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ISRAEL

SELECTED ISSUES

May 2018

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ISRAEL

SELECTED ISSUES

April 13, 2018

Approved By
The European Department

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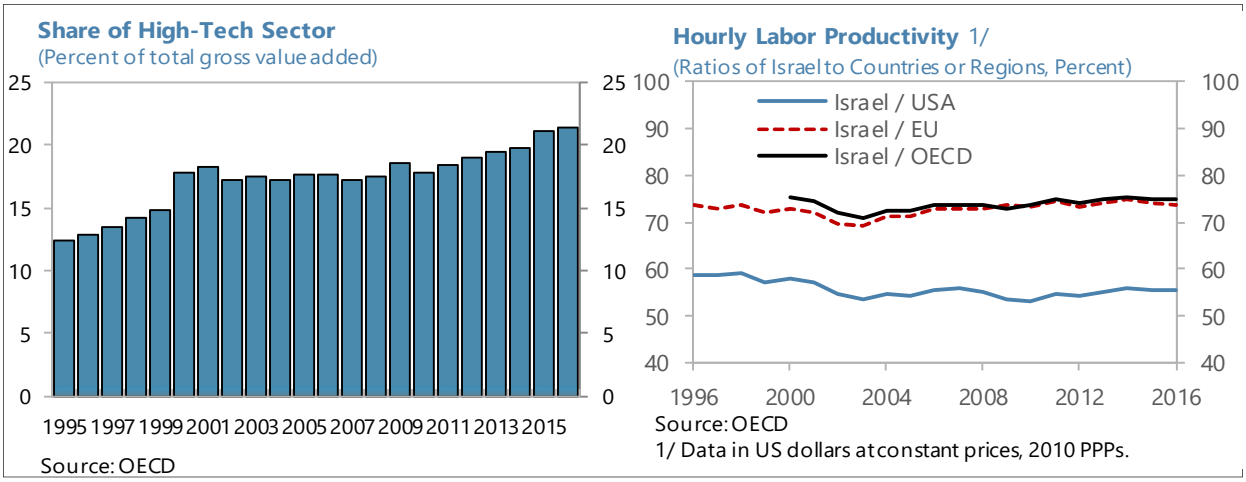
CONTENTS

UNLEASHING ISRAEL'S POTENTIAL: IS BOOSTING PUBLIC INVESTMENT THE ANSWER? [1]

Israel can be characterized as a dual economy, that is well known for its dynamic high-tech sector, but the remainder of the economy has relatively low productivity. One of the factors weighing on Israel's labor productivity are its sizable infrastructure needs, which may also hinder the labor participation of some groups. To address this issue, the authorities are preparing a long-term strategy to support higher infrastructure investment. This paper analyzes the macro-fiscal implications of an increase in infrastructure spending, taking into account Israel's dual economy character.

A. Israel's Infrastructure Needs

1. Israel's labor productivity is low and the gap with peers persists. Israel's high-tech sector is famous for startups, but it also includes R&D centers of many major technology companies. The high-tech sector currently comprises around 21 percent of gross value added, up from 12½ percent in 1995. Despite the strong performance of this sector, Israel's overall labor productivity rose by only ¾ percent annually in recent decades, leaving its sizable productivity shortfalls virtually unchanged.

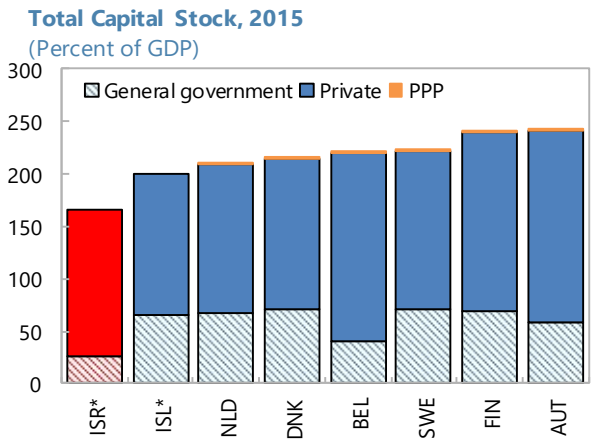


2. Israel's capital stock ratio has declined steadily to be among the lowest in advanced economies. Israel's total capital stock is estimated to be around 170 percent of GDP,[2] which is lower than a peer group of small European countries (left figure below). Following a surge in construction to absorb half a million immigrants from the former Soviet Union, total investment—both public and private—has been declining since the early 1990s. The reduction of public investment, from around three percent of GDP in the second half of the 1990s to less than two in recent years, was part of the fiscal consolidation process. But the amount and quality of infrastructure development was also

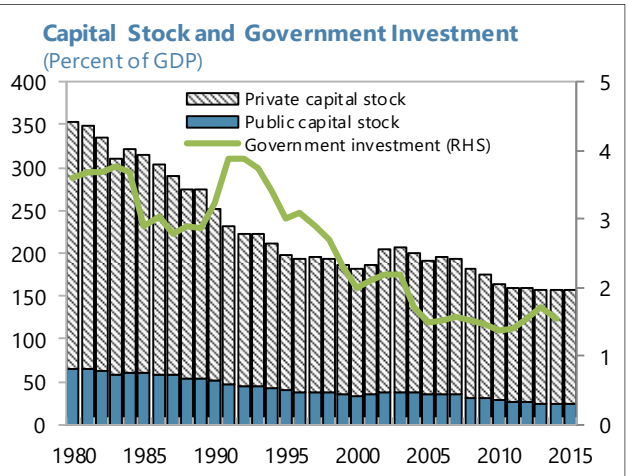
[1] Prepared by Aiko Mineshima and Vina Nguyen (all EUR). The chapter benefited from comments and suggestions from Giovanni Melina (RES) and colleagues from the Bank of Israel and Israeli Ministry of Finance.

[2] IMF estimate. The capital stock is estimated with the perpetual inventory method. The public capital stock does not include capital transfers to state-owned enterprises for investment purposes.

affected by issues with public investment management, the lack of land registries in the Arab towns, and the regulation of network industries.[3]

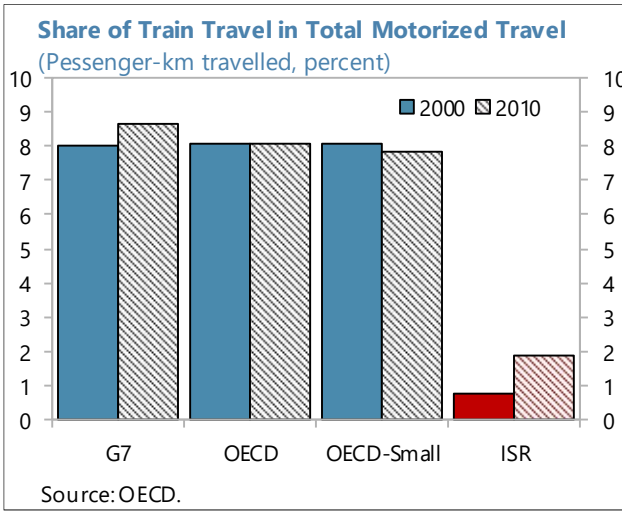


Source: "IMF Investment and Capital Stock Dataset, 2017"
Note: Data on PPP are not available for countries with "*."

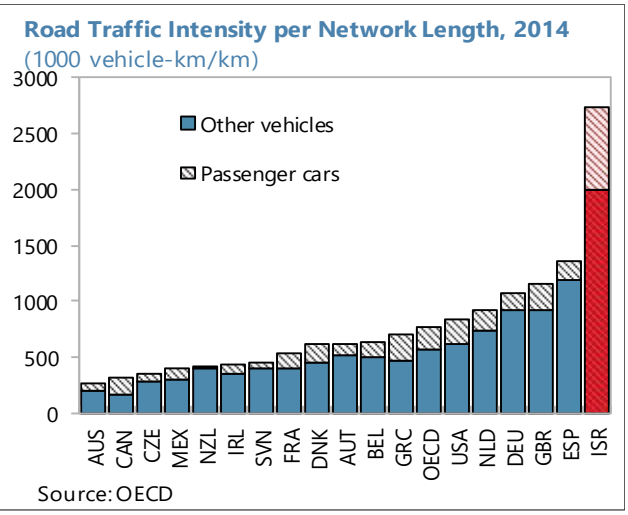


Source: "IMF Investment and Capital Stock Database, 2017"

3. The infrastructure need is especially large in the transportation sector. Cross-country benchmarks suggest a public infrastructure gap of around 35–40 percent of GDP. A more granular sectoral analysis of infrastructure needs recently conducted by McKinsey & Company finds a gap of around 20 percent of GDP. In particular, the public transport infrastructure in major cities is clearly inadequate for Israel's income level, failing to meet the needs of a growing population concentrated in the urban areas of central Israel. For example, the share of train travel in total motorized travel was only two percent in Israel, compared to eight percent in the OECD or OECD small states. Moreover, public transport does not operate during weekends and religious holidays, creating a strong incentive to own private vehicles. As a result, Israel's road traffic intensity per network length is by far the highest in OECD. Traffic congestion was causing an average loss of 60 minutes per road-user per day in 2012, weighing on productivity, with an estimated cost to the economy amounting to 1.5 percent of GDP in 2012.



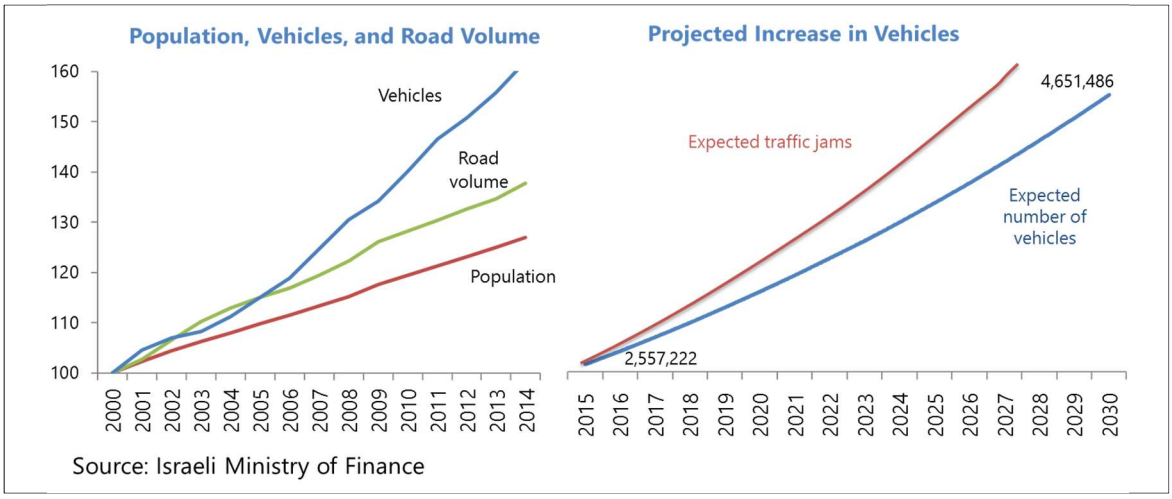
Source: OECD.



Source: OECD

[3] OECD (2018).

4. Prospects are for congestion to worsen. Since the mid-2000s, the expansion of Israel's car ownership has substantially outpaced population growth and the increase in road volumes. Yet, Israel's car ownership rate remains low relative to its per-capita income, suggesting that the number of vehicles in Israel may well continue to rise rapidly in the coming years. As a result, congestion will likely continue to increase even with further road expansion, partly due to physical limits on major roads.



5. To address these large infrastructure needs, the government is developing a multi-year strategy for a lasting boost in infrastructure investment. A government committee is developing an integrated long-term national infrastructure strategy through 2030 ("Infrastructure 2030"), while also preparing a list of additional projects for implementation for the next five years. Although the size and modalities of scaling up public investment is yet to be decided, the government has a strong preference to undertake infrastructure projects in a form of Private Finance Initiative (PFI) or Public Private Partnerships (PPPs). This plan is expected to succeed the ongoing five-year infrastructure program for 2017–21, "Investment for Growth," which supports the development of transport, education, social services, and housing. The total cost of "Investment for Growth" totals NIS 107 billion (8.5 percent of the 2017 GDP), of which NIS 41.6 billion is expected to be financed by the budget and the rest by tariffs, public private partnerships (PPPs), and the private sector. Infrastructure 2030 is expected to target a denser network of urban rail transport, including underground lines in Tel Aviv, a high-speed link between Tel Aviv and Eilat, and new airports in the north and south of the country. Moreover, Infrastructure 2030 is expected to be accompanied by "Employment 2030," which aims to boost the employment of population subgroups and their productivity, such as by enhancing technological and vocational education.

6. This paper analyzes the macro-fiscal implications of raising public investment. A dynamic stochastic general equilibrium model called DIGNAR (Debt, Investment, Growth, and Natural Resources) is adapted for this analysis. Section B introduces this model and discusses key modifications made for its application to the Israeli economy. Section C uses the model to analyze the macro-fiscal implications of boosting public investment under various scenarios of investment efficiency, financing options, and labor participation and productivity. Section D summarizes key findings and policy recommendations.

B. Adapting the DIGNAR Model to Israel

7. The paper uses a dynamic stochastic general equilibrium model for a small open economy with real variables. Our analysis largely relies on the Debt, Investment, and Growth for Natural Resource (DIGNAR) model, with the steady-state values and structural parameters calibrated for Israel (Annex I).[4] This model has the following key features:

- Comprises three economic entities: (i) households (the spending of a portion of households is subject to a liquidity constraint while the remainder are only subject to their intertemporal budget constraint); (ii) firms (a nontradable goods sector, a non-high-tech tradable sector, and a high-tech tradable sector); and (iii) the government.

- Covers a relatively long horizon and abstracts from money and nominal rigidities.

- Provides various financing options for the government: e.g., tax increases, tax benefit reductions, spending cuts, and debt financing.[5] Implementing public investment in a PFI or PPP framework may not immediately raise government debt, yet it increases the government's liabilities (or contingent liabilities). We, therefore, assume that all the additional public investment that is not financed by revenue measures or spending cuts is financed by higher deficits and debt.

- Explicitly allows for the crowding-in and crowding-out effects of public investment:

    - Public investment can crowd in private investment as public capital enters the production function and increases the returns on private investment. In the non-high-tech tradable sector, higher public capital and hence higher output can also raise total factor productivity in the subsequent period via a "learning-by-doing" channel.

    - Public investment can also crowd out private investment and private consumption by raising real wages, the real exchange rate, real interest rates, and the sovereign risk premium, which also affects firms' external borrowing costs.[6]

- Incorporates the implications for the efficiency of public investment spending from the pace of scaling up public investment.

[4] See Melina, Yang, and Zanna (2016) for technical details of the model.

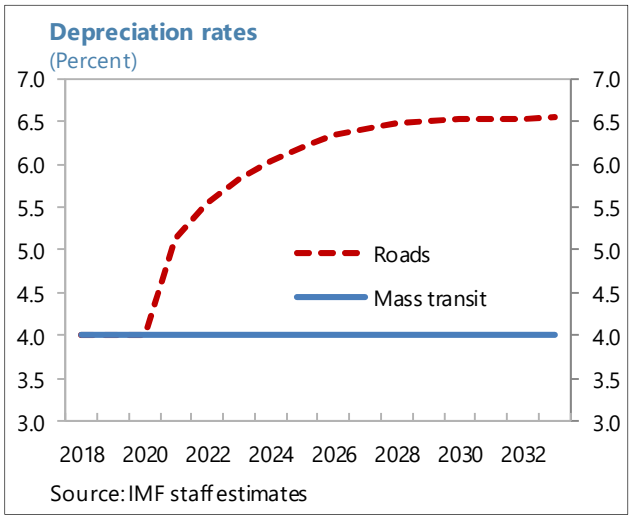
[5] Several studies (e.g., Barro 1990, Sala-i-Martin 1995, Futagami et al. 1993, Glomm and Ravikumar 1994, and Hodge 2016) analyze the growth impact of public investment in the context of endogenous growth models, but they assume government balanced budget rules (or for the case of Hodge (2016), the primary balance is imposed to maintain public debt at sustainable levels). Others (e.g., Turnovsky 1990, Greiner et al. 2000, and Greiner 2007) incorporate government debt in their endogenous growth framework, but do not allow for different financing schemes and ignore the role played by the structural and policy conditions for debt sustainability.

[6] We assume a small elasticity of sovereign risk premium (0.001) given Israel's access to international capital markets and moderate level of debt, which is slightly smaller than the Bank of Israel (BoI)'s finding (0.005 before the global financial crisis and 0.007 after the crisis). Simulations results, however, virtually do not change with the BoI elasticity.

8. We adapt features of the original DIGNAR model to better reflect the Israeli economy:

- **The natural-resource sector is replaced with a high-tech sector**. In DIGNAR, the resource sector facilitates the analysis of issues such as using revenues from exhaustible resources to develop domestic infrastructure and diversify the economy to facilitate continued growth after the resource is depleted. Despite significant gas discoveries, Israel's resource sector is not sufficiently large to warrant such analysis. In contrast, the high-tech sector is sizable and its rapid growth does not appear to have been significantly impeded by domestic infrastructure needs. In another parallel to a resource sector, strong high-tech exports have supported Israel's current account and an appreciation of the shekel over the past decade, implying that growth of the high-tech sector could contribute to "Dutch-disease;" indeed, the share of Israeli goods exports in global goods trade has declined notably. In the model, we assume the high-tech sector to grow independently by 4.7 percent annually, faster than the 2.5 percent rate in the rest of the economy, which leads to overall growth of three percent annually with some real exchange rate appreciation. The high-tech sector also has a lower effective tax rate (we assume four percent of high-tech GDP), therefore an increase in the share of high-tech sector in the economy reduces the effective tax rate for the total economy.[7]

- **Dynamic depreciation rates for roads**. The allocation of investment between roads and mass transit is of interest in the case of Israel, requiring some differentiation of their contribution to economic performance in the model. A study finds that the economic rate of return of public infrastructure is on average higher for roads and highways compared to railways and underground transit. But, other literature finds that road-building disproportionately benefits vehicle-intensive industries, and while interstate highway networks offer a one-time productivity increase, gains from other roads are limited. This suggests that the rate of return of roads may initially be high, but it eventually declines below that of mass transit. In the Israeli context, assuming vehicle ownership continues to rise in line with per-capita income while there are physical limits on expanding major roads, congestion will likely continue to rise, eventually triggering a rise in road depreciation rates.[8] We therefore assume that mass transit offers lower initial



[7] Lower tax rates on the high-tech sector are motivated by the high mobility of capital in this sector in the long run.

[8] Fernald (1999) models average congestion as the ratio of road stock divided by some measure of road use. Barro and Sala-i-Martin (1995, p.158) suggest that aggregate output or private capital are good proxies for congestion in a model with long-run growth.

rate of return with a constant depreciation, while roads offer a higher initial rate of return but with faster depreciation rates once per-capita GDP exceeds a pre-determined threshold: [9]

$$the\ elasticity\ of\ output\ to\ investment\ (\alpha_g) = \begin{cases} 0.15 & for\ mass\ transit \\ 0.21 & for\ roads \end{cases}$$

$$the\ depreciatoin\ rate\ for\ roads\ \delta_t = \begin{cases} \bar{\delta} & if\ \frac{y_t}{y_{ss}} - 1 \leq \bar{C} \\ \bar{\delta} + \phi\left(\frac{y_t}{y_{ss}} - 1\right) & if\ \frac{y_t}{y_{ss}} - 1 > \bar{C} \end{cases}$$

Where $\bar{C}$ is assumed to be 0.01, which means that depreciation starts to accelerate when output increases by more than one percent from its steady state; ϕ is the elasticity of congestion to output growth, which is assumed to be 0.8.

C. Macro-Fiscal Implications of Boosting Public Investment

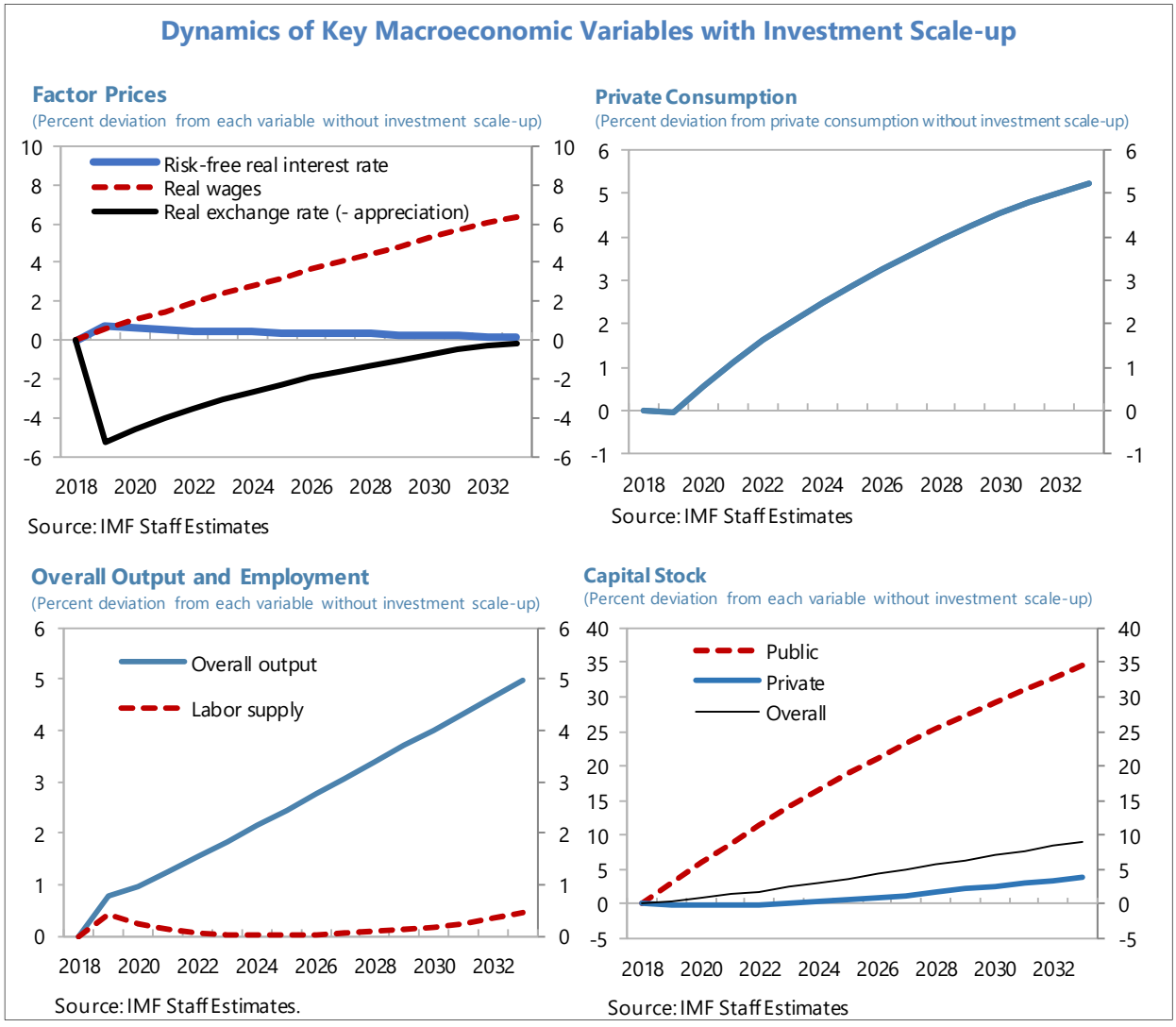
9. This section describes macroeconomic dynamics in response to increases in public investment under DIGNAR, and discusses key factors shaping the impact on output and debt. The scale and pace of increasing public investment under Infrastructure 2030 is yet to be decided. For illustrative purposes, the simulations assume an increase in public investment by 1.5 percent of GDP per year—from two percent of GDP to 3.5 percent of GDP per year—over the next 15 years. Such a scenario is roughly the minimum consistent with addressing a public infrastructure need of 20 percent of GDP, and it is not out of line with historical levels of public investment. Key factors that shape the impact of public investment on output and debt include the efficiency of investment, the type of financing used, the pace of capital depreciation, the pace of increasing public investment, and the magnitude of spillovers to labor participation and productivity. The simulation results are presented as deviations from the steady state in which public investment remains at two percent of GDP per year, growth in the non-high-tech sector at 2.5 percent, and overall growth at three percent. The government's current spending is assumed to grow at the same rate as output.

Baseline Results

10. In the DIGNAR model calibrated for Israel, an increase in public investment could initially crowd out private spending, but then gradually stimulates higher output and private investment. Assuming all the additional public investment is financed by higher deficits, the immediate impact of higher public investment is a rise in interest rates which leads to some initial small crowding out of consumption and private investment, resulting in a transitory decline in the private capital stock. There is also an immediate appreciation of the real exchange rate which

[9] In principle, roads and mass transit could be modelled as complementary capital inputs in a production function, but this was not feasible within DIGNAR.

unwinds gradually over time. Aggregate output benefits from the accumulation of public capital, together increasing labor supply (in the form of hours worked) owing to real wage increases.[10] These developments increase the return on private capital over time, so there is a crowding-in of private capital with some time lags, which also supports growth. By the end of the projection period, public capital is above that without investment scale-up by 35 percent, private capital by four percent, output by five percent, and labor supply (hours worked) along the intensive margin by one percent.



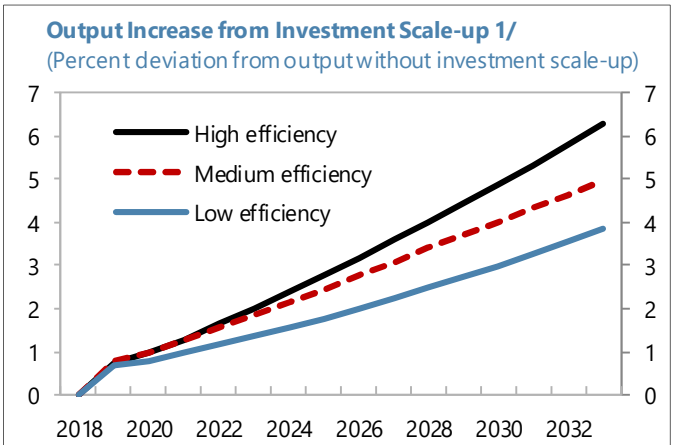
Efficiency of Public Investment

11. The efficiency of public investment is the proportion of investment spending that is actually turned into an increase in public capital. For example, an efficiency rate of 85 percent indicates that 85 cents out of one dollar invested turns into public capital. Based on the literature,

[10] The degree of response is governed by the elasticity of labor supply to income (so-called "Frisch elasticities"), which is assumed to be different between households with and without liquidity constraints.

the baseline scenario assumes an efficiency level of 85 percent (medium). We also consider high and low scenarios with efficiency of 95 and 75 percent, respectively.

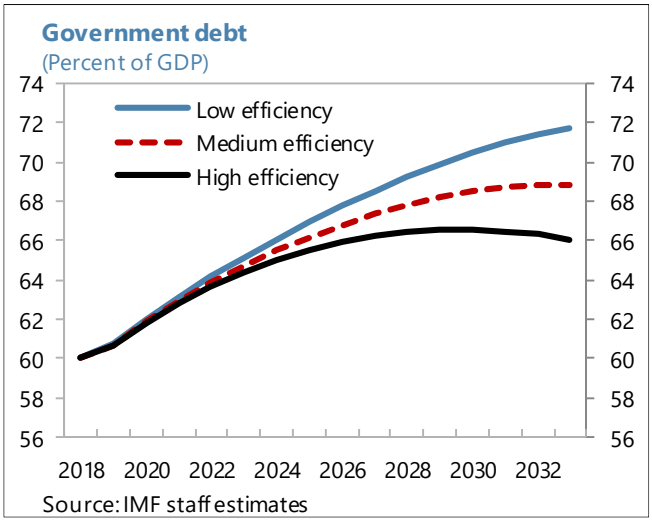
12. Growth benefits from public investment depend importantly on investment efficiency. At the end of the 15-year period of higher public investment with medium efficiency, the output gain relative to baseline is five percent, with the stock of public capital raised by 35 percent from baseline, private capital above by 10 percent, and labor supply up by one percent. Meanwhile, the end-period output with the high- and low-efficiency rate is 6.5 percent and four percent above baseline respectively, because (i) efficiency affects the stock of public capital at the end of the period, which increase by 44 and 25 percent respectively, and (ii) the crowding in effect is stronger with high efficiency, with private capital rising five and three percent respectively from baseline.



Source: IMF staff estimates.
1/ The additional real output when investment increases by 1.5 percent of GDP per year over 15 years under different efficiency levels. The efficiency in public investment is defined as the proportion of investment that is translated into capital stock. High, medium, and low efficiency levels correspond to 85, 76, and 67 percent of an increase in investment turns into capital accumulation over 15 years, respectively.

Financing Options

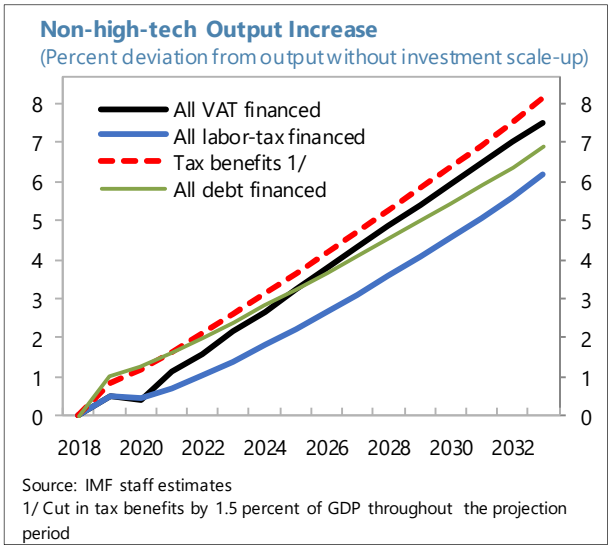
13. Allowing all the additional investment to be reflected in higher deficits financed by debt leads to significantly higher debt ratios. Productive public investment can raise potential output and future revenue, which in turn could offset debt increases from financing the investment. However, our analysis suggests that GDP gains are not sufficiently large to self-finance higher investment, as—from an initial level of 60 percent—the debt ratio rises to 66 percent at the end of the period even in the case of high efficiency. Lower efficiency levels reduce growth impacts, which imply higher debt ratios, at 72 percent in the case of low efficiency. This suggests a need to explore options for nondebt financing. The government can either increase revenues or cut spending, but Israel's very small civilian budget suggests focusing on different options to raise revenues.



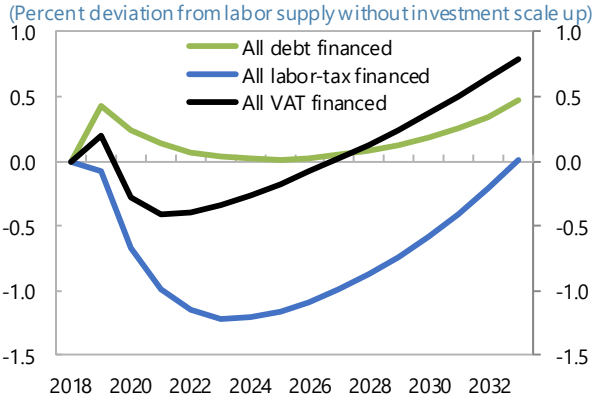
Source: IMF staff estimates

14. Different financing options lead to different growth impacts from higher investment. For example, the simulations below show the impact of each financing instrument if it is used to finance the entire scaling up of investment:

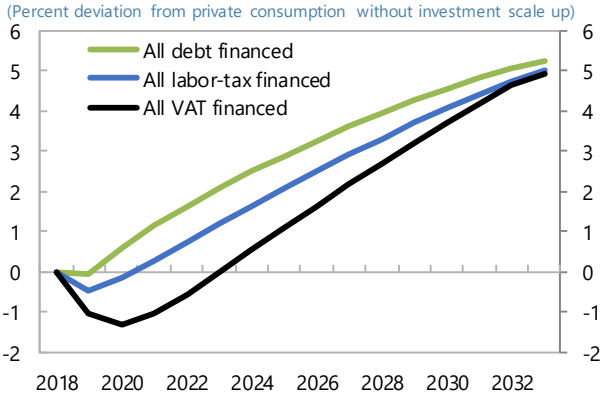
- ***VAT hike***: initially weighs on consumption and output, reducing labor demand. But higher savings leads to higher private investment, such that output gains are second only to tax benefits in the long run.
- ***Labor tax hike:*** reduces labor supplied by households, which in turn lowers household income and private consumption, resulting in the smallest output gain in the long run.
- ***Cut in tax expenditure***: limited impact on labor supply or consumption delivers the highest output increase.[11]



Source: IMF staff estimates
1/ Cut in tax benefits by 1.5 percent of GDP throughout the projection period

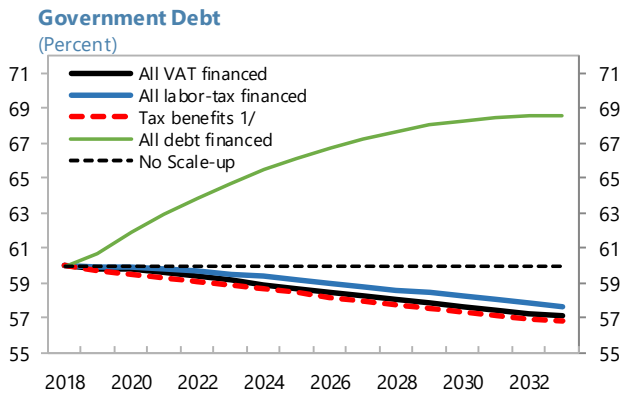


Source: IMF staff estimates



Source: IMF staff estimates

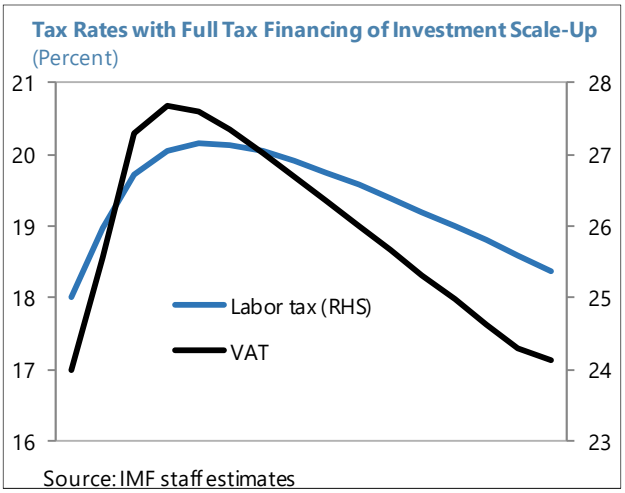
15. Fully financing higher investment with revenues would reduce debt ratios modestly. Reflecting the increase in output relative to baseline, across all scenarios with revenue financing, the debt ratio declines to between 57 to 58 percent of GDP. Financing with tax benefits results in a slightly faster pace of debt reduction—aided by more favorable output response—followed by VAT financing and labor tax financing.



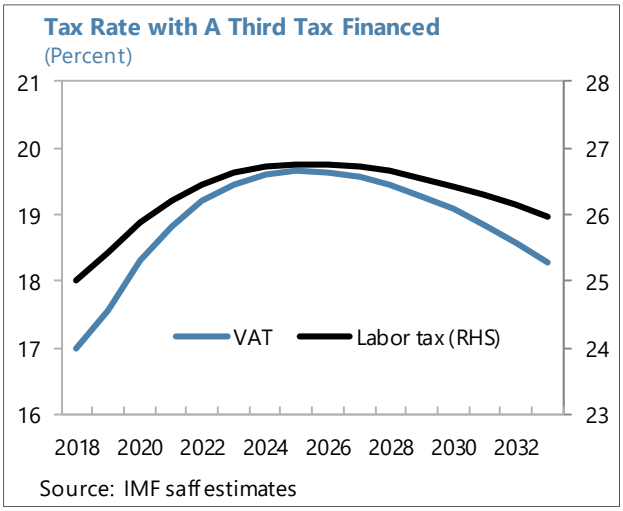
Source: IMF staff estimates
1/ Cut in tax benefits by 1.5 percent of GDP throughout the projection period.

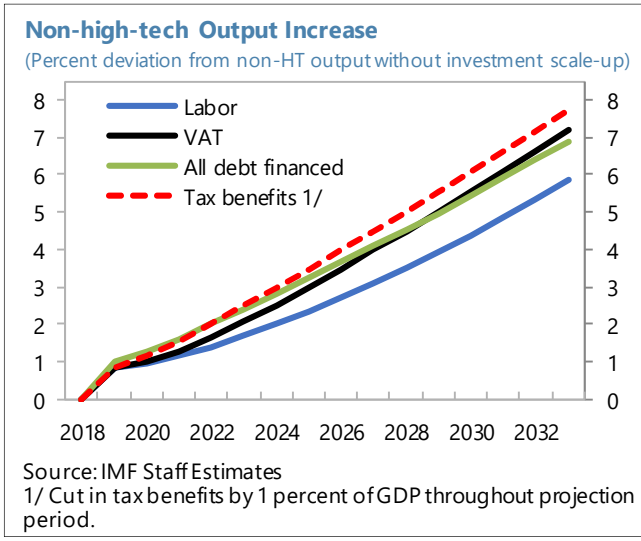
[11] We proxy cuts in tax benefits by an improvement in revenue efficiency—revenue increases without creating any distortions. In reality, however, the elimination of certain tax benefits—e.g., VAT exemptions on fresh fruit and vegetables, income tax benefits for families—is akin to raising VAT or labor tax, although primarily impacting the population that face fewer liquidity constraints.

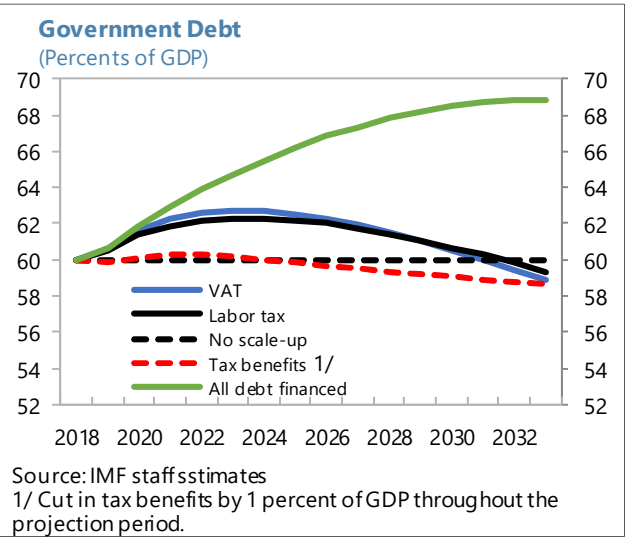
16. But financing higher investment fully with taxes would require a rather sharp increase in tax rates. For example, assuming all the additional investment to be financed by additional VAT collections, the VAT rate would have to increase to near 21 percent in two years, up from 17 percent. Similarly, when financing higher investment with increased labor taxes, the labor tax rate would have to rise from 25 to 27 percent in two years.



17. Combining tax and debt financing can strike a balance, where the advantages of reducing tax benefits are clear. For example, assuming that a third of the higher investment is tax financed, the size and pace of tax rate increases are smoothed significantly while debt accumulation also remains contained.[12] It is notable that financing high investment by cutting tax benefits by one percent of GDP per year throughout the projection period has the most positive impact on output, especially in the medium term, helping to prevent debt accumulation from the initial level.



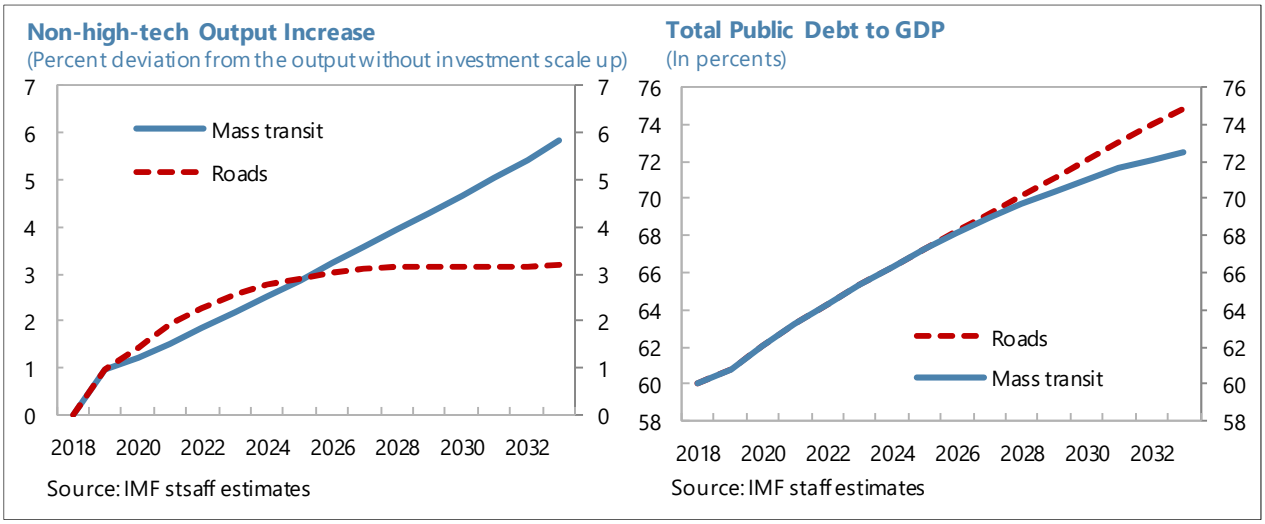




[12] 19 percent is one percentage point higher than Israel's historical high in the VAT rate of 18 percent.

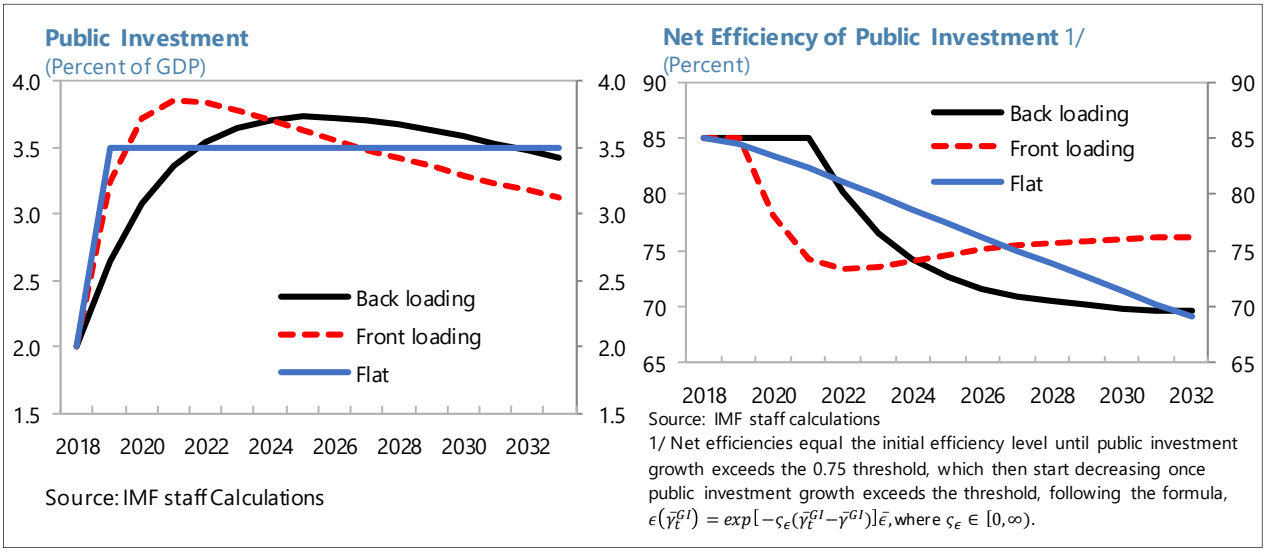
Roads Versus Mass Transit

18. As a result of the dynamic depreciation described previously in paragraph 8, investing only in roads would initially raise output more than investing only in mass transit, but the impact would eventually fade. This will also lead to a higher debt ratio increase in the 15-year period if investing only in roads. The government could maximize the rate of return by combining roads and mass transit as output gains from well-integrated road and mass transit system can be higher than the weighted average if synergies between road and mass transit augment their economic returns.



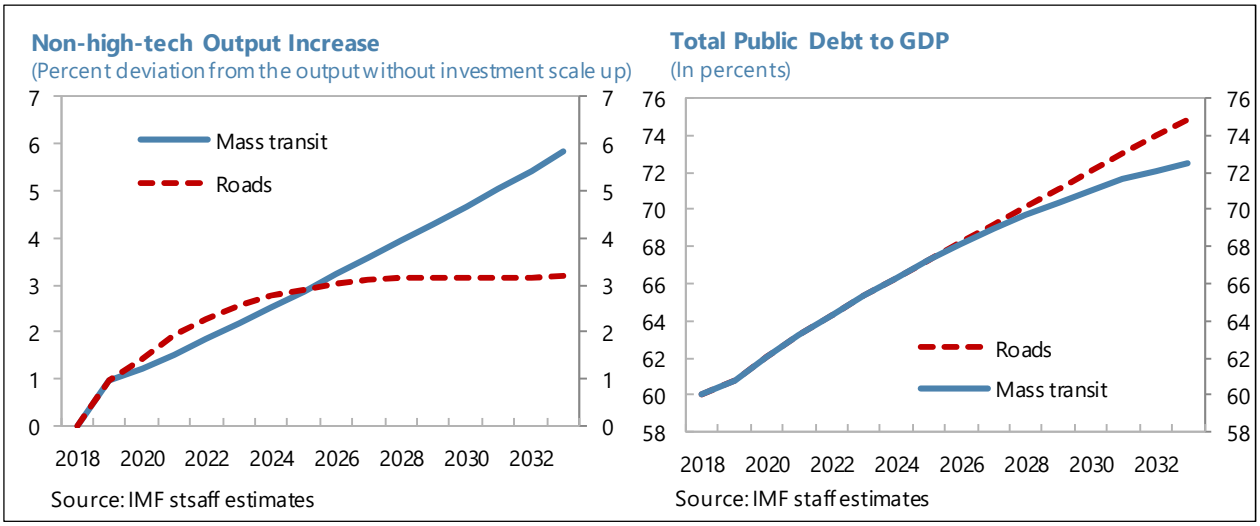
Pace of Scaling Up Investment

19. The efficiency of investment can depend on the pace of scaling up investment. In addition to the efficiency rate, the model considers absorptive capacity constraints, which tend to arise from technical capacity limits—which impact project selection, management, and implementation—leading to waste and leakage of resources in the investment process. Such



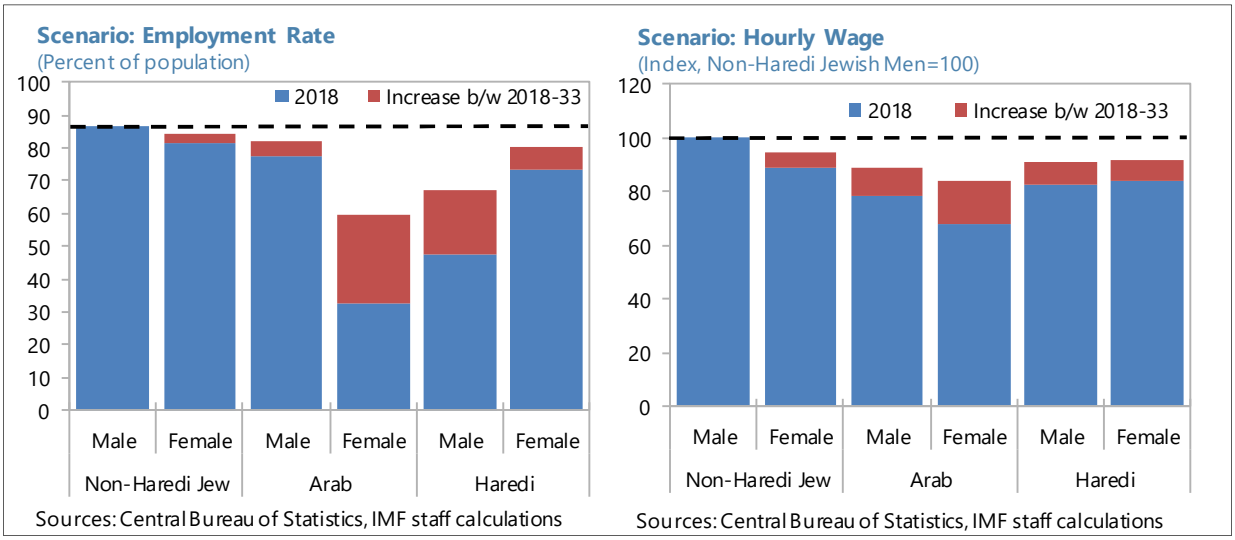
absorptive capacity constraints can have long-lasting negative effects on growth, Esfahani and Ramirez (2003). The government's absorptive capacitive constraints can cause efficiency losses if the pace of scaling up investment is too fast. In the model, such constraints are governed by (i) the threshold of absorptive capacity, which is the point at which further raising the growth rate in public investment leads to efficiency declines; and (ii) the severity of absorptive capacity constraints, which determines the degree of such efficiency losses. Below the absorptive threshold, the effective investment rate equals the efficiency rate, but it declines above that threshold reflecting severity.

20. Front-loading capital accumulation can have a lingering positive impact on output even with larger waste, but excessive front-loading can be counter-productive. Front-loading of public capital accumulation can crowd in private investment at earlier stages, which in turn can have a sustained positive impact on output. However, a fast pace of boosting public investment can lead to larger waste if the pace exceeds the government's absorptive capacity, which in turn slows the increase in output and results in larger debt accumulation. At the same time, back-loading public investment also appears counter-productive as it delays the crowding-in of private investment. Debt accumulation would slow initially, but the limited positive impact on output would eventually weigh on debt dynamics.

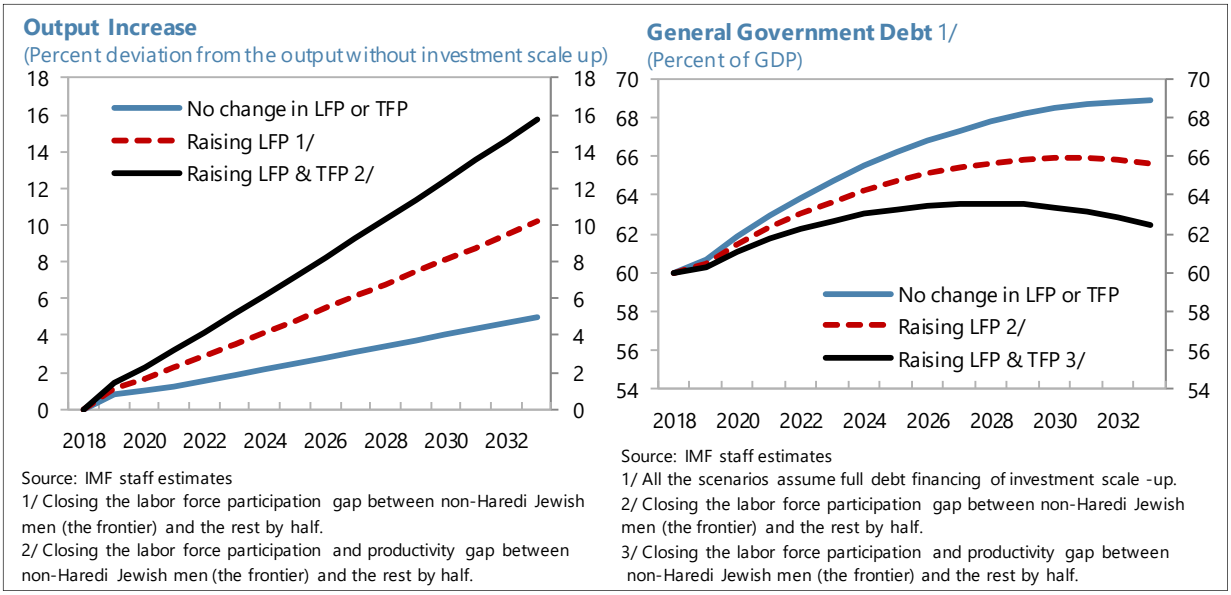


Labor Force Participation and Productivity Gains

21. Growth benefits of public investment increase if labor participation and productivity are boosted. Good infrastructure not only facilitates trade, bolsters market integration and competition, and enhances access to resources and public services, it can also help some people enter the labor market. Prior to 2009, a significant number of minority communities had no bus connection to the rest of the country (Knesset, 2014). Although the situation has improved, Arab towns remain relatively poorly served by public transport, which affects their residents and creates barriers to employment, especially for women, who are less likely to be licensed to drive and/or own cars (OECD 2018). If part of Infrastructure 2030 is focused on addressing the remaining issues of access to public transportation, it could raise the labor participation of disadvantaged groups and their better access to public services, including higher education, could enhance labor productivity.



22. If the scaling-up public investment is coupled with deep structural reforms that together reduce the gaps in labor participation and productivity, the combined output impacts are much greater. In some illustrative scenarios, it is assumed that reforms are adopted such that during the 15-year period of higher public investment there are declines in productivity and participation gaps in relation to non-Haredi Jewish men.[13] The output impact of scaling-up public investment together with halving the labor participation gap is double that from scaling-up public investment alone. Higher output would also help stabilize debt at around 66 percent of GDP even if all the additional public investment is debt-financed, assuming that all the structural reforms are funded without raising the deficit. If both the labor participation and productivity gaps are narrowed by half, the output gain would be triple that from just increasing public investment, and 0debt would be put in a declining path after peaking at around 63½ percent of GDP.



[13] Such reforms include education and training, product markets including regulation, and measures to support labor participation of women as discussed in the staff report for the 2018 Article IV consultation with Israel.

D. Key Findings and Policy Discussion

23. The efficiency of investment is key to ensuring growth benefits are achieved and to containing increases in the public debt ratio. Selecting projects with low rates of return, managing public investment inefficiently, or raising investment faster than absorptive capacity, can lead to weaker growth benefits and higher debt ratios that reduce the room to sustain increased public investment. To enhance the efficiency of public investment, Israel should:

- Establish a body with clear accountability and sufficient powers for upgrading Israel's infrastructure, supported by staff with the necessary technical expertise.
- Make project evaluation and selection more rigorous and transparent, including by ensuring consistency with a long-term infrastructure strategy.
- Streamline zoning and permitting processes and address other bureaucratic impediments to timely project implementation.
- Improve coordination between ministries and between the central and local governments. Broadening the coverage of the medium term fiscal framework to the general government could contribute to improved coordination and planning as local governments implement around three-quarters of public investment.
- Phase any scaling up of public investment judiciously to avoid waste.
- Use a public-private partnerships (PPP) only in cases where bringing in private sector know-how improves efficiency. Design and monitor PPPs carefully to protect the public interest.
- Maintain a high level of transparency around the level and composition of investment, including to help protect public investment against short-sighted cuts.

24. Yet, growth benefits will likely be insufficient to prevent a significant increase in debt ratios, indicating a need for revenue measures, where reductions in tax benefits are preferable. Allowing the public debt ratio to rise as much as 10 percentage points appears too high as Israel faces wider uncertainties than most advanced economies and it should also preserve fiscal space to facilitate structural reforms for long-term growth. Given Israel's very low civilian spending, the government should consider financing most of the additional investment with additional revenues. Israel's sizable foregone revenue from various tax benefits—around five percent of GDP per year—suggests significant scope for revenue gains. Our analysis also suggests that reducing tax benefits is least detrimental to growth, which in turn would be most positive for debt dynamics.

25. PFI or PPP financing should be used prudently with the associated risks monitored carefully. PFIs/PPPs can defer spending on infrastructure without deferring its benefits.[14] However, fiscal risks (e.g., direct costs, contingent liabilities) associated with PFIs/PPPs can be large, therefore such approaches should not be used as a means simply to avoid reporting higher public debt.[15] The government should restrict the use of a PFI/PPP framework to those projects that fit in a clear overall investment strategy and provide value-for-money, and where bringing the know-how of the private sector has clear benefits. Liabilities, including contingent liabilities, from PFIs/PPPs should be managed carefully and reported in line with international best practices.

26. Growth benefits can be substantially augmented if higher public investment is coupled with structural reforms to enhance labor participation and productivity. Expanding public transportation can improve access to better jobs and education, which in turn can raise labor participation and productivity. In particular, providing public infrastructure that can enable workplaces to locate within or close to minority communities would enhance labor participation and allow increased work hours, especially for Arab and Haredi women. But structural reforms are needed to make more substantial progress in reducing participation and productivity gaps. In this context, it is welcome that the government is preparing strategies to enhance labor participation and productivity along with Infrastructure 2030.

[14] PPPs are typically long-term contracts where the private sector executes and finances public investment.

[15] Queyranne (2014)

Annex I. Baseline Calibration of Key Parameters

The model is calibrated for the economy of Israel using annual data. The initial values are based on the macroeconomic data for Israel in 2017. Most of the structural parameters are drawn from the Bank of Israel's DSGE model for the Israeli economy (MOISE), while some other parameters follow the original DIGNAR model by Melina et al. (2016). The below lists the parameters that do not follow either source.

- **Returns on public capital** depend on the combination of the elasticity of output to public capital, the depreciation rates, and the efficiency level.

    - **Elasticity of output to public capital**: the meta-analysis by Melo et al. (2013) lists a wide range of estimates for the elasticity of output to transport infrastructure from -0.148 to 0.315. Another meta-analysis by Bom and Ligthart (2014) narrows this range by controlling for the definition of public infrastructure capital and output, and whether capital is installed at the national level or by state and local government. They suggest an elasticity of core infrastructure installed by a national government to be 0.17 and by local government to be 0.193. Our mid-point calibration of 0.18 results in an initial return of public capital at 30 percent. As Israel is an advanced economy, this is slightly higher to other estimates such as 22 percent for World Bank transportation projects and 25 percent for scaling up public investment in developing economies (Box 3.4 WEO October 2014). Our cumulative 15-year fiscal multipliers are also in line with estimates for advanced economies.

    - **Depreciation rates**: we use the estimates for public and private capital depreciation rates based on country income accompanying the Investment and Capital Stock Database 2017. In the case of Israel public capital depreciation, since we are focusing on the non-high-tech sector, we apply an annual depreciation rate of four, which is closer to the estimate for middle-income countries.

    - **The initial efficiency level**: we assume 85 percent for Israel. This means that for every dollar spent on investment, 85 cents would translate into public capital stock. This parameter is often calibrated to be 50 percent for low-income countries (Prichett 2000, Melina et al. 2016, Box 3.4 WEO October 2014). The Regional Economic Outlook 2016 uses the Data Envelopment Approach to estimate the frontier of public investment efficiency across 115 countries. If the frontier economies have a score of one, Israel shows an average score of 0.95. In practice, there is some unproductive public investment even in the most efficient economy. Therefore, we consider three scenarios of a high efficiency level at 95 percent, a medium efficiency at 85 percent, and a low efficiency level at 75 percent.

- **Frisch elasticities** for the response of labor supply to changes in income are sensitive to estimation methods and sample selection. For example, studies based on micro data often find lower elasticities than in macro studies and estimates are often lower for men than for women. Reichling and Whalen (2012) provides examples of Frisch elasticity estimates in the literature

ranging from zero to 0.8 for men, and from 0.5 to one for women. Macro models have used larger elasticities such as 1.9 (Smets and Wouters 2007), 2.6 to 4.0 (Cho and Cooley 1994, King and Rebelo 1999). Chetty et al. (2011) suggests that macro-models should match a Frisch elasticity of aggregate hours of 0.75. To differentiate between two types of households, in our model, we choose a lower elasticity of 0.5 for the credit-constrained households and an elasticity of 0.8 for the optimizers.

Initial values for Israel (in percent, unless indicated otherwise)	
Long-run non-high-tech growth rate	2.5
Long-run high-tech sector growth rate	4.7
Exports to GDP	38
Import to GDP	35
Government consumption to GDP	39.5
Government investment expenditures to GDP	2
Private investment to GDP	17.3
Share of high-tech sector	20
Share of tradables in government expenditures	42
Share of tradables in private consumption	31
General government domestic debt to GDP	51
Private foreign debt to GDP	16
Government external commercial debt to GDP	9
Annualized domestic net real interest rate	2.9
Annualized net real risk-free rate	1
Annualized net real interest rate paid on government external commercial debt	3.5
Labor income share in non-traded sector	67
Labor income share in traded sector	67
Private capital depreciation rate	8.3
Public capital depreciation rate	4
Efficiency of public investment (share of investment turned into actual capital)	85
Investment adjustment cost	3
Share of optimizers in the economy (non-credit-constrained households)	0.8
High-tech sector effective tax rate	4
User fees of public infrastructure (in percent of recurrent costs)	10
Labor income tax rate	25
Consumption tax rate	17
Capital return tax rate	23
Structural parameters	
Degree of learning by doing externality in the traded sector	0.1
Persistence in TFP in traded sector	0.1
Elasticity of output with respect to public capital	0.18
Inverse of the Frisch elasticity of labor supply for optimizers	1.25
Inverse of the Frisch elasticity of labor supply for rule of thumb consumers	2
Inverse of the intertemporal elasticity of consumption	1.1
Elasticity of substitution between the two types of labor (in tradables and nontradables)	1
Elasticity of substitution between traded and non-traded goods	0.1
Home bias for additional government spending	0.6
Elasticity of portfolio adjustment costs	0.001
Elasticity of sovereign risk	0.001
Severity of public capital depreciation when not maintained	1
Severity of absorptive capacity constraints	25
Thresholds of investment scaling up beyond which absorptive capacity constraints start binding	75

References

Barro, Robert J. 1990. "Government Spending in a Simple Model of Endogenous Growth." Journal of Political Economy 98 (5), Part 2: S103-25.

Barro, Robert J., and Xavier Sala-i-Martin. 1995. Economic Growth. New York: McGraw-Hill.

Bom, Pedro R.D., and Jenny E. Ligthart. 2014. "What Have We Learned from Three Decades of Research on the Productivity of Public Capital?" Journal of Economic Surveys 28: 889–916.

Buffie, Edward E., Andrew Berg, Catherine Pattillo, Rafael Portillo, and Luis-Felipe Zanna. 2012. "Public Investment, Growth, and Debt Sustainability: Putting Together the Pieces." IMF Working Paper 12/144, International Monetary Fund, Washington.

Chetty, Raj, Adam Guren, Day Manoli, and Andrea Weber. 2011. "Are Micro and Macro Labor Supply Elasticities Consistent? A Review of Evidence on the Intensive and Extensive Margins." American Economic Review 101 (3): 471-5.

Cho, Jang-Ok, and Thomas F. Cooley. 1994. "Employment and Hours over the Business Cycle." Journal of Economic Dynamics and Control 18 (2): 411-32.

Currie, Janet, and Reed Walker. 2011. "Traffic Congestion and Infant Health: Evidence from E-ZPass." American Economic Journal: Applied Economic Journal: Applied Economics 3 (1): 65-90.

Fernald, John G. 1999. "Roads to Prosperity? Assessing the Link between Public Capital and Productivity." The American Economic Review 89 (3): 619-638.

Futagami, K., Y. Morita, and A. Shibata. 1993. "Dynamic Analysis of an Endogenous Growth Model with Public Capital." Scandinavian Journal of Economics 95: 607-25.

Glomm, Gerhard, and B. Ravikumar. 1994. "Public Investment in Infrastructure in a Simple Growth Model." Journal of Economic Dynamics and Control 18 (6): 1173-87.

Greiner, Alfred, W. Semmler, and G. Gong, 2005, The Forces of Economic Growth: A Time Series Perspective, 1st edition (Princeton, N.J.; Princeton University Press).

Greiner, Alfred. 2007. "An Endogenous Growth Model with Public Capital and Sustainable Government Debt." Japanese Economic Review 58: 345-361.

Hodge, Andrew. 2016. "The Design of Fiscal Reform Packages: Insights from a Theoretical Endogenous Growth Model." IMF Working Paper 16/146, International Monetary Fund, Washington.

King, Robert G., and Sergio T. Rebelo. 1999. "Resuscitating Real Business Cycles." In Handbook of Macroeconomics, Vol. 1, edited by John B. Taylor and Michael Woodford. Elsevier.

Melina, Giovanni, Shu-Chun S. Yang, and Luis-Felipe Zanna. 2016. "Debt Sustainability, Public Investment, and Natural Resources in Developing Countries: The DIGNAR Model." Economic Modelling 52 (B): 630-49.

Melo, Patricia, Daniel Graham, and Ruben Brage-Ardao. 2013. "The Productivity of Transport Infrastructure Investment: A Meta-Analysis of Empirical Evidence." Regional Science and Urban Economics 43 (5): 695-706.

Munnell, Alicia H. 1992. "Policy Watch: Infrastructure Investment and Economic Growth." Journal of Economic Perspectives 6 (4): 189-198.

Organisation for Economic Co-operation and Development (OECD), 2018, "OECD Economic Surveys: Israel 2018," OECD Publishing, Paris.

Pritchett, Lant. 2000. "The Tyranny of Concepts: CUDIE (Cumulated, Depreciated, Investment Effort) Is Not Capital." Journal of Economic Growth 5 (4): 361-384.

Reichling, Felix, and Charles Whalen. 2012. "Review of Estimates of the Frisch Elasticity of Labor Supply." Working Paper Series, Congressional Budget Office, Washington, DC.

Smets, Frank, and Rafael Wouters. 2007. "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach." American Economic Review 97 (3): 586-606.

Turnovsky, Stephen J., and Partha Sen. 1991. "Fiscal Policy, Capital Accumulation, and Debt in an Open Economy." Oxford Economic Papers 43 (1): 1-24.

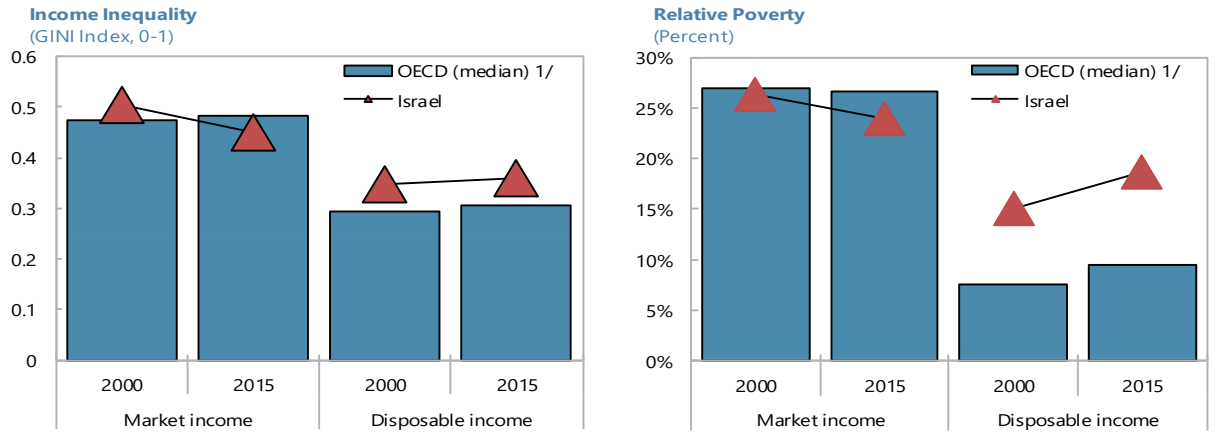
INEQUALITY AND POVERTY IN ISRAEL[1]

Poverty and income inequality are high in Israel compared with peers, being exacerbated by the lower labor participation and productivity of some population groups, such as the Israeli-Arab and Haredi populations and non-Haredi Jewish women. Israel's low redistribution of income through the budget limits its impact on reducing poverty and inequality. Given the projected rise in the share of the Haredi, and, to a lesser extent Arab, populations in coming decades, addressing the structural issues behind their low participation and productivity is an urgent matter. This paper discusses the trends in and characteristics of inequality and poverty in Israel, and explores policy measures to address these issues.

A. Key Characteristics of Inequality and Poverty in Israel

1. Israel's inequality and poverty based on disposable income have increased and remain well above peers, despite improvements in indicators based on market income (Figure 1). Israel's market-income based inequality and relative poverty[2] have declined since 2000—mainly benefiting from rising labor participation—and are currently moderately below peers.[3] Meanwhile, inequality based on disposable income rose during the 2000s, but has declined recent years close to the level in 2000, yet it remains among the highest in advanced economies.[4] Moreover, relative poverty based on disposable income has risen notably since 2000 and is the highest among advanced economies at roughly double their median.

Figure 1. Inequality and Poverty in Israel Relative to Peers



Sources: OECD
1/ Using data for 2014. The sample includes Australia, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, New Zealand, Norway, Sweden, United Kingdom, and United States.

[1] Prepared by Aiko Mineshima (EUR) and Henrique Chociay (FIN). The chapter benefited from comments and suggestions from the Israeli authorities.

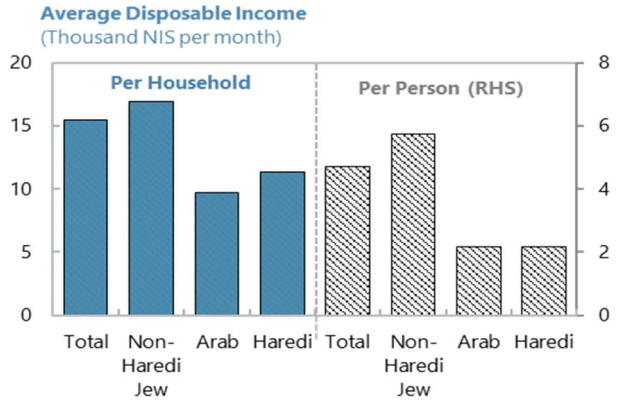
[2] The relative poverty rate is the share of the population with income below 50 percent of the median income.

[3] Market income includes income from work and capital, receipts from employment-related social insurance, and transfers from non-profit institutions and other households.

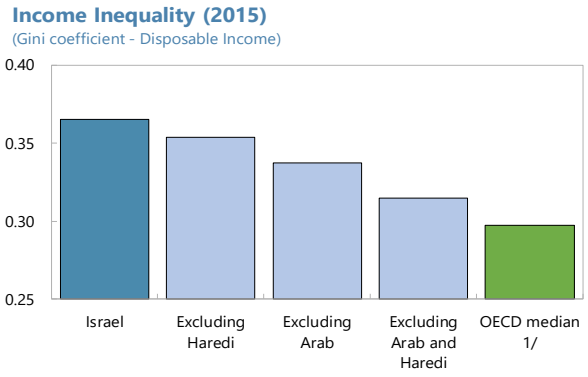
[4] Disposable income is defined as the sum of the market income and social security payments minus employment-related contributions, taxes on wealth and income, and social security contributions.

2. While inequality is a broad-based phenomenon, poverty is particularly high among the Arab and Haredi population (Figure 2). Incomes among the Israeli-Arab (Israeli citizens of Arab ethnicity) and Haredi (ultra-orthodox Jews) are low relative to non-Haredi Jews, especially on a per person basis. Poverty is particularly high among the Haredi and Arab households (above 50 percent), as well as households with a female breadwinner or with a single parent. Yet, even excluding these groups, inequality is higher than the OECD average. Hence, income inequality among the whole population is high in Israel.

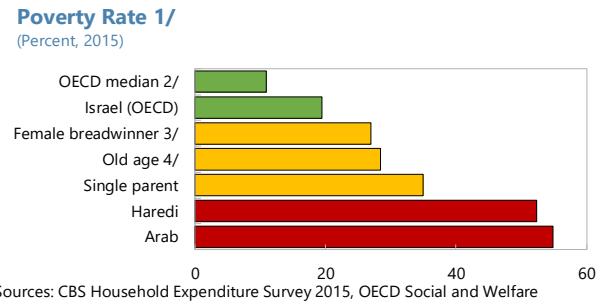
Figure 2. Characteristics of Inequality and Poverty in Israel



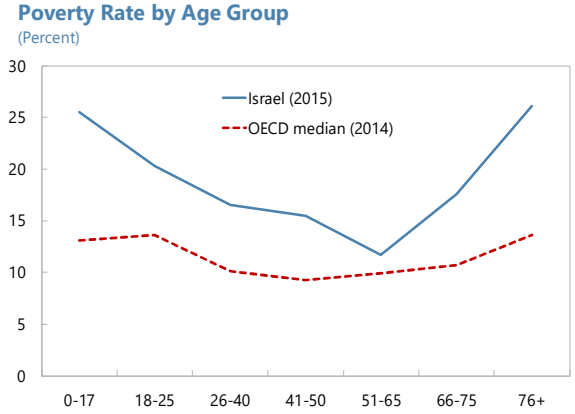
Sources: CBS Household Expenditure Survey 2015, IMF staff calculations.



Sources: OECD, CBS Household Survey 2015, and IMF staff calculations.
1/ Includes all OECD countries except Japan. Gini coefficient for 2015 or latest available.



Sources: CBS Household Expenditure Survey 2015, OECD Social and Welfare Statistics, and IMF staff calculations
1/ Share of population below the poverty line, defined as 50 percent of the median equivalized disposable income. The poverty rates for subgroups are based on the CBS data, which are not strictly comparable to OECD data as they use different standards for equivalization.
2/ As of 2015 or latest available.
3/ Most of household work income earned by women.
4/ Half or more of the household gross income earned from pensions and old age allowance.



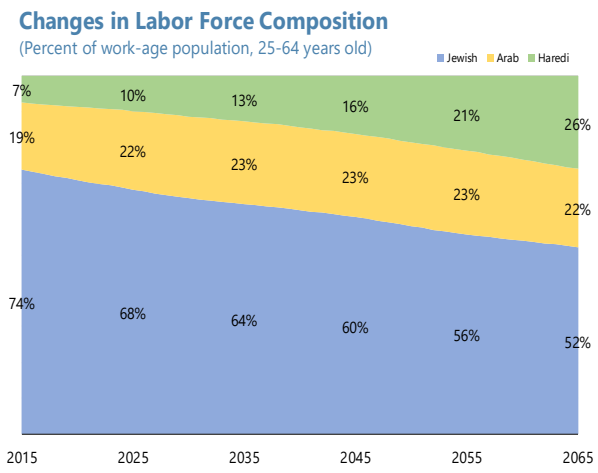
Source: OECD Income Distribution Database

3. Poverty is also higher at both ends of the age distribution (Figure 2, bottom right). Youth poverty appears to be associated with the higher fertility rates among the poorest population groups (especially Haredi), whose population share is high and rising among the youth (44 percent among the population aged 0–14 as opposed to 26 percent among the population aged 25–64).[5] Old-age poverty may be associated with low pension eligibility among new immigrants and Israeli-Arabs (Bleikh, 2016). Old-age poverty is set to decline with an increase in income-supplement allowances, elderly allowances, and investments in public housing for the elderly (OECD 2018).

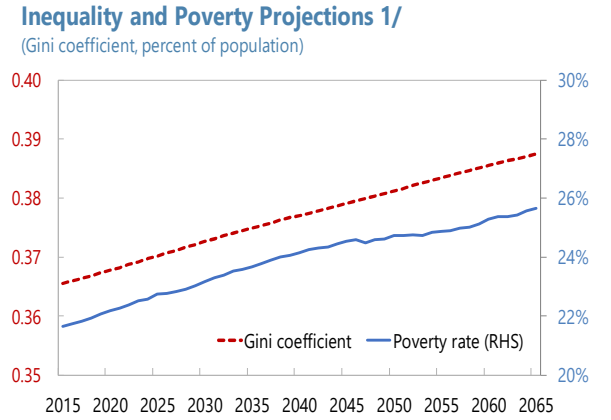
[5] The share of Arab-Israeli and Haredi population is around 25 percent, yet 44 percent of population under 14 years old are from Arab-Israeli or Haredi families.

4. The rising share of the Arab and Haredi populations will lead to increased poverty and inequality in coming decades, making policy measures to address inequality and poverty even more pressing (Figure 3). The share of the Arab and Haredi populations is expected to rise from one-quarter in 2015 to almost one-half by 2065. In particular, the share of the Haredi in the working age population is projected to jump from seven percent to just over 25 percent during the same period (Figure 3, left panel). With Arab fertility rates having declined notably, their share in the working age population stabilizes from 2025 at around 22–23 percent. Assuming the current income distribution of each population group to be maintained, staff estimates the projected demographic changes will raise the Gini coefficient by two percentage points (ppt) by 2065, and the poverty rate by four ppt.

Figure 3. Demographic Trends in Israel



Source: CBS - Projections of Israel Population until 2065



Sources: CBS, and IMF staff calculations.

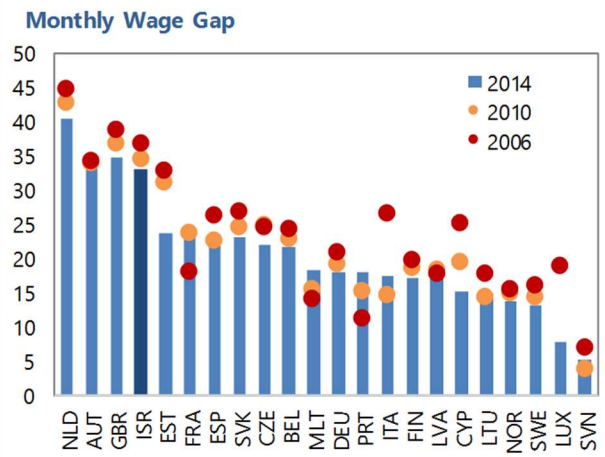
1/ Utilizing the 2015 Household Expenditure Survey as the reference for incomes and initial population share of Arab, Haredi and Other. Growth rates of each of the three groups are extracted from CBS population projections through 2065.

B. Factors Behind Employment and Wage Gaps

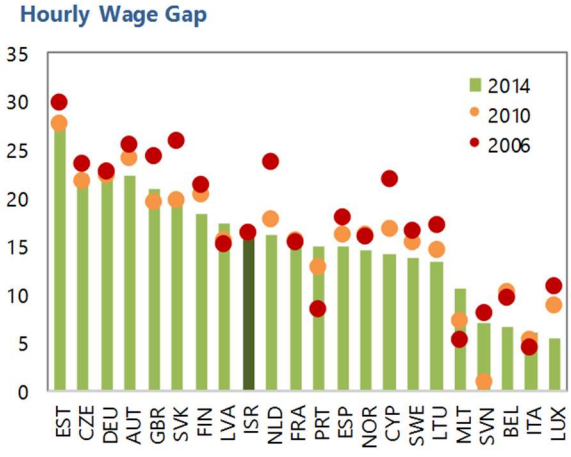
5. Israel has significant wage gaps across genders and population groups. Regarding gender wage gaps, while the hourly wage gap is comparable to peers, the monthly gap stands out, reflecting a larger gap in working hours per month between men and women (Figure 4). Adding the dimension of different communities in Israel, there are significant wage gaps between non-Haredi Jewish men (the benchmark) and others (Figure 5, left). For example, while hourly wages for non-Haredi Jewish women are below the benchmark by around 20 percent, the gap widens to around 30 percent for the Haredi (men and women), and to 50 percent for the Arab (men and women). Shorter work hours for women translate into larger gaps in monthly wages than hourly wage gaps across the communities, especially for Haredi women.

6. Employment rates tend to be particularly low among Arab women and Haredi men (Figure 5, right). This finding is in line with the general understanding that the Haredi population values the time men dedicate to religious studies while the Arab population has cultural features that lower female employment (Yashiv and Kasir, 2015).

Figure 4. Gender Wage Gaps in Advanced Economies

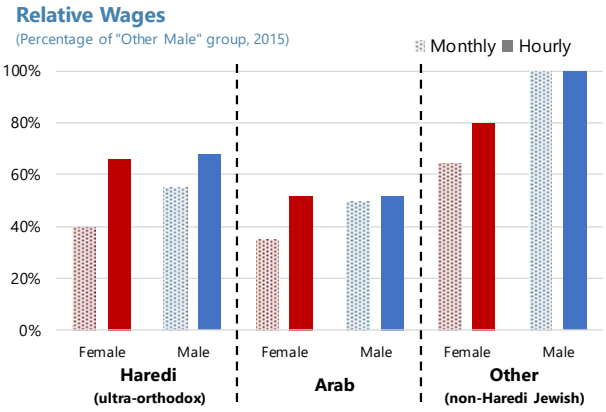


Source: UNECE

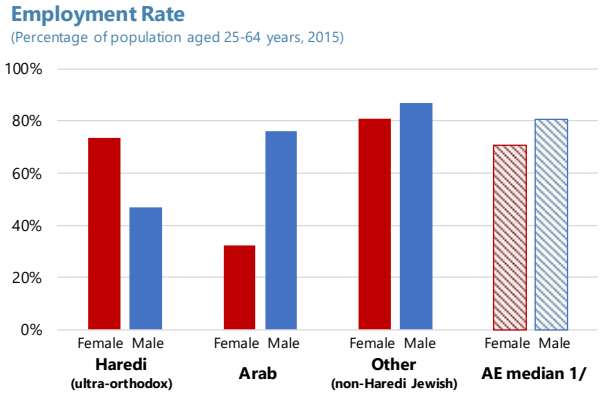


Source: UNECE

Figure 5. Gaps by Gender and Ethnic Groups in Israel



Sources: CBS, and IMF staff calculations



Sources: CBS, OECD, and IMF staff calculations
1/ Median employment rate across 31 advanced economies in the OECD database.

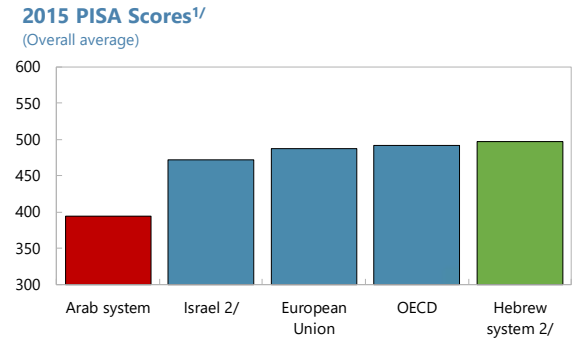
7. As elaborated below, skill and productivity differentials, occupational preferences, and impediments to higher participation seem to be at the heart of these wage and employment gaps. There is a high correlation between skills indicators and market income in Israel (OECD, 2018). Most of those who have gained the benefits from education suitable for highly paying jobs are non-Haredi Jewish men. A combination of occupational choices, lower labor participation, or shorter work hours also help explain gaps associated with gender.

Skills and Productivity

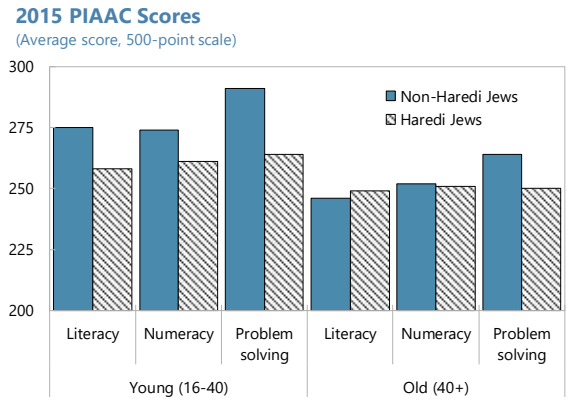
8. Skill and productivity gaps between ethnic groups are closely linked to education outcomes. For example, education outcomes measured by PISA scores are substantially lower for

students in the Arab schools compared with students in the Hebrew system.[6] PIAAC, which measures adult proficiency in key information-processing skills, shows substantial gaps between Haredi and non-Haredi Jews, and these gaps are larger for younger generations, signaling that educational differences are critical contributors (Figure 6).

Figure 6. Education and Skill Gaps



Sources: OECD Economic Surveys: Israel (2018)
1/ PISA scores are reported on a scale, with an approximate OECD average of 500 and standard deviation of 100.
2/ Haredi boys did not participate in the PISA test.



Source: OECD Economic Surveys: Israel (2018)

9. Arab students face more severe challenges, but also show strong potential for catching up. Fuchs (2017) identifies substantial gaps in performance after secondary education, which are largely attributable to underlying socioeconomic conditions. A key difficulty for Arab students that reduces their employment opportunities is their low proficiency in Hebrew (OECD, 2018). In tertiary education, despite recent improvements, Arabs lag their Jewish counterparts in science, technology, engineering, and mathematics (STEM) enrollment, and have higher dropout rates. Despite the overall better performance of Arab women in math and science than Arab men, a large portion of Arab women major in education to become teachers, limiting their potential future income given the lower wages and hours of teachers.

10. The gap between the Haredi and non-Haredi Jews is attributable to the different focus of their education. Haredi men study full-time in religious school ("yeshiva") until 40 years old on average (Berman 2000). As a result, Haredi men join the labor market late, and without being equipped with core education (math, science, English, and other marketable skills).[7] Late entry to the labor market has a negative effect on their long-term income for a number of reasons. First, it leads to a loss of years in gaining work experience and seniority in employment. Second, employers often prefer to hire young people for positions appropriate to the beginning of the professional path. Third, the late entrance to the market reduces the individual's ability to examine his suitability to the profession and to choose a most suitable profession. Fourth, learning abilities tend to be higher for young people (MoF, 2017c). Haredi men who pursue tertiary academic studies tend to be equipped

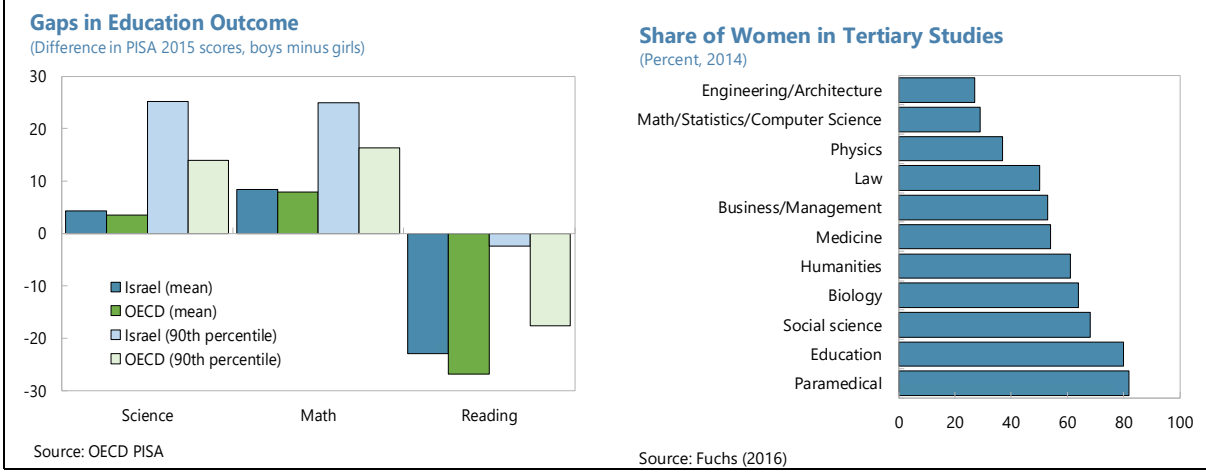
[6] In principle, Haredi students are part of the Hebrew system. However, in practice, Haredi boys do not participate in PISA, therefore the results for the Hebrew system can be interpreted as the performance of non-Haredi Jewish students.

[7] The long-term trend of Haredi men employment, declining from 80 percent in 1979 to less than 40 percent in the mid-2000s, was similar to that of men with up to four years of formal education (Ben-David and Kimhi, 2017).

with lower skills, resulting in higher dropout rates (Regev, 2016). In addition, a large portion tend to major in subjects that lead to lower employability in Israel, such as law (Regev, 2017).

11. Gender wage gaps are related to numeracy skill gaps, as well as different returns on a given numeracy skill, between men and women. The numeracy skill gap between men and women starts in early education, although relatively small. According to PISA scores, boys' overperformance in math and science is comparable to other advanced economies on average, but the performance gap is visibly larger among the top performers (Figure 7, left). In addition, girls tend to enroll less in advanced studies in math and science at secondary education,[8] and are less inclined to major in STEM courses in tertiary education (Figure 7, right). Furthermore, BoI (2017) finds that, while men in the workforce have higher numeracy skills than women in the workforce, men also have higher returns to skill, further amplifying the effect of the skill gap.[9] The higher returns to a given skill can be explained by a higher share of men in fields where returns to skill are high (IT and senior management), and a tendency for women with higher skills to work less hours than men.

Figure 7. Education and Gender



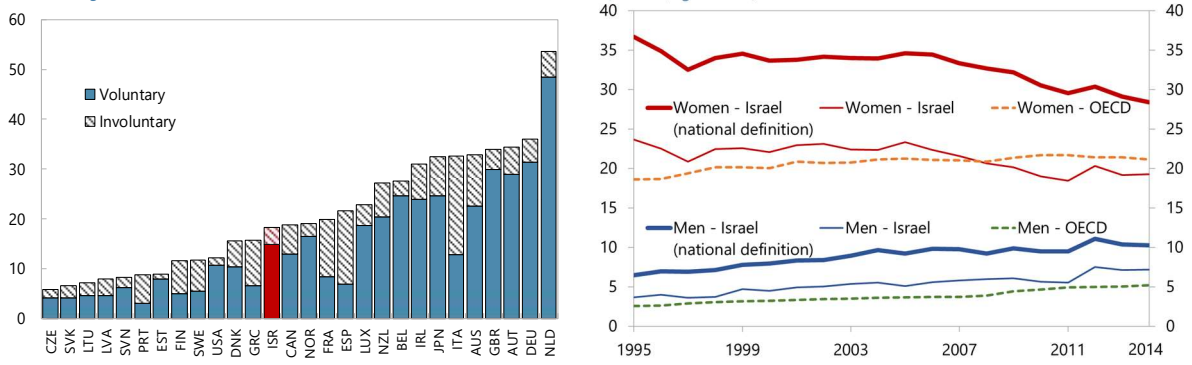
Work Hours and Occupation

12. Women's earnings are also negatively affected by the higher incidence of part-time work. International standard data indicate that Israel's gender difference in part-time work has been declining and is currently comparable to OECD peers. But national estimates, which reflect the longer work hours typical of the Israel labor market, point to a gap that exceeds OECD norms by over 10 percentage points (Figure 8). Shorter work hours not only reduce current earnings, but may also limit the potential for occupation and career progression, especially in the Israeli high-tech sector, which is marked by long work hours and less flexibility.

[8] Azary-Viesel and Ben-David (2016) report that the gap in has been diminishing, but in the "wrong" direction, as the result of lower enrollment of boys in advanced math and science courses.

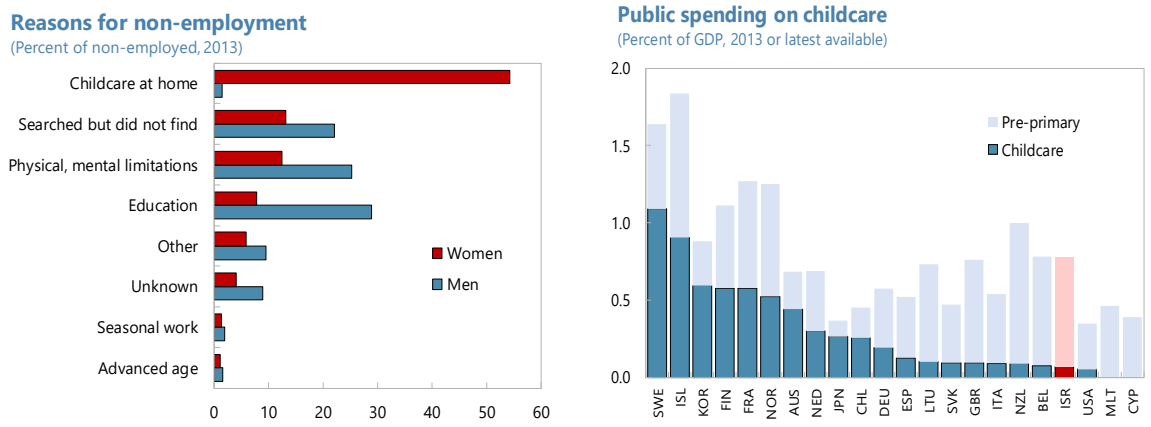
[9] According to OECD (2018), adjusting Israel's skills dispersion to the PIAAC average would reduce wage inequality by almost four percent.

Figure 8. Part-time Employment in Israel



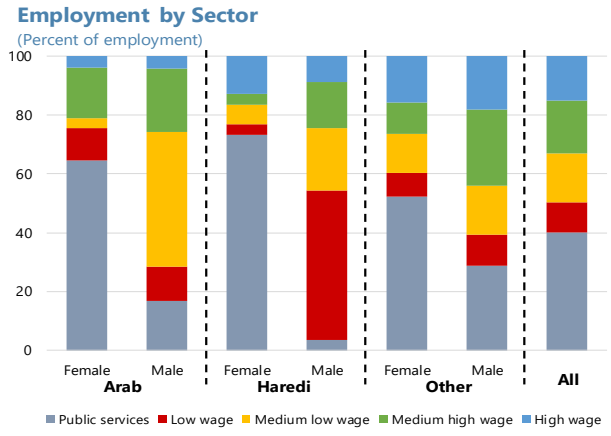
13. The lower participation and higher part-time work of Israeli women may reflect their larger role in childcare at home. Childcare at home is the main driver for non-employment for half of the women out of the labor force (Figure 9, left). The public provision of early childhood care (0 to 3 years) in Israel was low compared with other advanced economies in 2013 (Figure 9, right). Shachar (2012) finds that the cost of childcare in Israel has a significant negative effect on the employment of mothers, particularly when there is a shortage of subsidized childcare facilities.

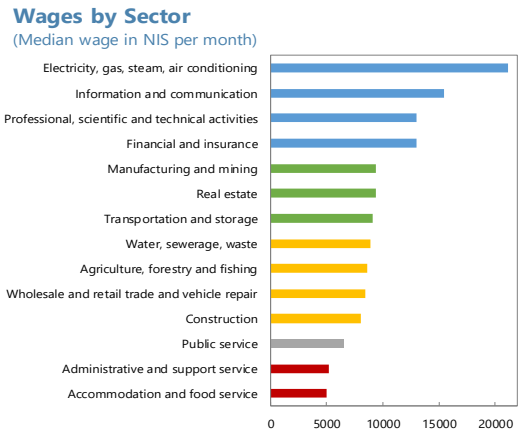
Figure 9. Childcare and Labor Participation in Israel



14. Inequality is also associated with the difference in the type of jobs that the Haredi, Arab, or women tend to occupy (Figure 10). There is a high concentration of women in the public sector, which tends to offer lower wages albeit with higher job security. Haredi men are largely employed in low-paid sectors while Arab men are mostly in low- to medium-low wage jobs. Fuchs (2017) adds that Arab women tend to choose to work in education due to cultural perceptions, limited transportation and childcare, and family-friendly work hours. MoF (2017b) finds that industries with higher share of female employment (e.g., health, social work) tend to have larger gender wage gaps, except the education sector.

Figure 10. Employment by Sector (2014)

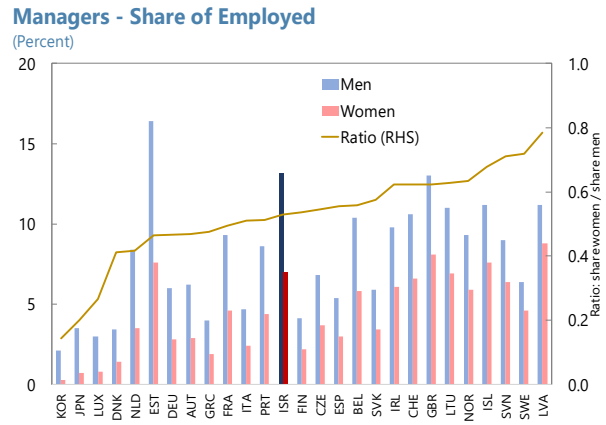




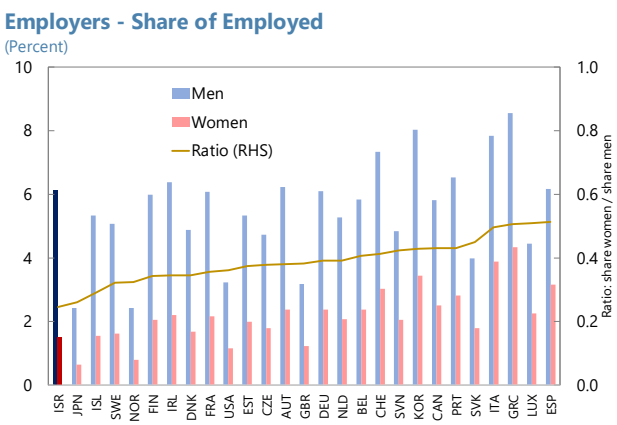
Source: CBS and IMF staff calculations.

15. As in other advanced economies, the share of women in managerial positions is low. Christiansen et al. (2016) find that the share of women in managerial positions is correlated with the incidence of part-time work, while labor force participation is not a good predictor. Indeed, Israel has a high incidence of part-time work and a considerable gap (47 percent) in the share of men and women who are managers (Figure 11, left). The gap is even larger (76 percent) in the share of entrepreneurs (Figure 11, right).

Figure 11. Women as Managers and Entrepreneurs



Source: OECD Social and Welfare Statistics



Source: OECD Social and Welfare Statistics

The Output Impact of Reducing Wage Gaps

16. Reducing the employment and wage gaps across ethnic groups and genders could significantly raise Israel's potential output. Reducing employment gaps by half is broadly consistent with the authorities' preliminary targets for employment rates by population group in 2030. If hourly-wage gaps are also reduced by half—leaving the share of part time workers

unchanged—a simple calculation finds potential output gains of around 14 percent (Figure 12.a).[10] If, instead, monthly-wage gaps are reduced by half—meaning the share of full-time workers increases toward the level of non-Haredi Jewish men—potential output would rise by around 22 percent (Figure 12.b).[11] About two-thirds of the increase is associated with closing employment and wage gaps for non-Haredi Jewish women and Arab women (Figure 12.c). The impact of closing gaps in the Haredi population is currently small due to their small share in the working age population (seven percent), but it will be larger in the future.

Figure 12. Potential Output Impacts from Reducing Wage and Employment Gaps

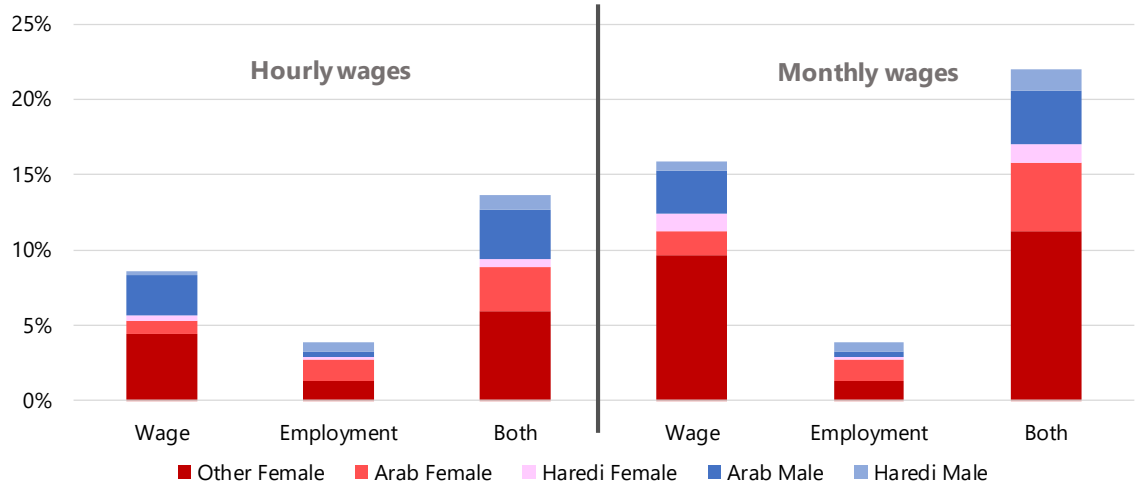
A. Hourly Wages

Reduction in **Hourly** Wage Gap \ Reduction in **Employment** Gap	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.8	1.5	2.3	3.1	3.8	4.6	5.4	6.2	6.9	7.7
10%	1.7	2.5	3.4	4.2	5.0	5.8	6.6	7.4	8.3	9.1	9.9
20%	3.5	4.3	5.2	6.0	6.9	7.8	8.6	9.5	10.4	11.2	12.1
30%	5.2	6.1	7.0	7.9	8.8	9.7	10.7	11.6	12.5	13.4	14.3
40%	6.9	7.9	8.8	9.8	10.7	11.7	12.7	13.6	14.6	15.6	16.5
50%	8.6	9.6	10.6	11.7	12.7	13.7	14.7	15.7	16.7	17.7	18.7
60%	10.4	11.4	12.5	13.5	14.6	15.6	16.7	17.8	18.8	19.9	20.9
70%	12.1	13.2	14.3	15.4	16.5	17.6	18.7	19.8	20.9	22.0	23.1
80%	13.8	15.0	16.1	17.3	18.4	19.6	20.7	21.9	23.0	24.2	25.4
90%	15.5	16.7	17.9	19.1	20.3	21.5	22.7	24.0	25.2	26.4	27.6
100%	17.3	18.5	19.8	21.0	22.3	23.5	24.8	26.0	27.3	28.5	29.8

B. Monthly Wages

Reduction in **Monthly** Wage Gap \ Reduction in **Employment** Gap	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.8	1.5	2.3	3.1	3.8	4.6	5.4	6.2	6.9	7.7
10%	3.2	4.0	4.9	5.7	6.6	7.5	8.3	9.2	10.0	10.9	11.8
20%	6.3	7.3	8.2	9.2	10.1	11.1	12.0	13.0	13.9	14.9	15.8
30%	9.5	10.5	11.6	12.6	13.7	14.7	15.7	16.8	17.8	18.9	19.9
40%	12.7	13.8	14.9	16.1	17.2	18.3	19.5	20.6	21.7	22.8	24.0
50%	15.8	17.1	18.3	19.5	20.7	21.9	23.2	24.4	25.6	26.8	28.0
60%	19.0	20.3	21.6	22.9	24.2	25.6	26.9	28.2	29.5	30.8	32.1
70%	22.2	23.6	25.0	26.4	27.8	29.2	30.6	32.0	33.4	34.8	36.2
80%	25.3	26.8	28.3	29.8	31.3	32.8	34.3	35.8	37.3	38.8	40.3
90%	28.5	30.1	31.7	33.3	34.8	36.4	38.0	39.6	41.2	42.7	44.3
100%	31.7	33.3	35.0	36.7	38.4	40.0	41.7	43.4	45.1	46.7	48.4

C. Contributions of Different Groups when Halving Wage and Employment Gaps



Sources: CBS, and IMF staff calculations.

[10] These illustrative calculations, based on 2015 data, assume that the relative change in output is equivalent to the relative change in total wage payments.

[11] MoF (2016) estimates that closing only the monthly wage gender gap between non-Haredi Jews by 40 percent (with no change in gender gaps of other populations) could yield a long-term output gain of about 7 percent, considering changes in the demographic composition. A simpler simulation by staff, without taking into account the demographic changes, finds a similar impact of around 7¾ percent.

C. Strengthening Redistribution While Protecting Participation

17. Addressing these inequality and poverty issues in a sustainable manner requires a multi-pronged approach:

- Reducing gaps in labor productivity and participation in both short- to long-term through a range of reforms supported by additional resources, especially in education and training, coupled with steps to reduce gender gaps.
- New measures to increase redistribution should be carefully designed to avoid creating disincentives to work that would partly undo the benefits for disposable income. This suggests a focus on strengthening support that is conditional on work while also ensuring adequate support for those who cannot work.
- The recurrent nature of the associated additional fiscal costs implies a need for recurrent financing by generating savings through reforms or reprioritization, or raising revenues.

Increasing Productivity and Participation

18. Enhancing the education system and job training should be at the center of a strategy to narrow labor productivity and participation gaps. Deep reform in the education system, including vocational training, as well as active labor market programs (ALMP), is required:

- **Education.** Education spending has been raised recently, primarily through increases in teachers' pay. But the academic qualifications expected of teachers remain low and the teaching day unusually short.[12] Educated in the separate schools of the Haredi community, many Haredi men lack education in math, science, English, and other market-oriented disciplines. Arab schools are receiving increased support and there are signs of quality improvement, but there are still large gaps, including in Hebrew skills, which affect employability.[13] It is therefore critical that the effectiveness of schools be increased, including through higher standards for teachers, covering core subjects at all grades in Haredi schools, improving Hebrew teaching in Arab schools, and extending the short school day.
- **Vocational training** Close involvement of suitable experts from the business community in the selection and design of vocational training courses is important. The modalities for delivering training should facilitate participation by the Haredi and Arab communities. Career centers should guide job seekers to suitable training, including business-oriented Hebrew. Low wage workers should receive support for training costs to upgrade their skills, and the government

[12] Dan Ben-David and Ayal Kimhi, An Overview of Israel's Education System and its Impact, Shoresh Research Paper, December 2017.

[13] Taub Center, 2017, The Arab education system in Israel: Are the gaps closing?

could also introduce a transfer program that is conditional on completing eligible classes and courses or participating in job training.

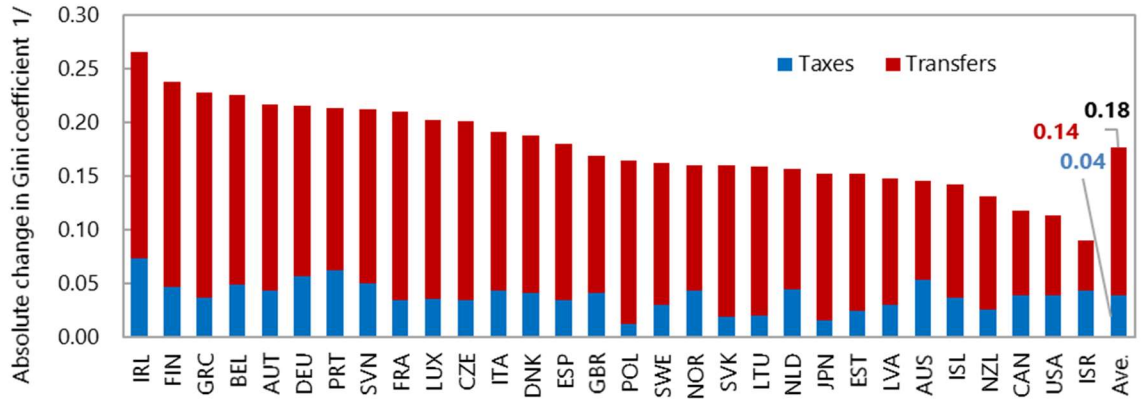
- **Active labor market programs (ALMPs).** External analysis of the Employment Circles program to enhance the "soft skills" of welfare recipients finds significant employment gains, especially among the Arab population, with the program paying for itself after only seven months. Preliminary results from a second ALMP program show that subsidizing mobility to jobs outside the home town of jobs seekers is also effective. Hence, government spending on ALMP of only 0.2 percent of GDP can be raised to expand its impact on participation.

19. Constraints on female participation should be alleviated to reduce gender gaps. Expanding childcare support, especially for younger children and afterschool care programs, would help promote female labor participation.[14] The 2019 budget allows for additional NIS 0.75 billion in afterschool programs. For women in minority groups, easing access to the workplace through improving commutes by enhancing public transportation or incentivizing new economic hubs close to minority areas, and developing work practices that allow participation of women with socio-cultural constraints, would also be helpful.

Improving Redistribution While Preserving Work Incentives

20. Israel has the lowest redistribution among advanced economies (Figure 13). Israel's tax progressivity—which reduces the Gini coefficient by 4 ppt—is broadly in line with the average for advanced economies. But the redistribution through transfers—which reduces the Gini coefficient by another 4 ppt—is substantially below the peer average (14 ppt). With inequality of market incomes being moderately below the average of peers, a mechanical calculation implies that increasing redistribution to the average level of advanced economies could place Israel at the frontier of disposable income equality.

Figure 13. Redistributive Impact of Taxes and Transfers in Advanced Economies

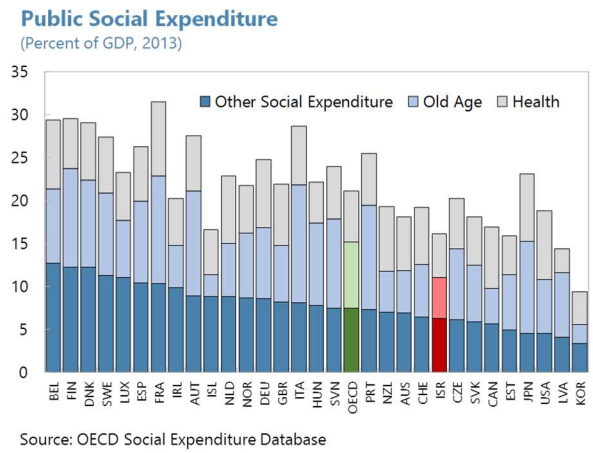


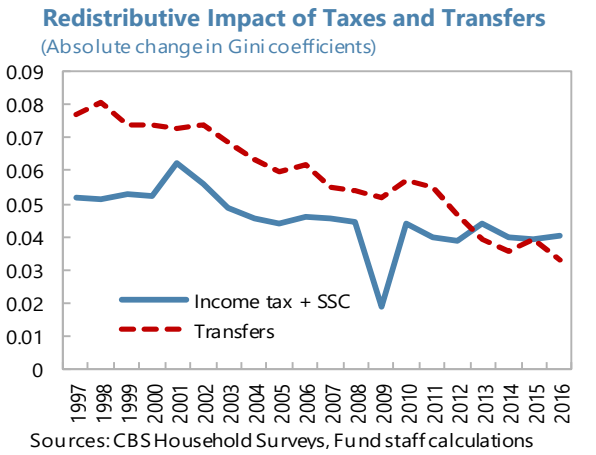
Source: IMF "October 2017 Fiscal Monitor."
1/ Calculated as Gini Coefficient for market income minus Gini coefficient for disposable income.

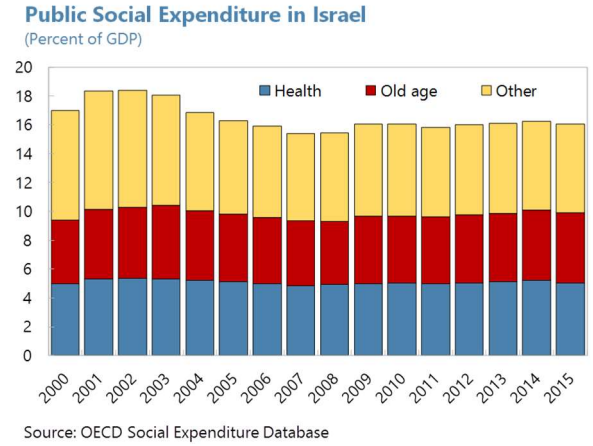
[14] Christiansen and Sierhej (2016) point that provision of childcare tends to have a positive association with labor force participation, while family cash transfers are negatively correlated.

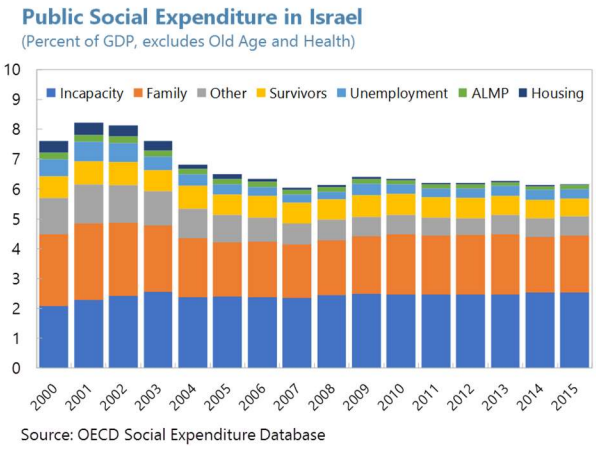
21. The redistributive impact of taxes and transfers has declined since the early 2000s (Figure 14). The impact of taxes has declined moderately and has remained broadly flat since 2010. The impact of transfers has declined markedly to about half of the level in 2000. Excluding old-age and health spending, the share of public social expenditures in GDP declined by about 1½ percentage points since 2000 (or two percentage points from the peak in 2001). The items that have seen large reductions include child allowances (0.8 ppt), housing assistance (0.3 ppt), cash benefits for socially excluded (0.3 ppt) and income support benefits (0.3 ppt).

Figure 14. Redistributive Policy in Israel









22. Redistributive measures to contain poverty can also support participation and productivity if carefully designed. The reductions in social benefits—especially child allowances—in the early 2000s aimed to strengthen incentives for labor participation.[15] Substantial progress in

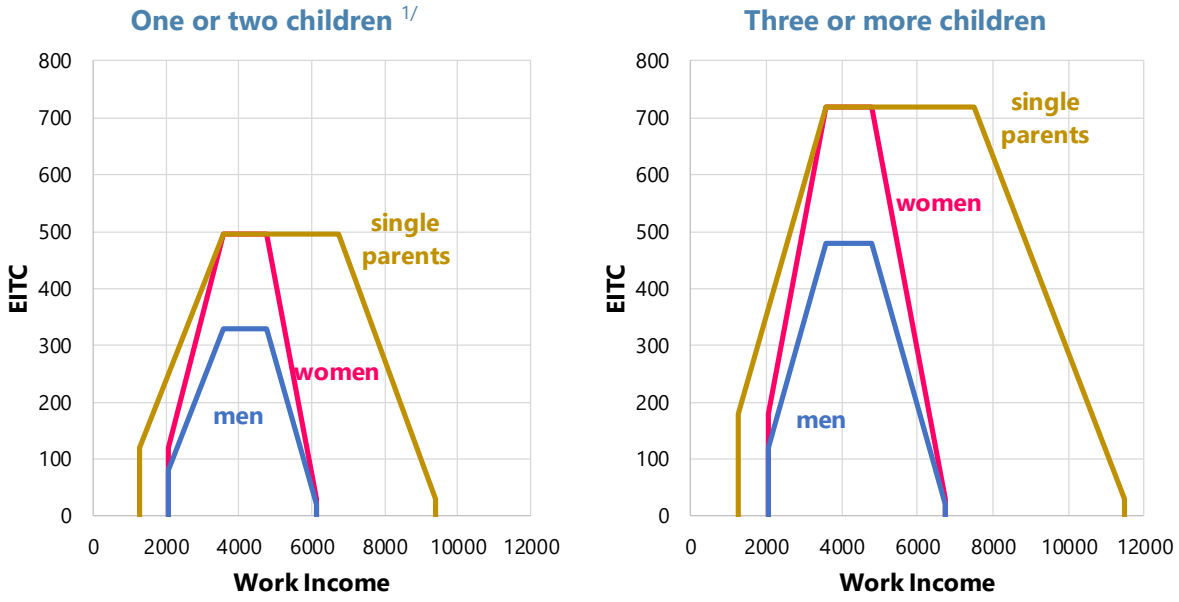
[15] Prior to May 2003, the monthly allowance increased substantially from the fourth child onwards, possibly creating incentives to higher fertility, with a negative impact on labor participation. The 2003 reform set a flat-rate benefit per child. However, as the children who were born under the old schedule were grandfathered, the impact was seen only gradually. In 2009, another reform was introduced to provide an additional allowance for the second to fourth children. Average annual allowances per child dropped from more than NIS 4,000 before the 2003 reform to around NIS 2,000 in 2013 (Thegeya, 2015).

raising the participation of Haredi women has been made since then, but progress with Haredi men has been smaller and appears to have leveled out in recent years. Simply raising transfers alone could lead to some reversal of this progress. Conditionality and targeting are key ingredients of a potential way forward. Conditionality helps social policies mitigate poverty while also promoting labor participation or skill development. Targeting helps to contain fiscal costs by prioritizing the resources to the segments of the population most in need.

23. The earned income tax credit (EITC) program is a natural candidate to support both redistribution and participation. The EITC is a tool that incentivizes labor participation as only those who pay income tax are eligible for the tax credit, which is consistent with Israel's "welfare-to-work" approach. Benefits are calculated on an individual basis according to a set of trapezoidal schedules (Figure 15). The payment of EITC began in 2008 in a pilot manner, which was extended nationwide in 2012. The eligible populations contain workers (including the self-employed) with at least one child, or of 55 years old or above. In 2016, benefits for single parents and populations with disabilities were raised, while the eligibility requirements for the self-employed were modified to be aligned to those for employees. In 2019, benefits are expected to be further expanded to raise men's benefits to the level of women, and to introduce a 30 percent bonus in benefits if the spouse has work income above the entry point of the benefit ceiling. The combination of individual benefits and spouse-related bonuses provides incentives for the participation of both spouses in the labor force.

Figure 15. EITC Schedules in Israel in 2017

(In NIS per month)

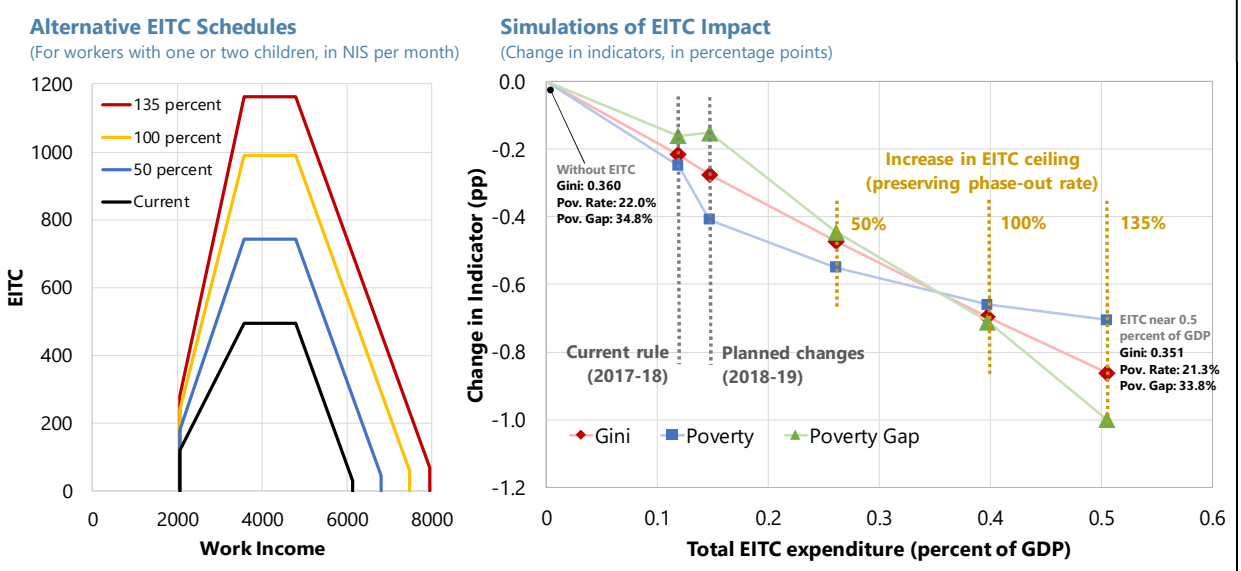


Source: Israel Tax Authority

1/ Workers above 55 years old without children have currently the same schedule as men with one or two children. The increase in EITC payments in 2019 will not apply to old-age workers.

24. The EITC can effectively address inequality and poverty, warranting an expansion of the amount and coverage. As 60 percent of the population under the poverty line have work as their main source of income, expanding the EITC has the potential to further reduce inequality and poverty. The amount of Israel's EITC has been expanded over time, and is expected to reach 0.16 percent of GDP in 2019, yet it remains low compared to 0.4–0.5 of GDP annually in the U.S. or the U.K. A simple estimate suggests that raising the ceiling of the EITC schedule by 100 percent would lift EITC spending to 0.4 percent of GDP annually, assuming no change in the marginal tax rates for the phase-out (Figure 16, left panel).

Figure 16. Simulations of EITC Expansion 1/



Sources: Israel Tax Authority, CBS Household Expenditure Survey 2016, and IMF staff calculations.

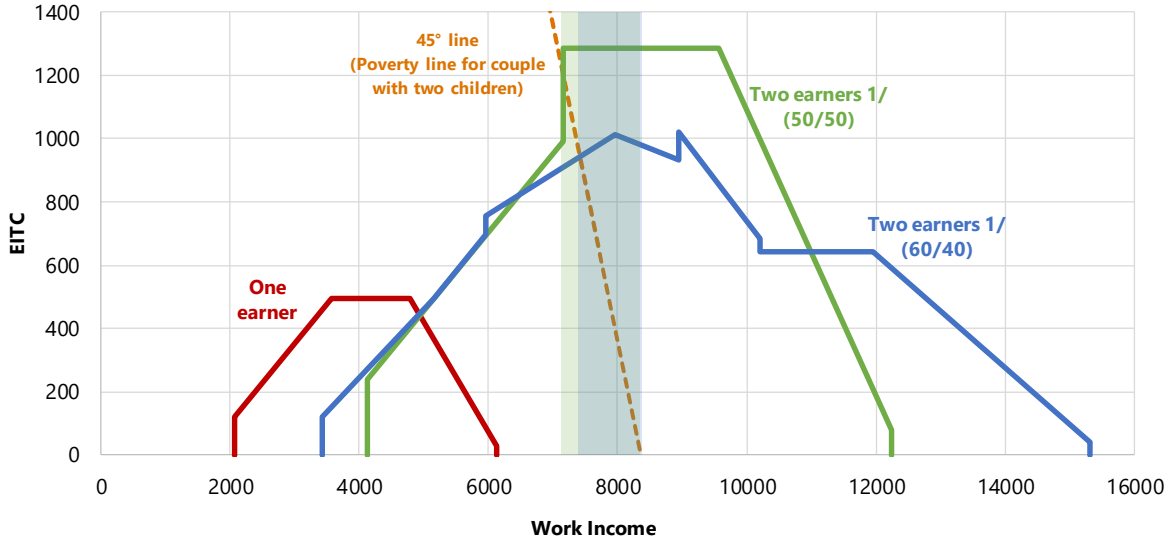
1/ The planned changes scenario includes the expansion of the schedule for fathers, and the 30 percent bonus for working couples with children. As exemplified in the left panel, the simulated EITC schedules are constructed by increasing the benefit ceiling (in increments of 50, 100 and 135 percent), maintaining the phase-out marginal rate (which causes the upper income threshold to be moved), and keeping the remaining income thresholds constant. In all scenarios, a take-out rate of 70 percent is assumed, and a maximum monthly household gross income of NIS 30,000 is used as a simplification of the additional income controls in EITC eligibility.

25. Such an EITC increase could reduce the poverty and Gini coefficient by ½ ppt (Figure 16, right panel). The rather modest impact on the poverty rate is due to the intrinsic nature of EITC schedules. Benefits for a household that comprises a couple with two children with a single earner are insufficient to lift them above the poverty line (red line on Figure 17). Even for households with two earners, only those in a narrow range of incomes (within the shaded area in Figure 17) can be lifted above the poverty line through the EITC. The MoF (2017a) considers that the most pronounced impact of the EITC is on reducing the poverty gap (the distance between poor households' income and the poverty line), and, to a lesser extent, in reducing inequality.[16]

[16] According to the MoF's estimates using the CBS Household Expenditure Survey 2015, the EITC reduces the poverty gap by 2.9 ppt to 35 percent, and the Gini coefficient by 0.2 ppt to 0.364.

Figure 17. Interaction of EITC and the Poverty Line

(In NIS per month)



Source: Israel Tax Authority, and IMF staff calculations.
1/ The combined schedules for two earners assume a constant split of work income between the couple (50/50 or 60/40 in the examples above). They consider the modifications included in the 2019 budget (equal treatment of men and women and 30 percent bonus if spouse income is above the entry point of the benefit ceiling).

26. Implementing the EITC more effectively can raise the work incentive and take-up, further enhancing the distributive impact. Israel's take-up of the EITC is currently around 70 percent, with varied participation across population groups, suggesting scope for further improvement. Enhancing the timeliness and frequency of credit refunds could tighten the perceived linkage between the benefit and work, better incentivizing work. One way to increase this frequency is to deduct the EITC from the monthly withholding of payroll tax. However, such schemes may be complex to implement for households with multiple earners or fluctuating income. In addition, the scheme is not applicable to the self-employed. Furthermore, employees have general concerns about receiving the EITC through their employers, as employers may reduce wages to partially offset the impact (BoI, 2015). Taking advantage of the existing infrastructure that is used for the social programs managed by the National Insurance Institute could also help improve the timeliness.

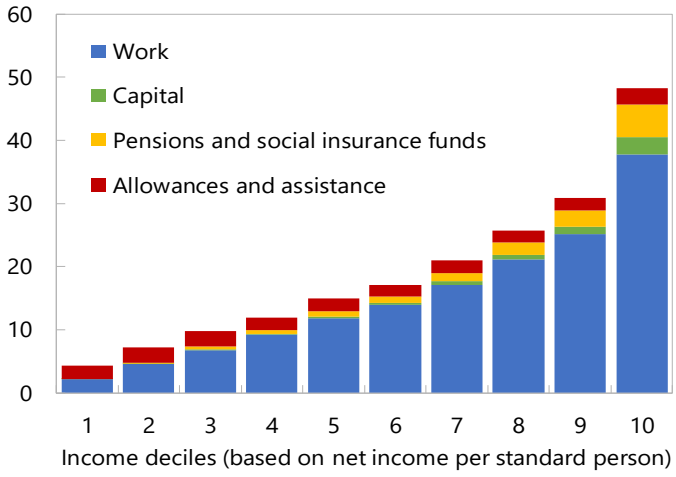
27. Additional direct transfers could be made conditional on skill development. To support the development of skills for youth and the working-age population, the government could introduce a transfer program that is conditional on completing eligible core classes (e.g., mathematics, science, technology, and English) or participation in job training. Additionally, attaching conditionality to some cash transfers can reduce the inequality of education outcomes, supporting the core education element of the inequality reduction strategy.[17]

[17] In other countries, conditional cash transfers have been attached to attendance of children at health clinic and school (as in Brazil), or to education performance (as in the U.K.). These schemes have been successful in ensuring access to basic education and health services, and in increasing investments in human and physical capital, reducing the inter-generational transmission of poverty (IMF, 2014).

28. Making transfers more targeted could facilitate a reallocation of resources to tackle the structural issues underlying poverty and inequality. Around 37 percent of the poor population have transfers as their main source of income. While an expansion of the EITC could incentivize poor persons with capacity to work to join the labor market, the most vulnerable groups cannot be reached through the EITC, and other transfer schemes are needed.[18] Israel's current transfer system is not targeted to the most vulnerable; in aggregate, it provides a similar amount—in shekel—to all households, even those in the top income decile (Figure 18). Targeting social supports to the lower households in the lower income deciles would free substantial resources to implement reforms discussed earlier help to address the underlying causes of low incomes.

Figure 18. Household Sources of Income

(NIS thousand per month, average)



Source: 2016 CBS Household Expenditure Survey

[18] MoF (2018) finds that those allowances that are intended for individuals who cannot participate in the labor market, such as old-age and disability benefits, have the largest contribution to poverty reduction.

References

Azary-Viesel, Sagit, and Ben-David, Dan, 2016, "On the Gender Gap in Israel's Labor Market," Policy Brief (Tel Aviv: Shoresh Institution for Socioeconomic Research).

Bank of Israel, 2015, "The Earned Income Tax Credit: A Preliminary Report on a Designated Survey among Eligible Individuals," Recent Economic Developments 140 (Jerusalem: Bank of Israel).

Bank of Israel, 2017, "Is there a Gender Difference in the Basic Skills of Workers and in the Return on those Skills in Israel?" (Jerusalem: Bank of Israel).

Berman, Eli, 2000, "Sect, Subsidy, and Sacrifice: An Economist's View of Ultra-Orthodox Jews", The Quarterly Journal of Economics, Vol. 115, Issue 3, pp. 905–953.

Ben-David, Dan, and Ayal Kimhi, 2017, "An Overview of Israel's Education System and its Impact," Shoresh Research Paper (Tel Aviv: Shoresh Institution for Socioeconomic Research).

Bleikh, Haim, 2016, "Poverty and Inequality in Israel: Trends and Decompositions," State of the Nation Report 2016 (Jerusalem: Taub Center for Social Policy Studies in Israel).

Fuchs, Hadas, 2016, "Gender Gaps in the Labor Market: Wage and Occupational Segregation," State of the Nation Report 2016 (Jerusalem: Taub Center for Social Policy Studies in Israel).

_____, 2017, "Education and Employment Among Young Arab Israelis," State of the Nation Report 2017 (Jerusalem: Taub Center for Social Policy Studies in Israel).

Christiansen, Lone Engbo, Huidan Lin, Joana Pereira, Petia Topalova, and Rima Turk, under the guidance of Petya Koeva Brooks, 2016, "Unlocking Female Employment Potential in Europe: Drivers and Benefits," (Washington: International Monetary Fund).

Christiansen, Lone, and Robert Sierhej, 2016, "Female Labor Force Participation in Poland," Republic of Poland: Selected Issues, IMF Country Report No. 16/211 (Washington: International Monetary Fund).

Cornfeld, Ofer, and Oren Danieli, 2015, "The Origins of Income Inequality in Israel—Trends and Policy," Israel Economic Review Vol. 12, No. 2 (2015), pp. 51-95 (Jerusalem: Bank of Israel).

International Monetary Fund, 2014, "Fiscal Policy and Income Inequality," IMF Policy Paper (Washington: International Monetary Fund).

Israel Ministry of Finance, 2016, "The Next Locomotive of Growth? The Economic Benefit of Reducing Gender Disparities in the Labor Market," Weekly Focus (Jerusalem: Ministry of Finance).

_____, 2017a, "The Effect of the Labor Grant (Negative Income Tax) on Poverty and Inequality," Weekly Focus (Jerusalem: Ministry of Finance).

_____, 2017b, "Is there a glass ceiling for women," Weekly Focus (Jerusalem: Ministry of Finance).

_____, 2017c "Employment and Wages among Haredi Men", Weekly Focus (Jerusalem: Ministry of Finance).

Israel Ministry of Finance, 2018, "Contribution of allowances and compulsory payments to reducing poverty in Israel", Weekly Focus (Jerusalem: Ministry of Finance).

OECD, 2018, "OECD Economic Surveys: Israel 2018." (Paris: OECD).

Regev, Eitan, 2016, "Challenges of Haredi Integration in Academic Studies," State of the Nation Report 2016 (Jerusalem: Taub Center for Social Policy Studies in Israel).

_____, 2017, "Patterns of Haredi Integration into the Labor Market," State of the Nation Report 2016 (Jerusalem: Taub Center for Social Policy Studies in Israel).

Shachar, Ella, "The Effect of Childcare Cost on the Labor Supply of Mothers with Young Children," Discussion Paper No. 2012.12 (Jerusalem: Bank of Israel).

Taub Center, 2017, "The Arab Education System in Israel: Are the Gaps Closing?" Bulletin Article (Jerusalem: Taub Center for Social Policy Studies in Israel).

Thegeya, Aaron, 2015, "Income Inequality in Israel," Israel: Selected Issues, IMF Country Report No. 15/262 (Washington: International Monetary Fund).

Yashiv, Eran and Nitsa Kasir, 2015, "The Labour Market of Israeli Arabs: Key Features and Policy Solutions," Policy Insight No. 78 (Washington: CEPR).