

Shoresh Research Paper

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A Primer on Israel's Pension System **Where it is Today** **and Suggestions for the Future**

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Abstract

The role of any pension system is to ensure that retired workers live in dignity. The characteristics of Israel's pension system differ from pension systems in other developed countries. This is mainly due to a relatively low old age social security allowance and pension funds that are mostly privatized and highly exposed to capital market volatility. Application of mandatory pension savings made the existing regressive tax benefits unnecessary. Funds saved by removing the tax benefits can be used to further reduce poverty among the elderly. Increasing life expectancy presents a challenge to the current system and necessitates continuous adjustments – primarily, a gradual raising of the official retirement age. Israel's low retirement age for women deepens the gender gap in pension allowances. The linkage of the allocation of earmarked bonds to the ages of savers increases their exposure to capital market crises. This paper details an alternative mechanism of progressive allocation based on wages that would enhance equality both in pension allowance amounts and in the distribution of earmarked bonds and their intrinsic benefits.

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A Primer on Israel's Pension System

Where it is Today and Suggestions for the Future

Sarit Menahem Carmi and Ayal Kimhi

1. Introduction

The issue of pensions, which until recently drew scant interest from researchers and policymakers, has in recent years frequently taken center stage in the public arena. Two demographic processes – rising life expectancy and declining birth rates – are leading to population aging, prodding policymakers to revise their thinking and their preparations for the pension future of citizens. Life expectancy in the distant past was considerably lower and individuals did not experience many years of old age; and those who did were supported by their families. However, among the changes that occurred in the 20th century was the geographical distancing between parents and children, a change that raised the need for pension savings. Pension reforms enacted in numerous countries attest to their internalization of the importance of the issue and to the dangers that may result from not accounting for the demographics – such as poverty among the elderly and overburdened welfare and health systems. Consequently, such countries, including developing countries, are now equipped with adequately functioning pension systems, while their policymakers continue to adapt and link them closely to continuously rising life expectancies and changes in working patterns during the course of people's lives.

Sidebar 1

What is pension insurance?

Most insurance policies are purchased to ensure suitable living standards, even if a random event may cause monetary loss. Thus, for example, apartment or vehicle insurance is intended to provide financial compensation in the event of damage to property; health insurance provides medical treatment at a reduced price in the event of a medical problem; unemployment insurance provides income in the event of job loss. As such, most insured individuals pay their insurance premiums willingly. Pension insurance differs from other types of insurance in that it is aimed at guaranteeing suitable living standards in the event of a long life. Property damage, sickness or being fired are negative events, in contrast to longer lives – though individuals who live long may be left with insufficient sources of subsistence. The objective of pension insurance is to reduce the impact of longer lives on living standards. The difficulty in perceiving long life as a factor detrimental to living standards, coupled with the fact that such an impact will materialize in the distant future (if at all), leads many to avoid purchasing pension insurance willingly. Just as the Israeli

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SIDEBAR 1 (*continued*)

government requires purchase of medical insurance (through a health tax) and unemployment insurance (through contributions to the National Insurance Institute, Israel's equivalent to the U.S. Social Security System), it also obliges individuals to purchase two forms of pension insurance. The first is the old age pension of the National Insurance Institute and the second is the occupational pension. The occupational pension has always existed, but only in 2008 did it become mandatory. Each employer must set aside a specific percentage of employees' incomes for pension insurance while deducting from wages the specific rate employees are required to set aside (for which the employee gains a tax benefit). Beginning in January 2017 pension insurance contributions also became mandatory for the self-employed. Today there are three pension instruments through which one may save for pension while employed ('occupational pension') – provident funds, managers' insurance, and the most common, pension funds. Savings in these instruments translate into a monthly pension allowance after retirement age. The size of these allowances is determined by the total amount of savings accrued during the course of one's working life and according to life expectancy.

Savings in a pension fund or managers' insurance* assures not only a pension allowance, but also insures against the risk of disability or death prior to retirement. Despite the similarity in characteristics, these two savings instruments are different. When individuals save in a pension fund, most of their monthly contributions are accumulated for savings, with a portion collected as premiums for insurance supplied by the fund (e.g. life insurance in the form of payments to survivors in the event of early death, and disability insurance in the event of a loss of working capacity). The pension allowance for retired savers is determined by the total amount of accumulated savings and the pension fund's pension conversion coefficient that translates the total into the monthly amounts.** The cumulative value of monthly pension allowances actually received depends on the lifespan of the saver. If the saver lives beyond their projected life expectancy (which is factored into the conversion coefficient), the saver will receive pension allowances whose value exceeds accrued savings. An insured person who dies before retirement will not benefit from accrued pension savings. However, his or her survivors will receive pensions based on the insurance plan and the fund's regulations. The main characteristic of the pension fund is its mutual insurance mechanism, which means that insurance supplied by the fund is paid out from the fund's sources, in other words from savings of the fund's members. When a risk materializes and an insurance claim is made, all of the fund's members must bear the cost. It should be pointed out that since the fund's members carry the risk, life insurance and disability insurance costs are below their market prices. Generally speaking, the pension fund is managed on the basis of a set of rules defining the rights and obligations of its members. Changes in these rules are possible, subject to approval by the Ministry of Finance.

Managers' insurance, on the other hand, has no mutual mechanism, nor can its insurance terms be altered. This is because such insurance is stipulated by a contractual agreement between the insured and the insurance company, and is not based on a set of rules. Since the insurance company assumes all of the risk in managers' insurance, the cost of such insurance is higher than in the pension fund. In this type of insurance, insured individuals have greater flexibility in determining the insurance amount for disability and

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SIDEBAR 1 (*continued*)

death. This differs from a pension fund, where flexibility is limited to choosing from different plans offered by the fund. An additional, and significant, difference between pension funds and manager's insurance is that the government, which is interested in encouraging individuals to save in pension funds, issued earmarked bonds with guaranteed returns to the pension funds. These amounted to 30% of the savings, with the remaining savings invested in the capital market.^{***} By contrast, savings in managers' insurance is entirely exposed to the capital market.

One of the major advantages to holders of managers' insurance in the past was the ability of insurers to offer a fixed conversion coefficient. A fixed conversion coefficient acts as a hedge against rising life expectancy.^{****} In 2013, insurance companies were prohibited from offering new savers fixed conversion coefficients due to fears that an assured conversion coefficient endangers the stability of insurance companies. Thus managers' insurance policies lost their chief advantage.

Saving in a provident fund permits savings without insurance components. Individuals who save in a provident fund will receive the savings they've accumulated as a pension allowance, unless they receive a pension allowance higher than NIS 4,418 per month (in 2016 prices) in which case they may make a onetime withdrawal of the accrued sum ('capital savings'). Provident funds do not benefit from the issuing of earmarked bonds.^{*****}

* The term managers' insurance does not attest to the nature of the product or its target audience, but is meant solely to position the product from a marketing aspect.

** The pension conversion coefficient reflects a saver's life expectancy upon retirement age. The monthly pension allowance that the saver receives equals the accumulated savings divided by the pension conversion coefficient.

*** Following recommendations of the 'Task Force for Increasing Certainty of Pension Savings', which assessed the manner of allocating earmarked bonds, since July 2017 this percentage varies according to the age of the saver. For details see Section 5.1.5.

**** The rise in life expectancy increases pension coefficients and decreases the monthly pension allowance, since the accrued savings need to provide for the retired insured for additional years.

***** Provident funds that do not benefit from the issue of earmarked bonds are claiming legislative discrimination in this matter and are seeking the law's cancellation in the courts. It should be noted that provident funds have served as a pension insurance instrument only since 2008. Up to then savings in provident funds consisted of capital savings only.

Israel's population is relatively young, in comparison with other developed countries – but the aging process is similar. Therefore, policymakers in Israel face similar pension-related challenges. In response to these challenges, numerous modifications were made to Israel's pension system.

- Longtime pension funds that had based their operations on the assurance of rights suffered deficits and were closed. They were replaced by new funds that operate on the basis of accrued savings, leaving them highly exposed to the capital market.
- Retirement ages were raised.
- Mandatory pension contributions were applied, first to wage earners and recently to the self-employed.
- More recently, changes were made in the allocation of earmarked (risk-free) bonds.

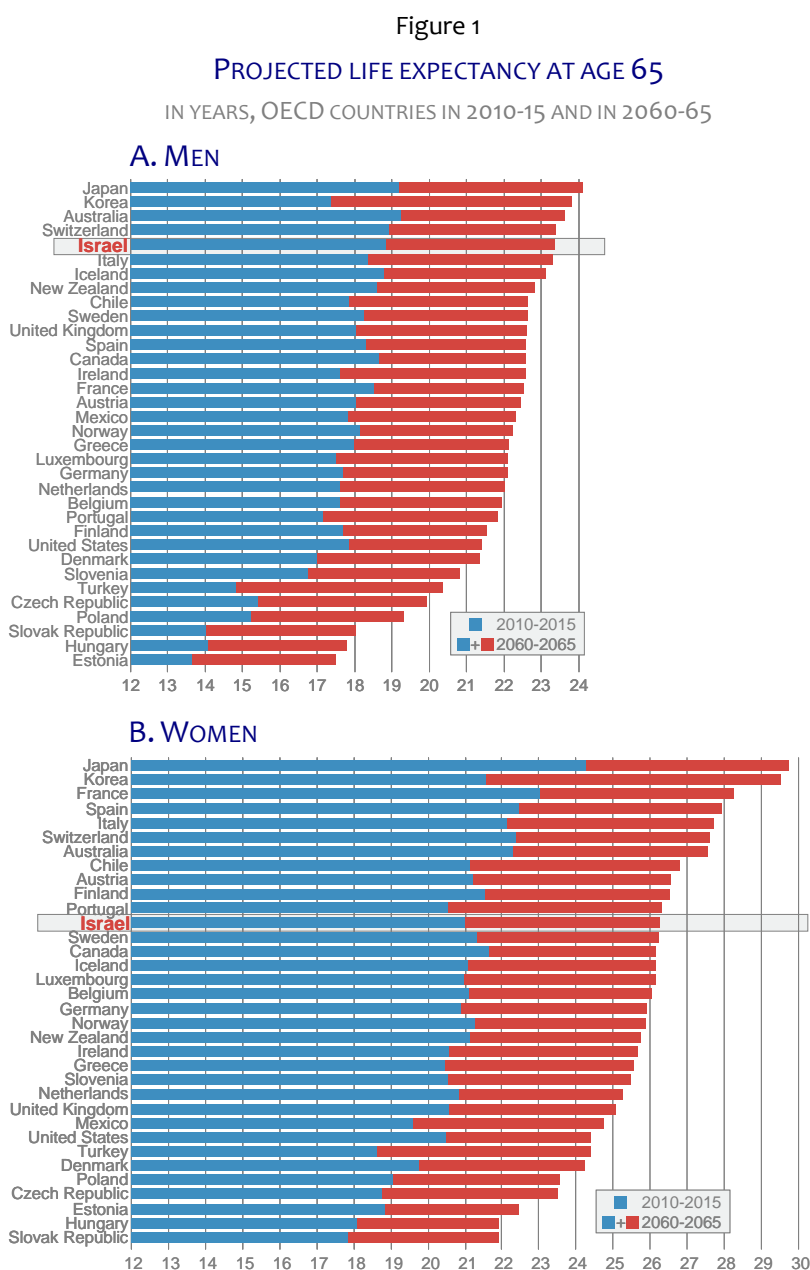
Other issues such as the continued increase in women's retirement ages are still being discussed.

The goal of this paper is to present the public with a comprehensive review of Israel's pension system. This includes cross-country comparisons as well as analyses of changes in the parameters determining pension allowances and evaluations of the implications of these changes. The analysis utilizes a pension calculator developed specifically for the purpose of such analyses. This calculator can accommodate different types of worker profiles distinguished primarily by wages over the span of their employment careers, thus enabling conclusions on the distributive aspects of the various possible changes.

Section 2 details the demographic trends that challenge pension systems and require significant reforms. Section 3 describes existing pension systems around the world and their main characteristics. Section 4 focuses on describing the pension system in Israel and reviewing how it has changed over the years. Section 5 implements the pension calculator, estimating pension allowances as a function of income for different types of workers. The model can incorporate a variety of assumptions on age upon entering the labor market, retirement age, the rate of contribution to pension savings, the rate of return on savings, and the allocation mechanism for earmarked bonds. Section 6 provides a summary of the findings and conclusions.

2. Demographic trends

Life expectancy in developed countries has risen by 30 years over the past century, from an average of approximately 50 years of age to roughly 80 years. During the first half of the 20th century, the prime factor underlying the increased life expectancy was the fall in infant mortality rates coupled with declining mortality from sickness at working ages. In recent decades, life expectancy has risen primarily as a result of extending the life of older adults (Figure 1). These changes can be attributed to improved living standards and accessibility to health services.



Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution
Data: OECD Pensions at Glance 2015

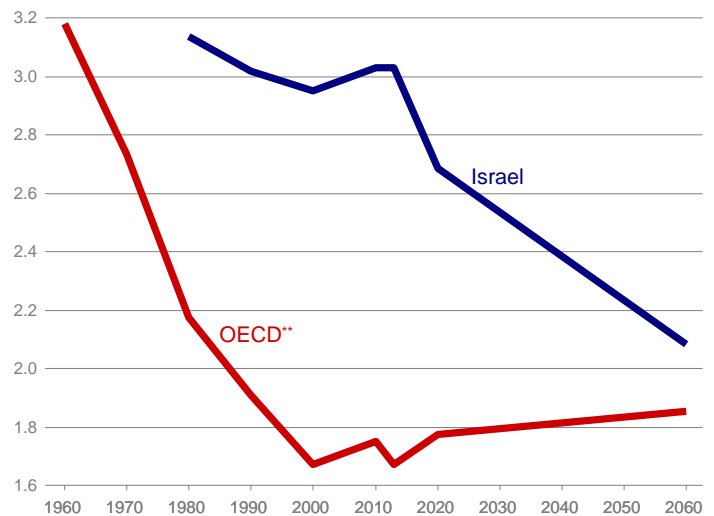
Another trend accompanying extended life expectancy is the decrease in global birth rates. The average birth rate in 2013 among 34 OECD countries was 1.67 children per woman, compared with 3.18 children per woman in 1960 (OECD, 2015). The tendency toward fewer children began in the 1960s, a key outcome of increased standards of living and the accompanying desire of parents to invest more in each child. This tendency was bolstered by economic changes such as uncertainty of employment and difficulties in obtaining housing, alongside changing lifestyle preferences (OECD, 2015). There has been a moderate rise in birth rates in recent years that is expected to continue, albeit at relatively low increments in the coming years. The OECD forecasts an average birth rate of 1.77 children in 2020 and 1.9 children in 2060 (compared with the average birth rate of 1.67 in 2013). By contrast, as can be seen in Figure 2, Israel's birth rate is expected to continue falling.

The combination of these trends – increased life expectancy and lowered birth rates – leads to an aging of the population. The old-age dependency ratio represents the number of individuals aged 65 and up per 100 working-age (20-64) persons. Current demographic trends are leading to an ever-increasing dependency ratio (Figure 3). In 1950, the old-age dependency ratio in 34 OECD countries stood at 13.9. It rose to 21.9 in 2000 and 27.3 in 2015. These trends are expected to continue, with the OECD forecasting a rise in average OECD dependency ratios to 45.5 in 2050 and 54.5 in 2075. These trends indicate a continuous decline in the potential labor force relative to the number of retirees, steadily eroding the stability of pension systems that had hitherto been funded by

Figure 2

FERTILITY RATES

AVERAGE NUMBER OF CHILDREN PER WOMAN, 1960-2060*



* Projections for future years

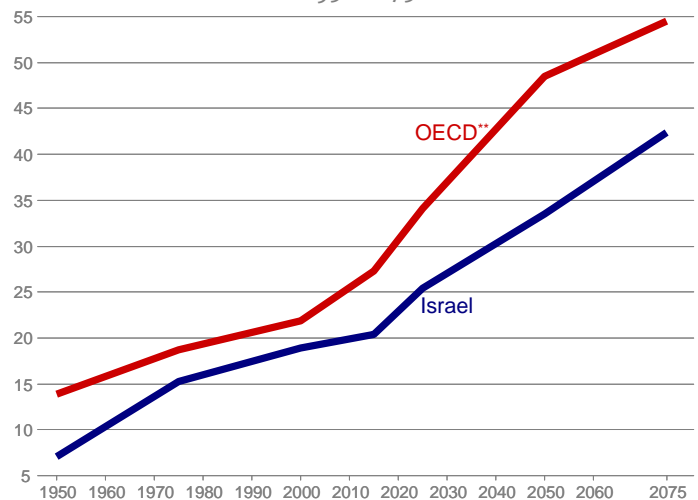
** Average for 34 OECD countries.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution
Data: OECD Pensions at Glance 2015

Figure 3

OLD-AGE DEPENDENCY RATIO

NUMBER OF 65+ PERSONS PER HUNDRED 20-64 YEAR OLDS, 1950-2075*



* Projections for future years

** Weighted average for 34 OECD countries.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution
Data: OECD Pensions at Glance 2015

current financing known as PAYG (Pay As You Go). In such systems, the younger population of working individuals supports the retiree population. In Israel the dependency ratio is lower than in most OECD countries due to higher birth rates. That said, Israel's dependency ratio is rising and is expected to continue rising in the future.

3. Pension systems – a global perspective

Since demographic characteristics significantly affect the pension allowance received after retirement, a new reality has emerged over the past two decades, one requiring pension systems to adapt accordingly. Moreover, national pension systems, which had become overly generous and ill-adapted to the demographic processes, accumulated actuarial deficits¹ that led to concerns about their stability. This has led policymakers to explore possible changes to ensure the sustainability of the pension systems and prepare for the increasingly powerful demographic trends.

The pension systems in Western countries differ substantially. This is due to the differing characteristics of their economies and populations, including their respective demographic makeups, their citizens' propensity to save, the characteristics of their welfare system and their prevailing economic ideology. The disparity also stems from the complexity of the pension issue, representing a major challenge for crafting together a single comprehensive solution.

In general, post-retirement income is comprised of four pillars. The first pillar is a universal pension allowance that is independent of the retiree's occupational history and is provided by the public National Insurance system. This pillar, existing in most OECD countries, is funded as a PAYG method and is aimed primarily at preventing poverty among older citizens. The second pillar is an occupational pension allowance that is determined according to the retiree's occupational history. The third pillar includes income from savings and investments accumulated over the years, while the fourth pillar is the labor income of those who continue to work beyond their retirement age. Of course, with the exception of the first universal pillar, not all retirees enjoy income from all four pillars. This paper deals only with the first two pillars.

Though basic eligibility and the distribution mechanism differ among the countries, provision of their universal pillar allowances is implemented via three channels: basic pension, minimum pension, and social welfare for pensioners. Each type of pension allowance is provided after official retirement age, or other eligible age, according to each country's practices.

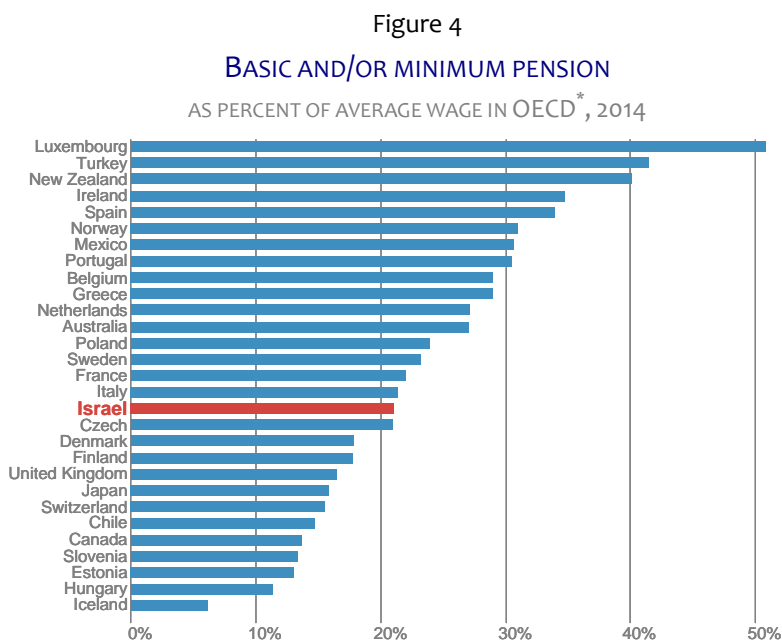
Basic pensions are the most common type of universal pillar pensions in OECD countries. Eligibility for basic pensions is based on years of residency and/or accumulated insurance periods – that is, payments to National Insurance that are unrelated to income and contribution amounts. Basic, residency-based pensions exist in the Nordic countries, with each requiring 40 years of residency for full eligibility. Australia and New Zealand, which

¹ An actuarial deficit arises when total assets held by the insuring body, including its future revenues from insurance premiums, are lower than its total liabilities to insured individuals who have retired or who are destined to retire. Generally speaking, the pension system strives to maintain an actuarial balance, i.e., a situation in which its assets, consisting of accumulated premiums and returns on accrued monies, will be sufficient for paying off its liabilities. The liability amount is determined according to anticipated pension payments plus forecasted insurance claims such as disability and survivor pensions.

adopted the basic pension, grant full eligibility after ten years of residency.² Eligibility in other countries is based on the accumulated insurance period. In Luxembourg, 40 years of insurance are required to be eligible for the full basic pension; in the Czech Republic and the United Kingdom, 30 years of insurance are needed (to be updated to 35 years in the United Kingdom starting in 2019).

Israel's basic pension – its National Insurance old age allowance – combines criteria of residency and years of insurance. The residency component is applied when individuals reach retirement age³ and is contingent on the condition that the retirees have no additional income (aside from pension income) in excess of a pre-determined amount. After the age of 70 (for men) or 65-70 (for women, depending on their year of birth) the additional income stipulation is dropped and all retirees receive an old age allowance regardless of additional revenues.⁴ In addition to the residency-based old age allowance is the “seniority supplement” that is based on the number insurance years (i.e. years in which the individual worked and paid National Insurance taxes) accrued prior to retirement. The size of this supplement is based on 2% of the old age allowance per full insurance year after the first 10 insurance years, and can reach a cap of 50% for individuals who have paid into National Insurance for at least 35 years. Basic pension rates in OECD countries range between 7% of the average wage in Iceland, to 40% in New Zealand, with the rate in Israel standing at 21% (Figure 4).

Another form of pension that exists in many countries is the minimum pension, which is conditional on the number of years of contributions to National Insurance. In Norway and Finland, however, the minimum pension is conditional on the number of years of residency, thus it is defined by the OECD as a basic pension. A minimum pension may be the sole component of the universal pillar in a country or it may be supplemental to the basic pension. In contrast with the basic pension, which is a fixed amount, the minimum pension varies according to the remaining pension income of the retiree, therefore it is conditional on the criteria of remaining pension income. Eligibility for a minimum



* Pensions received by individuals reaching official retirement age and eligible for full basic and/or minimum pension. In countries with a minimum pension, the maximum benefit (determined by the retiree's pension income) is the one considered here. In countries that have both a basic and a minimum pension, the sum of these is shown here.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution
Data: OECD Pensions at Glance 2015

² Conditional on five years of consecutive residency.

³ Retirement age for men is 67 and 60 for women born before June 1944. As of this writing, the retirement age for women born in 1955 and later is 62.

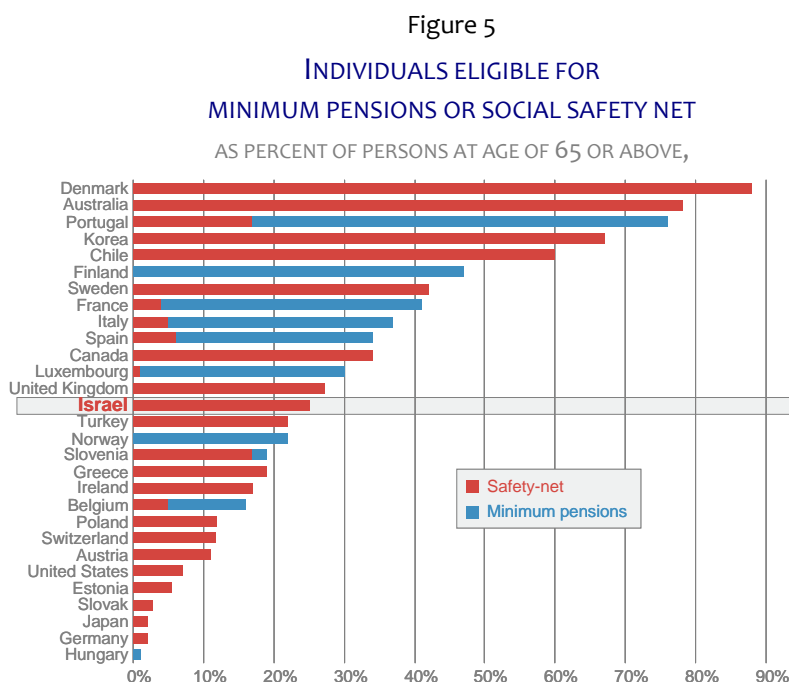
⁴ An individual who chooses not to receive the old age allowance, from retirement age until the eligible age will receive a 5% supplement to his/her old age pension from the age of eligibility.

pension based on years of contributions to National Insurance ranges from 15 years in Slovenia, Spain, and Turkey to 45 years in Belgium. In France the criteria for eligibility varies according to the age of the pensioner.

A third type of pension – social assistance to pensioners – is a pension that may vary according to the pensioner’s income and revenue from capital (savings, real estate, etc.). This pension is conditional on residency but not on contributions to National Insurance. One type of social assistance is the ‘safety net’, common in all OECD countries, which includes monetary and/or non-monetary assistance in areas such as housing, heating, and clothing. The income supplement allowance in Israel is a pension of this type. Eligibility for the income supplement allowance requires that individuals prove that their income (including income attributable to assets and owned vehicles) is low. Approximately one-quarter of the pensioners in Israel receive the income supplement allowance (Figure 5).

The second pillar of pensions is the occupational pension in which contributions and the overall savings are derived from past incomes. In some OECD countries this pillar is managed by the public system while in other countries it is privatized and managed by for-profit financial bodies. In the U.S., the second pillar is managed by the country’s Social Security Administration. It is defined by the OECD as a second pillar since it is an earning related scheme. The main purpose of the occupational pension pillar is to ensure savings at a level that provides pensioners with a reasonable standard of living compared to the one they had during their working years. In all OECD countries – with the exception of Ireland and New Zealand – second pillar savings are compulsory, though the contribution rates (and thus total savings) vary greatly among the countries.

For years, demographic trends have forced policymakers to modify their occupational pension structures to ensure that sufficient amounts will be saved over time and guarantee the financial stability of their pension systems. A prominent structural change in this pillar was the transition from funds offering defined benefits upon retirement (financed by the public system) to yield funds, otherwise referred to as Defined Contribution funds that are, for the most part, managed privately. Defined Benefit funds grant members predefined rights for the entire accumulation period, expressed as a proportion of insured wages on a graduated scale. Such funds are occasionally funded by contributions from insureds’ wages and occasionally by the insureds’ employers in the form of “unfunded” pensions (that is, pensions not funded by the public sector). The Defined Contribution pension grants members rights that are not predefined but rather are determined according to amounts accumulated in their accounts –



Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution
Data: OECD Pensions at Glance 2015

i.e. savers' rights upon retirement are linked to their past contributions. Additionally, longer life expectancies can erode these rights while financial losses are possible when pensions are exposed to the capital market. This structure places all risks in the pension savings on the insured.

Structural changes in occupational pension systems were accompanied by changing parameters – primarily raising the retirement age and the equalization of male and female retirement ages. Today, only 11 out of 34 OECD countries have different retirement ages for men and women (Figure 6).

However, this gap is expected to narrow in all of the countries – except Switzerland, Chile and Israel – in coming years.⁵ Other parameters that have been changed include incentivizing savings and cancellation of incentives for early retirement.

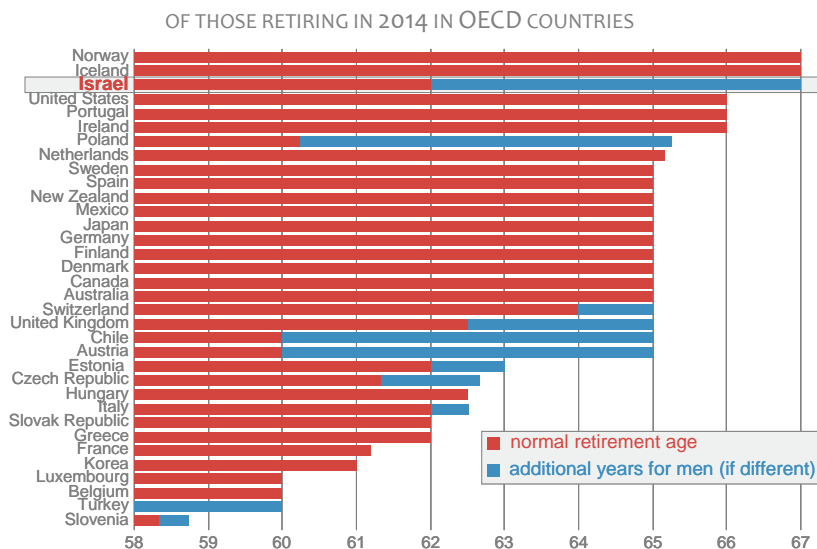
In most developed countries, the income-dependent stratum of the pension systems is managed publically using the Defined Benefit method, which is funded via PAYG.⁶ Private pension channels using the Defined Contribution method have relatively little weight in such countries (Table 1). Publically managed Defined Benefit plans currently exist in 18 OECD countries. Privately or semi-privately managed Defined Benefit funds exist in Iceland, Holland, and Switzerland. It is important to point out that these plans, whether managed publically or privately, have been updated so that today they depend on the insureds' years of contribution and wage levels.

Two additional types of pension plans exist at the publically managed occupational pension level. The first is the Notional Defined Contribution (NDC) pension model (see Sheshinski, 2015). This method, similar to the Defined Benefit fund, is based on PAYG. At its basis however, it seeks to imitate Defined Contribution funds. Individuals contribute from their monthly wages, with accrued savings recorded in what is referred to as a “notional” account. It is notional because in contrast with a Defined Contribution fund, there is no real corresponding accumulation of funds since it is the national pension fund that is based on PAYG. The return on savings is determined by the government and not by the market. In Sweden, which has adopted this model, the return on savings is equal to the increase in wages. Returns in Italy are calculated according to the nominal rate of GDP growth.

⁵ In Israel this gap was supposed to be reduced to three years in 2017, upon approval of legislation for updating women's retirement age from 62 to 64. As of this writing, this legislation has been shelved.

⁶ With the possibility of updating rights according to demographic changes.

Figure 6
RETIREMENT AGE



Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Data: OECD Pensions at Glance 2015

Table 1
STRUCTURE OF PENSION SYSTEMS IN OECD COUNTRIES
FIRST AND SECOND LAYERS

	First Layer			Second Layer	
	Basic pension	Minimum pension	Welfare assistance *	Public	Private
Australia	residency				contribution
Austria				benefits	
Belgium		✓	✓	benefits	
Canada	residency		✓	benefits	
Chile	residency		✓		contribution
Czech Republic	contribution	✓		benefits	
Denmark	residency		✓		contribution
Estonia	contribution			points	contribution
Finland**	residency		✓	benefits	
France		✓		benefits&points	
Germany				points	
Greece	residency			benefits	
Hungary		✓		benefits	
Iceland	residency		✓		rights
Ireland	contribution				
Israel	residency & contribution				contribution
Italy		✓		notional accounts	
Japan	contribution			benefits	
Korea			✓	benefits	
Luxembourg	contribution	✓		benefits	
Mexico		✓			contribution
Netherlands	residency				rights
New Zealand	residency				
Norway**	residency			notional accounts	contribution
Poland		✓		notional accounts	
Portugal		✓		benefits	
Slovak Republic				points	contribution
Slovenia		✓		benefits	
Spain		✓		benefits	
Sweden	residency			notional accounts	contribution
Switzerland		✓		benefits	rights
Turkey		✓		benefits	
United Kingdom	contribution			benefits	
United States				benefits	

* Since all countries provide welfare assistance in the form of a social safety net, the countries listed as providing pensions in the form of welfare assistance are countries in which pensioners working full-time at a low wage (30% or less of average wage) are entitled to additional welfare assistance, in accordance with additional income requirements and overall wealth.

** Norway and Finland have minimum pensions that are contingent on years of residency and are therefore defined as basic pensions by the OECD.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Data: OECD Pensions at Glance 2015

Consequently, monthly pension allowances on the eve of retirement are calculated on the basis of the pensioner's private notional account.

The second type of pension plan is the “points” plan that exists, for example, in Germany, Estonia and Slovakia. In this plan, workers accumulate points according to their incomes each year. On the eve of retirement, points are converted to a monthly pension allowance according to a set formula.

Seven OECD countries, including Israel, require that savings be made in privately managed Direct Contribution funds. In these types of funds, contributions are accumulated in the workers' personal accounts and are supplemented by yields (if such exist) from the funds' investments in the capital market. On the eve of retirement, accrued savings are converted to a monthly pension allowance that is calculated according to a formula that takes life expectancy into account.

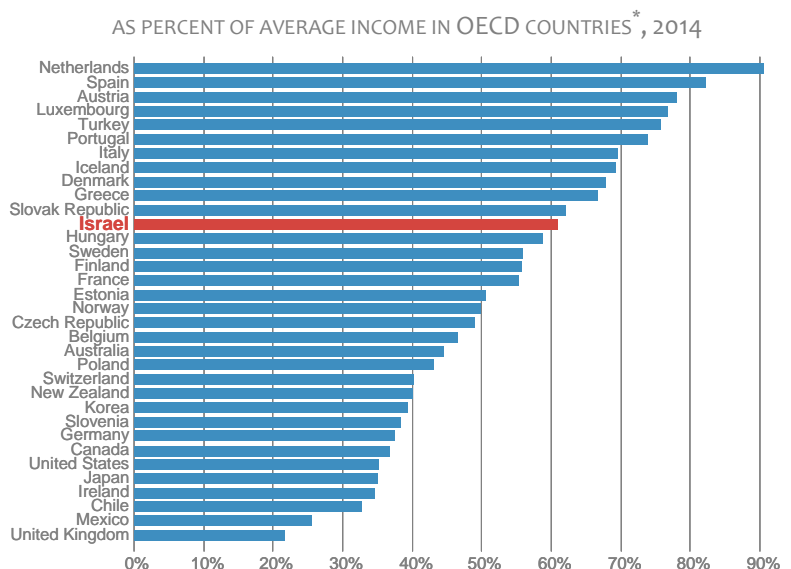
Figure 7 presents the level of pension allowance (in gross terms) from both pillars as a percentage of average income during the working career of workers in OECD countries. The pension allowance exceeds half of the average income in only half of the countries (including Israel).⁷

4. The pension system in Israel

Changes in the Israeli pension system have been rapid, with reforms over the past two decades reflecting the ideological perspective that individuals bear the prime, though not exclusive, responsibility for their pension futures (Achdut and Spivak, 2010). Israel's current pension system comprises the universal pillar of National Insurance (old age allowances that include income supplement allowance for eligible individuals) and the occupational pillar (mainly Direct Contribution occupational pensions). Occupational pensions are compulsory in Israel. Since 2008, all wage earners must contribute a given proportion of their income to a privately managed savings instrument – a pension fund, managers' insurance or a provident

⁷ The assumption is that one's working career begins at age 20. For Israel, one must take into account that individuals typically enter the labor market later than in other countries because of mandatory military service (Kandel, 2014). Thus it is virtually certain that Israel's true placing among OECD countries is lower than in Figure 7. Moreover, contributions to a pension fund in Israel are conditional on six months of consecutive employment (with the exception of workers with active insurance coverage in a pension fund), which mainly impacts young workers with high mobility of employment. According to Giorno and Adda (2016), approximately one-fifth of individuals in Israel aged 25–29 lack pension savings.

Figure 7
GROSS PENSION BENEFITS



* For males with mean earnings.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution
Data: OECD Pensions at Glance 2015

fund – that will pay out a pension allowance.⁸ In 2017, pension contributions also became compulsory for the self-employed. Longtime civil servants, university staff and other corporations still have remnants of Direct Benefit funds (unfunded pension), though such funds were no longer made available to new members as of 2001.⁹

Changes in Israel's pension system were mainly in the occupational pension pillar, with a few also being made in the universal pillar. In 2003, linkage of the old age allowance to the average wage was abandoned and linked instead to the Consumer Price Index, thus halting the creeping increase in the real value of this allowance. This is not simply a technical issue when real wages are rising since it means that the incomes of retired persons decline in relation to the rest of the population. Since poverty is measured relative to a country's median income, which to a large extent correlates with the country's average wage, erosion of the universal pension pillar has large negative implications for poverty among the elderly. The price linkage mechanism, sustained over time and without intervention, will increase the elderly poverty rate. It follows that such a linkage mechanism misses the mark – preventing poverty among the elderly – mainly among those who lack a second pillar pension arrangement, with the old-age allowance being their sole income.

15 of 34 OECD countries link their universal pillar pensions to the Consumer Price Index (including Israel). Other countries have adopted a different policy. Thus, for example, in the United Kingdom the universal pillar is linked either to the rate of change in wages, the rate of change in the CPI, or 2.5%, the highest of the three. Linkage in Norway is equal to the rate of change in wages less 0.75%. In Japan the basic pension is linked to wages, however upon reaching the age of 67 (retirement age in Japan is 65 for both men and women), it is linked to the CPI. In Luxembourg the universal pillar is linked both to wages and the Cost of Living Index (accrued).

Changes in Israel's occupational pension system began in the second half of the 1990s with the nationalization of traditional pension funds. These funds, of the Defined Benefit type, were fairly generous and lacked a mechanism for adjusting to demographic changes. As a result, they accrued actuarial deficits. A number of measures were adopted for stabilizing these traditional pension funds. These included partial financial bailouts from the government, a scaling down of rights that had hitherto been available in the funds, and closing the traditional funds to new members. These were replaced by new funds established for new workers, which included an automatic actuarial balancing mechanism. The funds received partial support by the government in the form of earmarked bonds with a guaranteed return (5.05%) on 70% of the accrued monies. In 2003 the retirement age for men was raised, from 65 to 67 for men and from 60 to 62 for women. The retirement age for women was supposed to have been raised to 64 in 2017 upon completion of legislation, however that legislation was shelved in July 2017. In 2003 earmarked bond coverage was reduced to 30% of accrued monies, with the guaranteed real return reduced to 4.86%. This move led pension funds to direct a larger component of their savings into the capital market. Since 2017 the

⁸ Achdut, Stravchinsky and Keidar (2015) have shown that the share of persons saving for pensions rose gradually in the years 2002–2012, but it is still relatively low in industries characterized by low wages and among weaker populations. Lurie (2015) stresses the need for efficient enforcement of mandatory pension contributions.

⁹ Based on a Ministry of Finance estimate, full liability including future accumulated rights in the unfunded pension total approximately 668 billion shekels. According to this estimate, liabilities for final payment of unfunded pensions will end in 2104 (State of Israel, 2014, page 184).

allocation of earmarked bonds has been raised to 60% for savers above age 60, while the allocation to savers under 50 years of age is being gradually reduced (see section 4.1).

After stabilizing the system, adjusting it to life expectancy and linking pension allowances received upon retirement to prior employee contributions, policymakers shifted their focus toward ensuring that the pension systems would provide pensioners with a dignified existence. Thus, the Mandatory Pension Law for Wage Earners was enacted in 2008. That year, regulations concerning savings in provident funds were changed as well, with the funds being converted from medium term capital savings instruments to allowance-based pension savings instruments.¹⁰ Application of the Mandatory Pension law and the modified nature of the provident funds attest to the government's assumption that individuals do not plan sufficiently well for their futures¹¹, this despite having imposed responsibility for pension savings on the individual. Moreover, in a pension product, as opposed to most products, there is no learning mechanism and no chance for an individual who is ill-prepared for retirement to retrace his or her steps and rectify past mistakes (Spivak, 2015).

Three primary, significant and challenging characteristics of the occupational pension in Israel are discussed below: increased capital market exposure, regressive savings incentives, and management fees paid by savers, which are relatively high for low wage earners.

Sidebar 2

Why do we find it hard to save for pension?

Traditional economic models that describe habits of consumption and savings during a person's lifespan maintain that individuals borrow or save such that consumption remains relatively steady over time. These models for the most part assume that one's lifetime is known ahead of time and thus avoid dealing with the challenge of pension savings. As a rule, during the period in which individuals work they will save in preparation for the pension period.* In practice, many struggle to save for the retirement period, consequently, numerous countries are in fact forcing their citizens to save for retirement. Why do individuals find it hard to save for pension despite knowing that savings will benefit them personally – and that without savings, they are liable to descend into poverty?

1. A challenging problem coupled with low financial literacy

Classical economic theory's inability to explain the common difficulty of saving for retirement has moved the discussion of this issue to the field of behavioral economics, which challenges the customary assumptions of economic theory concerning consumer

(continued on next page)

¹⁰ Up to 2008 provident funds were a medium to long term savings instrument, with a maturity of 15 years and accrued savings received as a capital sum, i.e., a onetime payment of the total amount. In 2008 the definition of a provident fund was changed, to become a pension savings instrument that distributes an allowance. This nullified the option of withdrawing accrued savings in a one-time payment, unless the saver has additional allowance-based monthly income of at least NIS 4,418 (as of 2016).

¹¹ The requirement that individuals set aside money for their future pensions produces some ethical dimensions that are not always clear cut. Among others, this requirement applies to low income individuals who struggle in supporting themselves in the present. By implementing this requirement on everyone, the government mandates savings behavior which may not be optimal for all individuals.

SIDEBAR 2 (*continued*)

behavior. Benartzi and Thaler (2007) argue that common economic models assume that individuals possess cognitive abilities enabling them to solve the mathematical problem set before them: What sum of money will they need during retirement and how much will they need to save during their working years? However, researchers who checked people's financial knowledge suggest that most people struggle in answering simple financial questions concerning the subjects of mortgages, interest, and most particularly stocks, bonds, and mutual funds. Among others, Lusardi and Mitchell (2011) found that only one-half of American respondents aged 50 and up were able to correctly answer simple financial questions.^{**} It follows that lack of knowledge makes it difficult for individuals to initiate a pension savings plan; or even if they have one, to be familiar with its details.

In addition, studies indicate that lack of familiarity with the subject of pensions leads individuals to avoid dealing with the subject. Benartzi and Thaler (1999) found that individuals dedicated more time to deciding on purchasing a baseball bat than handling their pension savings. Kogut and Dahan (2012) found that economists at the Israeli Ministry of Finance dedicated less time to choosing a pension plan than deciding on other sorts of consumption like purchasing an apartment, a vehicle or large electrical device.^{***} A study conducted in Germany (Dolls et al., 2016) found that sending current information to savers on their pension savings situation led to increased savings for pension purposes.

2. Cost is immediate but the reward is far-off

Benartzi and Thaler (2007) argue that in contrast with economic theory, which assumes that individuals understand the need for pension savings and translate such understanding into deeds, the reality is different. Practically speaking, individuals lack the willpower to implement their optimal pension savings plan.^{****} Insufficient willpower and self-control is a widespread characteristic in decisions that have implications over more than one period, i.e. "intertemporal choice". In the case of pension savings, cost (reduced present consumption) is immediate while the benefit (receiving a pension after retirement) is postponed, occasionally by decades. Furthermore, the individual has no certainty regarding the eventual pension amount, which further reduces the individual's desire to make a decision regarding his or her pension future. Hershfield et al. (2011) claim that individuals attribute less importance to the future because they are unfamiliar with their future selves. The researchers demonstrated how, when young subjects are exposed to a future "photo" of themselves in old age, they ascribed a higher weight to pension savings.^{****}

* According to Franco Modigliani's Life-Cycle Hypothesis, or Milton Friedman's Permanent Income Model, households maximize their utility by smoothing their consumption over all periods.

** The questions were: "Assuming you have 100 dollars in your bank account. The interest rate on savings is 2%. After five years will you have more than 102 dollars in your account, exactly 102 dollars, or less than 102 dollars?"; "Assuming that interest in your savings account is 1% per year and inflation in that same year is 2%. Will you be able to buy more, less, or exactly the same with the money you have after one year?"; "Is the following sentence true or false: Purchasing a single stock yields a more certain return than purchasing a mutual fund that invests in a basket of stocks." Only 34% of respondents succeeded in answering all three questions correctly; 35% answered two questions correctly; 16% answered just one answer correctly and 10% answered all wrong, or did not answer all questions.

(*continued on next page*)

SIDEBAR 1 (*continued*)

*** An additional explanation suggested by Kogut and Dahan (2012) is that avoidance of dealing with the pension problem stems from a disinclination to deal with matters that remind one of old age and disability.

**** Thaler and Sunstein (2008) checked (among other parameters) subjects' satisfaction with the amount of their accrued pension savings. Some 68% of respondents said that they needed to save more; 31% said they were saving at a correct rate and only 1% said they were saving too much. Notwithstanding, few respondents actually altered their rate of savings. The conclusion based on the study's results is that it is difficult for individuals to increase their pension savings even though they are aware of the need.

***** In this experiment, a portion of subjects were exposed to doctored photos of themselves in old age while the others were exposed to current photos. After this, subjects were asked to divide up \$1,000 among four alternatives: purchasing a gift for a person close to themselves, investing in a pension fund, planning a fun event, or depositing money in the bank. Subjects who were exposed to their old-age photos set aside double the amount for the pension fund than subjects not exposed to such photos.

4.1 Increased exposure to the capital market

One of the conspicuous aspects of the pension system in Israel is its broad dependence on the capital market. The universal pillar in Israel (old age allowance from the National Insurance Institute) is given as a fixed sum that is independent of contributions. However, it is a relatively modest sum. A pensioner who meets eligibility conditions in terms of residency receives an old age pension equal to 14% of the average wage. The full seniority supplement awards recipients with an additional 7% of the average salary. As of this writing, the old age pension for a couple stands at NIS 3,460 per month. For comparison's sake, a family of two is considered to be poor if its income falls below NIS 5,216 per month. Hence, the main pension pillar in Israel is the occupational pension, which is managed using a pure cumulative pension method and is exposed to capital market risks (with the exception of the component invested in earmarked bonds).

Numerous countries minimize the market risks that affect pension savings by imposing restrictions on investment portfolios, supervising pension funds, and encouraging transparency of the investment strategies to savers. One way of doing this, whose need was highlighted following the financial crisis of 2008, is to outline a default age-based investment plan that reduces the risk involved in investing pension savings as savers approach retirement age.¹²

When the financial crisis of 2008 hit global stock exchanges, savings instruments recorded highly negative yields causing savers close to retirement age to lose a considerable portion of their accrued savings. The crisis demonstrated the irrelevance of the claim, at least for relatively older savers, that capital market risks balance out over the course of decades of retirement savings, underscoring the fact that risks become more significant as one approaches retirement age.

In the aftermath of the crisis, the Israeli government decided that the Ministry of Finance must work to create investment plans that rely on the time-range of savings.¹³ Following this decision, the Capital Market division of the Ministry of Finance established its Khakham Model ("adapted financial savings") in the beginning of 2012, with implementation commencing in 2016. Consequently, three new investment plans were launched: a plan for

¹² For an extensive review of this subject see Levi (2013).

¹³ Government Resolution 4323 of Dec. 14, 2008.

savers up to the age of 50, for savers aged 50–60, and for savers aged 60 and up. Prior to this change, the majority of savers (approximately 95%) were enrolled in the ‘general’ default plan, where savings were managed in an identical blend of investments for savers of different profiles – this, despite the more logical arrangement of having older savers’ investments directed into channels with lower risk. The Khakham Model addresses the low financial literacy of savers (those who do not actively choose between savings plans) and/or their lack of decision-making ability.¹⁴

Earmarked bonds are a form of government subsidy that also affects the exposure of pension savings to the capital market. Until July 2017, such bonds were issued for the new pension funds at a rate of 30% of each saver’s savings fund, for the entire term of savings and of one’s pension.¹⁵ Earmarked bonds stabilize pension savings since they are not traded in the capital market and their price remains fixed. It follows that as the proportion of earmarked bonds in total savings increases, the volatility of those savings decrease.

The fixed yield provided by earmarked bonds affects the overall yield of savings. The crisis of 2008 and declines in financial markets also led to the establishment of the “Task Force for Increasing Certainty of Pension Savings.” The task force submitted its recommendations in December 2015 and these were approved by the Minister of Finance in March 2017. The task force examined whether the use of earmarked bonds in the current format constitutes their most efficient allocation in terms of providing greater certainty and stability of pension payments. The task force determined the existence of a more efficient allocation than the current system in place. Specifically, they suggested a 30% allocation of earmarked bonds for savers from the age of 50 and up until retirement age, with younger savers receiving no allocation, and savers at retirement age and up benefiting from a 60% allocation. The rationale for recommending this alternative is that at an early age, savers are less sensitive to volatility of savings and thus can gain higher returns through investments in the capital market. In contrast, upon receiving the pension, pensioners are more sensitive to risks given that a decrease in asset prices immediately impacts their pension and living standards (for continued discussion of this proposal and the impact of earmarked bond allocations on the extent of pension savings, see Section 5.1.5 below). The recommendations of the Task Force for Increasing Certainty of Pension Savings came into effect in July 2017. Since then, retirees obtain an allocation of 60% earmarked bonds instead of 30%. Despite the recommendation that the allocation of earmarked bonds will start at the age of 50, the saving portfolios of the young workers still include earmarked bonds that have been issued in the past, but their share in the portfolio will gradually decline in future years.

4.2 Regressive saving incentives

The difficulty of saving for one’s pensions and the obvious need for a stable monthly pension allowance that allows pensioners to live in dignity led Israeli policymakers to devise a pension system that includes savings incentives. In addition to the law requiring

¹⁴ Dahlquist, Setty and Vastman (2016) showed that the choice of investment blend in the default plan is likely to significantly affect the amount of the pension allowance for savers with low financial literacy.

¹⁵ Earmarked bonds are allocated for new, comprehensive pension funds. The cap on the monthly deposit to a comprehensive pension fund is NIS 3,880 as of 2016, which is 20.5% (allocation rate) of double the average wage in the economy (NIS 9,464 in 2016). The remaining balance of savers’ deposits that reach the cap on deposits for earmarked bonds is directed to new, general pension funds, which lack the earmarked bond allocation and are 100% exposed to capital market investments.

contributions to pension savings, there are also relevant tax incentives. For wage earners, these comprise four types of benefits. The first two, a tax exemption on employer deposits and a tax credit on employee contributions, increase the amounts saved in the present. The remaining two – a tax exemption on capital gains in a pension fund and a tax exemption on the pension allowance – increase pension allowances.¹⁶

There are two main disadvantages to tax benefits on pension savings. First, the intricacy of tax benefits reduces their effectiveness for savers who are, in any event, characterized by low financial literacy and who struggle in making wise decisions in this realm. Second, tax benefits on contributions for pension savings are regressive, since they are not relevant for workers whose incomes are below the tax threshold and their attractiveness increases as savers' marginal tax rates increase (Ahdut and Troitsky, 2015). In addition, the capital gains tax exemption benefits mainly high-income earners and higher pension contributions. The value of tax benefits at the time of deposit is estimated at NIS 10.8 billion in 2015.¹⁷ Data presented by the Knesset's Research & Information Center (Kaufmann, 2013) indicates that in 2013, over 40% of all benefits at the time of deposit of pension contributions were to top-echelon wage earners, i.e., those with monthly incomes exceeding NIS 20,000.¹⁸

An additional incentive for pension savings consists of a monetary subsidy that is indirectly given by the issuance of earmarked ("Arad") bonds. These guarantee an index-linked return of 4.86%¹⁹ and provide a solid, risk-reducing component of the investment portfolio. Until July 2017, earmarked bonds were allocated at a fixed rate of 30% of the monthly contribution for pension savings, up to a legally set cap (NIS 3,880 as of 2016). The bonds' intrinsic subsidy stems from the fact that in recent years, free-market interest rates have been very low. An estimate of the intrinsic subsidy provided by earmarked bonds in 2015 – relative to the financing cost of the government's alternative for raising money from the public, i.e., government bonds traded on the capital market – totaled approximately NIS 3

¹⁶ Tax benefits for wage earners in 2016 were as follows: employer contributions of up to 7.5% of the wage, to a cap on wages of 4 times the average wage in the economy (the lower of the two) were tax exempt; employee contributions up to 7% of the wage (up to a cap on wages of NIS 8,700 per month) benefited from a 35% tax return; full or partial tax exemption from a capital gains tax on pension savings (depending on the manner of withdrawal); tax exemption of 43.5% (gradually rising to 67%) on pension allowances, with a cap on the eligible pension allowance of NIS 8,460 per month. Abramson and Sarel (2015) claim that since pension contributions have become mandatory for wage earners, tax benefits became superfluous. This claim is valid only for those earning up to the cap on mandatory contributions and even so, assuming full compliance with the obligation. In reality, the tax incentives are likely to incentivize workers to insist on their rights vis-à-vis the employer concerning pension contributions. Based on the 'Social Survey' by the Central Bureau of Statistics (2012), 14% of wage earners are not covered by pension insurance. A survey conducted for the Knesset's Research & Information Center (Levi, 2014) in September 2014 (following implementation of the Compulsory Pension Law) found that 12.6% of wage earners are not covered by pension insurance. Among non-insured wage earners, 57.8% are non-professional workers. Only 7.5% of non-professionals in the wage earner population have pension arrangements. According to the survey, 40% of wage earners who reported having no pension arrangement claimed that this was because no such arrangement was offered by their employer.

¹⁷ State of Israel (2014), page 239. From this benefit, one must deduct payment of income tax upon withdrawal, estimated at NIS 3.9 billion.

¹⁸ Brender (2009) showed that lower-wage earners might be harmed even further following application of a mandatory pension savings law. This is due to losing their eligibility for the income maintenance allowance after retirement. As a result, Brender (2011) claimed that mandatory pension savings are liable to impact the employment of workers with low earning ability.

¹⁹ The savings portfolio also includes the older 'Meron' bonds, which offer an index-linked return of 5.57%

billion for pension funds and another NIS 1 billion for managers' insurance.²⁰ Similar to tax incentives, the benefit embodied in earmarked bonds – mainly reduced risk and smoothed returns over time - is regressive up to relatively higher income levels. The reason is that the benefit is extended proportionally, so high wage earners benefit more (Spivak, 2015a).²¹

4.3 High management fees mainly for low-wage workers

Management fees have drawn considerable public attention in Israel in recent years. Their cost directly affects the size of accrued savings. Management fees are collected via two channels: management fees collected as a percentage of accrued savings, and management fees collected as a percentage of monthly deposits to a fund. Restrictions pertaining to the maximum management fees for pension savings instruments – pension funds, provident funds and managers' insurance – were imposed in 2013 (Table 2). Differences in the management fee caps in different savings instruments, alongside the complexity of payments that integrate management fees in both monthly deposits and in accumulated savings over the years add an additional informational complication. These make it difficult for savers to estimate how much they are paying for the service, whether costs are competitive, and to comprehend their combined effect on accrued savings upon retirement.

An additional characteristic of management fees is that most low-wage workers pay higher management fees. According to the Ministry of Finance (2016), more than 750,000 workers – many, among the weakest workers in the economy – are paying the legally allowable maximum management fees. The main reason for this is that high-wage workers employed in larger companies benefit from the employer's business association with pension management companies – in agreements that grant the companies discounts on management fees as well as personalized service. Low-wage workers employed at less established companies for the most part manage their pension savings via an insurance agent. Thus, not

Table 2

MAXIMUM MANAGEMENT FEES ON PENSION SAVINGS, 2016

Types of savings	Maximum management fees on deposits	Maximum management fees on accumulated savings
Pension funds*	6%	0.5%
Managers' insurance	4%	1.05%
Provident funds**	4%	1.05%

* Refers to new comprehensive pension funds that include earmarked bonds (see footnote 15). Management fees in new general pension funds are equals to those in managers' insurance.

** In practice, most provident funds do not charge fees on deposits.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Data: Capital Market Authority

²⁰ Source: State of Israel (2014), page 183. Older plans are involved in managers' insurance.

²¹ An additional (negative) incentive that must be taken into account is that low wage earners who wish to work after retirement age in order to increase their incomes are liable to lose their eligibility for various allowances as a result (Auerbach et al, 2016). Andersen (2015) showed that the effective tax rate of low-earning individuals is likely to exceed 100% since the rise in income, resulting in an increased pension allowance, leads them to lose other benefits. A reform instituted in Norway that reduced the effective tax rate for retirees brought about a significant rise in employment among older individuals.

only are they denied a discount on management fees, but they also must bear the cost of the insurance agent's brokerage commission.²²

Low-wage workers' inferior ability to bargain for lower management fees led the Ministry of Finance to take action to establish pension funds of a new type – the “default pension funds” – active since November 2016.²³ These are pension funds in every sense of the word and workers are entitled to join them on their own accord. However, workers who have not chosen a pension fund will be automatically included in these funds. Default pension funds were selected through a tender publicized by the Ministry of Finance and they offer very low management fees relative to the allowable cap and to the average in the industry.²⁴ Based on data from the Ministry of Finance, the average management fee paid to pension funds in 2015 amounted to 3.17% on current deposits and 0.28% on accrued savings; the default funds on the other hand offer management fees below 1.5% of current deposits and 0.01% on accrued savings.²⁵ The challenge of default pension funds is to prove to savers that they have the ability to achieve competitive returns despite the low management fees.²⁶

5. Key determinants of the pension allowance amount and the replacement rate

Pension systems worldwide, and particularly in Israel, are designed such that accrued pension savings in the occupational (i.e. the second) pillar are dependent on characteristics related to the individual's income, occupation, and demographic data. Therefore, answering the main question concerning pensions (what will be the pension income for an individual upon retirement?) requires knowledge of the individual's income during his/her employment career, age upon entering the labor market and age upon retiring, and consecutiveness of employment. DC pensions, routine in Israel, are also dependent on additional characteristics that include a return on the savings component invested in the capital market, the management fee percentage, the fund's actuarial deficit or surplus, and the allocation rate for earmarked bonds. In the absence of such knowledge, mainly in terms of future data, it is

²² The ability of a small employer and/or an employer whose workers are low wage earners to obtain an agreement for low management fees via a direct channel with management companies is more limited. As for dealing with an insurance agent, that agent may well provide additional insurance services to the employer that have no connection to employee pension insurance. The insurance agent's ability to collect cross-subsidized fees raises the problem of conflict of interest for the employer. See State Comptroller's Report (2016) for more on this issue.

²³ Insurance companies and employers objected to the reform and appealed to the High Court of Justice. Their appeal was rejected.

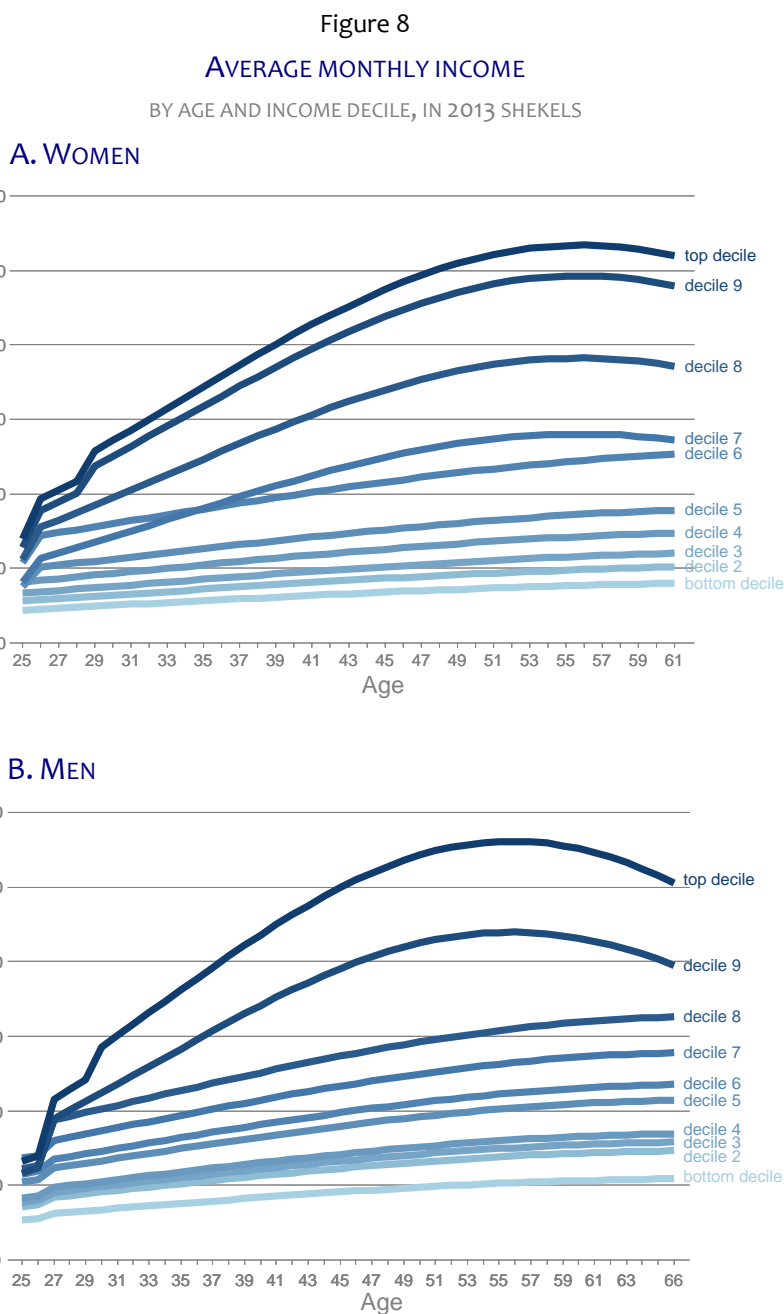
²⁴ The two bodies awarded the Default Fund tender in August 2016 were Meitav Dash Investments Ltd. and Halman Aldubi Investment House Ltd. Meitav Dash collects a 0.01% management fee on accrued savings and 1.31% on monthly deposits. Halman Aldubi collects a 0.001% management fee on accrued savings and 1.49% on monthly deposits. The valid term of these two investment companies in the framework of the tender is two years after which a new tender will be circulated among pension savings managers. Management fees for those who join the first two funds during these two years will remain valid for ten years.

²⁵ A saver who reaches retirement age and begins receiving a pension allowance continues to pay a management fee on accrued savings. Moreover, the pensioner has virtually zero bargaining power vis-à-vis the pension fund and he or she is not allowed to move the accrued savings to another fund. Therefore, it is quite possible that, generally speaking, management fees for pensioners are higher than those collected from savers who are still employed; and those savers are allowed to move between pension funds.

²⁶ Yitzhaki and Premisler (2014) as well as Amsterdamsky (2015) suggested setting up a state pension fund that would collect token management fees or none at all.

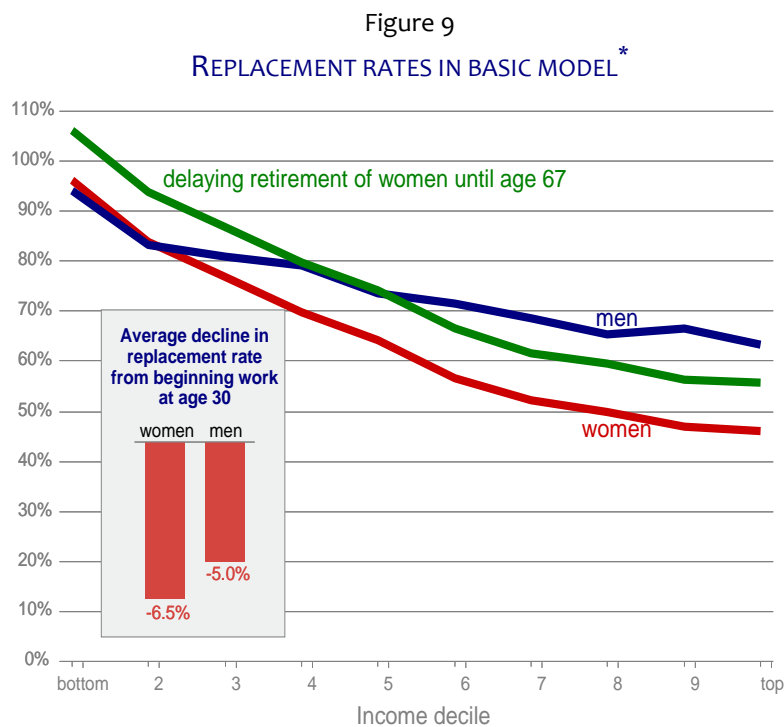
necessary to rely on assumptions and forecasts. This section presents the results of simulations performed using a pension simulator constructed especially for this purpose. The goal is to predict the individual's pension allowance given known parameters and on the basis of assumptions pertaining to unknown parameters concerning the individual.

To render a picture of the expected pension allowance for young savers entering the labor market, there is first a need to predict their income throughout their saving years. For this purpose, wage profiles (using estimated wage equations and simulations) were created that estimate monthly wages of workers for each year of employment. These profiles were built separately for representative types of men and women at each monthly wage decile (for further information on how these profiles were built, see Appendix 1). Figure 8 presents the different profiles, showing wage gaps between deciles that grow wider as wages rise.



Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

The wage profiles were fed into the pension calculator that determines pension fund contributions for each year of employment as a function of income as well as accrued pension savings over time. The calculator takes into account deductions for management fees, including on investments, as well as accumulated returns on a portfolio with an earmarked bond allocation up to the cap on allocations. The calculator makes it possible to factor in different assumptions and perform additional analyses including a sensitivity analyses for all parameters.²⁷ Each change in assumptions or parameters affects the expected pension allowance received upon retirement as well as the replacement rate – the ratio between the pension allowance and the worker’s latest wage. This rate allows us to assess whether the pensioner has succeeded in maintaining his or her pre-retirement standard of living. Predicted replacement rates for each income decile are presented in Figure 9.²⁸ Appendix 2 presents the average wage, final wage, and pension



* Replacement rates (ratios of pension benefits to final labor income of individuals) for ages 25 to 62 (women) and 25 to 67 (men)

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

²⁷ The pension calculator takes into account the pension contribution rate (employer, employee, and severance pay), which may be changed if desired. Based on the monthly contributions it is possible to calculate the annual accumulation plus returns, which is added to existing accumulations from previous years. The calculator can accommodate changes in management fees and can calculate the impact of management fees on accumulated savings and on deposits for a specific year in current values; alternatively, the costs can be capitalized to the eve of retirement. The calculator allows for changes in the age of labor market entry, and in the actual and formal retirement ages. It also allows for changes in the inflation rate, in the nominal rate of return on accumulated savings and in their portfolio composition. The calculator allows for changes in the insurance components of pension contributions, such that the division of the contribution between savings and insurance can be changed. The default setup of the simulation is a regular insurance plan – pension savings plus insurance against pre-retirement disability or death. The calculator assumes that the pension fund is actuarially balanced, although this can be changed. The calculator also assumes different conversion rates for males and females, similar to those reported recently by the management companies for workers who recently entered the labor market.

²⁸ This simulation is based on future wage profiles for workers currently entering the labor market. The simulation assumes that the individual enters the labor market at the age of 25 and retires at the official retirement age – 67 for men and 62 for women. Pension contributions are as follows: 6% from the employee, 6.5% from the employer, and 6% for severance pay, all deriving from 100% of the wage. The savings component out of the pension contribution is 85%; with the remainder of the contribution directed for covering insurance costs included in the framework of investment in the pension fund. Management fees are 4% on the deposit and 0.4% on accrued savings – the average managements fees in dealing with an agent. Assets in the savings portfolio consist of 30% designated bonds, which carry an index-linked return of 4.86%. This allocation has a maximum limit equaling 20.5% of double the average wage in the economy. The real return on the rest of the portfolio is set to 2%. The fund is in actuarial balance each year, thus the actuarial balance mechanism does not add to or subtract from accrued savings. Conversion coefficients for the pension allowance based on gender

allowance, including the basic, universal pillar (i.e., the National Insurance old-age allowance) for a saver with full eligibility.²⁹ All amounts presented in the Appendix are economic incomes (gross wages), before tax payments and pension contributions. The pension allowance upon retirement is also given as a gross amount.

In general, replacement rates in the lower deciles are relatively high. The reason for this is that at low wage levels, the universal pension has a higher weight in the total pension allowance.³⁰ The decrease in replacement rates – which corresponds with the rise in their wages – is more rapid for women. One of the reasons for this is that as women's wages increase, the monetary significance of retiring at a younger age increases. In other words, high-earning women who retire at the age of 62 lose pension contributions during the years in which their wages are highest. Additionally, they lose the accumulated return on accrued savings, which is at its peak during these years. As a result, replacement rates for women in the three upper wage deciles are lower than 50%, while men's replacement rates are always higher than 60%. Women also have longer life expectancies from which higher pension conversion ratios derive; this impacts the amount of their pension allowances as well as their replacement rates.

These replacement rates are obtained for non-conservative assumptions concerning the individual's employment characteristics. Thus, for example, in this simulation individuals benefit from an insured wage that is identical to the gross wage. Additionally, they enter the labor market at the age of 25 and maintain consecutive employment until retirement age, so they are not required to liquidate the severance pay component. It is doubtful whether these assumptions are realistic, particularly among unskilled workers in the lower deciles. The significance of this is that the pension allowance amount and replacement rate in the basic model are overstated. Figure 9 shows that entry into to the labor market at age 30 instead of 25 lowers pension replacement rates by an average of 6.5 percentage points for men and 5 percentage points for women.

Implications of various changes in the parameters are examined below. The objective is to examine the impact that changes in individual parameters have on subsequent replacement rates.

were taken from reports issued by management companies to savers currently entering the labor market. Simulations by Spivak and Tzemach (2017) also accounted for non-consecutive years of work. They found that this negatively impacts pension replacement rates, mainly for low wage earners, and increases inequality in the pension allowance.

²⁹ These simulations take into consideration the monthly old-age pension for an individual of NIS 1,531 in 2016 prices and a full seniority supplement of 50%.

³⁰ The simulation is based on consecutive employment and therefore does not take into account the possibility of withdrawing severance payments. Lack of consecutive employment is more common among low wage earners. Also, the likelihood of withdrawing severance payments in the event of job dismissal is higher for low wage earners. Thus, in practice, it appears that replacement rates decline to a lesser extent with increased incomes. This is the same conclusion arrived at by Krill (2016), who performed similar simulations. Amsterdamsky (2015) suggested imposing tighter restrictions on withdrawal of severance payments.

5.1 The effects of specific parameter changes on the replacement rate

5.1.1 Raising the retirement age for women

As noted in Section 4, the retirement age for women was supposed to have been raised in 2017, with the goal of enabling women to increase their pension savings and replacement rates. As of this writing, legislation on the issue has been frozen. Older retirement ages yield higher pension benefits as a result of the greater number of years in which pension contributions accumulate, the cumulative return on savings, which reach their peak at retirement, and deferred use of the savings. As noted above, most OECD countries have no retirement-age gender gap, with both men and women retiring at 65. Figure 9 shows that raising the retirement age for women to 67, equaling that of the men, increases women's replacement rates substantially – 10 percentage points for all income deciles.

Raising the retirement age for women to that of men would produce better replacement rates for women than for men in the lowest income deciles. This is because women's income in all deciles is lower than that of men, and the lower one's income, the more one's pension allowance is based on the universal old-age allowance (first pillar), rather than on pension savings (second pillar), meaning that pension allowances tend to be more equitable than pre-retirement income. It should be noted, however, that the assumption of employment continuity, where women are concerned, seems less well-founded, as some women's continuity of employment is disrupted by childbirth. A more realistic assumption of fewer working years for women would lower women's replacement rate relative to men's. Of course, an earlier retirement age for women further reduces women's pension benefits and replacement rate.³¹

5.1.2 Raising employer and employee pension contribution rates

In February 2016, a general collective agreement was signed by the umbrella union of Israel's business organizations and the Histadrut (Israel's largest labor union). The agreement aimed to increase the Israeli pension contribution rate by raising both employer and employee pension contributions by half a percent, in two stages (Table 3). The change, which went into full effect in early 2017, boosted employees' pension contributions by 1%.

Regarding the higher contribution rate's impact on replacement rates, it appears that a one percentage point rise in the total contribution rate (from 17.5% to 18.5%) raises the replacement rates of all income deciles – by two percentage points for women and three percentage points for men. The replacement rates are higher for men because they retire later and their pension conversion coefficient is lower. An additional contribution rate increase, to the legal maximum – 7% versus 6% – ups the replacement rate by a similar amount – two

³¹ Opposition to raising the retirement age further for women is based on the idea that many women actually stop working before retirement age, and that such a development would severely reduce their income. Jousten and Lefebvre (2016) showed that women's retirement decisions are more flexible than those of men, and are influenced by, among other things, retirement incentives. Thus, it is reasonable to assume that women would defer retirement if the retirement age were raised. Based on data from the *Report of the Public Committee for Examining the Retirement Age for Women* (2016), only 8% of women in the relevant age group may be expected to suffer a substantial income reduction if the retirement age is raised. Sohlberg and Yutav (2017) proposed that, in addition to raising the retirement age, a policy of encouraging older people's employment be instituted. In any event, the longer a decision on raising the retirement age is delayed, the higher the overall economic price of the delay will be (Góra, 2014). Sheshinski (2003) proposed linking retirement age to life expectancy. This would constitute an automatic adjustment mechanism for the financial system, and would have the great advantage of being severed from political considerations (Fall, 2015). Several European countries are now implementing such a mechanism.

percentage points for women and three for men. Thus, those who independently increase their pension contributions to the legal maximum will enjoy larger pensions.

5.1.3 Changes in the return on the savings component exposed to the capital market

One structural feature of Israeli pension savings is their high degree of capital market exposure. 70% of these savings are invested in the capital market and exposed to the price fluctuations of tradable assets. The remainder (30%) are invested in earmarked bonds (until July 2017 – see section 4.1).³²

Hence the great importance of the assumption concerning the rate of return on accrued savings. In all simulations except where otherwise indicated, a real return of 2% was assumed. This is considered a conservative rate of return, but due to the great impact of rates of return and the inherent disadvantages of financial calculators, conservatism is warranted. Financial calculators assume an average annual return, and thus do not take into account the inherent volatility of capital market investments, which can lessen the cumulative return. The model currently used in Israel is the Chilean one. As discussed earlier, it is a model that adjusts the investment portfolio composition to the age of its holder. These changes, which are age-based and do not take the state of the market into consideration, are liable to reduce the cumulative return on pension savings under certain market conditions. Policymaker recommendations for changes in the age-based allocation of earmarked bonds (to be discussed in the next section) may increase savings volatility.

Simulations for different (real) return scenarios are shown in Figure 10. The base scenario assumes a 2% return. For comparison purposes, scenarios assuming returns of 1%, 3% and 4% are shown as well. As can be seen in the figure, the return obtained for the capital market-exposed savings component has a major impact on the pension replacement rate. This impact is not linear and it grows as the rate of return increases, due to compounded interest. The impact is also greater for larger savings and for savings exposed to the capital market for longer periods. Therefore, the impact of rates of return on the replacement rate for men, for all return assumptions and in all deciles, is stronger than for women. Switching from an

Table 3

MANDATORY RATE OF PENSION ALLOCATION FROM SALARY*

Type of allocation	Allocation rate prior to change	First change July 2016	Second change January 2017 (basic scenario)
Allocation by employer	6%	6.25%	6.5%
Allocation by employee	5.5%	5.75%	6%
Severance pay	6%	6%	6%
Total	17.5%	18%	18.5%

* It should be pointed out that these changes are the minimum required by law. In practice, the employee can allocate up to 7% and the employer up to 7.5%, and still benefit from the tax breaks, up to the maximum legal ceiling. On the basis of 2016 tax benefits, employer allocations up to 7.5% of the salary and no greater than four times the average wage in the economy (the lower of the two) are tax-exempt; employee allocations, up to 7% of his/her wages (up to a ceiling of 8700 Shekels), receive a 35% tax refund; for details on all of the tax benefits, see footnote 16.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

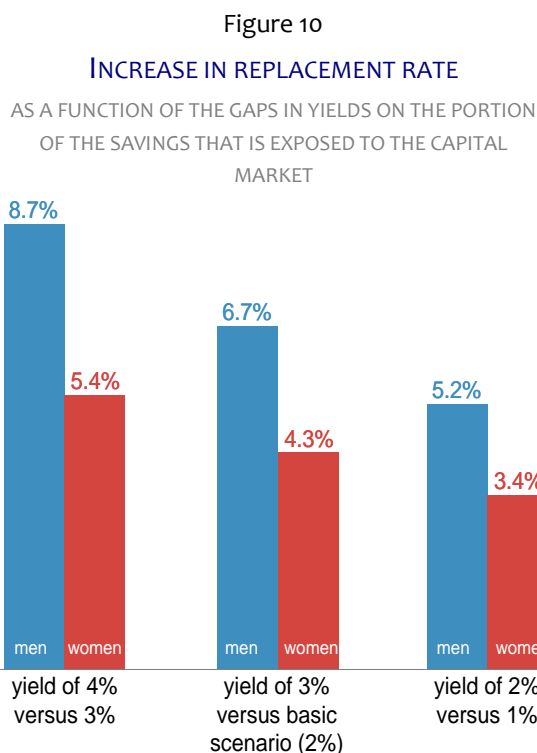
³² The capital market-exposed savings component may be larger if the monthly contribution is higher than the maximum comprehensive new pension fund deposit, which was NIS 3880 as of 2016. Beyond that ceiling, deposits are channeled to a supplemental fund that does not include earmarked bonds. Based on the wage profile developed in this study, and the earmarked bond allocation terms that were in effect until July 2017, only individuals in the highest decile reach the comprehensive new pension fund deposit ceiling.

annual real return of 1% to 2% over the savings period increases women's replacement rate by 3.4 percentage points on average, while men's replacement rate increases by 5.2 percentage points on average. Switching from a 2% to 3% real return over the savings period increases women's replacement rate by 4.3 percentage points on average, and men's replacement rate by 6.7 percentage points on average. Switching from a real return of 3% to 4% raises women's replacement rate by 5.4 percentage points on average, and men's by 8.7 percentage points on average.

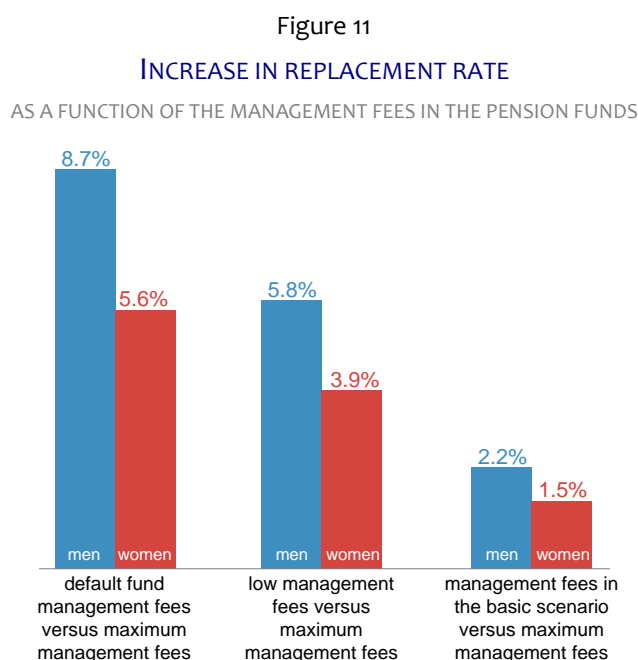
5.1.4 Management fees

Of the factors affecting pension allowances, management fees are the only one whose size is known in advance. Thus, management fees constitute an important element in the bargaining between pension funds and individual savers, labor unions, and large employers. The result is substantial variation in the management fees that savers pay. Figure 11 presents simulations of the replacement rate increase as a function of pension fund management fees relative to the current maximum management fee permitted, the average management fee (baseline scenario), the low management fees specified in agreements between pension funds and large employers, and the default fund management fee.³³

Replacement rate gaps between savers who pay the maximum fee and those who pay low fees reach four percentage points for women and six



Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution



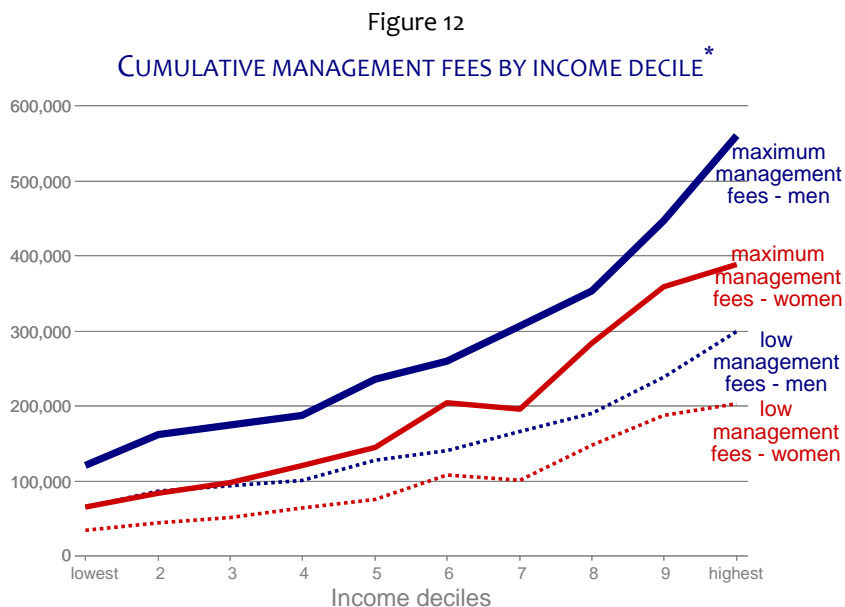
Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

³³ The baseline management fees are 4% on deposits and 0.4% on the accrued savings. The low management fees are 1.75% on deposits and 0.2% on the accrued savings. The maximum management fees are 6% on deposits and 0.5% on the accrued savings. The default fund management fees are that of the Meitav Dash default fund, 1.31% on deposits and 0.001% on the accrued savings.

percentage points for men. This means that the ability to bargain with pension funds may have a substantial effect on pension allowances. Switching from a low management fee to a default pension fund may raise the replacement rate by two percentage points for women, and by three percentage points for men. Of course, the burden of proof is on the default pension funds in terms of producing returns that are competitive with the other funds.

To illustrate how important the management fee is, Figure 12 shows the capitalized value of the management fees paid to the pension fund over the employment career.³⁴ The differences between the management fees paid by those charged at different rates reach tens of thousands of shekels at the lower wage levels, and hundreds of thousands of shekels at the higher wage levels. Women's cumulative management fees are lower than men's at all management fee levels and in all deciles, due to the fact that women's average wages over their years of employment are lower, and because they retire earlier.

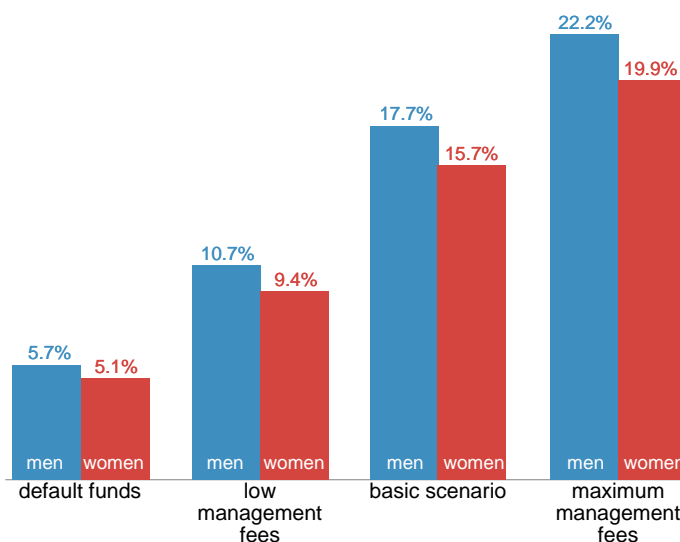
Figure 13 shows the share of cumulative management fees out of accrued pension savings. A 4% management fee from deposits, and 0.4% from savings will amount, on average, to 15.7% of accrued savings of women in all deciles, versus 17.7% on average for men. The share of the maximum management fee – 6% from deposits and 0.5% from accrued savings – out of the amount saved reaches 20.3% on average for women and 22.4% for men. Relatively low management fees of 1.75% from



* Management fees valued at end of saving period, in Shekels.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Figure 13
CUMULATIVE MANAGEMENT FEES*
AS PERCENT OF ACCUMULATED SAVINGS



* Management fees valued at end of saving period.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

³⁴ The management fee cost is calculated for management fees from deposit and accrued savings, with the focus on the cumulative management fee, i.e., the annual cost for the entire savings year capitalized for the retirement age. This calculated cost does not include management fees paid during the retirement years.

deposits and 0.02% from savings accumulate to 9.6% on average out of women's accrued savings and 10.8% for men. A management fee of 1.31% from deposits and 0.001% from accrued savings will amount to 5% of accrued savings for women in all deciles, and 5.7% on average for men. Additionally, low wage earners pay a larger proportion of their pension savings as management fees, though the drop in the share of management fees from savings as wages rise is not steep.

5.1.5 Allocation of earmarked bonds

Earmarked bonds issued for the comprehensive new pension funds constitute protection for the saver from asset price volatility in the capital market.³⁵ Until July 2017, the allocation rate was 30% of total savings, for both savers and pensioners, up to a contribution ceiling of 20.5% of twice the average wage.³⁶

The 2008 capital market crisis brought with it sharp drops in Israeli financial asset prices. Savers approaching retirement were significantly hurt, leading to the appointment of the "Commission for Increasing Certainty in Pension Savings", which submitted its conclusions in December 2015.³⁷ The commission began by assessing the impact of continued issuing of earmarked bond on government debt management flexibility, taking into account asset and fund membership growth rates. The commission found that, in global terms, there is no obstacle to the continued issuing of earmarked bonds at the allocation rates that were in effect until July 2017.

In the second stage of its work, the commission considered whether earmarked bond allocations in the format that was in effect until July 2017, allocation of 30% for savers and retirees alike, are the most effective of all possible allocation rules. To answer this question, the commission examined the pension replacement rates and the certainty and stability of pension allowances under the different allocation rules. The certainty and stability criteria relate to the volatility to which pension savings are exposed – even after the saver reaches retirement age, given that 70% of his/her accrued savings (in theory) are still being invested in the capital market (for a more in-depth discussion, see the sidebar "Earmarked Bonds for Pensioners as an Intergenerational Subsidization Mechanism"). In light of the options examined by the commission, emphasis was placed on increasing the proportion of guaranteed-return earmarked bonds in older people's savings.

The commission looked at four options, whose common feature is the total sum of earmarked bonds that the government will have to allocate:

- A. The situation that existed until July 2017 (hereafter – current situation): earmarked bond allocation at a uniform rate of 30% of contributions to pension savings, up to a contribution ceiling of 20.5% of twice the average wage.
- B. Age option: diversion of earmarked bonds from younger to older savers and pensioners, up to a contribution ceiling of 20.5% of twice the average wage.

³⁵ In the context of current returns in the capital market, it should be recalled that earmarked bonds give a relatively high guaranteed return, so that over and above the protection that it provides from volatility of returns, earmarked bonds also provide a form of subsidy for savers. Since there is no certainty that the capital market returns will continue to be low, this subsidy may be temporary.

³⁶ 3880 shekels in 2016 prices.

³⁷ *Report of the Commission for Increasing Certainty in Pension Savings* (2015).

In this option, the earmarked bonds would be allocated differentially by age. Savers below age 50 would not receive earmarked bond allocations. For savers from age 50 to retirement, the allocation would be 30% while for pensioners it would increase to 60%. According to the commission, the justification for this option is that younger savers are relatively indifferent to savings volatility, meaning that higher returns can be obtained for them via capital market investments. By contrast, once they start receiving their pension allowances, retirees are highly sensitive to yield risk, as drops in asset prices immediately reduce their pension allowances and living standards. The commission goes on to note that, should this option be implemented, the adjustment process would be gradual, so that the proportion of earmarked bonds for those up to age 50 would not drop below 25% until 2027, or below 15% until 2038. In 2044 the allocation of earmarked bonds to those under age 50 would cease entirely.

- C. Wage option: allocation of earmarked bonds at a uniform rate of 40% of pension contributions, up to a lower contribution ceiling of 20.5% of the average wage.

The justification for this option is that high-wage earners are better able to protect themselves from capital market volatility than are low-wage earners, as they are very likely to have additional post-retirement income sources, such as income from property. Therefore, it would be appropriate for low-wage earners to receive a higher allocation of earmarked bonds.

- D. Integrated option: diversion of earmarked bonds from young savers to pensioners, up to a contribution ceiling of 20.5% of the average wage.

This option combines the age option (by varying the earmarked bond allocation by saver age) and the wage option (by lowering the deposit ceiling and allowing a higher allocation at the age levels where earmarked bonds are allocated). In this option, savers below age 50 would not receive an earmarked bond allocation. For those between 50 and retirement age, the allocation would be 40%, while for pensioners it would increase to 60%.

The commission examined the outcomes of the various allocation levels for savers entering the labor market at age 30 and retiring at age 67. These savers were assessed at three levels of starting gross incomes that increase by 1.5% per year – half the average wage (5,000 shekels), the average wage (9,600 shekels) and twice the average wage (19,200 shekels). The team published outcomes for the age and integrated options only at their interim states. That is, a 15% allocation for savers under age 50, a 30% allocation (age option) or a 40% allocation (wage option) for savers age 50 to retirement, and a 60% allocation per that plan's maximum for pensioners. Thus, the figures displayed below also refer to these interim states. For each option, a capital-market return on the remaining balance ("free element") of pension savings was assumed. The return on savings balance is of great importance for the amount of accrued savings, and thus for the pension replacement rates to be obtained. Because the possibility of predicting returns is limited, three alternate return rates were assessed: the 50th percentile (median return), the 25th percentile, and the 10th percentile. The meaning of a 50th percentile return assumption is a 50% probability of the returns being higher than this scenario. The committee did not note the distribution of returns for which simulations were assessed, but from the outcomes we may conclude that the median return on which the simulations are based is higher than the return on earmarked bonds (5.4%).

Based on the rate of return and income assumptions, the commission calculated the replacement rates just prior to retirement as well as pension allowance volatility. Thanks to the detailed discussion published, it is possible to reconstruct the calculations for replacement rates, though not for pension volatility. The recalculated replacement rates and the pension volatility reported by the commission will be presented below.

Table 4 displays the results of simulations carried out on the basis of the assumptions noted in the commission's report.³⁸ On the basis of the pension replacement rate criteria, the wage option turned out to be preferable at all income levels and for the three return assumptions chosen, as it produces the highest replacement rates, though the gap vis-à-vis the other options is sometimes small. Thus, at an average starting wage and assuming median return, a replacement rate of 53.1% was obtained for the wage option, versus replacement rates of 52.7% for the current allocation, 52.2% for the age option and 52.4% for the

Table 4
COMPARISON OF ALTERNATIVE ALLOCATIONS OF EARMARKED BONDS

Alternative	Initial wage	Replacement rate			Standard deviation of payment
		Median yield	Yield 25 th percentile	Yield 10 th percentile	
A. Current Situation	5,000	65.5%	60.3%	57.1%	5.6%
	9,600	52.7%	47.4%	44.2%	5.6%
	19,200	45.7%	40.4%	37.2%	5.6%
B. Age	5,000	65.1%	58.9%	55.1%	3.2%
	9,600	52.2%	46.0%	42.2%	3.2%
	19,200	45.2%	39.0%	35.2%	3.2%
C. Wage	5,000	65.9%	61.4%	58.7%	4.4%
	9,600	53.1%	48.6%	45.8%	4.4%
	19,200	45.7%	40.8%	37.7%	6.8%
D. Combined	5,000	65.2%	59.1%	57.0%	3.2%
	9,600	52.4%	46.2%	44.1%	3.2%
	19,200	45.2%	38.9%	36.7%	5.6%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

³⁸ These simulations assess replacement rate and pension volatility for 3 starting wage levels that increase at a rate of 1.5% per year (see Table A.2.13 – Income Characteristics in Appendix 2). This simulation was carried out for men only, and assumes labor market entry at age 30 and retirement at age 67. The contribution rates are: 5.5% from the employer, 6% from the employee, and 3% severance. Severance contributions reflect an assumption that the saver withdrew the severance pay over the period of employment. The management fee rate is 3.4% of deposits and 0.3% of accrued savings. It is also worth noting that the financial calculator used in this work takes into account accrued savings only for work years, not for the retirement period, in contrast to the simulator used by the commission. Also, monthly pension allowances and replacement rates are in economic income terms (gross allowance), before taxes, and they include the first tier, i.e., the old age allowance from the National Insurance Institute.

integrated option. For lower return assumptions the wage option advantage increased. The wage option's replacement rate for an average starting wage and return in the 10th percentile is 45.8%, compared with 44.2% for today's allocation and the age option and 44.1% for the integrated option.

It should be noted that, at return levels above the median (not shown in Table 4), the wage option will have a lower replacement rate than the other options, as it anchors a larger proportion of accrued savings in earmarked bonds whose yield is lower than the capital market return. Theoretically, the higher the return on the portfolio balance, the more preferable the age option will be, as it allows higher exposure to the capital market with its higher return, relative to the earmarked bonds.³⁹

Regarding pension volatility, the commission's simulations, as expected, show that the age option allocation's standard deviation is the lowest (3.2%) of the options assessed, as this option assumes an earmarked bond allocation rate of 60% of retired savers' investment portfolios. The current situation, whose earmarked bond allocation rate for pensioners is the lowest (30%), exhibits the highest pension standard deviation – 5.6%. In the wage and integrated options, where the allocation ceiling is lower than in the age option and the current situation, the standard deviation for the highest wage level is the largest. At this wage level, the contribution ceiling is effective, meaning that earmarked bond allocation is actually lower. In the wage option, assuming a 40% earmarked bond allocation throughout the savings and retirement years, the standard deviation at the low and average wage levels is 4.4%. At the high wage level, the pension allowance's standard deviation is 6.8%. In the integrated option, where the earmarked bond allocation rate for retirees is 60%, the low and average wage standard deviation is 3.2%, while at the high wage level the pension allowance's standard deviation is 5.6%.

On the basis of these results, the Commission for Increasing Certainty in Pension Savings concluded that the age option is preferable. Although its replacement rate is lower at lower return levels, it substantially reduces the pension allowance risk. For a number of reasons, the authors of this paper disagree with the commission's conclusion and suggest that the wage option is preferable. One reason is that an external return assumption of 5% per year seems unrealistic given the state of the financial markets over the past decade. At lower returns, the wage option's advantage in replacement rate terms is greater. Another reason has to do with relatively higher exposure of pension savings to the capital market. Increasing the allocation of earmarked bonds at a certain age reduces the free portion of the savings, and may hurt savers who happened to reach the age in question after a capital market crash. The age option would deprive these savers of the opportunity of recovering their capital losses. It should be noted that the age option's advantage in moderating pension volatility can be obtained by increasing the solid element while reducing the risky element of retirees' savings portfolios, as in the Chilean model implemented in Israel in 2016.

Another argument in the wage option's favor is the regressive benefit created by the earmarked bond allocation. Allocation is done in relative, rather than absolute, values, that is, in pension savings contribution percentages. Thus, higher-income savers receive larger earmarked bond allotments from the allocation basket. Because the contribution ceiling (twice the average wage) is effective only for the highest decile, the benefit is allocated

³⁹ This is even more true of the age option in its final state, i.e., allocation of earmarked bonds only from age 50.

unequally among the deciles (Table 5). The wage and integrated options, in which a lower ceiling allows higher earmarked bond allocation to most savers, reduce benefit-allocation inequality relative to the present situation and to the age option. This issue gains in importance when one considers the inherent regressiveness of Israel's pension system.⁴⁰ According to the commission's report, the age and integrated options' earmarked bond allocation (60%) to pensioners would be for the new comprehensive pension fund portion of the savings. Thus, these options are regressive by nature, as unskilled workers in the lower deciles retire before reaching official retirement age. A situation in which earmarked bond allocation starts at age 50 would prevent these workers from fully reaping the benefits of the earmarked bonds, should they retire early. Only in options where earmarked bond allocation is fixed (the current situation and the wage option) is there no disadvantage to employees who cease working earlier than the official retirement age.

Furthermore, the authors of this paper believe that Israel's pension system, which is largely privatized, exposed to financial market volatility, and comprises a relatively small universal pillar – characteristics that underscore the government's limited involvement in determining the future pension status of its citizens, relative to other developed countries –

Table 5
ALLOCATION RATES OF EARMARKED BONDS FOR MEN BY INCOME DECILES

Decile	Current situation	Age alternative		Wage alternative	Combined alternative	
		Intermediate state	Terminal state		Intermediate state	Terminal state
1	4.2%	4.2%	4.2%	5.0%	4.9%	5.3%
2	5.6%	5.7%	5.6%	6.8%	6.6%	7.1%
3	6.1%	6.1%	6.1%	7.3%	7.2%	7.7%
4	6.5%	6.5%	6.5%	7.8%	7.7%	8.2%
5	8.2%	8.3%	8.2%	9.9%	9.7%	10.4%
6	9.1%	9.1%	9.1%	10.9%	10.7%	11.4%
7	10.7%	10.8%	10.7%	12.4%	11.9%	12.5%
8	12.5%	12.5%	12.6%	13.1%	12.5%	12.5%
9	16.5%	16.8%	17.1%	13.4%	13.7%	12.5%
10	20.5%	20.0%	19.8%	13.6%	15.2%	12.5%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

⁴⁰ Israeli pension arrangements are regressive, as the pension conversion coefficients do not take the positive correlation between income levels and life expectancy into account (Sheshinski and Gottlieb, 2017). Thus, low and high income people have the same pension conversion coefficient, while low income people have shorter life expectancies and therefore subsidize the pensions of higher income people. The uniform retirement age in Israel, regardless of employment sector and number of work years, is regressive. Unskilled, low wage earners who engage in physical and/or intensive work, have trouble working at older ages, and their effective retirement age is lower. Ayuso, Bravo and Holzmann (2016), and Brønnum-Hansen et al. (2017) discussed the problems pertaining to life expectancy heterogeneity, and proposed solutions. Also, a lack of employment continuity that lowers pension benefits is more common among low income people (Bowers, 2014; Spivak, 2015b).

makes it necessary and important that the pension savings portfolios of relatively young savers also have a solid, assured, progressive and fixed component throughout the saving period.

Sheshinski and Kalir (2017) also support earmarked bond allocations that take income into account. They propose two alternate models. One model is similar to the integrated option in which lower wage earners receive a higher earmarked bond allocation. The other model proposes, in addition, that the return on earmarked bonds be reduced, thereby making it possible to allocate more of them to low wage earners. Using simulations of replacement rates across the entire return distribution, they show that their proposals would likely decrease the probability of low income people reaching retirement age with small pension allowances, and would ensure a more equitable distribution of the benefit embodied in the earmarked bonds.

Sidebar 3

Earmarked bonds for Pensioners as a Solution to Intergenerational Subsidy

In the low interest rate environment of recent years, Israel's pension system – which exposes the majority (70%) of pension savings to the capital market – has been facing a major challenge. This challenge relates to the mechanism by which pension savings are converted into the monthly allowance that the pensioner will receive for the remainder of his/her life. Beyond prevailing life expectancy assumptions, pension allowances are determined by the projected long-term return on accrued savings during the retirement years. To forecast future return on investment, pension funds use the “calculated interest rate,” which the Capital Market, Insurance and Savings Authority in the Ministry of Finance has set at 4%.

This calculated interest rate was fixed at a time when the interest environment was higher and a 4% interest rate reflected a return on risk-free financial assets. However, since the financial crisis of 2008, this interest rate is considered high relative to risk-free interest rates in Western countries, Israel included. Because pensions are calculated on the basis of an interest forecast that is higher than actually obtained by the accrued savings, this has led to a situation where savers who have retired in recent years are getting higher pension benefits than what they actually accumulated. Those who are subsidizing the additional return are younger savers.*

One impetus for creating the Commission for Increasing Certainty in Pension Savings was the desire to resolve the calculated interest rate issue and to try and keep the pension funds from developing actuarial deficits. Implementation of the commission's recommendation of higher earmarked bond allocation to pensioners (the age option) would reduce the free portion of retirees' savings portfolios. The calculated interest rate return assumption would thus be relevant only for this portion, and the intergenerational subsidy would thereby be reduced.** However, the age option has several disadvantages, as noted above, and there is no guarantee that it would entirely eliminate the intergenerational subsidy or improve the status of younger savers.***

(continued on next page)

SIDEBAR 3 (*continued*)

* Pension funds are allowed to modify retiree benefits during the retirement period. However, such changes are not done retroactively. Thus, if high allowances were received during the period between approaching retirement and the update, due to the calculated interest rate assumption, the additional allowance paid to the pensioners would come from the accounts of those saving in the fund, creating an intergenerational subsidy. Oded Sarig, during his term as Supervisor of Capital Markets, Insurance and Savings, tried to issue a directive on reducing the calculated interest rate. It was estimated at the time that this directive would decrease by 10% the pensions of members approaching retirement, and eliminate or soften the intergenerational subsidy. However, this directive did not receive the support of then-Minister of Finance Yair Lapid, and was shelved.

** As of this writing, changes in the pension benefit calculation mechanisms that are supposed to go into effect in January 2018 may mitigate the intergenerational subsidy problem.

*** A larger allotment of earmarked bonds does not entirely counteract the intergenerational subsidy, but rather diminishes the element of pension savings diverted to the capital market. At the same time, the earmarked bond element is reduced for younger savers. In certain return scenarios, this option does not necessarily benefit young people but rather spreads the harm to them over the entire saving period; it may actually increase the damage.

6. Conclusion

This paper presents a broad picture of pension systems generally, and of the Israeli system specifically. The topic is high on the nation's public agenda, and has attracted increased interest from policymakers over the past few decades. Comprehensive reforms have been instituted in response to demographic processes – in particular, rising life expectancies and declining birth rates (Section 2). As a result of these processes, the share of pensioners relative to the labor force is growing. This trend has implications for economic activity, growth rates and, especially, for the pension systems' future stability and for the size of the pension allowances that will be received by retirees. Consequently, policymakers are seeking changes that will ensure the pension system's sustainability, prepare it for intensification of current demographic trends, and enhance its ability to prevent poverty among the elderly.

Section 3 discussed the pension systems in developed countries and their key characteristics. All of the OECD countries have adopted a pension structure comprising at least two pillars. The first pillar is a universal pension allowance funded by the national insurance system. The second pillar is an additional pension allowance based on saver contributions from their income. This pillar may be publicly or privately managed. Despite the common two-pillar structure, there are differences between the individual countries' pension systems and the way in which credits are accumulated in the systems. These differences can be accounted for, in part, by attributes of the national economies and populations, such as demographic structure, citizen attitudes toward savings, social welfare system features, and prevailing economic ideology. However, the differences can also be traced to the complexity of the pension sphere, where single, all-encompassing solutions pose a challenge.

Section 4 addressed the characteristics of Israel's pension system, with its universal pillar of national insurance (the old age allowance, including income support for those eligible), and its second, now-mandatory, second pillar composed mainly of defined contribution plans (DC). One major feature of the Israeli pension system is its extensive reliance on the capital market, which exposes savings to financial market volatility. The danger inherent in this kind of exposure grows as savers approach retirement age: the date of

retirement has a substantial impact on the final accumulation of pension savings. Capital market exposure increases uncertainty about the size of the pension allowance to be received.

Another notable feature of Israel's pension system is the regressiveness of the incentives and benefits of the primary savings product – the pension fund. The difficulty that individuals experience with pension savings, and the clear need for a monthly allowance so that retirees can live in dignity, led Israeli policymakers to design a pension system that offers incentives to save. However, the main beneficiaries of these features are savers whose income is relatively high. For example, tax incentives that increase saver income are not relevant for low wage workers who do not reach the tax threshold. Tax incentives that increase pension allowances also rise along with the saver's marginal tax rate. Another regressive incentive embodied in pension savings is the monetary subsidy that is given directly through the issuing of earmarked bonds with guaranteed return. These bonds are allocated relative to pension savings, up to a ceiling that becomes effective only for the highest decile, meaning that it is only this decile that fully utilizes the incentive.

Because both of these pension savings incentives are regressive, one may conclude that Israeli pension policy fails to achieve its main goal: ensuring basic pension benefits for all workers, especially those whose wages are low and whose pension savings, in consequence, are low as well. Progressive allocation of the earmarked bonds would offer greater protection from capital market risk to those whose pension savings are limited. Additionally, clear and tempting incentives could encourage low-wage workers to verify that they are utilizing their entitlements vis-à-vis their employers. Today, despite the mandatory pension law, there are still salaried employees whose workplaces do not provide them with pension arrangements. In most cases these are low-wage workers.

Section 5 utilizes a pension calculator to examine the size of pension allowances received by different workers as a share of their latest wage (the pension replacement rate). The calculator is based on several assumptions regarding the individual's wage over time, his/her employment characteristics such as retirement age and continuity of employment, savings management characteristics such as return, management fees, and the rate of allocation of earmarked bonds. In contrast to other pension calculators employed by researchers in the field, the calculator used here is based on estimates for the wage profiles of 20 worker types, representing the entire range of wages, over the course of the employment career.

It was found that women's pension replacement rates are lower than those of men in all income deciles. This is because women earn less than men on average in all income deciles, meaning that they contribute less and save less. Moreover, women have longer life expectancies – hence, their pension conversion coefficient is higher, which also reduces their pension allowances relative to men. Women's earlier retirement age in Israel reduces their pension allowances even further. Raising the retirement age will increase women's pension allowances, thanks to the additional work years during which pension contributions accumulate, and due to the additional cumulative return on savings, which peak at the time of retirement, and the deferred use of the savings. Equalizing male and female retirement ages can be expected to substantially improve female replacement rates and, at lower wage levels, raise them beyond those of men.

Other simulations reported here examined a number of policy changes, such as the raising of pension contribution rates and the reduction of management fees. These have a positive effect on replacement rates and pension allowances, but were found to have less

impact on women than on men due to – among other things – the earlier retirement age for women.

Another major policy measure examined in the pension replacement rate simulations is the way in which earmarked bonds are allocated. The simulations were used to examine the recommendations of the Commission for Increasing Certainty in Pension Savings, and the bond allocation change that was ultimately instituted (the age option). The results show that it may have been preferable to adopt the wage option and to allocate the earmarked bonds progressively, by wage levels. The wage option's main advantages are higher pension replacement rates, especially in a scenario of low capital market returns and more equitable distribution of the benefits embodied in earmarked bond allocations. The wage option allows higher earmarked bond allocations to most savers, at the expense of high wage earners for whom the ceiling is lowered. In so doing, it reduces inequality in the distribution of benefits embodied in the earmarked bond allocation. This option is also the only one assessed that does not worsen the status of workers in more physical and/or demanding occupations, for whom it is hard to keep working at later ages.

Appendix 1: Estimating Wage Profiles

The estimation of future wages represents one of the primary challenges involved in estimating the size of pension allowances for individuals who have not yet retired. In the past, researchers would determine a starting wage for a worker and assume an annual increase of a few percentage points. This paper uses a semi-log regression model of monthly wages by worker ages and other variables to estimate the wage profiles of workers across their employment careers. The data came from the *Household Expenditure Survey* for 2013. The population used for the estimates included employees of working age, which was defined as 25 to retirement age (62 for women and 67 for men).⁴¹ The use of cross-sectional data to predict future wages implicitly assumes that, given observed characteristics, the annual wage increase of a given worker is equal to the wage gap between two identical workers whose ages differ by one year.

The regression equation was:

$$\begin{aligned} \log(\text{wage}) = & \beta_0 + \beta_1 \text{age} + \beta_2 \text{age}^2 + \beta_3 \text{workhours} + \beta_4 \text{student} + \beta_5 \text{female} + \beta_6 \text{Arab} \\ & + \beta_7 \text{marriage} + \beta_8 \text{education} + \beta_9 \text{center} + \beta_{10} \text{profession} + \beta_{11} \text{sector} \\ & + \beta_{12} \text{manager} * \text{age} + \beta_{13} \text{manager} * \text{age}^2 + u \end{aligned}$$

where *wage* is the worker's gross monthly wage while *age* affects wage in a non-linear way, meaning that the regression also included the age variable squared. The *marriage* variable is a dummy variable for married workers, where those who are not married (single, divorced or widowed persons) were united in a single baseline group. The *education* variable is a collection of dummy variables for education levels, where the baseline group is those without high school matriculation certificates. Coefficients were estimated for five education levels: matriculation, non-academic higher education, BA's, MA's, and PhD's. The *center* variable is a dummy variable for workers living in the Tel Aviv and Central districts. All other districts were collected into a single baseline group. The *profession* variable includes five dummy variables denoting worker occupations. The baseline group for this variable is unskilled workers. Coefficients were estimated for five additional groups: managers and academic professionals, clerical support workers, service and sales workers, technical workers and skilled industrial workers.⁴²

The *sector* variable refers to the sector in which the worker is employed. It encompasses four dummy variables. The baseline group is the manufacturing sector, and coefficients were estimated for four other sectors: transportation and communication,

⁴¹ Individuals for whom data on family status, type of work, occupation or sector were unknown were omitted.

⁴² Occupation definitions: unskilled workers – cleaners, kitchen workers, launderers, fruit pickers, messengers, ushers, room attendants, packers. Managers and academic professionals are two occupational groups that were combined. Academic professionals were defined as individuals whose occupation requires skills entailing a relevant academic degree, e.g.: biologists, chemists, engineers, jurists, psychologists, accountants, teachers, etc. The managerial group includes senior managers, general managers, and officials in local government. Clerical support workers are tax clerks, motor vehicle license bureau clerks, bookkeepers, bank clerks, storekeepers, postal workers, and secretarial workers. Service and sales occupations include all types of salespeople, wholesalers, shop assistants, accommodation and food service workers, hotel workers, security workers, and financial service sales agents. Technical workers are practical engineers, technicians, agents and workers in related occupations who perform technical and similar tasks connected with research or the application of scientific or artistic concepts. Skilled industrial workers include welders, construction workers, operators of excavation equipment, plumbers, printers, production workers, and drivers.

commerce and retail, business services, and the general services sector.⁴³ Because the regression equation emphasizes the dependence of *wage* on *age*, interaction variables of *age* and *age squared* were included with the *occupation* and *sector* variables. However, most of the interaction variable coefficients were not statistically different from zero and were therefore omitted from the regression. Ultimately, it was found that only the academic occupation variable affects the wage profile by age, meaning that only the *age* and *age squared* interaction variables with this variable were included in the final regression.

The regression results are shown in Table A.1.1. The *age* and *age squared* coefficients indicate that wage rises with age, but at a decelerating rate. Also, monthly wages increase with the number of weekly work-hours. Women earn, on average, 21% less than men, and Arabs earn, on average, 8% less than Jews. Married persons earn 10% more than unmarried persons, and residents of central Israel earn 10% more than those living in what is often referred to as the country's periphery. Wage increases with education, and is higher in the business services sector than in the other sectors. Wages in the transportation and communication sector are also relatively high. Managers and practitioners of academic professions top the wage chart from their late twenties on, and the gap between them and other occupations widens with age and seniority.⁴⁴ Those in technical occupations also earn more than others, followed by persons employed in clerical occupations.

Table A.1.1
REGRESSION RESULTS OF LOG MONTHLY WAGE
USED TO PREDICT INCOMES

Variable	Coefficient	Standard deviation
Constant	6.5316*	(0.12419)
Age	0.0351*	(0.00584)
Age squared	-0.0003*	(0.00007)
Weekly work hours	0.0249*	(0.00054)
Student	-0.0249	(0.02267)
Female	-0.2130*	(0.01374)
Arab	-0.0823*	(0.01970)
Married	0.1025*	(0.01414)
Center of Israel	0.0965*	(0.01248)
Matriculation certificate	0.0646*	(0.01851)
Non-academic certificate	0.1114*	(0.02020)
BA	0.2409*	(0.01953)
MA	0.3576*	(0.02350)
PhD	0.4122*	(0.05268)
Managers and academics	-0.9165*	(0.20222)
Clerks	0.3173*	(0.03428)
Sales and services	0.1265*	(0.03047)
Technician	0.4542*	(0.03212)
Skilled manufacturing	0.1130*	(0.03192)
Transportation and communication	0.0840*	(0.02341)
Retail and wholesale trade	-0.1122*	(0.02285)
Business services	0.1514*	(0.03091)
Other services	-0.1179*	(0.01812)
Managers and academics * Age	0.0692*	(0.00966)
Managers and academics * Age squared	-0.0007*	(0.00011)
R squared	0.51	
Number of observations	8,521	

* Significant at the 1% level.

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

⁴³ The employment sector definitions are as follows: manufacturing includes agriculture, forestry, mining and quarrying, manufacturing and industry, electricity, gas and water supply, sewerage and construction (groups 1-6 in the Central Bureau of Statistics economic classification in this survey). The transportation and communication sectors are the transportation and information storage and communication sectors (groups 8 and 10 in the CBS economic classification). Trade and retail includes wholesale and retail trade and repair of motor vehicles. Business services include financial services, insurance and real estate (CBS groups 11-12). The service sector includes everything that is not included in other groups: hospitality and food, professional services, scientific and technical services, management and support services, local administration, public administration and security, education, health and social services, art and entertainment, other services, housekeeping, work in organizations and nongovernmental bodies (CBS groups 9, 13-21).

⁴⁴ This is because the relevant variable is included in the interaction with age.

Based on the data, typical workers were created who characterized each decile in the monthly wage distribution. This was done once for men and again for women – a total of 20 worker types (Table A.1.2). These types are differentiated by their weekly work-hours, family status, district of residence, occupation and the sectors in which they are employed. The type characteristics were determined by the prevalence of the characteristics among the individuals in each wage distribution decile, by gender.

Table A.1.2

TYPES OF WORKERS BY INCOME DECILE AND GENDER

	Work hours	Family status	Education	Place of residence	Occupation	Branch
Female deciles						
1	23.89	married	no matriculation	periphery	sales & services	other services
2	33.55	married	no matriculation	periphery	sales & services	other services
3	37.65	married	matriculation	periphery	sales & services	other services
4	38.26	married	matriculation	periphery	sales & services	other services
5	38.75	married	BA	periphery	managers-academics	other services
6	39.20	married	BA	periphery	managers-academics	other services
7	39.49	married	BA	periphery	managers-academics	other services
8	39.98	married	BA	center	managers-academics	other services
9	42.76	married	MA	center	managers-academics	other services
10	45.95	married	MA	center	managers-academics	other services
Male deciles						
1	27.02	married	no matriculation	periphery	sales & services	other services
2	38.98	married	no matriculation	periphery	sales & services	other services
3	42.59	married	no matriculation	periphery	skilled manuf. workers	other services
4	45.06	married	no matriculation	periphery	skilled manuf. workers	manufactureing
5	46.50	married	no matriculation	periphery	skilled manuf. workers	manufactureing
6	47.84	married	no matriculation	periphery	skilled manuf. workers	manufactureing
7	48.94	married	no matriculation	periphery	managers-academics	other services
8	48.21	married	BA	periphery	managers-academics	other services
9	48.92	married	BA	periphery	managers-academics	other services
10	50.23	married	MA	center	managers-academics	other services

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

On the basis of the estimated regression coefficients and type characteristics, the expected wage for each work-year was calculated for each worker type – from the age of 25 to retirement age. The wages obtained in this way are nominal, as they were calculated on the basis of cross-sectional data. Real values were obtained by increasing the nominal wage by 0.9% per year, which is the average rate of real wage increase for the two decades that ended in early 2015.⁴⁵ In this way, an expected wage profile over the course of the employment career was created for each worker type.

⁴⁵ Bank of Israel data.

Appendix 2: Detailed Estimation Results

Table A.2.1
BASIC SCENARIO
(FIGURE 9 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,233	3,999	3,850	96.3%
2	4,113	5,088	4,273	84.0%
3	4,860	6,012	4,632	77.1%
4	5,972	7,388	5,167	69.9%
5	7,179	8,918	5,737	64.3%
6	10,189	12,658	7,179	56.7%
7	10,974	13,767	7,188	52.2%
8	14,973	18,604	9,300	50.0%
9	19,178	23,973	11,234	46.9%
10	20,768	25,962	11,964	46.1%
Male deciles				
1	4,440	5,437	5,125	94.3%
2	5,983	7,326	6,108	83.4%
3	6,459	7,909	6,412	81.1%
4	6,909	8,461	6,699	79.2%
5	8,735	10,697	7,862	73.5%
6	9,611	11,769	8,420	71.5%
7	11,349	13,898	9,528	68.6%
8	13,208	16,285	10,670	65.5%
9	17,501	19,750	13,181	66.7%
10	22,226	25,242	16,000	63.4%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.2
ENTRY INTO LABOR FORCE AT AGE 30
(FIGURE 9 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,372	3,999	3,617	90.4%
2	4,291	5,088	3,976	78.2%
3	5,070	6,012	4,281	71.2%
4	6,230	7,388	4,735	64.1%
5	7,521	8,918	5,241	58.8%
6	10,675	12,658	6,475	51.2%
7	11,782	13,767	6,628	48.1%
8	16,076	18,604	8,514	45.8%
9	20,715	23,973	10,308	43.0%
10	22,433	25,962	10,961	42.2%
Male deciles				
1	4,633	5,437	4,747	87.3%
2	6,243	7,326	5,599	76.4%
3	6,740	7,909	5,862	74.1%
4	7,210	8,461	6,110	72.2%
5	9,115	10,697	7,118	66.5%
6	10,029	11,769	7,602	64.6%
7	11,842	13,898	8,561	61.6%
8	13,877	16,285	9,637	59.2%
9	18,729	19,750	12,131	61.4%
10	23,937	25,242	14,806	58.7%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.3
POSTPONING FEMALE RETIREMENT AGE
(FIGURE 9 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Retirement at age 64				
1	3,272	3,999	4,001	100.0%
2	4,163	5,088	4,465	87.8%
3	4,919	6,012	4,859	80.8%
4	6,045	7,388	5,445	73.7%
5	7,268	8,918	6,072	68.1%
6	10,315	12,658	7,654	60.5%
7	11,111	13,767	7,678	55.8%
8	15,159	18,604	9,986	53.7%
9	19,424	23,973	12,113	50.5%
10	21,035	25,962	12,911	49.7%
Retirement at age 65				
1	3,290	3,999	4,079	102.0%
2	4,186	5,088	4,565	89.7%
3	4,947	6,012	4,977	82.8%
4	6,078	7,388	5,590	75.7%
5	7,309	8,918	6,246	70.0%
6	10,374	12,658	7,902	62.4%
7	11,174	13,767	7,932	57.6%
8	15,246	18,604	10,344	55.6%
9	19,537	23,973	12,572	52.4%
10	21,158	25,962	13,405	51.6%
Retirement at age 67				
1	3,324	3,999	4,243	106.1%
2	4,229	5,088	4,774	93.8%
3	4,997	6,012	5,224	86.9%
4	6,141	7,388	5,893	79.8%
5	7,386	8,918	6,611	74.1%
6	10,482	12,658	8,419	66.5%
7	11,291	13,767	8,464	61.5%
8	15,406	18,604	11,091	59.6%
9	19,749	23,973	13,528	56.4%
10	21,387	25,962	14,435	55.6%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.4
PRIOR TO CHANGING PENSION ALLOCATION RATES
(FIGURE 10 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,233	3,999	3,766	94.2%
2	4,113	5,088	4,166	81.9%
3	4,860	6,012	4,506	74.9%
4	5,972	7,388	5,011	67.8%
5	7,179	8,918	5,551	62.2%
6	10,189	12,658	6,915	54.6%
7	10,974	13,767	6,924	50.3%
8	14,973	18,604	8,922	48.0%
9	19,178	23,973	10,751	44.8%
10	20,768	25,962	11,451	44.1%
Male deciles				
1	4,440	5,437	4,973	91.5%
2	5,983	7,326	5,902	80.6%
3	6,459	7,909	6,189	78.3%
4	6,909	8,461	6,461	76.4%
5	8,735	10,697	7,561	70.7%
6	9,611	11,769	8,089	68.7%
7	11,349	13,898	9,137	65.7%
8	13,208	16,285	10,217	62.7%
9	17,501	19,750	12,593	63.8%
10	22,226	25,242	15,292	60.6%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.5

MAXIMUM ALLOWABLE ALLOCATION

(FIGURE 10 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,233	3,999	3,934	98.4%
2	4,113	5,088	4,380	86.1%
3	4,860	6,012	4,758	79.1%
4	5,972	7,388	5,322	72.0%
5	7,179	8,918	5,923	66.4%
6	10,189	12,658	7,443	58.8%
7	10,974	13,767	7,453	54.1%
8	14,973	18,604	9,679	52.0%
9	19,178	23,973	11,712	48.9%
10	20,768	25,962	12,471	48.0%
Male deciles				
1	4,440	5,437	5,278	97.1%
2	5,983	7,326	6,314	86.2%
3	6,459	7,909	6,634	83.9%
4	6,909	8,461	6,937	82.0%
5	8,735	10,697	8,163	76.3%
6	9,611	11,769	8,751	74.4%
7	11,349	13,898	9,918	71.4%
8	13,208	16,285	11,123	68.3%
9	17,501	19,750	13,770	69.7%
10	22,226	25,242	16,699	66.2%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.6

1% YIELD ON PORTION IN CAPITAL MARKETS

(FIGURE 11 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,233	3,999	3,708	92.7%
2	4,113	5,088	4,092	80.4%
3	4,860	6,012	4,418	73.5%
4	5,972	7,388	4,903	66.4%
5	7,179	8,918	5,423	60.8%
6	10,189	12,658	6,733	53.2%
7	10,974	13,767	6,767	49.2%
8	14,973	18,604	8,683	46.7%
9	19,178	23,973	10,451	43.6%
10	20,768	25,962	11,112	42.8%
Male deciles				
1	4,440	5,437	4,844	89.1%
2	5,983	7,326	5,729	78.2%
3	6,459	7,909	6,002	75.9%
4	6,909	8,461	6,261	74.0%
5	8,735	10,697	7,308	68.3%
6	9,611	11,769	7,811	66.4%
7	11,349	13,898	8,808	63.4%
8	13,208	16,285	9,841	60.4%
9	17,501	19,750	12,125	61.4%
10	22,226	25,242	14,656	58.1%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.7
3% YIELD ON PORTION IN CAPITAL MARKETS
(FIGURE 11 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,233	3,999	4,029	100.8%
2	4,113	5,088	4,501	88.5%
3	4,860	6,012	4,901	81.5%
4	5,972	7,388	5,497	74.4%
5	7,179	8,918	6,131	68.7%
6	10,189	12,658	7,739	61.1%
7	10,974	13,767	7,709	56.0%
8	14,973	18,604	10,066	54.1%
9	19,178	23,973	12,205	50.9%
10	20,768	25,962	13,019	50.1%
Male deciles				
1	4,440	5,437	5,490	101.0%
2	5,983	7,326	6,600	90.1%
3	6,459	7,909	6,943	87.8%
4	6,909	8,461	7,267	85.9%
5	8,735	10,697	8,580	80.2%
6	9,611	11,769	9,210	78.3%
7	11,349	13,898	10,461	75.3%
8	13,208	16,285	11,742	72.1%
9	17,501	19,750	14,534	73.6%
10	22,226	25,242	17,717	70.2%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.8
4% YIELD ON PORTION IN CAPITAL MARKETS
(FIGURE 11 IN THE PAPER)

	Average gross wage during work period	Last wage	Pension allowance	Pension replacement rate
Female deciles				
1	3,233	3,999	4,255	106.4%
2	4,113	5,088	4,788	94.1%
3	4,860	6,012	5,241	87.2%
4	5,972	7,388	5,915	80.1%
5	7,179	8,918	6,629	74.3%
6	10,189	12,658	8,445	66.7%
7	10,974	13,767	8,354	60.7%
8	14,973	18,604	11,023	59.2%
9	19,178	23,973	13,414	56.0%
10	20,768	25,962	14,332	55.2%
Male deciles				
1	4,440	5,437	5,967	109.7%
2	5,983	7,326	7,242	98.9%
3	6,459	7,909	7,636	96.5%
4	6,909	8,461	8,008	94.6%
5	8,735	10,697	9,518	89.0%
6	9,611	11,769	10,241	87.0%
7	11,349	13,898	11,678	84.0%
8	13,208	16,285	13,138	80.7%
9	17,501	19,750	16,276	82.4%
10	22,226	25,242	19,921	78.9%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.9

**AVERAGE MANAGEMENT FEES:
4% ON DEPOSITS, 0.4% ON ACCUMULATION**

(FIGURE 12-14 IN THE PAPER)

	Pension allowance	Pension replacement rate	Total management fees	Management fees as % of accumulated savings
Female deciles				
1	3,850	96.3%	53,871	16.05%
2	4,273	84.0%	68,544	16.05%
3	4,632	77.0%	80,996	16.05%
4	5,167	69.9%	99,526	16.05%
5	5,737	64.3%	118,770	15.98%
6	7,179	56.7%	168,566	15.98%
7	7,188	52.2%	159,415	15.09%
8	9,300	50.0%	232,314	15.36%
9	11,234	46.9%	294,605	15.26%
10	11,964	46.1%	318,961	15.27%
Male deciles				
1	5,125	94.3%	99,810	17.82%
2	6,108	83.4%	134,491	17.82%
3	6,412	81.1%	145,195	17.82%
4	6,699	79.2%	155,321	17.82%
5	7,862	73.5%	196,365	17.82%
6	8,420	71.5%	216,050	17.82%
7	9,528	68.6%	255,126	17.82%
8	10,670	65.5%	293,288	17.69%
9	13,181	66.7%	370,390	17.19%
10	16,000	63.4%	464,728	17.13%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.10

**AVERAGE MANAGEMENT FEES:
6% ON DEPOSITS, 0.5% ON ACCUMULATION**

(FIGURE 12-14 IN THE PAPER)

	Pension allowance	Pension replacement rate	Total management fees	Management fees as % of accumulated savings
Female deciles				
1	3,789	94.7%	65,398	20.29%
2	4,195	82.5%	83,211	20.29%
3	4,540	75.5%	98,327	20.29%
4	5,053	68.4%	120,822	20.29%
5	5,601	62.8%	144,247	20.21%
6	6,987	55.2%	204,726	20.21%
7	7,003	50.9%	195,103	19.19%
8	9,031	48.5%	283,230	19.47%
9	10,893	45.4%	359,400	19.36%
10	11,594	44.7%	389,117	19.38%
Male deciles				
1	5,006	92.1%	119,981	22.37%
2	5,947	81.2%	161,671	22.37%
3	6,238	78.9%	174,538	22.37%
4	6,513	77.0%	186,710	22.37%
5	7,627	71.3%	236,049	22.37%
6	8,161	69.3%	259,712	22.37%
7	9,222	66.4%	306,685	22.37%
8	10,318	63.4%	352,799	22.21%
9	12,732	64.5%	446,754	21.62%
10	15,436	61.2%	560,926	21.56%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.11

**LOW MANAGEMENT FEES:
1.75% ON DEPOSITS, 0.2% ON ACCUMULATION**

(FIGURE 12-14 IN THE PAPER)

	Pension allowance	Pension replacement rate	Total management fees	Management fees as % of accumulated savings
Female deciles				
1	3,949	98.8%	34,402	9.64%
2	4,400	86.5%	43,773	9.64%
3	4,782	79.5%	51,724	9.64%
4	5,350	72.4%	63,558	9.64%
5	5,956	66.8%	75,798	9.59%
6	7,491	59.2%	107,578	9.59%
7	7,483	54.4%	100,625	8.98%
8	9,731	52.3%	147,445	9.18%
9	11,782	49.1%	186,806	9.12%
10	12,556	48.4%	202,247	9.13%
Male deciles				
1	5,324	97.9%	64,661	10.78%
2	6,377	87.0%	87,129	10.78%
3	6,701	84.7%	94,063	10.78%
4	7,009	82.8%	100,623	10.78%
5	8,254	77.2%	127,213	10.78%
6	8,851	75.2%	139,965	10.78%
7	10,036	72.2%	165,280	10.78%
8	11,255	69.1%	189,815	10.70%
9	13,922	70.5%	238,766	10.37%
10	16,929	67.1%	299,283	10.33%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.12

**MANAGEMENT FEES ON DEFAULT PENSION FUNDS:
1.31% ON DEPOSITS, 0.001% ON ACCUMULATION**

(FIGURE 12-14 IN THE PAPER)

	Pension allowance	Pension replacement rate	Total management fees	Management fees as % of accumulated savings
Female deciles				
1	4,023	100.6%	19,405	5.20%
2	4,493	88.3%	24,690	5.20%
3	4,893	81.4%	29,175	5.20%
4	5,486	74.3%	35,850	5.20%
5	6,119	68.6%	42,766	5.18%
6	7,721	61.0%	60,696	5.18%
7	7,695	55.9%	57,101	4.90%
8	10,045	54.0%	83,412	4.98%
9	12,178	50.8%	105,724	4.95%
10	12,985	50.0%	114,465	4.96%
Male deciles				
1	5,479	100.8%	36,263	5.76%
2	6,585	89.9%	48,864	5.76%
3	6,926	87.6%	52,753	5.76%
4	7,249	85.7%	56,432	5.76%
5	8,557	80.0%	71,344	5.76%
6	9,185	78.0%	78,496	5.76%
7	10,431	75.1%	92,694	5.76%
8	11,708	71.9%	106,491	5.71%
9	14,488	73.4%	134,149	5.56%
10	17,636	69.9%	168,223	5.54%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

Table A.2.13

**INCOME CHARACTERISTICS FOR THREE
WAGE LEVELS EXAMINED BY
GOVERNMENTAL PENSION COMMISSION**

Initial wage	Average gross wage during work period	Last wage
5,000	6,620	8,546
9,600	12,710	16,408
19,200	25,419	32,815

Source: Sarit Menahem Carmi and Ayal Kimhi,
Shoresh Institution

Table A.2.14

ALLOCATION RATES OF EARMARKED BONDS FOR MEN BY INCOME DECILES UNDER VARIOUS DISTRIBUTION ALTERNATIVES

Deciles	Average gross wage during work period	Annual average pension allocations	Annual average of share invested in earmarked bonds	Share allocated to earmarked bonds	Decile share of allocation out of total
A. Current situation					
1	4,440	7,925	2,378	30.0%	4.2%
2	5,983	10,679	3,204	30.0%	5.6%
3	6,459	11,529	3,459	30.0%	6.1%
4	6,909	12,333	3,700	30.0%	6.5%
5	8,735	15,592	4,678	30.0%	8.2%
6	9,611	17,155	5,147	30.0%	9.1%
7	11,349	20,258	6,077	30.0%	10.7%
8	13,208	23,577	7,073	30.0%	12.5%
9	17,501	31,240	9,372	30.0%	16.5%
10	22,226	39,674	11,618	29.3%	20.5%
B. Age alternative – intermediate state					
1	4,440	8,378	1,855	22.1%	4.2%
2	5,983	11,289	2,499	22.1%	5.7%
3	6,459	12,188	2,698	22.1%	6.1%
4	6,909	13,038	2,886	22.1%	6.5%
5	8,735	16,483	3,649	22.1%	8.3%
6	9,611	18,136	4,015	22.1%	9.1%
7	11,349	21,416	4,741	22.1%	10.8%
8	13,208	24,924	5,530	22.2%	12.5%
9	17,501	33,025	7,398	22.4%	16.8%
10	22,226	41,941	8,821	21.0%	20.0%
C. Age alternative – final state					
1	4,440	9,850	2,955	30.0%	4.2%
2	5,983	13,272	3,982	30.0%	5.6%
3	6,459	14,329	4,299	30.0%	6.1%
4	6,909	15,328	4,598	30.0%	6.5%
5	8,735	19,378	5,814	30.0%	8.2%
6	9,611	21,321	6,396	30.0%	9.1%
7	11,349	25,177	7,553	30.0%	10.7%
8	13,208	29,502	8,851	30.0%	12.6%
9	17,501	40,257	12,077	30.0%	17.1%
10	22,226	51,450	13,968	27.1%	19.8%

Deciles	Decile share of allocation out of total	Share allocated to earmarked bonds	Annual average of share invested in earmarked bonds	Annual average pension allocations	Average gross wage during work period
D. Wage alternative					
1	4,440	8,378	3,351	40.0%	5.0%
2	5,983	11,289	4,516	40.0%	6.8%
3	6,459	12,188	4,875	40.0%	7.3%
4	6,909	13,038	5,215	40.0%	7.8%
5	8,735	16,483	6,593	40.0%	9.9%
6	9,611	18,136	7,254	40.0%	10.9%
7	11,349	21,416	8,259	38.6%	12.4%
8	13,208	24,924	8,747	35.1%	13.1%
9	17,501	33,025	8,928	27.0%	13.4%
10	22,226	41,941	9,062	21.6%	13.6%
E. Combined alternative – intermediate state					
1	4,440	8,378	2,253	26.9%	4.9%
2	5,983	11,289	3,036	26.9%	6.6%
3	6,459	12,188	3,278	26.9%	7.2%
4	6,909	13,038	3,507	26.9%	7.7%
5	8,735	16,483	4,433	26.9%	9.7%
6	9,611	18,136	4,878	26.9%	10.7%
7	11,349	21,416	5,452	25.5%	11.9%
8	13,208	24,924	5,716	22.9%	12.5%
9	17,501	33,025	6,278	19.0%	13.7%
10	22,226	41,941	6,936	16.5%	15.2%
F. Combined alternative – final state					
1	4,440	9,850	3,940	40.0%	5.3%
2	5,983	13,272	5,309	40.0%	7.1%
3	6,459	14,329	5,731	40.0%	7.7%
4	6,909	15,328	6,131	40.0%	8.2%
5	8,735	19,378	7,751	40.0%	10.4%
6	9,611	21,321	8,528	40.0%	11.4%
7	11,349	25,177	9,311	37.0%	12.5%
8	13,208	29,502	9,311	31.6%	12.5%
9	17,501	40,257	9,311	23.1%	12.5%
10	22,226	51,450	9,311	18.1%	12.5%

Source: Sarit Menahem Carmi and Ayal Kimhi, Shoresh Institution

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