Recent Economic Developments

139

October 2014–March 2015

Bank of Israel
Research Department

Jerusalem, July 2015

Table of Contents

Recent Economic Developments is published every half year. The **first part** includes a macroeonomic review and a fiscal survey. The macroeconomic review describes the main economic developments which occurred during the period covered in the publication, and then focuses on a current economic issue; it is not a wide-ranging description and analysis of current economic developments. The fiscal survey analyzes fiscal developments in light of the budget targets, and from a long term perspective. This is intended to complement, rather than replace, the comprehensive analyses that appear in the Bank of Israel Annual Report. The **second part** of the publication presents analyses by the Research Department of relevant topics in Israel's economy.

Part 1: Economic Developments and Fiscal Survey

Main economic developments

The Israeli economy grew at an annual rate of 4.3 percent during the past two quarters (from October 2014 to March 2015), higher than the growth rate in the two previous quarters. Nonetheless, the growth rate remained in its environment of the past three years, due to a return of activity to the level that preceded Operation Protective Edge, and after deducting the one-time effect of bringing forward vehicle purchases prior to the entry into force of "green" taxation.[1] As a result, a particularly high growth rate was recorded in the fourth quarter of 2014. Goods and services exports increased following three quarters of decline, and private consumption increased rapidly. Civilian public consumption also expanded rapidly, while the growth rate of domestic public defense expenditures contracted. During the first quarter of 2015, the economy grew at a lower rate than in the previous quarter and than the average in the past three years. The main factors in this included a decline in investment in the principal industries, a decline in exports and an increase in imports, a decline in durable goods consumption as a result of bringing forward vehicle purchases to the end of 2014, and lower public civilian consumption as a result of the lack of a budget in the first quarter of 2015.

In terms of the labor market, the employment rate stabilized at a high level, and the unemployment rate declined throughout the period. The unemployment rate in Israel is lower than in other countries, and is also low in historical terms both in the entire labor force and in the prime working ages (25–64). The average nominal wage per employee post continued to increase at a rate of about 2 percent per year, similar to its rate of increase in recent years.

Annual inflation was negative during the reviewed period. The Consumer Price Index declined by 0.4 percent in the year ending in May. Most of the decline took place in January–February 2015. In March, the CPI again increased, with the increase continuing in April and May. Most of the decline was the result of the fact that fuel, electricity, water and communication prices declined at the beginning of 2015 due to regulatory decisions and due to the effects of global energy prices. In May, the CPI increased by 0.2 percent, and one-year inflation expectations increased to around the lower bound of the price stability target range.

Since inflation was below the target range, inflation expectations were low, and activity slowed at the beginning of 2015, the Monetary Committee reduced the interest rate for March by 0.15 percentage points, bringing the basic interest rate in the economy to its lowest rate ever, 0.1 percent. During the reviewed period (October 2014 to May 2015), the Bank of Israel purchased $3.5 billion, of which $2.2 billion were purchased as part of the program to offset the effect of natural gas production on the current account.

The depreciation of the shekel in terms of the nominal effective exchange rate—a process that began in August 2014—continued until the end of 2014. However, since the beginning of January 2015, there has been a change in trend and the shekel has appreciated. Asset prices in the capital market in Israel continued to increase at a relatively rapid pace during the reviewed period, similar to prices on capital markets around the world. Ten-year bond prices in Israel, the US and the eurozone declined in May, after increasing steadily since the beginning of 2014, and bond yields increased accordingly, returning to their level from the end of 2014.

The general elections were brought forward to March 17. As a result, the budget for 2015 was not passed. At the beginning of 2015, the State moved to an interim budget (1/12 of the total budget for 2014 per month) until the passage of a new budget, apparently in November. The domestic deficit (excluding the net provision of credit) in January–May was about NIS 1 billion smaller than that in the seasonal path consistent with the deficit target. Total tax revenue was higher than the seasonal path based on the deficit target and the expenditure rule, nontax revenue was lower than the seasonal path, and total domestic expenditure was lower than the seasonal path calculated according to the expenditure rule set in the law. A discussion of the fiscal situation—as a prelude to the discussions on the 2015–16 budget, and taking into account expectations to the end of the decade—appears later in Part 1 of this review.

The first part of this publication also includes an analysis of the link between the quality of education and growth in Israel and globally. The second part contains discussions of three other issues: the effect of the application of mandatory pension deductions from wages; an examination of the benefit of renewing the car scrapping program in Israel,

[1] The import of vehicles increases GDP because it increases tax revenues on vehicle imports, and because these taxes are high and are recorded as part of GDP.

mainly from the standpoint of safety; and an analysis of estimates of inflation expectations derived from the capital market in Israel and globally and possible biases in the estimates. The review also includes statistical tables showing the developments that took place in the economy during the reviewed period.

The connection between the quality of education and growth: Israel compared to the world

- This review compares the quality of education in Israel to the quality of education in advanced economies, using various international indices, and examines the connection between these indices and long-term economic growth.
- Various quality of education indices in Israel—particularly expenditure per student, class size in primary education, and achievements in international science and mathematics tests—show that Israel's rating is lower than other advanced economies.
- The research literature shows that such indices explain long-term economic growth rates. International tests such as the PISA test indicate that the quality of education in Israel lags behind the OECD median, and the extent of the lag deleted 0.4 to 0.6 percentage points from the long-term annual growth rate, and about one-fifth to one-quarter from the overall long-term productivity level.
- An examination of the quality of universities in Israel by way of international rankings shows that Israel is in the center of the distribution of advanced economies, but the share of high school graduates with a matriculation certificate enabling them to pursue a higher education is apparently halting the improvement of higher education. If this rate increases from 48 percent to 58 percent due to material improvement in the quality of education, it could increase long-term per capita GDP by between 2.0 percent and 3.5 percent.

There are many factors affecting the expected growth rate for Israel in the coming decades, and it is important to try to understand them for a number of reasons. First, the level of per capita GDP reflects the well-being of citizens in the economy (or is at least correlated with it), and identifying the factors that determine the long-term growth rate will help policy makers in adopting measures that will accelerate it and increase well-being in the economy. Second, in order to plan long-term fiscal policy, the potential growth of the economy must be taken into account, since the paths of the main fiscal quantities (tax revenues and public expenditure) depend on the future path of GDP (Geva, 2013). Finally, in order to formulate short-term policy as well, such as monetary policy, it is important to estimate the long-term growth rate. This estimation serves as a reference point in analyzing actual growth rates, which helps determine the economy's place in the business cycle.

The academic literature is of the opinion that one of the factors affecting long-term growth is the stock of human capital in the economy. A common and practical way to measure this combines the average number of years of schooling in the population with estimates of the return on schooling—the extent to which the number of years of schooling affects human capital and income. Mankiw, Romer and Weil (1992), and thereafter Hall and Jones (1999), showed that adding human capital (in terms of the number of years of schooling) helps to explain income gaps between countries, and essentially bridges Solow's basic neo-classical growth model with empirical data.[2]

Figure 1 shows the average number of years of schooling in Israel and its development compared to other advanced economies. The data on all countries comes from Johansson et al. (2012), a study that mainly uses census information (without effectiveness adjustments). The data on Israel are from two sources, and therefore appear in two bars: one presenting the findings obtained by Johansson et al. (2012), and the other presenting the findings obtained by direct calculations based on Labor Force Surveys.[3] It can be seen that in 2010, Israel was above the center of the distribution—in 16th place according to the first bar, and in 10th place according to the second.[4] It can also be seen that Israel maintained its relative ranking since 1970.

An analysis conducted by the Bank of Israel[5] found that the increase in the quantity of education contributed about 40 percent of the growth in per capital GDP in Israel since the mid-1970s. Moreover, the contribution of the quantity of education to growth declined in the past decade, and is expected to continue declining in at least the next few decades, mainly because the ability to increase the average number of years of schooling has drawn close to exhaustion.

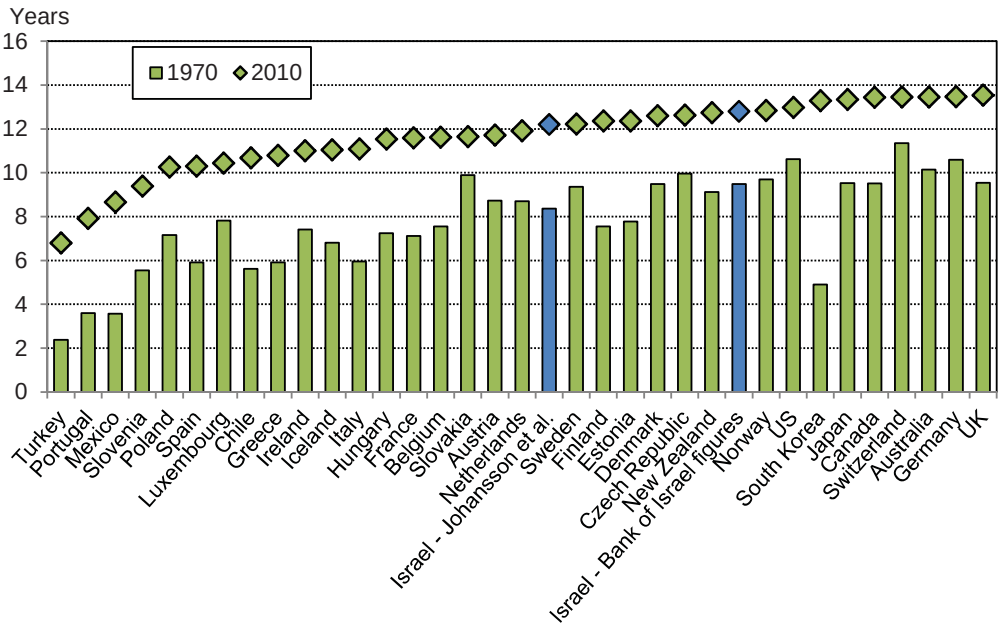
[2] Other researchers believe that education can explain only a small part of the difference in income between countries, and that the correlation between education and income growth reflects a reverse causality (from expected growth to education) or other omitted variables. See Klenow and Rodriguez-Clare (1997) and Bils and Klenow (2000).

[3] Details appear in "The Development of education in Israel and its contribution to long-term growth", Recent Economic Developments, number 136, April—September 2013.

[4] According to another international education database, Israel is in 9th place among the advanced economies. See Barro and Lee (2013).

[5] See "The Development of education in Israel and its contribution to long-term growth", Recent Economic Developments, number 136, April—September 2013.

Figure 1
Average years of schooling, OECD, 1970–2010



SOURCE: Johansson et al. (2012) and Central Bureau of Statistics, and Bank of Israel figures.

This phenomenon is also common in other advanced economies. Gordon (2014) estimates that in the US, this exhaustion will reduce education's contribution to growth by about 0.2 percentage points relative to previous decades.

Even though it is common to view the average number of years of schooling as an indicator of the stock of human capital, it is clear that there are other factors that also affect it. Some of them are not related to education (such as the health of workers), and some are connected to it but are not reflected in the average number of years of schooling—i.e. in the quantity of education. These are particularly true for the various layers of quality of education, since the economic return on education is also affected by its quality.

There are two main approaches to measuring the quality of education. The first is based on the inputs invested in the education system (total expenditure per student, average class size, etc.). The main problem with this approach has to do with the fact that increasing inputs does not ensure high quality. The second approach measures quality by the output of the educational system, for instance scores on standardized international tests on subjects such as mathematics and science. The main problem with this approach has to do with the fact that the tests are not standardized over time. In other words, it is hard to compare results obtained in different years, and it is therefore difficult to assess whether and how the quality of education has changed over time. However, empirical studies have shown that notwithstanding the problems, these indices do explain the gaps that exist between countries in growth rates or in the level of income. Some of the growth researchers even claim that it is only the quality of education, and not its quantity, that have an effect on long-term growth.

Islam et al. (2014) assessed growth regressions on about 60 countries from 1970 to 2010, and showed that when the level of human capital (number of years of schooling) is adjusted for quality, it has a positive and very significant ability to explain the average growth rate of overall productivity and the rate of convergence to the technological frontier. These researchers adjusted human capital by quality both through output indices and through input indices. In terms of output, the researchers used the First Principal Component method[6] to weight five indicators: the extent to which it is not necessary to repeat primary and secondary education, results on international tests conducted in primary and secondary schools in mathematics, science and literacy, and the number of universities ranked among the 500 best in the Shanghai ranking relative to the number of employed persons. In terms of inputs, the researchers weighted two indices: the number of pupils per teacher in primary and secondary education, and public expenditure on education per pupil relative to per

[6] First Principal Component is a statistical method that derives the linear combination of indicators that explains most of the common variance between them. It provides one series that characterizes the development of all the indicators.

capita GDP. The authors also showed that if the quantity of human capital is not adjusted for quality (meaning if only the average number of years of schooling is used), it has a less significant ability to explain growth.

Hanushek and Woessmann (2012) tested how the quality of education affects growth, and measures quality according to the output method. For that purpose, they compiled a quality of education index for each country and based it on the results of 12 international tests in mathematics and science conducted among students aged 9–15 between 1964 and 2003. (Not all countries conducted all the tests.) The researchers normalized the scores in all tests to the PISA scale (average of 500 and standard deviation of 100), and the quality of education index for each country was obtained from its average scores (divided by 100). Growth regressions on 50 countries (advanced and developing) raised a significant and stable connection between the quality of education index and the growth rate between 1960 and 2000: An increase of one standard deviation in the index (100 points on the PISA scale) contributes about 2 percentage points to the long-term annual growth rate. Moreover, when the number of years of schooling was added to the quality of education variable, without the interaction between them, the number of years of schooling variable was not significant.[7] It should be noted that even though the researchers apparently found that there is no connection between growth and the quantity of education, there is a positive connection between the number of years of schooling and the quality of education index that they used.

Bouis, Duval and Murtin (2011) used a panel of about 40 countries (most of them advanced) and conducted regressions of their long-term growth between 1970 and 2005. They found that Hanushek and Weossmann (2012)'s quality of education index has a significant effect on the overall productivity level in the long term. In particular, an increase of one point in the quality of education index (meaning an improvement of 100 points on the PISA scale in the results of the international tests) raises the long-term level of productivity by 90 percent, and this result reconciles with the elasticity found by Hanushek and Woessmann.[8,9] However, these researchers also found, contrary to Hanushek and Woessmann, that when the quality of education is included in the regression, the coefficient of the quantity of education (the average number of years of schooling) declined, but remained significant. (The macroeconomic return on a year of schooling declines from 10 percent in the regressions that do not control for quality to 5 percent in regressions that do control for it.)

The quality of education is therefore important for the long-term performance of the economy. Therefore, we present below Israel's place in a number of common indices for this factor. We observe both indices that focus on inputs invested in education (expenditure on education, class size, and so forth) and indices that focus on outputs of the education system (tests and international university rankings). We do not pretend to estimate the contribution of each of these factors to growth in Israel or to forecast its future contribution. We want to try to indicate the areas in which there are gaps between Israel and the other advanced economies, the closure of which can contribute to future growth in Israel and to improving its placement in quality of life indices.

The quality of education by input

Figure 2 presents data on national expenditure on education, relative to GDP, in 2011. The figure shows that the expenditure rate in Israel, 7.3 percent, is among the highest in the OECD. In addition, between 2011 and 2014, public expenditure on education increased significantly—by 18 percent, the equivalent of 0.5 percent of GDP. Expenditure on education is weighted highly because the Israeli population includes a high percentage of children, and they naturally require inputs in the education system.

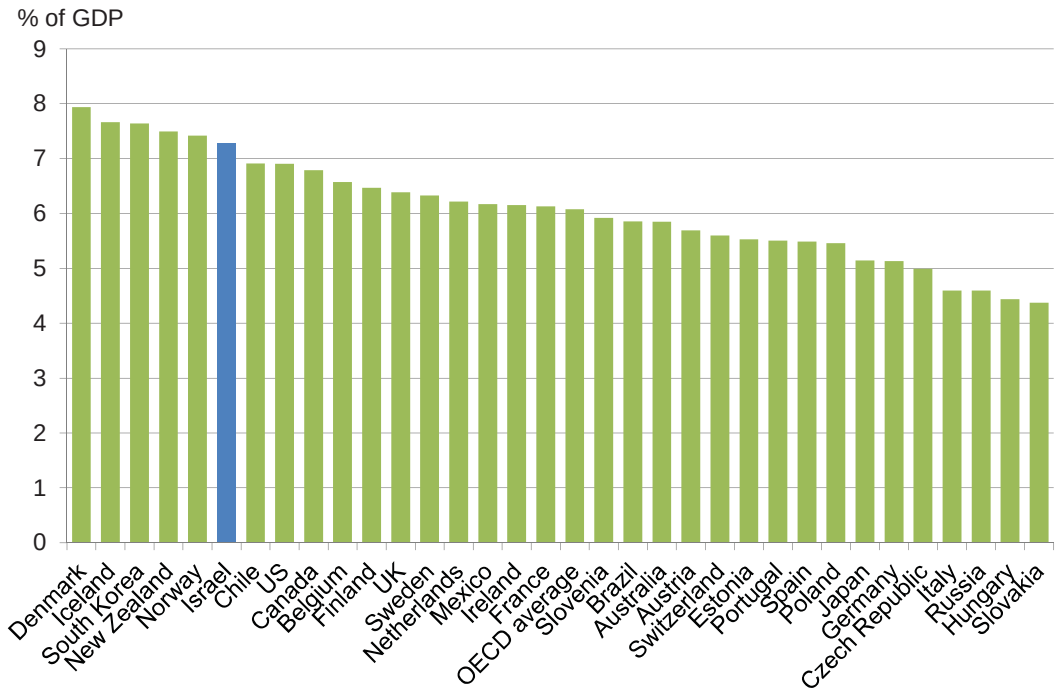
However, the picture changes if we look at expenditure per student. Figure 3 describes the connection that exists in OECD countries between per capita GDP and expenditure per student of the educational institutes, according to the

7 Hanushek and Woessman conducted a number of econometric tests in order to rule out the possibility that the connection between the quality of education and growth is the result of reverse causality or of an omitted variable. First, they estimated regressions that examined whether there was accelerated growth of per capita GDP in countries that improved the quality of education of their residents. Second, they examined whether there is a connection at the individual level between the wages of individuals who immigrated to the US and studied in their home countries and the quality of education index in the home country. These two approaches supported the assessment that the quality of education (according to scores on international tests) has a positive ability to explain the long-term growth rate.

8 The elasticities in the two articles are similar in small numbers. According to Hanushek and Woessmann (2012), an increase of 10 points in the PISA score leads to an increase of 0.2 percentage points in the annual growth rate. The effect on cumulative growth reaches $(1+0.002)^{40}$ -1=8.3 percent over 40 years (the duration of Hanushek and Woessmann's sample). According to Bouis, Duval and Murtin (2011), the same improvement in the index is expected to lead to an increase of 9.0 percent in the level of the overall productivity path.

9 Regressions that control for the level of income in the economy show that in a comparison among advanced economies only, the elasticity is smaller—56 percent—but is still statistically significant.

Figure 2
National expenditure on education relative to GDP, OECD countries, 2011



SOURCE: Education at a Glance (2014).

educational level (primary, secondary, higher). The figure shows a number of findings:

First, the volume of expenditure per student in Israel, at all educational levels, is lower than the volume in most OECD countries and lower than the OECD average. In other words, even though expenditure as a share of GDP is high, it is not sufficient to reach the average expenditure per student in the advanced economies. It should be noted that some of the gap has apparently been closed after the government increased public expenditures starting in 2011.

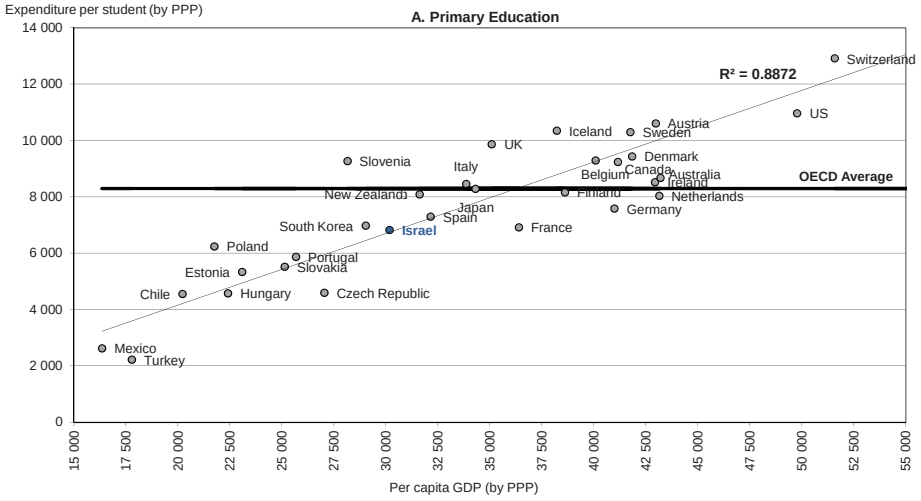
Second, there is a clear positive correlation between income in the economy and expenditure per student at all levels of education. It is important to emphasize that the correlation could reflect bi-directional causality: expenditure on education per student contributes to the level of per capita GDP, but wealthy countries also tend to spend more on education (both since education is a normal product, meaning its consumption grows as income grows, and because its relative cost increases with the level of income since it is a nontradable product—the Balassa-Samuelson effect).

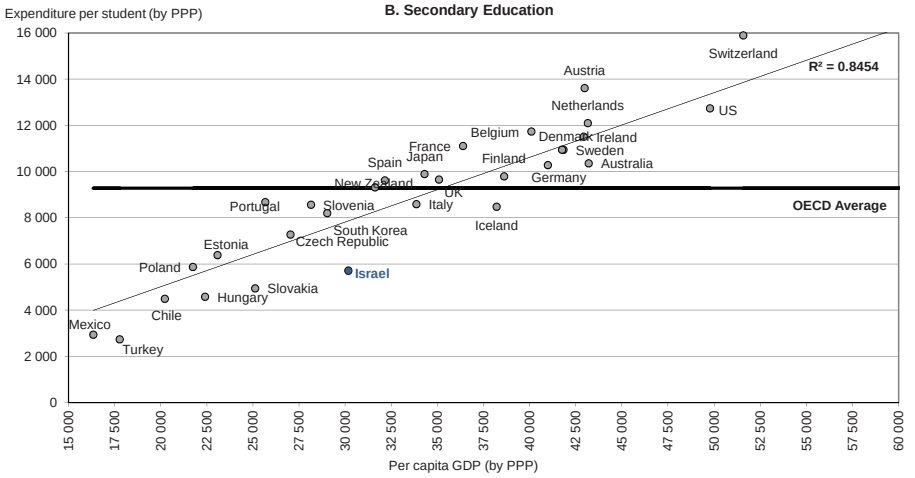
Third, Israel is on the regression line in primary and higher education, but is much lower than it in secondary education. In other words, taking into account per capita GDP, Israel spends little on a student in secondary school. It is possible that some of this gap has been closed after the government significantly increased public expenditure on secondary education as part of the "Oz Le'tmura" ("Courage to Change") program starting in 2011.

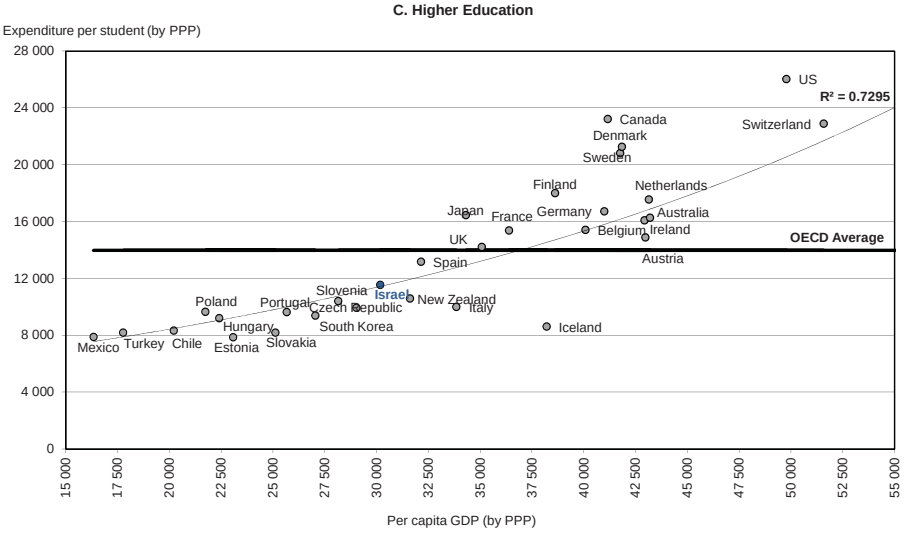
It can be argued that the last finding is the result of the fact that vocational education is characterized by high expenditure per student and its volume in Israel is low compared to the volume in other OECD countries. However, it seems that this is not the case. While Israel is ranked low in terms of the rate of students in vocational education at the secondary school level (22nd among OECD countries), the rate in Israel (39 percent) is not all that low compared to the OECD average (44 percent). Moreover, in a multi-variable regression in which both per capita GDP and the rate of students in vocational education serve as explanatory variables of the expenditure per student in secondary schools, the rate of students in vocational education is not significant, meaning that it does not explain the gap between Israel's ranking and the regression line.

The two aforementioned indices concentrated on monetary expenditure on education. It is interesting to examine how monetary expenditure is reflected. Figure 4 shows the average size of classes and the number of students per

Figure 3
Annual national expenditure per student in educational institutions by per capita GDP, OECD countries, 2011

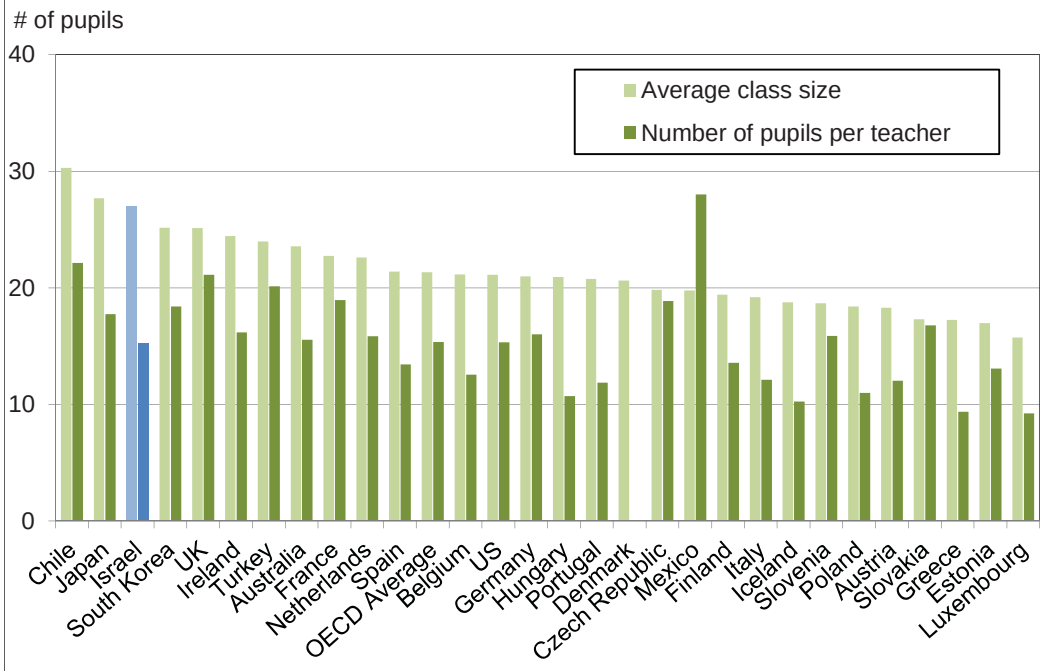






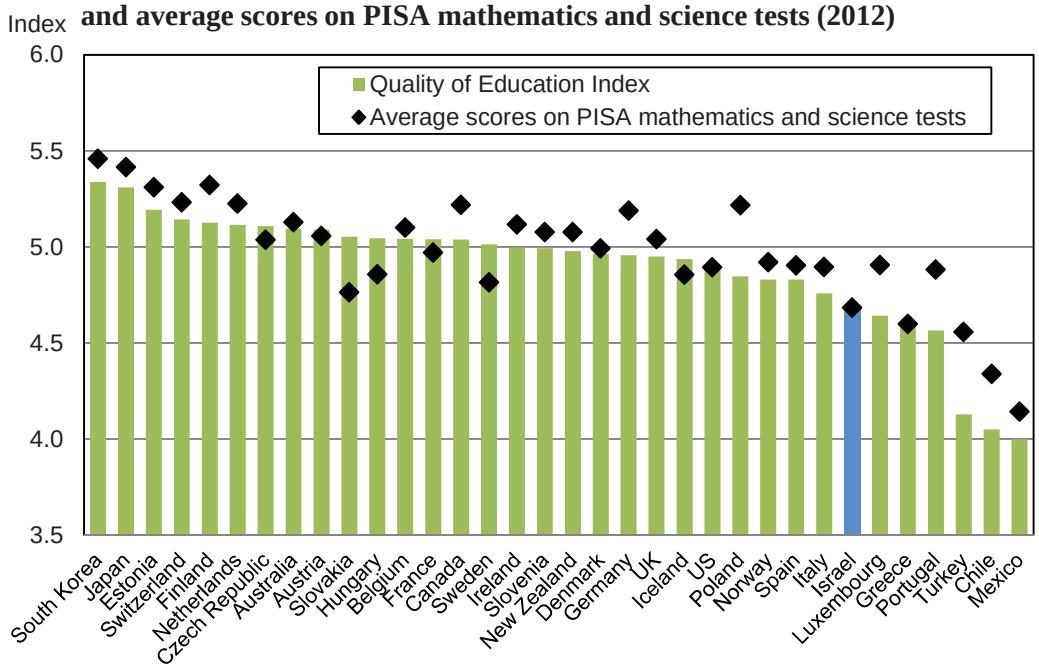
SOURCE: Education at a Glance (2014).

Figure 4
Average class size and number of pupils per teacher, primary education, OECD countries, 2012



SOURCE: Education at a Glance (2014).

Figure 5
Quality of Education Index based on international tests (1964–2003) and average scores on PISA mathematics and science tests (2012)



SOURCE: Hanushek and Woessmann (2012), PISA (2012).

teacher in primary schools in advanced economies. It can be seen that the classes in Israel are among the largest in the OECD. In contrast, Israel does not lag in terms of the number of students per teaching staff. These findings are in line with the assessment that while the classes in Israel are large, they are allocated larger teaching staffs. It is our intention to examine this assessment in a future study.

The quality of education by output of the education system

The most common way to examine the quality of education according to the output of the education system is based on the results of international tests. Figure 5 presents two such indices. The columns present an index calculated by Hanushek and Woessmann (2012), and show that Israel's ranking is low relative to the OECD countries (seventh from last), and that its score is 4.7 while the score of the median country, New Zealand, is 5.0. The use of the elasticities calculated by Hanushek and Woessmann (2012) and Bouis, Duval and Murtin (2011) shows that Israel's lag behind New Zealand deletes 0.6 percentage points from the long-term annual growth rate and about 27 percent from the level of long-term overall productivity. (As stated above, when calculating the elasticity obtained only among the advanced economies, the effect is about two-thirds of the estimate that appears here.) The picture is even worse when Israel's place is examined according to updated PISA test scores in mathematics and science (the results for 2012, shown by the diamonds in Figure 5)[10]: Israel falls another two places. It should be added that it is reasonable to assume that Israel's score in the PISA test is upward biased because the ultra-Orthodox schools are rarely tested, and we can assume that the scores they would have received in mathematics and science are lower than the average in the rest of the population.[11] It can therefore be said that the international tests conducted in the middle and secondary schools show that Israel lags in the quality of education, and it is possible that this lag is growing worse.

These results raise the question of to what extent government policy on increasing inputs or on regulation in the field of education (for instance a change in the incentives structure) can improve the system's results if at all. The empirical literature does not offer a uniform response. In a basic survey article, Hanushek (2006) shows that the data do not indicate a correlation between monetary resources invested in educational institutions, particularly in lowering class sizes, and test results. However, his assessment is that a good incentives system in educational institutions may actually improve students' achievements. In contrast to Hanushek (2006), articles published more recently found correlations between inputs invested in the system and achievements. Dolton and Marcenaro-Gutierrez (2011) analyzed a panel of advanced economies and found that higher teacher salaries, and in some cases higher teacher to student ratios as well, lead to improved student achievements. In terms of studies based on a microeconomic analysis at the individual level, Holmlund et al. (2010) showed that in England, expenditure per student has a positive effect on student achievements. Fredriksson (2013) studied the education system in Sweden and found that class size at the primary level is expected to have a negative effect on student achievements at the secondary level and on their wages in the 24–42 age range. In terms of education expenditure's effect on the future productivity of the students, Jackson et al. (2015) studied the education system in the US, and their estimation showed that an increase of 10 percent in expenditure per student (over 12 years of schooling) is expected to increase his wages by 7.25 percent. The increase in expenditure is reflected in an improvement in the ratio between the number of students and the number of teachers, and in an increase in teachers' salary.

We can also examine the relative quality of the higher education system in Israel. While there are no standardized international tests for graduates of the higher education system, it is possible to use international rankings published by various entities. One of the rankings is published by the Times Higher Education, which ranks the 400 leading universities in the world according to a score that weights 13 indicators in the field of instruction (30 percent), research (30 percent), quotes (30 percent), income from industry (2.5 percent) and international outlook (7.5 percent).[12],[13] Figure 6 shows the number of universities in each country that appear in the top 200 in the rankings (diamonds) and the weighted total of their scores (columns). We weighted the total by the number of students studying at each university, and normalized it by the total population aged 20–39. The formula for the calculation of this index is:

[10] PISA tests are conducted among 15-year-olds.

[11] We note that we do not have information on the extent of selection in other countries—meaning what population groups, if any, are not tested.

[12] The international outlook—the volume of research collaboration with other universities and the ratio between the number of students and faculty members from abroad and the other students and faculty members.

[13] There are two other common rankings: the Shanghai ranking and the Quacquarelli Symonds (QS) ranking. Relative to them, the Times Higher Education ranking provides greater weight to quality of education and less weight to the faculty's academic achievements.

$$M200^{i} = \frac{\sum_{j=1}^{200}\left(INDi_{j} * Score_{j} * Stud_{j}\right)}{Pop^{i}}$$

where:

$M200^{i}$ is the weighted sum of the scores received by the universities in country *i* that are included in the top 200 rankings.

$INDi_{j}$ is a dichotomic indicator that obtains the value of 1 if university *j* belongs to country *i* and the value of 0 if it does not.

$Score_{j}$ is the general score of university *j* in the Times Higher Education World University Rankings for 2014/15.

$Stud_{j}$ is the number of students studying at university *j*. Source: Times Higher Education World University Rankings for 2013/14 and 2014/15, and the university websites.

Pop^{i} is the population aged 20–39 in country *i* (2012). Source: OECD database.

In other words, in addition to the number of universities that appear among the top 200 in the ranking, our index also takes into account their place in the rankings (by score), the number of students studying in each university (an indicator of the university's specific weight in higher education in that country), and the absolute size of the population in the age range that includes most university students (20–39). It can be seen that the US and the UK have the highest number of universities ranked among the top 200. However, taking into account the size of the economies (according to the 20–39 age range) and the fact that the leading universities are relatively small (in terms of the number of students), the rankings of the US and the UK fall. The weighted index is similar in nature to the one that Islam et al. (2014) found that explains long-term growth.

In terms of Israel, in the most recent ranking (2014/15) only Tel Aviv University appears in the list of the top 200 (at the end), due to a high score in the area of research. We note that in some of the rankings for previous years, the Hebrew University was also included among the top 200, due to high scores in the areas of quotes and international aspects. However, according to the latest ranking, it is below the 200 threshold. Taking into account the other parameters of the total weighted scores, this result places Israel 15th among the advanced economies—the middle of the distribution (in the lower portion of the range of Israel's placement in terms of the average number of years of schooling, since this range fluctuates between 10 and 16; see Figure 1).[14] Israel's place is stable since the ranking for 2011/12. (As stated, in some years, the Hebrew University was also included in the top 200.) In the first ranking that was conducted, for the 2010/11 school year, no Israeli university was included in the top 200.

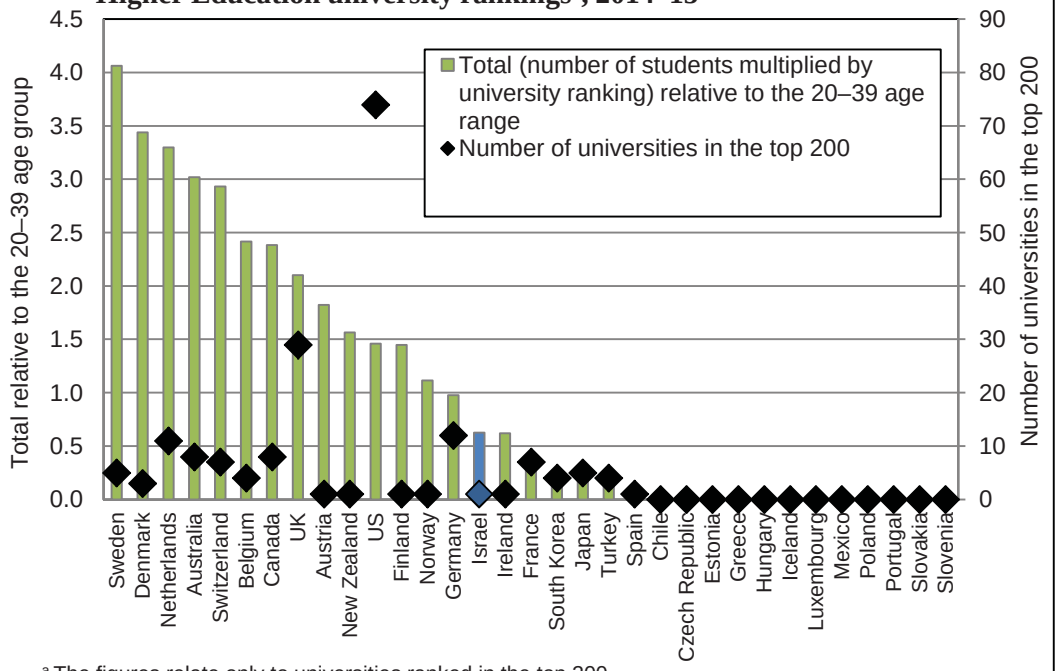
It is worth noting that a number of alternatives to the index were examined, mainly the use of alternative rankings, the use of universities ranked in the top 100 or the top 400 (instead of the top 200), and normalization of the results by the total students in the economy or total employed people instead of the population aged 20–39. We can say that there is a positive high correlation between the rankings that are generated by most of the various possibilities.

In summation, various quality of education indices in primary and secondary education—mainly expenditure per student (particularly in secondary education), class size in primary education and the results of international tests in science and mathematics—show that Israel's ranking is lower than other advanced economies. This finding should be taken seriously because empirical studies show that there is a close connection between these indices and long-term economic growth. It is important to emphasize that Israel allocates a relatively large portion of GDP to education (fifth place among the advanced economies), but the high number of children makes it possible to spend a smaller amount per student than what is spent in other advanced economies.

In terms of higher education, an examination of the quality of the university system in Israel through international rankings shows that Israel is in the center of the distribution of advanced economies. The scope of higher education increased in recent years, and a marked portion of the growth took place as part of the college system, a system that absorbed about 60 percent of Bachelor's students in 2012/13. However, Zussman et al. (2007) found that at the individual level, the return on a degree obtained in the colleges is, on average, about 16 percentage points lower than the return on a degree obtained in the universities. (The finding was obtained while controlling for the characteristics of the individual, particularly the abilities measured by the psycho-technical tests conducting during military enlistment.) This development may explain why there is relatively low exploitation of the human capital existing in the economy: The percentage of positions requiring higher education in

[14] According to the simple indicator of the number of universities that appear in the top 200, Israel is in 15th place, together with 8 other countries that have one university in the top 200. Consideration of the other parameters—population size, university size and their international ranking—does not materially change Israel's placement.

Figure 6
Higher education system quality index according to the Times Higher Education university rankings[a], 2014–15



[a] The figures relate only to universities ranked in the top 200.
SOURCE: Based on the Times Higher Education World University Rankings 2014–15, OECD,

Israel is lower than the average in the advanced economies, particularly in the domestic market oriented industries.[15]

In this context, it is worth mentioning the finding that at the end of the previous decade, the gap between the rate of high school graduates with a matriculation certificate that enabled them to pursue academic studies[16] and the rate of students beginning academic studies[17] was closed. Our discussion therefore shows that if the quality of primary and secondary education does not change—if it does not prepare many more candidates at a higher quality for the higher education system—the quantity of education will continue to grow only if the individuals pursuing academic studies choose to extend their studies, or if a non-academic educational system is established for the graduating population. In contrast, a material change in the quality of primary and secondary education will increase the percentage of those passing the university acceptance threshold, and will make it possible to increase the average number of years of schooling by increasing the percentage of those with higher education from universities.

If the rate of high school graduates with matriculation certificates that enable them to pursue academic studies increases from 48 percent to 58 percent, it could increase the level of long-term per capita GDP by 2.0 to 3.5 percent. Since the rate of graduates with a matriculation certificate that enables them to pursue academic studies was 39 percent in 1996, and has consistently increased since then to 48 percent in 2012, it seems that increasing this rate by 10 percentage points is an ambitious but reasonable goal.

There are a number of assumptions underlying the assessment of the effect of increasing the rate of graduates on growth, the most important being: (1) The additional graduates who pass the acceptance threshold for academic studies actually engage fully in about 3 years of academic studies; (2) The

[15] See Box 2.1 in the Bank of Israel Annual Report for 2013.

[16] Central Bureau of Statistics data indicate that as of 2012, 48 percent of high school graduates "met the university acceptance threshold"—a complete matriculation certificate including passing grades in mathematics at the 3-unit level, English at the 4-unit level, and one major subject in addition to English.

[17] See Box 5.1 of the Bank of Israel Annual Report for 2012: "The Effect of Education on the Labor Force Participation Rate in Israel".

average return on 3 years of higher education is 30 percent[18]; and (3) The gap between the return on university studies and the return on college studies is 16 percentage points (Zussman et al., 2007). There is uncertainty regarding the extent to which additional schooling is directed to universities or colleges, and there is therefore also uncertainty regarding the return obtained from additional higher education. The simulation range reflects this uncertainty.

Alternatively, if the investment in the education system improves the quality of education at a rate similar to 10 additional points on PISA tests, it could increase long-term per capita GDP by 6–9 percent. (This result is obtained from the elasticities presented above.)

SOURCES:

In Hebrew:

Geva, A. (2013), "Demographic Changes and Their Implications for Public Expenditure Between 2013 and 2059", Bank of Israel Survey, 87, pp. 7–30.

Zussman, N., A. Forman, T. Kaplan, and D. Romanov (2007), "Differences in the Quality of Education Between Universities and Colleges: An Examination of the Exchange in the Labor Market", Shmuel Ne'eman Institute.

Zussman, N. and A. Friedman (2009), "Labor Quality in Israel", Bank of Israel Survey, 82, pp. 7–77.

In English:

Barro, R. and J.W. Lee (2013), "A New Data Set of Educational Attainment in the World, 1950-2010". Journal of Development Economics 104, pp. 184-198.

Bils, M. and P. Klenow (2000), "Does Schooling Cause Growth?". The American Economic Review 90(5), 1160-1183.

Bouis, R., R. Duval and F. Murtin (2011), The Policy and Institutional Drivers of Economic Growth Across OECD and non-OECD Economies. OECD Economics Department Working Papers No. 283.

[18] This assumption is based on the study by Zussman and Friedman (2009), and is also consistent with the return environment on a year of schooling that is obtained in studies from Israel and abroad—about 10 percent. A survey of findings on the return on schooling appears in "The Development of Education in Israel and its contribution to long-term growth", Recent Economic Developments, number 136, April—September 2013.

Dolton, P. and O. Marcenaro-Gutierrez (2011), "If You Pay Peanuts do You Get Monkeys? A Cross Country Comparison of Teacher Pay and Pupil Performance", Economic Policy 26, Issue 65, pp. 5-55.

Fredriksson, P., B. Ockert and H. Oosterbeek (2013), "Long Term Effects of Class Size", The Quarterly Journal of Economics 128(1), pp. 249-285.

Gordon, R. (2014), The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections. Department of Economics, Northwestern University, Manuscript.

Hall, R. and C. Jones (1999), "Why Do Some Countries Produce So Much More Output Per Worker Than Others ", The quarterly Journal of Economics 114(1), pp. 83-116.

Hanushek, E. (2006), "School Resources", in Hanushek, E. and F. Welch (Eds.) Handbook of the Economics of Education 2006 (2), Chapter 14.

Hanushek, E. A. and L. Woessmann (2012), "Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation", Journal of Economic Growth 17, pp. 267-321.

Holmlund, H., S. McNally and M. Viarengo (2010), "Does Money Matter for Schools?", Economics of Education Review 29, pp. 1154-1164.

Islam, R., J. Ang and J. Madsen (2014), "Quality-Adjusted Human Capital and Productivity Growth". Economic Inquiry 52 (2), pp. 757-777.

Jackson, K., R. Johnson and C. Persico (2015), The Effects of school Spending on Educational and Economic Outcomes: Evidence from School Finance Reforms. NBER Working Paper No. 20847.

Johansson, A., Y. Guillemette, F. Murtin, D. Turner, G. Nicoletti, C. de la Maisonneuve, P. Bagnoli, G. Bousquet and F. Spinelli (2012), Long-Term Growth Scenarios. OECD Economics Department Working Paper No. 1000.

Klenow, P. and A. Rodriguez-Clare (1997), "The Neoclassical Revival in Growth Economics: Has it Gone Too Far?" in Bernanke, B. and J. Rotemberg (Eds.). NBER Macroeconomics Annual 1997, Volume 12. MIT Press.

Mankiw, G., D. Romer and D. Weil (1992), "A Contribution to the Empirics of Economic Growth ", The Quarterly Journal of Economics 107(2), pp. 407-437.

Fiscal survey: The situation ahead of the preparation of the state budget for 2015 and 2016, and fiscal trends expected over the remainder of the decade

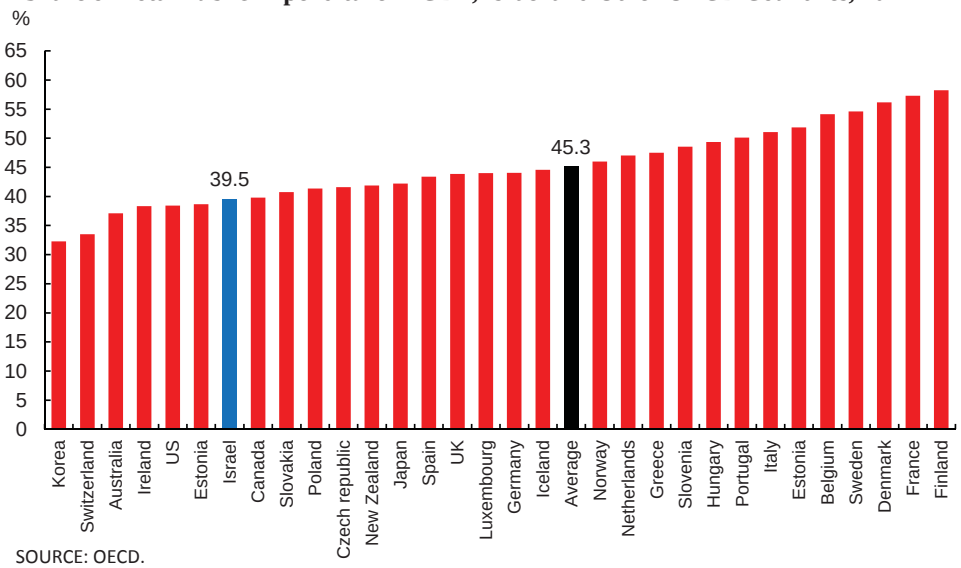
- The government is operating with an interim budget through November 2015, and so far expenditures are similar to the path consistent with the statutory expenditure ceiling. The deficit expected in 2015, of 2.5–2.8 percent of GDP, is similar to the statutory deficit ceiling.
- The new government's guidelines include programs with a marked budgetary cost whose sources of funding are not detailed. It is important that the contribution of these programs is examined from the perspective of two central issues that are impacted on by the government budget—economic growth and reduction of inequality.
- The expected deficit in 2016—based on expenditure programs approved by the government and those included in its guidelines, and given current tax rates—is around 3.3 percent of GDP, and in 2017–20 it is around 3.5 percent of GDP, significantly above the deficit target.
- The government's planned expenditures, based on approved programs, including those incorporated in its guidelines, are about NIS 10 billion greater than the expenditure ceiling for 2016 and about NIS 14 billion greater than the 2020 ceiling. This assumes that from now until 2020 the government does not decide on a single additional expenditure without offsetting another expense by the same amount.
- In light of the considerable adjustments required to meet the existing fiscal targets, the government should examine if those targets are appropriate for its order of priorities, and if it assesses that it will be able to meet them.
- In order to maintain fiscal credibility, the deficit target that is adopted should not exceed 2.5 percent of GDP, to assure a continued decline, even if moderate, in the debt to GDP ratio.
- In addition, the government has to decide whether to continue reducing the share of its expenses in GDP in line with the existing expenditure rule, even though this share is low compared with other advanced economies, or to raise the ceiling and increase revenue in parallel, subject to the target of a measured decline in the debt to GDP ratio.
- If expenditures and revenues continue as currently planned, the debt to GDP ratio is expected to rise to over 70 percent.
- In order to avoid repeated adjustments in expenses, due to gaps between expected and actual inflation, the government should switch to nominal budgeting, based on the midpoint of the inflation target range.
- It is important that the budget fully and transparently present—in line with common accounting principles—its expenses for dealing with expanding housing supply. To the extent that one-off expenditures are required for those objectives, it is preferable that they are recorded as an extraordinary addition to budgetary expenditure and the deficit in accordance with generally accepted accounting principles, and not through extra-budgetary items.

1. Introduction

The fiscal adjustment when the budget for 2013 and 2014 was approved succeeded in halting the increase in the deficit that developed at that time, and even to reduce it to a level allowing the stabilization of the debt to GDP ratio. On the basis of these steps, and since the expansionary budget planned for 2015 was not approved, the deficit in 2015 as well is expected to be similar to the target set in law. The achievement of 2013–14 contributed to a contraction in interest rate spreads between Israel and other advanced economies, and provides the new government with the option of continuing to gradually reduce the debt to GDP ratio. In contrast, the cost of new large programs that the government approved in the past will weigh on the achieving of the deficit targets in the coming years, and the moderate increase in the expenditure ceiling, due *inter alia* to the decline in inflation, will make it difficult to keep expenditures under the ceiling. These difficulties intensify in view of the additional expenditure programs set in the new government's guidelines. Against this background, the government will need to decide whether to adhere to the existing declining deficit targets, and if the reduction will be based on continued decline in the share of public expenditure in GDP—in accordance with the expenditure rule, even though the share is already lower than the level in most advanced economies (Figures 1 and 2)—or if it will be based on increasing government revenues through increased tax receipts, which are also lower than in most advanced economies (Figure 3). The decision faced by the government about the future path of the defense budget, following the expected recommendations of the Locker Committee that is examining the defense budget, will have considerable impact in that determination. It is important that if the government decides to increase the deficit target, the new level that is set will allow continued reduction, even if gradual, of the debt to GDP ratio, and that the composition of expenditure and revenue levels will enable the government to implement the important plans related to growth and to welfare policy, subject to the deficit target that will be set. To this end, the government may be assisted by the system to monitor multiyear budgetary obligations that was developed at the Ministry of Finance.

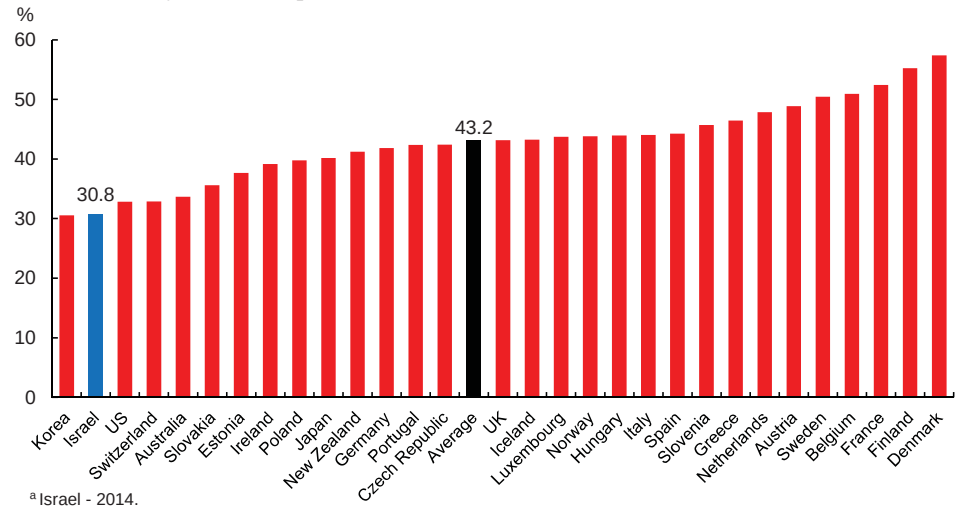
The previous government approved, and submitted to the Knesset, a budget proposal for 2015, but it was not approved

Figure 1
Share of Total Public Expenditure in GDP, Israel and Other OECD Countries, 2014



SOURCE: OECD.

Figure 2
Share of Primary Civilian Expenditure in GDP, Israel and Other OECD Countries, 2012[a]

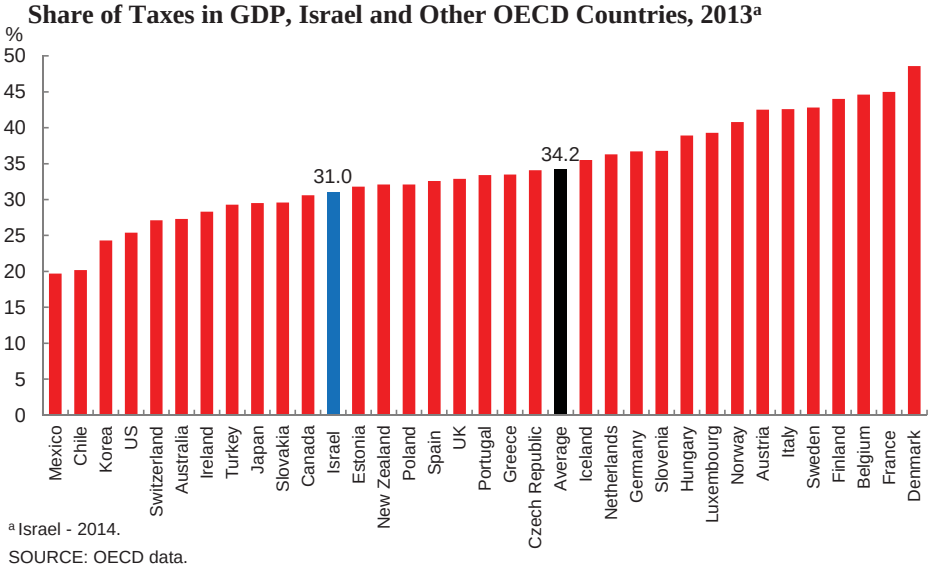


[a] Israel - 2014.
SOURCE: Based on OECD data.

as the Knesset was dispersed. Without an approved budget, the government has been operating since the beginning of 2015 on an interim budget, which allows it each month to expend 1/12 of the amount budgeted in 2014.[1] As the new government decided to only request the Knesset's approval of the 2015 budget in November—together with the budget for 2016—it will continue to operate on the basis of the interim budget until nearly the end of the year. Given the normal seasonal path of government expenditure, and due to the low level of debt repayments in 2015 and their being spread out over the course of the year, this framework will not be an obstacle to reaching an expenditure level similar to

[1] The monthly limit is cumulative, so that low expenditure one month allows increased expenditure in the following months. Based on the seasonal pattern of actual expenditures, these are usually lower in the first months of the year.

Figure 3
Share of Taxes in GDP, Israel and Other OECD Countries, 2013[a]

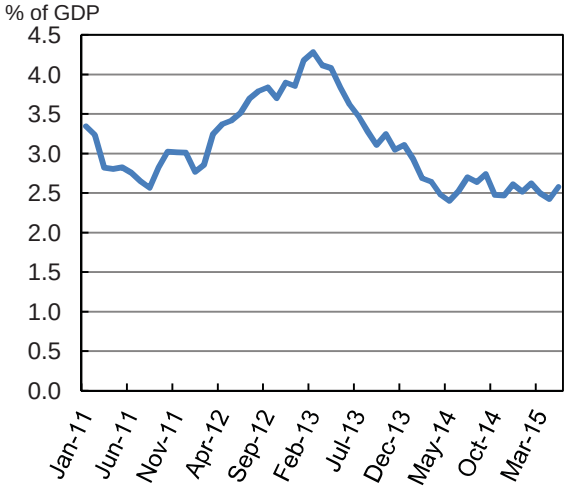


[a] Israel - 2014.
SOURCE: OECD data.

that permitted by the expenditure rule through November.[2] With that, based on past experience, the additional rules that apply to the government's activities under an interim budget limit actual expenditure and negatively impact primarily the implementation of the government's new programs and infrastructure investments.

In January–May, government expenditures were slightly lower than the level consistent with annual expenditure that is in line with the expenditure rule. This level reflects high defense expenditures—their path is even higher than what is in line with the budget approved by the previous government, including a "one-off" supplement of NIS 4.3 billion, alongside low civilian expenditures. The cumulative deficit over the past 12 months is 2.6 percent of GDP, and in the past year it has been in a narrow range of 2.5– 2.8 percent of GDP (Figure 4). Given projected revenues (from taxes and other sources) for the remainder of the year, and assuming that the increased child allowances included in the government's guidelines will be paid retroactively from May, and that all other steps included in the guidelines will only be implemented in 2016, the total annual deficit is expected to remain in this range, and the debt to GDP ratio is expected to increase slightly this year.

Figure 4
Cumulative Deficit in the Past 12 Months, January 2011 to May 2015



SOURCE: Based on Central Bureau of Statistics and Ministry of Finance data.

2. Fiscal steps incorporated in the government's guidelines

The new government adopted, in its guidelines, several programs that have significant potential budgetary cost. Some of those plans will be implemented this year, and some will be put into place in coming years. When fully implemented, the cost of these plans is expected to be about NIS 8 billion per year. Due to the marked cost of the plans, and given

[2] A more detailed explanation of the government's activities within the framework of an interim budget appears in Recent Economic Developments no. 138, which was published in February 2015. http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/RecentEconomicDevelopments/develop138e.pdf

the constraining expenditure ceiling and deficit targets, it is important to examine these plans from the perspective of two of the main areas on which the government budget impacts—inequality and economic growth—and in light of the government's budget strategy from the beginning of the previous decade.

The inequality of disposable income in Israel is among the highest in the OECD, and primarily reflects the government's limited intervention in income redistribution among households[3], among other reasons due to the focus on encouraging employment. There was a sharp increase in inequality in Israel in the beginning of the previous decade, when the government reduced allowances—in light of the budget deficit, and with the goal of increasing the incentive for the weaker segments of society to participate in the labor market—and adopted a policy of reducing direct taxes, which increased the incentives for employment at medium and high income levels. This policy brought the share of the government's civilian expenditure in GDP to one of the lowest levels in the OECD, and total tax revenues are also in the lower section of the distribution (Figures 1–3). The labor force participation rate did increase markedly over the years, affected by these measures, among other things, and its increase contributed to the trend of moderate contraction in inequality and poverty, a trend that developed in recent years and offset part of the initial increase in inequality. The increase in the participation rate contributes to increasing households' income, in particular those in the lower end of the income distribution[4], but the low productivity of many of those joining the labor force—a feature accompanied by low wages—makes reducing income gaps difficult.

There is no inherent contradiction between economic growth and social policy that aids in reducing inequality. The connection depends on the type of measures adopted by the government. If the government is interested in reducing inequality and the incidence of poverty, and in parallel to support sustainable growth, it can act through two channels—creating incentives and tools to increase employment and the wages of the population whose income from work is low, and enhancing economic support for the population that has a limited ability to work. There are various measures that can support both goals, and the government can examine its economic plan in accordance with the contribution of its components to achieving those goals.

An important tool in the first channel is improvement of the education system, through bolstering the resources allocated to providing skills that will allow graduates to attain quality employment and will increase productivity in the economy.[5] In addition, removing barriers to integration into the labor market can also promote employment and productivity. This can include offering quality solutions for working parents in terms of childcare for children younger than the age of compulsory education, and in the afternoon, for older children, as well; improved accessibility of employment to areas in the geographic periphery, and focused professional training for older adults who do not have a usable profession. Programs that contribute to increasing earnings of low-income working households, such as the earned income tax credit, serve to some extent as an incentive to work[6], and are an effective instrument for achieving both goals.[7] However, while increasing universal transfer payments to working-age families is helpful in reducing inequality and poverty, it weakens the incentive to work.

An examination of the main steps that the government adopted in its guidelines indicates that a notable portion of them are not in line with the approach that combines support for sustainable growth with reducing poverty. These steps include increasing child allowances by about NIS 2.5 billion per year, and an increase in other National Insurance Institute allowances and welfare payments by about NIS 500 million in 2015, and NIS 1 billion per year afterwards—

3 A discussion of this subject appears in chapter 8 of the 2013 Bank of Israel Annual Report (2014). http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/BankIsraelAnnualReport/Annual%20Report-2013/p8-2013e.pdf

4 A Bank of Israel calculation in 2014 Bank of Israel Annual Report (2015)—Table 8.3—indicates that households in the bottom quintile of disposable income increased the labor input by 40 percent between 1999–2001 and 2010–12. http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/BankIsraelAnnualReport/Annual%20Report%202014/chap-8.pdf

5 A discussion on the quality of education and its effect on growth appears in Part 1 of this survey. A discussion on the effect of educational attainment on growth appears in Part 2 of Recent Economic Developments 136, http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/RecentEconomicDevelopments/develop136e.pdf and a discussion on the contribution of education to an increase in labor force participation rates appears on Box 5.1 of the 2012 Bank of Israel Annual Report (2013), http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/BankIsraelAnnualReport/Annual%20Report%20-%202012/p5.pdf

6 See Report by the Research Team Monitoring the Earned Income Tax Credit, http://www.boi.org.il/en/NewsAndPublications/PressReleases/Pages/03-05-2015-Labor.aspx

7 Although it is likely that this tool weakens the incentive for some workers to invest in human capital.

these steps reduce poverty.[8] In addition, it was decided to, among other things, (a) increase support for educational institutions in the ultra-Orthodox sector (including grants to the students themselves) at a cost of more than NIS 1 billion per year, with an easing of the stipulations regarding learning professions that support employment and the labor productivity of graduates, (b) increase the grants (deposit) for discharged soldiers at an amount of more than NIS 1 billion per year, a step that assists youth after their military service, at a time when their income is low, and (c) grant a budget supplement to several ministries. In addition to the decisions regarding expenditures, the government's guidelines include examining the possibility of imposing differential VAT rates on basic food items, a step whose direct annual cost is expected to be more than NIS 1 billion, whose effectiveness in reducing poverty is low compared with other steps, and that is liable to adversely impact the efficiency of the tax system.[9]

The overall cost of the steps included in the coalition agreements and guidelines, if fully implemented, is greater than NIS 8 billion per year.[10] Further in the analysis we assume that part of these expenses will be covered by existing budget items, part will be delayed due to difficulties in implementing them, and some will be spread out over time. The main assumptions are than out of the NIS 1.3 billion supplement for discharged soldiers, only NIS 500 million will be paid in 2016, another NIS 500 million in 2017, and the remainder in 2018. We also assume that the plan for VAT of 0 percent on necessities will not be approved, and instead steps will be approved that are more effective in benefiting weaker population groups, at an annual cost of NIS 0.5 billion in 2016 and another NIS 0.5 billion in 2017. Subject to these assumptions, the calculations below include an additional cost of about NIS 6 billion in 2016 and NIS 7.5 billion in 2018.

An important budget issue for the government in coming years relates to its activity to increase the supply of homes and of land. The government defined reducing housing costs as a main target of its activities, and already at its outset it has adopted significant measures that are intended to expedite the planning processes and to moderate prices. Some of the issues holding back progress in planning and construction may be resolved though reallocating budget resources to construction of supporting infrastructures, reducing local municipalities' barriers that are holding up construction, and moving government and public facilities from areas in high demand while building alternative facilities in other areas. The government has already approved some such plans, and their implementation is likely to require a marked amount of increased expenditure. It is therefore important that the government account for this when formulating the coming budget, and insert these expenditures into its expenditure path for the following years, in order to prevent delays in implementing the plans.

The proper accounting for government activities to promote construction does not mean it has to avoid those activities, and is intended to maintain the transparency of the costs involved in government activities. If the government sees the housing supply as a main goal, it can budget those activities within the framework of the fiscal targets it sets, and even increase the expenditure and deficit ceilings for a limited period of time by an amount required for goals it views as important, in particular since selling the lands will allow the financing of the additional deficit without increasing the public debt. Such transparent conduct will prevent a potential negative impact on the credibility of the presentation of the government's accounts, and is preferable to presenting a lower deficit that is not in accordance with common accounting principles.

3. The 2016 budget

The expenditure ceiling for the 2016 budget is calculated on the basis of the fiscal rule adopted by the government at the end of 2013. This rule establishes that government expenditures can increase, in real terms, in line with the rate of population growth over the preceding three years (1.9 percent in 2012–14, which are the determining period for 2015 and 2016), plus the quotient that results from dividing 50 percent (representing a long term debt to GDP ratio anchor) by the debt to GDP ratio in the most recent year for which it is known (67.0 percent at the end of 2014). Based on this calculation, the real increase permitted in the 2015 budget is 2.66 percent, an increase that means an additional

[8] Increasing child allowances reverses their reduction in 2013. An international comparison indicates that total aid provided by the government in Israel to families with children is lower than in other OECD countries.

[9] An analysis of the expected effects of implementing a differential VAT rate appears in the 2014 Bank of Israel Annual Report (2015), pages 184–190
http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/BankIsraelAnnualReport/Annual%20Report%202014/chap-6.pdf

[10] In addition to the items noted above, the agreements also include purchasing homes for public housing, extending unemployment benefits to the self-employed or alternatively easing their unemployment insurance payments, and budget allocations for expenditures based on priorities of some Members of Knesset from coalition parties.

Table 1
Calculation of expenditure ceiling for 2016

		(NIS billion)
1	Expenditure ceiling in 2015 budget (net, including credit)	319.3
2	Reduction of base, in line with government and Knesset decisions[a]	3.8
3	Base for calculating expenditure ceiling for 2015 (1–2)	315.5
		(%)
4	Real rate of growth of expenditure, according to the rule	2.66
		(NIS billion, 2014 prices)
5	Addition to 2015 budget (3*4)	8.4
6	Addition in respect of inflation expected for 2015[b]	0.0
7	Nominal expenditure, per expenditure rule (3+5+6)	323.9
8	Addition to 2016 budget (4*7)	8.6
9	Addition in respect of inflation expected for 2016[c]	4.5
10	Nominal expenditure in 2016, per expenditure rule (7+8+9)	337.5

[a] In December 2013, the government decided to reduce the expenditure ceiling in tandem with reductions in income taxes and National Insurance fees.
[b] Based on the Research Department macroeconomic staff-forecast published in June 2015, the average CPI in 2015 is expected to decline compared with the CPI in 2014. the assumption is that the price ceiling will not be reduced in nominal terms as a result.
[c] Based on the Research Department forecast from June 2015. The assumption is that in 2016 there won't be a retroactive adjustment in respect of the negative CPI in 2015.
SOURCE: Based on budget data.

NIS 8.4 billion.[11] The calculation for the 2016 expenditure ceiling is similar, as it will be approved together with the 2015 budget and is based on the same figures, except that the increase will be based on the 2015 budget, rather than the 2014 budget. The 2016 budget will thus increase by NIS 8.6 billion (Table 1). In addition, the nominal increase in the budget will be adjusted for the price level expected in 2016, and based on the Bank of Israel forecast this adjustment will increase the budget by about 1.4 percent.[12]

The adjustments in respect of the difference between price levels when the budget is being prepared and the actual development of prices, such as the adjustments required in recent years, make budget planning quite difficult and at times require significant changes in the budget—just to discover that in the following year a gap in the opposite direction has developed. The difficulty stemming from price adjustments is because in the short term, there is a loose connection between budget expenditure and the CPI, so that changes in the CPI do not affect government expenditure in an equal manner. As such, government expenditures on wages, unindexed interest payments, various contracts signed in the past and some transfer payments do not change in accordance with the CPI, but the expenditure ceiling does change with it. Thus, when prices increase less than forecast by the government, a real reduction in its expenditures is necessary, and when they increase by more than the government forecast, an increase in expenditure is possible. The adjustments in both directions are liable to turn out over time to be redundant, and even burdensome, when the path of prices corrects itself.

A solution for this issue is to switch to a nominal budget based on the midpoint of the inflation target range.[13] Since Israel adopted the price stability target, in 2001, the CPI

[11] This projection is based on the government's understanding of the Budget Law. According to this understanding, the reduction of expenditure by NIS 3.75 billion that was carried out in the beginning of 2014, in parallel with the reduction in taxes at the same time, negates the need to reduce the budget (by about NIS 6 billion) in respect of prices increasing to a smaller extent than the forecast used to build the 2013–14 budget (see Section 2 on page 10 (in Hebrew) of the 2015 Budget Bill that was submitted to the government on October 7, 2014).

[12] In terms of the rate of price increase during the year—December 2016 over December 2015—it is inflation of around 2 percent.

[13] A more extensive discussion appears in Chapter 1 of the 2013 Bank of Israel Annual Report (2014).

has increased by a rate very similar to the midpoint of the target, about 2 percent per year, and the index of public consumption prices has increased by a similar rate. In such an environment, budgeting on the basis of the average increase in prices will permit greater stability in the budgeting process, avoid unnecessary adjustments, and allow the government budget to serve as an automatic stabilizer in times when the economy slows or accelerates and inflation declines or rises accordingly. When the economy slows, inflation is low, and the budget that is set on a nominal basis increases in real terms and supports activity. This process also bolsters the transparency of the budgeting; today, the budgeting process involves marked uncertainty in terms of its size, until the inflation adjustment for previous years, and the forecast of prices for the coming year, are presented.[14]

The effect of activity via an interim budget, which is moderating the growth of the government's expenditures in 2015, apparently will not be repeated in 2016, and to some extent will even increase the need for expenditure on activities that were deferred. Some of the plans that will not be carried out fully this year are new programs that were not executed because they were not budgeted for in 2014, but without a clear decision to cancel them, they are to be carried out in 2016. Therefore, the ability to incorporate the defense budget at its current size into the expenditure ceiling will decline, and clear budget adjustments will be necessary in order not to deviate from it.

Based on current estimates, which are based on previous governments' decisions regarding various programs, on the additional plans that are included in the government's guidelines, and the expenditure path derived from various rules and demographic developments (such as expenditures on education and health, and National Insurance Institute allowances)[15], the size of the reductions in government expenditure that are required in order to meet the expenditure rule for 2016 is NIS 10 billion.[16] In addition, further revenue of about NIS 6 billion is needed in order not to deviate from the deficit ceiling of 2 percent of GDP set in law. Accordingly, the total adjustment in 2016 is about NIS 16 billion. It is important to clarify that about NIS 6.5 billion of the required adjustment don't reflect a reduction in government expenditures, but rather an adjustment required in order to include additional expenditures (including allowances) that were set in the government's guidelines in the budget framework.[17]

The gap created between the costs of government-approved plans, including the new ones, and the expenditure ceiling points to the complex challenge faced by the government—to promote its plans while adhering to the fiscal rules. The expenditure ceiling allows only a moderate annual increase in government expenditure, an addition that more or less provides for the natural growth of expenditures, taking into account the more moderate increase of defense and interest expenses. Therefore any decision on expanding government activity, in any area, requires a reduction of expenses in another area, in order not to deviate from the expenditure rule. This constant pressure is seen often in solutions such as raising the expenditure ceiling (for example, by cancelling the price adjustment described above, or by excluding the supplement to defense expenditures, as proposed by the previous government). In addition, it encourages the transfer of various expenditures to "contingent expenditure"—on the basis of plans such as transferring funds from the JNF to government activities and budgeting activities on the basis on selling land[18], or by external financing, such as the bond issue by Israel Railways.[19] The necessity of relying on such steps indicates the lack of correlation between plans the government views as needed, and the budget framework allocated to do so, and is also seen in considerable reallocation of budget resources over the course of the year between various plans, and in particular in the slow and partial carrying out of multiyear investments in infrastructure.[20]

[14] These are usually not presented in the government's discussions on approving the budget, but are calculated at a later stage at the Ministry of Finance.

[15] It is assumed that for the near future, general wage agreements that will be signed in the public sector will maintain the real wage scale.

[16] The addition to child allowances is not recorded in the budget as an increase in expenditure, but as a decrease in revenue. This is because the allowances are paid from National Insurance Institute sources, and thus reduce its surplus flows, which are recorded in the budget as revenue (a detailed explanation appears in Box 3.3 of the 2002 Bank of Israel Annual Report (2003)). It is likely that in actuality the government will decide to change the accounting structure with the National Insurance Institute, so that the budget flow to it will be increased and the payment of allowances will also be reflected in the budget as an increase in expenditure in the budget.

[17] The amount of NIS 6.5 billion does not include all the sections appearing in coalition agreements, due to the assessment that there are some items that the government will ultimately not implement. To the extent that the implementation will be larger or smaller, the addition will grow or shrink accordingly.

[18] The expenditure ceiling does not apply to expenditures financed on the basis of earmarked income from external sources.

[19] The bonds themselves will apparently be recorded as part of the public debt, as most Israel Railways revenue is government subsidies, but expenses finance by the bonds will not be recorded as budget expenditure.

[20] See Box 6.2 in the 2014 Bank of Israel Annual Report (2015) http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Research%20Department%20Publications/BankIsraelAnnualReport/Annual%20Report%202014/chap-6.pdf.

In light of the government's clear difficulty in actually meeting the existing expenditure ceiling, and given the low share of civilian expenditure (and of total expenditure) in GDP compared with other advanced economies, the government should examine if the existing expenditure rule is in line with the range of goals it has set for itself, and if it assesses that it can consistently meet this ceiling over time. The balance between bolstering the credibility that comes from commitment, over the long term, to the existing fiscal rule, and the adverse impact of frequent changes in the ceiling, the accounting adjustments and cancellation of plans adopted by the government even before they are executed, highlights the need to consider adjusting the target.

A central component in government expenditure, which impacts on the ability to operate within a fiscal rule framework, is the defense budget. In 2008, the government adopted a multiyear framework for defense expenditures, based on the recommendations of the Brodet Committee, and essentially acted according to it until 2013. Nonetheless, the advantages of a multiyear framework were not fully seen because each year there were major changes in the defense budget over the course of the year, and notable supplements were added to the original budget that had been approved.[21] It is expected that the government will soon have to meet the recommendations of the Locker Committee regarding the setting of the defense budget in the coming years. In order to avoid the failures that made it difficult for the government to benefit from the previous multiyear framework—and caused a recurring process in recent years of changes in the approved budget—it is important that the government delineate, in a clear plan, how the defense budget framework will be aligned with the balance of risks and strategic goals set for the IDF, and define a clear work plan with acceptable effects on defense and the economy. Such a framework will help in mitigating the uncertainty regarding the ability to increase civilian expenditure while adhering to the expenditure and deficit ceilings.

4. Forecast and scenarios for 2015–20

The deficit and expenditure ceilings set by law are multiyear, and are intended to produce a stable framework that allows the government to plan its expenditures and tax rates over time, and together with that to support the decision making process in the business sector and macroeconomic stability. It is therefore important to examine the effects of the fiscal decisions reached, not only on the current year's budget, but also on fiscal policy over the rest of the decade. This analysis is presented under the assumption that the economy's growth rates from 2016 and onward will be 3 percent per year[22], on average—a rate of growth that takes into account the expected increase in the labor force in Israel.

Figure 5 presents the path of statutory deficit targets, that were approved with the 2014 budget (the red line, "deficit target set by law"). Based on this path, the deficit is to decrease from 2 percent of GDP in 2016 to 1.5 percent in 2019 and onward. Figure 6 indicates that if this path (the red line) will be followed, the debt to GDP ratio will decline gradually from its current level and reach 62 percent of GDP in 2020—a significant decline, which will contribute markedly to the resilience of the economy to crises and to a decline in the interest burden. As will be detailed below, meeting these targets will require significant decisions by the government regarding its expenditures and tax revenues, and extended determination to implement them.

The black lines in Figures 5–7 present the outcomes of an alternative policy, in which the government acts on the basis of the detailed expenditure plans it approved, meaning that it does not align its expenditures with the expenditure ceiling, but also will not decide on additional expenditures through 2020 and does not change tax rates. Based on this path, the deficit is expected to increase to about 3.5 percent of GDP in 2017 and to stabilize at that level for the remainder of the decade. The debt to GDP ratio will increase gradually and reach 71 percent of GDP in 2020. Such a policy will also result in stability of the share of public expenditure in GDP, but the share of primary civilian expenditure in GDP will not increase, as the increase in interest expenses—due to the increase in debt and in the risk premium—will offset the assumed decline in the share of defense expenditures.[23] An alternative policy path—according to which the government decides to maintain the level of expenditures derived from the plans it approved while meeting the deficit targets by increasing tax revenues—will require a cumulative increase in tax rates, or cancellation of exemptions, of around NIS 10 billion[24] in 2017–20 (given the effect of taxes on GDP

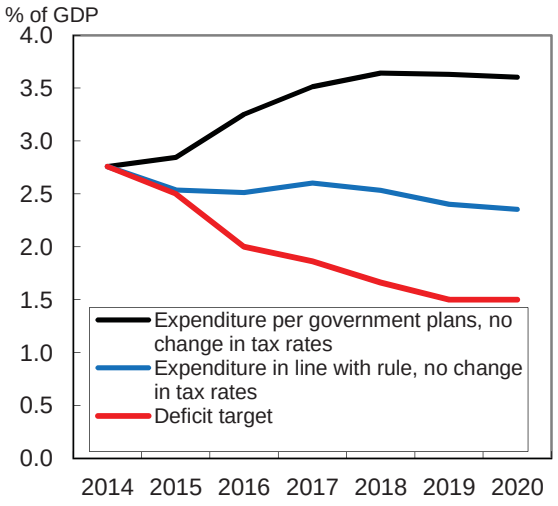
[21] A detailed discussion on the conduct of budgeting defense expenditures appears in Brender, A. (2012), "On transparency and simplicity: Setting the size of the defense budget since the adoption of the Brodet Committee's recommendations", Economy and Society, Volume 8, Van Leer Institute.

[22] The projection for 2016 is based on the forecast of the Bank of Israel Research Department published on June 22, 2015.

[23] A discussion of the effect of fiscal policy on the interest rate appears in Brender and Ribon (2015)—"The Effect of Fiscal and Monetary Policies and the Global Economy on Real Yields of Israel Government Bonds", Discussion Paper 2015.02, (Bank of Israel). http://www.boi.org.il/he/Research/DocLib/dp201502e.pdf

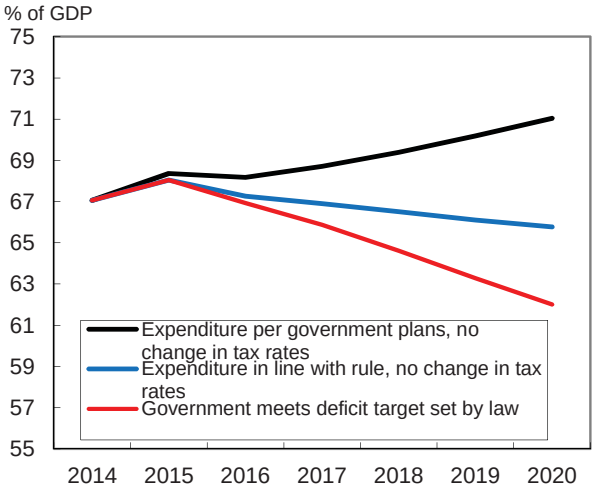
[24] This is in addition to the adjustment that will be necessary in 2016, as noted.

Figure 5
Deficit Targets and Share of Deficit in GDP Under Various Policy Scenarios, 2014-20



SOURCE: Based on budget data.

Figure 6
Debt to GDP Ratio Under Various Policy Scenarios, 2014–20



SOURCE: Based on budget data.

growth[25]), but it will reduce annual interest payments by about 0.3–0.5 percent of GDP in 2020, and allow a moderate increase in civilian expenditure.

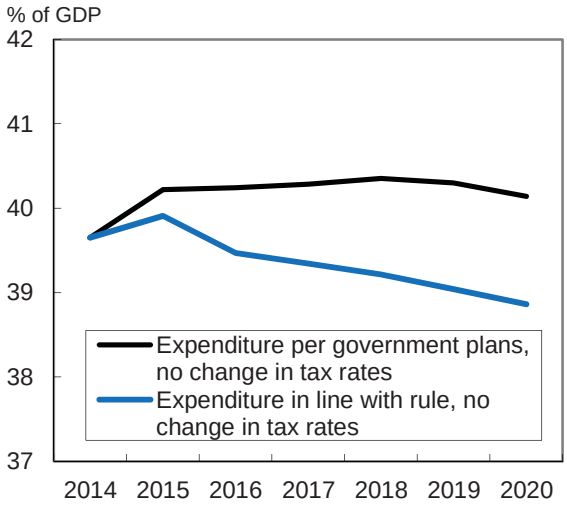
The blue lines in Figures 5–7 present what is expected should the government meet the expenditure ceiling but not make any changes in tax rates. The deficit will stabilize in this case at around 2.5 percent of GDP, greater than the targets set by law for all the years. Such a deficit will stabilize the debt to GDP ratio at around 66 percent, slightly below the current level, while reducing the share of public expenditure in GDP by 1 percent by the end of the decade. In order to meet the expenditure ceiling in 2017–20, the government will need to reduce the expenditure plans by a cumulative NIS 4.5 billion. This is in addition to the reduction required in 2016, and subject to the assumption that the adjustments each year will be permanent and the government will not decide on additional expenditures through the end of the decade.[26] This means a cumulative decline in expenditures of about 1.2 percent of GDP (the spread between the blue and black lines in Figure 7). It is important to note that the analysis presented here assumes a moderate, if plausible, path of increase in defense expenditure.[27] This heightens the government's expected challenge in the years being discussed within the framework of the effort to meet the expenditure ceiling it set: not only does it not have the option of deciding on increasing expenditures in any item without reducing expenditures in another item, but beyond that it must markedly reduce existing expenditure plans or those which it has already decided to carry out. This is even though already today the share of public civilian expenditure in GDP in Israel is nearly the lowest among advanced economies (Figure 2). The share of interest expenses in GDP is not expected to continue to decline markedly, particularly if the government does not reduce the deficit in

[25] An analysis of the effect of changes in tax rates on GDP and through it, on revenues, appears in Mazar, Y. (2013), "The Effect of Fiscal Policy and its Components on GDP in Israel", Israel Economic Review Vol. 9, No.1, http://www.boi.org.il/deptdata/mehkar/iser/16/iser_1.pdf and also in Brender and Politzer (2014), "The Effect of Legislated Tax Changes on Tax Revenues in Israel", http://www.boi.org.il/en/Research/DiscussionPapers1/dp1412e.pdf

[26] The size of the adjustment required each year is affected by the adjustments made in preceding years, both because the expenditure ceiling increases relative to the previous year's ceiling and not relative to actual expenditure, and because the deficit in a given year increases interest payments in future years.

[27] The assumption is that the defense budget in 2015 will be in line with the budget proposal approved by the previous government, meaning a decrease of about NIS 1 billion compared with total actual defense expenditure in 2014, and that afterwards the budget will increase from that level by 1.3 percent per year (similar to the rate of growth set in the Brodet framework). The implication of this framework is that the defense budget will decline by half a percentage point of GDP from 2015 through 2020.

Figure 7
Share of Public Expenditure in GDP Under Various Policy Scenarios, 2014–20



SOURCE: Based on budget data.

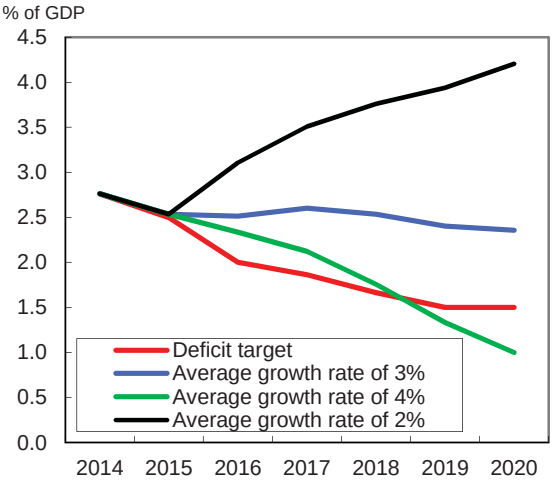
accordance with the framework set in law.[28] As noted above, the government should examine if, in its assessment, it is possible and desirable to maintain the current expenditure ceiling, or to increase it.

The analysis above indicates that meeting the deficit targets set in law will require significant budget adjustments, of about 2 percent of GDP, in 2016–20 (the gap between the red line and the black line in Figure 5), and even more when taking into account the effect of fiscal changes on short term activity. The sooner the government makes an adjustment, the smaller it can be, as the public debt, and the interest payments on it, will not grow. Clearly such an adjustment will require either conceding many programs to which the government attributes great importance or markedly increasing tax revenues.

To the extent that the government deems it correct to change the expenditure ceiling and the deficit targets, it is important that the new targets that will be set will ensure the continuation of at least a moderate decline in the debt to GDP ratio. This means, based on the paths appearing in Figures 5–6, that the deficit target can be set at no more than 2.5 percent of GDP. In light of past experience, and given the stage of the economy in the business cycle, it is preferable that the government does not set a larger deficit target for the coming year alongside a framework of future declines in the deficit, in particular if it does not pre-legislate the specific steps to ensure the decline (in contrast to a decision on a general framework of steps or of a reduction in expenditure). Subject to the framework that will be set, the government will also be able to decide what amount of expenditure is best, and to bring the revenue and tax rate levels in line with it.

The analysis presented here is sensitive to assumptions on the future rate of growth of the economy. The current estimation was based on assumptions that are slightly higher than those of the OECD and other institutions surveying the Israeli economy, and there is uncertainty about them. When analyzing how a change in the growth rate will impact on the path of the deficit in the framework where the government meets the expenditure ceiling but does not increase revenues, it is found that if the rate of growth will be 4 percent per year, on average, the government will be able to meet the declining deficit targets (the green line in Figure 8). In contrast, if the rate of growth will decline to an average of 2 percent per year, it is expected to lead to gradual increase in the deficit, to over 4 percent of GDP (the black line in Figure 8) and to a parallel increase in the debt to GDP ratio to around 75 percent.

Figure 8
The Deficit as a Share of GDP Under Various Growth Rate Scenarios, 2014–20



Under each scenario, tax rates are fixed and expenditure is per the rule.

SOURCE: Based on budget data.

[28] This analysis moderates the increase in interest on the public debt resulting from macroeconomic developments in Israel and worldwide, due to the impact of the decline in the debt to GDP ratio on the risk premium on Israel's public debt. In the policy path and scenarios in which the debt to GDP ratio increases, the interest expenses increase accordingly. A discussion on the impact of fiscal policy on the interest rate appears in: A discussion of the effect of fiscal policy on the interest rate appears in Brender and Ribon (2015)—"The Effect of Fiscal and Monetary Policies and the Global Economy on Real Yields of Israel Government Bonds", Discussion Paper 2015.02, (Bank of Israel).

Statistical Tables

Table 1.1 National Accounts, 2014-2015
(percentage change in annual terms, at constant prices, seasonally adjusted)

		Change from previous quarter					Year-on-year change[b]	
		2014				2015	2014	2015
	2014[a,b]	I	II	III	IV	I	IV	I
GDP	2.8	2.8	1.6	0.8	6.5	2.1	3.4	2.3
Business-sector product	2.7	2.6	1.8	0.0	7.5	2.6	4.1	2.2
Private consumption expenditure	4.1	1.8	6.0	5.4	7.9	7.5	5.9	5.2
Gross domestic investment	-0.4	4.2	1.5	-9.9	-5.7	20.9	2.2	3.1
Fixed investment	-2.8	-12.0	-5.3	-7.0	9.0	-6.5	-3.0	-4.5
Goods and services exports excl. diamonds	2.1	-2.5	-4.4	-3.5	12.8	-2.9	0.3	0.0
Goods exports[c]	1.2	9.2	-21.1	2.2	10.4	-3.8	-1.3	-4.0
Services exports[c]	0.8	-2.2	8.6	-17.6	6.1	2.4	-1.7	-1.3
Goods and services imports excl. diamonds[d]	2.6	-2.4	2.2	10.6	4.5	14.0	4.2	5.2
Goods imports[e]	1.0	-7.1	-3.7	18.4	-9.5	17.0	0.5	2.3
Services imports[e]	6.5	30.3	8.6	7.2	-9.2	21.6	7.9	8.5
Public sector consumption	4.2	3.7	6.6	5.6	6.9	0.8	4.4	4.2
Public consumption excluding defense imports	3.9	4.3	6.1	6.2	5.9	-0.5	3.9	4.4
Domestic use of resources	3.3	3.0	5.2	4.0	3.4	8.8	5.0	4.6

[a] Compared with previous year.

[b] Unadjusted data.

[c] New calculation - excluding subsidies.

[d] Excluding defense imports, ships and aircraft.

[e] New calculation - excluding taxes.

SOURCE: Based on Central Bureau of Statistics data.

Table 1.2 Indicators of Business Activity, 2014-2015
(percentage change, in annual terms, seasonally adjusted)

	Change from previous month						October-March		
	2014			2015			Change from previous period	Year-on-year change[a]	Last month for which data available*
	Oct	Nov	Dec	Jan	Feb	Mar			
Composite state-of-the-economy index	0.3	0.3	0.4	0.3	0.3	0.4	1.8	2.6	March
Large-scale retail trade	1.4	-0.2	-1.6	2.6	-0.5	1.5	3.2	6.1	March
Industrial production (excl. diamonds)	-1.1	0.5	1.4	-0.2	1.5	3.4	4.8	2.1	March
Index of trade revenue	-2.0	0.0	0.9	0.5	-2.1	1.5	1.9	1.2	March
Index of trade and services revenue	-1.2	-0.2	2.2	-0.1	-0.8	0.1	3.3	3.2	March
Index of services exports	0.5	0.7	-6.0	5.9	0.1	0.5	0.4	3.4	March
Tourist arrivals	6.7	-1.0	0.4	-3.6	1.2	0.2	-7.4	-19.4	March
Residential construction									
Starts	-15.5	13.7	-5.1	8.6	5.2	-9.3	1.7	-7.9	March
Completions	-6.6	42.9	-13.5	-24.1	61.4	-20.0	14.5	17.9	March
ILA land permits (units)[a,b]	995	4,143	6,364						December
Climate indices based on Business Tendency Survey[c]									
Assessment of present activity: total business sector	0.23	0.22	0.24	0.24	0.23	0.26			March
Assessment of present activity: manufacturing industry	0.25	0.25	0.26	0.29	0.28	0.26			March
Assessment of present activity: services industry	0.23	0.21	0.24	0.22	0.21	0.27			March
Assessment of future activity: total business sector[d]	0.18	0.19	0.21	0.20	0.20	0.22			March
Business Climate Index (total business sector)	0.19	0.21	0.19	0.21	0.22	0.23			March

* For monthly indicators, when the last month for which data is available is March, the previous comparison period is April–September; when the last month with data available is February, the comparison period is April–August; when the last month with data available is January, the comparison period is April–July. When the last month with data available is December, the comparison period is April–June. For indicators produced quarterly, the comparison is to the last complete quarter in the previous period reviewed.

[a] Unadjusted data.

[b] Land transactions authorized by the Israel Lands Administration in the relevant period.

[c] Figures are in terms of monthly growth of business product and refer to the month in which the survey was conducted.

[d] Expectations are attributed to the middle of the three month period following the survey.

SOURCE: Based on Central Bureau of Statistics and Ministry of Construction and Housing data.

Table 1.3 Indicators of Labor Market Developments, 2014-2015
(percentage change, seasonally adjusted)

		Percent change from previous quarter					October-March		
	I/2015	2014				2015	Change from previous period	Year-on-year change[a]	Last month for which data available*
	(thousand)	I	II	III	IV	I			
Civilian labor force	3,801.5	1.3	0.6	0.3	0.5	-0.1	-0.1	1.5	March
Israeli employees	3,596.2	1.2	0.4	0.2	1.1	0.2	0.2	1.9	March
of which : in public services	1,301.3	1.2	0.3	1.4	2.1	0.8	0.8	4.5	March
in business sector	2,296.4	1.2	0.6	-0.3	0.5	-0.3	-0.3	0.5	March
Foreign workers and Palestinians (unadjusted)	296.8	-0.1	-0.8	-2.0	0.3	0.6	0.6	-2.0	March
Average hours worked weekly per Israeli employee	35.4	-0.3	-1.7	-1.7	4.6	-3.3	-3.3	-1.3	March
Weekly labor input in business sector (incl. foreign workers and Palestinians)	108,368.1	0.5	-1.4	-0.5	1.5	-0.6	-0.6	-0.2	March
of which: Israelis	94,899.3	0.4	-1.5	-0.2	1.7	-0.7	-0.7	0.2	March
Weekly labor input in public services (Israelis)	32,731.4	0.4	-1.5	1.1	3.3	-0.7	-0.7	2.3	March
Unemployed	205.4	3.8	4.3	2.1	-8.6	-4.3	-4.3	-5.9	March
Job seekers	206.0	-0.7	-1.1	1.9	-0.8	-2.4	-1.0	-3.9	January
Claims for unemployment benefits	89.5	-0.6	-6.0	8.1	0.8	-0.8	4.3	1.6	March
Job vacancies[a]	76.5	0.4	2.7	0.8	9.5	5.2	12.8	19.6	March
	(NIS)								
Real wage per employee post[b]		0.7	0.3	0.6	0.2	1.1	1.1	2.4	March
In public services		0.8	0.3	0.8	0.4	1.3	1.5	2.4	March
In business sector		0.4	0.4	0.9	0.5	1.2	1.5	2.4	March
Nominal wage per employee post[c]	9,276.5	0.3	0.5	0.6	0.0	1.0	0.8	1.8	March
In public services	8,954.6	0.8	0.3	0.6	0.4	0.7	1.0	1.9	March
In business sector	9,437.2	0.1	0.6	0.9	-0.2	1.1	0.8	1.9	March
Unit labor cost		1.0	0.3	0.7	-1.9				December
		Percent, seasonally adjusted							
Participation rate		64.2	64.3	64.2	64.2	63.8			March
Employment rate		60.4	60.4	60.2	60.6	60.4			March
Unemployment rate		5.9	6.1	6.2	5.6	5.4			March
Depth of unemployment[c]		23.1	19.6	16.7	21.2	21.6			March

* For monthly indicators, when the last month for which data is available is March, the previous comparison period is April–September; when the last month with data available is February, the comparison period is April–August; when the last month with data available is January, the comparison period is April–July. When the last month with data available is December, the comparison period is April–June. For indicators produced quarterly, the comparison is to the last complete quarter in the previous period reviewed.

[a] Unadjusted data.

[b] Including foreign workers and Palestinians. Seasonally adjusted data.

[c] Percent of unemployed seeking work for more than six months (unadjusted).

SOURCE: Central Bureau of Statistics Labor Force Survey, except for data on Israelis, non-Israelis, and labor input in the business sector, and total Israelis employed, which are the Central Bureau of Statistics (CBS) National Accounts estimates; job seekers, which are derived from the Israeli Employment Service; claims for unemployment benefits, which are derived from the National Insurance Institute; job vacancies, which are derived from the CBS Survey of Job Vacancies, and the Balance of Employment, which is derived from the Ministry of Economy's Employers Survey.

Table 1.4 Government Budget Performance, 2014-2015

		Change from previous quarter					October-March		
		2014				2015	Change from previous period	Year-on-year change	Last month for which data available*
	2014[a]	I	II	III	IV	I			
Domestic deficit, as percent of GDP	-1.8	0.5	-0.8	-1.5	-5.3	1.4			March
Total deficit excluding credit, as percent of GDP	-2.7	-0.1	-1.6	-2.3	-6.7	0.2			March
Deviation from domestic budget path, excl. credit extended:[b]					(NIS billion)				
Revenue	-1.3	0.6	-0.9	-1.0	-1.3	0.1	0.4	-0.5	March
Expenditure	-6.9	0.4	-5.0	-4.1	-6.9	0.0	2.8	-0.5	March
Deficit	5.6	0.2	4.1	3.2	5.6	0.1	-2.4	-0.1	March
Total deficit excluding credit	-29.9	-0.3	-4.4	-6.2	-19.0	0.7	-7.7	1.0	March

	Real change year-on-year (percent)							
	2014			2015				
	Oct	Nov	Dec	Jan	Feb	Mar		
Government domestic revenues excluding credit	13.9	-1.2	-0.2	4.9	3.7	8.5	5.0	March
Government tax revenue	12.0	-1.4	1.1	2.5	3.8	11.6	4.7	March
of which : income tax, net	11.5	-11.4	-20.0	8.0	6.0	11.3	0.4	March
VAT, gross	-0.3	0.1	10.6	-0.7	1.2	10.5	3.4	March
Government expenditure excluding credit	1.9	0.6	2.9	0.0	6.3	3.1	2.6	March
National Insurance allowances	3.0	5.9	5.8	3.8			4.6	January
of which : Unemployment benefit	3.3	-1.7	7.3	8.2			4.2	January
Income support[c]	-2.8	2.6	-0.2	-1.6			-0.5	January
Payments to the National Insurance Institute by the public	3.7	3.9	6.3	6.1	6.2	6.0	5.4	March

* For monthly indicators, when the last month for which data is available is March, the previous comparison period is April–September; when the last month with data available is February, the comparison period is April–August; when the last month with data available is January, the comparison period is April–July. When the last month with data available is December, the comparison period is April–June. For indicators produced quarterly, the comparison is to the last complete quarter in the previous period reviewed.

[a] Compared with previous year.

[b] The path is determined in accordance with the deficit ceiling. The figures compared with the previous period and with the corresponding period are differences.

[c] Not including income support in old-age and survivors' pensions.

SOURCE: Based on Ministry of Finance and National Insurance Institute data.

Table 1.5 Foreign Trade, Balance of Payments, and the Reserves, 2014-2015
(Seasonally adjusted)

		Change from previous quarter					October-March		
		2014				2015	Change from previous period	Year-on-year change[b]	Last month for which data available*
	2014[a,b]	I	II	III	IV	I			
	(rate of change, percent)[c]								
Trade in goods[d]									
Goods imports	4.4	1.4	-0.3	-0.5	0.2	-6.9	-3.5	-4.2	March
of which : Consumer goods	9.0	3.5	1.0	2.2	3.0	-11.5	-1.9	1.1	March
Capital goods	4.9	1.1	-4.8	-1.3	3.9	-15.7	-4.9	-11.7	March
Intermediates	2.3	0.7	0.8	-1.5	-2.4	-1.5	-3.9	-3.9	March
Goods exports	1.4	-0.5	-4.1	0.4	0.8	-1.6	0.2	-6.0	March
of which : Manufacturing	1.5	-0.8	-3.5	2.0	-0.4	-2.5	-0.7	-5.8	March
of which : High-tech	-1.5	-6.8	-3.4	-2.7	6.2	8.5	9.2	-4.2	March
Balance of payments				$ million					
Goods and services exports	98,523	25,603	24,586	24,249	24,085	23,714			March
Goods and services imports	93,148	23,635	23,181	23,755	22,578	22,020			March
Balance of trade in goods and services account	5,375	1,969	1,405	494	1,507	1,694			March
Balance of trade in current account	13,253	4,682	4,396	1,525	2,649	2,885			March
Surplus/deficit in financial account (excl. foreign exchange reserves)[b]	-8,573	-961	-1,845	-498	-5,269	-3,461			March
of which : Nonresidents' direct investments[b]	6,738	3,214	1,499	2,056	-30	4,200			March
Nonresidents' portfolio investment[b]	9,555	2,864	1,881	1,916	2,894	968			March
Residents' direct and portfolio investment abroad[b]	11,907	4,287	5,512	1,717	392	4,531			March
Bank of Israel foreign currency reserves, end-period[b]	86,101	85,562	86,819	86,183	86,101	84,969	-1.4	-0.7	March
Net external debt (percent of GDP)[b,e]	-35.6	-29.6	-29.0	-31.4	-34.3	-37.3			March

* For monthly indicators, when the last month for which data is available is March, the previous comparison period is April–September; when the last month with data available is February, the comparison period is April–August; when the last month with data available is January, the comparison period is April–July. When the last month with data available is December, the comparison period is April–June. For indicators produced quarterly, the comparison is to the last complete quarter in the previous period reviewed.

[a] Compared with previous year.

[b] Unadjusted data.

[c] The change relates to the dollar values of imports and exports.

[d] Not including ships, aircraft, diamonds, and fuel.

[e] GDP is calculated at the end-of-period NIS/$ exchange rate.

SOURCE: Based on Central Bureau of Statistics data.

Table 1.6 Selected Price Indices, the Effective Exchange Rate, Nondirected Bank Credit, Interest Rates, Yields, and the Share Price Index, 2014-2015

(rates of change, percent)

	Change from previous month						October-March		
	2014			2015			Change from previous period	Year-on-year change	Last month for which data available*
	Oct	Nov	Dec	Jan	Feb	Mar			
CPI	0.3	-0.2	0.0	-0.9	-0.7	0.3	-1.2	-1.0	March
Consumer price index, seasonally adjusted	0.2	0.1	0.0	-0.4	-0.4	0.2	-0.3	-1.0	March
Price index of owner-occupied homes[a]	0.4	0.3	0.6	0.4	0.8	0.4	3.0	3.4	March
General share-price index[b]	-0.7	2.4	-1.9	-0.8	4.4	6.5	10.1	14.8	March
Real effective exchange rate[c]	1.3	1.0	1.2	-1.8	-1.5	0.7	3.7	3.5	March
Nominal effective exchange rate	1.6	1.1	1.3	-2.2	-2.7	0.3	3.0	1.7	March
Nondirected bank credit[d]	0.3	0.4	0.4	1.0	0.3	0.1	2.4	3.8	March
Effective interest rate in daily deposit auction[b]	0.2	0.2	0.2	0.2	0.2	0.1	0.2	1.0	March
Yield to maturity on 5-year notes[b]	-0.4	-0.3	-0.2	-0.3	-0.6	-0.7	-0.4	-0.2	March
Risk premium[b,e]	-0.2	-4.4	-3.5	-0.7	-0.1	-1.1	-8.3	-23.8	March
CPI[f]	-0.3	-0.1	-0.2	-0.5	-1.0	-1.0	-0.6	-0.5	March

[*] For monthly indicators, when the last month for which data is available is March, the previous comparison period is April–September; when the last month with data available is February, the comparison period is April–August; when the last month with data available is January, the comparison period is April–July. When the last month with data available is December, the comparison period is April–June. For indicators produced quarterly, the comparison is to the last complete quarter in the previous period reviewed.

[a] Not part of the CPI.

[b] Daily average over the month.

[c] The real effective exchange rate is the weighted geometric mean of the exchange rate of the shekel against 28 currencies, representing 38 of Israel's main trading partners (weighted by the extent of Israel's trade with those countries), adjusted for the difference between the rate of inflation in Israel and the rates of inflation in those countries.

[d] Credit from banks' funds and at their responsibility.

[e] As measured by 5-year credit-default-swaps (CDS). Calculated as the difference in basis points.

[f] Year-on-year period change.

SOURCE: Based on Central Bureau of Statistics data.

Table 1.7 Indicators of Economic Development in Advanced and Developing Economies[a]
(annual change, percent)[b]

			2013	2014	2015 Projection	2016 Projection
World GDP			3.4	3.4	3.5	3.8
	Advanced economies		1.4	1.8	2.4	2.4
	Emerging and developing economies		5.0	4.6	4.3	4.7
World trade			3.5	3.4	3.7	4.7
	Advanced economies	Imports	2.1	3.3	3.3	4.3
		Exports	3.1	3.3	3.2	4.1
	Emerging and developing economies	Imports	5.5	3.7	3.5	5.5
		Exports	4.6	3.4	5.3	5.7
Commodity prices ($)	Oil[c]		-0.9	-7.5	-39.6	12.9
	Nonfuel		-1.2	-4.0	-14.1	-1.0
Inflation (CPI)	Advanced economies		1.4	1.4	0.4	1.4
Short-term interest rate (%)[d]	Dollar deposits		0.4	0.3	0.7	1.9
	Euro deposits		0.2	0.2	0.0	0.0
Unemployment rate	Advanced economies		7.9	7.3	6.9	6.6

[a] According to the World Economic Outlook, Israel is classified as an advanced economy. The advanced economies include the industrialized countries and some emerging markets.

[b] Except for unemployment and interest rates (percent).

[c] The average price of a barrel of U.K. Brent, Dubai and West Texas Intermediate crude oil in 2014 was $96.25, excluding freight costs. Estimated price for 2015 is $58.14 and for 2016, $65.65.

[d] Six-month Libor rate for US dollar deposits, and three-month Libor rate on euro deposits.

SOURCE: World Economic Outlook (IMF), April 2015.

Part 2: Broader Review of Selected Issues

Implementation of mandatory pension saving and its effect on wages

- Mandatory pension saving was implemented in Israel starting in 2008. This arrangement placed employees' and employers' contributions on an increasing trajectory, which was fully realized in 2014.
- Pursuant to the arrangement, the proportion of workers who made pension contributions increased considerably, particularly among those at low wage levels.
- An examination of how wages have developed since this arrangement went into effect finds that the wages of workers who had not made pension contributions previously increased more slowly than the wages of those who had made contributions, and the discrepancy approximates the total size of the employer's contributions. In other words, in practice, workers bore the vast majority of the cost of the arrangement, especially if their direct contributions are also taken into account.

1. Introduction

Mandatory pension saving was imposed on all employees countrywide and on their employers in 2008. The arrangement was implemented incrementally: in 2008, employees and employers were required to contribute a combined 1.7 percent of salary (up to the national average wage) and this rate rose gradually to 11.5 percent in 2014 and onward. In addition, employers had to deposit 6 percent—of monthly wage—out of their severance-pay contributions into pension savings (Table 1).[1] Before the arrangement went into effect, in 2007, about 60 percent of workers (and their employers) allocated funds for pension savings; by 2012, this rate exceeded 80 percent. During this period, the proportion of savers among workers who had not been saving in 2007—a large majority of whom belonged to the low end of the wage distribution scale—attained parity with that among those who had been saving that year.[2]

Studies on the mandatory pension arrangement found that the arrangement was detrimental to a fairly large share of the population directly affected by it—workers who had not made pension contributions before it was implemented (Brender, 2010, 2011). This is because the arrangement reduces their wages in years when their expenses are high and their income (adjusted for household size) is low—below the poverty line in many cases—but gives them additional pension income at an age when their income would be relatively high to begin with.[3] Furthermore, for many of these workers, pension savings will trigger the offsetting of benefits at retirement age.[4] The same analyses, looking at the discounted value of the government financial benefits that these workers are supposed to receive through the National Insurance mechanism (net of their National Insurance contributions), showed that the pre-arrangement discounted value resembled that of the financial benefits that higher-income people receive by means of the tax benefits that attend to pension savings. The analyses also indicated that when workers are divided into pension savers and non-savers in the pre-arrangement period, the division largely reflects the economic worthwhileness of saving for pension in consideration of the existing structure of the tax and National Insurance systems: Usually, workers saved when it was worth their while and did not when it was not.

Although the arrangement may be harmful to its target population, it may also benefit this population because it requires employers to contribute to workers' pension savings at the level of 6 percent of their wage. This contribution is a supplement to the employee's wage; it may mitigate the adverse impact caused by the employee's mandatory contribution and may even improve his or her welfare, all things considered. Such an improvement, however, can only take place if employers do not offset the increase in their contributions at the expense of their employees' wages. Such an offset need not take the form of an absolute and/or concurrent reduction of wage that matches the full increase in the employer's contributions. It may also be reflected in a slower medium-term rate of increase in the wages of workers included in the arrangement than that of other employees' wages, or in a smaller wage increase when employees switch employers. The latter possibility

[1] A detailed discussion of severance pay appears below.

[2] For comparison, about 35 percent of workers who had not made pension contributions in 2000 began to contribute by 2005. It is found that in 2007—that is, before the arrangement went into effect— some 30 percent of employers had both workers who saved for pension (20–80 percent of those whom they employed) and workers who did not. This finding relates to only some employers because our database did not allow us to investigate the phenomenon among small employers.

[3] For a discussion of pension oversaving and its effect on workers' welfare, see Card and Ransom (2011). For discussion of the negative impact attending to mandatory pension oversaving, see also Martin and Whitehouse (2008) and Scholtz, et al. (2006).

[4] See Bank of Israel (2011), Annual Report for 2010, Box 6.2.

Table 1: Mandatory pension savings: Employees' and employers' contribution rates during the assimilation period
(Percent of pensionable wage, up to the national average wage)

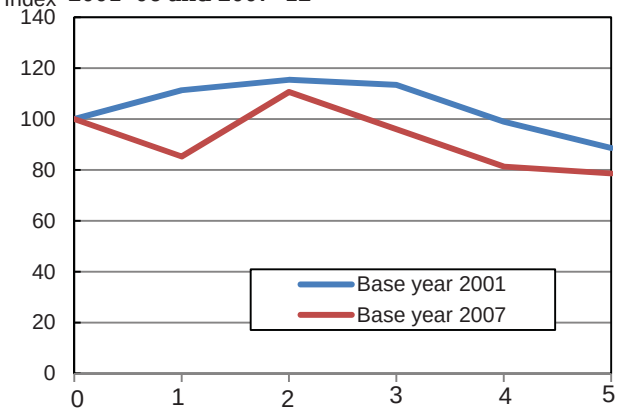
Start date	Employer's contribution	Employee's contribution	Employer's severance-pay contribution	Total
1.1.2008	0.83	0.83	0.83	2.50
1.1.2009	1.66	1.66	1.68	5.00
1.1.2010	2.50	2.50	2.50	7.50
1.1.2011	3.33	3.33	3.34	10.00
1.1.2012	4.16	4.16	4.18	12.50
1.1.2013	5.00	5.00	5.00	15.00
1.1.2014	6.00	5.50	6.00	17.50

is especially important because approximately 65 percent of workers in the relevant wage range for the arrangement (NIS 2,000–NIS 9,000 gross per month) switched employers in the five years preceding the arrangement and in the five years following its implementation.[5]

2. Econometric analysis

In this overview, we examine whether, and to what extent, the risk of an impairment to wage in the main group affected by mandatory pension saving—the workers who had not made pension contributions before the arrangement went into effect—came to pass. To do this, change in the wages of workers who made pension contributions before the arrangement were compared with the change in the wages of those who had not done so. In particular, since the arrangement is of limited consequence for most workers who had saved for a pension before 2008, we examine whether their wage changed in a manner that differs from that of workers who did not save.[6] However, since workers who saved also differ from non-savers in their characteristics, the inquiry should control for additional variables that may affect wage. This would determine whether the trends reflect the effect of the arrangement or the workers' characteristics, and the correlation between them and economic and statutory changes. Furthermore, the differences in characteristics may be manifested not only in different wage levels but also in the wage trajectory over time. Therefore, we compare the two groups in this respect as well, i.e., the discrepancy in wage trajectory between the pre-arrangement and the post-arrangement periods. In both periods, the business cycle (as reflected in the unemployment rate) developed similarly (Figure 1).

Figure 1
Unemployment trend among 25–64 year olds, 2001–06 and 2007–12



* In each period, the unemployment rate for the base year was set at 100.
SOURCE: Based on Central Bureau of Statistics.

[5] This finding relates to the specified income range and to workers aged 22–60 (for women, 22–55). Among those who had made no pension contribution in 2001 and continued to work in 2006, 75 percent switched employers by 2006, and among those who did not make contributions in 2007, 72 percent switched employers by 2012. Among workers who contributed, the rates were 60 percent and 56 percent, respectively. The detection of switching is prone to error in cases where employers changed their file numbers with the Israel Tax Authority, but a sample check found that the bias in question is small.

[6] The (gross) reported wage does not include employer's pension contributions (they are reported separately); in other words, the differences between the groups do not reflect the technical effect of the recording of the employer's contributions as wage.

To isolate the effect of the arrangement from that of the employee characteristics, we first calculated a binary variable that receives the value of one if the individual did not save for pension from wage in 2007 and the value of zero if he or she did so. Second, we estimated regressions in which the dependent variable was the rate of change in the employee's wage in the five years that passed since the assimilation of the arrangement (2007–12).[7] The independent variables in the regression include, in addition to the binary one, control variables for employees' demographic characteristics, pre-arrangement wage, and spouse's employment and income. We estimated the equations on data from a random sample that comprised 10 percent of employees countrywide, culled from employers' reports to the Israel Tax Authority and the population registry. This made it possible to track the wage and employment of each employee in the sample across the entire 2000–12 period. The data also allowed us to determine whether the worker was employed in the public or the private sector, to know whether he or she resided in an Arab municipality, and to estimate how many employees the worker's employer had.

The very fact that the employee and his or her employer did not make a pension contribution may be instructive of the employee's quality, the extent of his or her commitment to the labor market, and the value that the employer attributes to his or her unobserved characteristics. For this reason, we estimated the same equations for the 2001–06 period (for workers who saved and did not save for pension in 2001). We attributed the effect of the arrangement only to the difference between the coefficients of the equations that were estimated for 2007–12 and those of the equations estimated for 2001–06. Finally, a control variable was included in the equations: it receives the value of one if the employee changed employers between the two years and the value of zero if he or she did not.[8]

In 2001–12, the entire period investigated here, the rates of wage taxation changed in a way that reduced the tax burden on employees whose wages exceeded the tax threshold, and it did so in a differential manner. Although the rates of decrease between 2001 and 2006 were similar to those between 2007 and 2012 in the relevant income range, to avoid potential biases in the residual discrepancy, we used three variables in the equations to control for employees' wage: employee's monthly wage, wage squared (to take account of the possibility of a non-linear effect on wage), and a dummy variable for employees whose wages exceeded the tax threshold.[9] If the change in tax rates between the periods affected the wages of workers who were over the tax threshold differently than the effect on those below it, these variables should reflect the difference. In addition, we put the results through sensitivity tests that excluded workers whose wages exceeded the tax threshold, and the results did not change meaningfully.

Another factor that may affect workers' wage trajectory is the development of the minimum wage. Changes in this parameter may have a stronger effect on low-wage workers. Since workers who did not save for pension before the arrangement congregated at these income levels, changes in the minimum wage may have affected their wages more strongly than they would those of workers who did contribute. The real minimum wage decreased relative to the national average wage during the investigation period (2007– 2012) but not during the baseline period (2001– 2006). Therefore, we included—in addition to the other wage variables—a dummy variable for workers whose wages in the baseline period were below or around the minimum (approximately NIS 4,000 per month in 2007 prices). If the relevant workers' wages did decrease, in relative terms, as a result of the decline in the minimum wage, this variable should account for the effect. We also performed a sensitivity test on the results by excluding workers whose monthly wage was smaller than NIS 4,000, and the results were unchanged.

Age is yet another variable that may correlate with pre-arrangement pension contributions and the wage trajectory. The proportion of pension savers is lower among young workers than among older ones, and the rate of increase in their wage is higher and may change between the periods. To account for the fact that wages change in different ways at different ages, we included control variables for age and controlled separately for the effect of age among the Arab population. We also included, as a sensitivity check, dummy variables for young workers in various age ranges.

During the investigation period, about one-fourth of workers countrywide were employed in the public sector (general government), where employer incentives are different than

7 The investigation relates to a five-year period because there is no reason to assume that the arrangement would affect wage in the same manner over the years. Although it is a permanent arrangement in which most components were determined immediately upon implementation, institutional rigidities in the labor market may inhibit the adjustment.

8 Since, as stated, there is a high rate of job-switching among members of the relevant group, it may be inferred that the decisions of the specific employer for whom someone worked at the beginning of the period are less relevant for the same employee's situation at the end of the period.

9 Different groups of workers have different tax thresholds. Men and women, for example, have different thresholds, and among women the threshold varies in accordance with the number of children. In the equations, we controlled for number of children and employee's gender; we also estimated the effect on men and on women separately (Table 4 below).

Table 2: Selected characteristics of saving and non-saving employees, 2001 and 2007[a]

	Saved in 2001	Saved in 2007	Did not save in 2001	Did not save in 2007
	(Share of employees in private sector belonging to group)			
Women	0.52	0.51	0.4	0.43
Age (years)	36.34	36.99	33.28	34.24
Immigrated from 1989 onward	0.29	0.28	0.24	0.21
Working spouse (% of married employees)	0.72	0.76	0.62	0.65
Wage (NIS thousand per year)	64.24	68.19	45.32	46.09
Months worked in year	11.13	11.39	9.93	10.34
Single or widow	0.26	0.29	0.4	0.42
Number of children aged 0-3	0.29	0.3	0.3	0.31
Number of children aged 4-18	0.89	0.86	0.78	0.9
Employer with 1-30 employees	0.14	0.14	0.38	0.36
Employer with 30-100 employees	0.23	0.22	0.31	0.3
Employer with 100-1,000 employees	0.4	0.41	0.23	0.25
Employer with more than 1,000 employees	0.23	0.23	0.08	0.09

[a] Employees in the private sector who earned NIS 2,000-9,000 per month, were 22-60 years old (women to age 55) in the baseline year, and worked 5 years later at a monthly wage of at least NIS 2,000 (about half the minimum wage for a full-time position). All data in 2007 prices.

those in the private sector. In particular, there may be a difference between the emphasis on maximizing profits and the inclination to offset from wage the increase in pension costs. Similarly, the public sector introduced comprehensive pension arrangements even before pension savings became mandatory and determined that each worker who remained at a given workplace for a specified period would be included in them. Therefore, only 5 percent of workers who did not save before 2008 were employed in the public sector and the large majority among these few who failed to save were at the start of their employment. For this reason, the analysis that follows pertains to workers in the private sector only.

Examining the characteristics of savers and non-savers in 2001 and comparing them with their counterparts in 2007, we find no perceptible change in the characteristics of workers and their workplaces within each population group, but we do find differences between the populations.[10] As Table 2 shows, the shares of men, the young, singles, low-income individuals, and workers at small employers are larger among non-savers than among savers, although a large range of overlap exists between the groups. Given these differences in characteristics, controls are needed to neutralize effects on wage that may originate in these factors and not in the mandatory pension savings arrangement.

3. Results

The results of the regressions reveal a statistically significant difference between employees who saved in 2007 and those who did not in their rates of wage change (Table 3).[11] This difference is larger—in a statistically significant and economically meaningful manner—than the one estimated in 2001–06. The increase between 2007 and 2012 in the wages of non-savers in 2007 was 7.5 percent smaller than the increase in the wages of those who—together with their employers—were already making pension contributions in 2007. This is a 4.5 percent difference in comparison with the corresponding gap between 2001 and 2006. The difference between the coefficients is statistically significant at the 1 percent level[12] and resembles the rate of the employer's contribution in 2012—4.16 percent (Table 1).

[10] Private-sector employees who did not make pension contributions—with no control for their characteristics—increased their wages by 36 percent on average between 2001 and 2006 and by 40 percent on average between 2007 and 2012. Pension savers boosted their wages by 21 percent and 23 percent, respectively, during these periods.

[11] When the pension saving rates of workers who saved in 2007 (including their employers' contributions) are included in the equations, the variable has no statistically significant effect on the change in wage and its inclusion creates no meaningful change in the coefficients examined here.

[12] The t-statistic for the difference between the coefficients is -5.25.

Table 3: Determinants of change in wage: 2001–06 and 2007–12[a]
Dependent variable: change in monthly wage (percent)

	Regression coefficient for 2007–12	t		Regression coefficient for 2001–06	t	
Individual's characteristics						
Did not save for pension during baseline year	-7.612	-13.73	**	-2.958	-4.27	**
Gender	-20.79	-26.24	**	-19.569	-18.28	**
Number of children aged 0-3	-2.081	-4.51	**	-2.939	-4.87	**
Number of children aged 4-8	-3.14	-7.97	**	-2.971	-5.6	**
Immigrated to Israel after 1988	-7.466	-13.22	**	-5.662	-7.75	**
Income and employment characteristics						
Annual income (NIS '000)	-5.341	-71.8	**	-4.976	-51.87	**
Annual income squared (NIS '000)	0.031	62.44	**	0.03	46.04	**
Annual income lower than NIS 48,000	-8.524	-9.53	**	-9.554	-8.34	**
Employee paid income tax in baseline year	6.238	10.32	**	3.051	3.801	**
Number of places worked during the year	1.658	6.79	**	1.683	5.05	**
Number of months worked during the year	10.021	57.4	**	9.223	42.31	**
Employer size	0.007	6.68	**	0.006	4.9	**
Constant	133.061	24.29	**	149.854	20.59	**
Observations	88,612			67,756		
R^2	0.18			0.13		

[a] The population for which the equations were estimated is defined in the footnote to Table 2. In addition to the variables appearing in the table, the following variables were also included in the regressions: Live in an Arab locality, age, age squared, whether spouse worked in 2007, whether spouse allocated funds for pension in 2007, spouse's monthly wage in 2007, age*Arab, age squared*Arab, spouse's age in 2007, man*married, woman*married, man*divorced, woman*divorced, number of children aged 9–18, number of childred aged 19–25, does employer have up to 15 employees, 15–30 employees, 30–50 employees, did employee change employer between 2007 and 2012. In the equation for the years 2001–06, the data for 2007 were exchanged for data for 2001.
** Denotes that the coefficient is different than zero, and 1 percent significance.

To examine the robustness of the results, we estimated various alternative specifications of the equations. Table 4 compares the outcomes, presenting the coefficients that reflect how non-saving for pension in the baseline year impacts on the change in wage. In all cases, the spreads between the estimated coefficients between 2007 and 2012 are significantly larger than those estimated for the period preceding mandatory saving, and the size of the difference resembles that shown in Table 3. Thus, for example, when the results for 2007–12 are compared with those estimated for 2000–05 or 2002–07, they are not qualitatively affected.[13] When Arab employees are removed from the sample (due to the political and security situation at the beginning of the previous decade, which impaired their wages in 2001-06), the estimated effect of pension savings increased a little. When the equation was estimated for men and women separately, no meaningful difference in the size of the estimated effect was found. When employees whose wages in the baseline year were at the low or the high end of the

[13] As noted above, the 2001–06 period was chosen because it resembles the 2007–12 period in terms of the path of the business cycle. In addition to this rationale, there are other reasons to find the years 2000 and 2007 less suitable for the comparison: the 2000 data relating to pension saving do not totally correspond to the data for the other years and the 2007 data may have been affected already by the mandatory pension arrangement, because the decision to implement the arrangement was discussed and adopted that year.

Table 4: How not saving for pension affects change in wage: alternative specifications[a]

Specification	Coefficient for 2007–2012	Coefficient for 2001–2006	Difference
Baseline regression	-7.61	-2.96	-4.65
Comparison with 2000–05	-7.61	-2.51	-5.10
Comparison with 2002–07	-7.61	-3.12	-4.49
Excluding residents of Arab municipalities	-7.41	-2.51	-4.90
Men	-5.38	-1.11	-4.27
Women	-9.9	-5.43	-4.47
Monthly wage of NIS 4,000–9,000	-4.31	-0.79	-3.52
Monthly wage of NIS 2,000–7,000	-7.48	-3.58	-3.90
Monthly wage of NIS 3,500–6,000	-5.55	-2.14	-3.41
Monthly wage of NIS 3,000–6,000	-6.28	-2.68	-3.60
Without controlling for change of employer during the period	-7.52	-3.07	-4.45
Excluding youth below age 23 in baseline year	-7.17	-2.42	-4.75
And: excluding men over age 57 and women over age 52	-7.49	-2.44	-5.05
With dummy variable for ages 21–26 in baseline year	-7.62	-2.99	-4.63
Comparison between 2001–03 and 2007–09[b]	-4.75	-3.03	-1.72

[a] The equations estimated were identical as those in Table 3; the differences reflect the population regarding which the equation was estimated.
[b] Comparison is only for a 2-year period. The t-statistic for the difference between coefficients is 3.09 (significant at the 1 percent level).

distribution were expunged from the equation, the difference narrowed slightly. Similarly, the results are not sensitive to the removal of the youngest and/or the oldest workers and the addition of a dummy variable for young workers, whose wages rise more quickly than those of older workers.[14] Furthermore, when the first two years of each period are investigated—2001–03 and 2007–09, subperiods in which the unemployment rates rose (Figure 1)—the difference in the average annual rate of increase in wage resembles that found in estimations for the entire period.[15]

We also checked if some of the discrepancies trace to the sectorial composition of the workplaces—or a difference in the occupations—of employees who saved or did not save for pension in 2007. For this purpose, lacking data on the economic sector in which each employee worked, we used data from the Central Bureau of Statistics Social Surveys for 2003, 2007, and 2012 because they included data on employees who made pension contributions. We related to the sectorial distribution of these workers and, on this basis, asked whether a difference exists between the weighted average of the rate of wage increase in sectors that employed savers and the average in sectors that employed non-savers. (The weighted average was calculated on the basis of the share of the various sectors in the employment of the relevant workers.) It was found that wages increased at a slightly faster (and not statistically significant) pace in sectors that employed non-savers. The distribution by professions also yielded no significant difference between the groups.

When comparing the findings about the effect on wage of the arrangement with the added direct cost to the employer, the question arises of how much consideration should also be given to the effect of the severance-pay contribution that, according to the arrangement, must be transferred to pension saving. In our judgment, severance pay has no meaningful implications for the current analysis for several reasons.

[14] The dummy variable shows that the wages of young workers—before and after the arrangement—rise more quickly than those of the older workers. However, its effect on the main variable is negligible because the equations included, ab initio, control variables for age and age squared, as well as variables for the interaction between age and age squared and living in an Arab locality. The results do not change when we include dummy variables for age 30 and below or age 35 and below.

[15] It is not correct to perform a comparison for ensuing years in the 2001–2006 period because rapid economic recovery ensued in 2003, making the state of the business cycle different in those years than in 2007–2009. Similarly, it is improper to compare the years following 2003 with those following 2009 because most employees who had not made pension contributions before the arrangement began to contribute from 2009 onward; therefore, the group comprising those who had not yet begun to contribute is not representative of the population affected by the arrangement.

First, the Severance Pay Law preceded the mandatory pension saving arrangement by years and both groups of workers—those whose employers contributed to their pensions and those who did not—were eligible for severance pay. In other words, even if the depositing of severance pay in a pension-savings plan affects wage, it does not have differential effects on employees who saved for pension before the arrangement and those who did not. Therefore, severance pay should not affect the econometric comparison of the groups of employees. Second, it is unclear how much the mandatory depositing of the imputed severance-pay sum actually adds a meaningful additional cost on employers relative to the pre-arrangement situation. The uncertainty arises because when employers deposit the contribution to an employee's severance pay in a pension saving vehicle, they "insure" themselves against an increase in the employee's wage: whereas severance pay is paid out commensurate with the employee's most recent wage, pension contributions accumulate gradually on the basis of the employee's current wage. Since the average increase in the relevant employees' wage ranges, as stated, from 4 percent to 8 percent per year, the up-front contribution reduces the employer's future liabilities at a rate that resembles the prevailing interest rates. Finally, the authorities have not made it clear, thus far, who is entitled to severance-pay funds in the event that an employee resigns; in many cases, this allows employers to withdraw these proceeds.[16] For this reason, the decrease in the wages of employees who are affected by mandatory pension saving should be compared only with the component of the employer's pension contributions that does not substitute for a severance-pay contribution.

4. Conclusion

The findings above show that mandatory pension saving had the effect of slowing the rate of increase in the wages of employees who were the target group of the arrangement—those who had not saved for pension before—by 4–4.5 percent, similar to the rate of increase in the employer's contribution (4.16 percent in 2012). In other words, the burden of the expanded pension contribution—on both the employee's and the employer's side—was reflected in a decrease in the growth rate of employees' disposable income. Importantly, although the above analysis was performed across a large sample and a broad range of available data, it is based on certain assumptions about the effectiveness of the control variables and the periods compared. For this reason, the results should be interpreted from a qualitative point of view and within the range of sensitivity tests that appear in the analysis. It is also worth noting that when the rate of transfer of the burden from employers to employees is compared with the findings of studies on the effect of taxes and mandatory payments on employees' wages, the outcome here is somewhat larger than the range—between 50 percent and 80 percent—found in the literature.[17] This means that employees who had not saved for pension in 2007 and continued to work through 2014 lost 11 percent of their disposable income due to the arrangement. This statement would appear to be valid also for workers with similar characteristics who joined the labor market after 2007.

Thus, it seems, to assimilate far-reaching long-term programs in the labor market, their objectives should be carefully defined and the totality of their implications, including the market's response to them, should be soberly assessed. Formal determinations of the apportionment of the burden among various stakeholders may affect the results in the near term, but —as the economic forces find expression and shape the programs accordingly--, the programs may yield results that were neither foreseen nor intended by those who instigated them. The mandatory pension arrangement is a case in point: its assimilation did cause the share of employees who save for pensions to rise considerably. In contradistinction to the intention of the arrangement as implied by its formal structure, however, the burden of the program ultimately landed on the shoulders of the workers[18] and was not divided between them and their employers.

Sources

Bank of Israel (2011), Annual Report for 2010.

Brender A. (2010). Influence of the retirement age savings arrangements in Israel on income distribution, *Bank of Israel Survey 84*, pp. 87–123 (in Hebrew).

[16] Longstanding vagueness surrounds the legal entitlement to severance-pay proceeds in the often-encountered event that an employee resigns and withdraws his or her pension savings. Since the entities in charge of the arrangement—the Ministry of Economy and the Commissioner of Capital Markets at the Ministry of Finance—have not clarified the legal situation, many employers take back the funds that they contributed. Furthermore, even when employees resign and do not withdraw their savings, employers often exploit the employees' ignorance of their rights and withdraw the severance-pay funds.

[17] See, for example, Fuchs, Krueger, and Poterba (1998), and Gonzales-Paramo and Melguizo (2009). Brender and Politzer (2014) find that an increase of income tax in Israel causes wage to increase by about one-third of the rate of the tax hike and that net wage declines by about two-thirds. Their investigation, however, covered all employees countrywide whereas the current study deals only with those whose wages rank low on the income-distribution scale.

[18] The disparities between the objectives of the mandatory pension arrangement and its outcomes in other domains are also discussed in Bank of Israel (2011), Annual Report for 2010, Box 6.2.

Brender A. (2011). Implications of mandatory pension for the return to labor, *Economic Quarterly 58* (1/2), 90–119 (in Hebrew).

Brender A. and E. Politzer (2014). The Effect of Legislated Tax Changes on Tax Revenues in Israel. Bank of Israel Discussion Paper 2014.08.

Card D. and M. Ransom (2011), "Pension Plan Characteristics and Framing Effects in Employee Savings Behavior", *The Review of Economics and Statistics* 93(1), pp. 228–243.

Fuchs V.R., A.B. Krueger and J.M. Poterba (1998), "Economists' Views about Parameters, Values and Policies: Survey Results in Labor and Public Economics", *Journal of Economic Literature* 36(3), pp. 1387–1423.

Martin, J., Whitehouse, E., 2008. Reforming Retirement-Income Systems: Lessons from the Recent Experiences of OECD Countries. Working Papers, 66. OECD Social, Employment and Migration.

Gonzales-Paramo, M. and Melguizo (2009), "Who Bears Social-Security Taxes? A Meta-Analysis Approach", Instituto de Estudios Fiscales, 20/09.

Scholz, J., Ananth Seshadri, K., Khitatrakun, S., 2006. Are Americans Saving 'Optimally' for Retirement? Journal of Political Economy. 114, 602-643.

Car scrapping in Israel—lessons and recommendations

- Old passenger vehicles (those manufactured prior to the 1994 model year) are far more polluting and less safe than newer cars.
- There is therefore a clear economic benefit in removing old vehicles from the road through a car scrapping program.
- Passenger vehicle models are becoming safer for passengers, and even for pedestrians, and this process is expected to grow stronger in the next few years. This will increase the economic worthwhileness of scrapping older and less safe passenger vehicles.

1. Background

Between 2010 and 2013, 28 thousand old passenger vehicles were scrapped—removed from the roads—in Israel as part of a program run by the Ministry of Environmental Protection and the Ministry of Transport.[1] In 2013, the program was operated for only one day[2], and in the years thereafter it was not renewed. This review provides an analysis of the economic benefit that would be derived from its renewal.

The car scrapping program is based on two considerations. First, old vehicles cause a relatively high amount of pollution, and therefore a relatively significant amount of damage to public health. Second, old vehicles are more dangerous than new ones because the safety level of vehicle models improves over time. It is therefore apparent that from an economic standpoint, it is worthwhile for the State to purchase old vehicles from residents, take them out of service, and prevent these damages. While it is possible to alternatively act by increasing the fees and taxes imposed on old vehicles, this mode of action requires retroactive legislation, and may also negatively impact the ability of weaker population groups to remain mobile, since for the most part, they are the owners of the old vehicles.

[1] Eleven thousand vehicles were scrapped in 2010, 8,000 vehicles were scrapped in each of 2011 and 2012, and about 1,000 were scrapped in 2013 (numbers are rounded). As stated, the scrapping program relates only to private passenger vehicles. It does not include trucks, busses or two-wheel vehicles.

[2] Basically, the budget was not even full utilized due to concern about an overload of vehicles for scrapping.

Many countries have implemented a program of voluntary scrapping of old vehicles.[3] The motivation for such a program is sometimes environmental (the desire to lower the number of old and polluting vehicles[4]); sometimes it is economic or political (the desire to support automotive industries that have encountered difficulties and to accelerate economic activity in the market); and sometimes it is a combination of both considerations. Economies began instituting the program in 2009, as part of dealing with the global crisis. The automotive industry was negatively impacted by the crisis, and the programs were intended to support it and to create economic incentives for renewing vehicle fleets. A typical program in Europe included the scrapping of vehicles that were at least 10 years old, in exchange for a voucher valued at an average of €1,500 for the purchase of a new vehicle.[5] The overall cost to European governments was €7.9 billion, before administrative costs.

An examination of the result shows that the programs were more effective in both supporting industry and in renewing the vehicles.[6] Scrapping old vehicles also reduced the amount of gas emissions from vehicles in Europe by about 5.8 percent, about four times higher than the average annual decline between 2000 and 2008.[7] Finally, the programs contributed greatly to improving the average safety level of vehicles in Europe, directly leading to the fact that the increase in vehicles with air bags and advanced safety systems as a share of the stock of vehicles in Europe accelerated in 2009.

* * * *

The next section of this survey briefly discusses the estimations used by the Ministry of Environmental Protection and the Ministry of Transport in order to prepare the car scrapping program in Israel.[8] We adopt the estimates made regarding the benefit derived from reduced pollution. But in terms of the estimation that the economy derives only a very small economic benefit from the accompanying improvement in safety, the recalculation presented in Section 3 raises a different result. This is an important result, since the economic benefit of the scrapping program derives, as stated, from a combination of reduced pollution and improved vehicle safety. But while the marginal benefit of less pollution declines over time, the benefit from increased safety is actually expected to increase, for reasons explained below.

2. The car scrapping program in Israel

In 2010, the Ministry of Environmental Protection and the Ministry of Transport begin running a multiyear car scrapping program for private passenger vehicles. The program was to include vehicles 20 years old or older, since the motivation for the program was mainly environmental and since it became mandatory in 1994 to install a catalytic converter on vehicles imported into Israel—a step that reduced vehicular emissions by about 70 percent.[9]

Data on car scrapping collected in 2010—together with data on the volume of pollution caused by vehicles and the volume of traffic accident casualties—were used by the Ministry of Environmental Protection to methodically examine whether the program was economically worthwhile.[10] The methodology of the examination included an estimation of the participation rate of vehicles in a future scrapping program, and an evaluation of the additional scrapping due to the expansion of the program. In order to calculate the benefit from scrapping old vehicles, the researchers summed the reduction in the annual cost of pollution per vehicle (by its emissions) and the reduction in the cost in respect of traffic accidents. In order to calculate the multiyear benefit derived from the program, a discounted coefficient was determined for each model year group that takes into account the number of years by which the scrapping is brought forward. The difference in benefit between the model year

3 A detailed review appears on pp. 9–13 of "Evaluating the Expected Economic Ramifications of Expanding the Car Scrapping Program" (November 2011), a report commissioned by the Ministry of Environmental Protection, Air Quality Division, from the "Pareto Group: Consulting, Control and Strategy".

4 When the motivation is environmental, the program is sometimes accompanied by "green" taxation on new vehicles. See the Bank of Israel's Annual Report for 2013, pp. 174–177.

5 The price of a 2015 Volkswagen Golf in Germany starts at about €18,000.

6 "Assessment of the Effectiveness of Scrapping Schemes for Vehicles—Economic, Environmental and Safety Impacts" (March 2010), HIS.

7 "Monitoring CO2 emissions from new passenger cars in the EU: summary of the data for 2012", European Environment Agency, page 7.

8 See: 1) "Pricing the scrapping of old cars (August 2008), Pareto Engineering Ltd. and the Ministry of Environmental Protection; 2) "Evaluation the expected economic ramifications of expanding the program to encourage the scrapping of old cars" (November 2011), a report commissioned by the Ministry of Environmental Protection, Air Quality Division, from the Pareto Consulting, Control and Strategy Group.

9 EMEP/EEA emission inventory guidebook, 2013, page 33.

10 Evaluation the expected economic ramifications of expanding the program to encourage the scrapping of old cars" (November 2011), pp. 15–22 and 24–28.

groups is derived from emissions data, from the level of distance traveled, and from the number of years by which the scrapping is brought forward, but it should be noted that the gap between the various model year groups was very small. This examination led to an estimate that the annual benefit from reduced air pollution is about NIS 3,300 for an old car, and the benefit from improved safety is slightly less than NIS 200.[11,12]

The number of vehicles actually scrapped was in the end set according the budget allocated for the program—NIS 100 million, and according to the decision to pay vehicle owners a grant of NIS 3,000.[13] In total, about 28,000 vehicles were scrapped[14], as stated, and there are still about 60,000 vehicles on the road that were manufactured prior to 1994.

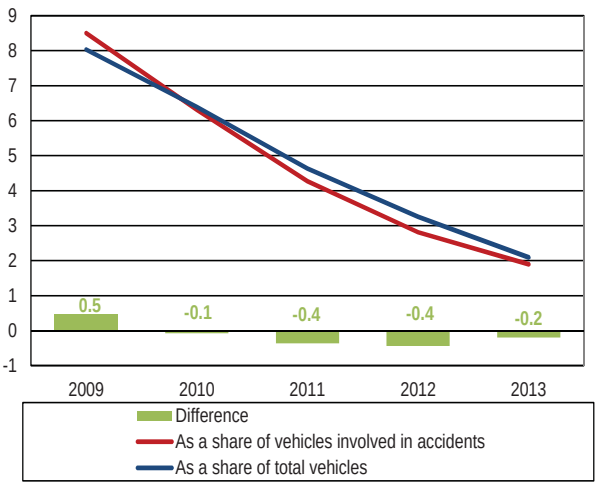
3. Evaluating the effect of scrapping on traffic casualties in Israel

There are three causes of traffic accidents: human error, road conditions, and vehicle characteristics (and the interaction between these factors).[15] We are focusing on the effects of one of the characteristics of the vehicle—its age. The extent of protection afforded by vehicles to their occupants in the cast of an accident increases over time thanks to technological improvements in the area of safety. As such, the scrapping of old cars raises the average level of safety of the vehicles traveling on the roads. However, the calculations made in the past have shown, as stated, that the economy would derive a very small economic benefit from a reduction in the number of casualties or in the seriousness of injury. The calculation we present below provides a different result.

Since the scrapping program compensates the owners of old vehicles, we are interested in quantifying the economic value gained by the economy from reducing the damage caused by traffic accidents, and in obtaining the monetary value of scrapping an old vehicle. Our analysis is based on data collected by the Central Bureau of Statistics on traffic accidents with casualties between 2009 and 2013[16], and it defines old vehicles as vehicles manufactured prior to 1994, in accordance with the Ministry of Environmental Protection's definition.

In the **first stage**, we analyzed data on traffic accidents with casualties and on the amount of vehicles in Israel. We divided the vehicles that were involved in accidents by model year—until 1994 and from 1994 onward—and found that the rate of old vehicles was very similar to their share among total vehicles (Figure 1). In other words, old vehicles and new vehicles have the same likelihood of being involved in traffic accidents with casualties.

Figure 1
Old vehicles[a] as a share of total vehicles in the economy, and as a share of total vehicles involved in traffic accidents, 2009–13



[a] Model year prior to 1994.
SOURCE: Based on Central Bureau of Statistics.

11 "Evaluation of the expected economic ramifications of expanding the program to encourage the scrapping of old cars" (November 2011), pp. 23–24.

12 The examination showed that a scrapping grant of about NIS 7,000 (for cars in which a catalytic converter was not installed) would lead to the scrapping of about 40,000 vehicles manufactured in 1993 or earlier. In other words, according to the estimate, the budgetary cost of the proposal would reach about NIS 300 million, while the economic benefit of reducing pollution would come to about NIS 750. This proposal was not implemented.

13 The prices of five family car models from the 1993 and 1994 model years, as they appear in the used car price list, range around NIS 3,000.

14 In essence, just NIS 87 million of the budget was used, not the full amount (see footnote 2).

15 The factors connected to road conditions are reviewed in Brown, L., R. Sharabany and N. Zussman (2014), "Causes of traffic accidents with casualties on intercity roads in Israel", Discussion Papers Series 2014.04, Bank of Israel Research Department.

16 Traffic accidents with casualties—an accident in which at least one traveling vehicle is involved, in which at least one person is injured, and which the policy are investigating (Traffic accident file). In each year, we combined two files: a file of the individuals involved in traffic accidents, and a file of vehicles involved in traffic accidents. In combining them, we deleted observations of involved vehicles with no vehicle details (9 percent), and we then deleted observations with no data on model year (4.5 percent). There were observations of 31,839 vehicles involved in traffic accidents, 21,765 of which (68 percent) included data on the seriousness of injury—lightly injured, seriously injured, and killed. In addition, we used data gathered by the Central Bureau of Statistics on the number of motorized vehicles by model year (and type). See: Central Bureau of Statistics, "Motorized Vehicles", annual publication, table 7: Motorized vehicles by model year and vehicle type.

Table 1: Distribution of driver's age by vehicle's model year, vehicles involved in accidents with casualties, 2013

Driver's age	Model year: up to 1994	Model year: after 1994
15-24	23.5%	21.9%
25-69	70.9%	74.5%
70+	5.2%	3.6%

SOURCE: Based on Central Bureau of Statistics.

It is important to note that attention should apparently be paid to the human factor and to road conditions as well, since these have, as stated, a marked effect on the likelihood of traffic accidents.[17] However, an assessment of drivers' ages in relation to the accident casualty rate (injured and killed) finds that the similarity between old and new vehicles is sufficiently large that we can ignore the differences (Table 1).[18] The same is true regarding road conditions (urban or intercity road) (Table 2).

Table 2: Distribution of type of road by vehicle's model year, vehicles involved in accidents, 2013

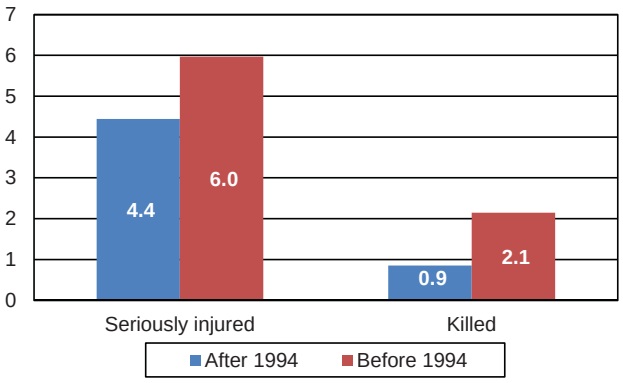
Type of road	Model year: up to 1994	Model year: after 1994
Intercity road	38.6%	33.6%
Urban road	61.4%	66.4%

SOURCE: Based on Central Bureau of Statistics.

It is also important to note that, taking into account the subject of this survey, we must calculate the likelihood of a traffic accident per vehicle, and not per kilometer traveled. The distance traveled on old vehicles is significantly lower than the distance traveled on new ones (ranging between one-third and one-quarter of the distance traveled on new vehicles).[19] Since old and new vehicles have the same likelihood of being involved in an accident, this means that the risk inherent in travel in old vehicles (per kilometer traveled) is much higher. However, this risk is offset by the low distance traveled. There is therefore no reason to examine the likelihood of an accident per kilometer traveled. In order to evaluate the external cost of scrapping an old vehicle, we must examine the likelihood of the car being involved in an accident. Assuming that there is no change in the distance traveled among drivers who exchange an old car for a new one due to the program[20], this estimate leads to a certain downward bias in the evaluation of the benefit of car scrapping.

In the **second stage** we related to vehicles that were involved in an accident and analyzed the seriousness of injury. We found that injuries are more serious with older vehicles. The likelihood of being killed is slightly more than double, and the likelihood of being seriously injured is about one-third more (Figure 2).

Figure 2
Average rate of killed and seriously injured as a share of total traffic accident casualties: Distribution by vehicle's model year, 2011–13



SOURCE: Based on Central Bureau of Statistics.

[17] The human factor includes many components, including cognitive state (fatigue, inebriation, distraction) and driver's training, and is directly responsible for about 60 percent of accidents in the US. See: American Association of State Highway and Transportation Officials" (2010), Highway Safety Manual. We do not have data that would make it possible to divide Israeli drivers by the age of their vehicle or to evaluate whether there are differences between them from these standpoints.

[18] As stated above, the human factor includes additional elements. A comprehensive study of the additional elements and an econometric estimation of them exceed the limits of this survey. Expanding the examination to aged 25–29—a group with a relatively high level of involvement in accidents compared to older population groups—shows that its share of ownership of old vehicles (10 percent) is actually lower than its share of ownership if new vehicles (15 percent).

[19] Central Bureau of Statistics, "Israel Statistical Abstract, 2014", Table 24.14. The average distance traveled per vehicle, by type of vehicle, and by age, type of fuel and total weight.

[20] This is in contrast to the analysis examining the behavior of drivers who replace their vehicle but not due to government involvement. In such a case, it was observed that some of them do so due to an interest or desire to increase the amount of use of the vehicle, and they want to improve safety and save on on-going usage costs. In such a case, the estimate presented is upwardly biased. In contrast, purchasers who do not change their distance traveled as a result of obtaining a newer vehicle reduce the average distance traveled, and the estimate presented is therefore downward biased.

In the third stage we calculated the cost to the economy derived from accidents involving old cars, assuming that the other variables remained fixed. For this purpose, we used a sample of years (2011–2013) and calculated the difference between the expected cost of the seriousness of injury in an accident involving an old car and the same figure for an accident involving a new car. In other words, we multiplied the cost to the economy of an injury of a given seriousness (Table 3)[21] by the likelihood of that injury in old cars and by the likelihood in new cars (Figure 2). We then multiplied the difference of results in each year by the likelihood that an old car would be involved in an accident in that year.[22]

Table 3: Cost per traffic casualty, NIS million (2012 prices)

Seriousness of injury	Cost per casualty
Killed	6.10
Seriously injured	1.53
Lightly injured	0.12

SOURCE: Transportation Project Appraisal Procedure (Nohal Prat), 2012, Page 72, Table 2. This procedure examines the economic worthwhileness of transportation projects.

We found that from a safety standpoint, the cost to the economy derived from leaving an old car on the road is NIS 1,015 per year. If this amount is capitalized a few years forward, we obtain the multiyear cost presented in Table 4. This cost, plus the multiyear cost in respect of air pollution and environmental damage, equals the benefit inherent in early scrapping of vehicles manufactured prior to 1994. The total cost to the economy due to old cars is therefore about 30 percent higher than the cost generated by the earlier calculation.

Table 4 shows that the external costs (pollution and accidents) inherent in maintaining old passenger vehicles are much higher than the market value[23] of these vehicles.

We emphasize that there is a sharp decline in environmental cost for vehicles manufactured after 1993, because the catalytic converter reduces the amount of pollution by about 70 percent. Therefore, the early scrapping of vehicles with a catalytic converter is much less worthwhile than scrapping vehicles without a converter. But the same is not true regarding safety costs, where the inclusion of safety improvements proceeded consistently and there was no sharp change. As a result, there are similar average environmental and safety costs for vehicles manufactured after 1993—about NIS 1000 per year each.

Table 4: The benefit derived from advancing the scrapping of old vehicles[a]

Advancing the scrapping (years)	Multiyear benefit from preventing pollution	Multiyear benefit from reducing the seriousness of accident-related injuries	Total benefit
3	9,517	2,927	12,444
4	12,566	3,865	16,430
5	15,554	4,784	20,339
6	18,485	5,685	24,170

[a] The real interest rate for capitalizing the benefit is 2 percent per year.
SOURCE: Based on "Evaluating the expected economic ramifications of expanding the car scrapping program" (November 2011), a report commissioned by the Ministry of Environmental Protection from the "Pareto" group.

[21] According to the Transportation Project Appraisal Procedure (Nohal Prat), 2012, Ministry of Transport and Road Safety. This procedure examines the economic worthwhileness of transportation projects.

[22] In order to calculate this likelihood, we multiplied the coverage rate of the sample by the rate of old vehicles involved in accidents out of total old vehicles.

[23] See footnote 13.

4. Conclusions

The program for scrapping old passenger vehicles—vehicles manufactured prior to 1994—was implemented in Israel between 2010 and 2013, and was stopped earlier than planned due to budgetary considerations. This survey showed that early scrapping is more worthwhile to the economy than previously estimated, since in the case of an accident, old vehicles are more dangerous to their passengers and to pedestrians than new vehicles. If, in addition to this benefit, we also include the environmental benefit derived from the scrapping program, we obtain a considerable reason for renewing the program.

If the scrapping program is renewed in the future, it is worth considering a graduated pricing structure—increasing the monetary grant from month to month (or from quarter to quarter) by a given amount—because this will make it possible to "cleanse" the market of old vehicles in a more efficient manner. This is because for some of the owners of old vehicles it will pay to scrap them in return for a relatively small amount (for instance, less than NIS 3,000, the amount given between 2012 and 2013). Since the budget for the program is limited and a delay could run the risk of missing the opportunity to scrap the vehicle, they will rush to take advantage of the program in the first few months even at a lower return. Alternatively, the scrapping program can be renewed in a completely different way—through a kind of "manufacturer's warranty".[24] Importers will divert small amounts to a government fund for each new vehicle sold.[25] When the vehicles reach the appropriate age, the fund will purchase them from owners who are interested in selling, and scrap them.

The safety of new vehicle models increases consistently relative to the safety of old models, and this process will not be stopped.[26] From a safety standpoint, the benefit to the economy from early scrapping programs is therefore expected to become more relevant and more important than in the past, since in the foreseeable future vehicles will be equipped with accident prevention accessories, which could increase the economic feasibility of a public policy that will expand scrapping programs to "newer" vehicles as well.

[24] The idea was discussed in the Ministry of Environmental Protection, but did not come to fruition.

[25] By way of illustration, a deduction of NIS 200 per new vehicle means NIS 40 million per year.

[26] In the past, improvements were made mainly to the passive safety of passengers (for instance through steel walls that protect passengers in case their vehicle is hit), but in recent years, the tendency to integrate active safety systems—systems that prevent accidents—has increased. The most advanced safety systems do not protect only the vehicle's passengers, but also pedestrians that it may hit. (Pedestrians constitute about one-third of those killed in traffic accidents.)

Capital market estimates of inflation expectations in Israel and abroad

Annual inflation in Israel has declined since the beginning of 2014. Starting in mid-2014, it has ranged below the inflation target range of 1–3 percent, and it recently even reached a level of negative 0.2 percent. The downward trend in inflation is not unique to Israel, but is a worldwide phenomenon that has raised concerns of deflation, mainly in Europe. To assess the depth of the phenomenon, central banks commonly examine estimates of expected inflation over the long term. For the most part, these expectations are anchored around the central bank's inflation target, since in the long term, the central bank is supposed to be able to return inflation to the target. If long-term expectations still deviate significantly from the inflation target, it may indicate a loss of confidence in the inflation target regime managed by the central bank. However, before concluding that there has been a change in the credibility of the inflation target, the possibility that other factors could explain the deviation must be considered. In particular, other components that are imbedded in the expectations estimates and could vary over time should be examined, mainly the liquidity premium and the inflation risk premium.

This survey presents two estimates derived from the capital market and uses them to examine the recent declines in inflation expectations in Israel and abroad. In Israel and the UK, there were moderate declines in these estimates in recent months, with their level indicating stability in expectations. In contrast, there was a significant decline in expectations in the US and Europe, with expectations in Europe declining to below the inflation target (2 percent). The declines in Europe are consistent with the standstill in the European economy, but the sharp declines in the US are not consistent with the improvement in the US economy. The common explanation among policy makers in the US and Europe is that the declines are partly the result of changes in biases inherent in estimates of expectations, and it is therefore possible that they do not indicate a deterioration of confidence in the

inflation target regime.[1] Our findings support the hypothesis that the decline in the US and Europe was affected by a decline in the inflation risk premium. Furthermore, we find that the decline in Europe was also affected by an increase in the spreads between the liquidity premium on nominal bonds and the liquidity premium on CPI-indexed bonds. These findings support the assessment that not all of the recent declines in the estimates can be attributed to a decline in inflation expectations.

The estimates

In order to estimate inflation expectations for the long term, central banks generally use two estimates derived from the capital market. The first is based on the spread between yields on nominal bonds and yields on inflation-indexed bonds, and is referred to as the breakeven inflation rate (BEIR). The second is taken from the derivatives market: the inflation rate quoted in forward transactions on the CPI. These transactions are referred to as zero-coupon inflation swaps (ISwaps), in which one side (which receives the inflation payments) commits to pay a fixed amount (the swap rate) in exchange for a payment at the level of the accumulated inflation until the contract's expiry.[2] Long-term expectations are usually examined with estimates of inflation expectations for the five-year, five-year-forward horizon, meaning estimates of expected inflation from the sixth year to the tenth year. The forward rate gives a more precise estimate of long-term expectations, since it is not supposed to be affected by short-term shocks to inflation.

Figure 1 shows the two estimates of long-term expectations in the eurozone, the US and the UK, and the BEIR in Israel. (In Israel, the market for long-term CPI contracts is in its infancy and does not allow for credible estimates of inflation expectations.) We can see that, for the most part, the BEIR and the ISwaps correspond closely, although their level is not always identical. (In the eurozone and the UK, the correlation coefficient between them is 50 percent, and in the US it is 70 percent.) There is also a marked downward trend in the estimates that began in the second half of 2014, mainly in the US and the eurozone. The decline in the US is surprising because indicators of real activity point to continued improvement in the economy. However, the level of estimates remains close to 2 percent. In the eurozone, in addition to the downward trend in estimates, their low level is also prominent, and in recent months, the estimates are significantly below the ECB's long-term target of 2 percent. In Israel as well, the BEIR declined starting in the second half of 2014, to a level close to 2 percent—the midpoint of the inflation target range.

Biases in the estimates

The two estimates are affected by the characteristics of their underlying financial instruments, which bias the estimates. Since some of the biases are common to both estimates and some are characteristic of just one, central banks prefer to examine estimates of inflation expectations from a variety of sources. The following is a short discussion of the main biases of market-based estimates of inflation expectations.[3]

Inflation risk premium: This premium compensates the purchasers of nominal bonds for the uncertainty surrounding future inflation levels. It is commonly assumed that this premium is positive and therefore biases the price of nominal bonds downward, and causes an upward bias in the BEIR. ISwaps also contain an inflation risk premium—the same premium as in nominal bonds, which causes a deviation in the same direction. It should be emphasized that the inflation risk premium can obtain a negative value. This happens when investors expect that a downward surprise in inflation will be accompanied by a downward surprise in growth, since in such a scenario, the nominal bonds are expected to pay a higher yield in real terms than real bonds. In other words, nominal bonds provide insurance against unexpected low growth.

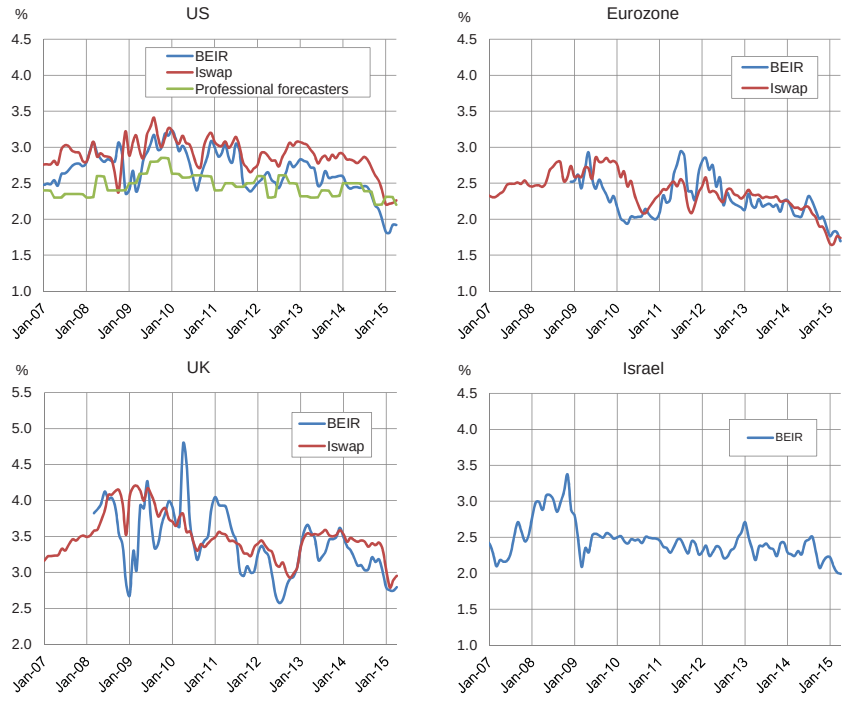
Liquidity premium on government bonds: It is common to assume that assets with low liquidity compensate their holders. In most of the reviewed countries, the indexed bond market is less developed than the nominal bond market—a market that is considered very liquid. The yields on indexed bonds are therefore expected to include higher compensation than the compensation included on nominal bonds, and this should lower the BEIR. Studies on the US

[1] At the meeting held by the Federal Open Market Committee (FOMC) in December 2014, members discussed the decline in estimates of long-term expectations, and raised the hypothesis that it derives at least partly from a decline in the inflation risk premium and from changes in liquidity premiums. This hypothesis was based on the Fed's estimations for the premiums and on the stability of professional forecasters' projections (Federal Reserve, Minutes of the Open Market Committee, December 16–17, 2014). The European Central Bank (ECB) attributed part of the decline in Europe to an increase in the supply of bonds indexed to European inflation, and raised the possibility of a negative inflation risk premium. The ECB also noted that the professional forecasters' projects remained close to 2 percent (ECB, Economic Bulletin, March 2015).

[2] More information appears in Barclays (2014), "Global Inflation-Linked Products: A User's Guide".

[3] Other factors bias expectation estimates, but they are of negligible size. More information appears in Kerkhof (2005), "Inflation Derivatives Explained: Markets, Products and Pricing", Lehman Brothers.

Figure 1
Five-Year, Five-Year-Forward BEIR and ISwap Quotes, Monthly Averages, January 2007 to April 2015



SOURCE: Israel—The Bank of Israel's zero-coupon curves. Foreign countries—Bloomberg and authors' calculations. We calculated the Eurozone's BEIR as the GDP-weighted average of the BEIR in Germany and France. US data are based on the yield curves generated by the Federal Reserve.

market show that the difference in compensation was quite large at the beginning of the 2000s (about 1 percent) but declined significantly in recent years. Furthermore, during periods of financial crisis, such as the global financial crisis of 2008, the compensation gaps increased significantly.[4] It is important to note that empirical studies conducted in the US showed that a lack of liquidity in indexed bonds affects the ISwaps less than it affects the BEIR.[5]

The structure of the ISwaps market: In this market, demand for inflation payments is greater than the supply. This is due to the fact that other than governments that issue debt indexed to inflation, there aren't many other entities that offer indexed payments. Therefore, those purchasing inflation are willing to pay a premium to those selling inflation, and this premium biases the estimate derived from ISwaps upward.

Table 1 summarized the main biases in BEIR and in ISwaps, and their directions. It shows that the ISwaps estimates deviate downward relative to the BEIR, and this is apparent in Figure 1, particularly in the US.[6]

Table 1: Biases in BEIR and ISwaps and their direction

	BEIR	ISwaps
Liquidity premium	↓	-
Risk premium	↑	↑
ISwaps market structure	-	↑

A single arrow indicates the direction of the bias. A dash indicates no bias.

Examining the declines in expectation estimates

Below we examine whether the changes in the liquidity premium and in the inflation risk premium may explain some of the declines.

4 A discussion of the liquidity premium appears, for instance, in Fleckenstein, et al. (2014), "The TIPS-Treasury Bond Puzzle", *Journal of Finance*. A study on the inflation risk premium appears, for example, in Grishchenko and Huang (2012),"Inflation Risk Premium: Evidence from the TIPS Market", Federal Reserve Working Paper.

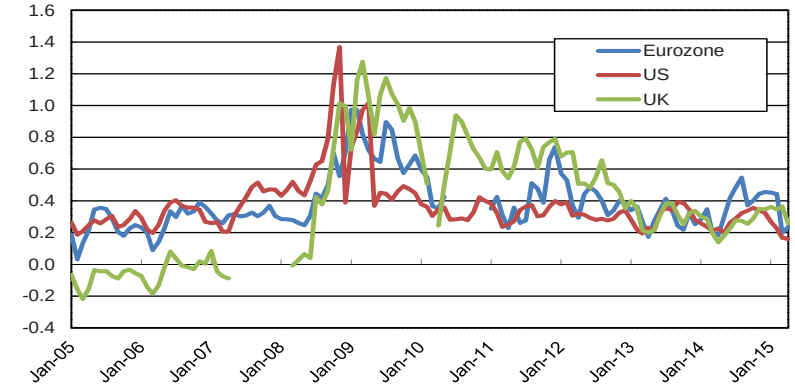
5 See, for example, Haubrich, et al. (2012), "Inflation Expectations, Real Rates, and Risk Premia: Evidence from Inflation Swaps", *Review of Financial Studies*.

6 In Europe, the deviation is not reflected throughout the period due to the thin trading of indexed bonds. This makes it difficult to extract the real yield that corresponds to the ISwaps' maturities.

The gaps in the liquidity premium

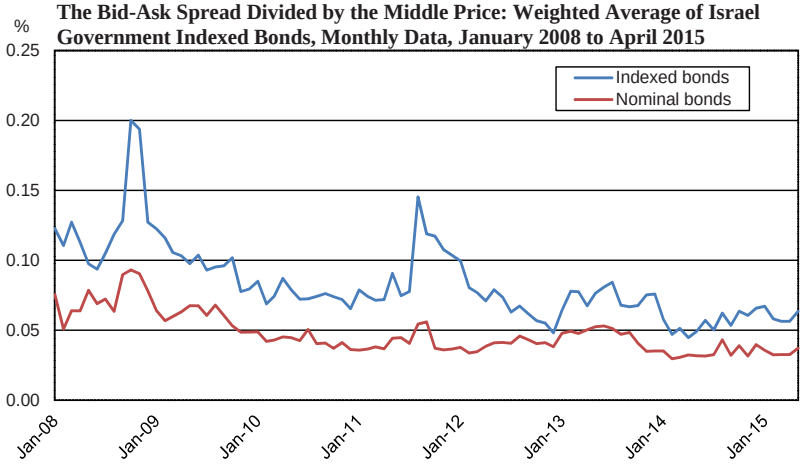
Since the gaps between the liquidity premium on nominal bonds and the liquidity premium on indexed bonds cause the BEIR to deviate from ISwaps, changes in the premiums will be reflected in the gap between the two estimates. Therefore, in order to examine whether the recent declines can be the result of such changes, we examine the gap between the ISwaps and the BEIR over five-year horizons in the US, the UK, and the eurozone.[7] We compare the recent period to previous periods for which it is known that the indexed bond market was characterized by illiquidity (Figure 2). Two such periods are prominent in Figure 2—the global financial crisis of 2008 that broke out against the background of the bankruptcy of the Lehman Brothers investment bank, and the European debt crisis that began at the end of 2011. During those two periods, there was a large gap between the two expectation estimates. In contrast, in recent years there has

Figure 2
The Gap Between Five-Year (Spot) ISwap and BEIR for US, UK and Eurozone, Monthly Averages, January 2005 to April 2015



SOURCE: Bloomberg and authors' calculations. We calculated the Eurozone's BEIR as the GDP-weighted average of the BEIR in Germany and France. US data are based on the yield curves generated by the Federal Reserve.

Figure 3
The Bid-Ask Spread Divided by the Middle Price: Weighted Average of Israel Government Indexed Bonds, Monthly Data, January 2008 to April 2015



SOURCE: Bank of Israel.

[7] We chose to look at the spread between ISwaps and the BEIR for five years, and not at the spread between the forward rates, since the forward spread in Europe is also affected by technical factors. See footnote 6.

been relative stability in the gap, at least in the US and the UK, and it is therefore unlikely that the decline in estimates there resulted from changes in the liquidity premium. The gap in the eurozone reached relatively high levels in 2014, which may indicate a bias in expectation estimates during that period. In other words, it is possible that the decline in Europe derived partially from an increase in the liquidity premium gaps—meaning a relative worsening of liquidity in indexed bonds. It is worth noting that in the first quarter of 2015, there was a decline in this gap with an increase in estimates of inflation expectations.

In Israel, as noted, there are no futures contracts on inflation, and another method must therefore be used to examine the liquidity gaps in the government bond market. One of the estimates of illiquidity is the bid-ask spread in the bond market: A large spread indicates a lack of liquidity in the market. An examination of this indicator in the Israeli bond market shows that the estimate of illiquidity in the indexed bond market is always higher than the estimate in the nominal bond market (Figure 3). It also shows that during the global financial crisis and during the European debt crisis, there was a sharper decline in liquidity (meaning a sharper increase in the bid-ask spread) in the indexed bond market, which indicates a downward deviation of the BEIR during those periods. In contrast, there has recently been relative stability in the liquidity estimates, and it is therefore unlikely that changes in liquidity are what contributed to the declines in the BEIR in Israel.

The inflation risk premium

As noted, some attribute the declines in the estimates of inflation expectations to the decline in inflation risk premiums.

One way to examine the magnitude of this bias is to compare expectations from the capital market to professional forecasters' inflation projections, since these forecasts do not include compensation for a lack of liquidity or for inflation risk. However, it should be noted that other factors may affect the gap between forecasters' projections and the estimates from the capital market. For instance, if the risk of deflation increases but the likely scenario is that long-term inflation will remain at the center of the target range, it is possible that the forecasters will not rush to change their projections. In contrast, expectations derived from the capital market are more sensitive to changes of this type, and they may change.

While the professional forecasters' projections in the US declined, they did so to a smaller extent than the forecasts derived from the capital market (Figure 1). As noted, it seems that the liquidity premium in the US did not significantly change during the recent period, and the change in the gap between market-based estimates and forecasters' projections can possibly be attributed to a decline in the inflation risk premium[8] and to an increase in the likelihood of deflation.

Regarding Europe, according to ECB reports, forecasters' projections of five-year, five-year-forward inflation remained stable around 2 percent in the first quarter of 2015, and ISwaps data remained at the low level of about 1.6 percent (with some recovery).[9] Therefore, in Europe as well, a decline in the inflation risk premium combined with a decline in the liquidity premium and an increase in the likelihood of deflation may explain the decline in estimates.

Conclusion

Estimates of inflation expectations include other factors, in addition to expectations, that create a gap between expectations and the estimate, and may change over time. Therefore, changes in estimates do not necessarily reflect a change in inflation expectations. Since it is not possible to directly estimate the biases, it is difficult to identify the expectations themselves. However, we can examine the changes in biases by comparing the various expectation estimates or by examining other indices that are affected by those biases. This type of analysis shows that it is likely that the recent declines in expectation estimates in Europe and the US resulted partly from declines in liquidity premium gaps, declines in inflation risk premiums, and a decline in inflation expectations. Regarding Israel, the estimate of long-term expectations declined relatively moderately. This decline is not the result of changes in the liquidity premium, but we cannot assess whether some of it is the result of a decline in the inflation risk premium.

8 The Federal Reserve's Monetary Policy Report for February 2015 notes that the models used by the Fed indicate that the inflation risk premium declined from mid-2014, but this does not explain the entire decline in estimates of inflation expectations (Board of Governors of the Federal Reserve, Monetary Policy Report, February 2015, pp. 12-13).

9 Data on the long-term forecasts by professional forecasters in Europe are published in the ECB's monthly report (see reference in footnote 1). In Israel and in the US, the professional forecasters do not publish long-term inflation forecasts at all.