an upward trend in wages for employees in key positions in other sectors in order to keep them there. This phenomenon, called Baumol's Cost Disease, is possible, but is still not identifiable in the data.

(2) Supply of manpower—training young people and developing appropriate human capital

Taking a long-term view, the main source for increased supply of manpower to the high-tech sector is training young people, particularly from among population groups that do not generally participate in the sector: women (who have particularly low representation in technological positions, and especially in technological management); *Haredim* (about 3 percent of the ultra-Orthodox are employed in high-tech, and women account for more than two-thirds of them[49]); and Arabs (about 1 percent of Arab employees worked in high-tech in 2019, compared with 11 percent

Taking a long-term view, the main source for increased supply of manpower to the high-tech sector is training young people, particularly from among population groups that do not generally participate in the sector.

[47] Gilad Brand (2018), "How Much Can the Israeli Start-Up Nation Continue to Grow?", in *State of the Nation Report*, 2018, Taub Center for Social Policy Studies in Israel.

[48] The study found that workers who were identified in the survey as being highly skilled and not employed in the high-tech industries are employed at high rates in occupations that require high skill levels. Assuming that these workers are a complementary factor of production, increasing the incentive to transition to the high-tech fields may be reflected in a decline in productivity in the other industries.

[49] The Israel Innovation Authority and Start-Up Nation Central (2021), ""Report on Human Capital in the High-Tech Industry – 2020".

of Jewish employees[50]). Among these population groups—particularly in the *Haredi* sector and among Arab society—expanding the number of people with the appropriate skills must be accomplished mainly through the education system, from its earliest stages through academia, since other professional training solutions geared toward older groups and more appropriate for the relatively short term cannot compensate for the full human capital gap that has accumulated from a young age.

There is a marked upward multiyear trend in the number of people studying scientific disciplines—those that enable employment in the high-tech industry as well—and in their share of the number of students (Figure 1.15). However, it seems that the number of those reaching academic studies can be further expanded. Demalach (2021) found that the low integration of Arabs in high-tech is due to gaps in educational achievement, which is a minimum requirement for joining high-quality academic programs, and then employment. These gaps accumulate over time at all stages of education. A number of indications mentioned in the study point to an encouraging but slow trend of improvement, including slow and moderate growth in the number of Arabs employed in the high-tech industry, and in the number of Arab students in these disciplines. Another study found that between 2012 and 2018, the number of Arabs employed in high-tech increased, as did their wages, at a higher rate than among Jewish employees, and that the number of Arab students gaining employment in high-tech doubled.[51] However, as Demalach (2021) notes, despite this increase, the rate of integration of those students in high-tech employment remains lower than that of all graduates in these professions.

(3) Demand for skilled manpower

The need for professional manpower also affects the extent of competition between companies over workers with relevant experience. A survey by the Israel Innovation Authority and Start-Up Nation Central for 2019[52] notes that the wage premium for employees with professional experience hired by a new company is high, and reflects a gap between their wages and those of veteran workers in similar positions. These gaps lead to the voluntary departure of workers and their move to other companies. According to data appearing in this survey, between 2018 and 2019, about one-tenth of all workers in high-tech companies resigned from those companies (compared with 3–4 percent who were dismissed). This ratio between workers who resign and those who are dismissed attests to these workers' certainty that they are able to join other companies.

[50] E. Demalach (2021). "The Arab Population in the Israeli High-Tech Sector," in *Selected Research and Policy Analysis Notes*, Bank of Israel.

[51] G. Cohen-Kovacs and N. Kassir-Kaliner (2020), "Trends in Integrating Israeli Arab Society in the High-Tech Field", Ministry of Labor, Welfare, and Social Services.

[52] The Israel Innovation Authority and Start-Up Nation Central (2021), ""Report on Human Capital in the High-Tech Industry – 2019".

(4) Geographic aspects of high-tech activity in Israel

Technological innovation in Israel, in both high-tech and other fields, is mainly concentrated in the center of the country.

a. The geographic deployment of high-tech activity[53]: Technological innovation in Israel, in both high-tech and other fields, is characterized by marked variance in its geographic deployment. There is a particularly high concentration of startup companies in the Tel Aviv and Central districts, and there are relatively large centers in Haifa and in Jerusalem. About one-third of all startup companies in Israel are registered in Tel Aviv. After that, the cities with the leading number of startups are Ramat Gan and Jerusalem, with just 6 percent of the companies registered in each. Only 12 percent of startup companies are in localities outside the Tel Aviv and Central districts. Expenditure on research and development in 2019 was also concentrated in the Tel Aviv and Central districts. About two-thirds of total R&D expenditure was in those districts; slightly less than one-quarter was in the Haifa and Northern districts, and just one-tenth was in the Jerusalem and Southern districts. The geographic clustering of innovative high-tech activity is due to a number of factors, mainly the supply of appropriate human capital and high-quality service infrastructure[54] in surrounding residential areas. The clustering is also due to the location of high-quality physical infrastructure that is necessary for the development of the industry, and from the proximity of business services that are necessary for companies, the clustering of which gives companies a consumption advantage.

The concentration of high-tech activity in the center of the country may have implications for the extent of integration of population groups living outside of these areas into high-tech employment, and in the exposure of young people from the northern and southern districts to role models from the high-tech fields in their day-to-day lives. Demalach (2021) notes that about half of Jewish high-tech workers in Israel live in the Tel Aviv and Central districts, compared with just 12 percent of workers belonging to the Arab population, and estimates that the strong demand for manpower may motivate companies to take steps that would help maximize the potential of the existing manpower outside the center of the country, including through remote employment. The different residential dispersion of Jewish and Arab populations was found in that study to be a main factor[55] that is correlated with the different prestige accorded to high-tech occupations among Jewish and Arab

[53] The data in this section are Bank of Israel calculations based on Central Bureau of Statistics, "Statistical Abstract of Israel, 2021", Table 17.1: "Startup companies and research and development expenses by district". The data relate to 2019. The information on the location of startup companies is based on the companies' registration with the tax authorities or with the National Insurance Institute. The data on R&D expenditure are according to the district in which the R&D activity takes place.

[54] The reference is to the "amenities"—the qualities of the residential environment, such as the quality of schools and other public services, and the supply and quality of business services.

[55] Other factors controlled for in the analysis are individual characteristics, including age, gender, and education.

citizens.[56] This factor may be correlated with the types of companies operating in the various areas, which affect the composition of occupations in those areas.

b. The link between socioeconomic background and learning scientific subjects: The geographic units in which the population lives are classified by the Central Bureau of Statistics into clusters according to the socioeconomic level of the residents.[57] The socioeconomic ranking of the residential location is closely linked with the occupations and education of the population. While that ranking is determined according to the characteristics of the adult population living in that locality, the characteristics of the adult population are closely linked to those of the younger population, and that link is reflected in the likelihood of obtaining an academic education, and in the distribution of areas of study in academia.

   Figure 1.16 shows the rate of all Bachelor degree students in the scientific subjects according to the socioeconomic cluster of their residential locality.[58] The rate of those studying a scientific discipline—which enables them in part to work in high-tech occupations—is directly correlated with their socioeconomic ranking, while the rate of those studying education has the reverse correlation. In terms of the other areas of study (which are not presented in the Figure), there seems to be no correlation between socioeconomic background and study rates. These links may be affected by various factors, including the level and field of education in the schools, and exposure to role models in various fields of employment. The education system plays a vital role in weakening the connection between the students' socioeconomic background and their discipline of study, a connection with intergenerational persistence.

(5) Is the high-tech industry in Israel generating "Dutch Disease"?

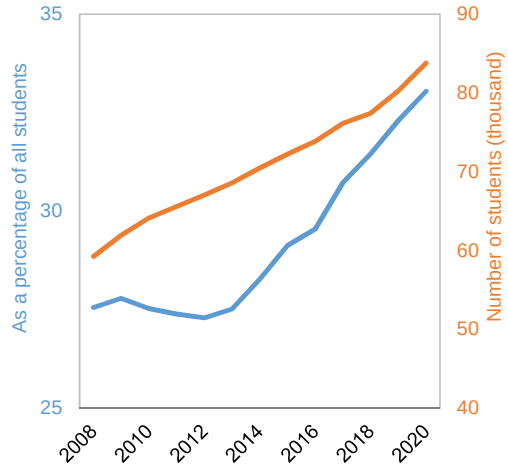
The term "Dutch Disease" refers to a situation in which the exceptional success of an exporting industry, which increases appreciatory pressure, pushes aside other export industries: The successful industry, as well as nontradable industries for which demand

[56] While about 71 percent of Jewish employees in the sector work in "high-tech core" professions, about 58 percent of Arab employees in the sector work in those professions. In contrast, the rate of high-tech employees who work in production or nonprofessional positions is greater among Arabs.

[57] This specification is determined according to a broad range of variables, including educational level (of the adult population, aged 25–54) and income level of the population. (Central Bureau of Statistics (2021), "Characterization and Classification of Geographic Units by the Socioeconomic Level of the Population in 2017", introduction). The socioeconomic clusters are not equal in size.

[58] It is likely that many students do not change their residential address in the Ministry of Interior when studying toward a Bachelor's degree, so their residential locality reflects their socioeconomic environment during their high school studies. Even if they attend high school outside their residential locality, their residential address reflects the socioeconomic background to which they are exposed during childhood and adolescence. There is a similar connection obtained when using a file that includes their residential address at age 18—to which there is apparently a greater attachment than to the place of residence during high school. However, this file does not include subjects of study at a sufficiently detailed level for our analysis. The localities in clusters 1 and 2 include mostly *Haredi* or Arab populations.

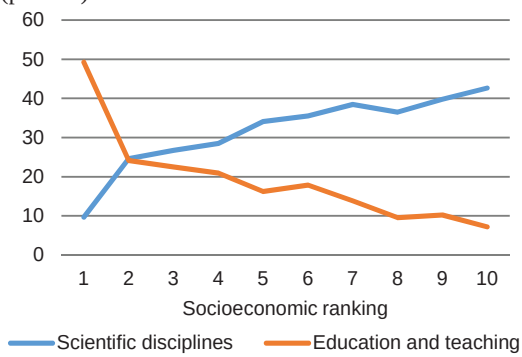
Figure 1.15
Students in the Scientific Disciplines*, 2008–2020



* Mathematics, statistics and computer sciences, physical sciences, biological sciences and agriculture, engineering, and architecture.

SOURCE: Based on Central Bureau of Statistics.

Figure 1.16
Students in the Scientific Disciplines and Education as a Share of Students in the Locality, by the Residential Locality's Socioeconomic Cluster*, 2019/20 School Year
(percent)



* The data include those studying at universities and at academic colleges, who live in localities with at least 30 students. The list of scientific disciplines is as it appears in Figure 1.15. Socioeconmic rankings are in ascending order from 1 to 10.

SOURCE: Based on Central Bureau of Statistics data.

increases as a result of the success of the exporting industry, attract manpower and investments at the expense of the other, mainly tradable, industries. In its original meaning, the term related to a natural resource that could be exported, or an exporting industry that had no advantage in terms of productivity, and a problem that developed when demand for that industry's product decline or when the resource became depleted. The economy at that point is liable to be left without high-productivity export industries, and rebuilding them may take a long time.[59]

The activity of the high-tech industry increases the appreciatory pressure on the shekel from two directions. High-tech exports increase the current account surplus, and the large amounts of venture capital raised increase pressure from the financial account of the balance of payments.[60] The appreciation may lead to a reduction in exports from companies in other industries, and harm sales of manufacturing products due to the eroded competitive ability with competing imports. A Bank of Israel Research Department internal study based on data from 1997–2016 found that the negative effects of the appreciation on exports were mainly felt in small manufacturing companies with low productivity. Moreover, the high-tech sector has high productivity, and apparently has some positive external impacts on productivity in other industries.

[59] The term was defined after large natural gas deposits were discovered in the Netherlands in the 1960s, leading to the dwindling of domestic manufacturing and agriculture, and instability of the currency.

[60] See a discussion about this in the "Selected Studies" addendum to the Bank of Israel *Annual Report* for 2019, "Financing Characteristics of High-Tech Companies in Israel".

In terms of attracting manpower and investments from other industries—as described above, demand for workers in the high-tech sector increased sharply in 2021. Job vacancy data does not contain—at least for now—any indications of anomalous growth in the number of job vacancies in other industries that are competing over skilled manpower. At this stage there are also no other available data that could indicate a significant transition of workers with high productivity from other industries to the high-tech sector. Yet, such transitions may exist, as the number of employees in the high-tech sector is growing faster than in the rest of the economy.

Another element of Dutch Disease-style impacts is concern of a reversal in the trend of global demand for high-tech services, particularly those exported by Israel. The increasing global digital transformation is targeted at maintaining high demand for innovative technology. In contrast with natural resources, where demand may suffer from sharp and prolonged volatility, demand for innovative technology will remain high, even if it is volatile for certain periods, but not necessarily in areas where Israel specializes. These factors lead to the conclusion that maintaining technological innovation requires constant investment in cultivating excellence in the Israeli technology sector. In addition, the relative advantages of Israeli technological manpower must be diversified and strengthened through top-notch training.

(6) Financing, wages, appreciation, and outsourcing

The significant amount of capital raised by startup companies enables them to increase wage expenses by expanding their workforces and offering employees higher wages than competitors.

The significant amount of capital raised by startup companies enables them to increase wage expenses by expanding their workforces and offering both newly hired and veteran employees higher wages than competitors. In an environment with intense competition over human capital, this is reflected in wage increases for Israeli employees and in those employees becoming more expensive than employees in other countries.

The capital raised by high-tech companies is in US dollars, and most export transactions—the details of which are often agreed to in contracts signed far in advance—are indexed to the dollar or the euro, while the shekel has been in a prolonged appreciatory trend against both (as discussed in Chapter 3). The appreciatory trend of the shekel makes Israeli employees, who are paid in shekels, more expensive in the global market. The relatively high price of Israeli employees makes the option of transferring some work to entities in other countries particularly relevant—especially when the advantage in the labor productivity of Israeli employees narrows. This phenomenon—called offshoring—continued to expand in 2019, according to a survey by the Israel Innovation Authority and Start-Up Nation Central (2020). In 2019, about 27 percent of companies that participated in the survey sent work abroad in the areas of hardware and software testing and in development—a field in which Israeli engineers are considered to have a relative advantage. This is a lost opportunity for the Israeli economy, which can at least be reduced by training more workers with high human capital to do the work instead of having it sent abroad.

e. Fundamental characteristics of the economy and the link between them and the high-tech sector

High-tech activity in Israel expanded in 2021. This expansion was reflected in high amounts of capital raised, a high number of exits, and high demand for workers. These may suffer from periodic volatility—and the high wages may serve as a buffer to absorb negative fluctuations.[61] In the long-term view, in order to respond to the high demand for workers in the technological fields, there must be investment in the development of human capital from elementary school through academia, in addition to short-term training programs. Aside from these, investment in transportation and communications infrastructure and the removal of social barriers may contribute to the expansion of the population groups employed in industries with high productivity. Investment in human capital and in physical infrastructure is of particular importance, since the expansion of high-tech, which is more rapid than that of industries with significantly low labor productivity, is widening the income gaps between employees in the various industries. General investment in human capital and in physical infrastructure may support an increase in labor productivity in all areas of the economy, and contribute to narrowing income inequality.

A policy of general support for improving the skills of the population and of the labor force and assimilating technology in all industries is preferable to a targeted policy of supporting a certain sector. A survey recently conducted by the Central Bureau of Statistics shows that the high level of technological intensity that characterize the high-tech sector does not characterize the rest of the economy, and that the extent of assimilation of digital tools in the business sector is lower than in EU countries. This is particularly true compared to the reference countries among them, which lead in digital uses.[62] These differences are reflected between exporting companies, which are characterized by higher technological assimilation, and others, and in inter-regional gaps. Businesses in the services industries that are in the Northern and Southern districts adopted technology to a lesser extent than their peers in the Tel Aviv and Central districts, but this may also be due to differences in their areas of operation.

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There is also a large gap in the adoption of advanced production technology in the manufacturing and services industries. The adoption rates in these industries are significantly lower in Israel than in other countries, particularly when compared with the average of the reference countries. These gaps are reflected in the lower assimilation of a wide range of technological tools—from the upper end (such as the use of big data in business analysis) to the lower end (such as the use of websites).

[61] Y. Friedman (2017). "The Information Technology Industries: Workers, Wages, and Dealing with Shocks", *Economic Quarterly*, March–June 2017 (in Hebrew).

[62] The comparison is to EU countries and to "reference" countries: Belgium, Denmark, Netherlands, Sweden, and Finland. Countries with relative small populations that are similar in size to Israel, and that present a high benchmark in terms of digital uses in their industries. See Be'ery and Esperanza (2021), "The Digital Divide of the Israeli Business Sector: Results of the First ICT Survey by the Israeli Central Bureau of Statistics from an International Comparative Perspective", Ministry of Economy and Industry, Strategy and Policy Planning Department.

The non-high-tech services, and low- and mixed-low-tech manufacturing industries are characterized by particularly low technological intensity. Difference in the extent of use of technology, which are correlated with differences in productivity, deepen the inequality between industries in their ability to attract high-quality manpower and withstand macroeconomic shocks, and therefore also have a long-term impact on social well-being.