Chapter 2
Aggregate Activity: GDP and Employment

- Gross Domestic Product increased by 3.3 percent in 2018, approximating the growth rate of potential GDP, and the labor market remained in the vicinity of full employment.
- Growth in activity was attenuated by the full-employment environment and the worsening of terms of trade; these factors, along with contraction of investment in residential building, resulted in somewhat slower growth than in the previous two years.
- Much as in 2017, growth was based both on domestic uses, which continued to increase with the support of accommodative monetary and fiscal policies, and on exports, which advanced at roughly the rate of increase in world trade.
- In 2018, the restructuring of the composition of exports continued, as services exports expanded rapidly while goods exports increased at only a moderate pace.
- In recent years, Israeli goods exports have grown less vigorously than world trade in goods, even when the composition of the goods and Israel's export destinations are taken into account. (See analysis in Box 2.1.)
- The employment rate continued to rise and the labor market remained tight. The unemployment rate fell to its lowest level in several decades, the job vacancy rate stabilized at a record high, companies in the business sector reported worsening shortages of labor, wage growth accelerated; and the share of labor income in GDP climbed markedly.
- In the past two years, imports increased more quickly than GDP and terms of trade worsened, causing the surplus in the goods and services account to decline. Against this background, real currency depreciation occurred in 2018 after more than a decade of protracted appreciation.
- A transition to industries that are relatively non-intensive in water, in view of the increase in water prices for agricultural use, abetted greater efficiency in the use of water in agriculture. The change in industry composition in response to change in intermediate or factor prices may also help to streamline additional sectors of the economy.

1. MAIN DEVELOPMENTS AND BACKGROUND CONDITIONS

a. Main developments

Growth decelerated slightly relative to the previous two years.

Gross Domestic Product (GDP) increased by 3.3 percent in 2018, approximating the growth rate of potential GDP. Growth decelerated somewhat relative to the previous two years (Table 2.1). This can be seen more clearly in the growth over the course of the year of 2.8 percent.[1]

Terms of trade worsened again during the review year,[2] impeding the expansion of activity. This factor, along with the contraction of residential construction investment, caused a slight slowing of growth relative to the previous two years. In contrast, accommodative monetary policy and expansionary fiscal policy continued to fuel increases in demand.

The labor market was again typified by a full-employment environment. The unemployment rate, at a low to begin with, fell on annual average but stopped trending downward in the course of the year. The job vacancy rate stabilized at a high level. Wages continued to increase rapidly, leading the GDP labor share to increase for the third consecutive year. GDP growth relied more on growth of physical capital stock and total factor productivity than on an increase in employment, as one would expect in a full-employment environment.

Table 2.1
Selected indicators of economic activity, 1995–2018

(annual rate of change, percent)

	1995–2013	2014	2015	2016	2017	2018
GDP	3.8	3.9	2.6	4.0	3.5	3.3
GDP of OECD countries	2.1	2.2	2.6	1.8	2.5	2.4[a]
GDP per capita in Israel	1.7	1.9	0.6	2.0	1.5	1.3
GDP per capita in OECD countries	1.5	1.6	2.0	1.2	1.9	1.7[a]
Exports excluding diamonds and startups	7.0	5.0	-1.5	-0.2	7.3	4.2
Domestic uses	3.3	4.3	3.8	6.5	3.7	3.4
Unemployment rate (ages 25–64, level)	8.2	5.0	4.5	4.1	3.7	3.5
Real wage per employee post	0.8	1.1	2.9	2.8	2.8	2.7

[a] Data for 2018 are based on estimates.

SOURCE: Based on Central Bureau of Statistics, OECD, and IMF.

[1] The year-on-year growth rate is equal to the rate of increase in total GDP in 2018 relative to total GDP in 2017. The growth rate over the course of the year, in contrast, is the rate of increase in GDP at the end of 2018 (last quarter) relative to GDP at the end of 2017.

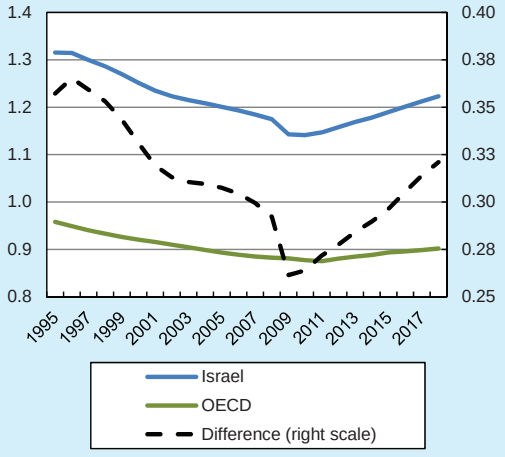
[2] The expression "terms of trade" denotes the ratio of import prices to export prices.

The dependency ratio in Israel has increased in the past decade and over time is slowing growth of GDP per capita.

In the past two years, per-capita income grew more slowly in Israel than the average of OECD countries (Table 2.1), causing the negative gap between Israel and other advanced economies to widen. One explanation for this has to do with long-term demography, manifested in a widening spread between Israel and the advanced economies in the dependency ratio—the ratio of the supported population[3] to the prime working-age (25–64) population. Israel's high fertility rate has created a permanent spread between its dependency ratio and that of the average of OECD countries, The gap has been widening in recent years due to a rapid increase in Israel's ratio, as the year-groups that exit the 25–64 cohort are larger than those within and entering the range (Figure 2.1a). In contrast, the rapid growth of Israel's employment rate has set this indicator above the OECD average.[4] Accordingly, the gap in GDP per individual of prime working age has been narrowing steadily and stands at less than 1.5 percent at the present writing (Figure 2.1b). In contrast to employment, which showed powerful growth, labor productivity advanced moderately, causing GDP per worker (of prime working age) in Israel to remain 10 percent below the OECD average, as it has been in the past fifteen years (Figure 2.1b).[5] Policy directions that would allow the country to improve its labor productivity and, in turn, to narrow the gap in standard of living between itself and the other advanced economies, are proposed in Chapter 1.

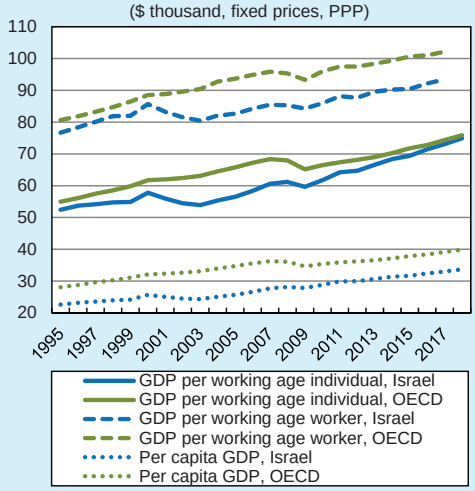
Figure 2.1

a. Dependency Ratio[a] in Israel and in the OECD, 1995–2018



b. Per Capita GDP, GDP per Prime Working Age Individual (25–64), and GDP per Prime Working Age Worker, 1995–2018

($ thousand, fixed prices, PPP)



[a] The dependency ratio is defined here as the ratio between the population that is not in the prime working ages (25–64) and the population that is in the prime working ages.

SOURCE: Based on International Labor Organization and OECD.

[3] The supported population comprises people under 25 and those older than 65.

[4] In 2018, Israel's employment rate among those of prime working age was 77.5 percent, as against 72 percent on OECD average.

[5] Employed persons in Israel work more hours on average than their counterparts in other advanced economies; therefore, the gap in GDP per hour worked is even wider.

b. Background conditions

World trade moderated, and uncertainty about the global environment increased.

The global economic recovery slowed in 2018, meaning that the development of activity abroad was somewhat less supportive of Israel's continued growth than in 2017. Global growth continued at a steady pace but world trade moderated relative to 2017 (Table 2.2) and uncertainty about the global environment mounted. International institutions and investment houses lowered their forecasts and expected the mild downward trend to continue in the next two years. These developments were accompanied by rising prices, to the detriment of national income. The upward movement of oil price in 2016–17 accelerated in 2018 and came to 50 percent relative to 2016. In the last quarter of the year, however, the price of oil dropped back to its 2017 level. In total, Israel's terms of trade worsened by 2.7 percent in 2018 and by more than 4 percent in the past two years, helping to precipitate a downturn in gross saving along with real currency depreciation.[6]

Table 2.2
Global economic developments, 1995–2018

(annual rate of change, percent)

	1995—2013	2014	2015	2016	2017	2018[a]
Advanced economies						
GDP[b]	2.4	2.1	2.3	1.7	2.3	2.4
Trade[c]	6.1	3.9	4.3	2.1	4.3	3.5
US						
GDP	2.8	2.5	2.9	1.6	2.2	2.9
Eurozone						
GDP	1.6	1.4	2.1	1.9	2.4	2.0
Developing economies						
GDP	6.5	4.7	4.3	4.4	4.7	4.7
Trade[c]	9.3	3.7	0.3	2.4	7.0	5.4
World trade	7.0	3.8	2.8	2.2	5.2	4.2

[a] Data for 2018 are based on estimates.
[b] Data for the years 1995–2013 are from the OECD.
[c] Simple average of rates of change of exports and imports of goods and services.
SOURCE: Based on OECD and IMF.

Monetary policy was accommodative in 2018 as well. The nominal interest rate remained near zero (0.1 percent) for most of the year, the annual real rate fell into negative territory (due to an upturn in inflation), and real long-term (10-year) yields remained low. (For elaboration on monetary policy, see Chapter 3.)

6 For the implications of the change in terms of trade, see Bank of Israel, *Annual Report* for 2015, Chapter 7.

Monetary and fiscal policy remained expansionary.

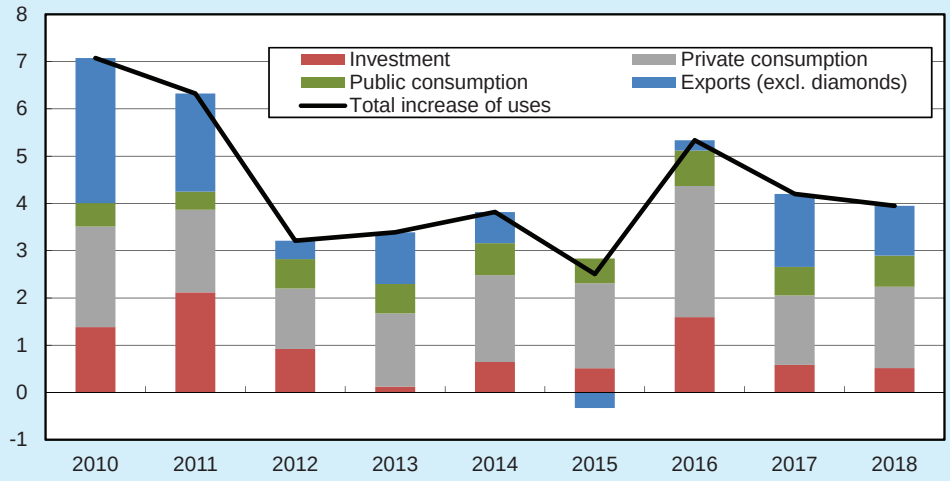
Fiscal policy was also expansionary, abetting the growth of domestic demand, but its contribution to growth was probably limited due to the near-full-employment economy and the increase in the structural deficit.[7] Public expenditure growth outpaced GDP growth, largely due to continued strong increases in civilian expenditure despite flat per-capita transfer payments (after payments spiked the previous year). Alongside the upturn in expenditure, the government stayed on its tax-cut path (corporate tax and customs duties), causing its deficit to rise to 2.9 percent of GDP and allowing the structural deficit to trend upward, as it had since 2015. (For elaboration on fiscal policy, see Chapter 6.)

2. AGGREGATE DEMAND AND USES

a. Composition of foreign and domestic demand

The rate of increase in uses in 2018 fell somewhat short of the 2016–17 average. Exports and public consumption continued to advance at a pace similar to the average in the previous two years[8] whereas private consumption and investment decelerated, moderating the growth of total uses (Figure 2.2).

Figure 2.2
Increase in Uses: Total Increase and Contribution of Components, 2010–2018
(percentage points)



SOURCE: Based on Central Bureau of Statistics.

[7] The structural deficit is the share of the deficit that originates in a structural disparity between statutory spending levels and revenue; it nets out the effect of the business cycle and other ongoing events.

[8] We bracketed the 2016–2017 period to neutralize the effect of shifting motor-vehicle imports between those years.

The slower pace of growth in uses also found expression in declining growth of imports, composed mainly of a sharp drop in imports of services and a smaller increase in imports of consumer goods. Nevertheless, as in the previous two years, import growth continued to outpace GDP growth (Table 2.3). Imports increased rapidly because the economy approached full employment, even though relative import prices increased after a protracted decline. The components of imports that increased included raw materials (a strong upturn), transport vehicles, and travel abroad.

Table 2.3
Sources and uses, 1995–2018

(annual change, percent)

	1995—2013	2014—2015[a]	2016—2017[a]	2018
GDP	3.8	3.2	3.7	3.3
Imports (excluding ships, aircraft, diamonds and defense imports)	4.7	2.2	8.1	4.7
Domestic uses	3.3	4.0	5.1	3.4
of which: Private consumption	4.1	4.2	4.9	3.9
Fixed capital formation (excluding ships and aircraft)	2.7	0.9	7.7	1.4
Investment in inventory (excluding diamonds and startups, percent of GDP)	-0.2	0.1	0.1	0.3
Output of startup companies	[2]-5.5	25.9	8.5	13.8
Public consumption (excluding defense imports)	2.1	3.5	4.4	3.7
Exports (excluding diamonds and startups)	7.0	1.8	3.6	4.2

[a] Data for 2018 are based on estimates.
[b] Data for the years 1995–2013 are from the OECD.
SOURCE: Based on OECD and IMF.

b. Domestic uses

(1) Private consumption

Private consumption grew at a 3.9 percent pace in 2018 and outpaced GDP growth, matching the trend in recent years. Assisting the growth of consumption were negative real interest rates and brisk growth in the public's financial asset portfolio,[9] which contributed to the wealth effect (Table 2.6). Private consumption growth, in contrast, slowed relative to the previous two years, largely because real income from labor and transfer payments increased at a more moderate pace and housing prices fell after rapid upward movement in previous years abetted the growth of private consumption.[10]

[9] All downturns in the financial markets in 2018 occurred in the last quarter of the year; therefore, they had little effect on the annual average increase in portfolio value.
[10] See A. Barak (2017). "The Private Consumption Function in Israel," *Bank of Israel Survey,* 89.

The deceleration of the consumption growth rate embraced all components of consumption, including domestic services,[11] and was accompanied by accelerated price increases in various components (Table 2.4) and slower growth in consumer goods imports (Table 2.5). On the supply side, most of the price increases reflected the worsening of terms of trade, manifested in higher prices of oil and imported goods and services. The slowing of the quantity increase in these components probably reflected the response of consumers to an exogenous acceleration of prices. On the demand side, consumption of "other" durable goods[12] showed slower growth amid price declines. This is evidently due to two years of declining volume of activity in the housing market, given the complementarity of durable goods and housing; it is also consistent with the slowing of growth in consumer credit to households. (For elaboration on consumer credit, see Chapter 4.)

Table 2.4
Rates of change in the components of private consumption

Components of private consumption	Share of consumption (percent)	Quantitative rate of change		Rate of change in price	
		2016—2017	2018	2016—2017	2018
Services	35.0	5.7	4.5	0.3	1.5
Of which: Services excluding travel abroad	31.5	4.8	3.8	0.7	0.8
Housing	22.6	3.5	3.1	1.9	2.2
Food	18.2	3.8	2.5	-0.2	1.1
Fuel, electricity and water	6.4	3.6	0.5	-2.0	3.4
Manufactured products for current consumption	3.7	7.1	6.6	-1.4	0.0
Motor vehicles	3.6	5.3	0.5[a]	-1.3	-1.2
Other durable goods	4.1	4.6	0.2	-4.5	-4.6
Semidurable goods	4.2	5.7	1.8	-2.3	-3.8
Consumption abroad	3.2	13.7	11.2	-8.4	0.2
Total private consumption		**4.9**	**3.9**	**-0.2**	**1.0**

[a] The increase in vehicle imports in 2018 relates to the rate of change compared with the average level in the previous two years, in order to neutralize the sharp fluctuations in motor vehicle imports that resulted from bringing purchases forward in response to the tax change that was implemented at the beginning of 2017.
SOURCE: Based on Central Bureau of Statistics.

[11] Services consumption, the largest item in private consumption, consists mainly of transport and communication services, restaurants and hotels, insurance and financial services, art, entertainment and leisure, education, and health.

[12] "Other" durable goods include electrical and other equipment, furniture, and watches.

Table 2.5
Rates of change in the components of consumer imports
(in fixed dollar prices)

Import components	2016–17	2018
Current consumption	8.3	4.6
Motor vehicle consumption	5.4	-2.1[a]
Consumption of other durable goods	2.4	2.6
Consumption of semidurable goods	6.8	9.5
Total consumer goods	**6.2**	**5.6**

[a] The increase in vehicle imports in 2018 relates to the rate of change compared with the average level in the previous two years, in order to neutralize the sharp fluctuations in motor vehicle imports that resulted from bringing purchases forward in response to the tax change that was implemented at the beginning of 2017.
SOURCE: Based on Central Bureau of Statistics.

Table 2.6
Domestic demand: Background conditions and main indicators of its development, 1995–2018
(annual change, percent)

	1995–2013	2014	2015	2016	2017	2018
Private consumption	4.1	4.3	4.1	6.4	3.4	3.9
of which: Consumption excluding durables	3.9	3.7	4.5	5.2	4.5	3.7
Durables goods consumption[a]	5.7	9.9	0.3	19.6	-8.0	6.2
Gross private disposable income from all sources[c]	3.6	4.7	4.5	5.7	1.6	7.2
of which: Labor compensation	3.8	3.7	5.3	6.1	5.9	4.3
Transfer payments	0.5	3.1	5.6	4.7	7.5	0.6
Credit to households	7.3[b]	6.2	6.5	6.7	5.5	4.7
of which: Nonhousing credit	3.5[b]	6.2	6.9	6.1	4.8	2.0
Real 1-year interest rate (government bonds, level)	3.2	-0.7	-0.5	-0.1	-0.1	-0.8
Value of the public's financial assets portfolio	10.5	9.3	7.1	1.8	4.4	4.1
Consumer Confidence Index	3.8[c]	2.7	3.4	1.9	3.7	2.9
Fixed capital formation (excluding ships and aircraft)	7.2	1.6	0.1	12.1	3.3	1.4
Credit to the business sector	5.0[a]	0.3	1.6	3.5	3.8	5.4
Real 10-year interest rate (government bonds, level)	3.8	1.0	0.5	0.4	0.6	0.5
Purchasing Managers Index (level)	50.7[c]	48.6	50.2	52.3	55.2	53.3
Change in capital utilization in manufacturing (net balance from the Bank of Israel Companies' Survey)	-2.7	-2.0	-9.0	0.0	5.9	5.3
Public consumption excluding defense imports	2.1	3.5	3.6	4.2	4.5	3.7
Total taxes[d]	33.0	30.8	31.0	30.9	32.4	30.8
General government budget deficit[e]	5.4	2.7	1.6	1.9	1.9	3.8[f]
Change in the structural deficit in the government budget[e]		-1.8	-0.9	0.7	1.9	1.1
Change in the cyclically adjusted deficit[e]		-1.5	-1.6	0.4	0.4	2.4

[a] The sharp fluctuations in durable goods consumption reflect deviations in motor vehicle imports in response to changes in taxation.
[b] The figure relates to the years 2005–2013.
[c] The figure relates to the years 2002–2013.
[d] The sharp fluctuations in 2017–18 are due to tax payments that were brought forward due to the temporary tax benefit for parties at inteiest in companies that withdrew dividends, and one-off capital gains tax in respect of the sale of Mobileye, and it is therefore likely that they did not have a marked effect on consumption.
[e] Percent of GDP.
[f] An explanation of the difference between the deficit shown in this table and the deficit reported by the Central Bureau of Statistics can be found in footnote 2 of Chapter 6 of this report.
SOURCE: Based on Central Bureau of Statistics, the "Globes-Smith" Consumer Confidence Survey, the Bank of Israel Companies Survey, and the Purchasing Managers Indices compiled by Bank Hapoalim and the Purchasing Managers Association.

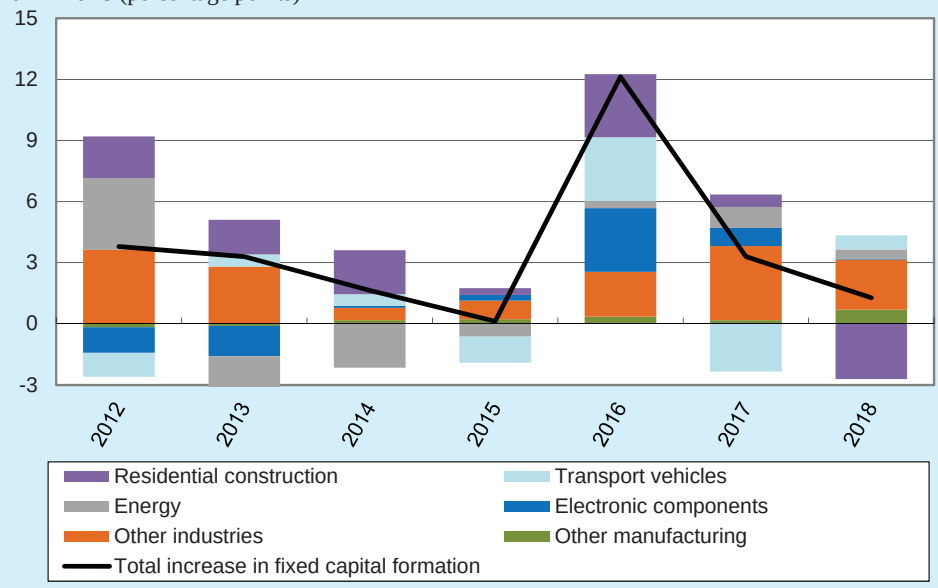
(2) Investment

Gross domestic investment increased by 2.6 percent in the review year, as fixed investment (not including ships and aircraft) inched upward by only 1.3 percent[13] and flattened during the year after two years of rapid increase.

Residential construction investment contracted, and the construction industry's contribution to growth was small.

Active investment in residential buildings—accounting for about one-third of fixed investment—contracted by 8.2 percent in the review year and was the main precipitant of the slowdown in fixed-investment growth (Figure 2.3). The downturn reflected a steep decline in building starts in the past two years (for elaboration, see Chapter 9) after nearly a decade of steady growth. Residential construction investment was one of the channels by which monetary policy helped the economy to cope with lower demand from abroad in recent years. Thus, construction-industry activity contributed 0.5 percentage points, on average, to annual GDP growth in the past decade.[14] In 2018, however, construction-industry output grew by only 2.0 percent (due to a rapid increase in nonresidential construction investment), leaving its contribution to total GDP growth at 0.2 percentage points.

Figure 2.3
Increase in Fixed Capital Formation: Total Increase and Contribution of Components, 2012–2018 (percentage points)



SOURCE: Based on Central Bureau of Statistics.

[13] The gap in 2018 between gross fixed investment and net fixed investment (net of ships and aircraft) originates mainly in investment in ships and aircraft, which increased by NIS 3.5 billion (0.3 percent of GDP) in 2018. Investment in startup inventories also headed upward again, contributing to GDP growth in the review year.

[14] The estimate is of the total contribution. The direct contribution of the construction industry to GDP growth during these years (2008–2017) was around 0.3 percentage point. (The direct contribution is the multiple of the rate of increase of construction-industry activity and the industry's share at the beginning of the period.)

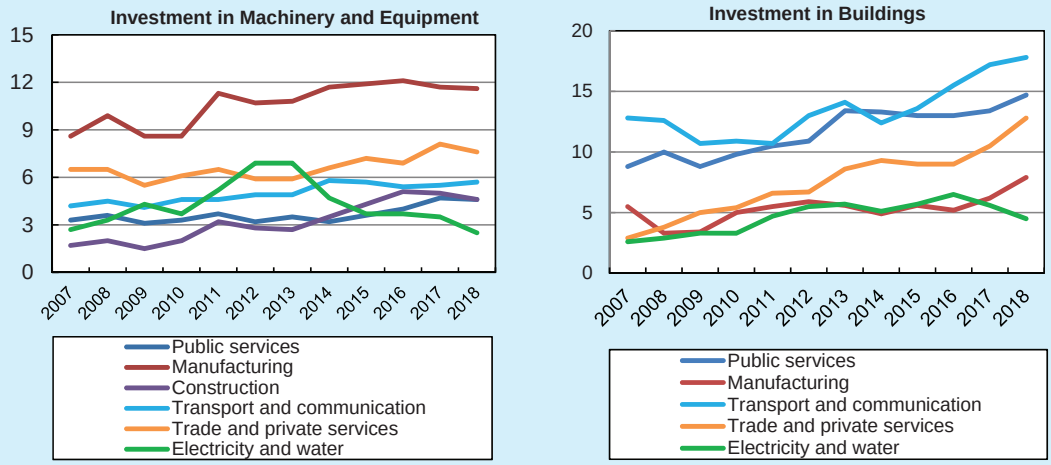
Investment in the principle industries—some two-thirds of fixed investment—advanced by 6.1 percent in the review year, bolstered by an increase in business credit against the backdrop of the low-interest environment (Table 2.4). Investment in these industries was bolstered by an increase in energy investment, occasioned largely by development work on the Leviathan gas reservoir and a recovery in transport-vehicle investment. Conversely, the rapid expansion of investment in electronic components halted after contributing positively to investment in industries that serve the domestic economy for two years (Figure 2.3) as Intel completed most of its investment program during the year.

Transitory and special factors aside, the principal industries made perceptibly larger investments in buildings in the review year (Figure 2.4). Nonresidential construction investment grew rapidly in the past two years, but after a tilt toward infrastructure in 2017, industrial buildings and office investments surged in 2018, as did public building in municipal jurisdictions against the background of local elections during the year.

Most industries reduced investment in machinery and equipment.

In contrast, most industries invested less in machinery and equipment (Figure 2.4). The contraction was notable in the trade and personal services industries, which were buoyed in previous years by strong domestic demand; construction and electricity and water, which continued to contract; and manufacturing, in which investment was flat.[15] Manufacturing expanded its output by using capital stock as in previous years, but did so in 2018 more by increasing utilization than by making investments. The only industry that invested more in machinery and equipment in 2018 was information and communication (presented together with transport), which continued to grow rapidly. This development is consistent with a powerful upturn of investment in intellectual

Figure 2.4
Investment in Machines and Equipment, and in Buildings in Various Industries, 2007–18 (NIS billion, fixed prices)



[a] Investment in machinery and equipment in manufacturing excludes investment in natural gas and in electronic components. There are no data on investment in buildings in the construction industry.
SOURCE: Based on Central Bureau of Statistics.

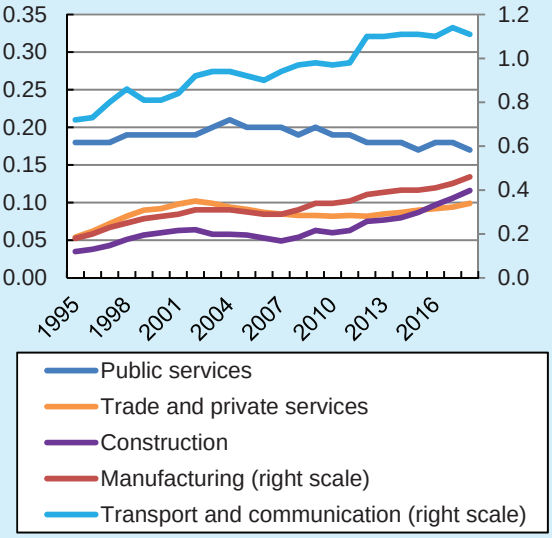
[15] With the exception of electronic components and national-gas investment.

property, reflected mainly in advanced export industries' investments in software and R&D.

Given the full-employment environment, the absence of an increase in machinery and equipment investment seems puzzling because one would expect producers to respond to the strong demand by investing in capital in order to boost production capacity. One reason for the standstill in investment appears to be an increase in the price of machinery and equipment investment after two years of declines. Another possible factor is the upturn in risk of a growth slowdown and greater uncertainty about the global economy. This development is consistent with full employment because investment is forward-looking whereas the labor market usually responds with some lag.

This aside, the very possibility of responding to surplus demand by increasing investment is unclear. Unlike the growth in domestic demand for goods in recent years, which could be met by stepping up imports, the response of labor-intensive trade and services industries to demand depends more on domestic human-resource constraints. Furthermore, the transition from goods to services in the export industries appears to mirror trends in global demand and is causing surplus demand to concentrate in the services. Accordingly, whereas manufacturing is not facing excessive demand, the production function of the trade and services industries makes it harder for these industries to replace human staff with machines in the short term. Importantly, however, per-worker capital stock in Israel's trade and services industries is relatively low, meaning that the long-term potential for further investment in machinery and equipment exists in these industries, too.[16]

Figure 2.5
Net Stock of Capital per Worker, Various Industries, 1995–2018 (NIS billion, fixed prices)



[a] The figures on the electricity and water industry are not presented due to a break in the data on employed persons, which resulted from a change in the industrial classification in 2013.

SOURCE: Based on Central Bureau of Statistics.

Finally, the increase in machinery and equipment investment in previous years outpaced the expansion of the labor input, leaving the level of capital stock per worker higher in some industries (transport and communication, manufacturing, and

The level of capital stock per worker is high relative to the past.

[16] "Policies for the Enhancement of Labor Productivity in Israel," The Eli Hurvitz Conference on Economy and Society (2014).

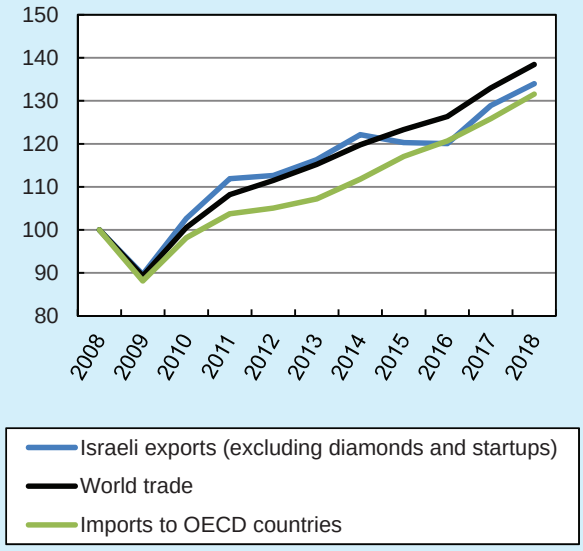
construction) today than in the past (Figure 2.5).[17] Accordingly, insofar as machinery and workers are complementary factor inputs, a labor shortage should affect return on equity for the worse. Indeed, this trend is expected to persist in view of the tightening of the labor market and the slowing of growth of the working-age population. Thus, a tight labor market may have an adverse effect on return on equity and, in turn, mitigate the incentive to invest.[18] Consequently, the softness in machinery and equipment investment appears to be consistent with the full-employment environment.

c. Global demand and exports

Export growth slowed due to moderation in world trade.

Exports (excluding diamonds and startups) grew by 4.2 percent in 2018, roughly commensurate with the rate of increase in global trade. Although the export growth rate slowed relative to 2017, it far surpassed the 2012–16 average (roughly 1.5 percent per year). Exports rebounded swiftly after the 2008 crisis but from 2012 onward, and particularly in 2015–2016, posted growth rates far behind those of world trade. In the past two years, the recovery has been strong enough to approximate the rate of world trade growth (Figure 2.6).

Figure 2.6
World Trade, OECD Imports, and Israeli Exports (Goods and Services), 1995–2018
(Quantitative index: 2008=100)



SOURCE: Based on Central Bureau of Statistics and OECD.

In 2018, as before, the main precipitant of export growth was services; goods exports, in contrast, continued to be sluggish. This reflects a structural change that most advanced economies have undergone and that Israel has experienced with particular celerity[19] (Figure 2.7).

[17] In the public services, per-worker capital stock slipped due to modest growth of investment and rapid expansion of employment, both relative to the business sector.
[18] This should be qualified by noting that capital and labor may also be substitutable factor inputs.
[19] See Bank of Israel, *Annual Report for 2017,* Chapter 2.

Business services continued to lead services exports[20]—40 percent of Israeli exports (net of diamonds and startups)—with an impressive 6.7 percent growth rate. Given the difficulty in separating price from quantity in the field of advanced services,[21] the development of services exports should also be examined in current prices. By this standard, exports grew even more quickly, by 12.1 percent.

Another reason for the upturn in exports was a 5.6 percent increase in exports of tourism services, which account for 6 percent of exports. Tourist arrivals grew at a brisk 13.8 percent pace as a half-year slump (in April–September) evidently occasioned by the security situation, yielded to rapid recovery in the last quarter.

Goods exports (not including diamonds)—53 percent of Israeli exports—continued to expand at a moderate 2.2 percent pace. Since 2014, cumulative quantity growth has been essentially zero and nominal revenue has contracted slightly. The growth rate of goods exports during these years failed to keep up with that of global trade in goods. The gap was even wider when the composition of the goods and the destinations of Israeli exports are taken into account: Box 2.1 shows that, in recent years, weighted indices parsed by export destinations and composition of goods increased more quickly than did the standard index of world trade. Thus, the development of the global-trade component of goods in the past two years was biased in favor of Israel's goods exports, actually supporting the growth of this aggregate.[22]

Goods exports underperform world trade, due to increasing competition vs. services industries.

Furthermore, according to companies' reports in the Central Bureau of Statistics (CBS) Business Tendency Survey, the shortage of export orders is less of a constraint to manufacturing growth than it was in previous years (Figure 2.8). The severity of this constraint in the exports of services industries has declined even more and is now less onerous than in the manufacturing industries. Consequently, while the manufacturing industries are better off than before in terms of global demand, their situation relative to service-exporting industries has worsened. Apparently, then, the constraints on goods exports trace mainly to domestic economic factors that impede export activity. The main impediments of this kind are growing competition with service industries over human resources[23]—a rivalry that has gathered strength in recent years—and real currency depreciation in previous years.[24]

[20] The main components of business services analyzed here are software services, R&D (excluding sales of startup companies), shipping and transport services, professional (legal, accounting, scientific, technological, managerial, and supportive) services, wholesale trade services, complementary services provided by production industries, financial services, and others.

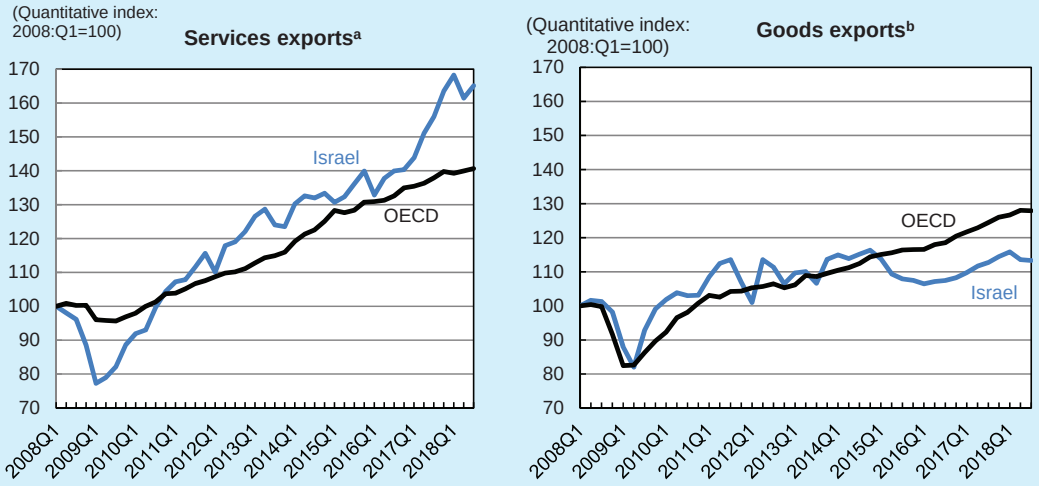
[21] See Bank of Israel, *Annual Report for 2017,* Chapter 2.

[22] The growing intensity of the global competition to that Israel's manufacturing industries face may be an additional factor in reducing these industries' global market share. Thus, even though the volume of trade that is relevant to exports of goods has grown, demand from abroad that the exporters see may be widening more slowly. Even if this hypothesis is correct, however, the effects of global competition appear to have diminished in the past few years, as evidenced in the decline in the severity of shortage of export orders.

[23] According to the CBS Business Tendency Survey, the severity of the labor constraint in Israel's manufacturing industries has stabilized in the past two years at a higher level than before.

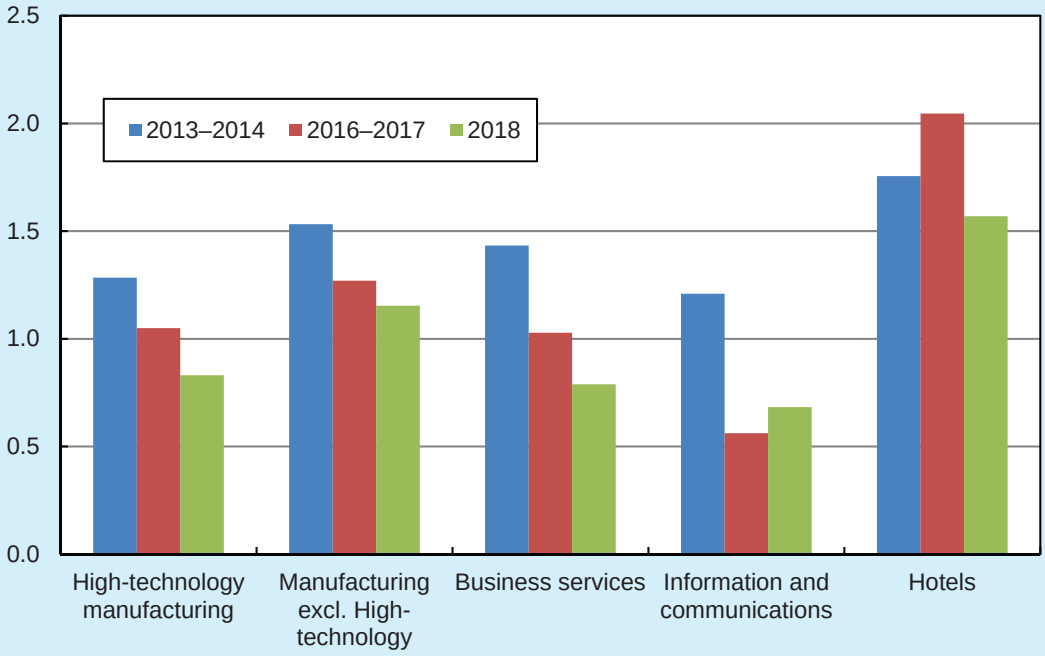
[24] There are indications that the real exchange rate is even more burdensome to manufacturing industries and that its effect is manifested with a lag. Accordingly, real currency appreciation during the review year may be supportive of export growth in ensuing years. (See Bank of Israel, *Annual Report for 2016,* Chapter 2, Box 2.2.)

Figure 2.7
Goods and Services Exports from Israel and the OECD, 2008–18



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

Figure 2.8
Severity of the Constraint due to Lack of Export Orders, 2013–18[a]



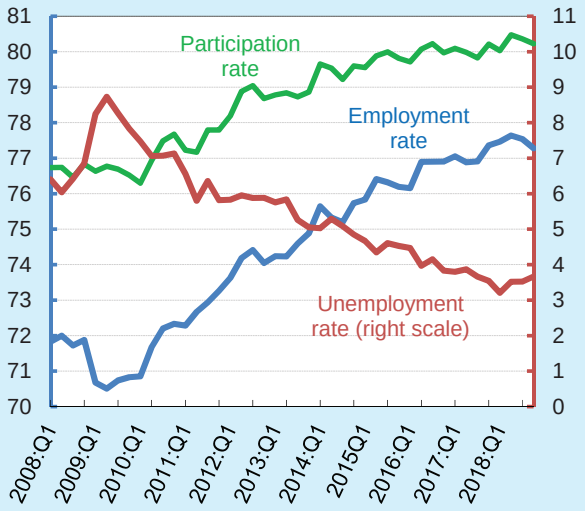
[a] In 2015, the sample was split into two due to a change made to other questions in the Business Tendency Survey.

3. MACROECONOMIC DEVELOPMENTS IN THE LABOR MARKET

Against the background of the full employment environment, the pace of growth in number of employed persons slowed.

The labor market remained tight in 2018 as a wide range of indicators attested to full employment: The employment rate (in the prime working ages, 25–64) climbed to a record 77.5 percent amid mild increase in the participation rate and continued declines in the unemployment rate. The trend turned around during the year, leaving the employment rate lower at the end of 2018 than it had been at the beginning (Figure 2.9).

Figure 2.9
Labor Force Participation, Employment, and Unemployment Rates, Prime Working Ages (25–64), 2008–2018 (percent)



SOURCE: Based on Central Bureau of Statistics.

After more than a decade of impressive upturns, labor supply continued to expand but did so moderately. Its growth rate has been slowing since 2015 for two main reasons: (a) slower growth in the main working-age population and (b) exhaustion of the effects of structural processes such as the upturn in schooling and the ongoing implications of raising the retirement age, a measure that caused participation among older workers (55–64) to increase. Additional potential for labor-force expansion continues to exist mainly in low-participation population groups—Arab women[25] and ultra-Orthodox men.[26] While the participation rate of Arab women has ramped up in the past two years, the upward trend among ultra-Orthodox men has halted—a troubling phenomenon because their share of the working-age population is expected to grow steadily.

As labor supply crept upward and demand continued to surge, the spread between these indicators manifested itself in an increase in the share of job vacancies, which ultimately leveled off at a high level of 3.8 percent. The ratio of vacant jobs to all employee posts continued to rise in most service industries,[27] especially hospitality and restaurant services. Concurrently, however, the increase in recent years in the

[25] The participation rate of Arab women aged 25–64 rose in the past two years to 40.0 percent.

[26] According to the CBS definition of the ultra-Orthodox, the participation rate of ultra-Orthodox men aged 25–64 (49.9 percent), although higher than a decade ago (37 percent), slipped back in 2017 and has leveled off at below half.

[27] Increases in job vacancy rates also occurred in information and communication services; financial and insurance services; real-estate activity; professional, scientific, and technical services; art, entertainment and leisure; and Other Services.

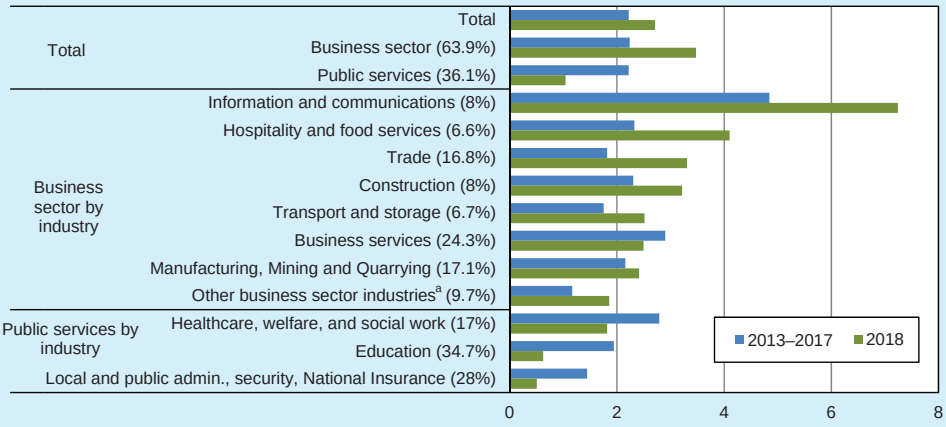
share of job vacancies in trade and manufacturing has slowed and the vacancy rate in construction has slipped appreciably.

Against the background of the full-employment environment, the rate of increase in employed persons and employee posts in the business sector slowed abruptly (Table 2.7). Conversely, the corresponding growth rates in the public services speeded up; this was probably one of the factors that made it hard for the business sector to increase hiring.

Despite robust demand for labor, the number of work hours per employed person declined this year.

Evidence of the difficulty in finding workers is provided by the Business Tendency Survey conducted by the Central Bureau of Statistics, and the Bank of Israel's Companies Survey. Both instruments find that the shortage remained as acute in 2018 as before in all industries other than construction and manufacturing excluding high-tech manufacturing.

Figure 2.10
Increase in Real Wages in the Various Industries, 2003–18
(The industry's share of total workers in each sector is in parentheses)



[a] The other business sector industries are the arts, leisure and entertainment, electricity and water, agriculture, and other services.
SOURCE: Based on Central Bureau of Statistics.

Despite strong demand for labor, work hours per employed person declined in 2018 (Table 2.7), reflecting a decrease in general-government work hours under the terms of an agreement between the Histadrut (General Federation of Labor) and general-government employers that shortened the work week from forty-three hours to forty-two (without cutting wages). In contrast, work hours per person in the business sector did not decline, and in the past two years stabilized at a high level relative to past years and to other advanced economies. This probably explains why work hours per employed person did not increase despite the full-employment environment.

The pace of wage growth accelerated, and was reflected in an additional increase in the cost of labor.

The surplus demand for labor was reflected in 2018 in a rapid 3.5 percent increase in nominal wage per employee post that allowed real wages to continue rising at a pace similar to that of the previous three years (Table 2.7). The development of wage

is composed of slower growth of average wage in the public services, particularly in general government, and rather strong acceleration in the business sector, manifested in most industries (Figure 2.10).

A further upturn in nominal unit labor cost to producers also reflected the wage increase. Thus, the rate of return on labor in business-sector output rose by 1.3 percent after a similar average increase in the preceding two years (Table 2.9). The upturn in the rate of return on labor followed a lengthy slump and brought this indicator back to its 2012 level.

Table 2.7
Principal labor market data, 1995–2018

(annual change, percent)

	1995–2013	2014	2015	2016	2017	2018
Population in the prime working ages (25–64)	2.3	1.8	1.4	1.5	1.5	1.4
Labor force participation rate in the prime working ages (level)		79.5	79.8	79.9	80.0	80.3
Employment rate in the prime working ages (level)		75.5	76.2	76.6	77.1	77.5
Unemployment rate in the prime working ages (level)		5.0	4.5	4.1	3.7	3.5
Employed persons (Including non-Israelis)	2.7	2.8	2.3	2.3	2.5	1.8
of which: Employed in the business sector	2.7	2.4	1.7	2.8	2.3	0.9
Employed in the public services	2.9	3.7	3.5	1.4	2.8	3.5
Total work hours (including non-Israelis)	2.8	2.1	2.3	3.8	2.3	1.3
of which: Total work hours in the business sector	2.6	1.6	2.0	4.2	2.1	1.0
of which: Total work hours in the manufacturing industry		-2.6	1.9	0.9	1.6	0.4
Total work hours in the public services	3.2	3.6	3.2	2.5	2.9	2.4
Hours per employed person (including non-Israelis)	0.0	-0.7	0.0	1.4	-0.2	-0.4
of which: Hours per employed person in the business sector	0.0	-0.7	0.4	1.3	-0.2	0.1
Hours per employed person in the public services	0.3	-0.2	-0.2	1.1	0.1	-1.1
Employee posts (including non-Israelis)	2.7	3.0	3.0	3.5	3.3	2.3
of which: Employee posts in the business sector	2.5	3.0	2.8	3.6	3.0	1.7
Employee posts in the public services	3.1	2.9	3.2	3.3	3.8	3.5
Nominal wage per employee post	2.5[a]	1.6	2.2	2.2	3.0	3.5
Real wage per employee post	0.4[a]	1.1	2.9	2.8	2.8	2.7

[a] The figure relates to the years 1999–2012.
SOURCE: Based on Central Bureau of Statistics.

Table 2.8
Change in output of principal industries, 1995–2018

(annual change, percent)

	Share of total output (2018)[a]	1995–2013	2014	2015	2016	2017	2018
Total		4.0	3.9	2.7	3.5	3.9	3.3
Public services	16.2	2.1	3.0	2.5	3.4	2.7	2.8
Business sector	71.1	4.5	4.1	2.8	3.5	4.2	3.4
Manufacturing, mining and quarrying	13.5	3.1	2.6	0.8	0.1	2.7	3.1
Trade and hospitality and food services	11.2	5.2	5.2	3.4	4.1	5.6	1.7
Business services	17.9	5.6	4.3	4.2	3.5	6.1	4.3
Construction	6.2	1.5	3.5	1.2	6.6	5.3	2.0
Transport and Storage	3.5	4.0	4.5	4.0	4.3	7.7	3.2
Information and communication	9.3	8.0	8.6	6.6	6.6	2.4	5.5
Agriculture	1.3	3.3	-4.3	-6.5	3.5	2.9	-1.9
Water and Electricity	1.6	4.3	0.6	1.4	1.7	-6.4	7.5

[a] In addition to output of public services and business sector product that appear in the table, total output also includes housing services output.

SOURCE: Based on Central Bureau of Statistics.

4. SUPPLY AND EQUILIBRIUM

a. Supply, potential GDP, and the output gap

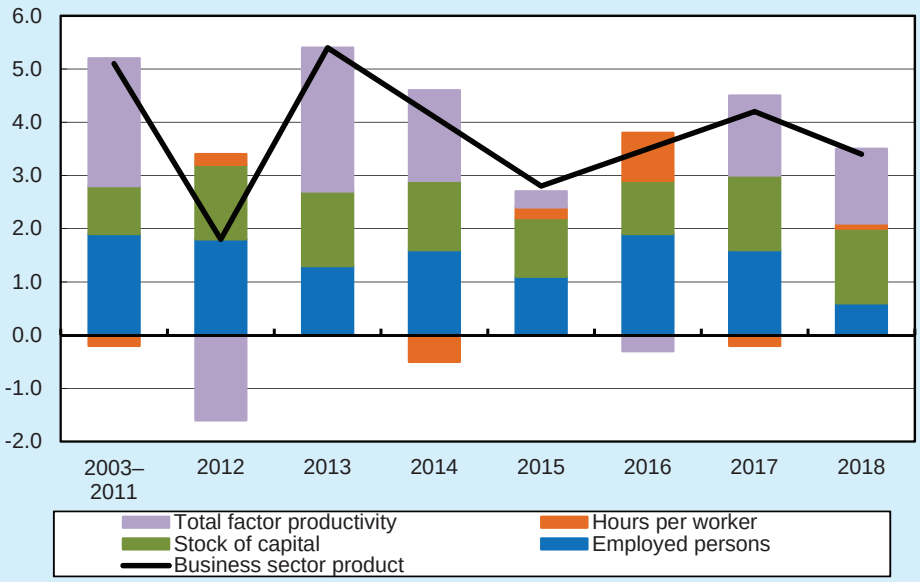
This year, GDP growth relied to a smaller extent on growth in employment.

Supply-side growth decelerated in 2018 due to the combination of moderate employment growth and no change in work hours per employed person—causing the net contribution of labor input to GDP growth to verge on zero. Consequently, GDP growth relied much more on physical capital stock and improvement in total factor productivity than on an increase in employment (Figure 2.12). Physical capital stock continued to expand vigorously but, like employment, its pace of growth slowed in the review year; accordingly, this factor is likely to be less supportive of output growth in 2019. Total factor productivity started growing again after contracting slightly in 2015–16, but at a slower pace than before.

The growth rate of potential output[28] slackened gradually after the emergence from the 2008 global crisis and up to 2015 but has leveled off at around 3.3 percent in recent years (Table 2.9). During this time, the growth rate of labor input decelerated

[28] According to the production-function approach—which underlies the analysis that follows—potential GDP equals the GDP obtained at a hypothetical equilibrium, at which the rate of utilization of all production factors resembles the long-term average and does not trigger price and wage pressures. The output gap reflects the deviation of actual GDP from potential GDP. The growth rate of potential GDP is derived from the multiannual trends of increase in the various factor inputs—physical capital, labor, and human capital—and the average increase in total factor productivity, which originates in technological, structural, and other improvements.

Figure 2.11
Increase in Business Sector Product: Total Increase and Contribution of Components, 2008–18 (percentage points)



Business sector product is at base prices.

SOURCE: Based on Central Bureau of Statistics.

Table 2.9
The supply of business sector product, 1995–2018

(annual change, percent)

	1995–2013	2014	2015	2016	2017	2018
Gross Domestic Product	3.8	3.9	2.6	4.0	3.5	3.3
of which: Business sector product	4.2	4.0	2.6	4.2	3.6	3.4
Public services output	2.1	3.0	2.5	3.4	2.7	2.8
Stock of physical capital of the business sector	5.6	4.1	3.6	3.2	4.3	4.3
Labor force	2.5	2.7	1.8	2.1	1.7	1.9
Total hours worked	2.6	1.6	2.0	4.2	2.1	1.0
Total factor productivity	0.9	1.6	0.3	-0.4	1.4	1.4
Output per work hour (nominal)	4.9	2.3	4.2	0.8	1.8	3.6
Labor compensation per hour worked (nominal)	4.2	2.2	3.4	1.9	3.4	4.6
GDP labor share	-0.6	-0.1	-0.7	1.1	1.6	1.0
GDP labor share (level)	63.2	59.2	58.7	59.2	60.2	60.5
Potential output[a]	4.0	3.9	3.4	3.3	3.3	3.3
Output gap[a,b]	0.0	-0.1	-1.2	-0.6	-0.5	-0.5

[a] Estimate. Potential output is equal to the output in a hypothetical equilibrium in which capacity utilization of all factors of production is similar to the long-term average and does not create price or wage pressures. The output gap reflects the extent to which actual GDP deviates from potential output. The change from year to year in the output gap is not the same as the difference between actual growth and potential growth as there are gaps between the quarterly and annual National Accounts data.
[b] A negative output gap is obtained when actual GDP is lower than potential GDP.
SOURCE: Based on Central Bureau of Statistics.

because the rate of increase in participation did the same (Table 2.7) and the effects of the decrease in the national unemployment rate nearly exhausted themselves. In contrast, physical capital stock and total factor productivity grew more quickly. The capital to output ratio has been rising moderately in recent years but is low relative to the past and will probably continue to fall due to macroeconomic restructuring, i.e., the expansion of service industries at the expense of manufacturing, which is physical–capital intensive.

GDP grew at a pace similar to its potential rate, and the process of contraction of the output gap halted this year.

After falling to near zero in 2016–17,[29] the negative gap between potential GDP and actual GDP stabilized in 2018 due to slowing of the actual growth rate, allowing potential and actual GDP to increase roughly in tandem. In most OECD countries, in contrast, negative output gaps continued to narrow in the review year, meaning that Israel's situation relative to its trading partners worsened in this respect.

Table 2.10
Savings, investment and the current account, 1995–2018

(percentage of national income)

	1995–2013	2014	2015	2016	2017	2018
Gross national savings	21.7	23.9	24.7	24.3	23.4	23.7
of which: Public	-1.9	0.2	1.1	0.9	1.2	-0.7
Private	23.5	23.8	23.6	23.3	22.2	24.4
Gross investment	21.2	19.6	19.4	20.5	20.6	20.8
of which: In principal industries	14.7	12.7	12.3	13.5	13.5	14.3
of which: General government's investments	2.6	2.1	2.0	2.2	2.5	2.6
In housing	5.8	6.5	6.3	6.6	6.6	5.9
In inventory	0.7	0.4	0.8	0.4	0.5	0.6
Net current account	0.5	4.3	5.2	3.8	2.8	2.9
of which: Balance of goods and services	-1.3	1.8	3.1	1.8	1.7	0.7
Net income account	-2.6	-0.6	-0.8	-0.9	-1.0	0.1
Net current transfers	3.6	2.9	2.7	2.6	2.0	1.6
Terms of trade[a]	-0.4	0.3	8.5	3.2	-1.6	-2.7
Real effective exchange rate[a,b]	0.1[c]	-1.3	-0.6	-1.9	-4.5	2.1

[a] Rate of change in annual terms, percent.
[b] An increase refers to depreciation.
[c] The figure relates to the years 1999–2013.
SOURCE: Based on Central Bureau of Statistics.

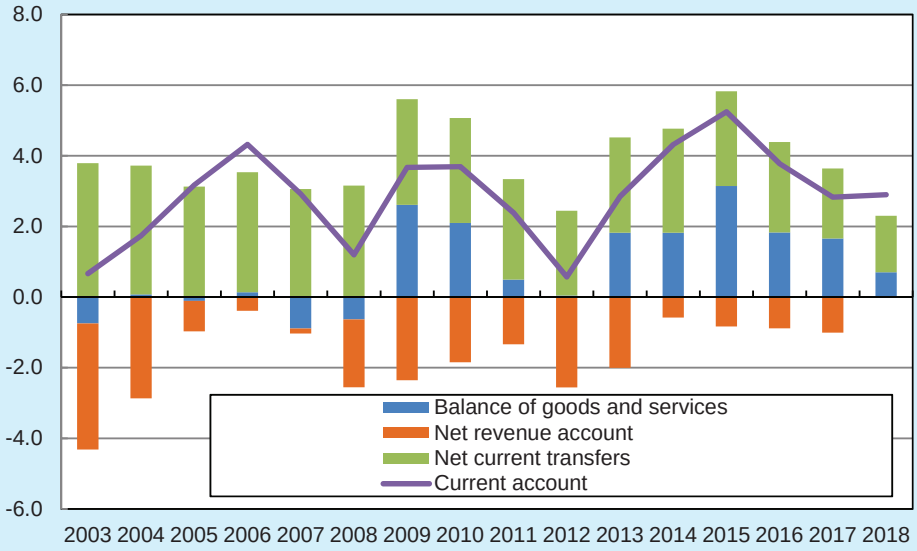
b. The current account and the real exchange rate

The current account surplus (NIS 40 billion) stabilized in 2018 at 2.9 percent of GDP after declining in 2016–17, approximating its average rate in the past fifteen years. Figure 2.13 charts the development of the current account since 2003, the year when Israel transitioned from long-term deficits to sustained surpluses. In 2003–08,

[29] We bracketed the 2016–17 period in order to neutralize the effect of shifting motor-vehicle imports between those years.

it was evident that the changes in the current account were mainly reflections of volatility in net revenue. Since then, in contrast, the surpluses on current account have matched the development of the goods and services account.

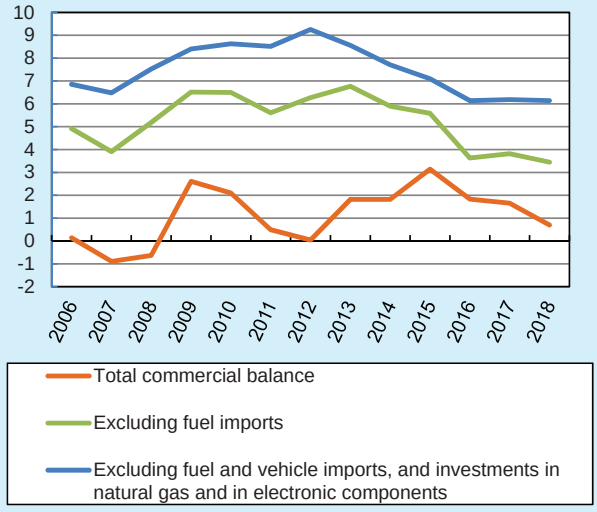
Figure 2.12
The Current Account Surplus and Contribution of Components, 2003–18
(as a percentage of GDP)



The difference between the current account surplus and the total contribution of the components reflects statistical differences.
SOURCE: Based on Central Bureau of Statistics.

As Israel is a (net) importer of fuel, a commodity with inelastic demand and that accounts for a large share of total imports (around 10 percent), fuel price has a strong effect on the national balance on the goods and services account. Accordingly, a decade of acute volatility in fuel prices explain much of the initial steep increase in the trade balance, cresting at more than 3 percent of GDP in 2015, and the precipitous

Figure 2.13
The Balance of Goods and Services, 2003–2018
(as a percentage of GDP)



SOURCE: Based on Central Bureau of Statistics.

The surplus in the trade account excluding fuel imports stabilized in the past two years.

decline that followed, which continued in the review year. Another possible factor of influence on the trade balance is the country's position in the business cycle. When domestic demand accelerates and the labor-supply constraint brings pressure to bear, economic activity finds it hard to continue expanding. As a result, the share of domestic demand channeled to imports is likely to grow and the current account surplus will probably contract.

To distinguish between the effect of fuel prices and that of position on the business cycle, Figure 2.14 presents the balance on goods and services account net of fuel imports and temporary factors that induced severe volatility in imports for exogenous reasons—investments in the national-gas and the electronic-components industries and motor-vehicle imports.

Although the total trade surplus has contracted in recent years, the surplus net of fuel imports was steady in 2017–18 after falling in 2013–16.[30] By implication, the trade balance has fallen due to the higher price of imported fuel and because of a surplus of domestic demand. An estimate calculated based on direct netting of fuel imports, however, would be inaccurate because it fails to take account of the indirect effect of the increase in energy prices on Israel's fuel exports.[31] Accordingly, we use an additional method to estimate the impact of fuel prices on the current account balance.

As many advanced economies are fuel importers, the adverse effect of fuel prices on the current account surplus is not unique to Israel. It is true that Israel is more sensitive to fuel price than other countries because the share of fuel in its imports is relatively high, but this may not suffice to explain why, since 2015, Israel's current account surplus has contracted by almost 3 percent of GDP—the steepest decrease among OECD members (with the exception of Iceland). A regression analysis (below) allows us to express various effects in quantity terms. It shows that only about 1 percent of GDP of the decrease in the current account surplus during these years traces to higher fuel prices. Furthermore, the reduction of the surplus in recent years seems to have taken place in view of a temporarily high level of surplus that constituted a short-term upward deviation from equilibrium.[32] As for the position of the Israeli economy on the business cycle in recent years,[33] its contribution to the decrease in the current account surplus is found to have been small.

[30] The trade balance declined during those years because the global trade slowdown induced a decline in the share of total trade (exports and imports) in GDP. Afterwards, the surplus continued to shrink because of protracted weakness in exports, occasioned in part by domestic factors (see elaboration in Part C of this chapter), while the share of imports in GDP fell less vigorously.

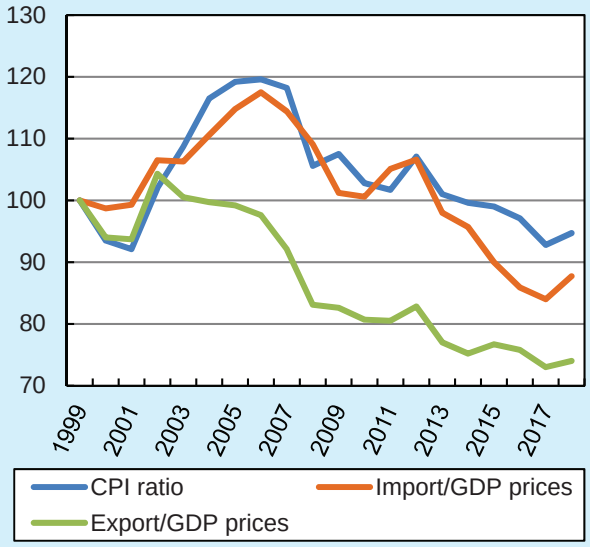
[31] The Central Bureau of Statistics does not publish direct data about Israel's fuel exports due to concern about revealing corporate proprietary information.

[32] When demographic and economic indicators are taken into account, Israel's current account surplus was high by international standards during that time. (See Bank of Israel, *Annual Report for 2016,* Chapter 7.)

[33] According to OECD estimates, Israel's output gap in 2015–2017 was more positive than its average in the past twenty years and more positive than the average gap among advanced economies in the same years.

The current account surplus balances domestic investment with national savings (public savings plus private savings by households and businesses).[34] The share of gross investment in GDP has increased rather strongly in the past three years; most of this upturn, however, traces to transitory factors (motor vehicles, electronic components, natural gas). Net of these variables, the ratio of investment to GDP has been stable in recent years. Hence, the changes in the current account surplus[35] represent, in the main, volatility in the national saving rate—which crested at 24.7 percent of GDP in 2015 and receded by 1 percentage point afterwards, still exceeding the long-term average.

Figure 2.14
The Real Exchange Rate, 1999–2018
(selected indices)



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

In response to the decrease of the current account surplus and the contraction in the negative output gaps among Israel's trade partners, the year saw real currency depreciation after more than a decade of protracted appreciation. Viewed in light of conventional measures of the real exchange rate, the change of trend is common to all and the depreciation was steepest in the index that takes account of import prices (relative to the GDP deflator), which went up steeply in the review year (Figure 2.14).

The real exchange rate depreciated this year, after prolonged appreciation of more than a decade.

[34] National savings are composed of public savings and private savings, i.e., of households and the business sector.

[35] The current account surplus climbed from 0.6 percent of GDP in 2012 to 5.2 percent in 2015 and has been trending downward since then, to 2.9 percent of GDP in 2018.

Contraction of the current account surplus in recent years—regression analysis

In the long term, the current account is affected by structural factors such as the level of economic development, revenue from natural resources, the public debt, the scope of assets abroad, the demographic dependency ratio, and openness to foreign trade.[1] Short-term volatility in the current account, in contrast, depends more on cyclical factors because structural changes usually occur slowly.[2,3]

Accordingly, to explain the development of the current account in recent years, we used the OLS method to estimate the following regression:

$$(CA_t - CA_{t-1}) = \beta_0 + \beta_1 * \Delta fuel\_price_t + \beta_2 * output\_gap_{t-1} + \beta_3 CA\_deviation_{t-1} + \varepsilon_t$$

where the explained variable is the change in the current-account surplus (CA) (in percent of GDP) and the explanatory variables are the rate of change in fuel price in the current year, the output gap[4] in the previous year, and deviation of the previous year's surplus from the long-term average (in percent of GDP). We ran the regression on Israel data for 1995–2018 and obtained the outcome shown in Table 1.

Table 1
Estimation of the factors affecting the current account in Israel in the short term, 1995–2018

Rate of change in the price of fuel	-0.036***
	(0.008)
Output gap (with a lag)	-0.447***
	(0.107)
Deviation of the current account surplus from the multiyear average (with a lag)	-0.234***
	(0.0652)
Number of observations	23
R-squared	0.653

The number in parentheses is the standard deviation. * denotes statistical significance at the 10% level. ** denotes statistical significance at the 5% level. *** denotes statistical significance at the 1% level.
SOURCE: Based on OECD.

Using the coefficients in Table 1, we calculated the contributions of each component to the decline in the current account surplus in 2016–18 (Table 2):

[1] For elaboration, see Bank of Israel, *Annual Report for 2016.*

[2] C. Cheung, D. Furceri, and E. Rusticelli (2013). Structural and cyclical factors behind current account balances. *Review of International Economics,* 21(5), 923–944.

[3] J. Haltmaier (2014). *Cyclically Adjusted Current Account Balances* (No. 1126). Board of Governors of the U.S. Federal Reserve System.

[4] By substituting the difference of the output gap between Israel and the OECD average (instead of the Israeli output gap), we obtain similar results for Israel but the coefficient of this variable is not significant in an equation that includes all OECD countries.

According to the results of the regression, the contribution of fuel price to the downturn in the current

Table 2
Contribution of the various factors to the decline in the current account surplus, 2015–17

Variable	Rate of change / Average	Coefficient	Contribution
Price of fuel (rate of change)	33.1	-0.036	-1.2
Output gap (2015–17 average)	0.6	-0.447	-0.8
Deviation of the surplus from the multi-year average (2015–17 average)	2.9	-0.234	-2.0

SOURCE: Based on OECD.

account surplus in these years was 1.2 percent of GDP, that of the output gap 0.8 percent of GDP, and that of the high surplus level in 2015–2017—reflected in the deviation from the historical average—2.0 percent of GDP. Thus, the total predicted decline in the current-account surplus during these years is 4.0 percent of GDP, whereas the actual contraction was 2.3 percent of GDP (5.2 percent in 2015 less 2.9 percent in 2016–2018 cumulatively).

We estimated a similar equation for the thirty-four OECD member states (in accordance with data availability). The only difference between the outcome of this equation and that of the regression above is that now the equation included fuel price in an interaction with the share of fuel (net) in each country's total imports (long-term average).

Following are the regression results:

Table 3
Estimation of the factors affecting the current account in the OECD countries in the short term, 1995–2018

Rate of change in the price of fuel x fuel as a share of imports	-0.002*** (0.000)
Output gap (with a lag)	-0.091*** (0.028)
Deviation of the current account surplus from the multiyear average (with a lag)	-0.252*** (0.0652)
Number of observations	760
Number of countries	34
R-squared	0.206

The number in parentheses is the standard deviation. * denotes statistical significance at the 10% level. ** denotes statistical significance at the 5% level. *** denotes statistical significance at the 1% level.
SOURCE: Based on OECD.

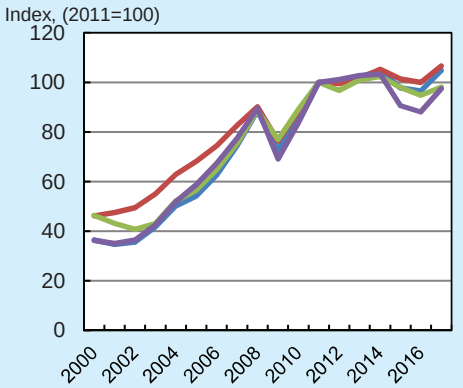
This estimate reinforces the results obtained above because here, too, we obtained significant coefficients in the same direction. As for the contributions of the sundry variables, we found a similar effect of the deviation of the current account surplus (-2.2) but smaller contributions of fuel price[5] (-0.8) and output gap (-0.2).

[5] In order to compare the coefficient of fuel prices to the coefficient obtained in the regression, regarding only Israel, the current coefficient should be multiplied by 10, and the share of fuel imports out of Israel's total imports should be taken into account.

Box 2.1
The connection between trends in world trade and Israeli goods exports

Goods[1] account for slightly more than half of Israel's exports. Although the proportion has been declining steadily since 2011, the dominance of goods in exports persists. From a long-term perspective, the trends in Israel's goods exports appear to track the evolution of world trade in goods. In short time frames, however, large spreads sometimes open between the two. To understand these gaps, this box analyzes the relationship between Israeli goods exports and world trade by means of various non-standard metrics of world trade that take account of Israel's export destinations and the composition of its exported goods. We found that in recent years these indicators rose more quickly than did the world trade index, indicating that the development of the composition of world trade in goods in recent years is actually supportive of faster growth of Israel's goods exports.

Figure 1
Israel's Exports and Selected Indices of World Trade, 2000–17



SOURCE: Based on UN and WTO.

A weighted index of world trade

Based on data that segments goods imports into groups,[2] we constructed a weighted index of world trade that takes account of the composition and destinations of Israel's goods exports in order to reflect the development of the kinds of global demand that are relevant to Israeli exports.[3] The indices are a weighted average of the rates of change in each country's imports of each group of goods. The weights are derived from the share of each component (combination of good and country) in Israeli exports the previous year.[4] Weighting the various components of world trade gives prime components of Israeli exports a stronger presence in the index, thus mirroring the development of the kinds of demand relevant for Israeli goods exporters. We also

[1] Excluding diamonds.
[2] The source and structure of the data are given in detail in the Appendix.
[3] Pinto and Friedman (2003) used a similar method to investigate the development of the exports of electronics and the other industries as against demand in the United States and the European Union. See A. Pinto and Y. Friedmann (2003). "Juxtaposing the development of American and European Union imports with Israel's exports", Jerusalem: Bank of Israel (Hebrew).
[4] The equation that we used to construct the indices is the following:

$$Index_t = Index_{t-1} * (1 + \sum_{1}^{j}\sum_{1}^{i} \frac{X_{ijt-1}}{X_{t-1}} * \frac{M_{ijt} - M_{ij(t-1)}}{M_{ij(t-1)}})$$

where X denotes Israel's exports to each country, M is the imports of the countries examined, i is the type of good index, j is the country index, and t is the year index. In constructing the composite index, we chose to forgo the category titled "Commodities and Transactions Not Classified Elsewhere in SITC," due to severe volatility of the data.

devised partly weighted indices that take account only of the composition of goods in Israeli exports or only of Israel's export destinations; this was done to assess the importance of each of these factors separately. In these indices, we calculated a weighted average of the rates of change in the imports of each country / each group of goods in view of the weight of said country/group in Israeli exports in the previous year. The indices are presented in Figure 1.

In Table 1, we examined the fit between the various indices and Israel's actual exports of goods in three subperiods: before the 2008 global crisis, during the crisis and the recovery, and since 2012. In this manner, we find that the (absolute) gaps between the annual rates of change in Israeli exports and those of the indices that account for the actual composition of goods are, on average, considerably smaller than the differences between actual exports and the other indices, particularly in the period of the crisis and onward. In contrast, the gaps between actual exports and the index that takes account of export destinations alone are only slightly smaller than those of the non-weighted index. Finally, it is seen that all the indices correlate with Israeli exports more strongly in the post-crisis era than in the preceding period.[5]

Table 1
The difference in rates of change between goods exports and selected indices of world trade, 2000–17

(average absolute values of deviations, in percentage points)

	WTO data	Imports based on Comtrade data		
Period	Unweighted index	Index weighted by export destination	Index weighted by composition of goods	Index weighted by destination and goods
2000—2017	4.6	4.3	3.3	4.0
2000—2007	4.4	4.6	3.9	6.1
2008—2011	6.1	5.0	3.2	2.9
2012—2017	3.9	3.4	2.6	2.2

SOURCE: Based on UN Comtrade database and World Trade Organization.

The foregoing results indicate that the global-trade indices that take account of the composition of Israel's exports of goods correlate with the actual development of exports more strongly than does the non-weighted index, particularly in recent years. In contrast, the index that takes only Israel's export destinations into account is only slightly more advantageous than the non-weighted index for the time ranges examined. These outcomes suggest that Israeli industry has managed, even for short terms, to divert its goods exports among countries in accordance with changes in demand and, as expected, is much more limited in its ability to cope with changes in overall global demand for certain types of goods. Table 2 shows that the average growth rate of Israel's goods exports since 2012 approximates the rate yielded by the non-weighted index but falls short of the indices that take account of the composition of the goods

[5] This outcome should be expected in view of the geopolitical conditions in the early 2000s and the structural changes that the Israeli economy underwent at that time. Checks of the average of the squared deviations and of Pearson correlation, yielded similar results.

that Israel exports. Most of the difference traces to the past two years (2016–17). This means that Israel's goods exports during these years underperformed relative to the global demand that is relevant to the exporters. This underperformance is larger than the underperformance of goods exports from the onset of the economic crisis in Israel at the beginning of the millennium (Figure 2).

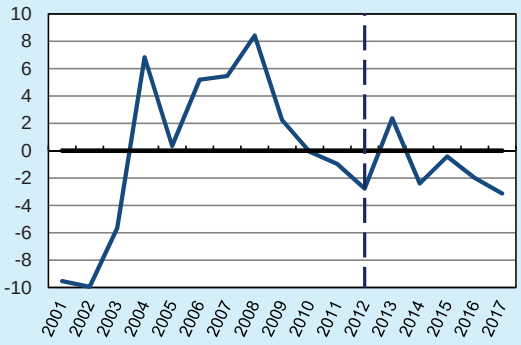
Table 2
Israeli exports and world trade in goods
(rates of change in annual terms, percent)

	WTO data	Imports based on Comtrade data			Exports
Period	Unweighted index	Index weighted by export destination	Index weighted by composition of goods	Index weighted by destination and goods	Israeli exports
2012—2017	-0.4	-0.5	0.7	0.9	-0.3
2012—2015	-1.9	-1.9	-0.5	0.3	-0.4
2016—2017	3.7	3.1	3.6	2.6	0.0

SOURCE: Based on UN Comtrade database and World Trade Organization.

Unlike the nominal resemblance of Israel's (nondiamond) goods exports to the non-weighted index of world trade, in real terms these exports underperformed during this time relative to the CPB World Trade Monitor in goods[6] (Figure 3). The difference is consistent with the only slight negative impact on Israel's exports of the global decrease in prices of goods in those years.

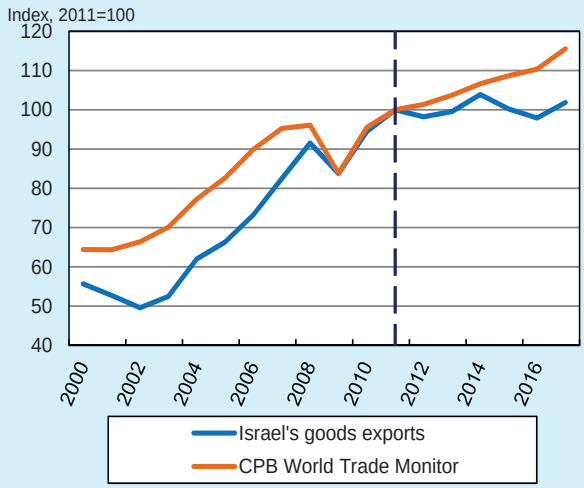
Figure 2
The Difference between the Annual Rate of Change in Demand Relevant to the Rate of Change in Israel's Goods Exports, 2001-17



* When the index is below zero, Israel's exports grew less than it did during the year. In years when the index is above the zero, Israel's exports grew by more than the index.
* Similar results are obtained when using only the goods-weighted index for examining the relevant demand.

SOURCE: Based on UN Comtrade database.

Figure 3
Israel's Goods Exports and the CPB World Trade Monitor in Goods, Real Terms, 2000–17



SOURCE: Based on Bloomberg and the Central Bureau of Statistics.

[6] The World Trade Organization (WTO) data are available in nominal terms only. It is via the CPB index that we can examine real change in world trade in goods.

To examine the source of the underperformance of Israel's goods exports, we calculated the contribution of each type of good to the gap between Israeli exports and world trade in 2012–2017. We sorted the groups of goods into industries of relevance for each type of good[7] and then divided the industries by technology intensity within the manufacturing sector. Table 3 presents the contribution to underperformance in those years by technology intensity and the deconstruction of high-tech and medium-high tech industry into its components.

As Table 3 shows, Israeli exports underperformed by 6 percentage points during this time.[8] Higher levels of underperformance are present when examining only the past two years. The underperformance is evident mainly in high tech and medium-high tech industries and is particularly acute in the chemical and chemical products industry, in which the decrease in performance probably originates in a steep decline in the prices of the potash that Israel exports.

Table 3

The difference between Israeli goods exports and world trade by industry, 2012–17 (percentage points)

Level of technological intensity	Industry	Weight at the beginning of the period[a]	Contribution to total underperformance in the period	Level of underperformance
	All goods[b]	91.5	-6.4	-6.4
High	Total	43.6	-2.7	-10.9
	of which: Manufacture of pharmaceutical prducts, including homeopathic drugs	15.4	0.0	-10.3
	Manufacture of computer, electronic and optical products	28.2	-2.7	-11.8
Medium-high	**Total**	30.3	-6.3	-21.0
	of which: Manufacture of chemicals and chemical products	23.3	-5.8	-21.3
	Manufacture of machinery and equipment n.e.c.	8.2	1.1	18.1
	Manufacture of motor vehicles, trailers and semi-trailers	0.3	-1.6	-42.7
Medium-low	**Total**	12.2	2.9	21.3
Low	**Total**	5.4	-1.0	-11.7

[a] Excluding energy and diamonds.
[b] The weights do not add up to 100 percent because a number of complementary categories, such as agriculture, do not appear in the table.
SOURCE: Based on UN Comtrade database.

[7] This classification is not totally precise but by testing it against the Central Bureau of Statistics' industry-differentiated export data we found that is quite accurate, particularly when the industries are aggregated by technology intensity.

[8] The data in Table 2 are presented in annual average terms; the figure, however, expresses the total spread in rates of change during the entire period. Furthermore, the data here, unlike those in Table 2, are calculated with the energy group (Commodity Group 33, combining petroleum, petroleum products, and similar) omitted.

Conclusion

For many years, Israel's goods exports developed at a pace similar to that of world trade in goods. However, since 2012, and particularly in 2016–17, the increase in goods exports (in constant prices) has been much slower than that of world trade whereas services exports outperformed. In this box, we looked into the claim that the underperformance traces to changes in the composition of world trade that were adverse to Israeli goods export growth, and we found the opposite: During the years examined, the indices weighted by destinations and the composition of goods of Israeli exports grew more rapidly than did the index of world trade. By implication, the development of the composition of world trade in goods in recent years has actually abetted faster growth of Israel's goods exports.

A possible explanation for the underperformance of Israeli exports relative to the development of demand is a structural change in the Israeli economy—a transition to services exports at the expense of goods exports. Although the change dealt a blow to exports of goods, from the macro standpoint it reflects the Israeli economy's adjustment to the worldwide upward trend in the importance of services at the expense of goods. Israel's rapid adjustment to the trend allows its economy to use its factor inputs more efficiently, in accordance with its comparative advantage.

Appendix: The data[9]

Our main source of data is the UN Comtrade Statistics database, which includes the values of exports and imports of goods in a range of countries in current US dollars, parsed by types of goods[10] and destination countries.[11] The data run from 1988 to 2017, but due to a severe shortage of data from the early part of the period, we use data from 2000 onward only. The data originate in country reporting and give no information about world trade. Therefore, we use World Trade Organization data for total world trade.[12] We omitted the data for the nonferrous minerals and miscellaneous group, an area of activity that in Israel is almost totally comprised of exports of diamonds.

[9] We thank the representatives of the Israeli delegation to the OECD for helping us to access the data, and Helen Brusilovsky, director of the Foreign Trade sector at the Israel Central Bureau of Statistics, for helping us to update and examine the data that we used.

[10] Goods are classified at the four-digit level following the SITC-3 model. We used a two-digit level of detail because greater detail for some of the data was unavailable. The trade data are net of diamonds (Group 66 in the SITC taxonomy).

[11] Our analysis uses the trade data of seventy-five countries for which all nondiamond data for 2000–17 are available. The data parsed by types of goods only cover 99 percent of Israeli exports in 2017; by export destinations alone, 88 percent; and by types and destinations. 85 percent.

[12] The data are drawn from the WTO website: http//:stat.wto.org/StatisticalProgram/WSDBViewData.aspx?Language=E.

We also summarized the import data of all the reporting countries in the database and found high correlation between the databases.

Box 2.2
Structural change in agriculture: Decline in the share of water-intensive crop industries

- The use of water in agriculture has become much more efficient in recent decades, in view of the increase in the price of water for growers: output per unit of water has increased markedly.
- A change in the industry composition of agriculture—a shift from water-intensive to less-water-intensive crops—in addition to impressive technological improvements contributed to this increase. A notable example is the contraction of two water-intensive industries—cotton and citrus.
- These developments indicate that other sectors as well can increase efficiency, in view of changes in relative prices of inputs or production factors, not only through technological improvements, but also through changes in their industry composition. Distortion of these prices may impede technological improvement and warp industry composition.

The prolonged water shortage in Israel and the growing concern of a water shortage in numerous countries worldwide, in view of global warming, heighten the need for sustainable management of water resources. As such, it is important to analyze the processes impacting on water usage in Israel as well as the effectiveness and ramifications of the water policy adopted. The lessons yielded by this analysis may also project on additional sectors of the economy.

Agriculture is a very large consumer of water, and even though the quantity of fresh water allocated to it has decreased markedly (Table 1), its share in the use of such water in the economy in 2016 was still 35 percent.[1] Since most water consumed by agriculture is used for crop irrigation, restraining water use in these industries is of major importance for the attenuation of Israel's total water consumption.[2]

The policy on restraining water consumption in agriculture has been implemented over the years by raising the price of water, given the importance of water as an input in crops,[3] and by limiting quantities.[4] Water price to farmers has gone up much more quickly than the Consumer Price Index and even more so against the index of crop output prices. Concurrent with the increase in water price and the imposition of limits on water quantity, use of water has become much more efficient: Even though crop output quantity

[1] Its share in total water consumption (including non-potable water) in 2016 was 57 percent. By comparison, in 1970, agriculture accounted for 80 percent of all water consumption in Israel, and nearly all of it was fresh water. Central Bureau of Statistics and Israel Water Authority, *Activity Report for 2017*.

[2] Seawater desalination is one way of coping with the water shortage on the supply side. It, too, involves high costs and external effects and does not obviate the need for additional measures, including measures to restrain consumption. Desalination accounted for about one-third of fresh water consumed in Israel in 2016.

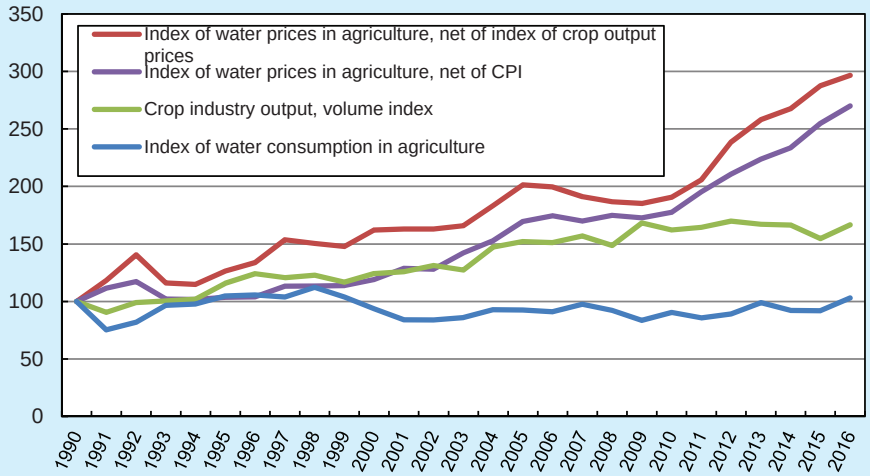
[3] In 2006, expenditure on water accounted for 11 percent of the total value of field crops and 14 percent of value of fruit and vegetable crops. In livestock industries, water cost is negligible—around 0.3 percent (Central Bureau of Statistics, Input-Output Tables for 2006).

[4] The quantities and prices of water allocated to agriculture are determined via complex institutional arrangements and agreements and not in the free market. These arrangements include allocations, graduated prices that rise commensurate with the rate of use of the allocation (in the past) or the rate of allocation overrun (today), different rates for different levels of water quality, and additional considerations that play a role in setting water prices for various agricultural consumers. For elaboration on the way quotas are allocated and prices are set, see, for example, Yoav Kislev (2011), "The Water Economy of Israel," Taub Center for Social Policy Studies in Israel, Policy Paper 2011.15, http://taubcenter.org.il/wp-content/files_mf/thewatereconomyofisrael.pdf. The most recent notable update actually reduced the cost of fresh water for most farmers, when Amendment 27 of the Water Law went into effect, in May 2017. For an up to date review, see Israel Water Authority, *Activity Report for 2017*.

increased by 70 percent between 1990 and 2016 (Figure 1), total water consumption by agriculture hardly changed during that time.[5]

The marked increase in crop output per unit of water has been documented in many sources, most of which stress the definitive contribution of advanced irrigation methods (such as drip irrigation) that are based on technological innovations developed in Israel.[6] Other processes—wider use of fertilizers and pesticides, greenhouse growing, switching to more efficient large-scale farms—also contributed to the increase in output per unit of water and the overall upturn in agriculture productivity over the years.

Figure 1
Water Prices for Agriculture[a], Water Consumption in Agriculture[b], and Crop Industries Output, 1990–2016
(Index, 1990=100)



[a] Index of input prices for agriculture–water.
[b] Water consumption: all types of water, for all agriculture (including raising livestock).

SOURCE: Based on Central Bureau of Statistics data.

[5] The effect of water price on quantity consumed by agriculture has also been documented in micro data: In a study based on data for 185 agricultural localities in Israel in 1992–1997, it was found that demand elasticity for water in agriculture with respect to water price was -0.3 in the first year and -0.46 in the long term. The authors of the study do not explain whether the decrease in consumption reflected greater efficiency only or was accompanied by a decline in crop volume. See Z. Bar Shira, I. Finkelshtain, and A. Simhon (2006). Block-rate versus uniform water pricing in agriculture: An empirical analysis, *American Journal of Agricultural Economics* 88(4), 986–999.

[6] See, for example, Kislev (2011) and Yoav Kislev and Shaul Tsaban, *Statistical Atlas of Israeli Agriculture 2013,* and Central Bureau of Statistics, *Agriculture and Environment Indicators 2000–2015,* October 2018. The OECD also emphasized the contribution of Israel's irrigation technology to the enhancement of water-use efficiency in Israeli agriculture (*OECD Review of Agricultural Policies: Israel 2010*).

This box focuses on an additional development, besides technological improvements in irrigation, that has helped to boost the value of crop output per unit of water in the past two decades: the shift from water-intensive crop industries to those less intensive in water use. Importantly, the reference here is not to the adoption of water-saving strains of the same crops, which may be regarded as a technology-induced improvement in the use of water.

When we characterize the water intensity of various crops, we should take into account an additional process evidenced in Israel in recent decades: a steep increase in the use of treated effluent. Treated effluent is used almost exclusively for crop irrigation and is replacing fresh water to a growing extent. Effluent is treated to several degrees of quality; the higher the quality, the broader the range of crops for which it may be used.[7] One implication of this process is that the stability in total agricultural water consumption (Figure 1) and the rate of decrease of agriculture's share in total Israeli water consumption underestimate the contribution of agriculture to water savings. This is because these indicators relate to all types of water, whereas the problem centers on fresh water. Absolute consumption of fresh water in agriculture has fallen by about half in the past two decades whereas the shares of treated effluent and total non-potable water in all agricultural water consumption have doubled to around 45 percent and 61 percent, respectively (Table 1).

Table 1
Potable and nonpotable water in agriculture

	1996	2006	2016
Potable water for agriculture (million cu.m.)[a]	892	520	485
Nonpotable water[b] as a share of total agricultural water consumption	31	53	61
of which: treated waste water[c] as a share of total agricultural water consumption	21	32	45

[a] Ground water, above-ground water (mainly from the Sea of Galilee), and desalinated water.
[b] Treated waste water, saline water, flood water, and reservoir water.
[c] Treated water (waste water treated at water treatment plants and at the Gush Dan waste water treatment facility).
SOURCE: Based on Central Bureau of Statistics, Agricultural and Environmental Indices, May 2014; Government Water and Waste Water Authority, 2017 Activity Report.

Another implication of the process is that farmers use different types of water for which they pay different prices.[8] The extent of use of the various grades of water varies among crops. Accordingly, reference must be made to the total cost of the water input, taking into account the composition of the

[7] The cost of treating sewage rises with treatment quality. However, most sewage has no use other than agriculture and would have to be treated at a high level of quality even if it were not directed to agriculture in order to mitigate environmental damage. Notably, despite some exceptions, the discharge of sewage into rivers is prohibited by law; when such water is discharged into nature, it is of especially high quality (most of it potable).

[8] Potable water is the most expensive; treated effluent is priced commensurate with the level of treatment.

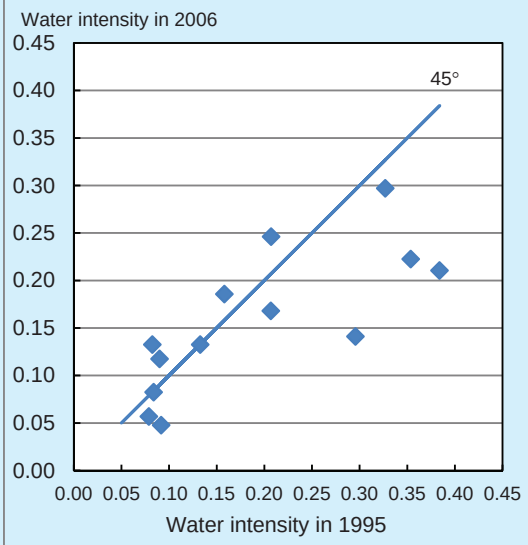
types of water used for the crop examined, weighted by their price. This cost relative to output value is the indicator of the economic water intensity of various crops; it is this that makes the crops comparable.[9]

The direct coefficients of the water input for agricultural industries that appear in the Central Bureau of Statistics input-output tables serve as an index for each industry's economic water intensity.[10] The latest available data pertain to 2006 and, before that, to 1995. The Central Bureau of Statistics calculates these coefficients for groups of crops (industries) and not for each crop separately.

To serve as indicators of an industry's long-term water intensity, these coefficients must satisfy two conditions: the industry's (economic) water intensity must not have changed radically between the points of time in which it is measured (1995 and 2006) and the proportions of its internal composition of crops must not have changed radically as to affect its average water intensity. These requirements allow us to examine thirteen of the sixteen irrigated crop industries that accounted for 85 percent of total crop output value in 2016.[11]

Figure 2 presents the direct coefficients of the various industries in 1995 and 2006. It shows that the water intensity of most industries declined during this interval (represented by the points under the 45° line) and that the decrease centered on water-intensive industries. In industries that saw increases in intensity, the average upturn was milder than the average downturn in the other industries. The ranking of industries by water intensity has largely persisted: industries intensive or non-intensive in water relative to others in 1995 remained so in 2006. Importantly, the decrease in economic intensity over the years may not be due solely to technological improvements that allowed various crops to consume less water; it may also reflect a decrease in the effective price of water (e.g., when fresh water is replaced with less expensive treated effluent) or an increase in output price (in domestic or export markets). The upturn in

Figure 2
Water Intensity[a] of Crop Industries, 2006 Compared to 1995



[a] The direct coefficients of the water input from Input-Output tables.

SOURCE: Central Bureau of Statistics, Input-Output

[9] Economic water intensity is different from physical water intensity, which relates to the quantity of water required to produce a crop irrespective of the types and prices of the water. To demonstrate the difference, consider two crops that consume the same quantity of water but are irrigated with expensive fresh water in the first case and with treated effluent in the second. Their physical water intensities are the same but the economic water intensity of the first crop is greater than that of the second. This is a desired characteristic of the index, especially since the shortage centers on fresh water. Just the same, physical intensity is the more suitable indicator for certain uses.

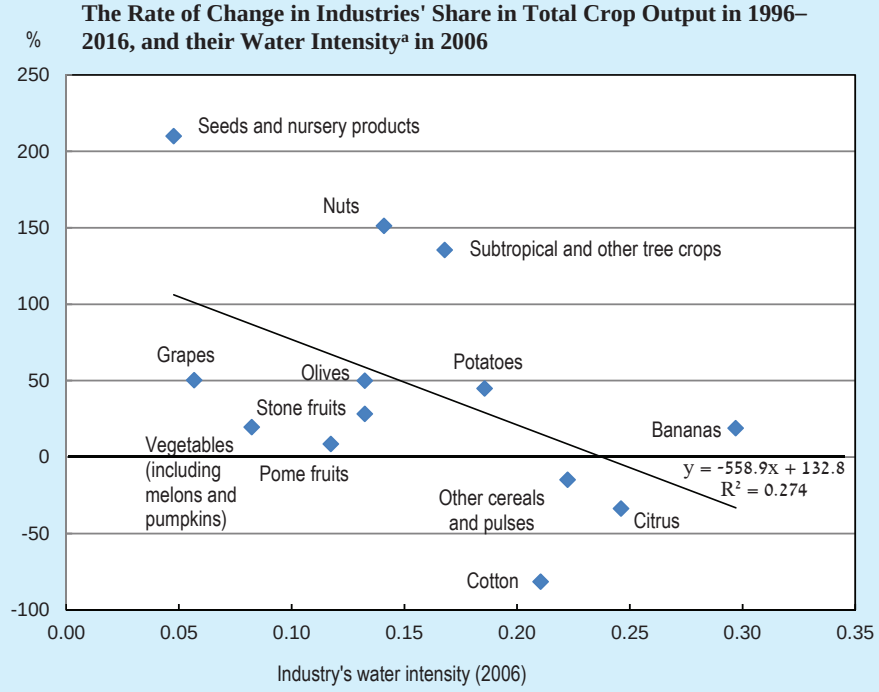
[10] The direct coefficients are the shares of the cost of goods, services, and primary inputs in each production industry's total output. Since they cover all inputs, including operating profit, they add up to 1. For a detailed explanation, see Central Bureau of Statistics, *Input-Output Tables 2006,* Publication 1561, 2014.

[11] The share of these industries in crop output was 75 percent in 1996. The proportional decline of the omitted industries traces almost entirely to the steep decrease in growing flowers for export during this time.

intensity in some industries may trace, among other factors, to a change in the internal composition of the industry or to the relocation of growing areas (e.g., of citrus fruit and olives) to southern Israel, where there is less rainfall.

Figure 3 plots the rate of change in the share of each industry in total crop output in 1996–2016 against its water intensity in 2006. The figure indicates that in those years the industry composition in agriculture changed toward industries with lower water intensity—in general, the higher the water intensity of the industry, the lower the growth rate of its share in total crop output. This negative correlation is robust to several sensitivity checks.[12] This picture is consistent with measures taken to limit the quantity of water for agriculture and to raise its price. However, the finding does not suffice to prove causality, particularly since those measures were not the only factor that acted in this direction. Additional factors, including changes in the domestic or foreign prices of various products and the contraction of farmland in central Israel due to rapid development, also likely contributed to the change in industrial composition.

Figure 3
The Rate of Change in Industries' Share in Total Crop Output in 1996–2016, and their Water Intensity[a] in 2006



[a] The direct coefficients of the water input from Input-Output tables.
SOURCE: Based on Central Bureau of Statistics data.

[12] The negative correlation also persists (although to varying degrees) when we juxtapose the rate of change in the share of the industry to water intensity in 1995, when we examine the two decades separately, and when we omit some of the industries.

The structural change described in the figure is consistent with, and may partly explain, the measured improvement of efficiency in agriculture in terms of output per unit of water. The figure, however, does not take account of differences in the size of the industries. Accordingly, it is difficult to learn from it about the extent of the change in agricultural industry composition and the quantitative contribution of the change to the improvement in water use efficiency. The data below, however, indicate that the structural change and its contribution to water saving were indeed sizable.

First, it is noteworthy that the share of the four industries that were lowest in water intensity (in 1995) increased during the two decades from 36 percent to 47 percent of total crop output. Most of the upturn is due to two industries—seeds and vegetables.

Two water-intensive industries that were once central in Israeli agriculture—cotton and citrus—are particularly interesting in terms of the contribution of structural change to water conservation. In 1995, they accounted for 18 percent of total crop output but consumed 30 percent of all water in agriculture (in monetary terms).[13] Accordingly, the steep decrease in their absolute size[14]—also reflected in their falling share in crop output, to only 9 percent in 2016—contributed markedly to saving water. As for the cotton industry, its water intensity declined considerably in addition to the sharp downturn in its size.

The limitations of the data make it hard to quantify the total contribution of the change in industrial composition to water conservation. A calculation that assumes constant water intensity throughout the period for each industry, however, offers an estimate of this saving across the set of industries included in Figure 3. The change in industrial composition alone reduces the monetary value of the water needed to obtain the total actual output in 2016 by 11–13 percent relative to the amount that would be needed to attain the same level of output had the industrial composition remained as it had been in 1996.[15] As noted, the calculation relates to the monetary value of the consumption of water (of various types) and not to physical quantity.

In sum, the negative correlation between the rates of change of the share of the agriculture industries in total crop output and their water intensity points to a restructuring process that is in line with the raising of water prices for agriculture and the water quantity constraint over the past two decades. This notable structural change contributed to the enhancement of efficiency in water use. The array of incentives included a major increase in the price of fresh water and differential pricing of types of water commensurate with their quality (along with creating an alternative to fresh water, an alternative whose quantity and quality

[13] By 2006, their share in water consumption had fallen to 20 percent. The calculation is based on input-output tables for 1995 and 2006. As Figure 3 shows, two additional industries (bananas and other grains and legumes) are very water intensive, but their share in crop output was only 3.0 percent in 1995 and 3.4 percent in 2016.

[14] Between 1996 and 2016, citrus plantation area contracted by 32 percent, output in tons by 43 percent, and exports in tons by 53 percent. Cotton growing area decreased during that time by 70 percent, crop in tons by 76 percent, and exports of fibers (in tons) by 67 percent.

[15] First, we used actual industry output in 2016 and water intensity in 2006 to calculate the monetary value of total hypothetical water consumption in 2016. Next, we assumed that these industries' total output in 2016 was divided in accordance with the industry composition in 1996; from this we derived each industry's output. We multiplied this output by the intensity coefficient of the industry in 2006 and obtained its hypothetical water consumption. By summing the results for each industry, we obtained the value of the total water consumption that would have been needed in 2016 if the industrial composition had been the same as in 1996. The result obtained is an 11 percent saving. By using the 1995 intensity coefficients, we obtain a saving of 13 percent.

have been increasing over time). As a result, the increase in efficiency manifested both in using much less fresh water and in using more treated effluent. In view of Israel's population growth and concomitant increases in fresh-water consumption and quantities of effluent, as well as programs meant to increase the reclamation of effluent and improve its quality, it appears that the transitioning of agriculture to the use of this type of water has not yet exhausted itself. Furthermore, agriculture in Israel is still protected by high import barriers. (For elaboration, see Chapter 7.) Insofar as various agricultural industries are less protected in the future, their output prices will fall and thus their economic water intensity will increase. This process may encourage further efficiencies in the use of water through additional changes in industry composition and technological improvements.

Beyond their importance for Israel's chronic water shortage, the findings may project onto the economy in a broader context. Namely, various economic sectors may improve their efficiency, specifically in response to change in the relative prices of their inputs or production factors, not only by means of technological improvements but also via changes in their industry composition. If these prices become distorted (e.g., importing large numbers of foreign workers to reduce the price of labor), both the pace of technological improvement and the industry composition may be impaired. Changes in industry composition may also affect the economy's total demand for inputs and production factors.[16]

[16] For the effect of economy-wide industrial restructuring on total demand for electricity in Israel, see Lior Gallo, *A Long-Term Forecast of Electricity Demand in Israel,* Discussion Paper 2017.13, Bank of Israel Research Department, https://www.boi.org.il/he/Research/DocLib/dp201713h.pdf.