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Israel's National Transfer Accounts: Income, Expenditures, and Life-Cycle Deficits

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The Fiscal Consequences of Changing Demographic Composition: Aging and Differential Growth Across Israel's Three Major Subpopulations

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According to the definition of the Central Bureau of Statistics, national accounts "comprehensively and in detail describe the economic activity in the economy, the relationships among the country's economic agents, and the links between the Israeli economy and abroad. [...] This system is used to monitor economic developments, to conduct macroeconomic analysis, for economic planning and forecasting, and for international comparisons" (Central Bureau of Statistics, 2020, p. 221).

With the acceleration of population aging — a global phenomenon characteristic of both developed and developing countries, stemming primarily from increased life expectancy and declining fertility rates — there is a growing need for an analytical framework that can assess how of shifts in age composition affect economic activity and economic growth. In response to this need, at the end of the 1990s a complementary framework to national accounting was developed — National Transfer Accounts (NTA). It incorporates data on intergenerational transfers obtained from surveys representing the entire population into standard national accounts. The integration of micro and macro data enables an analysis of a country's economy through the age distribution of its population. Moreover, simulating the expected changes in the age structure can provide a fairly detailed picture of the anticipated shifts in various macroeconomic indicators resulting from changes in age distribution.

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In this paper, we present this innovative tool to researchers and decision makers in Israel in the belief that it can assist in shaping economic policy in accordance with expected demographic developments. Furthermore, to provide a more global perspective, we compare Israel's NTA accounts for 2018 with those of other countries around the world, highlighting Israel's unique demographic-economic characteristics.

Introduction

Over the last 20 years, the National Transfer Accounts (NTA) project has become the main empirical framework for combining classical national accounts systems with core demographic characteristics, in particular age structure. The NTA does this by disaggregating the major components of the national accounts in order to quantify life-cycle deficits at both the per capita and aggregate levels, and identify the types of reallocations, including private transfers within and between households, that help resolve those deficits. By building this unique accounting architecture of the *generational economy*, that is, tracking life-cycle consumption smoothing through deficits and the reallocations that finance them, the NTA also makes it possible to forecast the fiscal consequences of shifts in population composition. This refers not only to aging, but also to the shifts that have been accompanying it in most places: increases in education, changes in economic activities, in the magnitude of public transfers, in the intensity of private transfers, and in all other reallocations used to shift resources across age groups or from one subpopulation to another.

The analytic power of the NTA means that it is now centrally featured in many reports issued by the World Bank, the IMF, and the UN population division. Partial NTA estimates are now available for almost 100 countries, including almost all members of the OECD and emerging economies, and full estimates are available for a large subset of these. Yet until now, no estimates whatsoever have been available for Israel. This is unfortunate given Israel's unique economic-demographic profile. Broadly, as described below, Israel has the macroeconomic, educational and mortality profile of a high-income country, the fertility patterns of a low-middle income country, and, as a consequence, it has

the highest overall dependency ratio of any high-income country in the world.[1] This unique profile has broad implications. Among many other things, it means that Israel has not yet completed its main or first *demographic transition*. This refers to the profound changes in age distribution associated with sharp reductions in both mortality and fertility that all other high-income countries — barring some wealthy petrostates — have experienced, and that have such profound consequences for the generational economy. As a result, Israel is the only economically diversified high-income country to have experienced much of the second demographic dividend (economic growth stemming from improved human capital) before experiencing the first demographic dividend (economic growth stemming from an increased share of the population at working ages).

Our principal goal in this paper, the first in a series, is to introduce baseline NTA estimates for Israel. Much of our description will be familiar to those who know NTA's core ideas and methods. However, since we have two key goals — to simultaneously introduce this accounting system to our Israeli colleagues and introduce Israel's unusual demographic-economic interactions to our non-Israeli NTA colleagues — we intentionally err on the side of presenting more rather than less. As such, the paper is divided into two main sections. In the first, we briefly describe key characteristics of the NTA project, some pertinent features of Israel's unusual sociodemographic and economic profile, and the data used to produce our estimates — the latter are available through the NTA site, alongside those of all other member countries. In the second, larger section, we will review the main features of Israel's NTA accounts relative to those of other high-income countries, pointing toward areas where Israel's unique economic-demographic profile can be seen. While presenting these data, we will provide a fuller description of the specific variables. Sources of data are specified in Appendix A. We will close with a summary of key findings.

1 The overall dependency ratio is the sum of the child dependency ratio (number of people aged 0–19/number of people aged 20–64) and the old age dependency ratio (number of people aged 65+/number of people aged 20–64). It is a frequently used measure of a country's economic stability given its age structure, but also an increasingly flawed measure given rising employment at older ages, often high unemployment at younger ages, and increasing wage inequality by education (which significantly affects tax rates and public spending). Each of these weaknesses is addressed in the NTA system.

In terms of substantive results, six key differences emerge between Israel's NTA profile and that of other high-income countries:

1. Israel's public expenditures on education are substantial and they continue longer than in most high-income countries. They begin in early childhood — broad coverage starting at age 3 — and last deep into people's 20s.
2. Israelis enter the labor market somewhat later than in most countries, and, as a result, they reach their life-cycle surplus, when their labor income exceeds their total consumption, later in life.
3. Israelis remain in the labor market for longer than their counterparts in other high-income countries, due to later entrance into the labor market and relatively low replacement rate of pensions.
4. Israel's life-cycle deficit as a percentage of GDP is much higher than the average for high-income countries.
5. As a share of average income, private transfers — both intrahousehold and interhousehold — are relatively high and extend over more years.
6. Net interhousehold transfers are negative for the elderly and continue deep into people's 70s, meaning that there is pronounced elderly support for younger generations.

Section 1: The basics

The NTA offers a comprehensive accounting of income, consumption, and economic flows or transfers from one age group or generation to another within a given population, integrating public and private measures included in the System of National Accounts (SNA). More recent extensions of the method have disaggregated all of these measures across other types of groups within a population, for example across gender or educational categories (Hammer & Prskawetz, 2022; Spielauer et al., 2022). Thus far, our own extensions of the NTA analysis within Israel are focused on differences across Israel's distinct subpopulations — Haredim (ultra-Orthodox Jews, about 13% of the population), non-Haredi Jews and "Others" (about 67%) and Arabs (about 21%) (Shraberman & Weinreb, 2024).

In all cases, the NTA is designed to cover the complete life cycle, from birth to death, considering how people at every age produce, consume, transfer to others, and save. Age-specific indicators of these individual- or household level behaviors are derived from survey data based on nationally representative samples. In our estimates for Israel, we use data from the Households' Expenditures Survey, Labor Force Survey, and Long-term (Longitudinal) Survey. Using standard NTA methodology (United Nation, 2013), we then combine age-specific patterns derived from survey data with measures of the country's economic activity from the SNA, calibrating one to the other.

There are two broad categories of flows in the NTA system: inflows and outflows. The particular direction is always from *the perspective of individuals (not households)*. Thus, all resources or services consumed by residents, such as education or healthcare or infrastructure, are defined as *inflows*, and all resources provided by residents, such as taxes paid and interhousehold transfers,[2] are defined as *outflows*. Saving is a balancing item. When individuals save they generate an outflow (for the future) and when they dissave they generate an inflow (from the past).

Consistent with this micro- and individual-level focus, all institutions in the NTA, from private institutions such as households and corporations to the state are treated as intermediaries or agents that represent the interests of individuals. For example, flows to and from any of these institutions are treated as flows to and from the individuals who are stakeholders in those corporations, and who bear the costs or reap the benefits associated with those flows. In order to construct a complete set of accounts for the country, flows to and from the rest of the world (ROW) are also documented. As detailed below, the age-specific measures of flows, generated from household-level survey data, are then calibrated to their aggregate-level parallels in the System of National Accounts (SNA). The key structural advantage of the NTA as an analytic tool is that it is a true interactive model linking three distinct but interrelated dimensions:

1. Core economic characteristics and outcomes of individuals and households

2. Demographic shifts in terms of changing size and composition of population, where compositional change includes shifts in the age distribution or in

2 Note, however, that while interhousehold transfers are outflows for those making the transfers, they are inflows for those receiving them.

the relative size of subpopulations with distinctive educational and labor market characteristics, etc.

3. Macroeconomic outcomes

This structural advantage has other important implications. First and foremost, by carefully calibrating aggregations of age-specific income, consumption and transfers to their value in National Accounts, NTA provides a unique analytic architecture to visualize how macro-level variables are distributed within the economy. This integration of macro and micro measures allows researchers to reconfigure generational accounting in a more layered way than is possible in older models (e.g., those associated with Auerbach et al., 1991). In turn, this allows researchers to estimate life-cycle deficits at a given point in time, how it changes over time, and also to anticipate how projected patterns of population change, in terms of both absolute and relative shifts in age or other compositional factors, will affect life-cycle deficits in the future, through aggregate measures of taxation, public expenditures, and even environmental outcomes.[3] Projecting these types of shifts is essential for empirically anchored mid- and long-term policy planning.

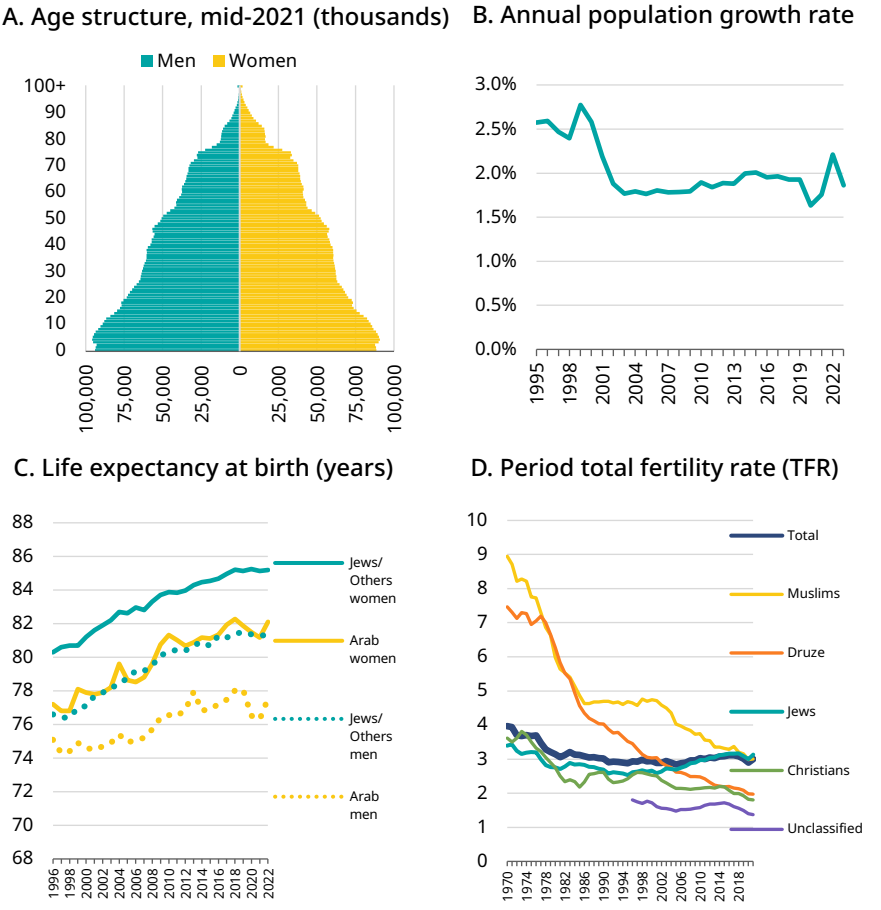
Second, extensions of the same methodology can be used to estimate the different life-cycle deficit patterns of key subpopulations. This is particularly important in Israel, whose discrete subpopulations have quite distinct patterns of employment, income, consumption, age structure and demographic growth. In the same way, extensions allow us to simulate what will happen across the economy if there is change in one of the model parameters. For example, given anticipated demographic growth, what will happen to overall tax revenue and government expenditures if the labor force participation of Haredi men increases, the fertility of Jewish women begins to fall, the age or ethnic composition of the population changes, the retirement age increases, and so on, or if none of these changes occur even as the population grows and its composition changes? These are all critical questions, especially in light of Israel's highly heterogeneous population. The baseline estimates that we present in this paper will anchor answers to some of those questions that we will address in future extensions of our Israel-focused NTA research.

3 By constructing nutritional and waste-generating consumption age-profiles, it is possible to project GHG emissions, waste accumulation and even public health outcomes.

Israel's unusual sociodemographic profile

A number of relevant characteristics of Israel's population can be seen in Figure 1. Panel A shows Israel's distinctively young age structure. As of June 2022, approximately 28% of the population was under age 15, and 12% aged at least 65, with rapid growth in the population above age 80 forecast over the next decade, given the distinctive bulge around age 75.

Figure 1. Selected demographic characteristics of Israel's population



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: Israel's CBS

Israel's population growth rate averages 1.9% per year since 2000 (Panel B). As implied by the age structure, most of that growth — roughly 80% in most years — has been "natural," that is, arising from the excess of births over deaths. This is in spite of increasing rates of net in-migration to Israel in the last decade preceding the 2023–2024 Gaza War.

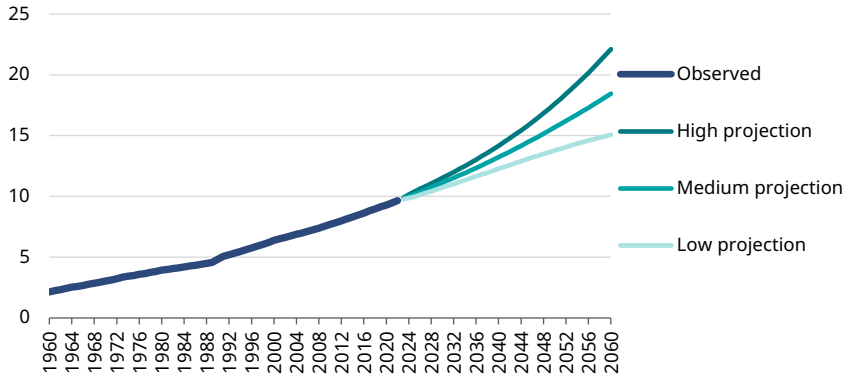
This high rate of natural growth is rooted in Israel's unusual combination of very high fertility and very high life expectancy. Israel's Total Fertility Rate (Panel D) has remained above 3.0 almost every year since Israel's founding in 1948, only dipping beneath it briefly in the mid-1990s, in 2020, 2022 and, based on our own extrapolations from data on the recent number of births, in 2023 (Weinreb, 2024; Weinreb & Shraberman, 2022). This overall stability in the TFR disguises substantial shifts across different subpopulations. Specifically, fertility reductions in Israel's diverse non-Jewish populations have been offset by moderate rises in the fertility of Jewish women above age 30. Life expectancy (Panel C) is also high and rising. As of 2019, according to UN Population Division estimates, overall life expectancy at birth was around 82.8, placing it in the top-10 countries globally. Jewish men and Arab women were close to this national average, trailing Jewish women (85.1) and topping Arab men (78.1). Across all groups, with the exception of Arab men, life expectancy had been rising by around 2.5 months each year since 1996 — for Arab men, affected by much higher rates of smoking and a higher incidence of type-II diabetes, increases were slower, at 1.6 months per year. As in many other high-income countries, the pace of increase started to flatten in the final years prior to the Covid-19 pandemic, and, as a result of the pandemic, life expectancy dropped by around 3 months in 2020 and an additional month in 2021 (Weinreb, 2021; 2022).

Together, these demographic trends mean that Israel has the highest overall dependency ratio of any high-income country. The underlying stability of its core demographic components have also fed a uniform bullishness about prosperity arising from a larger work force, higher consumption and human welfare, alongside considerable anxiety about the disproportionately rapid growth of Israel's less educated and less productive subpopulations. As can be seen in Figure 2, between 1960 and 2022, Israel's population grew from 2.15 million to 9.65 million. For some perspective on this rate of growth, if the populations of France, Italy, or the UK had grown at the same rate, they would now be 203 million, 225 million and 235 million, relative to actual 67.5, 59.4 and nearly 67.1

million, respectively.[4] By 2060, according to Israel Census Bureau's projections, Israel's population will reach 15.1 million in the low variant projection — over the last few decades these have fallen short of actual growth — 18.4 million in the medium variant, and 22.1 million in the high variant. In each of the latter, growth is projected to continue at least into the end of the century, bringing Israel's population on par with that of Spain. We note, too, that this overall outlook is shared by UN and IHME projection models. All point to continued high levels of growth into the late 21st century.

Figure 2. Israel's population, 1960–2060

Millions



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: Israel's CBS, Long-term projections

To set the stage for Israel's NTA profile, we also briefly survey a number of other aspects of Israel's sociodemographic and economic profile.

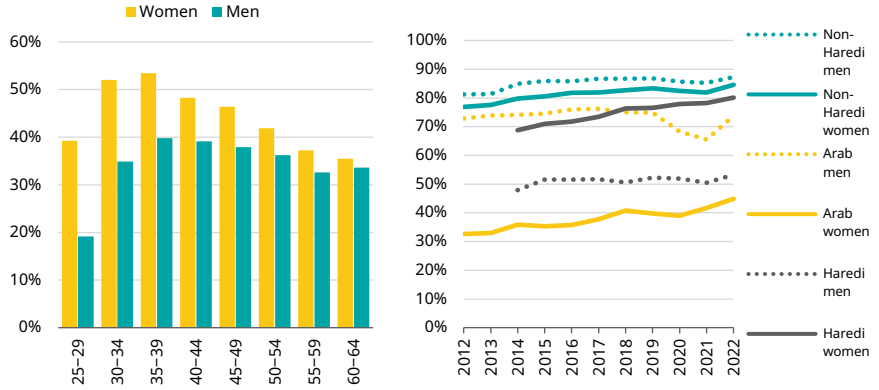
First, a relatively high share of Israel's population is university-educated, especially at older ages. This can be seen in Panel A of Figure 3. Overall, as of 2022 more than 30% of Israel's male and female population aged 55–64 had an academic degree. Among those in the 35–44 age group, the share was around 50% of women and 40% of men. Here, too, these relatively high averages hide

4 Total population in 2020, OECD Statistical Portal.

substantial differences across subpopulations, especially at older ages. Below age 30, university enrollment has increased dramatically among Israeli Arabs, especially Arab women — more than 20% of students in higher education in Israel are Arab, on par with their share of the population (though still less than their share at young adult ages). In fact, university enrollment now only lags significantly among Haredim, especially men, who mostly dedicate themselves to religious studies and rarely receive a formal secular education after primary school. Only 10% of Haredi men aged 25–64 have an academic degree, relative to 28% of Haredi women.

Second, as shown in Panel B of Figure 3, Israel has high levels of employment. As of 2022, around 87.2% of Jewish non-Haredi men aged 25–64 were employed, as were 85% of their female counterparts. Haredi women and Arab men also tend to work at high rates, though among the latter the rate fell in the years prior to Covid (and has since recovered). The two groups with much lower employment rates are Haredi men and Arab women, though among the latter, there has been a noticeable rise in recent years, especially among younger cohorts.

Figure 3. Key measures of educational attainment and employment in Israel, ages 25–64



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: Israel Labor Force Survey

Third, Israel mandates military service for young Israelis, and this marks a crucial difference in the life-course relative to the norm in almost all other developed countries, and relative to their Arab and Haredi compatriots, who generally do not serve in the army. Among Jews, Haredim are given an exemption from serving in the army, but this comes at a cost of being required to remain in their religious study institutions (Yeshivot) and not being allowed to enter the workforce until their mid-20s. Among the Arabs, the Druze, and to a lesser extent the Bedouin and Arab Christians, habitually serve in the army, but these religious groups are much smaller than Arab Muslims. Of course, several other high-income countries have mandatory service that is quite lengthy — notably Cyprus, Singapore, South Korea, Switzerland, Taiwan, and Turkey. But Israel is the only high-income country that mandates it for women as well as for men. Moreover, relative to those six other countries, military service in Israel is also longer: 32 months for men and 24 months for women (a minority of Jewish women — mostly religious — perform some other form of National Service that typically lasts 1 or 2 years). Finally, in most high-income countries with mandatory military service, there is some flexibility in terms of when to serve, so the overall effect is diffused across age-specific measures. That is not the case in Israel. People uniformly begin within a year of completing high-school at age 18 or 19 and then, after completing the mandatory period of their military service, frequently take time off before entering higher education. As a result, Israeli women and men begin their post-secondary and academic degree programs at much higher median ages than do their counterparts in most high-income countries: our estimate for Israel is 22 and 23, respectively. Add to this the higher subsequent fertility, around 94% of which is within marriage (relative to around 55% in OECD countries on average), and it becomes clear that Israelis have a more compressed life-course in their 20s and 30s, filled with overlapping events — studying, marrying and having children — that in other countries, where these life events are approached in a more discrete series of sequential steps, if at all.

A final set of considerations that help us understand Israel's NTA patterns is related to more general macroeconomic and fiscal characteristics.

Overall, despite rapid population growth, Israel's GDP per capita has grown somewhat faster than that of most high-income countries over the last 20 years, yet it remained just below the OECD average, due in part to the economic crisis that followed the second intifada in 2001–2003.[5] Relative to other OECD countries, it also has somewhat low tax revenues as a percentage of GDP,[6] and a relatively low debt-to-GDP ratio (brought back to around 60% in 2023, after excess borrowing associated with Covid expenditures pushed it up around 70% in 2020 and 2021, though it then climbed again to around 69% in 2024 because of the war). Additionally, public civil spending is also constrained by other factors. In the years prior to the current war, defense spending fell to around 4–5% of GDP, notably higher than in any other high-income country (except, in recent years, for Poland), but is expected to rise to 6.5% of GDP in 2025. The total percentage of GDP devoted to R&D is also higher than in any other high-income country — it also exceeds 5%, though this comes from a mix of public and private sources. The combination of these factors means that there is less fiscal room for other types of public expenditures in Israel. This opens a space for private consumption and transfers, especially intergenerational transfers, as will become clear in the NTA estimates.

Introducing the NTA

The two central variables in the NTA system are labor income (YL) and consumption (C) — all expenditures fall under C in the NTA framework.[7] The difference between these two variables (C-YL) is the life-cycle deficit (LCD). Both YL and C comprise several other variables, that are further divided into

5 Other than Ireland and South Korea, all high-income countries with growth rates higher than Israel's in the 2001–2022 period are towards the lower end of the GDP-per-capita distribution or are economies in transition. For details, see Appendix Figure A1.

6 For details see Appendix Figure A2.

7 In the economics, the term *consumption* is used for private or household expenditures and also for government spending that finances public services provided to individuals and household, such as health, education, security, etc. For example, public consumption of health refers to public expenditure on health in the country. Likewise, we use the term in this way throughout this paper when referring to consumption in the two contexts whether private or public.

measures of public and private transfers. These are the crucial economic indicators for understanding gaps between C and YL, defined as life-cycle deficits, and how those deficits are financed at the household level or through public expenditures. The NTA framework can also be used to identify particular subpopulations for which life-cycle deficits are more pronounced. We present these in a separate analysis (Shraberman & Weinreb, 2024).

Before presenting the estimates of YL, C, and transfers in Israel, we point to a number of characteristics of the NTA in general.

First, as noted above, we used standard NTA procedures throughout to generate all our estimates (the methods are detailed in United Nations, 2013). Two main types of data were used. Macro-variables were taken from the System of National Accounts (SNA) Statistics.[8] Age-specific measures at the individual level were estimated from 2018 data collected as part of the Households' Expenditures Survey (HES), Labor Force Survey (LFS) and the Long-term (Longitudinal) Survey (LT). Each of these is a nationally representative survey fielded by Israel's Central Bureau of Statistics. More information on each is available in Appendix A.

Second, the aggregate value of a given variable at each age reflects a given individual's probability of participating in a given activity at that age, multiplied by the average monetary value of those participating in the activity, multiplied by the total number of people at that age. For instance, the value of aggregate private consumption of education at a particular age is a product of the average private expenditure per student in formal education at that age, the age-specific rate of enrollment in formal education, and the total population at that age. The private education consumption age-profile is estimated from HES data, enrollment by age from OECD data (as reported to them by Israel's Ministry of Education), and population estimates are from the Annual Statistical Abstract. The overall value of private consumption of education in Israel is simply the sum of this product across all ages. In the final stage, this aggregated estimate is calibrated to the overall SNA value of private expenditures on education, making individual-level estimates consistent with the macro level accounting.

8 For convenience, National Accounts Statistics data were downloaded from OECD Statistical Portal. Israeli data are official publications of the Central Bureau of Statistics of Israel (CBS) according to ISIC rev4 definitions of SNA.

Third, NTA estimates are typically presented in both per capita and aggregate terms, with each arrayed against age. Differences in age structure across countries, or across groups within a country, can lead to profoundly different patterns between these two levels, which in turn allows for a deeper understanding of the source of differences across countries.

Fourth, to facilitate a better comparison across countries on each of its per capita measures, NTA normalizes the age profiles to Labor Income (YL) at ages 30–49. In other words, it normalizes age-specific patterns to the particular level of labor income in each country.

Finally, the observations of individuals aged 80 and above are limited in Israeli survey data. As a result, the oldest age group in our calculations is 80+. This is not ideal since we cannot distinguish patterns of consumption and transfers at above age 80. However, it does not affect the identification of key parameters below that age, which is where the vast bulk of expenditures and transfers occur. Nor does it affect estimates of aggregate spending above age 80.

Section 2: Results

Baseline

We present results by NTA category — broadly, labor income (YL) consumption (C), life-cycle deficit (LCD), then age reallocations — looking both at Israel-specific patterns and also at Israeli patterns in comparison to other high-income countries. In making these international comparisons we pay particular attention to different types of economies, welfare regimes and political-economic traditions, additionally distinguishing countries from continental Europe — including Conservative, Southern and Nordic welfare regimes — countries with liberal Anglo-Saxon approaches, and high-income countries from other areas of the world (Chile, Mexico, South Korea). Note that we use the latest available year for each country, with these ranging from 2008 to 2018. For example, Israel's data are from 2018, the US from 2011, and Sweden from 2008. Thus, differences between countries may also reflect a temporal factor.

Labor income (YL)

YL is the sum of two income sources: salaries from Earnings (YLE) and Self-Employment Labor Income (YLS).[9] The age profile of each of these was calculated from two main data sources: the Labor Force Survey (LFS) and the Household Expenditures Survey (HES). The LFS was used to calculate age-specific rates of salaried employment and/or self-employment. The average salaried wage and average self-employment income was then calculated from HES for salaried and self-employed individuals, respectively.[10]

The age profile of YL is presented in Figure 4. Panel A is the per capita profile, Panel B the aggregate (i.e., measured by the actual population at each age). A number of things can be seen. First, Israel's YL peaks just before people's mid-40s, and then slowly falls, rather than flattening out or even rising beyond the mid-40s. This general rise and fall is a standard age-pattern across countries and results from two things: employment rates fall at older ages alongside deteriorating health status, which is associated in particular with physically intensive or hazardous jobs; and those who are older and unemployed often struggle to be reemployed due to the obsolescence of their human capital (Neuman & Weiss, 1995). That said, per capita values of YL remain in the tens of thousands per year up to people's late 70s, in part because low pension replacement rates, especially among high earners, incentivize continued employment (see Appendix Figures A4 and A5). Second, comparing the per capita graph to the aggregate graph shows a clear age structure effect. Specifically, the reason that the level of per capita salaried wages after early 40s is convex while in the aggregate it is more concave is due to the relatively small cohorts in the ages 45–55 range, relative to those aged 35–45. Likewise, despite the non-trivial values of per capita YL above people's early 70s, the relatively small population at these ages means that the aggregate values are also relatively small.[11]

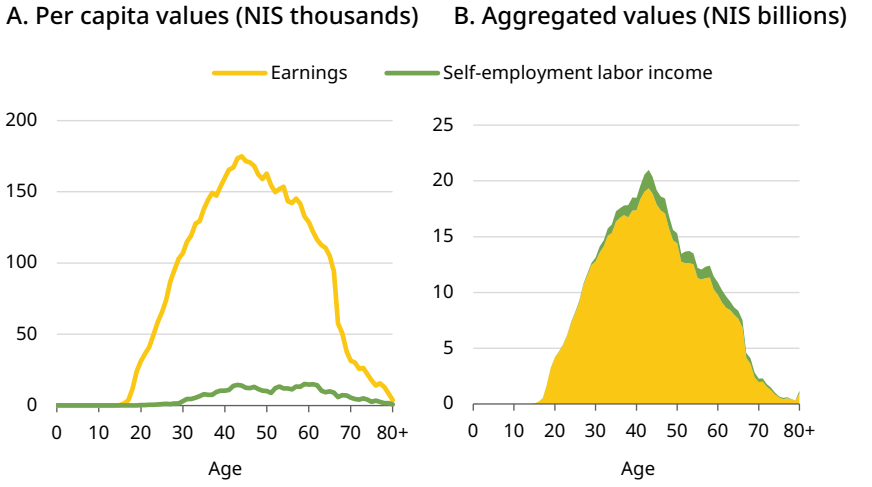
9 It is assumed that two thirds of total self-employment income related to labor and one third to capital/assets. For detailed age-profiles of self-employed and salaried income, see Israel's full NTA.

10 Note that YL is not intended to capture all household income. Other components of household income, including all public and private transfers, asset income and asset-based reallocations, are estimated separately in the NTA system. These are described in later sections of the present paper.

11 For a detailed chart of salaried income by age, see Appendix Figure A3.

Figure 4. Age profile of labor income (YL), per capita and aggregated, Israel, 2018

2018 prices



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Figure 5 presents the per capita measure across a number of countries, with each standardized to the labor income (YL) of those aged 30–49. Relative to all European countries in Panel A and most other countries in Panel B and Panel C, Israelis' YL starts a little later and it also rises slower in the 25–34 age range. Interestingly, the two countries with the most similar age pattern are South Korea, which also mandates lengthy military service (though, as mentioned above, not for women and not necessarily straight after secondary school), and the US.

Additional factors influence the relatively slow gains in YL in Israel. The first is the combination of high enrollment in higher education among those who have completed military service and the high share of those Israeli students who work during studies. Around 57% of those currently engaged in higher education are employed, most of them in temporary jobs with lower wages, especially relative to expected post-graduate wages (Debowy et al., 2021).

A second additional factor is related to the characteristics of the two populations that rarely or never serve in the military or in some other form of national service. This includes the vast majority of young Haredi men, who constitute around 15% of Israel's male population in the late teens to early 20s and who, as explained above, officially remain in religious institutions and out of the labor market, since that is the principal condition through which they may legally avoid the military draft. As of 2018, only 30.9% of Haredi men aged 18–29 were employed, relative to 77% of non-Haredi Jews and 63% of Arab men in the same age group.[12] Among Arab men, who constituted about 25% of Israeli men aged 20–29 in 2018, and with the exception of the Druze minority also had very low rates of military service, relatively low levels of education means that employment is disproportionately in low wage occupations (Berrebi et al., 2017; Kimhi & Shraberman, 2014).

The employment rate of Haredi women was much more similar to that of their Jewish non-Haredi counterparts: at ages 18–29, 73.5% of Haredi women, 78.8% of non-Haredi Jewish women, and only 33.2% of Arab women were employed. It is important to note that the sharp rise in educational attainment among younger cohorts of Arab women over the last 10 years are driving up their employment rates, but it will take some time for these changes to significantly affect Arab women's YL age profile.

A third factor that influences Israel's relatively slow rise in YL at younger ages is related to fertility. Over the last 20 years the mean age at first birth has increased by around 3 years among Jewish women and 1.5 years among Arab women (Weinreb et al., 2018). More than 90% of children are born within marriage, increasingly compressed into people's 30s, and the sheer number of children that families produce reduce time devoted to the labor market.

12 According to OECD requirements, from 2012 onward, employment rates also include those serving in the security forces.

Since many mothers take prolonged maternity leaves (beyond the 15 weeks that are state-funded), or choose to engage in occupations allowing part time employment, increases in salary are more gradual during their childbearing years, despite other financial and in-kind benefits that accrue to families with children. High childcare costs below age 3 is likely an added factor.[13]

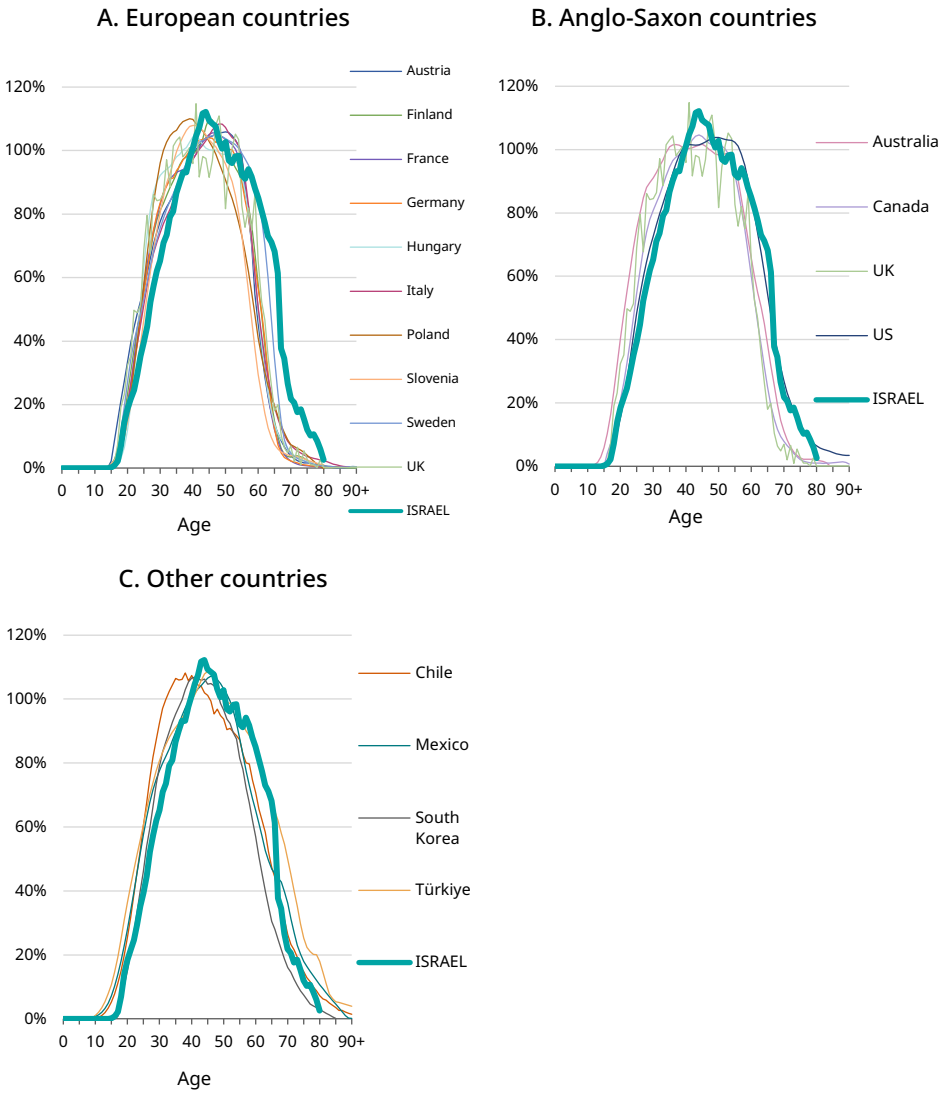
Another factor, which is a distinct characteristic of Israel's YL profile, is the length of time spent in the labor market. Like their counterparts in the US, the relative YL of Israelis in their mid-late 60s is the same as that of most of their European counterparts seven years younger, though it lags their age-mates in Turkey, Chile and Mexico. Other Taub Center analyses of labor force data in Israel show that the probability of a person aged 70+ remaining in the labor market rises with education and is also higher in white-collar professions (Axelrad et al., 2021; Kimhi & Shraberman, 2013). This makes sense given that these jobs are less physically demanding, and also given the relatively low pension replacement rates for high-earners. Some of these factors have also been observed in the USA, where the relatively high rates of employment among the elderly have been ascribed to a combination of pull and push factors, with the latter including concerns that the combination of social security benefits, private pensions and personal savings provide insufficient income (Button, 2019; Maestas, 2018), especially in face of high out-of-pocket costs of medical services in the US.[14]

A final factor in Israel is that larger family sizes, relative to all other developed countries, may propel Israelis into remaining employed for longer. Signs of this can be seen in high levels of interhousehold outflows at these ages, shown later, which are, in turn, consistent with grandparent's positive effects on fertility (Okun & Stecklov, 2021).

13 Public educational institutions are very scarce for ages 0–3, which keeps tuition cost very high for these ages. Aside from child allowances paid by the NII, tax credits are given for each child under age 18, granted to mothers. Since 2013, an additional 2 tax credits for each child aged 0–3 have been granted to fathers in order to ease burden of private pre-school costs. By design, all means-tested direct monetary support and many in-kind public services consider all dependents in families, and are therefore more beneficial for families with many children. For example, households' water bills (for domestic use) are calculated using per capita consumption thresholds; eligibility for income support and negative income tax are based on number of dependents within household; and before the beginning of each school year, the NII grants a lump sum benefit for each child in formal education, regardless of the marital status of parents.

14 For a comparison of pension replacement rates and employment of elderly, see Appendix Figures A4 and A5.

Figure 5. Age profile of labor income (YL) per capita, relative to YL(30–49), Israel and other high-income NTA countries, by continent or ethnocultural type



Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

In summary, Israel's YL profile looks a little different than that of most high-income countries. Israelis enter the labor force later, remain in it for longer, and their income increases at a somewhat slower rate than their peers in most Anglophone countries. There is, of course, substantial variation on all these measures across Israel's diverse subpopulations, as we detail in a separate analysis (Shraberman & Weinreb, 2024).

Consumption (C)

The NTA distinguishes private from public consumption and divides each of these into three main categories: education, health and all other types.

Private consumption refers to all household expenditures. Age-specific estimates of each of these three types are adapted from HES data. Private consumption of education captures tuition for formal education only, including early childhood education. Consumption of non-formal education, things like children's sports activities or after-school clubs, are included in the "all other consumption" category. Private consumption of health refers to all out-of-pocket health expenditures, including private insurance, prescription drugs, therapists, and so on. All other household expenditures are included in the "other consumption" category.

Public consumption is an estimate of per capita (per user) values of services provided by the government across its various domains. Public consumption of education covers the provision of formal education from early childhood to adult education. Public consumption of health includes all public medical expenditures, moderated at each age by the Ministry of Health's capitation formula. All other public expenditures (on security, infrastructure, debt payments, etc.,) fall into the Other category.

As mentioned earlier, the information on consumption of education comes from HES data, and enrollment rates in each level of formal education come from OECD data on Educational Statistics by age.[15] Public spending on education is the average expenditure per student. To obtain age-specific estimates for the population as a whole, these per student expenditures are multiplied by enrollment rates at each age.

15 OECD Statistical Portal.

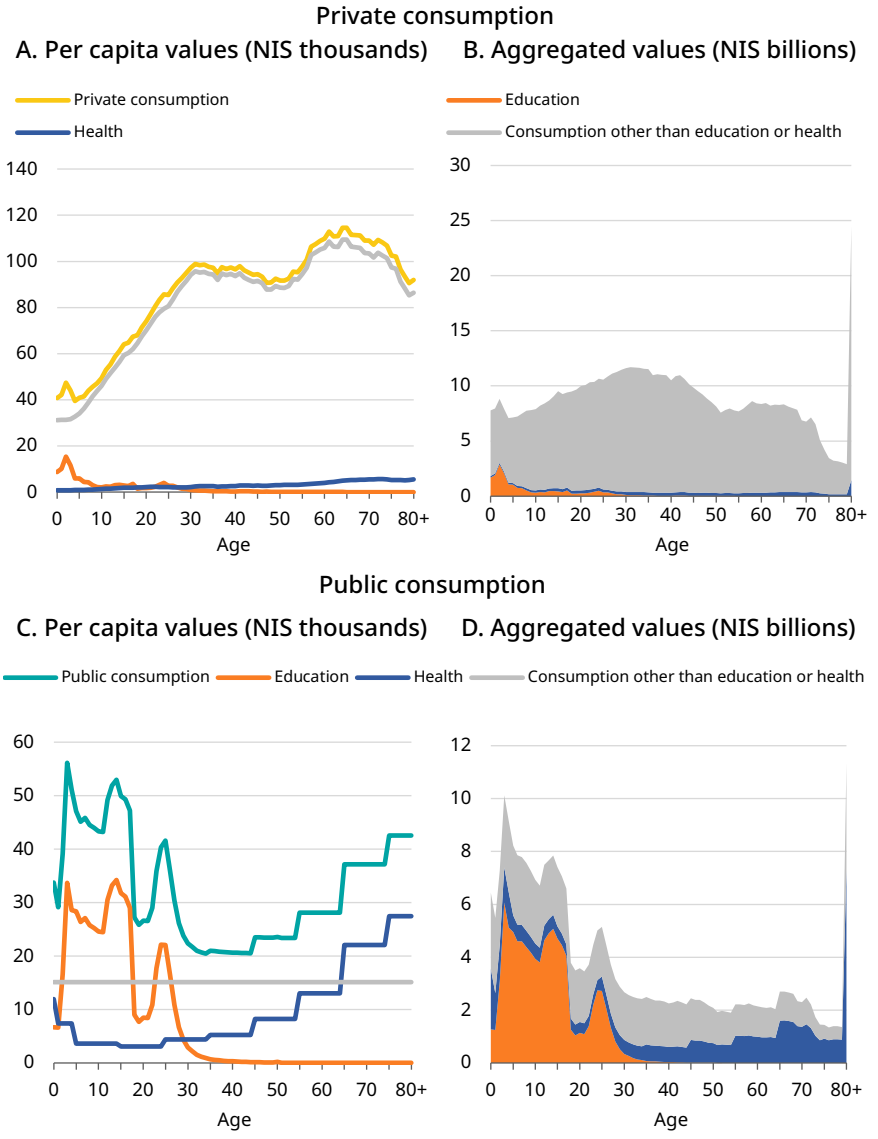
Figure 6 depicts the private and public age profiles of consumption across the three NTA categories of consumption. At the per capita level, private consumption begins with a bump in early childhood — as will be shown below, this mostly stems from substantial private consumption of education up to age 3, since Israel's publicly funded education begins at age 3 — and thereafter rises in gentle waves across the life course, with peaks in people's early 30s and mid-60s reflecting trends in non-health and non-education consumption. At the aggregate level, private consumption peaks in the early 30s.

The age profile of public consumption is a lot more variable. Below age one, there is a substantial health component, but from then until people's late 20s the main component of public consumption is education. In fact, from around age 3 to age 12, public per capita spending is roughly equivalent to private other consumption at those ages. This points to another notable characteristic of Israel: the fact that public consumption of education is greater than those on health is related not only to age structure, but also to the relatively low spending on health in general (Levi et al., 2022). Only around 7.5% of GDP was spent on health in 2019, relative to 8.8% in the OECD in general, around two-thirds of which was from public sources (Levi & Davidovitch, 2022). We will discuss health consumption age profiles in more detail below.[16]

16 We will expand on this third category, "other public consumption," below, including delineating how it differs from education and health in the way it is calculated.

Figure 6. Age profile of private and public consumption, per capita and aggregated, by category, Israel, 2018

2018 prices



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Education

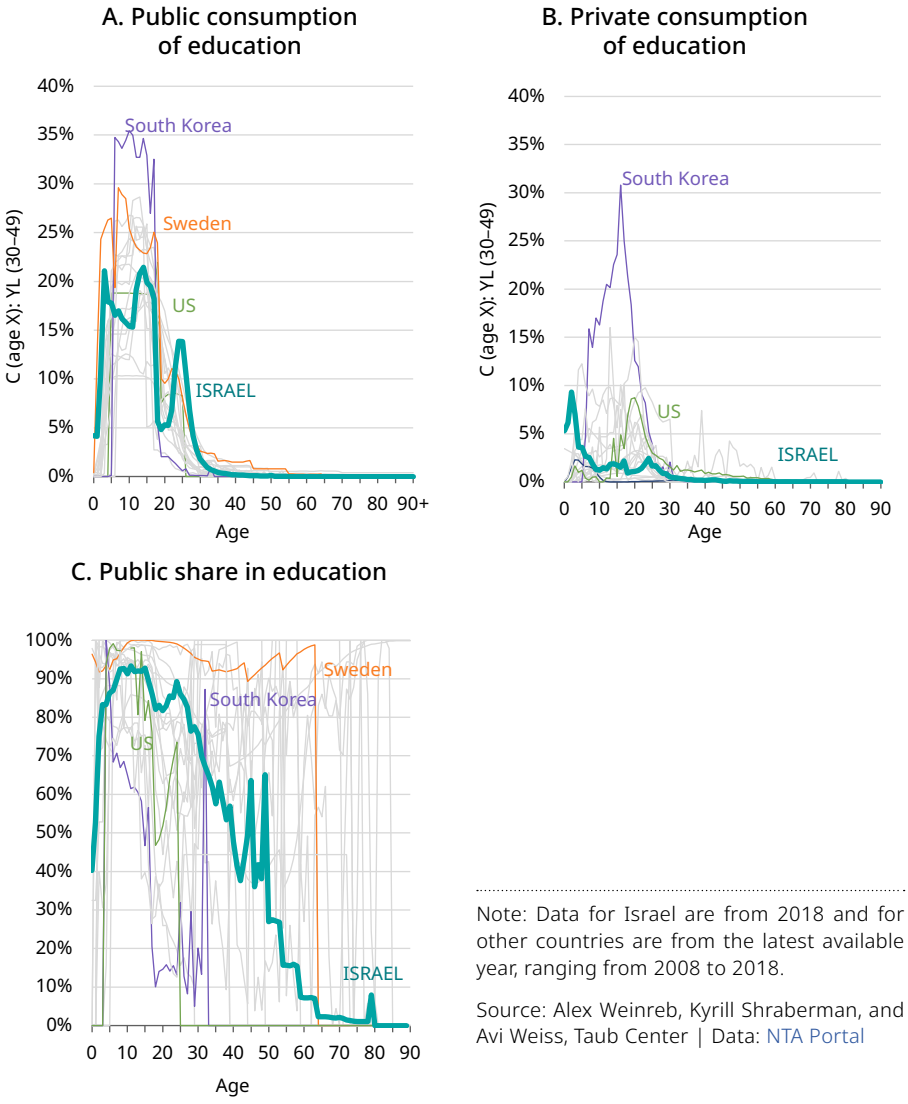
Educational consumption includes public and private expenditures on formal education. We calculate age profiles for private educational consumption across the life course using household expenditures data. Naturally, differences across countries in attitudes and social policy related to education shapes these age profiles, especially the division between private and public. We see this clearly in Figure 7, which presents a number of comparative charts about the consumption of education across high-income countries.[17]

Relative to other countries, Israel's age profile has three distinct patterns. First, it rises earlier in life, initially with private educational consumption. This is likely related to the high labor force participation of Jewish women, which drives high demand for early childhood care, mostly provided by private entities. Of course, this says nothing about the quality of the childcare, which is low on several measures (Vaknin, 2020).

From age 3, children's education is predominantly state-funded through "pre-mandatory kindergarten." This switch from private to public consumption can be clearly seen in Panel C below.

17 Israel's educational consumption data appear to be more detailed than those of some countries in these NTA tables. Some of the latter have zero or fixed consumption noted in early years, which may distort the age-profile for early childhood education.

Figure 7. Age profile of public and private consumption of education, relative to YL(30–49), Israel and other high-income NTA countries



Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Second, after the dip associated with military service, especially noticeable in public educational consumption, there is a highly unusual post-secondary peak around age 25, mostly stemming from later enrollment in undergraduate education but also substantial enrollment in publicly subsidized graduate programs. This, too, is especially notable in public share of educational consumption (Panel C). This late peak keeps public educational consumption relatively high deep into people's 20s, which is more years than in almost every other high-income country.

Third, Israel's consumption of education is predominantly public. That is, from around age 3 to age 30, during which 91% of all educational consumption occur in Israel, 80%–90% of it are public. In this regard, the age profile of Israel's public educational consumption is much closer to the standard continental European patterns than it is to those in the US or South Korea, which have substantial private consumption of education, as a share of YL(30–49) during those first 30 years (as shown in Figure 7, Panel B).

Health

As mentioned earlier, in the years prior to Covid, around two-thirds of national health expenditures in Israel were public (Levi & Davidovitch, 2022).[18] Public consumption of health is the total public health expenditures distributed across ages according to the Israeli Ministry of Health's capitation formula.[19] Note that since early 1995, every Israeli resident has been entitled to a standard basket of health care services through one of four publicly operated, competing, but non-profit Health funds. This right, enshrined in the National Health Insurance Law in 1994, is not affected by whether a person has paid the dedicated health tax, or how much they have paid. Assessed as 5% of declared wages, over and above income tax, this tax is the major source of financing health care, though it is supplemented by funds from general taxes.

18 In NTA estimates, 76% of C (Health) is public. The difference between these estimates and the estimates of the public share reported in Levi and Davidovitch (2022), stem from the fact that the NTA refer solely to consumption, whereas national health expenditures also include investment.

19 In accordance with the 1994 National Health Insurance Law, the Israel government distributes public health resources among the nation's four competing Health Funds on the basis of a capitation formula that takes the age of the Funds' members into account. For details see National Insurance Institute Portal (Hebrew).

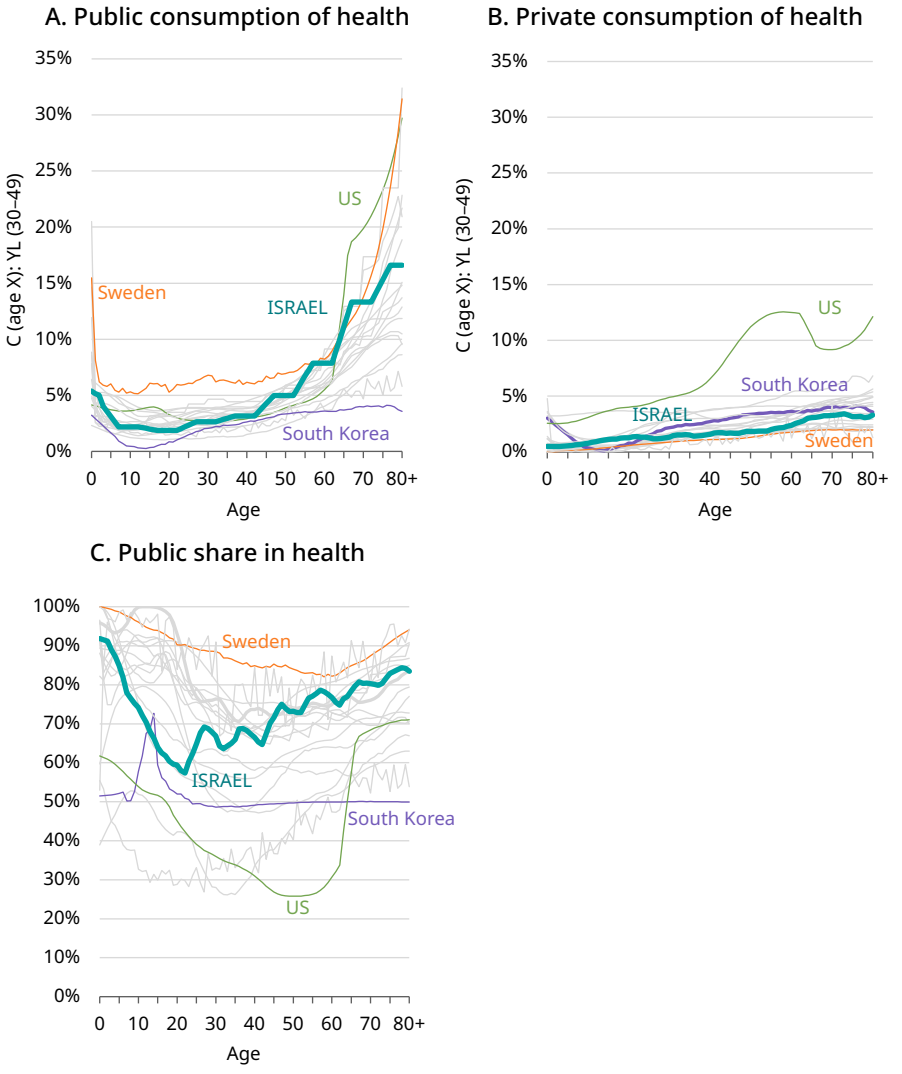
We estimate the private consumption of health using household expenditure data. Because there are no personally identified health expenditures, we divided households' health expenditures between all members of the household, according to age weights applied for the "other consumption" category.[20]

Figure 8 presents Israel's health consumption in relation to other high-income NTA countries. Overall, Israel is largely in line with other high-income countries in terms of the level of spending relative to YL(30–49), the source of spending (private versus public), and the age profile. That is, after dipping from infancy into childhood, public health consumption according to the capitation formula rises slowly with age, averaging less than 5% of YL(30–49) until people's late 30s, then climbing to around 20% of YL(30–49) by age 80.

Within this overall pattern, the age profile of public spending on health as a share of the total (Panel C), looks somewhat different than that of other countries. Below age 5 and above 45 it is very similar to the European patterns, though still substantially below Sweden. In the intermediate period between these two ages, it drops much further than most, pointing to a substantial share of private spending on health, but not as in the US or South Korea. By the late 40s, however, the shift is back toward public spending. In fact, from the late 50s into early 60s a higher share of Israel's per capita health spending is public than in almost any other high-income country. And above age 70, which is where the bulk of health consumption is concentrated, more than 80% of per capita health consumption in Israel are public. Again, that remains lower than in Sweden but far higher than the level seen in the US — even after the Medicare-driven expenditures kick-in in people's 60s — and several other countries with relatively large private health sectors.

20 Arguably, for private health consumption we could employ the age weights built into the capitation formula. The problem is that these capitation weights reflect public rather than private spending. For instance, the elderly benefit from substantial discounts on purchase of medications and other medical aids, reflecting the higher health expenditure weights associated with their age. Newborns also have higher weights than 2-year-olds, due to higher costs of hospitalization in maternity wards. It is not clear whether these patterns exist in private expenditures.

Figure 8. Age profile of public and private consumption of health, relative to YL(30–49), Israel and other high-income NTA countries



Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

We suspect that this distinct age pattern in terms of balancing public and private health consumption is one of the ways that Israel combines below-average health expenditures with below-average mortality rates. Relative to other high-income countries, public consumption of health is more concentrated in high morbidity ages, which includes not only early childhood and the elderly, but also people from their late 50s. In fact, the high share of public spending on health in people's late 50s and early 60s may also be one of the features facilitating Israel's particularly low mortality from vascular disease.[21] These are the ages in which early detection and intervention can save lives effectively and relatively cheaply.

Another factor in the relatively low share of private consumption of health at older ages is the array of discounts on medication available to the elderly though the National Health and Medications Basket, which is financed through the Ministry of Health. From age 72, all citizens receive an automatic 10% discount on medications that are in the "medications basket." Discounts of 55% are granted to those who receive a supplementary income allowance on top of their universal old-age allowance — this discount is also available to a number of smaller groups below retirement age. Finally, a 100% discount on medication costs is granted to Holocaust survivors and veterans of WWII. The Claims Conference (2023) estimates that as of mid-2023 there were 119,300 Holocaust survivors in Israel, accounting for 41% of the population aged at least 80.

Other consumption

Other consumption in the NTA accounting system includes all private expenditures and all public expenditures not directly associated with health or education.

In general, as seen in Figure 9 below, other private consumption (Panel A) represents a much larger share of YL(30–49) than does other public consumption (Panel C). Relative to YL(30–49), Israel follows the standard pattern across high-income countries, with other private consumption rising slowly until around age 30, then slowly decreasing until around 50. The deviation from standard patterns begins in people's late 50s. From there into the 70s, Israelis' other private consumption is one of the highest in relation to YL(30–49): it is only exceeded by the US, as well as Italy, Uruguay, and Chile.

21 IHME data rank it third lowest on cardiovascular mortality and lowest on cerebrovascular mortality among OECD countries (Weinreb & Seela, 2021).

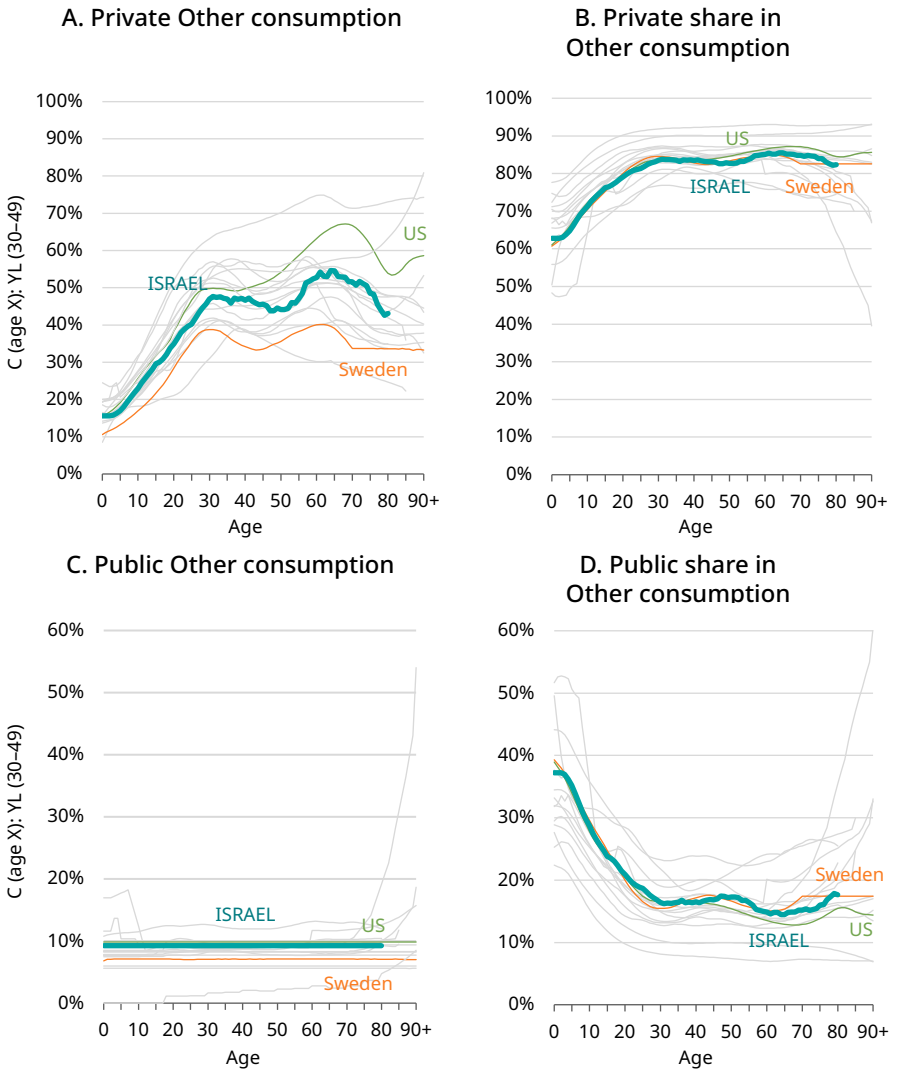
In terms of the share of total other consumption that is private (Panel B), Israel's age profile largely follows the cross-country average, except at younger ages, where the public share is higher-than average.

As mentioned above, other public consumption includes all public consumption that is not health or education. It includes allowances, security and interest payments on public debt, and many other goods and services that can be seen as public goods.[22] Because we assume that these categories are consumed equally by the whole population, we subtracted health and education consumption from total public consumption and then distributed the remainder equally across the whole population.[23] Comparison of Israeli age profile of other public consumption to other high-income countries (Panel C) shows a somewhat higher level of other public consumption. It is also can be seen in comparison of public share in other consumption, that is especially high in younger ages (Panel D).

22 For instance, the size of NII old-age allowance, received by practically all Israelis when reaching retirement age, is not affected by NII contributions made by individuals throughout their working years. Thus, the eligibility of a given person to the NII's old-age allowance does not affect the eligibility of others. The same is true for any other allowance, what allows us to treat other public consumption as public good.

23 There are countries with more detailed age-related data on other public consumption than is available for Israel including, for example, contributions to public pensions, age-dependent welfare programs like the National Insurance Institute, and more. In such countries, the availability of those data makes it possible to create a more accurate profile of other public consumption by age.

Figure 9. Age profile of all other consumption (not education or health) relative to YL(30–49), and private other consumption's share of total other consumption, Israel and other high-income NTA countries



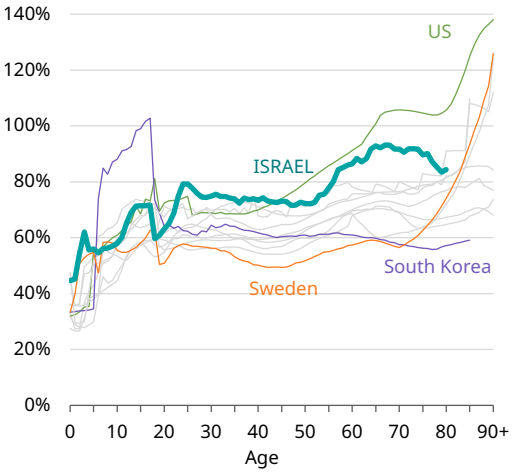
Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Total consumption

Figure 10 below gives us a sense of how Israel's total consumption (C) age profile, relative to the average YL at ages 30–49, compares to that of all other high-income countries in the NTA database. It shows the distinctive bump in early childhood, associated with high private consumption of education, and the distinctive dip in the late teens/early 20s associated with military service. From around the mid-20s to the mid-50s, Israel's age profile of total consumption lies in the top of the range — at around 60% of YL(30–49) — which is above levels observed in the US, South Korea, and Sweden. From age 50 until the mid-60s, consumption in Israel rises quite sharply to around 80% of YL(30–49), staying below US in this age range, and then falling slightly in the late 70s. In general, it can be said that in comparison to other high-income countries, Israel's total consumption age profile is relatively high.

Figure 10. Age profile of total consumption, relative to YL(30–49), Israel and other high-income NTA countries



Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Life-Cycle Deficit (LCD)

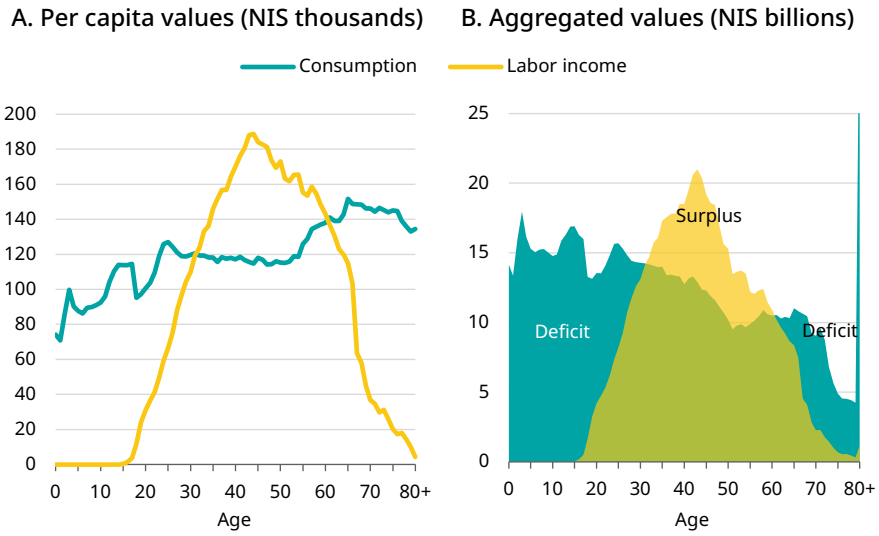
As mentioned above, labor income (YL) and consumption (C) are the two primary variables in the NTA. Although Israel has the standard patterns of per capita YL and C for a wealthy, developed economy — YL is zero below the mid-teens, peaks in people's 40s and 50s, drops relatively rapidly until mid-60s, then precipitously in the late-60s, eventually falling close to zero at age 80 and above — we have also documented ages where Israel is somewhat different to most high-income countries, which reflects country-level differences in the timing of entrance to, and exit from, the labor market.

In addition, Israel's young age structure means that in the aggregate a lot more is spent on Israel's young than on Israel's elderly: four times as much is spent on 3–5-year-olds as on 76–78-year-olds. This relationship between per capita and aggregate spending by age is quite different from the relationship found in almost all other high-income countries.

The Life-Cycle Deficit (LCD) measures these differences between C and YL. This is shown graphically in Figure 11, in terms of the per capita LCD (left-hand panel) and aggregate LCD (right-hand panel). We can see the clear effect of age structure on the difference between these two graphs: although the amount spent on any given child is much lower than on any given retiree, the aggregate deficit associated with children is much larger than the old-age deficit.

Figure 11. Age profiles of YL and C, per capita and aggregated, Israel, 2018

2018 prices



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Table 1 provides specific figures for the LCD in nominal billions of shekels by age group. We see a total LCD of NIS 361.8 billion, with the bulk of this stemming from expenditures on the large cohorts of 0–19-year-olds, despite much more costly healthcare among the elderly.

Table 1. Components of life-cycle deficit in Israel, by age, 2018
Aggregated values, nominal, NIS billion, 2018 prices

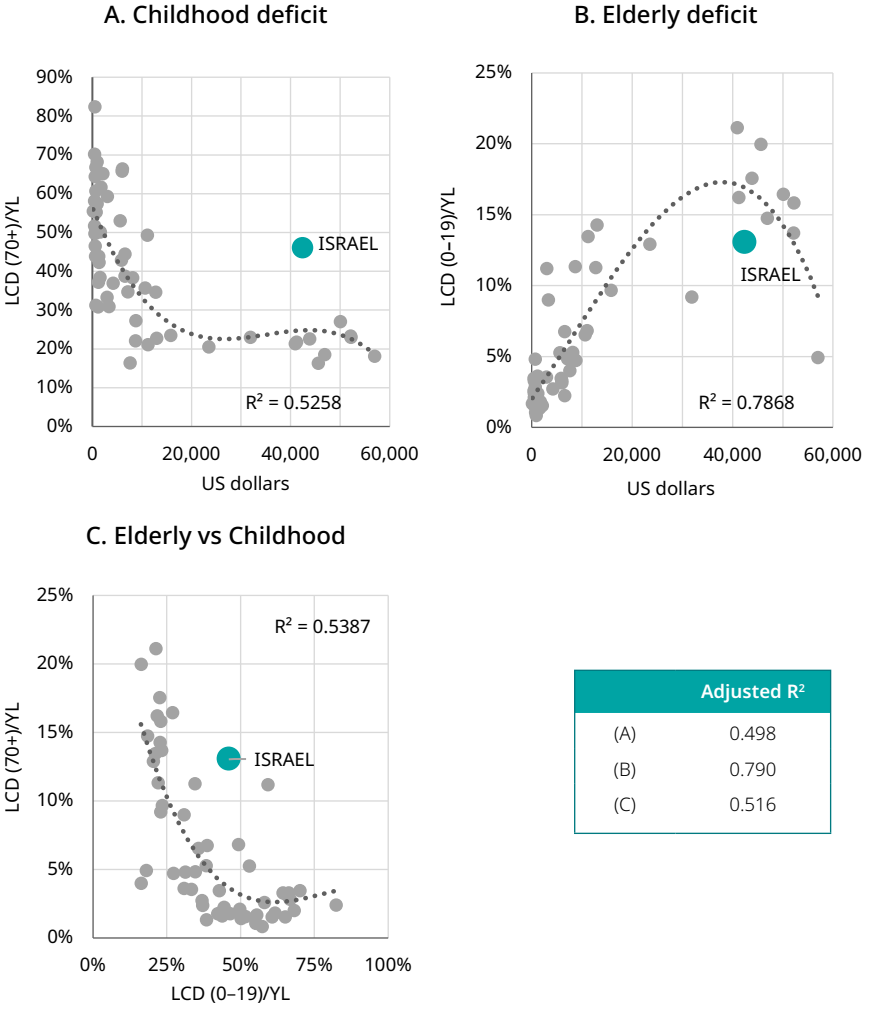
	Total	0–19	20–29	30–49	50–59	60–69	70+
Consumption	1,018.1	308.0	146.2	260.4	101.0	104.2	98.3
Public consumption	302.0	142.0	39.6	47.6	20.9	23.5	28.4
Private consumption	716.1	166.0	106.6	212.8	80.1	80.7	69.9
Less: Labor income	656.3	5.6	80.4	351.6	130.1	76.0	12.6
Life-cycle deficit	**361.8**	**302.3**	**65.8**	**-91.2**	**-29.1**	**28.2**	**85.7**

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Overall, deficits associated with spending on 0–19-year-olds and on those aged 70+ amounted to 59.1% of total labor income in Israel in 2018. That is an unusually high combined child and elderly deficit for a wealthy country. Across developed countries (OECD plus Singapore and Taiwan, but not including Mexico), the combined deficit average is just below 35% of total labor income, with the highest being the US where it was around 43.4% in 2011 (the latest estimates on the NTA database). In contrast, Israel's deficit level is more typical of much poorer countries. It is almost identical to that of Mexico (59.2% in 2010), and it is above that of Paraguay, Ethiopia, and Burkina Faso (58.2% in 2012, 57.1% in 2005 and 56.2% in 2014, respectively).

Disaggregating this overall deficit into its discrete childhood and elderly components — respectively, LCD(0–19) and LCD(70+) as a proportion of total labor income YL — confirms that the main source of Israel's exceptionalism is the childhood deficit. This can be seen in the top two panels of Figure 12, which graph the childhood deficit (Panel A and elderly deficit (Panel B) against GDP per capita in the year of the NTA estimate. Israel's childhood deficit is twice as high as that of other countries with a GDP per capita above $40,000, and its elderly deficit is about 85% of that observed in those countries.

Figure 12. Childhood and elderly deficits as a proportion of total labor income in 56 countries, by GDP per capita



	Adjusted R^2
(A)	0.498
(B)	0.790
(C)	0.516

Notes: Trend lines obtained from polynomial equations, for highest explanatory power (adjusted R^2). (a) 3rd degree, (b) 4th degree and (c) 2nd degree polynomials. Equations from lower or higher order have less explanatory power. Data for Israel are for 2018. Data for other countries are for the latest available year, ranging from 2005 to 2019.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

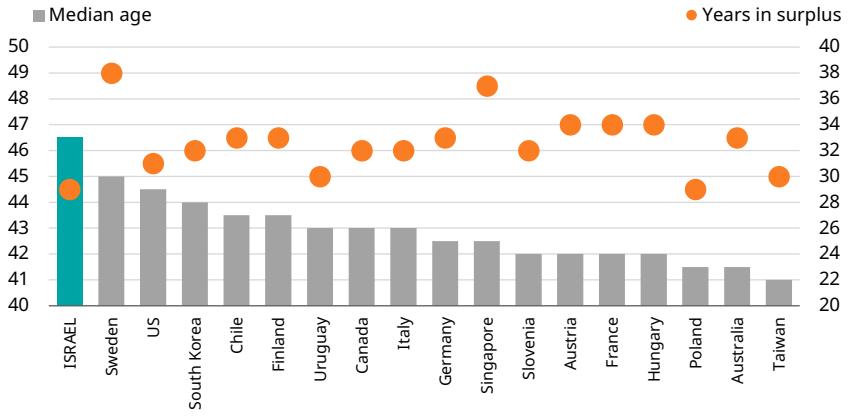
In fact, in this balance between the childhood and elderly deficit, Israel looks like Latin American. This can be seen in Panel C of Figure 12, which arrays the elderly deficit, LCD(70+)/YL, against the childhood deficit, LCD(0–19)/YL. While most countries are on the curve, Israel, has relatively high elderly deficit given its childhood deficit.

A final perspective on this LCD can be seen in the number of years that people live in a life-cycle surplus, that is, where, as in Figure 11, YL exceeds C. Across all 63 countries with available data, the number of years in surplus is lowest in lower-middle and upper-middle income countries (27.4 and 27.9 years, respectively), though with very high variability in both of these groups), and is highest in low-income countries (35.1 years).

The number of years in life-cycle surplus across the 18 high-income countries in the NTA database is shown in Figure 13. In Israel it is only 29 years,[24] which together with Poland is the lowest in this group (the mean is 32.9 years). Yet the relatively late entry into the labor market, somewhat later retirement and slow rise in YL means that the median age of the life-cycle surplus — indexed by the gray bars — is the highest. In fact, aside from Sweden, the other countries with a notably high median age of YL > C are the US and South Korea, both of which have distinct private consumption patterns (shown in Figures 7 and 8).

24 The first year of life-cycle surplus, when C<YL, is 32, and the last year is 61. Thus, as seen in the figure, the median age is 46.5 and overall 29 years of life-circle surplus.

Figure 13. Median age in a life-cycle surplus (YL>C) and total number of years in surplus, Israel and other high-income NTA countries



Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2005 to 2019.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

The general point here is that the fact that Israel's life-cycle deficit is large as a share of GDP, relative to other countries, is the result of Israelis' life-cycle structure. The resulting fewer-than-average years of surplus (relative to high-income countries) is due to substantial expenditures on children. The difference between Israel's average age of production, 44.2, and average age of consumption, 35.7, clearly points to the substantial flow of resources in Israel toward children, through age reallocations, both public and private.[25] Elsewhere, we show that over the next few decades a much larger growth of public consumption will stem from Israel's rapidly growing elderly population (Shraberman & Weinreb, 2024). For now, it is to these age reallocations, the third pillar of the NTA system, that we turn. We shall see that although age reallocations are mostly constituted by the transfer of life-cycle wealth from parents to their children, they also reflect an array of other types of private and public transfers.

25 Average age of production or consumption are calculated on basis of National Life Tables (CBS), population age structure and age-profiles of YL and C. For more details, see NTA Manual 2013, pp. 109–111.

Age reallocations

In Israel, as in other countries, life-cycle deficits are sustained through a complex system of age reallocations.

Broadly, age allocations include public and private transfers and asset-based reallocations, which can also be divided to public or private. Public transfers include taxes (considered "outflows" in NTA jargon since they move from the population to the government) and various types of benefits and services ("inflows" from the government to the population). These are broadly divided into education, health, pensions (NII allowances) and cash transfers (allowances from other than NII institutions) and governmental consumption in-kind (the remaining types of government consumption such as security, interest payments etc.). The government's budget deficit and changes in the government's asset income, meaning a change in its assets value, is designated as a public asset-based reallocation, and will be explained in more details below.

Private age-reallocations are divided into intrahousehold and interhousehold transfers, where intrahousehold refers to the flow of resource within the household, and interhousehold refers to flows between households.[26] Private asset-based reallocations refer to changes in the distribution of assets and incomes associated with ownership, among different age groups.

Our public transfers inflows for education and health match exactly the age-profiles of public consumption in these categories. The age-profiles of pensions and cash transfers are derived from HES data, and then calibrated to SNA macro values. The in-kind public consumption age-profile is derived by distributing the remaining government consumption evenly across the whole population.

The age profile of private transfers, like the YL and C components reviewed above, are derived from HES survey data after calibration to their SNA values. The age profiles of private asset-based reallocations, that is the ownership of financial and real-estate assets, and incomes associated with owning assets, are derived from the Long-Term Survey and HES. Here, too, we follow standard NTA protocol. The head of the household is considered the main breadwinner in the household, so all assets owned by the household are assigned to her/him. So is self-employment income within the household. Of course, the head

26 By definition, Aggregated Private Transfers, the sum of inter and intra households' transfers, must equal 0. Formally, total resources received by individuals must equal total resources transferred.

of the household is often not the only breadwinner. Since HES includes labor income and personal allowances data for every household member,[27] we can calculate each household member's generated surpluses and deficits, and the way they are financed within a typical household.[28]

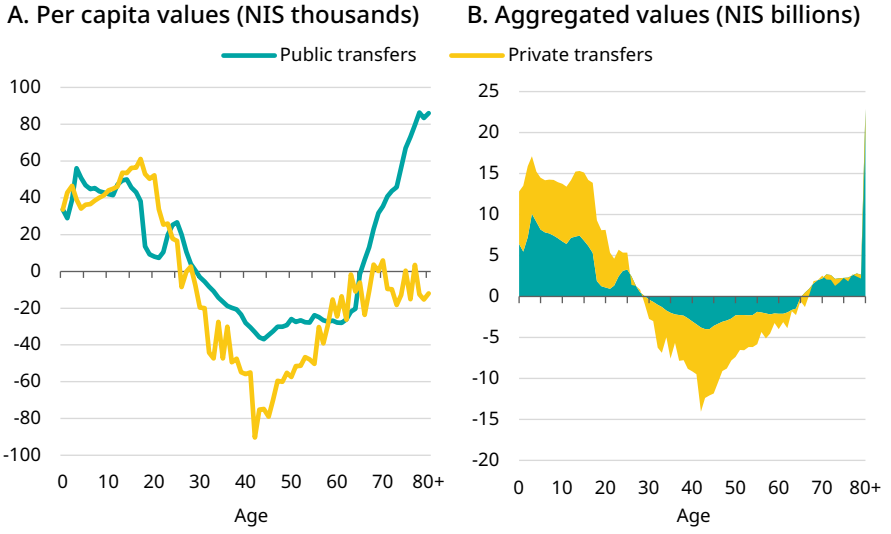
Figure 14 presents the basic age profile of net public and private transfers (outflows minus inflows), in terms of the annual value in shekels, with per capita values in the left panel and the aggregate values (per capita multiplied by the population in each age group) in the right panel. Overall, until people's late 60s, when public transfers towards the elderly increase substantially with public pensions and public health consumption, we see much greater fluctuations in private rather than public transfers in this age group. Many of those aged 60 and more are living in single person or coupled households, without dependents. The vast bulk of inter-household transfers therefore sum up to zero, where outflow seldom equals inflow.

In terms of per capita private and public transfers, the total area above the horizontal y=0 line from age 0–29, where a majority of individuals are supported by households, looks smaller than the area below the same line from 29 up to 65, the main working ages. It means that on average each individual in his main working years produces more resources, beyond his consumption, than he consumes during the years in which he was dependent on household resources. However, in the aggregate graph, the relative size of these two blocs is reversed, given Israel's young age structure, seen in Figure 1, resulting in the aggregate life-cycle deficits documented in Table 1 and Figure 11.

27 Data regarding some governmental allowances from NII or other governmental entities are available at the individual level, while data on other allowances available only at the household level. Where the latter is the case, we follow NTA protocol in assigning the income to the head of household.

28 Surpluses are generated when one's income exceeds one's personal consumption. In the NTA framework, those surpluses are transferred to the head of household and therefore counted as saving intrahousehold outflows, since they help the household finance its total private consumption. In cases where total household income falls short of total household's consumption, the deficit is financed by a change in asset income. For details, see Appendix B.

Figure 14. Age profile of net public and private transfers, per capita and aggregated, Israel, 2018
2018 prices



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Since the level of private transfers is more interesting, and potentially more important, we will look at this in more detail.[29] Here, too, some distinct patterns can be seen in Israel's estimates.

Figure 15 shows the per capita and aggregate value of intrahousehold transfers by type, for inflows (top two panels) and outflows (bottom two panels). As expected, there are substantial shifts across age in terms of the composition of inflows and outflows. The latter peak in people's 40s, when children are older and consume more, but still living with their parents, and extend across the whole adult life. They are mostly dedicated to "other consumption", the biggest consumption category. On a per capita basis, "other consumption" inflows peak in late teens and early 20s at around NIS 50,000 per year (around

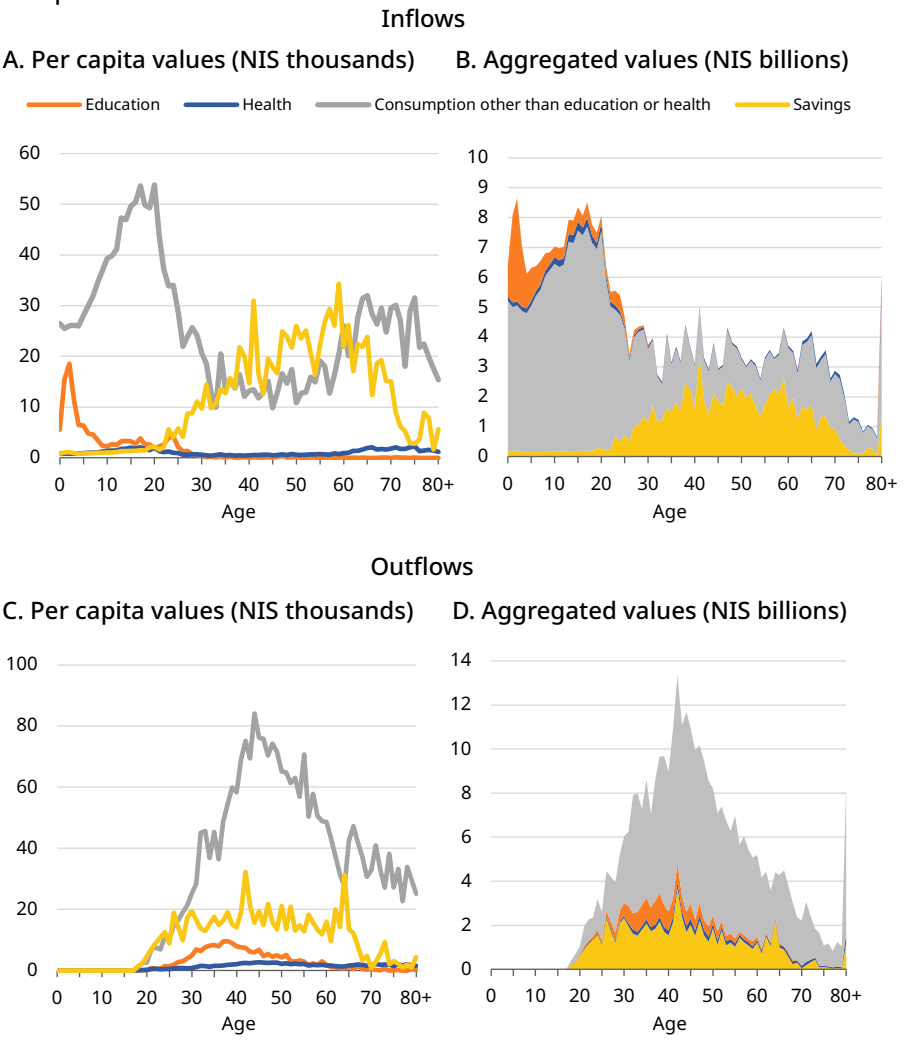
29 The subject of public transfers and the difference between public goods and services consumed and taxes paid to finance government activity, is discussed in detail in a separate publication (Shraberman & Weinreb, 2024).

NIS 8 billion in the aggregate), then gradually fall, as youngsters enter labor market, and they rise again after people's 60s, when people retire from the labor market and become more dependent on other family members, though the much smaller cohort sizes mean that aggregate inflows are much lower for the elderly, summing to around NIS 1 billion in any given single year of age in people's late 70s.

As expected, inflows associated with education are concentrated in people's younger years, especially under-5s — reflecting the relatively high private consumption in those ages (Figure 7C above) — and educational outflows peak at people's late 40's, reflecting the considerable educational expenditures of parents with multiple children. Transfers associated with health spending are low at all ages, reflecting low private share in health consumption (Figure 8C previously).

Figure 15. Age profile of intrahousehold transfers (inflows and outflows), per capita and aggregated, by type of transfer, Israel, 2018

2018 prices

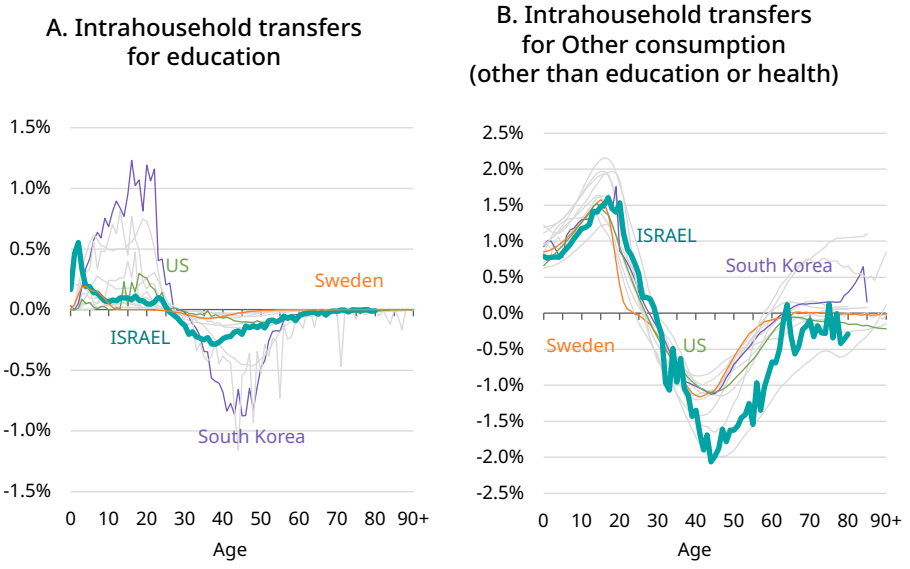


Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Figure 16 shows selected types of net intra-households transfers, as a share of YL(30–49) in relation to other high-income NTA countries. Net transfers associated with other consumption point to very similar per capita inflows (y>0) to those found in other countries, in the 0–35 age group, but much greater net outflows (y<0) among those aged 36–65, that sink lower and last longer. They only approach the zero line in people's mid-60s but largely hover beneath it. These patterns are consistent with Israel's higher fertility levels and perhaps some multigenerational co-residence, especially in the Arab subpopulation.

In contrast, net intrahousehold transfers for education look different. We see the bump of inflows associated with early childhood education, with inflows continuing at a more modest level until people's mid-20s. There is then a very rapid switch to outflows during people's late 20s — which matches the median age at first birth among Jewish Israelis — peaking in people's mid-30s. The magnitude of the outflows for educational purposes slowly diminishes until people's 70s.

Figure 16. Age profile of net intrahousehold transfers earmarked for education and other (not education or health) consumption, relative to YL(30–49), Israel and other high-income NTA countries



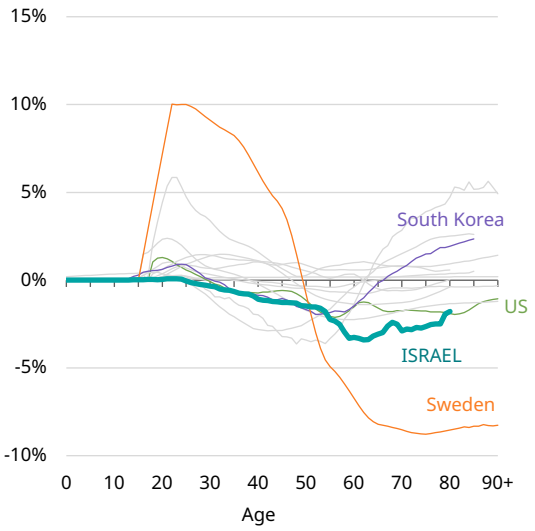
Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Overall, health is the least substantial consumption type associated with intrahousehold transfers. Both as an inflow and as an outflow health consumption peak never accounts for more than 1.3% of YL(30–49). Interestingly, it is also around zero at older ages, which suggests that the 20% of health expenditures at older ages that originates in private sources (Figure 8, Panel C) is paid by the elderly themselves, rather than by other family members. This makes sense given discounts available to the elderly, as discussed at the end of the section on health consumption.

A final glimpse of a somewhat distinct Israeli transfer regime can be seen in its net inter-household transfers age profile, shown in Figure 17 below. By around ages 55–60, the Israeli age profile begins to diverge from those of all other countries represented here. Between ages 60–80, in each age on a per capita basis, Israelis give slightly less than 3% of YL(30–49) to other households, with at least some of those beneficiaries in their 20s and 30s. This is a larger net transfer than that of any other high-income countries with the exception of Sweden.

Figure 17. Age profile of net interhousehold transfers per capita relative to YL(30–49), Israel and other high-income NTA countries



Note: Data for Israel are from 2018 and for other countries are from the latest available year, ranging from 2008 to 2018.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

More generally, distinct European and East-Asian patterns can also be seen in Figure 17. The latter — represented here by South Korea — are characterized by outflows from people's 30s into their 60s, then a reversal at older ages. In the former, a number of countries have interhousehold outflows at older ages — like France, the US, Hungary, and most notably Sweden. *But Israel is the only one of these to not have substantial inflows at young ages*. In other words, we see a continued net movement of resources from older people to younger that intensifies as people age. Again, this makes sense given the large number of children and grandchildren.

Asset-based reallocations

Asset-based reallocations provide the main source of resources for financing life-cycle deficits, both at the level of a single household and at the level of the economy. As the name suggests, it relies on asset ownership and income associated with assets.

Many Israeli households run current deficits in their family budget (Shraberman, 2018), and those deficits must be financed. Unfortunately, HES does not provide sufficient information regarding the value of assets that help finance household deficits, or how surpluses are utilized. However, by combining several data sources, the NTA framework provides indirect measures of how much Israeli households save annually, and allows us to see how saving or dissaving (i.e., a decrease in assets when consumption exceeds labor income) patterns change with age.

Thus far, only labor income has been mentioned as a source of household income, but clearly income related to the ownership of assets, which economists seldom denote as income from capital, must also be included. In the NTA framework, asset-based reallocations are defined as the difference between asset income[30] and saving.

The calculation of public asset-based reallocations is relatively straightforward. Governments finance public inflows through public outflows (taxes paid), with the difference defined as net public transfers, a component of aggregated life-cycle deficit.[31]

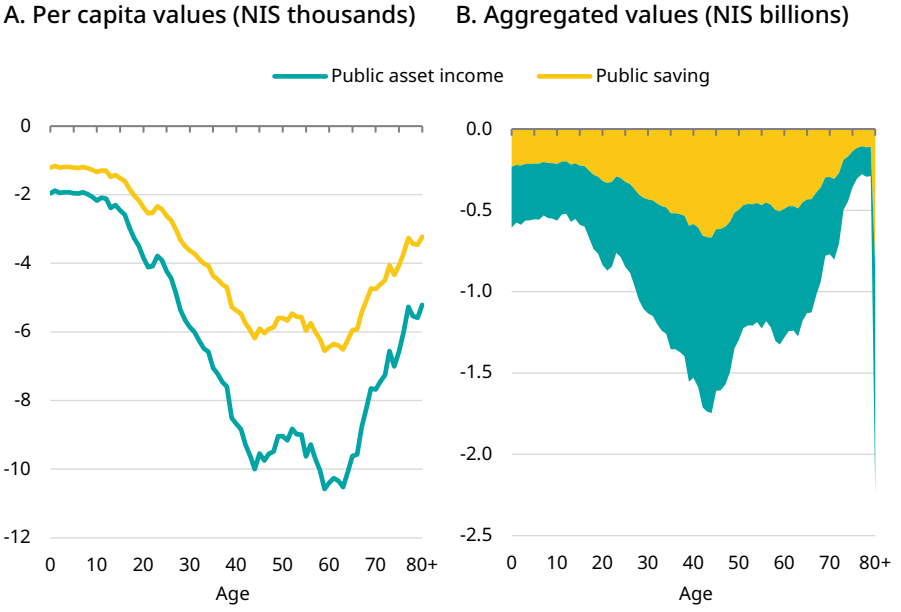
30 Following SNA definitions, asset income refers to a net operating surplus, that is the added value attributed to ownership of capital. For more details, see Appendix B.

31 Formally, public saving is defined as a net saving of the general government (as defined in the SNA), and public asset income is defined as the net operating surplus of the general government (Table 14A: Non-financial accounts, OECD stats.oecd.org) including public property income (dividends from public owned companies, etc.). In both the SNA and NTA frameworks, public asset-based reallocation is the difference between these two.

The calculation of age profiles for these two measures is based on the general tax age profile,[32] meaning that aggregated values of public asset income and public saving, obtained from the SNA, were distributed based on annual general taxes paid in each age. Figure 18 graphs these measures. We see that the difference between public saving and public asset income in Israel (in 2018) was small, meaning that a relatively small share of total public consumption was financed through a change in the value of public assets.

Figure 18. Age profile of public asset-based reallocations, per capita and aggregated, Israel, 2018

2018 prices

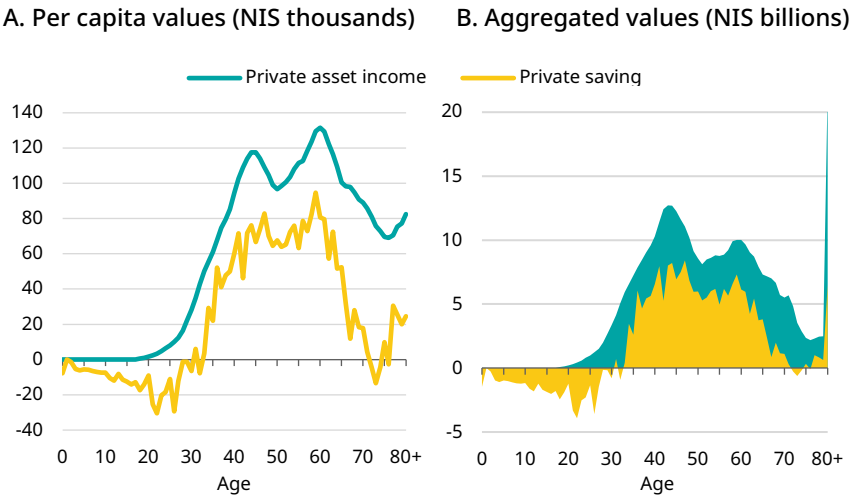


Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

32 In NTA, taxes are divided into ear-marked taxes, such as NII contributions and health tax, and general taxes, which refers to taxes that are not designated for a particular use.

Calculating private asset-based reallocations, is somewhat different from public. Private saving is actually a residual category obtained by preserving accounting identities and consistency of the NTA accounts.[33] As can be seen in Figure 19, the per capita age profile (Panel A) of private asset income starts to accumulate at age 18, mainly through the ownership of assets and distribution of business-related income. Yet, the age profile of saving remains negative for those aged below 30, representing on average higher total consumption in these ages than all sources of incomes combined. Only at age of 31, after several years in the labor market, does per capita saving becomes positive, increasing until people's 60's, when it reaches around NIS 6,000 per annum. As people start to retire from the labor market, their private savings decrease.

Figure 19. Age profile of private asset-based reallocations, per capita and aggregated, Israel, 2018
2018 prices



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

33 For details see NTA Manual, Appendix C (United Nations, 2013).

The public transfers and much more the private asset-based reallocations, are very important components of the intricate socio-economic generational agreement, allowing us to sustain significant life-cycle deficits. Table 2 shows that private asset-based reallocations finance almost 72% of the total life-cycle deficit, while public asset-based reallocation and public transfers finance the rest. We also see that given aggregated dissaving of those aged 0–19, total aggregated saving (private and public) in 2018 was positive, meaning that a generational agreement was economically sustainable.

Although the increasing number of children in Israel signals a larger number of people at working age in the future, the absolute number of those aged 70+ is expected to rise even more rapidly, which will have implications for the aggregated life-cycle deficit. Given a "business as usual" economic scenario, it is unclear, especially in the face of high fertility and compositional changes associated with a rising share of Haredim, whether additional taxes from the greater working age population in the future will suffice to cover expected old-age deficits related to substantial public health inflows for this age group. In other words, the economic sustainability of the current asset-based reallocation, and especially public transfers patterns as a salve to future deficits, is not certain. We address those questions more directly elsewhere (Shraberman & Weinreb, 2024).

Table 2. Components of age reallocations in Israel, by age, 2018

Aggregate values, nominal, NIS billion, 2018 prices

	Total	0–19	20–29	30–49	50–59	60–69	70+
Life-Cycle Deficit	361.8	302.3	65.8	-91.2	-29.1	28.2	85.7
Public transfers	120.9	132.9	16.6	-50.2	-21.5	-4.4	47.4
Private transfers	0.0	145.2	20.5	-116.3	-34.3	-8.4	-6.6
Total asset-based reallocation	240.9	24.2	28.7	75.3	26.7	41.0	44.9
Public asset-based reallocations	-18.9	-2.8	-2.1	-6.8	-2.9	-2.6	-1.6
Public asset income	-49.6	-7.2	-5.5	-17.9	-7.6	-6.9	-4.3
Less: Public saving	-30.7	-4.5	-3.4	-11.1	-4.7	-4.3	-2.7
Private asset-based reallocations	259.8	27.0	30.8	82.1	29.6	43.6	46.6
Private asset income	416.7	0.5	13.1	177.8	91.0	80.2	54.1
Less private saving	156.9	-26.5	-17.6	95.6	61.4	36.5	7.5
Total saving	126.2	-31.0	-21.1	84.6	56.7	32.3	4.8

Note: See more detailed disaggregation of private Asset-Based reallocations in Appendix Table B1.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

Summary and conclusion

We had two central goals in this introductory paper. The first was to introduce some key elements of the NTA's unique analytic architecture to our Israeli colleagues. The second was to introduce Israel's unusual demographic-economic profile to our NTA colleagues, since we think it can serve as a type of deviant-case analysis. Not surprisingly, given Israel's age structure, high dependency ratios, high life expectancy, alongside a diversified high-income economy, Israel's NTA estimates are unusual in a number of ways. We have noted six distinct patterns relative to other high-income countries.

There is a much higher share of public consumption of education starting at age 3 and heading deep into people's mid-20s. The latter is largely a function of mandatory military service combined with high enrollment in tertiary education, which also receives a large share of public expenditures. In contrast, the private share of consumption of education is exceptionally high at ages 0–2 but relatively low thereafter.

Consistent with the later age at higher education, people also enter the labor market somewhat later than in most countries. Once they are in the labor market, their incomes rise at a similar rate as in other countries.

Israelis remain in the labor market for much longer. The formal age of retirement in Israel is 67 for men and climbing toward 65 for women, but the effective age of retirement is around 71, and those with more education remain in the labor market longer. Overall, Israelis spend fewer years in a life-cycle surplus than the average across other high-income NTA countries.

The relatively few years in a life-cycle surplus means that Israel's aggregated life-cycle deficit as a percentage of GDP is much higher than the average for high-income countries. This is a direct result of consumption of a very large population aged 0–19, relative to other high-income countries.

As a share of average income, private transfers are relatively high in Israel and they extend over more years. This is consistent with both Israel's higher fertility (which provides a motive for giving) and more years spent in the labor market (the means for giving). On the other hand, these transfers appear to be less directed at educational or health spending, due to the substantial public share in these consumption categories. Instead, they are directed at generic "other consumption."

There is pronounced support of younger generations by elders, seen here in net interhousehold transfers. In this respect, grandparents are arguably a "secret weapon" in sustaining Israel's unusually high fertility and, thus, its unusually high aggregated life-cycle deficit.

A number of more theoretical and methodological concerns arise from our analysis. Both Jewish and Arab Israelis have frequent and intensive family contacts and transfers — in-kind and monetary (Okun & Stecklov, 2021; Raz-Yurovich, 2014; Shraberman, 2018), even if the overall context and reasons for contact vary across Israel's subpopulations (Schwartz et al. 2019). We assume that some elements of these are being missed in the survey data that underlie these NTA estimates. Haredi communities, in particular, also have large flows of assistance and resources through communal and local charities, many unregistered (Keren-Kratz, 2016). This, too, implies that we are missing additional mechanisms for resolving households' deficits and smoothing consumption. More generally, we have seen that Israelis enter and exit the labor market later, and actual retirement age will increase further, given already legislated increases in the retirement age for women. These circumstances, raises the question of whether YL(30–49) is the right reference point for Israel? How different would Israel's ranking on some of these measures look if we used YL(35–54) as the base?

Finally, and most important, we have presented estimates for Israel as a whole, but socio-demographically and economically, Israel has three distinctive subpopulations: Haredi Jews, constituting about 13% of the population; Arabs, constituting about 21%; and everyone else. We have already completed a disaggregation of Israel's NTA estimates by these major subpopulations, pointing to the effects of differential age-specific growth rates and age composition as we project their respective public transfers up to 2050 (Shraberman & Weinreb 2024). Those estimates highlight the substantial dangers to Israel's fiscal stability embodied in the anticipated growth patterns of these subpopulations and the rapid growth in Israel's elderly population over the next 30 years. They also point to the enormous utility of NTA frameworks in helping identify where policy interventions will have the most leverage.

References

Axelrad, H., Luski, I., & Sherman, A. (2021). *Employment and happiness levels: The impact of employment on levels of happiness among Israelis ages 60–80*. Taub Center for Social Policy Studies in Israel.

Auerbach, A. J., Gokhale, J., & Kotlikoff, L. (1991). *Generational accounts: A meaningful alternative to deficit accounting*. Tax Policy and The Economy, 5, 55–110.

Berrebi, C., Shraberman, K., & Yarin, S. (2017). *Trends in the labor market*. Taub Center for Social Policy Studies in Israel.

Button, P. J. (2019). *Population aging, age discrimination, and age discrimination protections at the 50th anniversary of the Age Discrimination in Employment Act*. NBER Working Paper No. 25850.

Claims Conference (2023). *Holocaust survivors worldwide: A demographic overview*. Claims Conference Center for the Study of Holocaust Survivor Demography. Report December, 2023.

Debowy, M., Epstein, G., & Weiss, A. (2021). *Returns to education and labor market experience in Israel*. Taub Center for Social Policy Studies in Israel.

Hammer, B., & Prskawetz, A. (2022). Measuring private transfers between generations and gender: An application of national transfer accounts for Austria 2015. *Empirica 49*, 573–599.

Keren-Kratz, M. (2016). Westernization and Israelization within Israel's extreme orthodox Haredi society. *Israel Studies Review, 31*(2), 101–129.

Kimhi, A., & Shraberman, K. (2013). *Employment and income trends among older Israelis*. Taub Center for Social Policy Studies in Israel.

Kimhi, A., & Shraberman, K. (2014). *Labor income inequality trends in Israel*. Taub Center for Social Policy Studies in Israel.

Levi, B., Bin Nun, G., & Davidovitch, N. (2022). *An examination of the cost update mechanism for the healthcare services basket between 1995 and 2020*. Taub Center for Social Policy Studies in Israel.

Levi, B., & Davidovitch, N. (2022). *The healthcare system in Israel: An overview*. Taub Center for Social Policy Studies in Israel.

Maestas, N. (2018). The return to work and women's employment decisions. In C. Goldin and L. F. Katz (Eds.), *Women working longer: Increased employment at older ages* (pp. 55–83). University of Chicago Press.

Neuman, S., & Weiss, A. (1995) On the effects of schooling vintage on experience-earnings profiles: Theory and evidence. *European Economic Review, 39*, 943–955.

Okun, B. S., & Stecklov, G. (2021). The impact of grandparental death on the fertility of adult children. *Demography, 58*(3), 847–870.

RazYurovich, L. (2014). A transaction cost approach to outsourcing by households. *Population and Development Review, 40*, 293–309.

Schwartz, E., Khalaila, R., & Litwin, H. (2019). Contact frequency and cognitive health among older adults in Israel. *Aging & Mental Health, 23*(8), 1008–1016.

Shraberman, K. (2018). *The income-expenditure gap and household debt*. Taub Center for Social Policy Research in Israel.

Shraberman, K., & Weinreb, A. (2024). The fiscal consequences of changing demographic composition: Aging and differential growth across Israel's three major subpopulations. *The Journal of the Economics of Ageing Volume 27*, 2024.

Spielauer, M., Horvath, T., Fink, M., Abio, G., Souto, G., Patxot, C., & Istenič., T. (2022). Measuring the lifecycle impact of welfare state policies in the face of ageing. *Economic Analysis and Policy, 75*(4), 1–25.

United Nations (2013). *National Transfer Accounts Manual: Measuring and Analyzing the Generational Economy*. United Nations, Population Division, Department of Economic and Social Affairs.

Vaknin, D. (2020). *Early childhood education and care in Israel compared to the OECD: Enrollment rates, employment rates of mothers, quality indices, and future achievement*. Taub Center for Social Policy Studies in Israel.

Weinreb, A. (2021). *Excess mortality and life expectancy in Israel in 2020*. Taub Center for Social Policy Studies in Israel.

Weinreb, A. (2022). *Life expectancy in Israel in 2021: On the rise again?* Taub Center for Social Policy Studies in Israel.

Weinreb, A. (2024). Demography overview, 2024: Diverging fertility, shifting migration, and shrinking yishuvim. In: A. Weiss (Ed.), *State of the nation report: Society, economy and policy 2024* (pp. 259–301). Taub Center for Social Policy Studies in Israel.

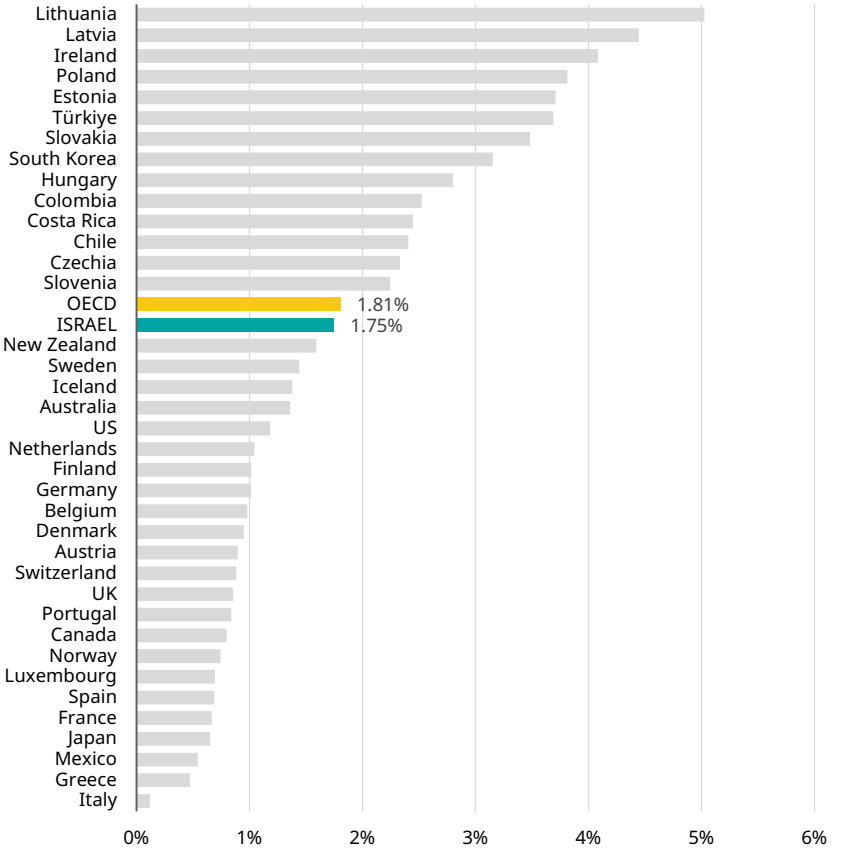
Weinreb, A., Chernichovsky, D., & Brill, A. (2018). *Israel's exceptional fertility*. Taub Center for Social Policy Studies in Israel.

Weinreb, A., & Seela, E. (2021). How many lives could be saved in Israel? A comparative analysis of cause of death across 37 countries? In: A. Weiss (Ed.), *State of the nation report: Society, economy and policy 2021* (pp. 169–190). Taub Center for Social Policy Studies in Israel.

Weinreb, A., Shraberman, K. (2022). Demographic trends in Israel: An overview. In: A. Weiss (Ed.), *State of the nation report: Society, economy and policy 2022* (pp. 207–237). Taub Center for Social Policy Studies in Israel.

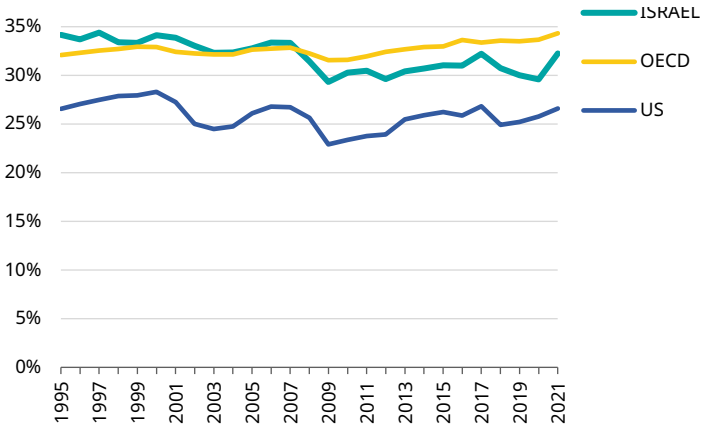
Appendix A

Appendix Figure A1. Annual average growth rate of GDP per capita, Israel and other high-income NTA countries, 2001–2022



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: OECD

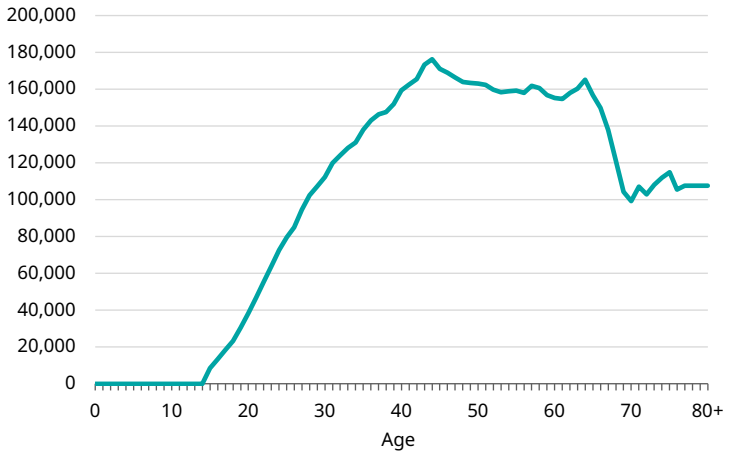
Appendix Figure A2. Israel, US, and average OECD total tax revenues, as share of GDP



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: OECD

Appendix Figure A3. Annual salaried income, by age, Israel, 2018

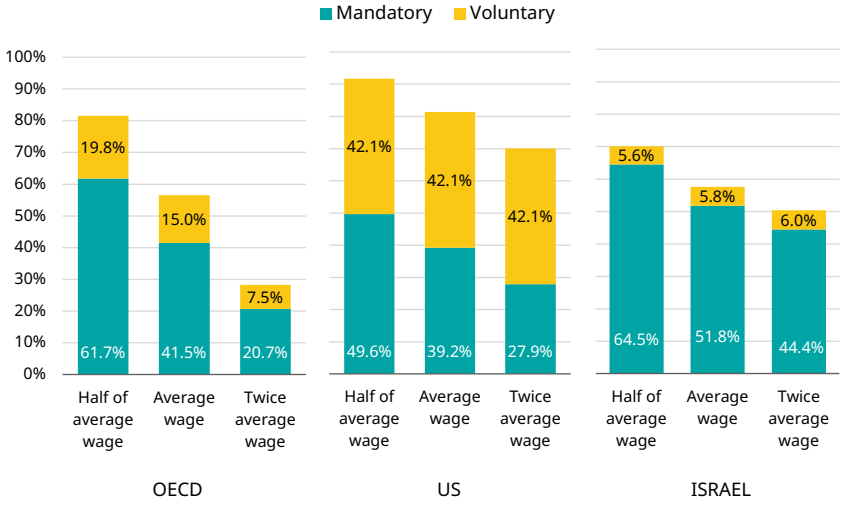
NIS, 2018 prices



Note: Salaried workers only.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: CBS, Households' Expenditures Survey 2018

Appendix Figure A4. Israel, US, and average OECD pension replacement rates, as share of average salaried income, 2020



Notes: For a single person who enters the labor market at age of 22 and retires at the official retirement age in that country, using a 3.5% discount rate.

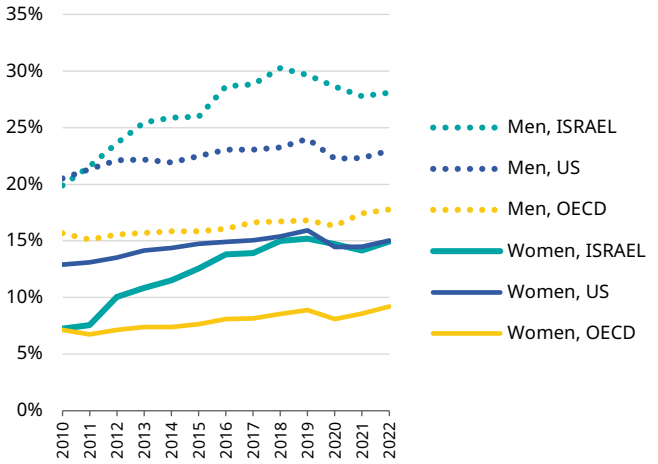
The rates are shown for a person who earns half the average wage (0.5AW), the average wage (AW) and twice the average wage (2AW).

Mandatory refers to employee and employer contributions that are mandated by a country's Social Security and labor legislation. All countries have some share of Social Security contributions dedicated to old-age pensions. In Israel, since 2008, occupational pensions' contributions have also been mandatory, conditional on length of employment with a given employer.

Voluntary refers to contributions to occupational pensions and life insurance that exceed mandatory contributions.

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: OECD, Pensions at a Glance 2021

Appendix Figure A5. Israel, US, and average OECD employment rates among aged 65+



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: OECD

Data sources

In this paper we used four main sources of data: three surveys conducted by Israel's CBS, each drawn from a nationally representative sample frame, and tables from Israel's System of National Accounts.

Household Expenditure Survey (HES)

HES data include household expenditures, incomes, and additional variables that allow us to characterize households' economic well-being. Distinct measures are available for leisure, different types of food, level of total monetary income and its sources and also housing consumption and housing conditions. Israel's HES data are used in marketing research and in research on Consumer Prices Index dynamics.

Since 2012 the HES sample frame has covered around 97% of Israel's population. The HES 2018 survey used here included data on 29,238 individuals in 8,792 households.

Labor Force Survey (LFS)

The LFS monitors ongoing labor force trends in Israel, its size and characteristics, and many other economic aspects of Israeli households. It includes detailed data on individuals regarding their civilian labor force characteristics, age, years of education, type of last school, date of immigration to Israel and country of origin, level of religiosity (since 2014) and much more. It also includes information regarding household composition and housing conditions, commuting and other economic characteristics of individuals and their households. Since January 2012, Israel's CBS has fielded the LFS on a monthly basis, rather that quarterly, collecting data from approximately 12,000 households each month (each household is followed for four consecutive months, then, after an eight-month break, is followed for another four consecutive months). The data are weighted in order to represent Israel's population aged 15+. The 2018 LFS data used here included observations on 236,557 individuals.

Long-Term Survey (LTS)

The LTS is a relatively new survey, conducted by CBS of Israel, Bank of Israel, National Insurance Institute, Ministry of Finance and Ministry of Education of Israel. It is conducted annually and is comprised of a constant pool of individuals within households, and new individuals that join those households over time. The main purpose of the LTS is to assess the dynamics of individuals' and households' socio-economic indicators, such as education, labor market performance, health status, housing, financial and physical assets, and incomes. The 2018 LTS data used here included information on 12,040 individuals in 4,014 households.

Appendix B

Asset-based reallocations

When a given household runs a current surplus, it means that income from all sources exceeds total consumption, and non-consumed funds must accrue somewhere. Economists' standard advice is to invest these additional funds and transform them into assets that can provide a positive rate of return, making larger sums available to the household in the future. If the same household runs surpluses in subsequent periods, and continues investing, this may increase the value of assets even more.

When a household is in deficit, its total consumption is greater than its total income, and it typically finances the deficit by "eating down" total assets owned by, for example, taking out a loan or selling assets. In either case, these funds are subtracted from net assets owned.

The same principle applies to the government budget. When public expenditures exceed public income from all sources, that is taxes paid by residents and government's asset income, the government has to take loans in order to finance the deficit, frequently by issuing bonds. In this case, too, that additional government debt is subtracted from the net worth of public assets.

To understand these definitions fully, it is crucial to also define "assets" and "asset income." Assets refer to the stock of all kinds of private capital, such as the equity of companies, bank deposits, pension funds, and real estate. Since all these are types of capital, "private assets income" in the NTA is equivalent to the *gross operating surplus* of the private sector in SNA. Gross operating surplus is both the share of total production attributed to capital and the source of change in the total value of assets. Public asset income is the gross operating surplus of government, which also includes incomes received from government owned companies.

Appendix Table B1 below shows a further division of private asset income, shown at the bottom of Table 2, into three discrete categories: business income, imputed income from owned housing, and general property income. Business income is the share of self-employment income attributed to capital, non-payable profits and change in stocks of the business sector that contribute to companies' net worth, and they are distributed across ages using the assets ownership age profile. Property incomes are all monetary incomes related to ownership of assets, such as payable dividends, rents from real-estate, payable interest rates, incomes from assets owned abroad. Imputed incomes from owned housing are also considered to be property associated income, but because it is imputed, it is defined as a separate category.

Private asset-based reallocations refer to the difference between private asset income and private saving. In other words, this is the change in assets' net worth that is not associated with extra saving. The difference between public asset income and public saving is the public asset-based reallocations.

Appendix Table B1. Sources financing life-cycle deficit in Israel, by source and age, 2018

NIS billion, 2018 prices

	Total	0–19	20–29	30–49	50–59	60–69	70+
Private asset-based reallocations	259.8	27.0	30.8	82.1	29.6	43.6	46.6
Private asset income	416.7	0.5	13.1	177.8	91.0	80.2	54.1
Private capital income (business & non-profits)	267.9	0.4	7.8	129.1	63.1	49.2	18.5
Private capital income (owner-occupied housing)	114.9	0.1	3.3	42.9	24.0	22.5	22.2
Private property income	33.8	0.1	2.1	5.8	3.9	8.6	13.4
Less private savings	156.9	-26.5	-17.6	95.6	61.4	36.5	7.5

Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

We noted earlier that, on average, Israelis enter a life-cycle surplus (when labor income YL exceeds total consumption C) at the age of 32. We see clear signs of this in Table B1 in the shift that happens between people's 20s and their prime working ages (30–49), and then the subsequent decline in private asset income, and concomitant rise in private asset-based reallocations, in the upper age groups.

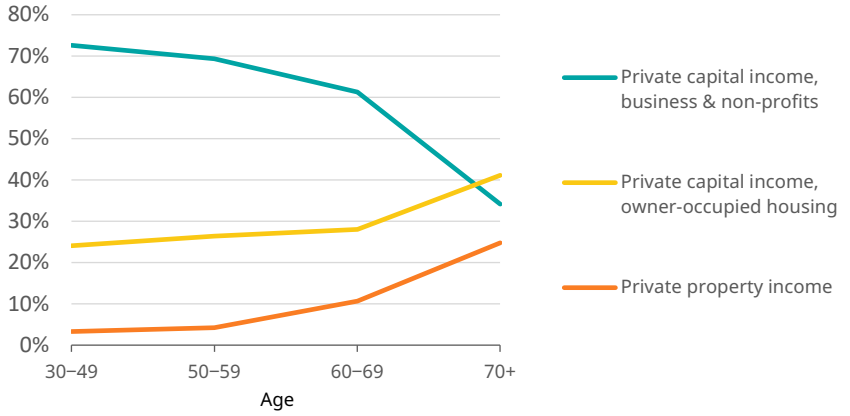
In this regard, it is also instructive to look at the relative share of different sources of asset income by age. These are shown in Appendix Figure B1. The largest source of "Private Asset Income" for individuals aged 30–69 is capital income from businesses and non-profits. It includes mainly the change in the value of assets owned by individuals which also includes contributions that people make to occupational pensions.[34] The second highest share is attributed to owner-occupied housing income, that is rental money avoided by owning housing. Finally, property income had the lowest relative share in asset income throughout the working ages.

34 Contributing to a pension fund increases the overall value of asset owned by an individual. After retirement age, that pension fund becomes available to its owner in the form of a monthly pension benefit, which in the NTA framework is defined as property income.

Assuming that the outcome displayed in the Table and Figure stems from a gradual decrease in labor force participation in later years in life, the results reflect a shift in the relative shares of the different components of private asset income as a person ages. On the one hand, the share of business income drops. On the other hand, pension contributions made over the years become available to them, but they are listed as property income, explaining why the relative share of property income starts to rise for those aged 60+. Note that this is also the only category that rises (in absolute terms) in Table B1 from people's 50s into their 60s and 70s. There is also a rising share of owned-housing with gradual retirement from labor market – though in absolute terms it remains stable as a result of smaller cohorts at older ages. This points to the growing significance of ownership of housing after retirement, rather than before it. Because current income at retirement from the labor market falls significantly (Appendix Figure A4 above), ownership of housing allows people to avoid rental payments, leaving retirees with more resources to spend on other consumer items, or to transfer more to younger generations.

Alongside this explanation, it should also be noted that these data are cross-sectional. That means that at least part of the explanation for the shift in the relative share of the different components of private asset income as a person ages is that the younger generation simply owns more assets and will carry them with them into their retirement years. This is particularly true given the changes Israel has undergone since its founding 76 years ago.

Appendix Figure B1. Relative share of sources in private asset income, by age, Israel, 2018



Source: Alex Weinreb, Kyrill Shraberman, and Avi Weiss, Taub Center | Data: NTA Portal

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The fiscal consequences of changing demographic composition: Aging and differential growth across Israel's three major subpopulations

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ABSTRACT

Israel's rapidly growing population comprises three major groups: Israeli Arabs; Haredim, also known as ultraorthodox Jews; and the general population, mainly composed of secular and religious Jews. Each of these has a different demographic and socioeconomic profile, including very different age structures and anticipated growth patterns. Here, we disaggregate Israel's 2018 national NTA schedule for each of the three subpopulations. We show that as of 2018, collected tax income fell short of public expenditures by 4.9% in the general population, 56.2% in the Arab population, and 66.1% in the Haredi population. The Haredi population was almost fully reliant on public transfers to make up this difference. The low fiscal support ratios (FSRs) in Israel's Arab and Haredi populations are a direct result of their low employment levels and low-quality employment. We forecast the fiscal consequences of two type of compositional shifts within Israel's population up to 2050: aging and a rapid increase in the share of Haredi Jews at all ages. These forecasts point to a 12% reduction in Israel's national fiscal support ratio by 2050, with two-thirds of this caused by aging, and the remainder by the increasing share of Haredim.

Introduction

Among high-income countries, Israel has an unusual demographic profile. While averaging 1.8 % growth per year in GDP per capita (constant USD) over the last 25 years, its population has been increasing by 1.9 % per year. Most years, around 80 % of this population growth is driven by Israel's high fertility: the period TFR was 3.0 in 2022, almost double the OECD average. As a result, Israel's age-structure is much younger, and its old-age dependency ratio much lower, than other high-income countries with a similar life expectancy (e.g., Italy and Spain) or a similar GDP per capita (e.g., Canada and Sweden).

In a forthcoming paper, we describe how this young age structure alongside other idiosyncratic national characteristics—in particular, the lengthy national military service that delays entry into higher education and into the labor market—are reflected in Israel's National Transfer Accounts (NTA) profile (Weinreb et al., 2024b). Using data from 2018, we identify a number of key differences between Israel's profile and that of other high-income countries: Israel's substantial public expenditures on education last deeper into the lifecourse than in most high-income countries; Israelis enter the labor market relatively late, remain in it for longer, and their average labor income only comes to exceed average consumption later in life; as a share of average income, private transfers, both intrahousehold and interhousehold, are relatively high and extend over more years, deep into people's 70s in terms of net interhousehold outflows transfers from elderly to younger generations. Finally, Israel's lifecycle deficit as a percentage of GDP is higher than the average for high income countries, reflecting its unusual combination of substantial public expenditures, relatively low tax revenues, unusually high public asset income relative to the OECD, and a young population whose continued growth makes saving more difficult.

This paper has two starting points. The first is the anticipated compositional shifts within Israel's population that will alter the balance within its "generational economy" across three core groups or subpopulations, each of which has distinct demographic and socioeconomic profile: *Haredim* (ultraorthodox) Jews, who currently constitute about 12.5 % of the total population[1]; *Arabs*, comprizing about 21 % of the population; and the remaining *general population* that is mostly composed of non-Haredi Jews but also includes more than 500,000

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[1] There are three major groups of Haredim: Hasidim; Mitnagdim, also known as Lita'im in Israel; and Sefardi Haredim. Dödtmann (2022) provides a clear description. We do not distinguish between them here since in terms of demographic and economic behavior, all three are much more similar to each other than to the two other major Israeli subpopulations.

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people who are categorized as being neither Jewish, according to religious Jewish law, nor Arab. The second starting point is the rapid growth of Israel's elderly population, in general, and its differential growth patterns across the three core subpopulations, in particular. Both the compositional shifts and the rapid growth in the elderly population will occur as Israel's population is projected to grow from 9.7 million in mid-2022 to 15.9 million in 2050 (Israel Census Bureau's medium scenario projection).

In the next section of the paper we delineate each of these starting points in some detail. We then describe the NTA framework that we employ to estimate the likely range of effects on public finances that will result from these anticipated demographic shifts by: (i) disaggregating Israel's overall NTA schedule into its discrete age-specific patterns for each of the three core subpopulations; and (ii) forecasting the fiscal consequences of compositional shifts in Israel's population, in particular the effects on "fiscal support ratios" associated with aggregated net public transfers. By fiscal support ratio (FSR), we refer to the ratio between a state's income from taxes and its total expenditures, where each of these is based on age-specific tax profiles and public consumption. As is standard in the NTA literature, our forecasts look at how the FSR will shift if current age-profiles of taxes and benefits remain constant (Miller, 2011). Here, we consider both group-specific FSRs for each of the three core populations, and the national FSR, which will be increasingly influenced by behavioral patterns in Israel's Haredi and elderly populations.

Our analysis is intended to make two contributions. The first is empirical and Israel-specific. We confirm that by 2050, unless there is a substantial reduction in support from public transfers among Haredim and Arabs, Israel's two poorest subpopulations, Israel's overall FSR will deteriorate. However, our NTA models also suggest that, given current economic conditions, the most important factor driving this deterioration is population aging, especially in the general population. It accounts for about two-thirds of the detioration in Israel's FSR, as opposed to the third arising from anticipated increases in the share of Haredim. This strong effect of aging means that in Israel, as in other high-income countries, substantial increases in the FSR are baked-in to the current age structure, despite its unusual demographic profile. Recognizing this adds weight to those calling for increases in employment and skill levels in Israel's poorer and less educated subpopulations. Barring some radical and transformative economic transition—for example, some combination of AI, robotics and automation, universal basic income and other innovations that herald the dawn of a new economic utopia—improving employment rates at higher income levels, and thus tax revenues, is the only way to help reduce the impact of aging on a range of national fiscal parameters and support ratios.

The second intended contribution is more general. Israel is uniquely heterogeneous in its particulars—it is the only majority Jewish country in the world—but it is far from unique in being heterogeneous. On the contrary, most countries in the world are religiously or ethnically diverse (Horowitz, 2000); and in many of these countries, those same religious and ethnic distinctions also mark differences in socioeconomic characteristics and patterns of demographic growth. In some cases, the diversity underlying differences in sociodemographic patterns is more regional. The vast majority of post-colonial states in Africa and Asia fall into this category: particular areas within many of these countries experienced educational and demographic transitions far earlier than other regions within the same country, in part, driven by the colonial-era placement of Protestant missions (Woodberry, 2012). Well-known examples of such areas in demography and international development include Kerala in India, Kikuyu areas in Kenya's Central Province, and Igbo areas in south-central Nigeria (Chukwuezi, 2001; Véron, 2001; Weinreb, 2001). In other cases, the diversity underlying differences in sociodemographic patterns is associated with longstanding religious minorities or immigrant populations distributed across regions. Christian minorities in Middle Eastern countries often fall into this category, being disproportionately urban, more highly educated and low fertility (Fargues, 2001; Masters, 2008). So do non-European immigrants in European cities, typically less educated than the national average, having higher fertility in the first generation and being somewhat concentrated within "ethnic enclaves" (Coleman, 2006; Demireva & Zwysen, 2021).

Israel has both patterns of diversity when it comes to the three subpopulations that are our focus here. It has spatially *distinct* areas associated with a single group. In fact, most of Israel's Arab and Haredi population live in separate towns or in distinct neighborhoods within cities. New neighborhoods or towns are often explicitly built for Haredim (Hershkowitz, 2010; Rosen & Razin, 2008). In fact, even when in spatially *integrated* areas that include at least two and sometimes all three of the subpopulations that are our focus here, as can be found in officially defined "mixed cities" (e.g., Jerusalem, Haifa, Lod, Ramle), the educational and lifecourse track of each of the three subpopulations is distinct: each subpopulation is educated in a separate school systems (described below); and while only small minorities of Haredi and Arab men serve in the army or do some other type of national service, as do even smaller minorities of women from these communities, in the general population, which includes the "national religious" population, there is almost universal service for both men and women. This not only delays the progression from secondary school to higher education or into the labor force by a few years. It also affects the degree of exposure to others, which in turn influences national versus subpopulation-level solidarity (Alesina et al., 2020; Cáceres-Delpiano et al., 2021). All of these factors have downstream effects on sociodemographic and economic profiles of each of the three subpopulations.

The combination of these three populations' discrete sociodemographic profiles and political geographies is what makes the current exercise valuable for the NTA in general. We argue that despite frequent odes to singular national cultures or economies, analysts need not limit their attention to a single set of national estimates. This is at least implicitly recognized in NTA analyses that have generated regional NTA estimates (e.g., Olayinka et al., 2023) or disaggregated national estimates by educational class and parenting status (Hammer & Prskawetz, 2022; Spielauer et al., 2022). Our analysis complements these, and confirms that it can also be productive to disaggregate NTA estimates into subnational contributions, based on sociodemographic differences. At the very least, it provides a more solid empirical ground for targeted interventions by policy makers.

Background

Differential age-structure and growth

The differences between Israel's three core subpopulations—Haredim, Arabs, and everyone else, referred to here as the "general population"—begin with age structure. Each of these three subpopulations has a very different age structure, shown in Figure 1, that signals substantial differences in past demographic behavior and future patterns of growth.

At younger ages, these differences in age structure have mostly been driven by different fertility patterns. Since the early 1980s, the TFR has been in the 2.5–3.0 range in the general population, in the 6.5–7.2 range for Haredim Jews, and it has fallen from around 5.7 in 1980 to 2.8 in 2022 in Israel's Arab population.[2] The results of these differences can be

[2] Within the non-Haredi Jewish population, the most important predictor of fertility in Israel has long been religiosity (Friedlander and Feldman, 1993) even as secular Israelis also have surprisingly high fertility given their other socioeconomic and educational characteristics (Okun, 2016; Weinreb et al., 2018). Current levels of period TFR ranges from arund 2.2 for secular Jews to 3.8 for religious (non-Haredi) Jews, and has fallen to 1.4 for the growing population of "Other"/religiously unaffiliated (ethnically and politically associated with the Jewish population). Within the Arab population, the TFR is around 2.9 for Muslims, 1.9 for Druze and 1.7 for Christian Arabs (Weinreb, 2023).

seen in Figure 1: the slow and steady growth in the general population, the very young Haredi population, and a sudden flattening of the age structure in the Arab population over the last 20 years.

Other differences in age structure reflect particular demographic histories of each subpopulation. The distinct bumps in the age structure of the general population, along with echo effects every 30 years, have their origin in the post-WWII baby-boom that coincided with Israel's founding, with the movement of surviving European Jews after the end of the British Mandate, shortly followed by a large stream of Jewish refugees from Arab countries. The eldest of the three largest bumps was augmented by the arrival of almost one million Jews from the ex-USSR during the 1990s, many of whom were in their 40s and 50s. A relatively constant fertility rate over multiple decades has given rise to the echo effects at younger ages, with recurring bumps and dips every 30 years. More generally, this signals the distinctive cohort-associated demographic effects on Israel's economic development.

The age structure of Israel's two other subpopulations are quite different. A slight dip in the Arab population's age structure at age 70 coincides with the lower number of births during Israel's 1948–49 War of Independence. Rapid growth of cohorts in their 40s through 60s was driven by a TFR of around 8 children up to the late 1970s. And the rapidly increasing size of cohorts born between 1988 and 2001 coincides with the freezing of the fertility transition around the First Intifada (1987–1993), though it continued past the 1993 Oslo peace agreements. Across these decades, Israel's Arab population grew from around 11 % of Israel's 2.15 million people in 1960 to 21 % of Israel's 9.66 million people in 2022.[3] Over the last 10 years, as implied by the flattening age structure, the pace of growth in Israel's Arab population has slowed substantially, such that it is projected to peak around 2030 and then fall to around 20.3 % of Israel's population by 2050. This slowdown is driven by fertility reductions that are similar in timing and magnitude to those in neighboring Arab societies (United Nations, Department of Economic and Social Affairs, Population Division (2023), 2023), and it has coincided with substantial improvements in Israeli Arabs' socioeconomic characteristics, such as the share holding academic degrees, especially among Arab women.

The Haredi population has few notable fluctuations in its age structure. Rather, the overall shape is very similar to that of sub-Saharan African countries in the pre-demographic transition era of the 1970s-1990s, pointing to consistent high rates of growth over many decades. There are no robust estimates of the number of Haredim in Israel during the state's first decades since they were more integrated into the general population in those years, both residentially and in terms of employment. This made it both more difficult and less important analytically to distinguish them from other orthodox Jews (Keren-Kratz, 2023). Recent Israel Central Bureau of Statistics estimates point to around 1.15 million Haredim in 2020, around 12.4 percent of the total population, and 15.7 % of the Jewish population. Other indications point to rapid growth. Notably, the four discrete Haredi school systems now educate around 20 % of Israeli children, up from 10 % in 2001 (Cahaner & Malach, 2020). Almost no non-Haredi children are in these networks beyond primary school, so this growth comes from within the community. Even allowing for denominational shifts that leads to some net movement from the Haredi to the general subpopulation, Haredim will comprise a growing share of Israel's total population over the next few decades: 15 % by 2030, 17.7 % by 2040 and 20.5 % by 2050.

Growth in Israel's aging population

The larger weight of Israel's general population at older ages means that Israel's overall age structure currently has a distinct bulge in the mid-to-late 60s age-group, seen in the top panel in Figure 1. As shown in panel (a) of Figure 2, this means that between 2020 and 2030, the number of people aged 70+ will increase by around 3.7 % per year on average, twice the rate of the overall population growth rate. It will then slow somewhat, fluctuating between 2.0 and 2.8 % per year until 2050.

Hiding beneath these shifts in the share of the national population that reaches older ages, there are substantial differences across the three major subpopulations covered here. Between 2020 and 2035, the annual rate of increase in the Arab population aged 70+ will be around 6 % per year, before dropping off to around 3 % per year by 2050; and the annual rate of increase in the Haredi population aged 70+ will be around 8 % per year until 2028 before falling into the 4–5 % range until 2050. Growth rates in the general population will track the national average, albeit at a somewhat lower level.

Panel (b) confirms that in all three subpopulations, this rapid growth will lead to a rise in the share of the population that is elderly, triggering an overall rise at the national level from 8.2 % of the population aged 70+ in 2020 to 11.2 % in 2050. However, in absolute terms the rise will be most pronounced in the Arab subpopulation—the share of the Arab population aged 70+ will rise from around 62,000 in 2020 to 289,000 in 2050, or 3.3 % to 8.9 % out of total Arab population. In contrast, in the Haredi population, despite higher growth rates among the elderly overall, ongoing (expected) high fertility rates will continue to fill out the bottom of the age structure. This will allow the Haredi population to maintain a classic pyramid-shape. That is, even as the number of Haredim aged 70+ will increase from 24,000 in 2020 to 122,000 in 2050, the share of elderly within the Haredi population will increase from only 2.0 % to 3.7 %.

As is the case in other high-income welfare states, the overall increase in the share of the population that is aged will pose fiscal challenges, since it will require a rising share of national resources to be devoted to public expenditures on health, pension schemes and other allowances directed at the old-age population.

Educational and socioeconomic differences

What magnifies the relevance of Israel's three subpopulations' distinct age stuctures and growth patterns for any NTA analysis, especially one focused on current and future fiscal situations, is that each of them also has substantially different socioeconomic profiles. These profiles are driven by different levels of individual and household income, which in turn influence net contributions to the state (taxes less allowances), but also the magnitude of private transfers within each subpopulation, both at the inter- and intra-household level.

Figure 3 presents trends in educational and employment characteristics across these three populations, and by gender. The general population has substantially higher scores on both. In 2022, 42 % of men and 53 % of women in the general population aged 25–64 had an academic degree. By international standards, the overall share with an academic degree is high, and the female advantage very substantial: OECD averages for these two were 40.7 % and 47.4 %, respectively, in 2022 (2023).[4] The percentage with academic degrees was much lower in the two other subpopulations: 18 % of men and 25 % of women in the Arab population, and only 11 % of men and 28 % of women in the Haredi population.

It is important to acknowledge the uniqueness of the Haredi population's low levels of secular education, especially that of Haredi men. We know of no other population in which there is a 17 percentage point difference, to the advantage of women, in the share with an academic degree. These different secular educational levels are also meaningful economically since they affect both total expenditures on education in Israel today and expected employment and income patterns in the future. There are two key points here.

[3] Currently, around about 85% of the Arab population is Muslim, and the remaining 15% is divided roughly equally into Arab Christians and Druze. Each of these also has a distinct demographic, educational and employment characteristics, which are not addressed here.

[4] Education at Glance: Share of population by educational attainment aged 25–64 (Data extracted on 30 Oct 2023 from OECD.Stat).

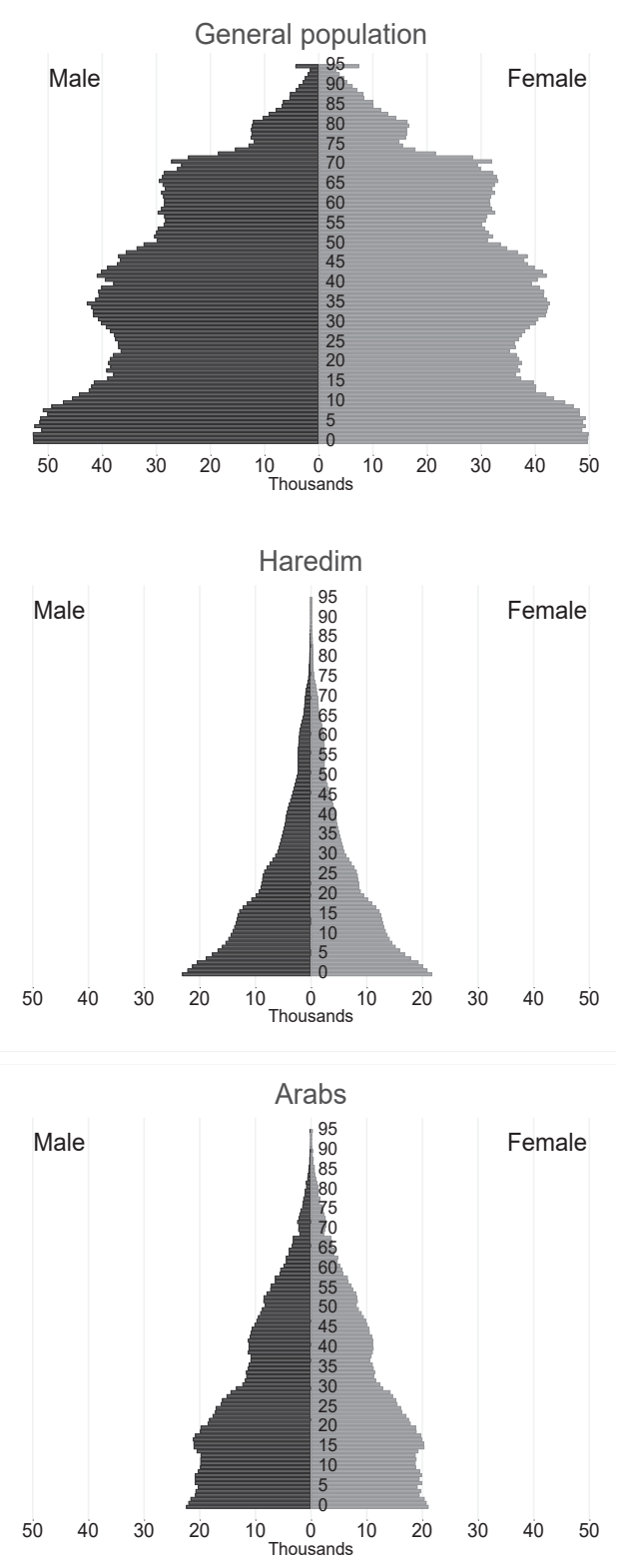

Figure 1. Israel's major subpopulations, by age and sex, 2018.

First, to receive full public funding (per student) from the state, Israeli schools need to teach core subjects, as defined by the Ministry of Education. These include humanities, sciences, mathematics and English. Schools can choose to forego full funding, and avoid educational supervision by the Ministry of Education, by not teaching those core subjects. That is what the vast majority of Haredi boys schools do (Haredi schools are gender-segregated from kindergarten). As of 2018, only 16 % of Haredi boys were being taught *any* math or English at the secondary school level (Government comptroller (2020), 2020). In contrast, the majority of Haredi girls schools do teach some version of a standard curriculum that includes core subjects. This provides a much easier pathway for Haredi girls into some form of post-secondary education, including into degree-granting institutions. More generally, the decision to avoid core subjects means that per student public expenditures on education are substantially lower in the Haredi population than in the general or Arab population.

Second, from the perspective of the Haredi leadership in almost all its educational streams, the relative lack of secular education, especially in boys schools, is intentional. It reflects the dominance of a segregationist ideology within the Haredi population that treats secular learning for *men* in particular as both dangerous and profane. This is a relatively new ideology within Jewish thought, arising as a response to the attractions of modernity. It is based on the articulation of a new set of ideas that valorize a lifetime of Torah-based learning for Haredi men over employment, supported by their working wives or society in general (Keren-Kratz, 2023; Stadler, 2002). These new ideas redefine any secular learning as *bitul Torah* ("cancellation of Torah"), that is, an unjustified waste of time spent on things other than Jewish religious learning, where the latter is seen as men's key function, privilege and burden in this world (Ahrend, 1980). This is the source of Haredi women's longstanding advantage over their male counterparts in terms of secular education (El-Or, 1994). The Haredi leadership does not apply the principle of *bitul Torah* to women.

Employment rates largely reflect these differences in educational characteristics. 87.2 percent of adult men aged 25–64 in the general population are employed. If all Israeli men were employed at this level, Israel's national employment rate would be the highest in the OECD (OECD 2023b).[5] The same is true of women. Their employment rate of 84.2 % in the general population is also higher than the national average of any OECD country. In large part, these high rates reflect strong pro-employment norms for both men and women, as well as the financial needs that arise from a combination of high fertility and strong consumption desires.

Arab men have long entered and exited the labor force at younger ages, the latter occurring in part because of injuries arising from higher employment in blue-collar professions (Habib, 2010). Their overall employment rates have also been lower than those of Jews, as their lower educational levels limit their employment prospects (Habib, 2010). This process appears to have intensified more recently. Between 2016 and the Covid-19 pandemic, employment rates of Arab men under age 30 fell by about 10 percentage points (Debowy, Epstein, & Weiss, 2021a). This is in spite of the fact that the number of Arab students successfully completing matriculation exams in high school rose from 50 % of high school cohorts in 2010 to 70 % in 2020 (Blass, 2022), and over the same period, the number of Arab students in higher education more than doubled, from 31,782 in 2010 to 65,531 in 2022 (Malach & Cahaner, 2023). Consistent with these improved measures of educational attainment, there has been a concomitant rise in employment, but mainly among Arab women: from 33 % in 2012 to 45 % in 2022. These trends suggest, if continued, that the gender gap in employment levels in the Arab population will eventually converge to that of general population. More generally, it also points to an improvement in the

[5] OECD (2023b), Employment rate (indicator). https://doi.org/10.1787/1de68a9b-en (Accessed on 9 October 2023).

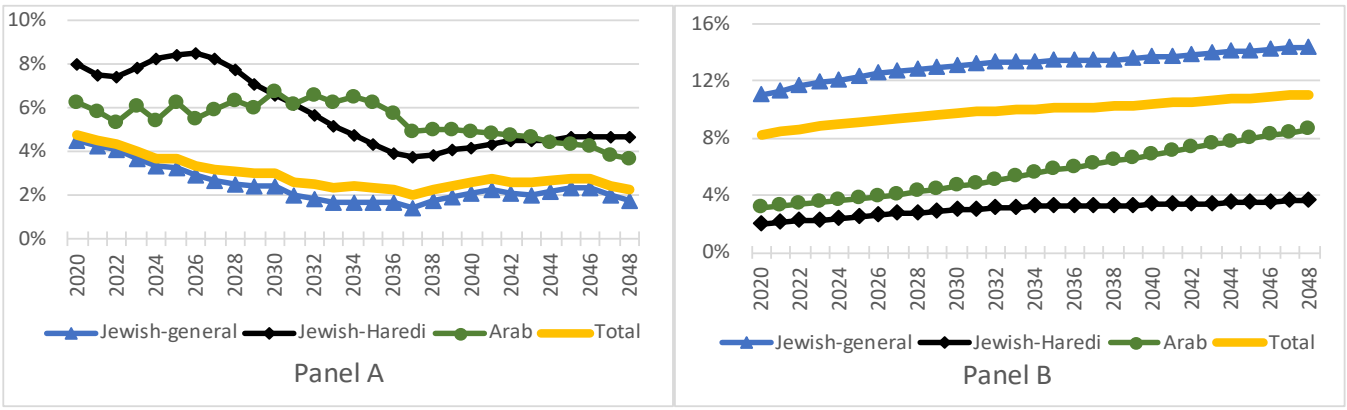

Figure 2. Annual growth rate (%) in the number of people aged 70+ (Panel A), and share of each subpopulation aged 70+ (Panel B), 2020–2050, by subpopulation.

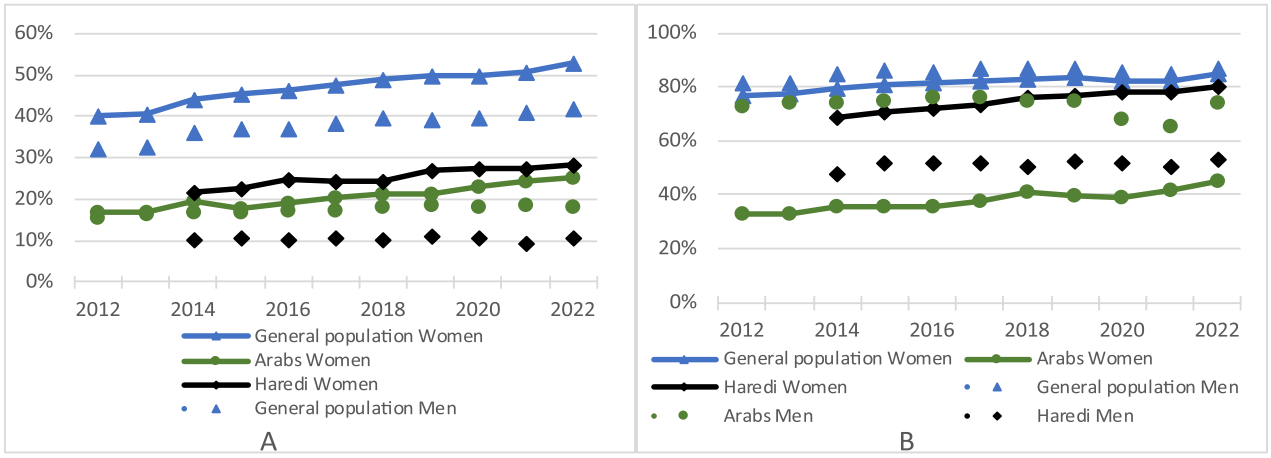

Figure 3. Academic degree holders (Panel A) and employment rates (Panel B) among people aged 25–64, 2012–2022, by gender and subpopulation.

socioeconomic status of Israel's Arab minority.[6]

Lower employment levels of Haredi men also pulls down the national male employment rate. Only 53.3 % of Haredi men aged 25–64 were employed in 2022. This figure has fluctuated a little over the last decade, generally moving upward, from 47.9 % in 2014. Observers have linked these low employment levels to Haredim men's inadequate skills for the local labor market, and to financial disincentives associated with the package of financial support made available to Haredi families in which there is a male "learner" (Cohen Kovatch, 2022; Debowy, Epstein, & Weiss, 2021b). Evidence of this support will be shown below in the magnitude of public monetary transfers. Yet there is also some evidence that the strength of norms promoting religious learning, and the associated political and institutional support for them within the Haredi community, makes it particularly costly to pull the most devout Haredi men into higher (secular) education appears (Perelman et al., 2019). That is, the more religiously devout, the higher the financial incentive needs to be. This has been a longstanding challenge for Israel's policy makers.

The overall picture that emerges from these patterns is that low Haredi employment is a product of, and made possible by, the political influence of Haredi political parties in Israel's unicameral proportional-representation-based legislature. That disproportionate political leverage has enabled those parties to enshrine norms that valorize Torah-based learning over employment into narrowly focused, sectorally-specific, financial support from the state. Government allowances for older and married yeshiva students (*avarechim*) is the best example of this support. We show later (see Figure 6) that these amount to almost 8,000 USD per year per *avarech* aged 25–44. That is in addition to the standard array of non-sectoral welfare programs made available to all poor households (Gal et al., 2019).

It should also be noted that even in the absence of extra funding for Haredi institutions, the mismatch between Haredi skills and a shifting labor market that places increasing emphasis on highly skilled labor (Berrebi et al., 2017; Madhala, 2019), would pose increasing challenges to the Haredi population. This is not unique to Israel. Kingsbury (2020) describes very similar patterns, and the fiscal challenges they pose, in the UK's rapidly growing Haredi population.

The results of these substantial differences in educational attainment are reflected in average labor income within each of these subpopulations. These estimates, shown in Figure 4, are taken directly from our NTA accounts, described shortly. Between people's 30s and 60s, average labor income in the higher-skilled general population is more

[6] Inequalities between Jews and Arabs has been a focus of academic and policy-related research in Israel since the 1970s (Smooha & Peres, 1975). Over the last two decades, these inequalities have diminished, in part because of considerable investments in the Arab sector. For example, in Arabic-language state schools, classes are now smaller and teachers are more likely to have a degree than in in Hebrew-language state schools (Blass & Bleikh, 2022). Likewise, at the upper end of the educational spectrum, more than 30% of newly registered physicians in the healthcare system since 2016 have been Arab, alongside more than half of the pharmacists and a large share of nurses (Tur-Sinai et al., 2020). This signals the growth of large and highly educated Arab middle class, in spite of persistent inequalities across a range of other dimensions (Saabne and Shalev, 2024), and in particular a rapid rise in the murder rate of young Arab men since 2017 (Weinreb et al., 2024a).

than double the labor income in the lower-skilled Arab and Haredi populations. Some of that difference is employment; most is wages.

Anticipated compositional shifts

Over many decades, the object of demographic-economic concerns in Israel was Israel's rapidly growing Arab minority. The combination of rapid increases in Arabs' educational attainment, especially among women, and a growing share of white collar professions, alongside a foreseeable demographic peak in that population, has largely dampened those concerns.

The primary focus of contemporary anxiety is now the Haredi population. The combination of low secular education, low and low-quality employment, especially among men, low taxes paid, and very high demographic growth, undergirds numerous pessimistic accounts of Israel's economic and political future. These are especially notable in Hebrew-language publications (repeated articles by Tel-Aviv University economist Dan Ben-David, and one of Israel's leading economic correspondents, Meirav Arlozorov), but they can also be found, though framed more soberly, in regular IMF and OECD reports on Israel's economy (2023; IMF 2023) and in more general academic surveys of challenges confronting Israel (Conway, 2017; Endeweld & Karadi, 2023; Krebs, 2009). Those accounts uniformly point to the impending reduction in per capita levels of human capital, with subsequent falls in the type of scientific and technological innovation that powers Israel's high-tech sector, the "locomotive of growth" in Israel's otherwise relatively low-productivity economy (OECD, 2023). Specifically, the high-tech sector currently employs around 12 % of the labor force, and is responsible for approximately 25 % of payroll taxes, making it a major source of funds for Israel's substantial system of public transfers. However, employees in the tech sector are disproportionately non-Haredi males since skill-levels in math, science and English are lower in all other groups, including among non-Haredi Jewish females (Fuchs et al., 2018). Pessimistic accounts of Israel's future point to the reduction in the share of the population that is in this non-Haredi general population and project an increasing burden on Israel's most economically productive core, as will be shown below.

The compositional shifts in Israel's core working age population—defined here as those age 30–59—across the three core subpopulations are shown in Table 1. As of 2020, only 8 % of Israel's working-age population was Haredi. Within 30 years that share will almost double. In contrast, the Arab population's share of the working age population will peak around 2040 and then slowly fall, as the more recent smaller birth cohorts start to enter the labor market, and relatively large ones age out of it.

Employment rates of Arab men are higher than those of Haredi men, and even if Arab women currently have lower levels of employment than their Haredi counterparts, there are, as noted above, ongoing sharp increases among the former, driven both by a compositional shift into more educated groups, and by a secular rise in employment.

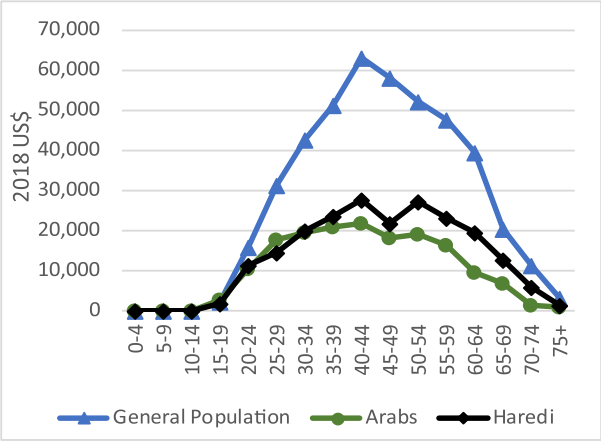

Figure 4. Annual Labor Income per capita, 2018, by age and subpopulation.

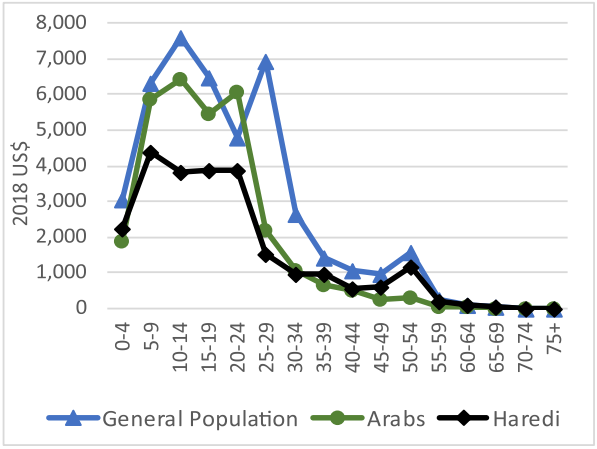

Figure 5. Annual Public Consumption of education per capita, 2018, by subpopulation.

Table 1
Composition of peak working age population (30–59), by subpopulation (%).

	Haredim	Arab	General population
2020	8.0	20.0	72.0
2030	10.3	22.3	67.4
2040	12.9	23.7	63.5
2050	15.3	23.2	61.6

Notes: Based on Israel Census Bureau projections, moderated by assumption of 15 % movement of Haredim to general population over ages 0–24

Combining changing composition and aging

We noted earlier in relation to Figure 2 that the share of the total population aged 70 + will grow quite substantially by 2050, with the most rapid growth (in relative terms) in the Arab population and the slowest in the Haredi population. Together, the share of the population aged 70 + that is in the general population will shrink from 89.1 % today to 77.4 % by 2050.

A priori, we expect the rising number of elderly in Israel's two poorest subpopulations, and the rising share of the national total, to increase public expenditures even more, since even when members of these groups are employed, it is at lower wages than in the general population. Additionally, the mandatory pension law, effective since 2008, preserves observed gaps between these subpopulations in their labor income, and exacerbates the income gaps even more at older age, due to poorer coverage that private pensions offer to workers from the lower half of the wage distribution.[7] On both these counts, therefore, the elderly in Israel's two poorest subpopulations will be more reliant on public transfers of one type or another as they age.

[7] Seasonal and temporary employment is more common in the lower half of the wage distribution. According to Mandatory Pension Law, effective since 2008, both employee and employer make mandatory contributions to the private pension fund of the employee after a 3-months period of work for same employer. Not surprisingly, this eligibility period leaves many seasonal and temporal workers with insufficient coverage, or no coverage whatsoever. A detailed analysis of private pension coverage by wage deciles can be found in Gronau and Spivak (2021).

An NTA approach

By an NTA framework, we refer to the comprehensive system of age-based economic accounting that incorporates age into standard systems of national accounts (SNA) and, therefore, allows for the disaggregation of all major components of National Accounts by age, as well as estimates of all private transfers within and across households. NTA methods were developed over a number of decades, beginning with the integration of mathematical demography into overlapping generational models (Arthur & McNicoll, 1978) and further developments by Lee (1980, 1994), Mason (1987) and Willis (1988). It is widely considered the most effective analytic architecture for considering the consequences of population aging for standards of living and the sustainability of government programmes (UN 2013). Yet the key focus on age-specific fluctuations also makes it extremely useful for looking at the effects of any type of demographic change, including those arising from compositional shifts in educational class and parenting status (Hammer & Prskawetz, 2022; Spielauer et al., 2022).

Our analysis, which disaggregates Israel's national NTA schedule into three core subpopulations, applies a similar approach, albeit across a different type of social boundary. This is intended to correct two core weaknesses in existing empirical predictions of Israel's future economic growth (Argov & Tzur, 2019; 2023; Popper et al., 2015). First, they pay insufficient attention to age-specific patterns, including those associated with age-specific compositional shifts, and the age-specific level of public and private transfers. This is especially important in a country that, like Israel, has a distinctively cyclical age structure (see Figure 1). It affects the accuracy of projected patterns of growth, labor force participation, and related assumptions about taxes and age-specific public expenditures.

Second, existing accounts treat the Haredi and general non-Arab Israeli population as "closed populations," meaning estimates are premised on a net-zero shift in religiosity between these two populations. This is contrary to the best empirical estimates of this type of change in Israel, which suggests a net "migration" of roughly 15 % of children born in the Haredi population who move toward the general population by early adulthood (Weinreb & Blass, 2018).

The NTA framework used here corrects for both of these. It incorporates age-specific patterns while disaggregating Israel's national NTA schedule into the three core subpopulations discussed thus far. Additionally, the population projections that we employ to forecast the fiscal consequences of compositional shifts in Israel's population—the effects on dependency and fiscal support ratios (FSRs) and aggregated net public transfers—assume a 15 % shift away from the Haredi population into the general (non-Arab) population between birth and age 25.

We proceed in two stages. We first describe the current fiscal status using the baseline 2018 data, while pointing to key differences across the three subpopulations in public expenditures, including cash allowances. We then project FSRs in 10-year increments up to 2050 based on the 2018 age-specific patterns. The full NTA profiles for each of the three populations are available as supplementary material.[8]

Current fiscal status

We follow the standard NTA framework (United Nations, 2013) in distinguishing between public expenditures, referred to as *inflows* in the NTA, ascribed to: 1) health; 2) education; 3) public pensions (National Insurance Institute allowances) and cash allowances (other governmental institutions); and 4) in-kind expenditures. We focus on public expenditures for two reasons. First, these account for a much greater share of total educational and health expenditures: 82 % and 76 %, respectively. Second, separate analyses using household-level data from Israel's Household Expenditures Survey show substantial differences in public pensions and other public cash inflows across subpopulations, when measured in relation to the labor income of those aged 30–49 within each subpopulation.

The fiscal status of each subpopulation depends on the magnitude of its public *outflows*, that is, the amount it pays into the public purse, relative to the magnitude of public inflows that it receives. As is standard in the NTA, our estimated outflows also account for asset-based reallocations, representing public capital movements, which are complementary to taxes paid. We show below that the much lower labor income of Haredim and Arabs, seen in Figure 4, reduces their outflows in very significant ways. This occurs both because of Israel's progressive income tax system and because of differences in the absolute amount of indirect taxes associated with private consumption, itself correlated with household income.[9] In addition, since many government programs are means-tested, the same differences in incomes also imply that these three subpopulations qualify for different levels of public *inflows*, that is, services and direct monetary support received from the government.

To summarize the differences in the magnitude of public inflows and outflows we calculate FSRs of each subpopulation. Within the NTA framework, the FSR is the ratio of the effective number of tax payers to the effective number of beneficiaries (NTA 2013: 19), sometimes expressed as the ratio of aggregated public outflows (taxes paid) to aggregated public inflows (public expenditures).

Health

We assign equal per capita health inflows (expenditures) at any given age to all three population groups. This is based on two factors. First, since 1995, when the National Health Insurance Law was passed, all citizens of Israel have been entitled to health coverage through membership in one of four "Sickness Funds" (a version of the Bismarck model used in Germany, France, Belgium, the Netherlands, Japan, and a number of other countries), all of which provide a mandated list of health services. Second, the distribution of public monies to Sickness Funds to cover health expenditures is determined by an age-based capitation formula that has the same J-shape as a classic age-specific mortality curve, in order to cope with rising expenditures as people age. Alongside the universality of health coverage, that capitation formula provides the basis for assigning equal health inflows (per capita spending on health) at each age across all three population groups, at least from public sources. There are known differences across populations in private health spending, which in Israel occurs primarily through supplementary insurance, since that rises sharply with income (Chernichovsky et al., 2016).[10]

The much higher incidence of type-2 diabetes in the Arab population, alongside the elevated per capita health expenses of people with type-2 diabetes (Charbonnel et al., 2017; Stedman et al., 2020), raises questions about how accurately this equal assignment of public health inflows captures actual public expenditures on health in the Arab population as opposed to the two Jewish populations. Here we assume that the higher expenditures in the former are somewhat offset by the Arab population's lower access to health services, given that a disproportionate share of the Arab population lives in the north and south of the country, both of which have a substantially lower share of physicians per capita (Levi & Davidovitch, 2022).

[8] Available at: https://www.taubcenter.org.il/wp-content/uploads/2023/12/Israel-NTA-2018-by-subpopulation-taub2023.xlsx.

[9] Israel's income-tax gradients are more similar to those in Western Europe than in the US. Tax credits and exemptions are also much more favorable to families with children. This further diminishes the contributions of the less affluent, particulary those with larger families.

[10] The main source of finance for Health Funds is the separate health tax, paid by every adult, regardless of employment status, collected by NII. Transfers from NII to Health Funds' depend on capitation formula, rather personal contributions. Budgetary deficits are financed by supplementary government expenditures from its general budget.

Education

The calculation of age-profiles of public education inflows across the three populations are more complicated, at least from 1st to 12th grade. This stems from the fact that though only a very small percentage of Israeli pupils are in private schools, and that the publicly-funded educational system has several streams, as noted above, where each stream receives a different amount per student. This amount is affected by many criteria. Broadly, between kindergarten and 12th grade, differences in funding per pupil are linked to the grade-level, the SES of the pupils' residential area, the number of hours spent on different types of subjects, percent of pupils assigned to special education, number of children per classroom, and a number of other factors. These criteria continue to fuel public debates and social tensions between groups. However, they are largely transparent, as highlighted in detailed empirical reviews of school funding at the primary and secondary level (Blass & Bleikh, 2020).

In our estimates, Arab-language schools are assigned to the Arab population, Haredi schools to the Haredi population, and all remaining Hebrew-language schools (religious, mixed, or secular) are assigned to the general population. Our estimates of public education inflows for each population are based on Ministry of Education data, which include several data sources. The first is the number of students by subpopulation and level of education, from day-care until the end of secondary education—these data are from "Mabat Rahav", the Ministry of Education's database. The second source is the number of students in higher education, including students for academic degrees, technical degrees and vocational training. These data come from the CBS Statistical Abstract for 2018. The third source of data is the Ministry of Education's online source of budgetary information ("shkifut ba'chinuch", literally "Transparency in Education"), which provides detailed budgetary information by level of education and stream.

Educational expenditures on higher education, which is highly subsidized in Israel, are mostly linked to attainment rates of each subpopulation. Higher academic attainment within a subpopulation means higher per capita public education inflows.

The age-profile for public educational expenditures are shown in Figure 5. It confirms the relatively equal per capita spending between the general and Arab education systems during school years. The slightly higher spending in Hebrew-language middle- and secondary schools largely stems from additional subjects taught at religious schools (Blass & Bleikh, 2024). Lower per capita expenditures in the Haredi system reflect their decision to forego full funding, especially in boys' schools, as discussed earlier, in favor of independence from Ministry of Education. The differently timed peaks during people's 20s reflect delays associated with military or other national service in the general population and very low rates of service in the Arab and Haredi populations. Differences in levels of public inflows for these ages reflect different educational attainment rates.

Pensions and other cash allowances

Age profiles of public pensions, which includes disability and other allowances,[11] and other cash inflows were estimated from HES data and then calibrated to SNA values in order to preserve the distributional properties of these transfers within and between subpopulations.

Whereas many NII allowances, including pensions, are universal and quite similar across subpopulations (Figure 6A), the age-profile of other cash inflows looks very different (Figure 6B). This is mainly due to allowances for married Haredi men who are involved in religious studies. These range between 7,500–8,500 USD per year per capita between people's mid-20s to mid-40s. There are also some Ministry of Defence allowances associated with military service and Holocaust survivors allowances to the 75+ age group. The Arab population does not qualify for the latter, and since only a small number will have served in the Israeli security forces, few Arabs qualify for the former.

Other in-kind public consumption

This final catch-all category of inflows in the NTA framework includes all types of public expenditures not covered by education, health, public pensions or other cash inflows. It includes all expenditures on defense and internal security, infrastructure, repayment of public debts, and so on. These kind of expenditures, especially those associated with security, are quite significant in Israel, relative to other rich countries: around 5.5 % of GDP is spent on defense, more than twice the OECD average.

As is standard in the NTA, aggregated expenditures in this category are equally distributed across the entire population, with identical per capita values (in a uniform age structure) imputed based on amounts reported in the SNA.

Public outflows

Figure 7 shows the per capita age-profiles of public outflow transfers, by tax type and by subpopulation in Israel in 2018. This figure provides a detailed picture of how much each subpopulation contributed to the government's budget.

Differences in those contributions across the three populations are consistent with differences in labor income shown in Figure 4. This to be expected given that mandatory health and pension taxes are a fixed percent of income. Likewise, per capita outflows on consumption tax also rises with household income. This consumption tax is 17 % on almost all products and services—exceptions are fruits and vegetables and flights—so in absolute terms, higher-income households pay more.

Fiscal support ratio

Current fiscal support ratios

A summary of all aggregated public inflows and outflows in 2018, by population, is shown in Table 2. To ease comparability across settings, we have converted all amounts from the Israeli currency—New Israel Shekels (NIS)—into US dollars.

In the general population, inflows and outflows were relatively balanced. This subpopulation paid almost 100 billion US$ in taxes and received slightly more than 105 billion US$ in benefits and services, resulting in 5 billion US$ of net public transfers and a FSR of 0.95. That is, for every 100 effective beneficiaries, there were 95 effective tax payers.

The equivalent FSRs for Arab and Haredi subpopulations were much lower. Aggregated public inflows to the Arab subpopulation in 2018 summed to 27.1 billion US$ and outflows to 11.9 billion US$, yielding net public transfers of 15.2 billion US$ and a FSR of 0.44. In the Haredi subpopulation, the imbalance was even larger (in relative terms). Aggregated inflows were 17.4 billion US$ and aggregated outflows of only 5.9 billion US$, yielding net public transfers of 11.5 billion US$ and a FSR of 0.34.

Comparing the share of inflows and outflows across the three subpopulations to each one's share of the total population points to the main source of these very different FSRs. It is much more the distribution of outflows than inflows. For example, in 2018, Haredim and Arabs constituted about 12.5 % and 21 % of the total population, respectively, and they received about 11.6 % and 18.1 % of total inflows. This relative parity likely stems from the small share of elderly in these two populations. In contrast, Haredim contributed a mere 5.0 % and Arabs 10.1 % of the total outflows, less than half of their share in population.

Figure 8 places these massive differences in FSRs and the distribution of public transfers in the larger context of aggregated life-cycle deficits (LCDs), that is, the difference between total consumption (private and

[11] Data limitations prevent us from distinguishing premiums on pensions from those associated with other types of national insurance such as disability, child allowance and unemployment.

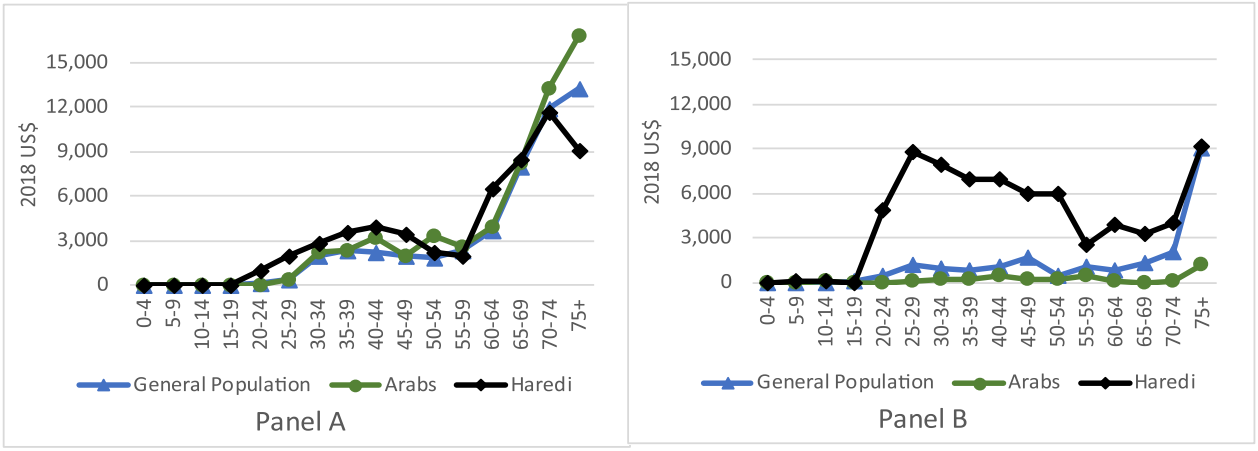

Figure 6. Annual Public Pensions* (Panel A) and Other Cash (Panel B) Inflows, 2018, by subpopulation.

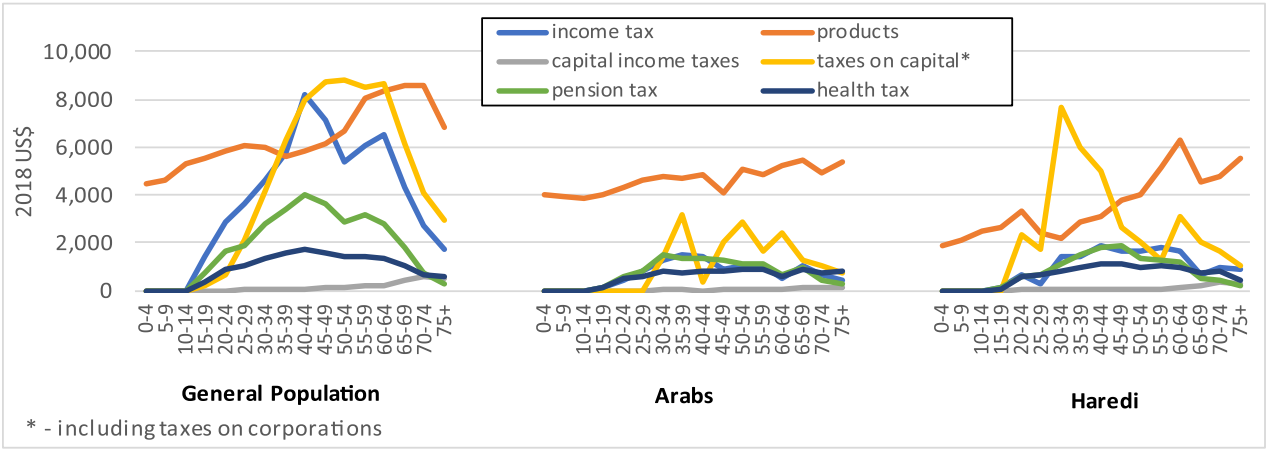

Figure 7. Annual Public Outflows per capita, 2018, by tax type and subpopulation.

Table 2
Aggregated Annual Public Inflows, Outflows, and Fiscal Support Ratio, 2018, by subpopulation.

	General population	Arabs	Haredim	Total
Inflows (billions US$)	105.03	27.12	17.42	149.57
Share of total inflows (%)	70.2	18.1	11.6	100
Outflows (billions US$)	99.93	11.87	5.90	117.71
Share of total outflows (%)	84.9	10.1	5	100
Fiscal support ratio (outflows to inflows)	0.95	0.44	0.34	0.79

public) and labor income (YL). Those deficits amount to 58.6, 29.6 and 13.1 billion US$ across the general, Haredi and Arab subpopulations, respectively. However, the share of life-cycle deficit that was financed by net public transfers across these subpopulations was 8.7 %, 51.5 % and 87.9 %. In other words, given the labor income, consumption and transfers patterns in 2018, the general population financed more than 90 % of its LCD with asset-based reallocations. The Arab population asset-based reallocation financed 50 % of its LCD, and the Haredi population a mere 12 %. The latter was almost completely reliant on public funds to cope with their LCD.

Projected fiscal support ratios, 2018–2050

To see how these ratios shift in line with anticipated changes in age composition, we project the FSR of each subpopulation from 2018 to 2050, allowing for anticipated changes in the age composition alongside 15 % net movement away from the Haredi toward the general subpopulation between birth and age 25 (Weinreb & Blass, 2018). In order to isolate the effects of shifting age composition within each subpopulation on its unique discrete FSR, we hold constant age-specific patterns of economic activity and public inflows and outflows.

We also project the national FSR, whose 2018 values were shown in the final column of Table 2. That national FSR takes into account the shifting composition within the national population, especially as the share of the Haredi subpopulation within the total population continues to rises, giving more statistical weight to their extremely low FSR in the national measure.

Figure 9 portrays both the subpopulations and national trends in the FSR. Note that since our focus is on trends—differences in the absolute levels were discussed in relation to Table 2—we index the projected FSR, for each subpopulation and national, relative to 2018.

The main finding is that anticipated shifts in the age composition of each of Israel's three subpopulations will marginally improve the FSR of the Arab and Haredi subpopulation, while in the general population the FSR will deteriorate significantly.

In the Arab population, there is an initial improvements until 2028. This appears to be driven by the reduction in fertility, which reduces education-related expenditures. Rising aging-related expenditures then flatten the curve. Recall that the share of the Arab population aged 70+ will increase from around 3 % of the population in 2018 to around 9 % in 2050. The light decrease in FSR after 2030 is driven by the extra public expenditures on health and public pensions associated with aging. They

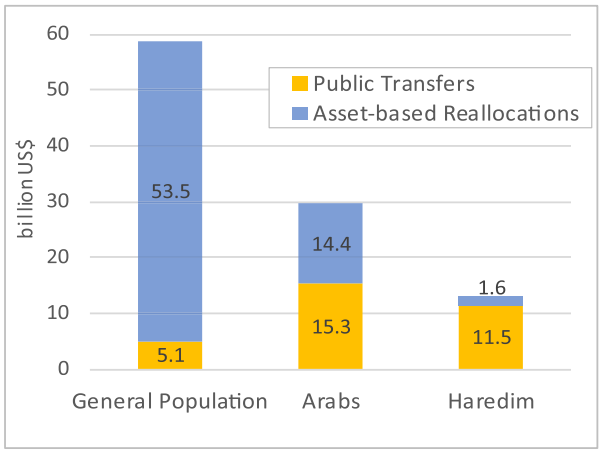

Figure 8. Aggregated Annual Life-cycle Deficit, 2018, by source of finance and by subpopulation.

outweigh any reduction in public expenditures on education associated with falling fertility.

In the Haredi subpopulation, the trends are flat for the first ten years and they then climb slowly towards 102.5. This also reflects anticipated minor reductions in fertility alongside generally "stable population" characteristics (Preston et al., 2000). We saw earlier that by 2050, only around 3.5 % of the Haredi population will be aged 70+. In the Haredi subpopulation, ongoing high fertility implies a constant rise in the number of people entering employment years which, even at lower levels of labor income, will attenuate the impact of aging on the FSR.

Among Israel's three major subpopulations, the most dramatic change in the FSR will occur in the general population. Here the trend is notably downward: to 94.9 by 2030 and then to 91.8 by 2050. This, too, reflects anticipated reductions in fertility and an especially rapid increase over the current decade in the absolute size of population aged 70+, with ongoing increases to 15 % of the total by 2050. Here, too, the extra public expenditures on health and public pensions associated with these increases will substantially outweigh any reduction associated with falling fertility.

The bottom line in Figure 9 is the trend in Israel's national FSR. Compositional shifts alone will lead to a 12 % deterioration in Israel's FSR by 2050. A simple decomposition implies that 68 % of this deterioration is associated with shifting age composition within Israel's population, aging in particular. The remaining 32 % is the product of the shifting composition within the national population as the share that is Haredi continues to rise. By 2050, around 20.5 % of Israel's population will be Haredi, up from 12.4 % in 2020.

Discussion

Like any other analysis anchored in a demographic projection, this paper makes no formal predictions about what will be. Rather, its goal has been to illuminate how shifts in age structure and the relative composition of its three major subpopulations, will affect Israel's FSR over the next three decades, with these effects occurring in the context of rapid growth in the overall size of the population. In that regard, our core finding is that the anticipated demographic shifts within Israel's will depress its FSR substantially. This deterioration will be concentrated in the general population, whose FSR until now was relatively balanced. Demographic shifts will push down its FSR by roughly 8.1 percentage points. In both the Arab and Haredi populations, the FSR, which was already very low, will only marginally improve.

These findings are important in general. We argued above that Israel's demographic profile is unusual for a high-income country. Two contextual factors are worth noting in this regard. First, Israel is the only high-income country in the OECD whose labor force, as currently defined in terms of age-range, is projected to grow into the late decades of the current century. Second, Israel is also the only high-income OECD country that has yet to experience the full benefits of a first demographic dividend, that is, that multi-decade period of low rates of combined child and old-age dependency that follows the reduction of fertility to around replacement-level (Total Fertility Rate≈ 2.1). The fact that Israel's FSR is projected to deteriorate in spite of above-replacement level fertility rates, and in spite of an ever-growing labor force, confirms how powerfully shifting age structures, in particular aging, can affect overall inflows and outflows, especially in welfare states that spend substantial sums on their elderly.

The differences across Israel's three major subpopulations are also important. In general, they confirm how critical it is for wealthy welfare states to enable and encourage all subpopulations to be full economic participants. More specifically, the extremely low FSR of the Haredi population shows that a young age structure alone is not sufficient to reach FSR parity, even with very high rates of female employment. Likewise, the very low FSR of the Arab population shows that even a flattening age structure at younger ages will not substantially raise the FSR absent shifts in employment patterns. In each of these cases, the indispensible mediating factor linking age structure to improved FSR appears to be education: low educational levels lead to low or low-quality employment, which in turn depresses outflows to the state and drags down the FSR.

We reiterate that our projections assume that the 2018 age-specific per capita patterns of inflows and outflows in each of Israel's three core subpopulations remain constant. This is clearly an unrealistic assumption, but it is a necessary heuristic device that isolates the effects of demographic change on the FSR. Moreover, it is also not immediately

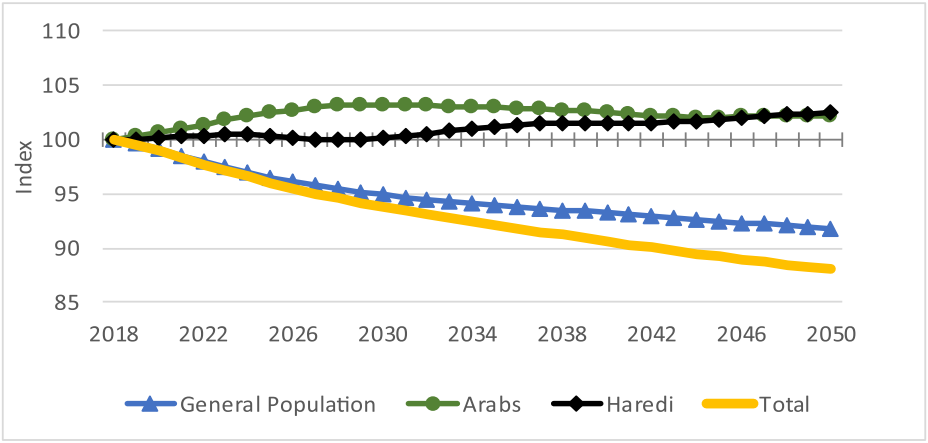

Figure 9. Fiscal Support Ratios, 2018–2050, by subpopulation and total.

clear whether more realistic expectations would mitigate or exacerbate these conditions.

For one thing, our estimates ignore emerging research on the future labor market in general, and the complex interaction between demographic structures and robotics and AI in particular (Acemoglu & Resrepo, 2022). Instead, we implicitly assume that a given society's ability to take advantage of these technological innovations will be correlated with existing and future levels of human capital; and that a given society's readiness to share the fiscal benefits of these innovations, at least over the next couple of decades, will be correlated with prior patterns of sharing, which are in part embodied in contemporary patterns of public outflows. If these assumptions are valid, the core structural effects that we have identified here will remain largely immune to the emerging shifts in the labor market.

Perhaps more significant, our estimates also ignore endogenous processes, ranging from government policies to individual behavior, that could improve the FSRs, especially in the Arab and Haredi subpopulations, where levels of human capital are relatively low. For example, the Israeli government has initiated a number of five-year plans to pull these populations into higher education and more skilled areas of the labor market. The economic justification for these interventions is that they will result in higher labor incomes and net taxes paid, alongside reduced health expenditures that often result from higher education. Those benefits will far outweigh the greater educational investments required to jumpstart them.

In our review of transitions within Israel's Arab population, we pointed to rapid increases in terms of education, especially among women, that are consistent with the aspirations underlying these five-year plans. We anticipate increased public outflows from these more educated cohorts as they reach peak earning ages over the 2030s and 2040s. That will raise the FSR in the Arab population. It should also increase the share of the Arab population that can draw on age reallocations, especially at older ages, rather than having to rely on more meagre public transfers. Together, these shifts suggest that our estimates likely underestimate improvements in the FSR in Israel's Arab subpopulation.

In contrast, such efforts have thus far been the least successful with Haredi men, whether because of deeper ideological commitment to a life of Jewish learning, strengthened by strong community norms, or because of the strong public financial support, as in the allowances for married Haredi men who are involved in religious studies, discussed in relation to Figure 6b. In either case, we see few signs of positive change, and certainly nothing on the magnitude of Israel's Arab population. For example, there are signs of increasing interest in core secular studies among some Haredi parents, reflected in the growing share of Haredim sending their sons to State Haredi schools that teach them math and English beyond age 12. However, this remains a very small minority, and it continues to be condemned by many religious leaders (e.g., Farkash, 2022). Likewise, over the 2014–2021 period there was no shift in overall male Haredi employment rates: rises among Haredi men above age 40 were offset by reductions below age 30. Finally, the Likud-led coalition's budget for 2023–2024 in the period prior to the Israel-Hamas War of 2023 added at least two billion shekels (around 500 million USD) to the national budget to finance Haredi educational institutions, while cutting elsewhere.[12] As of the time of writing, these budgetary agreements have been suspended and will be revised given the economic impact of the 2023 War. However, the readiness to enact such changes suggests that it is politically unrealistic to expect a shift in public expenditures that will reduce inflows to the Haredi population, in particular, especially monetary support, and even less realistic to expect substantial increases in outflows, which could arise from substantial movement towards more skilled and higher-paying employment.

Here we confront the core barrier to mitigating these problems. Israel has a delicately-balanced parliamentary system comprising several sectorally-specific political parties, including dedicated Haredi and Arab parties. The proportional representation system gives disproportionate political influence to small parties, since ruling coalitions rely on their votes. Haredi parties, in particular, which have sat in almost every government for the last 30 years, have skillfully protected their sectoral interests (Neuberger, 2024). There is no reason to think that they will stop trying to do so. Given that the Haredi population has the most profoundly imbalanced FSR, and is the fastest growing of these three major populations, this political-structural issue is a concern.

There are additional ways to improve Israel's national FSR by either reducing public inflows and increasing outflows. The ongoing rises in life expectancy point to the importance of increasing official retirement age in order to both maintain outflows for a longer period and postpone public inflows associated with public pensions. Improving preventative healthcare in order to increase healthy life expectancy, especially by reducing Israel's high levels of obesity and Type-II Diabetes, will also reduce expected health costs in the future. Abolishing tax exemptions and broadening the tax base, especially in asset-related incomes, will also increase public outflows.

In summary, even if the negative impact of aging on FSRs is already built-in to Israel's population dynamics, especially in the general population, and even if the effects of aging are compounded by growth in Israel's least economically productive subpopulation, Israel has ways to improve its long-term fiscal stability, and it has been taking some steps in that direction, though not all have been successful.

Conclusions

Over and above the importance of providing an NTA-based analysis for understanding Israel, we have highlighted the value of disaggregating national populations into their core subpopulations, especially when the sociocultural borders between those subpopulations also index differential demographic growth and economic behavior. That is the case in Israel. Barring changes in policy or unrelated shifts in economic behavior, those anticipated shifts will weaken the country's fiscal health. Disaggregating Israel's NTA into three subpopulations allows us to pinpoint core structural sources of that deterioration. In the general and Arab populations, the rapid rise in the share of the population that is elderly is similar to other high income countries, pointing to coming increases in health and pension-related expenditures associated with old age. Only among Haredim will this growth in the elderly population be largely offset by growth in the working age population (aged 30–59). This undercores the importance of pulling more Haredi men into the labor force, including by providing more apposite educational pathways.

Similar structural characteristics, albeit quite different in their particulars, appear to exist in other countries. We can imagine a similar disaggregation being conducted across language minority groups in Western Europe, Latin America or India; or across different tribal coalitions in many countries in sub-Saharan Africa or in some Arab societies. In each of these cases, some combination of longstanding patron-client networks, discriminatory practices, and cultural factors have generated and then entrenched differences in educational and employment characteristics. In either case, where age-related patterns of employment, income and social benefits covary with identity, the NTA analytic framework provides a clear analytic pathway to exploring the long-term consequences of differential growth, since it carefully links

[12] This would have further entrenched lower employment and earnings in the Haredi sector in the future in two ways: (a) by fully funding those streams of Haredi schools irrespective of whether they teach any math, English or science; and (b) by providing extra welfare payments which disproportionately favor Haredi families by increasing per child payments beyond the fourth child (Gal et al., 2023). Additionally, since these added expenditures were to have been funded, in part, by cutting welfare and education, some of the planned social investments that would have yielded economic benefits down the line, would also not occur.

age with socially and economically meaningful types of public and private expenditures, and public and private receipt of benefits. In a country like Israel, where subpopulations are also connected to sectoral political parties, exploring the long-term consequences of differential growth is also politically meaningful.

There is, of course, a danger in this type of exercise, since it is not difficult to imagine either how such information can be used to rank groups based on how much they contribute to the public purse, or how this type of ranking can be misused. In Israel, this issue, captured in the emotive phrase "an equal burden" ("*shivyon ba'netel*"), lies at the center of much political discourse.

On the flipside, in places where such discourse is already circulating widely, as is the case in Israel, unless that discourse is based on high-quality data and an NTA framework, it will likely be misleading. Under those circumstances, providing accurate estimates and framing them responsibly is imperative. It can provide a robust empirical anchor for subsequent policy that will be designed to increase the well-being of the population as a whole, while tailoring interventions to sub-populations' specific demographic and economic challenges and constraints. It is our hope that the empirical estimates presented in this paper are accepted in that light.

CRediT authorship contribution statement

Kyrill Shraberman: Conceptualization, Data preparation, Data curation, Formal analysis, Writing – original draft, Writing – review & editing.. **Alexander A. Weinreb:** Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Acemoglu, D., Resrepo, P., 2022. Demographics and automation. Rev. Econ. Stud. 89 (1), 1–44. https://doi.org/10.1093/restud/rdab031.

Ahrend, M., 1980. Secular study in the opinion of the Sages of Israel. Studies in Education 28, 51–62. https://www.jstor.org/stable/23392635.

Alesina, A., Reich, B., Riboni, A., 2020. Nation-building, nationalism, and wars. J. Econ. Growth 25 (4), 381–430. https://doi.org/10.1007/s10887-020-09182-7.

Argov E. & Tzur S. (2019). A long-run growth model for Israel". Discussion Paper No. 2019.04. Bank of Israel, March 2019.

Arthur, W.B., McNicoll, G., 1978. Samuelson, population and intergenerational transfers. Int. Econ. Rev. 19 (1), 241–246. https://doi.org/10.2307/2526407.

Berrebi C., Shraberman K., & Yarin S. (2017). "Trends in labor market" Policy Paper No. 03.2017, Taub Center for Social Policy Studies in Israel.

Blass, N., and Bleikh, H. (2020). Expenditure per class and per student in the primary school education system. Policy Paper No. 03.2020. Taub Center for Social Policy Studies. https://www.taubcenter.org.il/wp-content/uploads/2021/01/expenditureinprimaryschoolsystemeng.pdf.

Blass, N., Bleikh, H., 2024. – in press). Expenditure per class and per student in the secondary school education system. Policy Paper No. 0X.2024. Taub Center for Social Policy Studies.

Blass, N., (2022). Achievements in Israel's education system: An overview. *State of The Nation Report 2022*, Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2022/12/Education-Overview-ENG-2022.pdf.

Cáceres-Delpiano, J., De Moragas, A.-I., Facchini, G., González, I., 2021. Intergroup contact and nation building: Evidence from military service in Spain. J. Public Econ. 201, 104477 https://doi.org/10.1016/j.jpubeco.2021.104477.

Cahaner, I., Malach, G., 2020. Statistical report on ultra-orthodox society in Israel. Israel Democracy Institute. https://en.idi.org.il/haredi/2020/?chapter=34273.

Charbonnel, B., Simon, D., Dallongeville, J., Bureau, I., Dejager, S., Levy-Bachelot, L., Gourmelen, J., Detournay, B., 2017. Direct medical costs of type 2 diabetes in France: An insurance claims database analysis. PharmacoEconomics Open 2 (2), 209–219. https://doi.org/10.1007/s41669-017-0050-3.

Chernichovsky, D., Bleikh, H., and Regev, E. (2016). Private expenditure on healthcare in Israel. *State of The Nation Report 2016*. Taub Center for Social Policy Research in Israel. https://www.taubcenter.org.il/wp-content/uploads/2020/12/privateexpenditureonhealthcareinisrael.pdf.

Chukwuezi, B., 2001. Through thick and thin: Igbo rural-urban circularity, identity and investment. J. Contemp. Afr. Stud. 19 (1), 55–66. https://doi.org/10.1080/02589000124437.

Cohen Kovatch, G., 2022. Integrating, but slowly: Trends in the employment of Haredim, Arabs, and other groups in high tech. Labor Division, Ministry of Economy and Industry. Hebrew.

Coleman, D., 2006. Immigration and ethnic change in low-fertility countries: A third demographic transition. Popul. Dev. Rev. 32 (3), 401–446. https://doi.org/10.1111/j.1728-4457.2006.00131.x.

Conway, D., 2017. Judaism and liberalism: Israel's economic problem with its Haredim. Econ. Aff. 37 (2), 240–253. https://doi.org/10.1111/ecaf.12232.

Debowy M., Epstein G. and Weiss A. (2021b). Returns to education and labor market experience in Israel. *State of The Nation Report 2021, Taub Center for Social Policy Studies in Israel*.

Debowy M., Epstein G. and Weiss A. (2021a). The Israeli labor market in the wake of Covid-19: An overview. *State of The Nation Report 2021, Taub Center for Social Policy Studies in Israel*.

Demireva, N., Zwysen, W., 2021. Ethnic enclaves, economic and political threat: An investigation with the European Social Survey. Front. Sociol. 6. https://www.frontiersin.org/articles/10.3389/fsoc.2021.660378.

Dödtmann, E., 2022. Haredi fundamentalism in the State of Israel: How the status quo between state and religion provides ground for a modern religious counter-collective. Zeitschrift Für Religion, Gesellschaft Und Politik 7 (1), 119–150. https://doi.org/10.1007/s41682-022-00139-8.

El-Or, T., 1994. Educated and Ignorant: Ultraorthodox Jewish Women and Their World. Lynne Rienner Publishers.

Endeweld M., Karadi L., Pines R. & Kasir (Kaliner) N. (2023). Poverty and income inequality. National Insurance Institute, Israel. (Hebrew).

Fargues, P., 2001. Demographic Islamization: Non-muslims in Muslim countries. SAIS Rev. Int. Aff. 21, 103. https://doi.org/10.1353/sais.2001.0037.

Farkash, T., 2022. 'The State is tripping it up': How the State Haredim education fell between the cracks (Hebrew). Ynet News. https://www.ynet.co.il/judaism/article/b1ckdlyqq.

Friedlander, D., Feldmann, C., 1993. The modern shift to below-replacement fertility: Has Israel's population joined the process? Popul. Stud. 47 (2), 295–306. https://doi.org/10.1080/0032472031000147026.

Fuchs H., Yanay G. & Blass N. (2018). Technological education: Trends and developments, 2006 to 2017. *State of The Nation Report 2018,* Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2020/12/techeducationtrendseng.pdf.

Gal, J., Oberman, O., & Keidar, N. (2023). Nutrition insecurity in Israel: Are food vouchers the solution? (Hebrew). Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2023/09/Food-insecurity-2023-HEB.pdf.

Government comptroller (2020). Haredim education and its supervision. (Hebrew). https://www.mevaker.gov.il/sites/DigitalLibrary/Documents/2020/70b/2020-70b-210-Education.pdf.

Gronau, R., Spivak, A., 2021. Reforms in the Israeli pension system, 1995–2015. In: Ben-Bassat, A., Gronau, R., Zussman, A. (Eds.), The Israeli Economy 1995–2017. Cambridge University Press.

Habib, J., et al. (2010). Labour market and socio-economic outcomes of the Arab-Israeli Population. OECD Social, Employment and Migration Working Papers, No. 102, OECD Publishing, Paris. https://doi.org/10.1787/5kmjnrcfsskc-en.

Hammer, B., Prskawetz, A., 2022. Measuring private transfers between generations and gender: an application of national transfer accounts for Austria 2015. Empirica 49, 573–599. https://doi.org/10.1007/s10663-022-09542-z.

Hershkowitz, A., 2010. Ideological shifts and doctrine changes in national level planning in Israel. Town Plan. Rev. 81 (3), 261–281. https://doi.org/10.3828/tpr.2010.3.

Horowitz, D.L., 2000. Ethnic Groups in Conflict. University of California Press.

Keren-Kratz, M., 2023. From integration to segregation: The turnaround in Israel's Haredi society in the late 1970s. Israel Studies 28 (2), 76–99. https://doi.org/10.2979/is.2023.a885230.

Kingsbury, I., 2020. Haredi education in Israel: fiscal solutions and practical challenges. Br. J. Relig. Educ. 42 (2), 193–201. https://doi.org/10.1080/01416200.2018.1556603.

Krebs, R.R., 2009. Israel's bunker mentality. Foreign Aff. 90 (6). https://www.jstor.org/stable/pdf/23039625.pdf.

Lee, R., 1980. Age structure intergenerational transfers and economic growth: An overview. Revue Économique (démographie Économique) 31 (6), 1129–1156. https://doi.org/10.2307/3501185.

Lee, R., 1994. The formal demography of population aging, transfers, and economic life-cycle. In: Martin, L.G., Preston, S.H. (Eds.), Demography of Aging. National Academies Press, Washington (DC).

Levi, B., Davidovitch, N., 2022. The healthcare system in Israel: An overview. State of the Nation Report 2022, Taub Center for Social Policy Studies in Israel.

Madhala S. (2019). "The risk of automation in the Israeli labor market". *State of The Nation Report 2019,* Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2020/12/theriskofautomationintheisraelilabormarket2019eng75.pdf.

Malach, G., & Cahaner, I., (2023). *Statistical report on ultra-orthodox society in Israel 2022.* Israel Democracy Institute.

Mason, A., 1987. National saving rates and population growth: a new model and new evidence. In: Johnson, D.G., Lee, R.D. (Eds.), Population Growth and Economic Development: Issues and Evidence. University of Wisconsin Press, Madison, Wisconsin, pp. 523–560.

Masters, B., 2008. Christians and Jews in the Ottoman Arab World: The Roots of Sectarianism. Cambridge University Press.
Miller, T., 2011. The rise of the intergenerational state: Aging and development. In: Lee, R., Mason, A. (Eds.), Population Aging and the Generational Economy. Edward Elgar, Cheltenham, UK and Northampton, MA.
Neuberger, B., 2024. The Haredim in Israeli politics. In: Caplan, K., Leon, N. (Eds.), Contemporary Israeli Haredi Society: Profiles, Trends, and Challenges. Taylor & Francis.
OECD (2023). Education at Glance. www.stat.oecd.org.
Okun, B.S., 2016. An investigation of the unexpectedly high fertility of secular, native-born Jews in Israel. Popul. Stud. 70 (2), 239–257. https://doi.org/10.1080/00324728.2016.1195913.
Olayinka, L.A., Olanrewaju, O., & Noah, O. (2023). Comparative analysis of the national and subnational National Transfer Account results in Nigeria. Presented at the 14th Global Meeting of the NTA Network, University of Paris - Dauphine, February 14-17, 2023.
Perelman, Y., Yaish, M., Bental, B., 2019. The price of religiosity: Enticing young Haredi men into secular academic studies. Ration. Soc. 31 (2), 129–151. https://doi.org/10.1177/1043463119831271.
Popper, S., Shatz, H., Abramzon, S., Berrebi, C., Efron, S., 2015. The strategic perspective and long-term socioeconomic strategies for Israel: Key methods with an application to aging. RAND Corporation. https://doi.org/10.7249/RR488.
Preston, S., Heuveline, P. & Guillot, M., (2000). Demography: measuring and modeling population processes. 2001. *Malden, MA: Blackwell Publishers.*
Rosen, G., Razin, E., 2008. Enclosed residential neighborhoods in Israel: From landscapes of heritage and frontier enclaves to new gated communities. Environ. Plann. Econ. Space 40 (12), 2895–2913. https://doi.org/10.1068/a4066.
Saabne, A., Shalev, M., 2024. – in press). Inequality in an era of economic integration: Palestinian and Jewish citizens 2001–2019. In: Shalev, M. (Ed.), Palestinians in Israel in an Era of Neoliberal Economic Integration. Van Leer Press, Jerusalem.
Smooha, S., Peres, Y., 1975. The dynamics of ethnic inequalities: The case of Israel. Soc. Dyn. 1 (1), 63–79. https://doi.org/10.1080/02533957508628678.
Spielauer, M., Horvath, T., Fink, M., Abio, G., Souto, G., Patxot, C., Istenič, T., 2022. Measuring the lifecycle impact on welfare state policies in the face of aging. Econ. Anal. Policy 75, 1–25. https://doi.org/10.1016/j.eap.2022.05.002.
Stadler, N., 2002. Is profane work an obstacle to salvation? The case of ultra orthodox (Haredi) Jews in contemporary Israel. Sociol. Relig. 63 (4), 455–474. https://doi.org/10.2307/3712302.
Stedman, M., Lunt, M., Davies, M., Livingston, M., Duff, C., Fryer, A., Anderson, S.G., Gadsby, R., Gibson, M., Rayman, G., Heald, A., 2020. Cost of hospital treatment of type 1 diabetes (T1DM) and type 2 diabetes (T2DM) compared to the non-diabetes population: A detailed economic evaluation. BMJ Open 10 (5), e033231.
Tur-Sinai, A., Zontag, N., Blondheim, O., Weinreb, A., Chernichovsky, D., 2020. Physicians in Israel: Trends in characteristics and training. In *State of the Nation Report 2020,* Taub Center for Social Policy Studies in Israel.
United Nations, 2013. National Transfer Accounts Manual: Measuring and Analysing the Generational Economy. United Nations, New York, p. 2013.
United Nations, Department of Economic and Social Affairs, Population Division (2023). Custom data on Egypt, Jordan, Lebanon, Syria, Saudi Arabia in *World Population* Prospects: The 2022 Revision. https://population.un.org/wpp/.
Véron, R., 2001. The "new" Kerala model: Lessons for sustainable development. World Dev. 29 (4), 601–617. https://doi.org/10.1016/S0305-750X(00)00119-4.
Weinreb, A.A., 2001. First politics, then culture: Accounting for ethnic differences in demographic behavior in Kenya. Popul. Dev. Rev. 27 (3), 437–467. https://doi.org/10.1111/j.1728-4457.2001.00437.x.
Weinreb, A., & N. Blass (2018). Trends in religiosity among the Jewish population in Israel. Policy Paper 02.2018, Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2020/12/trendsinreligiosity-1.pdf.
Weinreb A. & Sela E. (2021). How many lives could be saved in Israel? A comparative analysis of cause of death across 37 Countries. *State of The Nation Report 2021,* Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2021/12/Life-Expectancy-ENG-2021.pdf.
Weinreb, A., Chernichovsky, D., & Brill, A. (2018). Israel's exceptional fertility. In *State of The Nation Report 2018,* Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2020/12/exceptionalfertilityeng.pdf.
Weinreb, A., Shami, L., Keidar, N., & Weiss, A. (2024 – in press). Homicide rates in Israel: Recent trends in an international perspective. Taub Center for Social Policy Studies in Israel.
Weinreb, A., Shraberman K. & Weiss A. (2024 – in press). Israel's national transfer accounts, 2018: Baseline patterns and an introduction. Taub Center for Social Policy Studies in Israel.
Willis, R., 1988. Life cycles, institutions and population growth: a theory of the equilibrium interest rate in an overlapping-generations model. In: Lee, R., Arthur, W. B., Rodgers, G. (Eds.), Economics of Changing Age Distributions in Developed Countries. Oxford University Press, Oxford, pp. 106–138.
Woodberry, R.D., 2012. The missionary roots of liberal democracy. Am. Polit. Sci. Rev. 106 (2), 244–274. https://doi.org/10.1017/S0003055412000093.

Further reading

Weinreb, A. (2021). Youth bulge, violent crime, and shortages in the Israeli Arab marriage market. Policy Paper 06.2021, Taub Center for Social Policy Studies in Israel. https://www.taubcenter.org.il/wp-content/uploads/2021/12/Arab-marriage-market-ENG-1.pdf.