

# **Economic Developments in Israel: An Overview**

**Benjamin Bental and Gilad Brand**

A chapter from the *State of the Nation Report 2018*

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## Taub Center for Social Policy Studies in Israel

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 Internet edition

# Economic Developments in Israel: An Overview

Benjamin Bental and Gilad Brand\*

This overview looks at macroeconomic developments in Israel from several different and related perspectives. The first part of the chapter discusses macroeconomic processes in the Israeli economy, including the development of GDP and its components, and government activity in this sphere; it also offers a comprehensive assessment of the country's fiscal system (including security spending). The second part examines productivity and growth, especially the effects of growth on standard of living in the various sectors that make up Israeli society, and recent cost of living developments.

## 1. Macroeconomic processes

Indications are that 2018 has been an economically robust year for Israel in many respects: the employment rate is the highest it has been in years, and unemployment is at a historic low. GDP growth for 2018 is expected to amount to 3.2 percent — a similar rate relative to the past, reflecting per capita growth of 1.2 percent. The labor market has remained tight, and the business sector has shown an impressive rise in wages this year as well.<sup>1</sup> Nonetheless, looking ahead, there are worrisome trends: the economy's growth potential is declining due to demographic changes, and Israel's labor productivity shows few signs of growth.

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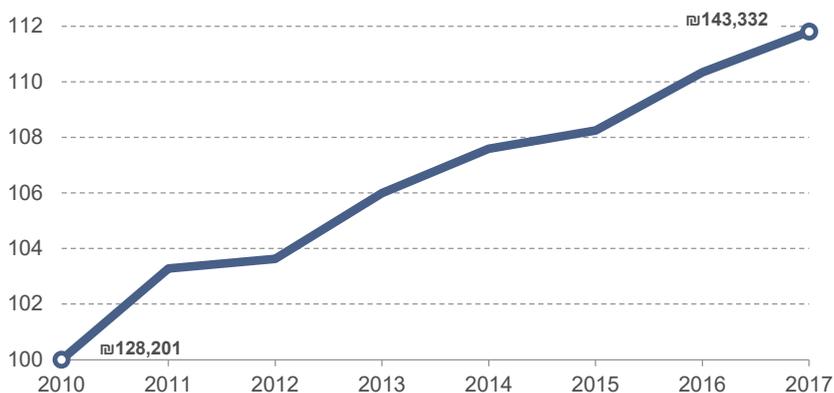
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1 A tight labor market is a market in which employers have trouble filling job vacancies. The index is the ratio between the job vacancy rate and the unemployment rate.

## GDP and its components

Figure 1 shows how GDP per capita (in constant prices) has developed since the beginning of the decade. Based on the data, GDP per capita grew during this period at an average rate of 1.5 percent per year. Growth and productivity are discussed at length in Section 2.

**Figure 1. Trends in GDP per capita**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS, *Statistical Abstract of Israel 2017*

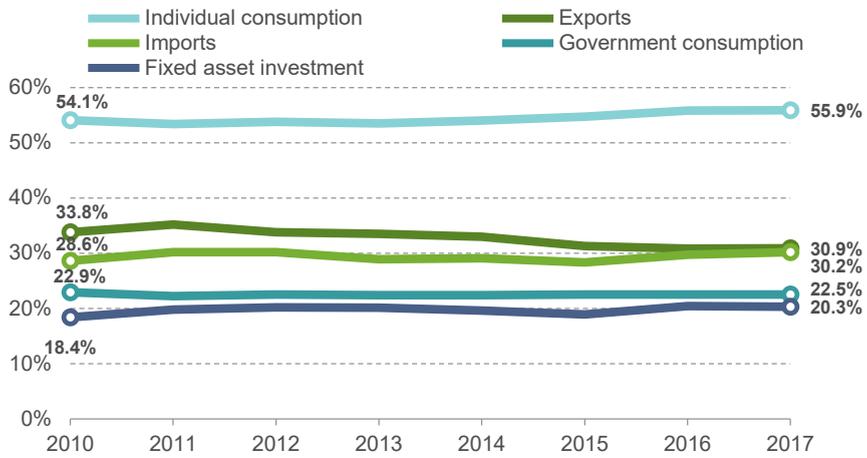
The following figures present the components of GDP and their relative development over the past eight years. The graphs are meant to show the processes that characterized Israel's economy during this period, disregarding short-term fluctuations. The graphs are based on Central Bureau of Statistics (CBS) national accounting data, and are presented in constant values (2015 prices).<sup>2</sup>

Figure 2 shows the development of the shares of the major GDP components: private consumption, public consumption, fixed asset investment, exports and imports. This breakdown of GDP makes it possible to determine whether growth can be attributed to a component whose relative weight increased. The picture that emerges is one of stability: no substantive changes in the relative shares of the main GDP components.

<sup>2</sup> To compare with international figures in dollars, the values in the graph should be divided by the shekel (NIS) exchange rate in PPP 2015 dollars. According to OECD data, the exchange rate was NIS 3.86 to the dollar.

The share of private consumption rose during these years by slightly less than 2 percentage points, while the share of public consumption remained constant.<sup>3</sup> Investment showed mild volatility, but remained close to an average of about 20 percent, ending the period with a slight increase. The share of exports declined consistently over the past five years, while that of imports has remained the same since 2012. The overall picture might thus be described as one of “balanced growth.”

**Figure 2. GDP and its components**  
As a percent of GDP



Note: Due to concatenation, the expenditure components do not add up to the total.  
Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS, *Statistical Abstract of Israel 2017*

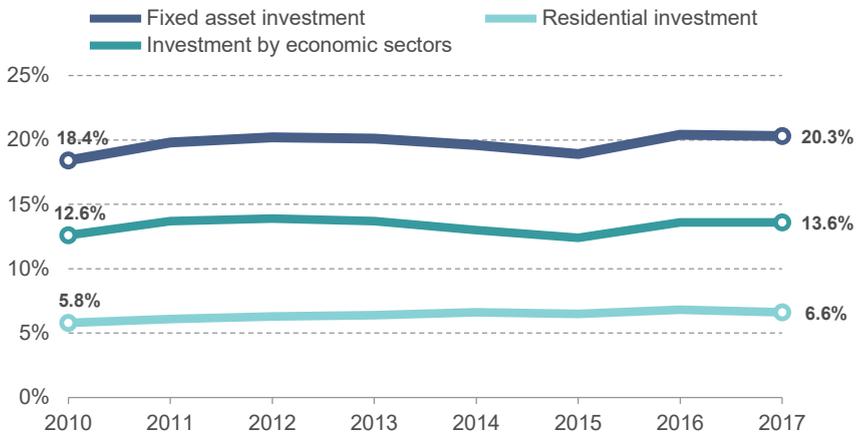
### Investment

Figure 3 presents trends in the various forms of investment used in computing GDP: investment by economic sectors, residential investment,

<sup>3</sup> Since the rate of increase is minimal, it should be interpreted with caution. The percentages may not add up to 100, due to the linking of expenditure components based on different price indices, and because small year-to-year value changes can also stem from problems with the conversion of current values into fixed values. As a rule, the picture that emerges from an assessment of current values is a little different: a slight drop in private consumption relative to GDP and a slight increase in export surplus. The differences appear to stem from the relative decline in consumer prices (see a detailed discussion in the next section).

and investment in fixed assets, which is the sum of the former two types of investment. The data indicate that the investment volatility shown in Figure 2 is due to investment activity by the economic sectors (including governmental and private-sector investment in industrial equipment, real estate, infrastructures, and the like). Between 2012 and 2015, the share of this kind of investment in GDP fell by 2 percentage points, due, apparently, to reduced investment in the natural gas fields. Over the past two years, investment recovered, rising by a little over 1 percentage point. Throughout the period, residential investment rose consistently, amounting cumulatively to a 1 percentage point increase.

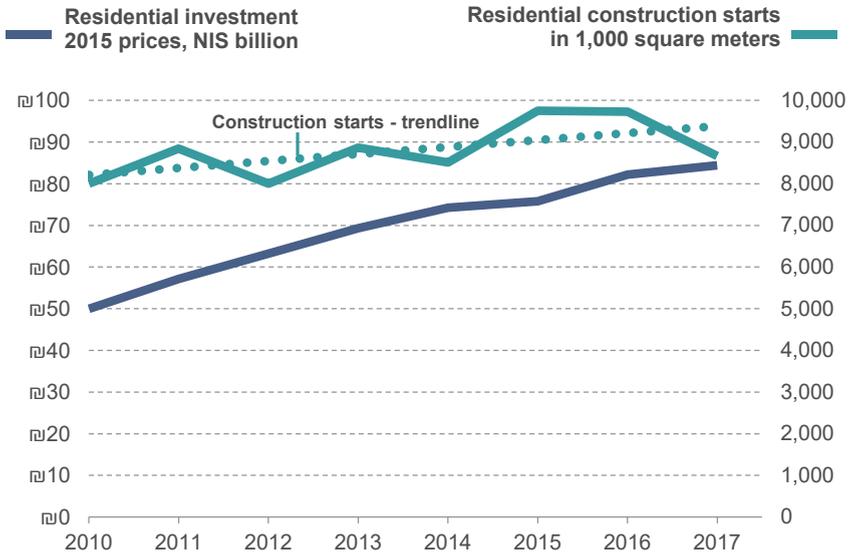
**Figure 3. Investments and its components**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS, *Statistical Abstract of Israel 2017*

Figure 4 shows how residential investment, displayed in Figure 3 as a percentage of GDP, translates into monetary terms (the sum total of investment in residential construction) and into actual construction data (residential construction starts in square meters per year). The figure indicates a decline in housing starts over the last few years, and especially in 2017 — a worrisome development given the housing shortage in Israel and the ensuing price pressure it creates. This decline is also reflected in a leveling off of residential investment relative to earlier years. These data are extremely important for the housing market, as the housing shortage cannot be resolved without diverting additional resources to residential construction and increasing residential investment as a percentage of GDP.

**Figure 4. Investment in residential building and construction starts**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS, *Statistical Abstract of Israel 2017*

### Government consumption

Government consumption is divided into two components: collective consumption (e.g., security and infrastructure) and government expenditure for individual consumption (e.g., education and healthcare). As Figure 5 shows, these two spending components have similar weight. Over the years, the expenditure on the individual consumption component has shown stability, while the collective component has fallen slightly. The collective component’s downturn stems from a decline in the share of security spending, which accounted for slightly over half of the collective spending at the start of the period but dropped to slightly less than half by its end.<sup>4</sup>

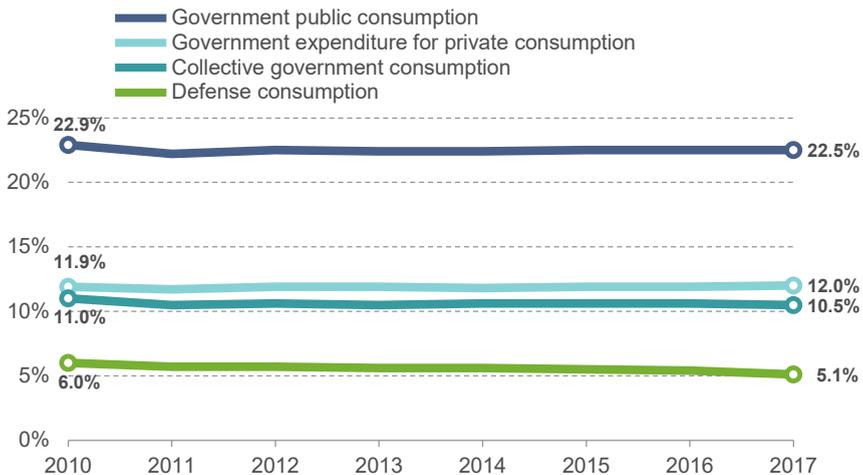
The Prime Minister recently proposed increasing the security spending component and fixing it at a level of 6 percent of GDP, as was the case in 2010. If this proposal is approved and public consumption remains at its

<sup>4</sup> The security consumption figures were taken from the Bank of Israel. Since two different data sources were used, there may be small discrepancies.

current relative level, the other spending items will be negatively affected (a more detailed discussion on the fiscal effects are provided in the following *Spotlight*, while the economic aspect of the security budget is addressed in the Appendix).

### Figure 5. Government consumption and its components

As a percent of GDP



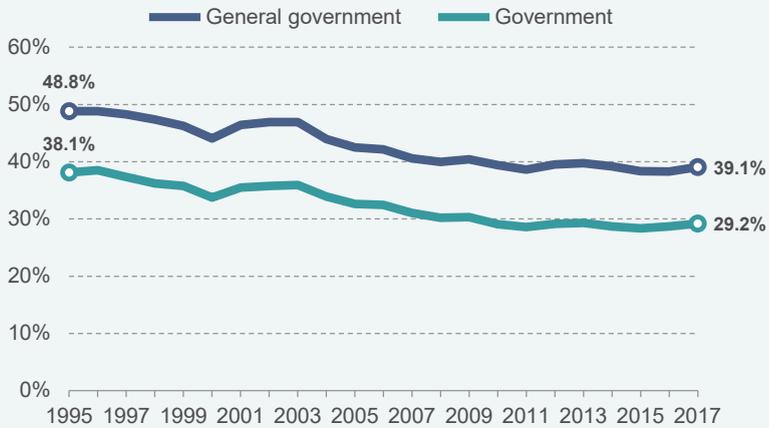
Source: Benjamin Bental and Gilad Brand, Taub Center  
Data: CBS, *Statistical Abstract of Israel 2017*; Bank of Israel

### ***Spotlight: The fiscal aspect of government consumption from a historical perspective***

The Israeli economy's impressive stability of recent years does not accurately reflect the trends of earlier years. Figure 6 shows government spending over the course of two decades. In addition to consumption, the spending figures include interest on public debt, subsidies, current transfers, capital transfers to the private sector, gross capital formation, building and land purchases, and capital transfers abroad, minus taxes on defense-related imports. "General government" spending includes not

just actual government expenditures but also spending on the National Insurance Institute, other national institutions, local authorities, and public nonprofits. The stability of “government” spending share since 2010 is also seen in Figure 6, but seen in this way, it appears as the end of an extended convergence process in which spending as a percentage of GDP dropped by 9 percentage points over a 15-year period.

**Figure 6. Government expenditure**  
As a percent of GDP

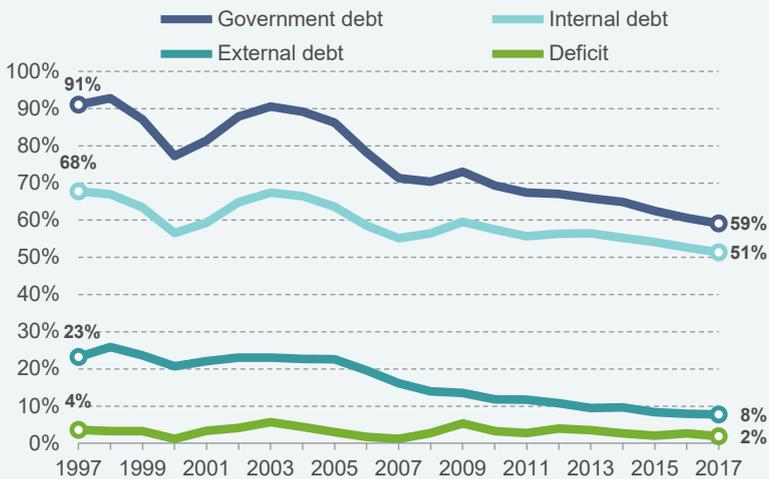


Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel

The contraction of the government’s share of GDP over the past 20 years was accompanied by major budgetary deficit reduction processes and a lowering of the public debt to GDP ratio, as can be seen in Figure 7. While, two decades ago, debt amounted to 90 percent of GDP, today’s ratio is 60 percent — the target set by the Eurozone countries in the Maastricht Treaty (which most of these countries do not meet).

Of particular note is the exceptionally small share of external debt (debt owed to foreign creditors), which led to a historic change in the Israeli economy's international standing and in its ability to raise funds in the global capital market. These figures appear to be due largely to the fiscal discipline that has characterized the state budget in recent years: spending rules instituted at the end of the last decade (to be discussed below) put the brakes on government spending, and the lowering of the deficit ceiling resulted in a deficit reduction from 3-6 percent of GDP during most of the relevant period, to 2-3 percent in the last few years.

**Figure 7. Deficit and government debt relative to GDP**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel

## An international comparison of Israel's fiscal policy

In this section, a comparison is made between Israel's fiscal policy and that of other OECD countries. The data in this section are drawn from OECD sources, and may differ from those used in the previous sections.

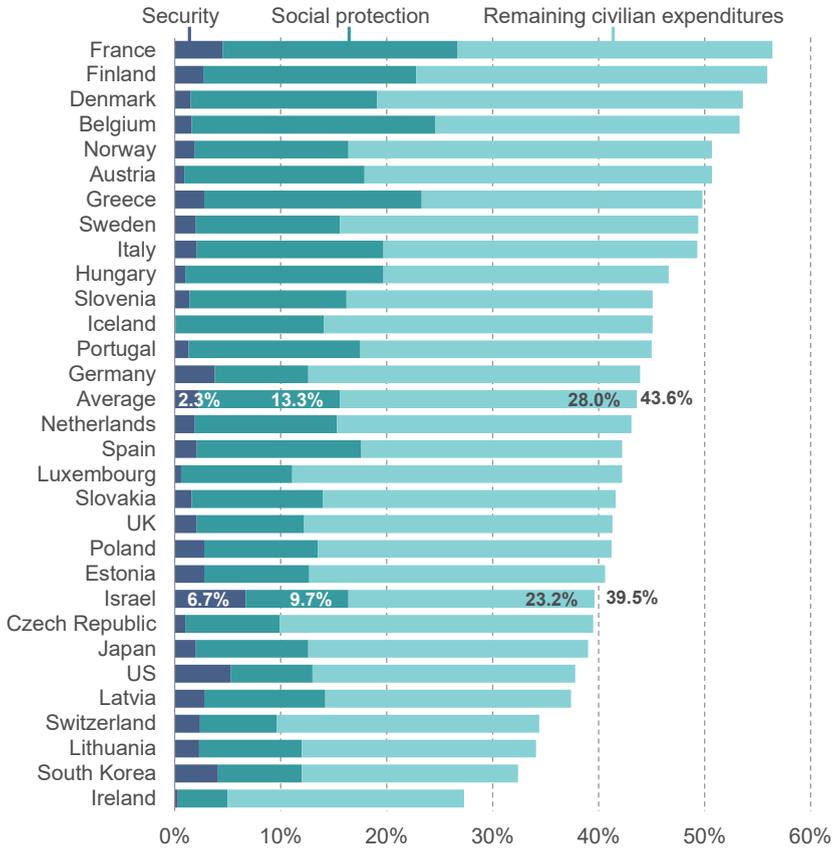
Figure 8 shows the level of public spending and its major components: security, social protection (including transfer payments), and other civilian expenditures. Israel stands out in two ways: its public spending share is relatively low (40 percent of GDP), while its security expenditures are high (6.7 percent of GDP). The combination of these two factors results in a civilian spending share (including social protection) of 33 percent of GDP.

Countries differ greatly in terms of the social protection component. In France, for instance, the component amounts to 23.2 percent, while at the other end of the spectrum is Ireland, with a social protection component of 4.7 percent. The disparities reflect differing social outlooks, as well as differences in population composition. In particular, Israeli society is younger and its unemployment rate is lower than that of other countries, and these factors have an impact in terms of transfer payments. In contrast, the OECD countries show less variation with regard to the other civilian expenditures. Israel (23 percent) is in the lower part of the distribution, but the entire range is from 20 to 30 percent. Israel's similar expenditure rate matches its relatively low share of government spending in GDP.

Despite the deficit reduction of the last few years, Israel still has a larger deficit than most OECD countries (Figure 9). In some of the other countries, not only is there no deficit, but there is actually a surplus. In Ireland (whose deficit is minimal) and Greece (which has a budgetary surplus), deficit reduction is related to the lessons learned from the global financial crisis of 2008, and the necessity to address the resulting debt. Other countries, such as Italy, Japan, and Spain, are trying to pursue an expansionary policy with the aim of lowering unemployment rates. These factors do not apply to Israel, whose deficit is due mainly to a lack of desire to raise taxes and eliminate exemptions.

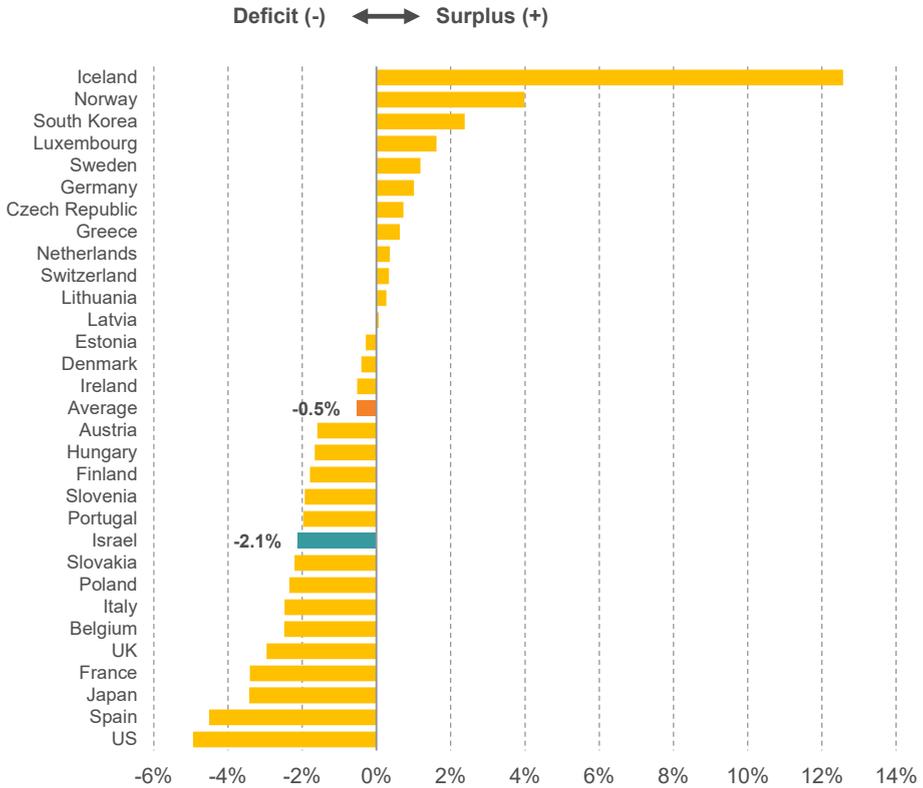
## Figure 8. Public expenditure and its components in the OECD countries, 2016

As a percent of GDP



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD

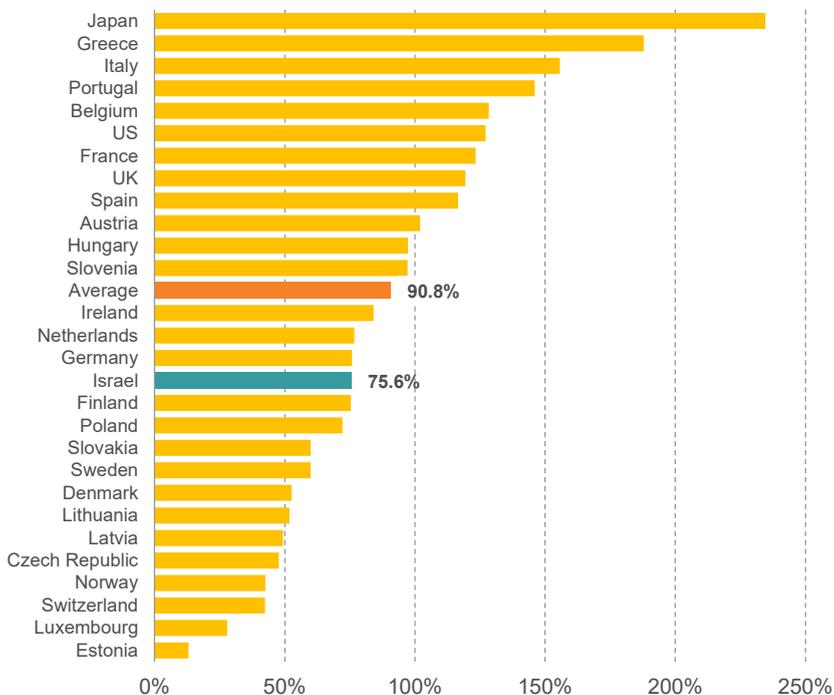
**Figure 9. Deficit and surplus as a percent of GDP in the OECD countries, 2016**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD

According to OECD reports, Israel’s national debt amounted to 75.6 percent of GDP in 2016 (Figure 10).<sup>5</sup> This figure puts Israel near the middle of the country distribution. Maintaining the deficit ceiling is crucial to keeping the debt-to-GDP ratio from rising.

5 The debt definition in Figure 10 differs from the definition in the Maastricht Treaty on which Figure 7 was based. For example, the OECD considers underfunding of financial obligations toward state employees as part of the debt, while the Maastricht Treaty does not. According to OECD estimates, these components account, on average, for 5-10 percent of debt in the Eurozone countries (OECD 2017).

**Figure 10. Deficit to GDP ratio in the OECD countries, 2016**

Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD

### ***Spotlight: The fiscal system and projections for the coming years***

The state budget formation is supposed to follow two rules: a spending limit (“total spending”) and a deficit ceiling. An amendment to the Reduction of Deficit and Limitation of Budgetary Expense Law, passed in 2014, allows the government to increase its spending in real terms at a rate calculated by

the average population growth over the preceding three-year period plus the ratio between 50 percent (the figure specified as the target for public debt as a percentage of GDP) and the debt-to-GDP ratio computed for the previous year (in percentages).<sup>6</sup> This year, for example, the formula allows spending to grow by 2.8 percent: an increase according to the average population growth rate (2 percent) plus another 0.8 percent — the result of dividing 50 percent by 60 percent which is (approximately) the current debt-to-GDP ratio. If the debt-to-GDP ratio target is achieved and population growth does not change, this rule will enable the government to increase its expenditures by 3 percent per year, which is to say an increase in per capita spending of 1 percent.

The second rule sets the deficit ceiling, which is legislated as a “temporary directive” and varies from year to year. According to a 2015 amendment to the aforementioned law, for example, the deficit ceiling for 2018 and 2019 has been set at 2.9 percent of GDP.

On the face of it, these rules obligate the government to adjust its programs and their budgetary implications annually according to the input data. In reality, and especially given the scarcity of resources allocated to civilian spending items, various means are found to work around these legal constraints. The most straightforward way is through passing another “temporary directive,” legislated by the Knesset and permitting deviations from the rule. For the 2019 budget, for instance, a temporary directive was passed allowing the government to increase its expenditures by an additional maximum of 3 percent relative to its 2018 expenditures. In many cases, temporary directives originally intended to meet urgent but temporary needs have been used on behalf of ongoing programs, ones with a long-term impact on government spending. For example, in 2017, programs subsidizing children’s afternoon day care and

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<sup>6</sup> This rule replaced that of earlier legislation, according to which the permissible spending increase was linked to the rate of GDP growth.

shortened school vacations for grades 1-3 were approved, and the Home-Buyer's Price Program (Mechir Lamishtaken) was extended until the end of 2018, with no reductions on other budget items.<sup>7</sup> In 2018, funding for these programs was again extended by temporary directive to the end of 2019.

Another means of working around the spending and deficit rules is to transfer governmental activities to extra-budgetary frameworks. The Bank of Israel (2016) noted the use of the "revenue-dependent expenditures" item, which is not subject to the spending ceiling, to fund ongoing government projects. Revenues needed to fund these activities are obtained from extra-budgetary public entities such as KKL-JNF, the Israeli lottery (Mifal HaPais), the Israel Airports Authority, and various government companies.<sup>8</sup> A notable example is the Home-Buyer's Price Program, which is operated and funded by the Israel Lands Authority through the sale of state land. Technically, the program is not listed as a government expenditure and so does not count as part of the spending that would be limited according to the expenditure rules.

In addition to these rules, 2015 saw the legislation of Section 140a of the "Basics of the State Budget Law," which extends the rules' applicability over time. This section, referred to as the "numerator," obligates the government to assess the budgetary ramifications of its activities over a three-year period. In particular, an activity expected to bring about a deviation from the budget rules cannot be carried out unless a budgetary source has been found for it within the framework of the rules (i.e., canceling another activity or finding a funding source). The rule applies to all programs, and not just new ones.

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7 The Home-Buyer's Price Program (Mechir Lamishtaken) is an affordable housing program for subsidizing first-time home buyers in Israel.

8 KKL-JNF: Keren Kayemeth LiIsrael — Jewish National Fund is Israel's largest green NGO established in 1901. It supports projects in the fields of education, recreation, and the arts.

Table 1 examines the feasibility of the budget proposal for 2019 based on the described spending rule — that is, assuming that the government will increase its spending in accordance with the average population growth of the three previous years, minus the required correction (50 percent minus the estimated debt-GDP ratio for 2018). Based on the data, it appears that, even if the government is able to fund the entire expenditure, beginning in 2020, it will not be able to overcome the deficit restriction currently mandated by law. In the long term, the problem will worsen: in 2023 and 2024, the permitted deficit rate is expected to drop to 1.75 percent and to 1.5 percent of GDP, intensifying the difficulty that it poses. It is clear that adjustments will have to be made to the government budget.

**Table 1. Government expenditure and deficit projections**

Year	Expenditure (NIS billion)	Deficit (NIS billion)	Deficit to GDP, permitted percent	Difference (NIS billion)	Percent deficit to GDP
2019	397.4	40.2	2.90	0.0	2.9
2020	412.0	41.1	2.50	5.3	2.9
2021	426.2	40.2	2.25	6.6	2.7
2022	441.4*	39.9	2.00	7.5	2.5

\* Out of overall expenditure, NIS 442.2 billion can be spent.  
Source: Ministry of Finance, Budget Expenditure 2019

The budgetary problem revealed by the figures in the table is expected to worsen if the Prime Minister's intention of increasing security expenditures to 6 percent of GDP (versus today's level of just over 5 percent), and linking it to the GDP growth rate, is realized. Bank of Israel calculations (2018b: Table 3, Figures 4-7) indicate the cost associated with this proposal. Optimistically assuming continued economic growth with no shocks, and adherence to the spending rule, if tax rates are not increased — but the deficit ceiling is raised to 3 percent

of GDP – then civilian spending (excluding current transfer payments) will have to drop from 22.6 percent of GDP in 2019 to 21.9 percent in 2025. Over the same period, government debt will increase from 61.4 percent of GDP in 2019 to 66.3 percent. If the government wants to maintain the level of civilian spending as a percentage of GDP, while also meeting deficit targets and stabilizing the debt-to-GDP ratio, it will have to raise tax revenues at a cumulative rate of 1 percent of GDP until 2022. In this case, the additional security cost would be funded by a tax hike that would have to take effect immediately. Alternatively, if the civilian spending share is to remain at 22.6 percent of GDP without raising taxes, the deficit will grow to 3.8 percent of GDP by 2025, and the debt-to-GDP ratio will rise to 68.5 percent. According to the spending rule, such an increase would entail lowering the spending ceiling by 0.1 percentage points of GDP relative to today.

These trends are the opposite of the developments that formerly characterized the Israeli economy (see Figure 7). They will impair the government's ability to improve civilian services and infrastructure, and could potentially weaken the Israeli economy's status in the global capital market.

## 2. Growth and productivity

Israel is characterized by higher growth rates than those of other OECD countries. Central Bureau of Statistics (CBS) reports show that, in 2017, the Israeli economy grew by 3.5 percent, compared with an average OECD growth rate of 3.0 percent. However, the comparative picture changes when GDP per capita growth is examined: because the Israeli population grew by 2 percent in 2017, the GDP per capita growth rate was only 1.5 percent, while in the OECD, GDP per capita grew by 2.4 percent on average.

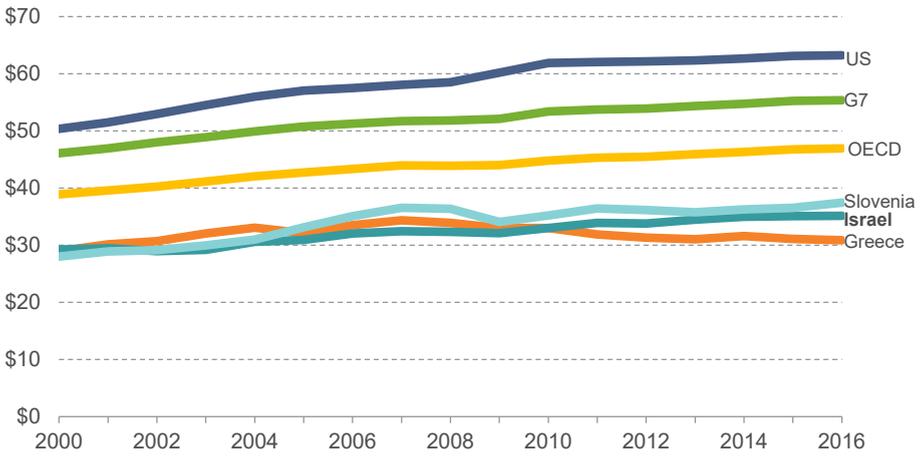
Nevertheless, international comparisons based on GDP per capita do not paint an accurate picture, mainly because the Israeli economy has a larger

share of children and young adults who do not participate in the labor market, relative to the OECD countries. For a more accurate comparison, Figure 11 shows the GDP per work hour for Israel and several other countries, as well as selected indices starting in 2000.

The data indicate that Israel is not managing to close the gap between itself and the OECD and G7 average, and even less so between itself and the United States (see also Figure 12). Two other countries worthy of note are Slovenia and Greece, whose GDP per work hour figures were similar to Israel's in 2000. As can be seen, Slovenia has overtaken Israel (see also Figure 13), while in Greece, the GDP per work hour has declined substantially (remember that the country has only just emerged from the great debt crisis in which it became mired in 2008).

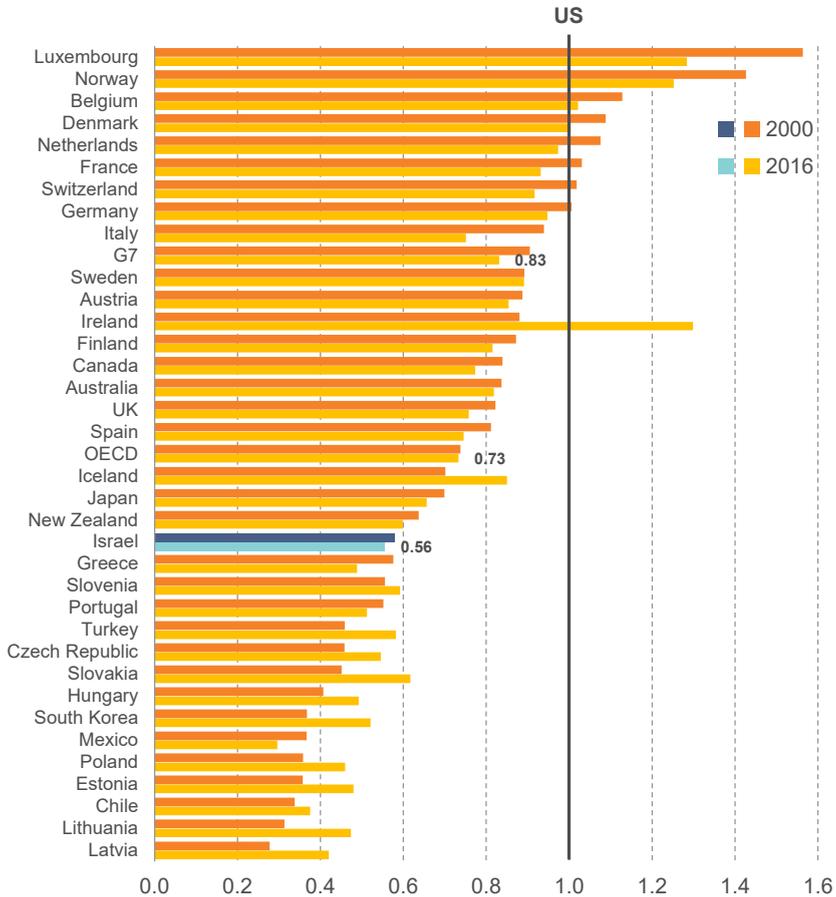
**Figure 11. GDP per work hour in Israel and in selected OECD countries**

In 2010 PPP dollars



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD

Figure 12 shows the GDP per work hour for all OECD countries relative to the US GDP in 2000 and 2016 (the countries are organized by this ratio for the year 2000). Except for Mexico and Greece, all of the countries below Israel (that is, those whose GDP per work hour to US GDP ratios were lower than that of Israel in 2000) improved their status; some have surpassed Israel (Slovenia, as noted above, along with Turkey and Slovakia). Israel's GDP per work hour fell from 58 to 55.5 percent of the analogous US figure in 2016.

**Figure 12. GDP per work hour relative to the US**

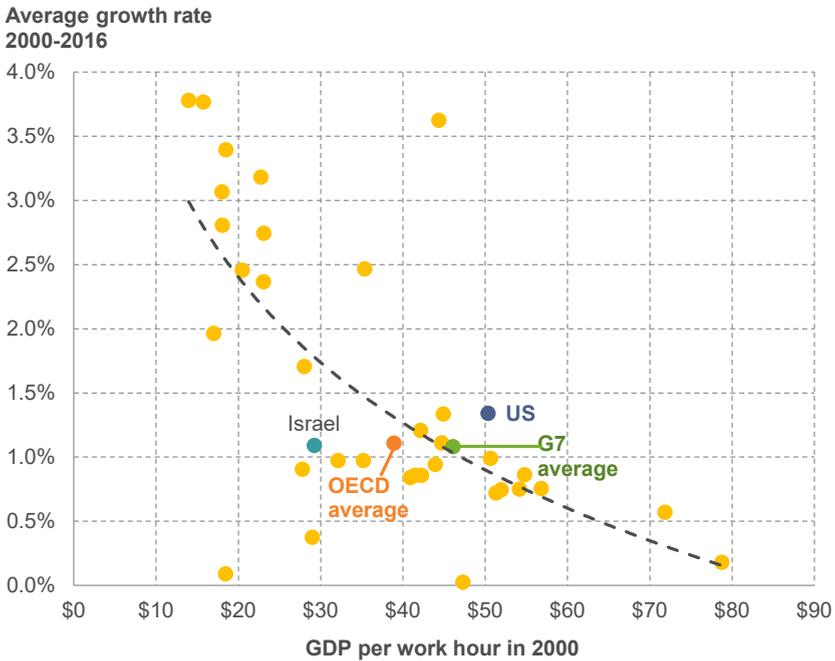
Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD

According to accepted economic theory of growth, the rate of GDP growth (per work hour) should decline the wealthier the country is, due to the law of diminishing returns. The relationship between GDP per work hour and the growth rate of this index can be assessed by means of a regression linking them (see Mankiw, Romer, and Weil 1992). Figure 13 provides a simple examination of this relationship.<sup>9</sup>

<sup>9</sup> The regression line estimated in the literature shows the average growth rate over the course of time as a function of the log of GDP per capita at the start of the period. This specification stems from suitable approximations of the theoretical model.

We can clearly see that Israel lies far below the regression line. The expected annual rate of growth in GDP per work hour, according to the regression, should have been 1.7 percent, approximately that of Slovenia. In reality, however, the average growth rate was 1.1 percent. In numerical terms, the meaning of this difference is that, in 2016, Israel’s GDP per work hour should have been \$4 higher than the amount measured for that year (\$35), that is, it should have been 11 percent higher.

**Figure 13. GDP per work hour in 2000 and average growth rate 2000-2016**



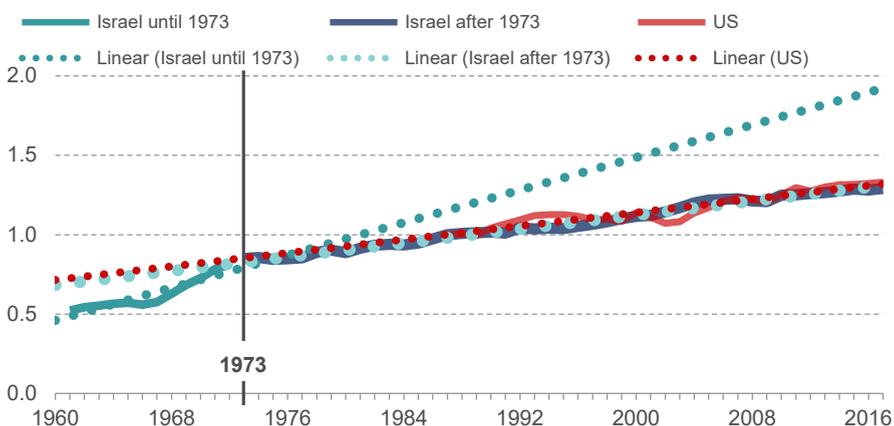
Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD

The explanation for the Israeli economy’s relatively poor performance lies in the way that productivity has developed over the years. Figure 14 displays the business sector’s total factor productivity (TFP) coefficient for

Israel and the United States (where comparable data exist), normalized to a level of 1 in 1987 (the year when the current US data set begins).<sup>10</sup>

The graph shows similarity between the two countries in the development of the total factor productivity coefficient since 1973. The trend lines almost completely overlap, which is consistent with the finding that the gap in GDP per work hour between Israel and the US has remained constant. However, this trend emerged in Israel only in 1973; prior to that, the rate of growth had been much faster. Had Israel's TFP continued to grow in accordance with the trend line based on 1961 to 1973 growth data, the business sector's TFP would be 40 percent higher than it actually is. In other words, the gap between Israel and the United States in GDP per work hour, currently about 40 percent, would have been eliminated!

**Figure 14. Total factor productivity, Israel and the US**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel; US Bureau of Labor Statistics

<sup>10</sup> The total factor productivity coefficient as the sum of annual changes in total factor productivity growth in the business sector. This coefficient is a residual stemming from the difference between the business sector output and the weighted average of the growth in production means employed within the sector. This difference is usually attributed to technological and organizational developments that allow production factors to be utilized more efficiently.

The slowdown in productivity growth that has characterized the Israeli economy since 1973 is well-known; even the rapid growth experienced by Israel's high tech sector from the 1990s on has not altered that trend. It is easy to understand why 1973, the year of the Yom Kippur War, was the turning point, but it is hard to explain why, 45 years later, the rate of change in total factor productivity has yet to recover.

Even the dynamic developments in Israel's labor market do not appear to promise future trend reversal. Extensive documentation has shown that the largest increase in labor market participation has actually occurred among low income workers. For example, Bank of Israel data (2018a:Figure H5) show a steep rise in the number of employed persons per household in the lowest income quintile (from 1 at the start of the millennium to over 1.5 in 2016), versus a very moderate increase in the higher quintiles, to the point of stability in the highest quintile. Moreover, gaps in hourly wage have remained the same throughout the period, with the lowest quintile's hourly wage standing at 30 percent of the highest quintile's hourly wage (ibid:Figure H6). This being the case, the rapid entry into the labor market of low productivity workers (as reflected in their low wages) offsets the high tech sector's impact on total productivity.

## Drivers of growth

Growth in the economy can be attributed to several factors: the human and physical capital stock, number of work hours, and total factor productivity. A look at growth sources by the production function approach allows us to analyze the effect of each factor on the growth rate (by examining the changes attributed to capital and labor, and by attributing the remainder to TFP). Basic growth accounting comprises simple addition of the economy's total work hours, but in order to obtain a more accurate assessment of changes in work inputs, they are commonly combined with assessments of labor force quality, as workers differ from each other in their characteristics. A common method of assessing labor force quality is by weighting all observed worker characteristics, combined with estimates of the return on those

characteristics.<sup>11</sup> Additionally, in recent years another explanatory variable has proven important — the share of prime working age adults (ages 25-64) in the population.<sup>12</sup>

Figure 15a shows the increase of each source of per capita growth in aggregated periods. The analysis indicates that per capita growth in the last few years has relied mainly on the increased employment rate, alongside a decrease in TFP. Since 2012, the labor component — through a rise in labor input — has been the primary source of per capita growth.

Figure 15b shows the development of each growth component over time. Labor input has risen sharply; in contrast, TFP has not increased in recent years, and the capital-to-GDP ratio has also remained nearly unchanged.<sup>13</sup>

11 There are several common methods of measuring changes in the economy's human capital stock. The most widely-used method comprises a grouping of years of schooling within the population and estimates of the return on education (Argov 2016; Johansson et al. 2012). Another accepted means is that of weighting all observed worker characteristics, combined with estimates of the return on those characteristics. The advantage of the latter approach is that it allows us to take into account other factors that affect the human capital stock, such as years of experience. The approach relies on a methodology that has been used for a relatively long time (Jorgenson and Griliches 1967); an updated version of the methodology was employed by Friedman and Zussman (2008), who presented estimates of Israeli labor quality for the period of 1987 to 2005. Brand and Weiss (2016) applied the methodology presented by Friedman and Zussman, and provided updated assessments to 2015. This section adds an estimate for 2016 to the earlier analysis, and updates the estimates for 2012-2015 based on changes and updates to the CBS *Household Expenditure Survey*. The methodology and the way in which it was applied in the analysis are presented in Brand and Weiss (2016).

12 The standard growth-accounting framework assumes that output  $Y$  is produced through use of labor input  $L$ , by means of physical capital stock  $K$  and human capital stock  $Q$ . The function is defined as follows:  $Y = A \cdot K^\alpha \cdot (Q \cdot L)^{1-\alpha}$  where  $A$  is fixed and  $\alpha$  represents the share of capital in the output (usually taken to be a third). By means of a few simple manipulations we can also represent the GDP per capita ( $y$ ) as dependent on the capital stock to GDP [output] ratio and the prime working-age population share:

$$y = A^{\frac{1}{1-\alpha}} \cdot \left(\frac{K}{Y}\right)^{\frac{\alpha}{1-\alpha}} \cdot \frac{L}{pop^{25-64}} \cdot \frac{pop^{25-64}}{pop} \cdot Q$$

where  $pop$  represents the total population and  $pop^{25-64}$  represents the prime working age population.

Representing the production function in this way allows an analysis of GDP per capita growth by the major components that affect it (changes in the capital-to-GDP ratio, human capital, labor input, and prime working-age population share), and to attribute the remainder to total factor productivity. The results are displayed in Figure 15a and Figure 15b.

13 This trend is consistent with the common assumption that, in an open economy, the capital stock per GDP is stable in the long term, and not dependent on the levels of the other components.

Israel's labor force quality has continued to improve, even though the relevant period was, as noted, characterized by the addition of relatively low skilled workers to the labor market (see Fuchs and Weiss 2018).<sup>14</sup> This trend was made possible by two major developments: (A) an aging work force with more years of experience in the labor market, due, among other things, to an increase in the retirement age; (B) an additional increase in education levels (more moderate than in the past), with no decline in the return to education.

**Figure 15a. Total increase in per capita GDP and determinants of growth**

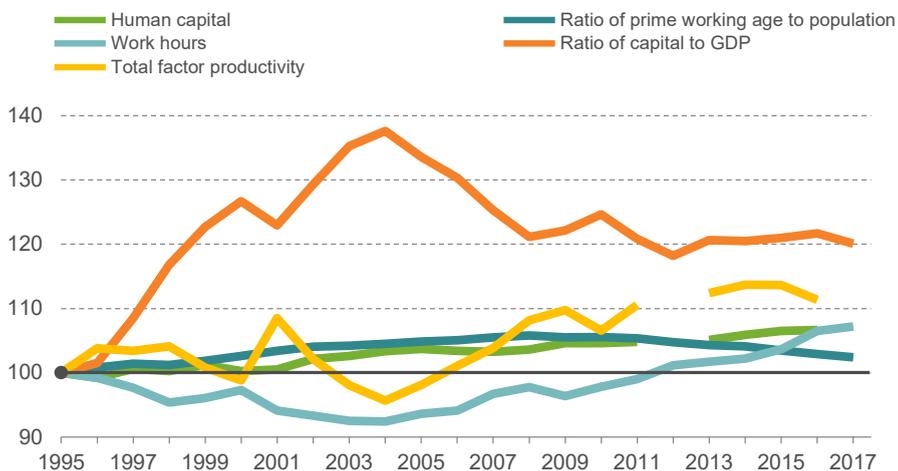


Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel website; CBS website

<sup>14</sup> Bank of Israel (2016) shows that a major portion of the past decade's employment rate upturn can be attributed to a rise in the retirement age. A calculation performed in this chapter reveals that, between 2012 and 2016, the Haredi (ultra-Orthodox) population's contribution to the aggregate employment rate was negative, as the sector's employment growth was too small to offset its increasing weight among the prime working-age population. The Arab Israeli population, by contrast, has made a positive (though relatively small) contribution to the aggregate employment rate increase over the past few years (see discussion in Fuchs 2018).

**Figure 15b. GDP per capita growth rate and its sources:  
Development of various growth components**

Index year: 1995 = 100



Note: For prime working-age individuals. In 2012, the CBS survey methodology changed, resulting in a break in the data series.

Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel website; CBS website

The share of prime working-age population has also been declining for a decade. This phenomenon, which has been countervailed by the economy's growth potential, is expected to intensify through 2025 and to persist into the following decade.<sup>15</sup> Looking ahead, as the employment rate continues to increase and the prime working-age population share falls, the potential for future growth based on increased labor input declines, and other growth-supporting sources will be needed.

## The impact of rising employment rates on Israeli household standard of living

As noted, the labor component is responsible for most of Israel's per capita growth. This section looks at the implications of changes in labor market data on the standard of living of various population groups.

<sup>15</sup> See CBS, *Statistical Abstract of Israel 2017*: Table 2.5.

Figure 16 shows the average annual change in total income (gross and net, i.e., after taxes and transfer payments), in labor income, and in consumption for households at different income levels and in different population groups. The growth that characterized these years affected all population groups. The steepest rise in net income took place within the middle income quintile, while the highest income quintile showed only a moderate increase, apparently because the trend toward employment growth is less relevant to households in this quintile, where employment rates were already high. Consumption levels rose more moderately than did net income, meaning that savings rates also increased during this period – except for those in the lowest income quintile, whose net income growth translated entirely into higher consumption.<sup>16</sup>

The data also indicate that households substantially increased their labor income, including households in the lowest income quintile. Consequently, the weight of labor income in all household income rose by 5 percentage points in the lowest quintile, and the share of income from supports and transfer allowances decreased by a similar rate. This period's rising income from labor was the source of 83 percent of the growth that occurred in total household income, and the only source of income growth in the lowest income quintile.<sup>17</sup>

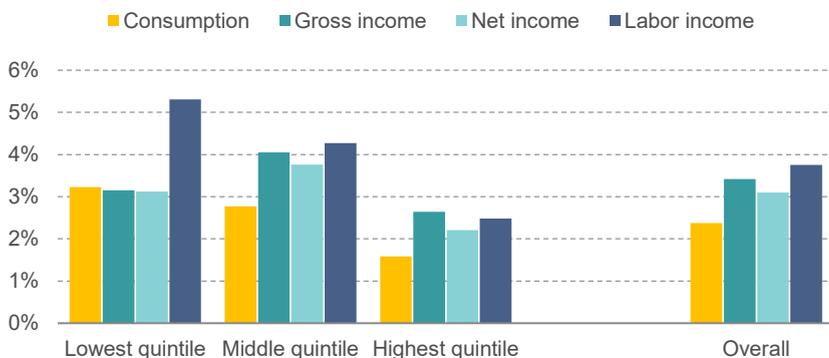
The conclusion that arises from these comparisons is that increasing employment has made a significant contribution to growth, which in turn manifested itself in higher household income and consumption, and a rise in the aggregate saving rate (Bank of Israel 2018a, *Statistical Appendix*, Table 8). This period was also characterized by a decline in inequality and in the incidence of poverty, along with a raising of the poverty line (National Insurance Institute 2016).

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16 Savings are defined as the difference between disposable income and consumption, and do not include expenditures that fall into the category of investment, such as housing. Thus, a situation can arise where the savings rate climbs along with an increase in household debt.

17 This quintile also showed a 1 percent decline in income from all other sources.

**Figure 16. Average annual change in household income and consumption, 2012-2016**



Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS, *Household Expenditure Survey*

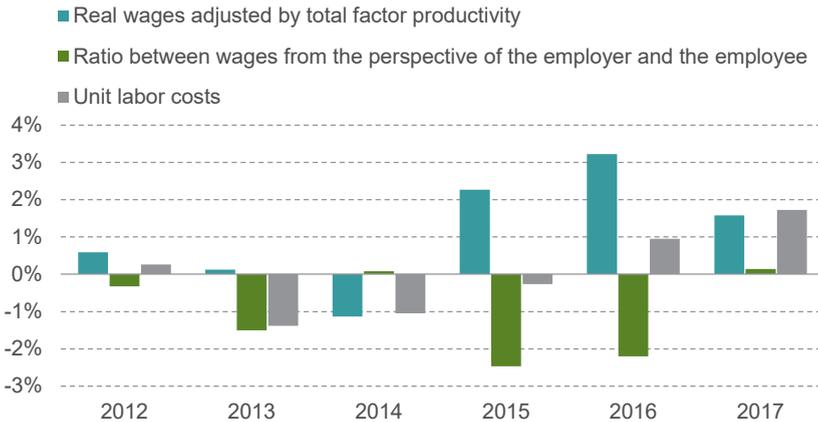
### 3. Changes in relative prices and the cost of living

The rise in household labor income stems mainly from employment growth, but also from an increase in real wages. Since 2015, wages have risen substantially, across all income levels and population groups. This period's wage increase is surprising, given the lack of productivity growth; increased wages which are not accompanied by increased productivity should result in higher labor costs (per unit of production, i.e., unit labor cost). It is, therefore, also surprising to discover that the unit labor measured by wage payments as a share of GDP rose only moderately during these years (Figure 17). The figure illustrates the contradiction: on the face of it, the change in unit labor cost should have been expected to be identical to the change in real wage relative to the change in labor productivity, since a wage increase that is not accompanied by a corresponding rise in productivity may be expected to result in higher labor costs for the employer. However, as the figure shows, there is a substantial gap between the two indices, and they sometimes display opposing trends.

This is explained by a consumer price decline over the past few years that did not apply to the business-sector GDP price index (which encompasses products and services relevant to business sector activity, but not the household consumption basket). The differences between the two price indices are reflected in a gap between wages from the worker's perspective

and wages in employer cost terms, as seen in the graph. Consequently, the past few years' relative decline in consumer prices drove real wages up without increasing employer costs, thereby supporting a rise in household income and in the standard of living.

**Figure 17. Unit labor costs and real wages in the business sector, rate of annual change**



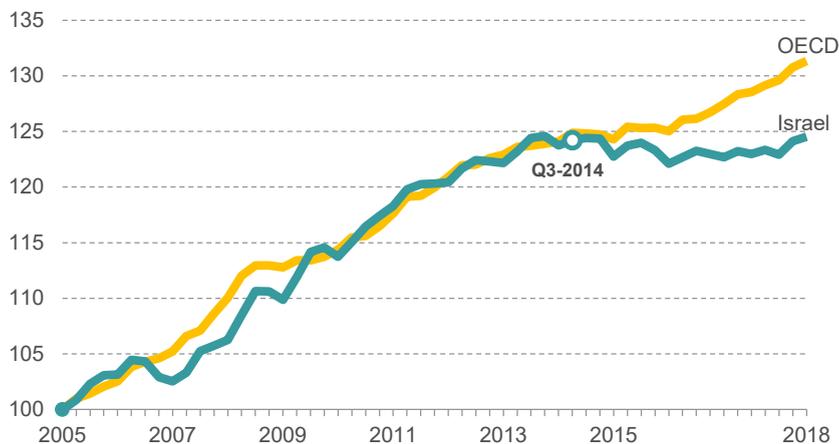
Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS, *Household Expenditure Survey*

The decline in consumer prices (relative to GDP) appears to be part of the stabilization of Israeli prices as they are stabilizing at a new level, similar to that of other developed economies.<sup>18</sup> Brand, Weiss, and Zimring (2017) show that Israeli consumer prices are significantly and substantially higher than those of most other OECD countries, but price gaps appear to be narrowing in recent years. A comparison of the consumer price indices of Israel and the OECD countries indicates that, since the third quarter of 2014, there has been a cumulative price decline of 5.2 percent relative to the OECD average (Figure 18).

<sup>18</sup> See the discussion in Brand, Weiss, and Zimring (2017) and in Bank of Israel (2018a, Box C-1). This explanation comes up frequently in summaries of discussions regarding interest rate decisions.

**Figure 18. CPI in Israel and the OECD average**

Index period: Q1-2005 = 100, annual moving average



Note: 2018 data are to the end of the third quarter.

Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD.Stat

The downward trend in consumer prices becomes clearer when we look at the consumer price index without the housing, petrol, and fruits, and vegetables components.<sup>19</sup> Since the beginning of 2014, this index has shown a cumulative price drop of 3 percent (Figure 19). A comparison based on income levels suggests that the price downturn's impact has been more strongly felt at the lower income levels, due to inter-quintile differences in the composition of the basket of goods and services (Figure 20).

19 This index is based on what is referred to as “core inflation” — a commonly-used index that excludes petrol prices, due to petrol’s status as an external and uncontrollable factor, and fruit and vegetable prices due to their volatility. In this chapter’s comparison, the housing component, whose trends deviate from the norm, was excluded as well. Focusing on consumer prices without these categories allows for an examination of the question of the degree to which the inflation trend is exceptional, given the economy’s location within the business cycle; the excluded price categories are less relevant to this question.

**Figure 19. CPI without the housing, petrol, fruits, and vegetables components**

Annual moving average

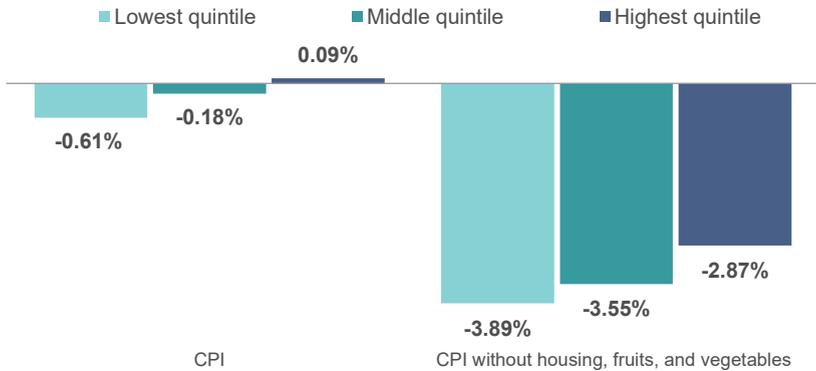


Note: Data for 2018 are through May.

Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel

**Figure 20. Change in the CPI, 2014-2018**

Decline in the average consumption basket by income quintile, cumulative change



Note: Data for 2018 do not include December.

Source: Benjamin Bental and Gilad Brand, Taub Center | Data: CBS

This trend of slowing inflation is inconsistent with the labor market's positive trends in recent years (see an extended discussion in Fuchs and Weiss 2018), such as the high ratio between job vacancy and unemployment rates, and the difficulty of recruiting workers. A price drop while the labor market is tight constitutes an unusual situation, and is due, apparently, to governmental efforts to reduce domestic price levels.

An econometric estimate was performed to shed light on the factors behind this trend. The goal of this estimate was to determine the degree to which the consumer price decline is consistent with the economy's position in the business cycle, whether it constitutes a deviation relative to other developed countries, and how it can be seen in the various consumption categories. For purposes of the estimate, let us assume that local inflation is explained in the short term by global price levels and labor market tightness — assuming that the residual derived from this estimate reflects only that particular price development, which is not part of the standard development of inflation in the economy as a whole.<sup>20</sup> The analysis reveals that, starting in 2014, Israeli inflation (excluding housing, fruit, and vegetable prices) was significantly lower than expected given global developments and the state of the labor market, and that, during the relevant period, there was a cumulative price decline of about 5.5 percent that cannot be explained by these variables.

A similar analysis was conducted for the various consumption categories.<sup>21</sup> The steepest price decrease was found for the communications category, with substantial price reductions for food, transportation, and recreation/culture as well. At the same time, housing prices rose (Figure 21). The downward trend in prices thus does not appear to be concentrated in specific categories, but is, rather, apparent in most categories of household consumption.

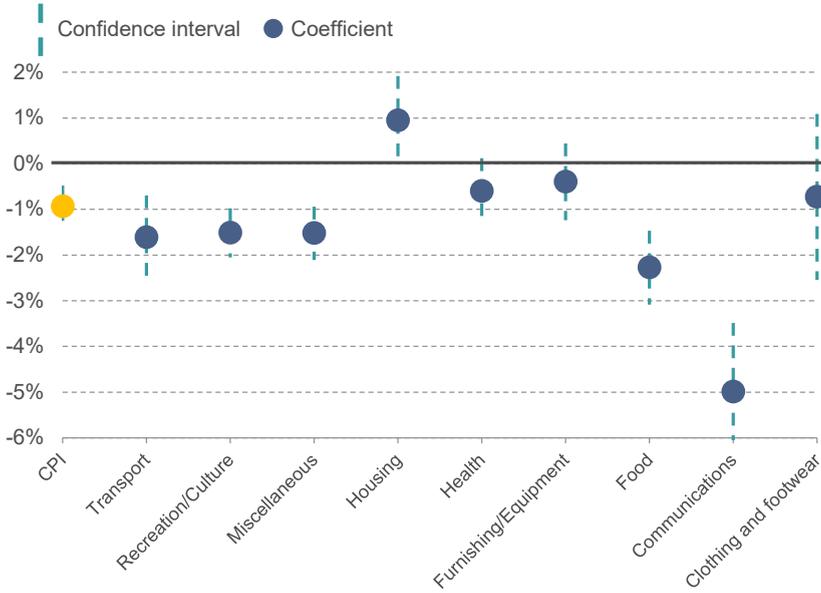
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20 This analysis employed an augmented Phillips curve, in which domestic inflation is explained by unit labor cost and the unemployment gap (the difference between the actual and the natural rate of unemployment). The equation also includes export prices and the exchange rate, to reflect supply instability. See the detailed discussion in the Appendix.

21 As part of the study, we estimated separate equations for each consumption category and one for the general consumer price index. In this estimation, the domestic price change is explained by the change in the dollar exchange rate and by the level of the GDP gap (lagged). The model includes dummy variables for fiscal quarters and countries. In order to allow country specific elasticities with respect to the exchange rate/business cycle and domestic price level, interaction variables were added between exchange rates and the country dummy variables GDP gaps. The estimate was carried out for the period 2000 to 2018, for 28 OECD countries (excluding Australia, Canada, Chile, Finland, France, Turkey, and the US). A similar comparison has been presented by Bank of Israel (2018a) for other years.

**Figure 21. Average inflation, 2015-2018**

By main categories of the CPI, relative to 28 countries in the OECD, reduced by the business cycle and currency exchange rate, annual rate of change



Note: Data for 2018 are until the second quarter.  
 Source: Benjamin Bental and Gilad Brand, Taub Center | Data: OECD.Stat

In summary, the past few years have witnessed a sizable increase in real wages that is not attributable to improved labor productivity, but can be traced to a decline in consumer prices relative to the prices of all products and services produced in the economy; that is, to improved terms of trade for workers. An examination of consumer price trends reveals that global macroeconomic or domestic factors cannot explain the inflation slowdown of recent years, making it likely that the price decline also stems from measures taken by the government to lower the cost of living.

## Conclusion

Since the start of this decade, the Israeli economy has, in general, been characterized by stability. Real GDP per capita has grown at an average annual rate of 1.5 percent, and the distribution of the main GDP components – individual consumption, government public consumption, and investment – has varied only slightly. At the beginning of the period, residential investment as a share of GDP rose by a percentage point, but the past few years have seen a moderation of this trend – along with a sharp decline in housing construction since last year.

The fiscal system is subject to growing pressure. In the 2019 budget, the government is deviating by 3 percentage points from the permissible amount, and it also seems to be on the verge of deviating from the legally-specified deficit ceiling. Such deviations are expected to continue in the coming years, thereby stopping the trend toward lower debt-to-GDP ratios that have characterized the Israeli economy for many years.

Growth and productivity figures continue to indicate a gap between Israel and the OECD countries. An analysis of growth sources shows that growth has been due mainly to a rise in labor inputs, while total factor productivity has not increased, a situation that is impairing the Israeli economy's ability to close gaps between itself and other developed countries. Nevertheless, the increase in labor inputs, which has mainly characterized the lower income deciles, has increased the income of households at the bottom of the income scale, and reduced inequality. Moreover, thanks to a decline in consumer prices relative to GDP prices, real household income has risen and consumption has grown, despite the fact that labor productivity has not increased.

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## Appendix

### Analysis of domestic inflation through estimation of a Phillips curve

In order to determine whether inflation has developed in an unusual pattern over the past few years, given the background variables, an augmented Phillips curve was estimated, in which the change in “core” inflation,  $p$  (inflation without housing, petrol, fruit, and vegetables prices) in year  $t$  is explained by the change in the unit labor costs  $ulc$ ; the employment gap, defined as the difference between the actual unemployment rate  $U$  and the natural unemployment rate  $NAIRU$ ; the shekel-dollar exchange rate  $exchange$ ; import prices  $p^{import}$ ; petrol prices  $p^{petrol}$ ; and a dummy variable for each quarter.

The variables for the labor market appear with a lag, but the estimate allows for a simultaneous impact between the exchange rate and price levels. Thus, the estimate relies on the commonly accepted assumption that prices are influenced by the exchange rate in the short term, while price levels affect the exchange rate only in the long term.

Formally, the following model was estimated:

$$\Delta p_t = \beta_1 + \beta_2 \Delta ulc_{t-2} + \beta_3 (U - NAIRU)_{t-2} + \beta_4 \Delta exchange_{t\dots t-2} + \beta_5 \Delta p_{t\dots t-2}^{import} + \beta_6 \Delta p_{t\dots t-2}^{petrol} + \beta_7 D_{Quarter} + \varepsilon_t$$

The assumption is that the residuals of this estimate express the particular price level changes that have characterized Israel in recent years.

Phillips curve versions also include an expected-inflation variable, but because the goal of our discussion is to examine evidence of structural changes in relative prices, expected inflation will also express expectations regarding those structural changes, and is thus irrelevant in this context. Also, the estimate includes the dollar exchange rate, not the basket of currencies, in accordance with literature pointing to the dollar as a “leading” currency (e.g., Casas, Diez, Gopinath, and Gourinchas 2016; Boz, Gopinath, and Plagborg-Møller 2017) and findings showing that Israeli prices are strongly influenced by the fluctuation of the dollar exchange rate (Israel Export Institute 2017).

Since the natural unemployment rate is not an observed variable and is usually estimated with a Phillips curve, this variable has to be expressed

through alternate means. The HP filter was employed for this purpose.<sup>22</sup> This estimation indicates a significant slowdown in the development of inflation since 2015. Inflation during this period seems to have been about 2.2 percentage points per year lower than the fundamental economic factors would have suggested (Appendix Table 1). This finding is also shown in Appendix Figure 1, which displays the estimated residuals without the dummy variable for the 2015 to 2018 period. Thus, recent years appear to have witnessed an unusual change in the development of prices, probably due to governmental efforts to reduce the cost of living.

### Appendix Table 1. Estimation results for Phillips curve, quarterly figure for three periods

Dependent variable: core inflation (excluding housing)

Estimation starts at year:	2000	2003	2005
Import prices (standard deviation)	0.450*** (0.103)	0.412*** (0.092)	0.399*** (0.131)
Import prices (1 period lag)	0.221 (0.139)	0.102 (0.125)	-0.018 (0.157)
Energy prices (1 period lag)	0.025 (0.021)	0.027 (0.023)	0.035 (0.028)
Dollar exchange rate	-0.332*** (0.094)	-0.338*** (0.088)	-0.345*** (0.092)
Dollar exchange rate (1 period lag)	-0.024 (0.105)	0.000 (0.094)	-0.037 (0.114)
Unit labor costs (2 period lag)	-0.353 (0.281)	-0.068 (0.177)	-0.081 (0.219)
Unemployment gap (2 period lag)	-0.007*** (0.003)	-0.010*** (0.002)	-0.009*** (0.003)
Dummy variable for 2015-2018 (coefficient is 2-year change rate)	-0.022*** (0.004)	-0.022*** (0.004)	-0.022*** (0.004)
Constant	0.607*** (0.134)	0.791*** (0.114)	0.883*** (0.123)
Dummy variable per quarter	√	√	√
Number of observations	75	63	55
R <sup>2</sup>	0.752	0.796	0.802

Note: Robust standard errors in parentheses. \*\*\* p < 0.01.

Source: Benjamin Bental and Gilad Brand, Taub Center

22 Other alternatives were considered for estimating the natural unemployment rate, such as the Beveridge curve or the division proposed in Hamilton (2017). The results of the estimate are not sensitive to the various alternatives.

## Appendix Figure 1. Inflation net of the impact of macroeconomic factors

Residuals from Phillips curve estimates, four quarter moving average, in annual terms



Note: Data are through the third quarter of 2018.

Source: Benjamin Bental and Gilad Brand, Taub Center | Data: Bank of Israel website; CBS

## Security spending

The Prime Minister's proposal that security expenditures be increased and their level fixed relative to GDP placed the question of security spending levels on the public agenda.

In theory, security consumes resources that could be channeled to other uses, public or private. Diverting resources to security is meant, first and foremost, to deter enemies and, in so doing, to keep threat at bay. In this sense, security spending should be regarded both as insurance against the cost of a confrontation that would occur should deterrence fail, and as a factor that minimizes the damage resulting from failed deterrence. Accordingly, security spending should be dictated by threats and the likelihood of their realization, and by attitudes toward risk. However, security investment also has positive externalities, especially in terms of the knowledge amassed through security research and development, which has applications in the civilian economy.<sup>23</sup> Clearly, it is very hard to estimate the “optimal investment” in security, and economic research on the topic is quite sparse.

<sup>23</sup> This phenomenon is especially prevalent in Israel, but of course characterizes security systems worldwide, including in the United States.

Nevertheless, several studies point to the positive relationship that is likely, theoretically, to exist under an optimal GDP-security spending scenario. Eckstein and Tsiddon (2004), for instance, link security risk (terrorism) with the chance of loss of life. Security investment reduces this risk and increases life expectancy. This investment comes at the expense of consumption enjoyed by the representative individual during their lifetime. Accordingly, there is a trade-off between consumption levels and the reduced probability of death in a security incident; in the optimal investment these two factors would balance out. In such a world, increased risk, i.e., the likelihood of being harmed in a security incident, entails a higher security investment. Another conclusion that emerges from this model is that additional resources available to the economy when GDP rises will be channeled to both uses: increased security investment and higher consumption. The way the additional resources are divided up between the two uses depends, of course, on the marginal utility from consumption and on the resources' contribution to reducing risk.

An empirical study by Guiso and Paeilla (2008) deals with attitudes toward risk in the financial context. However, the study also illuminates the relationship between income and attitudes toward risk, and the relationship between attitudes toward risk and the nature of risk. In particular, the authors found that risk aversion declines as individual wealth increases. Extrapolating to the national economy, at a given risk level this finding should reduce security investment relative to national income and GDP. However, the study found that risk aversion of individuals facing risks that are uninsurable (in the market) is higher. Since most security risks are not, in this sense, insurable, we may reasonably assume that aversion to this form of risk is indeed high. This fact may justify high security investment, for the purpose of deterring the enemy, lowering the risk of attack (action that is referred to in the insurance literature as "self-protection"), and minimizing the damage caused if attack does occur (action referred to by researchers as "self-insurance"). Nevertheless, the study provides no information on the link between income and uninsurable risk and the effect of this link on risk aversion levels.

There is also an extensive body of empirical research on the relationship between countries' security spending and their growth rates. Initial work in this sphere was carried out by Benoit (1978), who made waves with his discovery of a positive relationship between security spending and economic growth in developing countries. The findings have been checked again and again, and summarized in Alptekin and Levine's meta-analysis (2012). Most of the relevant studies appear to support the existence of a positive relationship

between security spending and economic growth rates, even in developed nations. However, the studies also note that the relationship is not linear. At low security-spending levels the relationship is positive, but after a certain point it becomes negative. The authors do not indicate the level at which the relationship reverses direction. Rather, they state that, presumably, at low investment levels, the externalities (adaptation of military technologies for civilian uses) and the risk reduction work to increase growth, while at higher levels security investment displaces civilian investment and, accordingly, reduces growth. Nevertheless, the authors note that most of the studies have been based on data from the 1960s, 1970s and 1980s, when the level of global security risk was higher due to the Cold War.

One of the studies reviewed in the article is a 2006 paper by Aizenman and Glick. The study employs a growth regression technique based on data from 1989 to 1998 and includes, as an explanatory variable, the security expenditures, the risk faced by the given country, and the interaction between these two variables; the risk index the authors use is based on the number of wars waged by the country since 1970. The findings indicate that both security expenditures and security risks have a negative impact on growth rates, but that the interaction changes the picture for countries with high security risk. In particular, at the highest risk level measured by the authors, a 1 percent increase in security spending relative to GDP raises the growth rate by 0.9 percentage points. Regarding Israel, at the risk level that prevailed during the sample period according to the authors' calculations, increasing security spending relative to GDP by 1 percentage point would have raised the growth rate by a quarter of a percent.<sup>24</sup>

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<sup>24</sup> These findings should be treated with great caution, as the threats have clearly changed a great deal relative to the period with which the study is concerned. Beyond that, construction of the linear specification of the model cannot reflect a decline in the impact of security investment.