

# “Pension reform in Israel”

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## Pension reform in Israel

### Abstract

This paper examines in both conceptual and quantitative terms – the development trends of the two pillars of Israel's pension system, and delineates the future character of the pension system. We will simulate the effects of the changes in Israeli pension system by a pension simulator which is based on the bylaws of the pension funds and the insurance companies in Israel. The results of the simulation of the changes in pension system on the standard of living of the elderly in Israel indicate that there is a significant difference between the anticipated allowances of the different pension plans, such as pension funds and executive insurance. The empirical comparison of the subject's expected utility in a script that does not include the mandatory pension plan which follows the extension order shows a rise in the subject's utility following government intervention. The empirical results are consistent with the results of the theoretical analysis of the optimal avenues for intervention.

**Keywords:** pension reform, hyperbolic preferences, simulation.

**JEL Classification:** D10.

### Introduction

The recent demographic changes is one of the main causes for the growing global interest in the elderly. According to the predictions, the future of the world in the next few decades and especially the future of the industrial countries is that of accelerated aging.

There are two main causes for the aging of the population: an increase in life expectancy and a decrease in birth rates. The most prominent manifestation of the aging phenomenon is the rapid growth of the elderly population, which is considered the weakest population from a financial point of view. As the population ages, there is a decline in its participation in the work force. This process, that of the aging of the population together with the diminished participation in the work force, is the cause of much concern for economists and policy makers all over the world, since behind such phenomena lurks the problem of retirement funding. The burden will fall initially on the national insurance systems, which is the first layer of old age funding. This is so because the national insurance systems operate according to a principal called "pay as you go", that is, the younger generation finances the older one.

In Israel, the aging of the population may cause not only a deficit in the national insurance budget but also an increase in the poverty rates among the elderly. The reason for this is the decline in the participation rates of the elderly in the work force and the low pension coverage. Often the elderly do not have other sources of income apart from the national insurance allowance, such as: employment-based pension, provident funds or other kinds of savings. Therefore, the question that must be asked is whether the national insurance allowance allows their recipients to retain a decent standard of living. The analysis of the income sources of the elderly population shows that labor income and pension income have the largest influence on the standard of living of the elderly. Elderly people whose sole

income is national insurance allowances cannot retain a decent standard of living.

This study examines in both conceptual and quantitative terms – the development trends of the two pillars of Israel's pension system, and delineates the future character of the pension system.

We begin by describing the major stages in the development of the first pension pillar in Israel – the old age, survivors and disability benefits paid by National Insurance – using the principal indicators of the activity of the pension system in this pillar. We then describe the second pension pillar, the occupational pensions. We discuss the main characteristics of pension policy in this pillar carried out in a series of reforms. This policy appears to be consistent with a wider world view supporting privatization and the reduction of government involvement in all aspects of the economy.

The second part of this paper simulates the effects of the pension insurance extension order by a pension simulator which is based on the bylaws of the pension funds and the insurance companies in Israel. We, then, use a utility function with hyperbolic preferences to assess to evaluate the outcome of this reform.

The results of the simulation of the pension insurance extension order<sup>1</sup> on the standard of living of the elderly in Israel indicate that there is a significant difference between the anticipated allowances of the different pension plans, such as pension funds and executive insurance. This can be explained first and foremost by the existing difference in management fees.

The calculation of the replacement rates, which are very likely to occur as a result of the extension order, between the income during retirement and the income on the eve of retirement shows replacement

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<sup>1</sup> The extension order extended the validity of a collective agreement between the employers and the union, the Histadrut, so that every employee must be covered by a pension plan. Thus, it is equivalent to mandatory pension law.

rates that are lower than the desirable ones. The empirical comparison of the subject's expected utility in a script that does not include the mandatory pension plan which follows the extension order shows a rise in the subject's utility following government intervention. The empirical results are consistent with the results of the theoretical analysis of the optimal avenues for intervention.

The sensitivity analysis of the benefit level from the mandatory pension plan shows that if the rates of contributions and the salary ceiling that is mandated by the extension order were consistent with what is customary today, the subjects' benefit from government intervention would be higher. At the same time, the direction of change in the subjects' well-being as a result of this intervention is strongly influenced by the value of subjective capitalization rates. For example, the decline in capitalization rates makes intervention less beneficial and for certain values of the capitalization rates the mandatory pension plan is not beneficial at all from the point of view of the subjects.

Since the simulation used the standard values of the different parameters, the overall conclusion is the extension order should improve the condition of subjects with various socioeconomic characteristics. Of course, the conditions of the extension order are not ideal for the subjects. An increase in contribution rates can improve the condition of the various subjects. Since an increase in the rates of contribution for the pension funds means an increase in state expenses on tax benefits and its support of the pension funds through designated bonds, it is impossible to conclusively determine whether increasing the contribution rates will be beneficial for the whole economy. This question remains to be addressed in future studies.

## 1. Israel and pension reforms in the West

Israel's pension system can be compared with those in other western countries on the basis of three main criteria: the relation between state and private pensions, i.e., the share of state insurance in the pension system; the weight of the basic pillar vis-à-vis the relative pillar in state insurance; and the existence of a private pillar within the public system, i.e., full or partial privatization of the public pension or the introduction of compulsory pension in the framework of the private pension channels. In most western countries universal pension insurance – financed on a pay-go basis – remains the dominant component even after a series of reforms, whereas the private pension channels, which function in the framework of accrued funding, play a smaller role.

In many countries state insurance comprises two pillars: a basic pillar, consisting of a universal pension based on residence and/or a minimum pension and/or a benefit based on a means test; and a relative pillar

providing a pension on the basis of years worked and wages. The compulsory relative pillar is generally managed within a public framework according to plans which are DC (still the most common in the OECD countries) or NDC (Notional Defined Contributions)<sup>1</sup>, but in some countries part or all of it is managed in private DB or DC frameworks<sup>2</sup>.

In state systems in western countries the ratio between the basic pillar and the relative pillar in 'pension wealth' terms<sup>3</sup> is a spectrum ranging between two poles: at one end of the scale, the basic pillar is exclusive or nearly exclusive, as found in countries such as Ireland, New Zealand (in which the basic pillar consists of 100 percent of pension wealth) and the UK (in which the basic pillar consists of 85 percent of pension wealth). At the other end of the scale, the relative pillar of the public system is exclusive or nearly exclusive, representing over 95 percent of pension wealth, as found in most of the European OECD countries as well as the US (OECD, 2007). Israel resembles Ireland in this aspect: its social securities are not the main component of the pension system, and it guarantees only a basic pillar.

Different countries have adopted different approaches to resolving the problems of the pension system. Some have chosen parameter solutions, a path in which one or another parameter of the system is altered without making a radical change in the guiding concept. Others have opted for a paradigmatic approach, meaning, a path involving a radical and conceptual change in the pension system – generally in addition to changes in the parameters of the plan. However, the dichotomy between the two types of reform does not reflect the impact of the parameter or conceptual changes introduced. While

<sup>1</sup> *Notional Defined Contribution Plan (NDC)*: a system in which current receipts from insurance contributions are intended to finance the current commitments of pension payments, but the pension is calculated for each individual on the basis of his/her notional accrual, namely, in accordance with the notional return determined by the system. For a discussion of the NDC system as it is implemented in several pension systems in the world, see Holzmann and Palmer (2006).

<sup>2</sup> *Defined benefits (DB)*: the fund accords members rights to old age, disability, and survivors' insurance. The rights are defined in advance for all accrual periods in accordance with a graded accrual scale as a proportion of the insured person's wage, although this may change for the purposes of actuarial balance. *Defined contributions (DC)*: the fund accords members rights in accordance with the money accrued in his/her personal account for old age, disability, and survivors' insurance. The rights change on an ongoing or periodical basis on the basis of the development of the money accrued, and are not defined in advance. In 1992 managers' insurance schemes switched to a profit-sharing policy, i.e., accrual in them is subject to the yield obtained by the fund in the capital market. Consequently, there is no longer a contractual obligation to give compensation or pension at a given, pre-set level, so that the contributions are defined but not the rights. There are several policies on the market which guarantee a minimum yield and pension, and hence they are defined as DB, although under certain conditions the pension may change all the same. However, these policies are not demanded by consumers because of the low yield they offer.

<sup>3</sup> *Pension wealth*: wealth is the present discounted value of future pension rights from the various pension pillars.

30 OECD countries have made changes in their national pension systems, only 16 of them introduced far-reaching reforms. Table 1 below presents the basic elements of the pension reforms in those

OECD countries which made significant reforms. The categories of the components are defined as being based on whether the reform involves parameters or is conceptual.

Table 1. Basic components of pension reforms in OECD countries that introduced significant reforms

	Parametric reforms					Paradigmatic reforms			
	Pension age		Retirement incentives	Calculation		Pension indexation	Transition to compulsory DC	NDC system	Life expectancy
	Men	Women		Measure	Valorization*				
Austria	√	√	√	√		√			
Finland			√	√	√	√			√
France			√	√	√				√
Germany	√	√	√				***		√
Hungary	√	√	√	√		√	√		
Italy	√		√			√		√	
Japan	√	√		√					
Korea	√	√							
Mexico							√		
New Zealand	√	√							
Poland			√	√		√	√	√	
Portugal	√		√	√	√	√			√
Slovakia	√	√		√			√		
Sweden				√			√	√	
Turkey	√	√							
UK	√	√	√				**		
Israel	√	√	√			√	****		

Source: Martin and Whitehouse (2008, chart 1); the data for Israel have been added by the authors.

Notes: \* Measurement refers to the share of the insured person's wage and years of work taken into account (e.g., the last three years, the best fifteen years, etc.); valorization refers to the system by which the wage is brought forward throughout the period of work until the retirement date (e.g., the method of averages in the veteran pension funds). \*\* Planned in the next reform, which has already been approved by parliament. \*\*\* Saving under the DC system is not compulsory, but 72 percent of insured persons in the national pillar are covered by this form of saving. \*\*\*\* In the framework of the Extension Order to the collective agreement.

Parametric changes such as postponing retirement age and introducing penalties or incentives to prevent early retirement, as well as changes in at least one of the parameters of the formula for calculating the pension (such as the system for the accumulation of rights, the number of years of work taken into account, and the wage used as a basis for the pension), and the method of updating it after retirement have characterized almost all the countries cited in the table above. The changes in the formula for calculating the pension and in the method of updating it generally led to a reduction in the generosity of the public system, although on the whole the solutions implemented in western countries have succeeded in stabilizing their pension systems while maintaining most of the principles of social solidarity (Pearson, 2008). *This fact stands in contradiction to the gloomy predictions about the end of the welfare state.* Similarly, it is important to note that most countries have refrained from raising the insurance contributions of employees and employers as a way of improving the financial situation of the pension system, sometimes preferring to finance the minimum pension or old-age, survivors, or disability benefit by means of general taxation rather than state insurance contributions.

On the basis of the international experience of reforms of public systems it is possible to define three paradigmatic changes: the transition from a DB to a DC system; the introduction of an NDC system in the framework of pay-go financing; and the incorporation of automatic mechanisms for adapting the pension to life expectancy or other risks affecting the economic dependency rate of the system (i.e., the ratio between the number of recipients of pensions and the number of persons paying insurance contributions). Below we review some of the characteristics of paradigmatic reforms.

Reforms of the pension system introduced in several Latin American countries – starting with Chile (in the early 1980s), Mexico, and several central European countries, as well as Hungary and Slovakia – represent the extreme view of the privatization of national pensions according to the pure DC model. The system introduced in Chile, as an example of the DC model, is not a social insurance scheme in the usual sense of the term. It requires that employees save for pensions (without the employer's participation), but it does not play a part in the redistribution of income or in protecting insured persons against various risks, including life expectancy, death, and disability risk. In addition, Chile is

characterized by two unique problems: a low coverage level because of the considerable extent of the informal labor market, and high management fees which erode the level of pensions. In order to overcome these failures a supplementary reform was introduced in 2008 in which an initial ‘solidarity’ pillar of pay-go financing from general taxation was introduced. The role of this pillar was to guarantee a given level of income and provide pension coverage for persons who did not have insurance. Similarly, by offering subsidies and tax benefits the government began to encourage workers and employers to save voluntarily. *This policy really reflects a retreat from the ‘Chilean’ model and a return to the traditional model of a three-pillar pension system.*

In contrast with Chile, the reforms of the national systems in continental Europe were based in one way or another on mechanisms intended to increase life-expectancy, unemployment, and early retirement within a pay-go financing framework. Their aim was both to improve the financial robustness of the pension system and to obtain a greater extent of actuarial fairness (namely, to ensure that the pension received by an insured person was consistent with his/her contributions during employment). Sweden and Italy introduced the NDC system based, as stated, on pay-go financing in combination with notional accrual. Under this system receipts from insurance contributions are intended to finance current payments, but each saver’s pension is calculated on the basis of individual accrual, so that each person receives what they have invested. In Sweden the return on the investment is equivalent to the per capita growth rate of wages, and in Italy the return is equivalent to the nominal rate of GDP growth (on the basis of the moving average of the last five years). Sweden rebuilt a two-pillar system, the first including a pension plan using the NDC system, and the second based on a DC accrual plan. The second pillar constitutes compulsory saving by means of pension funds which manage individual accounts in real and not notional accumulation. Retired persons who have no pension or whose pension does not reach a minimum amount are guaranteed an income supplement which is financed from general taxation. Italy also implemented the NDC system, although its basic conditions are somewhat inferior to Sweden’s: in Sweden the aging process has more or less reached its limit, while in Italy it is still ongoing. Despite the fact that the demographic forecast is for a rapid aging process in Italy, the reform is being implemented very gradually. The transition stage is very prolonged, and the reform will be implemented in full only for persons who began working after 1995.

Germany has not officially adopted the NDC system, but the reforms introduced there in the last

decade have focused on guaranteeing the long-term stability of the pension system without notably increasing the cost of labor. The stabilization of the system involved increasing the government’s participation (financed *inter alia* by increasing VAT and imposing ecological taxation). One of the main components of the reforms was incorporating an automatic mechanism for adapting pensions to the rise in the economic dependency rate. This is a mechanism which imitates the NDC method, which could eventually lead to a reduction in the pension replacement rate. As is the case in Sweden, Germany also introduced a funded pension alongside the system which continued to function on the basis of the pay-go financing system – in order to boost pension saving, thus compensating for the expected decline in the replacement rate of the national pension as a result of the reform<sup>1</sup>. In Germany this pillar is voluntary and private, not compulsory and public as in Sweden, and the incentives for saving in this framework are in the form of the direct subsidy of saving or tax credits. Another important component of the reform expresses the social objective – the introduction of a minimum pension guaranteeing a basic income for all.

The recent reform of the pension system in the UK aspired, on the one hand, to rehabilitate and reinforce the social security pillar which grants a basic pension after this had been eroded in the wake of Margaret Thatcher’s policy in the 1980s – and primarily following the cancellation of the indexation of parameters of the first and second pillars of the national system to the average wage – and on the other to encourage saving in the occupational and private pension system. In addition to the demographic challenge presented by the future, the problems of Britain’s pension system include high poverty rate among the elderly, a fairly high proportion of persons requiring an income supplement, and a low saving rate in the occupational and individual pension arrangements – as regards both the number of savers and the level of savings. The reform in the UK, which began to be implemented in 2007, was not purely on the parametric level. It included parameter changes, such as the postponement of the retirement age, as well as structural changes in the national system – focusing on the first pillar, with a marked increase in generosity (primarily a return to indexation to the average wage), and the cancellation of the second pillar (which was indeed rather modest). The reform of the private system in Britain was approved in November 2008 (DWP, 2008a). It

<sup>1</sup> The effect of pensions saving on total private saving and on total saving is discussed extensively in the economic literature. For a review of the literature and an account of the situation in Israel, see Lavi and Spivak (1999).

included the introduction of a compulsory pension in an occupational or individual pension plan via the place of employment for all workers, at the individual's discretion.

In what way is the reform in Israel similar to these reforms? In the first part of this article we showed that changes in the state insurance pillar in Israel were mainly at the parameter level, while the reform in the second pillar was paradigmatic – a shift to a purely DC system in all occupational pension channels, alongside the introduction of a compulsory pension outside the framework of state insurance. Israel resembles Britain in this respect. Like the UK, from the outset Israel adopted the Beveridge model which, it will be recalled, stresses the role of the state in guaranteeing a basic income for all. Both countries have a relatively young population and in both the elderly population suffers from poverty, in limiting of which the social security pillar plays a significant role. As is the case in Britain, in Israel, too, the occupational pension system was characterized by a low coverage rate and the considerable heterogeneity of savings channels. Consequently, the British experience is very valuable for Israel. The similarity between the two countries is also expressed in the current reforms both have introduced. However, even though both of them have adopted a similar solution with regard to the occupational pillar, namely, the introduction of a compulsory but private pension, Britain renewed the indexation of the first pillar to the average wage (from 2012) while Israel cancelled it in 2003. By doing this Israel failed to learn from Britain's experience, which proved that weakening the basic pillar only serves to increase poverty among the elderly, making it necessary to raise the income supplement.

The reform of the occupational pillar in Israel altered the public-private ratio of the pension system because it replaced the public system of the Hista-drut with the new, private pension funds and cancelled the budgetary pension. Sweden and Germany also added a funded private pillar (DC) to the currently-funded national system, although the change in the public-private ratio was more moderate than that in Israel.

The reform of the veteran pension funds and budgetary pensions in Israel parallels the reforms of the relative national pillar in Germany, Italy, and Sweden. Parameter changes were made in the veteran funds some of which have parallels in these and other countries: these included the reduction of rights, raising the retirement age, and changing the way the wage that constitutes the basis for the pension is calculated. Similarly, in Israel as well as in those countries the national budget is used to overcome the problem of the actuarial deficit. Israel

is unique in the intensity of the changes, their introduction within a relatively short period of time, and their application to the adult population, too. An outstanding example is the rapid rate at which the retirement age was raised: in Israel the retirement age is raised by one year every three years (e.g., for men it rose from 65 to 67 in six years), in Britain it is raised by one year every seven years, and in Germany it is raised by one year every twelve years (four times as slow). In addition, in Israel the change went into effect immediately, while in the countries mentioned it went into effect ten years after the legislation was ratified.

**1.1. Reform principles – the basic pillar.** Examination of the basic pillar's development – retirement, survivorship and disability allowances of social security – points out three main trends:

- ◆ The perpetuation of the universal coverage expansion process.
- ◆ Raising of the retirement age and letting go of the relative view of allowances updates.
- ◆ Increase in the use of social security as a tool in fiscal and government employment policies.

In the first two decades of the operation of the social security pillar there was a clear tendency to reinforce the universal model. This trend was expressed in the weakening of the insurance foundations of the old-age and survivors schemes and the increased flexibility of the conditions for eligibility. Concurrent with this development, in the late 1960s (1968) the State Insurance Institute undertook to pay exceptional benefits primarily to immigrants who had arrived in Israel at an advanced age. The introduction of the General Disability Insurance Law, granting insurance coverage to the entire population, including housewives, reflects the entrenchment of the view that social security should provide only the minimum means of subsistence, leaving the task of preventing a steep drop in the standard of living after retirement, or as the result of death or disability, to the occupational pension system. The entrenchment of the universal model was also expressed in legislation regarding welfare insurance in the mid-1980s, and the extension of old-age insurance to housewives in the mid-1990s. Housewives are entitled to an old-age pension only when they reach the absolute retirement age, and are exempt from the requirement to pay insurance contributions. This exemption is controversial, and proposals for the Economic Arrangements Law submitted alongside the National Budget by the Ministry of Finance in recent years have included a recommendation to annul it. 80 percent of persons in the eligible age-group received this old-age benefit in 2007, and this proportion will continue to rise in the future, as the process of insuring housewives matures.

In the first half of the 1970s the relative view regarding the determination of benefits and the definition of the poverty line crystallized in Israel. According to this view, the level of benefits should be consistent with the general standard of living so that recipients of benefits may also enjoy the fruits of economic growth. Thus, in 1974-1975 the old-age and survivors benefits as well as the minimum subsistence standard of living guaranteed to the elderly, widows and the disabled (in the framework of the General Disability Law under which benefits were first paid at that time) were determined as a percentage of the average wage and linked to changes in it. The basic old-age benefit for a single person was set at a level equivalent to 16 percent of the average wage, while the minimum income and maximum disability benefit were set at a level equivalent to 25 percent of it.

In 2002-2004 the government introduced a new socio-economic policy focusing on far-reaching cuts in public expenditure, and primarily in social security benefits and social services. This policy was intended mainly to contend with the fiscal crisis that had emerged in 2001, but its intensity and the long-term structural changes it embodied in effect reflected the ideology which advocates the gradual reduction of government expenditure as a share of GDP. This policy was established due to the need to cope with the fiscal crisis<sup>1</sup>, and was made possible due to the unique political set-up at that time – a broad center-right government whose policy gained public support. The legislation introduced in the framework of the new policy led first to the temporary erosion of old-age benefits for persons who were not eligible for an income supplement (a 4 percent cut which was repaid in 2005-2006) and stagnation in the level of benefits to persons receiving an income supplement (the elderly, survivors, and the disabled). Subsequently it led to the benefits being linked only to the level of prices rather than to changes in the average wage. In other words, the new policy was intended to maintain the purchasing power of the benefits and not their relative level. In 2005, for the first time since 2001, the old-age and survivors' benefits were updated (disability benefits were updated only in 2006), but recipients of these benefits were not compensated for the failure to update them during the years that they were frozen. From 2002 to 2009 the average wage grew by a cumulative 13.8 percent in accordance with the So-

cial Security Law, but the benefits were raised by only 10.3 percent<sup>2</sup>.

However, in 2005-2008 a process to rehabilitate the level of benefits for the elderly and survivors (but not for the disabled) was set in motion in the framework of the implementation of political coalition agreements. In addition to the repayment of the 4 percent cut in old-age benefits, the basic benefits and the minimum subsistence income were increased, and benefits to persons aged 80 or more were increased relatively steeply. Increasing the benefits went beyond merely updating them in accordance with price rises. Hence, these adjustments served to reduce the erosion in the relative level of old-age and survivors benefits at the first pillar, which had begun in the wake of the cancellation of the linkage to the average wage.

Since the mid-1980s the government has increased the use of social security contributions as a policy tool for attaining economic goals, although this is not usually done in order to collect money from the public – as was the case in the first three decades in which the Social Security Institute operated – but rather to stimulate employment in all industries<sup>3</sup>. The fiscal considerations underlying this policy were not always accompanied by the appropriate concern for the future needs, financial stability, or budgetary independence of the Social Security Institute as a statutory corporation responsible for social insurance in Israel. In 1987 the government decided for the first time to reduce labor costs by cutting the rate of social security contributions paid by employers and self-employed persons, but simultaneously supplemented the budget by the equivalent amount taken from its own budget (Treasury indemnity). This policy continued until 1996, when the social security contributions of employers and self-employed persons were increased, but the employer's contribution to health insurance was cancelled as a source of income for the health system<sup>4</sup>. Insur-

<sup>1</sup> In the wake of the 10 percent rise in the average wage in 2000 social security benefits were updated by a similar rate in 2001. However, in view of the decline in tax receipts in 2001, the increase in public expenditure resulting from the updating of benefits exacerbated the public sector deficit.

<sup>2</sup> An estimate of the long-term effect of the shift of linkage of benefits from the average wage to prices indicates that by 2020 this in itself (other things being equal) will lead to the erosion of the relative level of benefits by 30 percent of the average wage. Old-age benefits, for example, will plummet to 11.2 percent of the average wage, compared with 16 percent of the average wage according to the law that was in effect until 2002. The estimate was based on the assumption that the average wage will rise by 2 percent a year in real terms. If the average wage rises by 1.2 percent a year the erosion will be 20 percent, and old-age benefits will fall to 12.9 percent of the average wage by 2020. However, the government's policy in 2005-2008 moderated the decline in the level of old-age and survivors benefits (but not for disabled persons) by special supplements, and for low-income elderly persons the level was even raised relative to the average wage.

<sup>3</sup> Other countries, such as the Netherlands, Belgium, and France, adopted a similar policy, emphasizing the reduction of social security contributions by employers for employees receiving a low wage (see OECD, 2003, Chap. 3).

<sup>4</sup> *Employer's health insurance contribution*: a designated tax used in the past to finance the activity of the Sick Funds. The tax was imposed on employers by the Social Security Institute and distributed among the Sick Funds in accordance with the numbers of their members.

ance contributions were increased again in 2002, but reduced sharply in 2005-2009 in the framework of the general policy of easing the tax burden ‘in exchange’ for increasing fees in the framework of the plan to extend aid to the veteran pension funds. In contrast with the policy of previous years, in 2005-2009 the Treasury indemnity component to the Social Security Institute did not cover the reduction in social security contributions<sup>1</sup>.

**1.2. Reform principles – the relative pillar.** Examination of the relative pillar’s development – occupational pensions – points out six main properties:

- ◆ Actuarial stabilization of the sector – taking care of the old funds that were in deficit by nationalizing them, worsening of the conditions for the insured including raising the retirement age, and streaming Government aid to the funds.
- ◆ Transition from pension plans where the rights are defined (DB) to plans where the contribution fees are defined (DC), and are automatically actuarially balanced.
- ◆ Transition from investment in specialized government bonds for pension plans (designated bonds) to investment in the free market.
- ◆ Changing the ownership of the savings channels in the long run: the pension funds were transferred from public to private ownership, and the provident funds were transferred from bank-ownership to the ownership of investment houses and insurance companies.
- ◆ Diversion of long-term savings tax benefits exclusively to retirement, emphasizing the pension savings at the expense of the equity component, and unification of tax benefits for all savings channels: pension, senior employees insurance and provident funds (Amendment No. 3 to the Provident Funds Law).
- ◆ Introduction of a pension obligation under the collective bargaining agreement Extension Order on the comprehensive pension market, as a first step towards compulsory pension law.

Unlike the basic pillar, the changes to the relative pillar are paradigmatic. In the new pension reality, the risk falls on the insured instead of the government or the fund itself. This change transpired together with the automatic actuarial balance, but it imposes great liability on the insured. These last two changes – Amendment No. 3 and the pension obligation indicate withdrawal from the concept that the insured is rational and can be held to full responsibility, and returning to a more paternalistic approach, where the state knows better than the citizen how to handle retirement savings.

Here are a few tables which describe the development of the pension market quantitatively until 2007 (2008 data can be misleading due to the intensity of the world economic crisis, and 2009 data was not yet available when this paper was being written).

Table 2. Assets of the pension arrangements, 1997-2007 (billion NIS, 2007 prices)

Year/ Arrangement	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average growth rate of assets 1997-2007
Old pension funds	111.65	110.93	113.75	117.36	122.06	121.88	124.23	129.06	149.24	150.54	159.62	3.64%
New pension funds	2.57	4.08	6.07	8.58	12.13	14.76	19.96	24.43	31.57	38.09	46.75	33.65%
Total pension funds	114.22	115.01	119.82	125.94	134.19	136.64	144.19	153.49	180.81	188.63	206.37	6.09%
Senior employees insurance and life insurance with savings component	63.24	66.04	71.92	78.78	87.61	87.82	100.57	110.2	125.42	136.02	150.05	9.02%
Provident funds and personal severance funds	116.05	108.18	113.48	116.26	118.72	107.76	120.58	132.19	149.29	155.63	164.29	3.54%
Total	293.51	289.23	305.22	320.98	340.52	332.22	365.34	395.88	455.52	480.28	520.71	5.90%

Source: Treasury department, Commissioner of Capital Markets, Insurance and Savings, Annual reports for the years 1997-2007, [www.ozar.mof.gov.il/hon/2001/general/gen\\_reports.asp](http://www.ozar.mof.gov.il/hon/2001/general/gen_reports.asp).

<sup>1</sup> There were two rates of social security contributions: a reduced rate imposed on that part of income that does not exceed 60 percent of the average wage (50 percent until 2006), and a usual rate imposed on the remaining income up to the ceiling set by law. In order to compare rates of social security contributions over time it is customary to calculate the weighted average rate (the weights are the volume of wages on which the reduced and usual rates are imposed). The picture in 2009, in accordance with the collection data given in the Social Security Institute’s statistical quarterlies, is that the average rate of social security contribution (excluding payments to the health system) paid for employees was 8.81 percent: 3.7 percent is paid by the employee, 4.44 percent by the employer, and the government pays 0.67 percentage points instead of the employer. At the beginning of 1987, before the government indemnity was introduced, the social security contribution totaled 15.75 percent – 5.35 percent paid by the employee and 10.4 percent by the employer. Thus, the employer’s share was 6 percentage points lower than it had been in the mid-1980s (and is 11 percentage points lower if the cancellation of the employer’s health insurance contribution, which was 4.95 percent of the insured person’s wage, is taken into account).

Table 2 describes the development of different pension investment channels, the sharp growth in new funds and senior employees insurance, at the expense of old funds and provident funds. It should be noted that the average growth rate of assets (5.9%) is higher than the average GDP growth at the same time period. Thus, the weight of the pension savings

in the GDP increased. This increase has two sources: the premiums paid for accrual and the yield the savings returned. Table 3 shows that the premiums of the relative pillar's weight in the GDP is just short of 5%, and is not rising in the reported years. Hence, the increase is caused by the yield the savings returned, which was greater than the GDP growth at the time.

Table 3. The development of premiums, 1997-2007 (% of GDP)

Year/Type of arrangement	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Veteran funds	1.23	1.06	0.98	0.90	0.94	0.93	1.09	0.95	0.76	0.72	0.71
New funds	0.29	0.37	0.43	0.43	0.54	0.55	0.67	0.79	0.85	0.96	1.10
Total pension funds	1.52	1.43	1.41	1.33	1.48	1.48	1.76	1.74	1.61	1.68	1.81
Life insurance with savings component	1.95	2.03	2.09	2.11	2.33	2.19	1.93	1.86	1.85	1.79	1.84
Provident funds for benefits and individual funds for severance pay	-	-	-	-	-	1.32	1.22	1.26	1.60	1.00	0.96
Total premiums in the second pillar	-	-	-	-	-	5.00	4.92	4.86	5.06	4.47	4.61
State insurance contributions*	2.08	2.12	2.12	2.14	2.26	2.32	2.37	2.28	2.25	2.22	2.21

Source: Ministry of Finance, Commissioner of the Capital Market, Insurance and Savings, annual reports for 1997-2007; [ozar.mof.gov.il/hon/2001/general/gen\\_reports.asp](http://ozar.mof.gov.il/hon/2001/general/gen_reports.asp); *ibid.*, Public Financial Statements, 2006-2007; [ozar.mof.gov.il/hon/2001/general/newComp.asp](http://ozar.mof.gov.il/hon/2001/general/newComp.asp); State Insurance Institute, statistical quarterlies, 1997-2007; [www.btl.gov.il/Publications/quarterly/Pages/default.aspx](http://www.btl.gov.il/Publications/quarterly/Pages/default.aspx).

Note: \* To the Old-age and Survivors Department, and to the Disability Department.

How about the management fees, an issue that rose in relation to the UK and Chile? They are presented in Table 4.

Table 4. Rates of management fees in pension arrangements, 1999-2007\* (% , weighted average)

Year	On assets			On premiums	
	New pension funds	Insurance firms	Provident funds for benefits & individual funds for severance pay	New pension funds	Insurance firms
1999	0.40	1.52	0.67	4.23	-
2000	0.40	1.56	0.67	4.22	-
2001	0.40	1.55	0.66	4.21	-
2002	0.40	1.54	0.65	4.21	-
2003	0.40	1.54	0.65	4.19	-
2004	0.40	1.54	0.66	4.19	5.71
2005	0.40	1.53	0.68	4.20	5.61
2006	0.40	1.50	0.71	4.24	4.97
2007	0.40	1.52	0.74	4.25	4.97

Source: Ministry of Finance, Capital Market, Insurance and Savings Division, annual reports, 1999-2007; [ozar.mof.gov.il/hon/2001/general/mainpage.asp](http://ozar.mof.gov.il/hon/2001/general/mainpage.asp).

Note: \* Excluding management fees on premiums in executive insurance.

Whereas the new pension funds and the insurance firms take management fees on both accrued assets and premiums, the provident funds charge management fees only on assets. The differences in the management fees are notable also within each pension channel as a result of differences in marketing policy, and hence the data refer to the average management fees in each channel. Our analysis shows that average management fees remained fairly constant during the period reviewed, with a slight increase in the provident funds and a decrease in the insurance firms in 2006. Management fees in insurance schemes are higher than those in new pension funds: the management fees on assets are almost four times as

great in insurance schemes as in the new funds (1.5 percent vis-à-vis 0.4 percent); and management fees on premiums were about 35 percent higher in 2005 and 20 percent higher in 2007 (5 percent vis-à-vis 4.25 percent) in the insurance schemes than in the new funds. Management fees on assets only in the insurance firms are almost twice as high as those in the provident funds (1.5 percent vis-à-vis 0.7 percent).

In order to compare the provident funds with the new pension funds, we use the calculation made by Avia Spivak and Rami Yoseph (Spivak and Yoseph, 2008), according to which for the insured, a premium which is 0.5 percent of accrued assets is equivalent to management fees of 12 percent on the

premiums. Translating the management fees charged on premiums in the new funds into the management fees on assets shows that in the new funds these fees are 0.58 percent, while in the provident funds they are 0.7 percent. Thus, the management fees in the new funds are the lowest, although the difference between them and the provident funds is not great. A similar calculation for the insurance firms shows that the overall management fees on accrued assets are 1.8 percent. Since the extent of

management fees has a considerable effect on the size of the expected pension, from this point of view it is preferable to aim for savings in the framework of the new pension funds.

Do the insurance firms, which charge high management fees, also give their members higher returns? Table 5 below presents the differences between the various arrangements and the gross annual average returns in 1999-2007.

Table 5. Gross nominal returns in pension arrangements, 1999-2007\* (% , weighted average)

Year	Return of new pension funds	Return of insurance firms	Return of provident funds for benefits & individual funds for severance pay
1999	7.76	13.06	15.09
2000	4.72	4.4	3.5
2001	8.75	6.94	7.89
2002	8.35	-0.27	-0.68
2003	7.68	21.03	16.8
2004	7.09	9.55	8.99
2005	10.89	12.18	12.94
2006	7.78	8.41	7.47
2007	9.01	9.53	8.58
2008	-11.13	-18.18	-16.46
January-August 2009	19.91	17.89 <sup>1</sup>	22.34
Average up to 2007	8.00	9.43	8.95
Standard deviation up to 2007	1.65	5.94	5.49
Average up to 2008	6.09	6.67	6.41
Standard deviation up to 2008	6.25	10.37	9.56
Average up to August 2009	7.35	7.69	7.86
Standard deviation up to August 2009	7.25	10.40	10.26

The insurance firms and provident funds generally obtained a higher gross return than the new pension funds – 9.4, 9, and 8 percent respectively. A rough estimate of the net return, adjusting for management fees as described earlier, attests to the superiority of the provident funds, as well as to fairly negligible differences between the insurance firms and the new funds. The higher returns of the insurance firms and provident funds should be regarded in connection with their higher level of risk, as expressed in the standard deviation of the returns, which is more than three times as great. However, the risk that was realized in 2008-2009 reduced the gap between the pension funds with a lower risk and the other channels to about 0.5 percent, considerably increasing the standard deviation of all the channels. Nevertheless, the pension funds are less risky than the insurance firms and the provident funds.

Three points are worthy of note: First, in order to obtain a reliable picture it is necessary to analyze trends in the level of returns and risks across many business cycles and over a very long period. Second, the data are in nominal terms; deducting 2 percent inflation (in accordance with the Bank of Israel's target) leads to real returns of over 5 percent, not much more than indexed government bonds and

very close to the return on the earmarked bonds, which is 4.8 percent. Third, the data do not take into account the possible effect on the level of net return of the differential treatment by the tax system of the various savings channels.

## 2. Structure of pension rights, taxation and social security calculation simulators

**2.1. Pension fund simulator.** Using this simulator, the pension allowance is calculated for various income levels and enrollment age. The simulator is based on the set of rules of "Migdal" Insurance Company's "Makefet" fund. Although "Makefet" is not the largest fund it is a representative one, since the large funds' ("Mivtachim" and "Mitavit) sets of rules are very much alike.

The pension allowance is calculated according to the balance the insured has accrued throughout the period of insurance. The balance is accrued via the contribution fees deposited in the fund, which are paid by the employee and employer from the insured salary. The funds that have accumulated are invested in securities in the free market and in desig-

<sup>1</sup> Return up to June 2009.

nated bonds (30% of the portfolio). The fund deducts from the contributions insurance fees that cover the risk of death and disability. Likewise, the fund charges management fees out of from contributions and charges assets management fees. The formula for calculating the accrued balance is as follows:

$$W_{t+1} = (W_t + mS_t - M_t - I_t)(1 + r_t),$$

where  $W_{t+1}$  is the accrued balance until  $t+1$  time period;  $W_t$  is the accrued balance until  $t$  time period;  $S_t$  is insured salary in  $t$  time period;  $m$  is contribution fees rate;  $M_t$  is total management fees in  $t$  time period:  $M_t = p_1W_t + p_2mS_t$ , where  $p_1$  is the management fees rate out of the accrued balance and  $p_2$  is the management fees rate out of the current deposits;  $I_t$  is risk charges for death and disability insurance in  $t$  time period;  $r_t$  is fund yield in  $t$  time period.

The pension allowance the individual receives upon retirement is determined by dividing the accrued balance on retirement day by a coefficient determined by the pension fund. This coefficient depends on gender and retirement age. The pension funds publish an update to these coefficients every once in a while to maintain actuarial balance.

**2.2. Executive insurance simulator.** This simulator is intended to calculate the pension allowance in a senior employees plan. This simulator is based on the insurance policy contract of "Migdal" Insurance Company's "Migdolor" fund, and its data. Policies of other large insurance companies' have similar properties, but differ in allowance coefficients. We chose to focus on this company due to its leading market share.

Senior employees insurance plan is based on an individual agreement between the insurance company and the insured. Similarly to a pension fund, in senior employees insurance funds the employee and the employer both deposit monthly contribution fees deducted from the salary of the insured, and the balance is invested in securities and yields profits. But unlike in a pension fund, the insurance coverage for cases of death, disability or loss of working capacity is purchased separately and not as mutual insurance. The insurance premium for disability or loss of working capacity is paid by the employer, and the premium for death risks is paid for out of the employee's contribution fees, meaning the insured's volume of the accumulated savings is reduced. Since senior employees insurance is based on an individual agreement and not on mutual insurance, the premium for the insurance coverage is higher than those charged by the pension fund. The formula for calculating the accrued balance is as follows:

$$\tilde{W}_{t+1} = (\tilde{W}_t + \tilde{m}S_t - \tilde{M}_t)(1 + \tilde{r}_t),$$

where  $\tilde{W}_{t+1}$  is the accrued balance until  $t + 1$  time period;  $\tilde{W}_t$  is the accrued balance until  $t$  time period;  $S_t$  is insured salary in  $t$  time period;  $\tilde{m}$  is contribution fees rate discounting the rate of life insurance premium;  $\tilde{M}_t$  is total management fees in  $t$  time period:  $M_t = \tilde{p}_1\tilde{W}_t + \tilde{p}_2\tilde{m}S_t$ , where  $\tilde{p}_1$  is the management fees rate out of the accrued balance,  $\tilde{p}_2$  is the management fees rate out of the current deposits and  $\tilde{m}_1$  is the contribution fees rate (not discounting the rate of life insurance premium purchased) in  $t$  time period;  $\tilde{r}_t$  is fund yield in  $t$  time period.

**2.2.1. The pension allowance.** The pension allowance in a senior employees plan the individual receives upon retirement is determined by dividing the accrued balance on the retirement day by a coefficient agreed upon in the individual agreement, which depends on gender and retirement age.

The calculations in both simulators are carried out while altering different parameters, which characterize the insured individual, the funds' procedures and the markets insurance regulations.

**2.2.2. Parameters characterizing the insured individual.** The parameters are the following:

- ◆ **Planholder's gender** – due to survival differences between men and women.
- ◆ **Enrollment age and retirement age** – the pension allowance is paid from the accrued balance in the fund; the difference between retirement age and enrollment age is the record of service of the individual.
- ◆ **Salary track** – in a pension fund it is customary to build a salary track by multiplying the initial salary by the salary growth rate for each insurance year of the service record. *This paper calculates salary tracks for different profiles of population individuals. This was an important part of the empirical effort.*
- ◆ **The rate of the pension insured salary** – there is a difference between an individual's salary and a pension insured salary, which is usually lower, due to salary components (overtime, clothing expenses, travel expenses, phone expenses) which are not covered by the pension insurance. Thus, the need to determine the rate of the pension insured salary arises. This rate varies between individuals; according to Israeli data, the mean rate is 70%<sup>1</sup>.
- ◆ **The rate of survivorship and disability pensions** – according to the sets of rules of the pension funds and insurance companies, individuals are allowed to choose the coverage extent for cases of death or disability. Risk fees for

<sup>1</sup> Terkel and Spivak (2001).

purchasing of insurance premiums are determined according to this choice. Obviously, as the coverage extent increases so do the risk fees reducing the fund's balance and the expected pension allowance.

2.2.3. *Parameters characterizing the funds' procedures and the markets insurance regulations.* The parameters are the following:

- ◆ **Wage contribution rates** – the wage contribution rates differ between the pension funds and the insurance companies. Thus, the contribution rate at the expense of future benefits in pension funds is 11.5% (5.5% by the employee and 6% by the employer) in comparison to 10.5% in a senior employees insurance plan (5.5% by the employee and 5% by the employer). According to the Extension Order, the contribution rate at the expense of future benefits is 10%<sup>1</sup> (5% by the employee and 5% by the employer). Obviously, the contribution rates have direct impact on the accrued balance in the fund: the more they increase the more the expected pension allowance increases.
- ◆ **Management fees** – the management fees rate has major impact on the expected pension allowance. There are two types of management fees: management fees on current deposits and management fees on the accrued balance. The management fees rates vary between the funds and insurance companies. According to the Commissioner of Capital Markets, Insurance and Savings<sup>2</sup> the management fees rates in the insurance companies are higher than those in the new pension funds: nearly 4 times higher on the accrued balance (1.4% in contrast to 0.3% in 2007) and 20% higher on the current deposits (5% in comparison to 4.25% in 2007).
- ◆ **Discount interest rate** – the rates of return the pension fund yields has a major effect on the accrued balance at the time of retirement. The rates not only differ between the pension funds and insurance companies, but also within plans amongst themselves.
- ◆ **Aging coefficients** – aging coefficients also considerably impact the pension allowances. Each pension fund and insurance company uses their own sets of aging coefficients. They are determined by the planholder's age and gender, and can vary according to the funds' actuarial status.

Comparison of simulation results obtained by changing the values of one or more of the parameters enables observation of trends in pension funds

by desired sections (such as changes that occurred after the coming into force of the expansion order).

**2.3. Tax benefits to pension savings**<sup>3</sup>. The pension simulator must take the tax system, which includes the basic pillar, into account. The current tax benefits to pension savings in the younger age groups in Israel are as follows:

1. Employer's deposits into pension funds or unfunded pensions up to 7.5% of the insured's salary are exempt from tax for the employee and are also exempt from social security contributions. This order applies to salaries up to 4 times the average wage.
2. The equivalent deposits made by the employee allow a 35% tax credit. The credit applies to deposits up to 7% of the insured's salary, up to average wage level. A 5% tax credit is applied to the difference in salary between the average wage and twice the average wage. Similar orders exist to benefit workers whose employers do not deposit funds into their pension savings.
3. The yields on the accrued balance are exempt<sup>4</sup>.
4. The pension allowances are taxed as regular income at the time of collection, and enjoy an additional 35% exemption up to about 30% of the average wage. In addition, the retired are accredited an additional tax credit point (197 NIS a month) if their spouse is unemployed and does not collect pension allowances.

**2.4. Social security aging benefits: taxation and allowances.** In addition to pension savings, individuals are entitled to aging allowances from social security. The monthly contribution for these benefits is 0.22% of wages 60% lower than the average wage, and 3.85% on the part of income that is above this brink (until 5 times the average wage). Employers contribution an additional 1.45% on the part of income that is below the brink and 2.04% on the part of income that is above this brink. The benefits the system offers include three components:

1. A fixed amount at 16% of the average wage for an individual and 24% for a couple, linked to the consumer price index.
2. An additional 2% for each pension year after the first 10 years, and up to 50% of the original amount. Two working spouses are entitled to an allowance according to their individual rights, which are greater than their rights as a couple.

<sup>3</sup> According to Adi Brander (2009).

<sup>4</sup> The general tax rates for interest and capital gains for individuals are 15% for linked assets (on real returns) and 20% on non-linked assets (on nominal returns).

<sup>1</sup> The rates increase gradually, reaching 10% in 2012.

<sup>2</sup> Source: Commissioner's website.

3. Conditional income accomplishment plans supply a minimum income of 30% of the average wage for individuals and 45% for a couple. These rights are not affected by pensions up to 13% of the average wage for individuals and 20% for couples<sup>1</sup>.

### 3. Cross section data profiling and application of the simulator to simulate compulsory pension

The problem with creating profiles of income tracks based on cross section data, which do not follow the same individuals over time, is to find representation of population groups which remain constant in surveys from different years (clearly using deciles is inappropriate since individuals migrate between deciles). The methodology was to create types of persons with similar attributes based on gender, age, education (less than 12 school years, 12-14 school years, over 14 school years) and nationality status (veterans, immigrants<sup>2</sup>, non-Jewish). We resulted in 18 profile groups.

After profiling we began building the income track of each type. The data source was the Family Expenditure Survey 2007<sup>3</sup>. For the sake of the simulation, we chose to examine a few enrollment ages: 25, 30, 35, 40, and 45. The reason is that the Extension Order entered into force after many of the uninsured workers reached advance ages. Therefore, we opted to examine the pension of individuals who enrolled relatively late. For this purpose we needed

to calculate their income at the enrollment age. Table 6 describes the wage distribution of different groups upon enrollment to the pension fund.

In order to calculate the expected pension allowance of the average individual, we needed to build them a wage expectancy track. In addition, we needed to find the individual's conditional probability of working<sup>4</sup> between the ages selected. Since the Family Expenditure Survey 2007 does not include employment history data, we used the Labor Force Survey data for 2007.

The individual's conditional probability of working was found using an econometric model designed specifically for this purpose. This model helps understand the influence of each variable on the probability of the individual to retire separately, and isolate the relationships between the variables described above.

There are two states of nature: employed or unemployed. The appropriate statistical model for these cases is the Logit model. The econometric model can be formulated as:

$$work = f(\text{gender}, y\_school, \text{population}, \text{age}, \text{work\_last\_year}),$$

where  $f$  is a Logit distribution function, where the dependent variable is  $work$ , the employment status of the individual, which receives "1" when the individual is employed and "0" otherwise.

Table 6. Wage distribution of different groups upon enrollment to the pension fund<sup>5</sup>

		Enrollment age	25	30	35	40	45
Men	Veterans; less than 12 school years		4,827	5,761	5,858	5,930	7,418
	Veterans; 12-14 school years		6,237	7,516	8,402	9,383	9,068
	Veterans; over 14 school years		8,136	11,249	15,054	16,747	16,089
	Immigrants; less than 12 school years		5,204	6,063	5,188	5,869	4,589
	Immigrants; 12-14 school years		5,642	6,087	6,240	6,618	6,612
	Immigrants; over 14 school years		7,960	10,871	10,754	9,834	8,983
	Non-Jewish; less than 12 school years		4,407	4,677	5,425	4,566	5,195
	Non-Jewish; 12-14 school years		5,385	4,889	5,098	6,893	7,034
	Non-Jewish; over 14 school years		7,177	7,266	7,684	8,772	12,285
Women	Veterans; less than 12 school years		3,306	3,494	3,469	3,854	3,401
	Veterans; 12-14 school years		4,388	4,719	5,088	5,324	5,696
	Veterans; over 14 school years		5,921	7,325	8,717	8,956	8,517
	Immigrants; less than 12 school years		3,281	3,663	3,363	3,530	3,215
	Immigrants; 12-14 school years		4,017	4,120	4,196	3,967	3,648
	Immigrants; over 14 school years		5,522	6,993	6,321	6,447	5,546
	Non-Jewish; less than 12 school years		2,470	2,893	1,999	2,623	2,755
	Non-Jewish; 12-14 school years		2,782	3,300	2,871	3,852	3,974
	Non-Jewish; over 14 school years		4,465	4,966	5,978	5,625	7,146

<sup>1</sup> The last increase in conditional benefits for people over 80 which was implemented starting 2008 was not included in these calculations.

<sup>2</sup> Came to Israel after 1988.

<sup>3</sup> Under the assumption that the real annual salary increase is 2%.

<sup>4</sup> Conditional to the previous year's employment status.

<sup>5</sup> Source: Family Expenditure Survey 2007.

The explanatory variables are: Gender (*gender*); education (*y\_school*); population type (*population*) – a categorical variable for the nationality status: veterans, immigrants, non-Jewish; age (*age*); and the previous year's employment status (*work\_last\_year*). Human capital theory predicts the relationship between these variables and the probability of working. These predictions were confirmed in the estimate.

As Table 7 shows, the conditional probability of working amongst the individuals who were employed in the previous year is high, and increases

with age (according to the results of the regression). The results indicate that individuals who were employed in the previous year have a habit of working. Thus, if we observe the Non-Jewish population, we will see that the conditional probability of working amongst this population is the highest (according to age and education), even though their labor force participation rates are lower compared to other populations<sup>1</sup>. Meaning, the Non-Jewish population participate less in the work force, but those who do participate have a high tendency to keep working.

Table 7. Conditional probability distribution of working between the ages selected

Age		25	30	35	40	45	50	55	60	63	65	66
Men	Veterans; less than 12 school years	0.862	0.882	0.9	0.916	0.929	0.94	0.95	0.958	0.962	0.965	0.966
	Veterans; 12-14 school years	0.903	0.918	0.931	0.942	0.951	0.959	0.966	0.971	0.974	0.976	0.977
	Veterans; over 14 school years	0.93	0.941	0.95	0.958	0.965	0.971	0.976	0.98	0.982	0.983	0.984
	Immigrants; less than 12 school years	0.882	0.9	0.915	0.928	0.94	0.949	0.958	0.964	0.968	0.97	0.971
	Immigrants; 12-14 school years	0.918	0.931	0.942	0.951	0.959	0.966	0.971	0.976	0.978	0.98	0.981
	Immigrants; over 14 school years	0.941	0.95	0.958	0.965	0.971	0.976	0.98	0.983	0.985	0.986	0.986
	Non-Jewish; less than 12 school years	0.892	0.909	0.923	0.935	0.945	0.954	0.962	0.968	0.971	0.973	0.974
	Non-Jewish; 12-14 school years	0.925	0.937	0.947	0.956	0.963	0.969	0.974	0.978	0.98	0.982	0.982
	Non-Jewish; over 14 school years	0.946	0.955	0.962	0.968	0.974	0.978	0.982	0.985	0.986	0.987	0.988
Women	Veterans; less than 12 school years	0.809	0.836	0.86	0.88	0.899	0.914	0.928	0.939	0.945	0.949	0.951
	Veterans; 12-14 school years	0.863	0.884	0.901	0.917	0.93	0.941	0.95	0.958	0.962	0.965	0.966
	Veterans; over 14 school years	0.9	0.916	0.929	0.94	0.95	0.958	0.965	0.97	0.973	0.975	0.976
	Immigrants; less than 12 school years	0.835	0.859	0.88	0.898	0.914	0.927	0.939	0.949	0.954	0.957	0.958
	Immigrants; 12-14 school years	0.883	0.901	0.916	0.929	0.941	0.95	0.958	0.965	0.968	0.971	0.972
	Immigrants; over 14 school years	0.915	0.928	0.94	0.949	0.958	0.964	0.97	0.975	0.978	0.979	0.98
	Non-Jewish; less than 12 school years	0.849	0.871	0.891	0.907	0.922	0.934	0.945	0.953	0.957	0.96	0.96
	Non-Jewish; 12-14 school years	0.894	0.91	0.924	0.936	0.946	0.955	0.962	0.968	0.972	0.973	0.974
	Non-Jewish; over 14 school years	0.923	0.935	0.945	0.954	0.962	0.968	0.973	0.978	0.98	0.981	0.982

It is worth mentioning that we also calculated a prediction of the probability track for individuals that were not employed the previous year. The probabilities were so low (most were very close to zero), that the predicted pension allowances that were calculated in the simulator were also very close to zero. Therefore, in order to examine the effect of the Extension Order, we decided to focus merely on populations that were employed the previous year.

After calculating the predictions for the probability of working, we moved to the next stage of constructing a wage expectancy track for the different individuals. In order to do so, we multiplied each of the representing individuals' wages by their probability to work – from age 25 until retirement age (64 for women and 67 for men). Then, we entered the data into the simulator and calculated the expected pension allowances for each type based on enrollment age.

#### 4. Simulation results

##### 4.1. Extension order simulation assumptions.

There are the following assumptions:

1. **The total savings contribution rate** is 15%, the covered salary limit is the average wage in the Israeli market.

2. **The covered salary portion** of the worker's total salary is 70%<sup>2</sup> on average. It is used to calculate the covered salary in pension insurance, the outcome of multiplying the total salary by the covered portion.
3. **The real salary growth rate** in the market is used to calculate salary increase over time; it was set at 2%<sup>3</sup>. Since the increase in an individual's salary side by side individual aging is explained not only by the individual's seniority<sup>4</sup> but also by the market's wage growth, the real salary growth rate should be taken into account when calculating the individual's expected retirement allowance.
4. **Monthly yield** is used to calculate the accrued balance in the pension fund. The monthly yield rate is 0.396% in pension funds and 0.4% in senior employees insurance plans<sup>5</sup>.

<sup>1</sup> Source: Labor Force Survey data for 2007.

<sup>2</sup> Terkel and Spibek (2001); based on State Revenue Administration data.

<sup>3</sup> Source: Bank of Israel time series data.

<sup>4</sup> We decided an individual's education does not change after the age of 25.

<sup>5</sup> Source: Treasury department's comparison tools' data for pension funds ("Pension – Net") and insurance companies ("Insurance – Net"); average growth rates.

5. **Management fees** on monthly deposits and accrued assets are also used to calculate the accrued balance in the fund. Management fees on monthly deposits are 4.24% in pension funds and 4.97% in senior employees insurance plans; management fees on accrued assets are 0.03% in pension funds and 0.14% in senior employees insurance plans.
6. The individual's **marital status** is used to calculate the risk fees for purchasing life insurance. For the sake of this simulation we decided all the individuals are married.
7. **The guidelines for calculating social security aging benefits** – in 2007 the amount of the basic aging allowance for an individual stood at 1,191 NIS. Additional amounts are added if the individual was insured for over 10 years: 2% for each pension year after the first 10 years, and up to 50% the original amount,

meaning the maximum amount for an individual in 2007 stood at 1,786 NIS. In 2004 the linkage of all social security allowances to the changes in the average wage was canceled; instead they were linked to the consumer price index only. Since the simulation was done in real prices, social security aging allowances are constant throughout the years (of course, we can assume that the allowance will rise partially in relation to the average wage, in adjustments ad-hoc as was observed in recent years. It is not likely that linkage to the average wage will be reinstated).

**4.2. Expected pension allowances and replacement rates in the first simulation.** Tables 8 and 9 below present the expected pension allowances for each group based on enrollment age and the type of plan.

Table 8. Distribution of expected pension allowances between the different groups, according to enrollment age<sup>1</sup>

Enrollment age		25	30	35	40	45
Men	Veterans; less than 12 school years	3,683	3,280	2,425	1,744	1,524
	Veterans; 12-14 school years	4,903	4,402	3,571	2,830	1,907
	Veterans; over 14 school years	6,477	6,666	4,911	3,483	2,427
	Immigrants; less than 12 school years	4,026	3,498	2,174	1,747	953
	Immigrants; 12-14 school years	4,476	3,596	2,673	2,011	1,400
	Immigrants; over 14 school years	6,382	6,485	4,650	3,014	1,918
	Non-Jewish; less than 12 school years	3,395	2,687	2,264	1,354	1,075
	Non-Jewish; 12-14 school years	4,260	2,880	2,179	2,090	1,486
	Non-Jewish; over 14 school years	5,741	4,325	3,316	2,684	2,618
Women	Veterans; less than 12 school years	2,127	1,657	1,180	917	554
	Veterans; 12-14 school years	2,945	2,330	1,797	1,313	960
	Veterans; over 14 school years	4,045	3,677	3,127	2,241	1,456
	Immigrants; less than 12 school years	2,153	1,770	1,164	854	532
	Immigrants; 12-14 school years	2,731	2,059	1,499	989	621
	Immigrants; over 14 school years	3,811	3,544	2,288	1,627	956
	Non-Jewish; less than 12 school years	1,610	1,390	688	631	454
	Non-Jewish; 12-14 school years	1,884	1,575	1,022	957	675
	Non-Jewish; over 14 school years	3,072	2,509	2,157	1,416	1,228

Table 9. Distribution of expected pension allowances between the different groups, according to enrollment age to a senior employees insurance plan

Enrollment age		25	30	35	40	45
Men	Veterans; less than 12 school years	2,500	2,320	1,801	1,358	1,222
	Veterans; 12-14 school years	3,325	3,111	2,651	2,202	1,529
	Veterans; over 14 school years	4,390	4,709	3,645	2,710	1,945
	Immigrants; less than 12 school years	2,732	2,473	1,615	1,360	764
	Immigrants; 12-14 school years	3,034	2,540	1,984	1,565	1,123
	Immigrants; over 14 school years	4,324	4,580	3,451	2,345	1,537
	Non-Jewish; less than 12 school years	2,303	1,900	1,682	1,054	862
	Non-Jewish; 12-14 school years	2,888	2,035	1,617	1,626	1,192
	Non-Jewish; over 14 school years	3,890	3,055	2,461	2,088	2,099

<sup>1</sup> Real values, 2007 prices.

Table 9 (cont.). Distribution of expected pension allowances between the different groups, according to enrollment age to a senior employees insurance plan

	Enrollment age	25	30	35	40	45
Women	Veterans; less than 12 school years	1,283	1,047	785	639	395
	Veterans; 12-14 school years	1,774	1,470	1,195	914	684
	Veterans; over 14 school years	2,436	2,319	2,078	1,560	1,037
	Immigrants; less than 12 school years	1,298	1,118	774	595	379
	Immigrants; 12-14 school years	1,645	1,299	996	688	443
	Immigrants; over 14 school years	2,294	2,235	1,520	1,133	681
	Non-Jewish; less than 12 school years	971	878	458	440	324
	Non-Jewish; 12-14 school years	1,088	986	639	617	434
Non-Jewish; over 14 school years	1,849	1,582	1,434	986	875	

These tables show that there is a significant difference in expected pension allowances between plans, such as pension funds and senior employees insurance. The first and foremost reason for this is the difference in management fees. Thus, monthly management fees on timely deposits are 4.24% in pension funds and 4.97% in senior employees insurance plans<sup>1</sup>. The difference is even greater when comparing management fees on accrued assets, which are 0.03% in pension funds and 0.14% in senior employees insurance plans. As mentioned above, the increase in management fees causes a direct decrease of the accrued balance in the fund, thus lowering the expected allowance as well.

An additional observation from these tables is the decrease in expected pension allowance together with the delay of enrollment to a pension plan. This results, of course, in a much shorter record of service, meaning less years of deposits and returns accumulation.

There is also an obvious relationship between an individual's salary and the expected pension allowance, which grows with the individual's increase in capital. It is important to mention that this is the expectancy of the pension allowance, according to the individual's probability to employment. Thus, the allowance expectancy is lower than the expected pension allowance in case the individual works constantly up to retirement.

Table 10. The replacement rate between the expected pension allowances and the expected gross salary<sup>2</sup>

	Enrollment age	25	30	35	40	45
Men	Veterans; less than 12 school years	35.70%	29.40%	23.60%	18.50%	14.30%
	Veterans; 12-14 school years	36.10%	29.70%	23.80%	18.60%	14.30%
	Veterans; over 14 school years	36.30%	29.80%	18.10%	12.80%	10.20%
	Immigrants; less than 12 school years	35.90%	29.50%	23.70%	18.60%	14.30%
	Immigrants; 12-14 school years	36.20%	29.80%	23.80%	18.70%	14.40%
	Immigrants; over 14 school years	36.40%	29.90%	23.90%	18.70%	14.40%
	Non-Jewish; less than 12 school years	35.80%	29.50%	23.70%	18.60%	14.30%
	Non-Jewish; 12-14 school years	36.20%	29.80%	23.80%	18.70%	14.40%
Non-Jewish; over 14 school years	36.30%	29.80%	23.90%	18.70%	14.40%	
Women	Veterans; less than 12 school years	32.80%	26.70%	21.10%	16.30%	12.30%
	Veterans; 12-14 school years	33.30%	27.00%	21.30%	16.40%	12.40%
	Veterans; over 14 school years	33.50%	27.10%	21.40%	16.50%	12.40%
	Immigrants; less than 12 school years	33.00%	26.80%	21.20%	16.40%	12.40%
	Immigrants; 12-14 school years	33.40%	27.10%	21.40%	16.50%	12.40%
	Immigrants; over 14 school years	33.60%	27.20%	21.50%	16.50%	12.50%
	Non-Jewish; less than 12 school years	32.90%	26.80%	21.20%	16.30%	12.30%
	Non-Jewish; 12-14 school years	33.40%	26.00%	21.40%	16.50%	12.40%
Non-Jewish; over 14 school years	33.50%	27.20%	21.50%	16.50%	12.50%	

Table 11. The replacement rate between the expected senior employees insurance allowances and the expected gross salary<sup>3</sup>

	Enrollment age	25	30	35	40	45
Men	Veterans; less than 12 school years	24.20%	20.80%	17.50%	14.40%	11.50%
	Veterans; 12-14 school years	24.50%	21.00%	17.70%	14.50%	11.50%
	Veterans; over 14 school years	24.60%	21.10%	13.40%	9.90%	8.20%

<sup>1</sup> Source: Annual Reports of the Commissioner of the Capital Market (2004-2007).

<sup>2</sup> According to the conditional probability distribution of working.

<sup>3</sup> According to the conditional probability to employment.

Table 11 (cont.). The replacement rate between the expected senior employees insurance allowances and the expected gross salary

	Enrollment age	25	30	35	40	45
Men	Immigrants; less than 12 school years	24.30%	20.90%	17.60%	14.50%	11.50%
	Immigrants; 12-14 school years	24.50%	21.00%	17.70%	14.50%	11.50%
	Immigrants; over 14 school years	24.60%	21.10%	17.70%	14.60%	11.50%
	Non-Jewish; less than 12 school years	24.30%	20.90%	17.60%	14.40%	11.50%
	Non-Jewish; 12-14 school years	24.50%	21.00%	17.70%	14.50%	11.50%
	Non-Jewish; over 14 school years	24.60%	21.10%	17.70%	14.50%	11.50%
Women	Veterans; less than 12 school years	19.80%	16.90%	14.10%	11.40%	8.80%
	Veterans; 12-14 school years	20.00%	17.00%	14.20%	11.50%	8.80%
	Veterans; over 14 school years	20.20%	17.10%	14.20%	11.50%	8.90%
	Immigrants; less than 12 school years	19.90%	16.90%	14.10%	11.40%	8.80%
	Immigrants; 12-14 school years	20.10%	17.10%	14.20%	11.50%	8.90%
	Immigrants; over 14 school years	20.20%	17.20%	14.30%	11.50%	8.90%
	Non-Jewish; less than 12 school years	19.80%	16.90%	14.10%	11.40%	8.80%
	Non-Jewish; 12-14 school years	19.30%	16.20%	13.40%	10.60%	8.00%
	Non-Jewish; over 14 school years	20.20%	17.20%	14.30%	11.50%	8.90%

Once we analyzed the expected allowances, we examined the replacement rates of the individuals in the different groups. The replacement rate is the ratio between the individual's expected pension allowance and his or her salary on the eve of retirement<sup>1</sup>. As Tables 10 and 11 show, the lowest replacement rates are amongst the individuals with the highest wages (veteran, educated males). This is due to the relatively low limit of wage coverage under the Extension Order. In addition, the later the enrollment, the lower the replacement rates are, explained by the established relationship between the enrollment age and the expected pension allowance. If we compare the replacement rates from the simulation to those known today, we will see that the replacement rates of individuals who enrolled at 25 years of age are similar to those known today concerning the entire population – 35%<sup>2</sup>. It is important to mention that if these individuals worked con-

stantly up to retirement (meaning probability to employment of 1), then the simulation would indicate an replacement rate of 40% in average.

International comparison shows that the expected replacement rates in Israel are lower than those in the US (55%), Switzerland (57%), Canada (49%) and the UK (50%); and are similar to those in Belgium (35%) and Germany (28%)<sup>3</sup>.

If we calculate the replacement rate using the net incomes we will get higher results. The cause is a progressive taxation system. Thus, all the representative individuals must pay income tax throughout the time they are employed, due to a relatively low brink. However, individuals with high pension allowances surpass the tax exempt pension limit. Since the simulation is based on calculations using representative individuals, none of the individuals have surpassed the tax exempt limit.

Table 12. The replacement rate between the expected pension allowances and the expected net salary<sup>4</sup>

	Enrollment age	25	30	35	40	45
Men	Veterans; less than 12 school years	38.40%	32.80%	26.40%	20.80%	16.70%
	Veterans; 12-14 school years	41.10%	34.90%	28.50%	22.90%	17.50%
	Veterans; over 14 school years	43.20%	38.00%	32.40%	26.00%	19.80%
	Immigrants; less than 12 school years	39.30%	33.40%	25.90%	20.80%	15.40%
	Immigrants; 12-14 school years	40.40%	33.70%	27.10%	21.50%	16.50%
	Immigrants; over 14 school years	43.20%	37.80%	30.20%	23.30%	17.60%
	Non-Jewish; less than 12 school years	38.50%	31.70%	26.10%	20.00%	15.60%
	Non-Jewish; 12-14 school years	40.00%	32.20%	26.00%	21.60%	16.70%
	Non-Jewish; over 14 school years	42.40%	34.90%	28.20%	22.70%	18.70%

<sup>1</sup> Ages 66 for men and 63 for women.

<sup>2</sup> Source: Family Expenditure Survey 2007; Since it does not include employment history data, we assumed it to be the ratio between the income of 65-74 year old persons from pension allowances and the income of 55-64 year old persons from work.

<sup>3</sup> Source: Towers Perrin, 'Retirement Income Throughout the World', 1991.

<sup>4</sup> According to the conditional probability to employment.

Table 12 (cont.). The replacement rate between the expected pension allowances and the expected net salary

Enrollment age		25	30	35	40	45
Women	Veterans; less than 12 school years	35.20%	28.70%	22.70%	17.50%	13.30%
	Veterans; 12-14 school years	35.80%	29.00%	23.00%	17.80%	13.50%
	Veterans; over 14 school years	36.90%	31.20%	25.40%	19.70%	14.70%
	Immigrants; less than 12 school years	35.50%	28.90%	22.80%	17.60%	13.30%
	Immigrants; 12-14 school years	35.90%	29.10%	27.60%	17.70%	13.40%
	Immigrants; over 14 school years	36.60%	31.00%	24.00%	18.50%	13.60%
	Non-Jewish; less than 12 school years	35.40%	28.80%	22.80%	17.60%	13.30%
	Non-Jewish; 12-14 school years	35.90%	27.90%	23.00%	17.70%	13.40%
Non-Jewish; over 14 school years	36.10%	29.40%	23.70%	18.00%	14.20%	

Table 13. The replacement rate between the expected senior employees insurance allowances and the expected net salary<sup>1</sup>

Enrollment age		25	30	35	40	45
Men	Veterans; less than 12 school years	26.00%	23.20%	19.60%	16.20%	13.40%
	Veterans; 12-14 school years	27.80%	24.60%	21.20%	17.80%	14.00%
	Veterans; over 14 school years	29.30%	26.80%	24.10%	20.20%	15.90%
	Immigrants; less than 12 school years	26.60%	23.60%	19.20%	16.20%	12.30%
	Immigrants; 12-14 school years	27.40%	23.80%	20.10%	16.70%	13.30%
	Immigrants; over 14 school years	29.30%	26.70%	22.40%	18.10%	14.10%
	Non-Jewish; less than 12 school years	26.10%	22.40%	19.40%	15.50%	12.50%
	Non-Jewish; 12-14 school years	27.10%	22.80%	19.30%	16.80%	13.40%
Non-Jewish; over 14 school years	28.80%	24.70%	20.90%	17.70%	15.00%	
Women	Veterans; less than 12 school years	21.30%	18.10%	15.10%	12.20%	9.50%
	Veterans; 12-14 school years	21.50%	18.30%	15.30%	12.40%	9.60%
	Veterans; over 14 school years	22.20%	19.70%	16.90%	13.70%	10.50%
	Immigrants; less than 12 school years	21.40%	18.20%	15.20%	12.30%	9.50%
	Immigrants; 12-14 school years	21.60%	18.40%	15.30%	12.30%	9.50%
	Immigrants; over 14 school years	22.00%	19.60%	15.90%	12.90%	9.70%
	Non-Jewish; less than 12 school years	21.30%	18.20%	15.10%	12.20%	9.50%
	Non-Jewish; 12-14 school years	20.70%	17.50%	14.40%	11.40%	8.60%
Non-Jewish; over 14 school years	21.70%	18.50%	15.70%	12.50%	10.10%	

Tables 12 and 13 show that the replacement rates from net incomes rose amongst all groups when compared to gross incomes, where the sharpest increase is amongst the groups with highest salary (veterans, educated men). The explanation is again the progressive taxation system. The marginal tax rate of high income individuals is greater than those with low incomes. Thus denominator of the replacement rate (net wages) amongst those with higher wages dropped more (compared to the calculation of the gross income replacement rate) than

amongst those with lower wages, and the numerator remained the same of the entire population (in comparison to the gross income calculation).

We should note that these replacement rates do not include income from other sources after retirement, such as social security allowances and/or working salary. These replacement rates would obviously be higher if those were taken into account. Thus, our next step was to calculate replacement rates which include social security allowances<sup>2</sup>.

Table 14. The replacement rate between the expected pension and social security<sup>3</sup> allowances and the expected net salary<sup>4</sup>

Enrollment age		25	30	35	40	45
Men	Veterans; less than 12 school years	57.00%	50.70%	45.90%	42.10%	36.30%
	Veterans; 12-14 school years	56.00%	49.00%	42.80%	37.30%	33.90%
	Veterans; over 14 school years	55.20%	48.10%	33.60%	26.80%	24.50%

<sup>1</sup> According to the conditional probability to employment.

<sup>2</sup> We did not calculate the prediction of the pension collectors' participation rates in the workforce and their wages because this was not the objective of this paper.

<sup>3</sup> Social security allowance, according to the conditional probability to work, includes the maximum record of service addition of 1786 NIS according to social security regulations, in 2007 prices.

<sup>4</sup> According to the conditional probability to work.

Table 14 (cont.). The replacement rate between the expected pension and social security allowances and the expected net salary

Enrollment age		25	30	35	40	45
Men	Immigrants; less than 12 school years	56.70%	50.40%	47.20%	42.20%	44.20%
	Immigrants; 12-14 school years	56.60%	50.50%	45.30%	40.60%	37.60%
	Immigrants; over 14 school years	55.30%	48.30%	41.80%	37.00%	33.90%
	Non-Jewish; less than 12 school years	58.80%	52.80%	46.70%	46.30%	41.60%
	Non-Jewish; 12-14 school years	56.80%	52.20%	47.40%	40.10%	36.80%
	Non-Jewish; over 14 school years	55.60%	49.40%	43.40%	37.80%	31.40%
Women	Veterans; less than 12 school years	64.90%	59.60%	57.10%	51.70%	56.10%
	Veterans; 12-14 school years	57.50%	51.30%	46.00%	42.10%	38.70%
	Veterans; over 14 school years	53.10%	46.30%	40.00%	35.40%	32.70%
	Immigrants; less than 12 school years	64.90%	58.00%	57.80%	54.50%	58.00%
	Immigrants; 12-14 school years	59.40%	54.40%	50.40%	49.80%	51.80%
	Immigrants; over 14 school years	53.70%	46.70%	42.70%	38.90%	39.00%
	Non-Jewish; less than 12 school years	74.60%	65.80%	81.90%	67.30%	65.60%
	Non-Jewish; 12-14 school years	69.90%	59.60%	63.20%	50.80%	48.80%
	Non-Jewish; over 14 school years	57.10%	50.30%	43.30%	40.80%	35.00%

Table 15. The replacement rate between the expected senior employees insurance and social security<sup>1</sup> allowances and the expected net salary<sup>2</sup>

Enrollment Age		25	30	35	40	45
Men	Veterans; less than 12 school years	44.70%	41.10%	39.10%	37.50%	33.00%
	Veterans; 12-14 school years	42.80%	38.80%	35.40%	32.30%	30.40%
	Veterans; over 14 school years	41.20%	37.00%	33.00%	29.30%	26.30%
	Immigrants; less than 12 school years	44.10%	40.60%	40.50%	37.50%	41.20%
	Immigrants; 12-14 school years	43.60%	40.60%	38.30%	35.80%	34.30%
	Immigrants; over 14 school years	41.40%	37.20%	34.00%	31.90%	30.40%
	Non-Jewish; less than 12 school years	46.40%	43.50%	40.00%	41.90%	38.50%
	Non-Jewish; 12-14 school years	43.90%	42.70%	40.70%	35.30%	33.50%
	Non-Jewish; over 14 school years	42.00%	39.10%	36.10%	32.80%	27.70%
Women	Veterans; less than 12 school years	50.90%	49.10%	49.50%	46.40%	52.20%
	Veterans; 12-14 school years	43.20%	40.60%	38.20%	36.70%	34.80%
	Veterans; over 14 school years	38.50%	34.80%	31.40%	29.40%	28.50%
	Immigrants; less than 12 school years	50.90%	47.30%	50.20%	49.10%	54.20%
	Immigrants; 12-14 school years	45.10%	43.70%	42.70%	44.40%	48.00%
	Immigrants; over 14 school years	39.20%	35.20%	34.70%	33.30%	35.10%
	Non-Jewish; less than 12 school years	60.60%	55.20%	74.20%	62.00%	61.70%
	Non-Jewish; 12-14 school years	54.70%	49.10%	54.60%	44.50%	44.00%
	Non-Jewish; over 14 school years	42.70%	39.40%	35.40%	35.30%	30.90%

By comparing Tables 12, 13, 14, 15 we can determine the social security benefits' contribution to the replacement rates of the different individuals. First of all, the increase in replacement rates of individuals with relatively low income is greater than the increase in replacement rates of the wealthier groups: the increase amongst women is higher than it is amongst men, the increase amongst individuals with low capital is higher than amongst individual with high capital. This is caused by the progressive structure of the social security system: each individual pays social security tax according to their salary, but the social security

aging allowance is determined only by the individual's record of service (amount of years) with the system. Thus, the same addition<sup>3</sup> causes a higher increase for low-income individuals.

These tables also show that despite a significant increase in replacement rates, even after inclusion of social security allowances in our calculations, the pension income of disadvantaged persons (such as uneducated, Non-Jewish person) and those who enrolled late (starting at the age of 40) is lower than 3,000 NIS in 2007 prices. Meaning, even though the improvement in replacement rates and in retirement income in comparison to the situation without the

<sup>1</sup> Social security allowance, according to the conditional probability to work, includes the maximum record of service addition of 1786 NIS according to social security regulations, in 2007 prices.

<sup>2</sup> According to the conditional probability to work.

<sup>3</sup> Since the conditional probability to work is high amongst all individuals, the record of service credits all of them with the maximum social security aging allowance.

pension coverage requirement, the extension order's guidelines still do not enable part of the population to maintain a more significant portion of their income after retirement. A greater improvement can be achieved by raising the contribution rates, for instance to 17.5%, as we will demonstrate in a sensitivity analysis in the following section.

**4.3. Raising contribution rates and covered salary limit.** What were to happen if the extension order were to implement the existing policy regarding pension coverage, namely if the contribution rates were raised to 17.5% (instead of 15%) and the covered salary limit were raised to twice the average wage (instead of just the average wage)?

Table 16. The replacement rate between the expected pension and social security<sup>1</sup> allowances and the expected net salary<sup>2</sup> (using 17.5% contribution rate and the salary coverage limit of twice the average wage)

Enrollment age		25	30	35	40	45
Men	Veterans; less than 12 school years	64.10%	56.80%	50.90%	46.00%	39.40%
	Veterans; 12-14 school years	63.60%	55.50%	48.10%	41.70%	37.20%
	Veterans; over 14 school years	63.10%	55.10%	47.50%	40.00%	34.00%
	Immigrants; less than 12 school years	63.90%	56.60%	52.10%	46.10%	47.20%
	Immigrants; 12-14 school years	64.00%	56.70%	50.40%	44.70%	40.80%
	Immigrants; over 14 school years	63.20%	55.30%	47.50%	41.50%	37.20%
	Non-Jewish; less than 12 school years	65.90%	58.70%	51.60%	50.10%	44.60%
	Non-Jewish; 12-14 school years	64.20%	58.20%	52.30%	44.20%	40.00%
	Non-Jewish; over 14 school years	63.40%	55.80%	48.70%	42.10%	34.90%
Women	Veterans; less than 12 school years	71.20%	64.80%	61.30%	55.00%	58.50%
	Veterans; 12-14 school years	63.90%	56.60%	50.20%	45.40%	41.20%
	Veterans; over 14 school years	59.80%	51.90%	44.70%	39.10%	35.50%
	Immigrants; less than 12 school years	71.30%	63.20%	62.10%	57.70%	60.40%
	Immigrants; 12-14 school years	65.90%	59.70%	54.70%	53.10%	54.30%
	Immigrants; over 14 school years	60.30%	52.30%	47.20%	42.40%	41.50%
	Non-Jewish; less than 12 school years	81.00%	71.00%	86.10%	70.60%	68.00%
	Non-Jewish; 12-14 school years	76.30%	64.70%	67.40%	54.10%	51.20%
	Non-Jewish; over 14 school years	63.50%	55.60%	47.70%	44.10%	37.60%

In order to examine this, we decided to conduct a simulation using higher contribution rates and higher covered salary limits, while keeping all other parameters constant.

By comparing Tables 14 and 15 we can determine that if the contribution rates and the covered salary limits were higher, the replacement rates of all individuals were to increase, thus an increase in the expected allowances. This is caused by a larger accrued balance achieved by greater contributions rates, which are higher than the net salary decrease (due to the enlarged contributions). Therefore, if the workers had the power to decide upon their contribution rates they would have chosen the higher rates.

## Conclusion

The objective of this paper was to determine the long term effects of the extension order. The results of the proposed research are innovation in the Israeli pension sector and may initiate a conceptual and

quantitative foundation, which will enable public and professional discussion of the long-term pension policy in Israel.

For this purpose we constructed a simulator, which calculated the expected future pension benefits and allowances of the individuals according to socio-economic profiling and according to their enrollment ages and pension plans.

The simulation results indicated a significant difference in expected pension allowances between plans, such as pension funds and senior employees insurance. The main reason for this is the difference in management fees.

The calculation of the expected replacement rate between the expected pension allowances and the expected gross salary on the eve of retirement due to the extension order has shown the existing replacement rates, which were lower than the desired ratios which promise an adequate living standard for the elderly.

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<sup>1</sup> Social security allowance, according to the conditional probability to work, includes the maximum record of service addition of 1786 NIS according to social security regulations, in 2007 prices.

<sup>2</sup> According to the conditional probability to work.

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