The Impact of Pension Schemes on Saving in Israel: Empirical Analysis

Yaakov Lavi* and Avia Spivak**

Discussion Paper No. 96.09

October 1996

* Research Department, Bank of Israel

** Ben Gurion University and Bank of Israel

Research Department, Bank of Israel, POB 780, Jerusalem 91007.

1. Introduction

Households' and private firms' savings constitute the main source of supply of capital in Israel. Saving for retirement is a significant part of households' saving: saving for retirement through pension and provident funds alone constitute 35 per cent of households' total savings. Saving for retirement has undergone major changes in recent years. Pension funds owned by the Labour Union Movement and others declared deficits, and this crisis created pressure to reform not only the funds themselves but also the framework for pension saving generally. The Government, in concert with the Labour Union Movement has already decided the outline of a new pension scheme, but pressure from various sources will probably lead to changes to it. The public debate that followed the crisis raises several important issues that are the focus of current research projects by the authors. In this study we concentrate on two issues: what is the economic situation of the elderly, and what is the contribution of pensions under the current system to post-retirement income.

This paper examines the way that income and consumption vary with age, and focuses on the elderly. The impact of occupational pension schemes on the income of the elderly is investigated by estimating the degree to which voluntary private non-pension saving offsets pension saving; we call this the 'offset coefficient'. A coefficient of 1 means that an increase in occupational pension saving is totally offset by a decrease in other forms of private saving, leaving total saving, and therefore income at old age unaffected. A low coefficient means that extra pension saving is not offset, so that total saving and thus income during old age rises. We largely ignore the National Insurance universal pension scheme, and concentrate on employers' pensions.

The effect of pension saving schemes on overall savings has been extensively discussed since Feldstein's seminal 1974 paper. A central issue, both theoretical and empirical, is the degree

to which other private saving falls to offset the rise in pension saving caused by government intervention, as measured by the offset coefficient. In theory, when strong time-preference, income uncertainty and liquidity constraints are included, the offset coefficient should be small (Samwick, 1994). But empirical studies such as Venti-Wise (1990) and Gale-Scholtz (1994) yield a wide range of quantitative effects of a rise in pension saving on total saving.

We derived cohort data on consumption, income and saving in Israel by combining data from five annual Consumer Expenditure Surveys taken between the years 1968 and 1982. The surveys contain detailed socio-economic data useful for the estimation of income and consumption/saving equations. Detailed questions on the sources of income allowed us to build a picture of the financial situation of the elderly, and the contribution of occupational pensions and National Insurance pensions to their income.

Our findings show that neither income nor consumption decline with age. The upper income quintile of the elderly saves substantially; this refutes the simple life-cycle theory of saving. About half of income at retirement age comes from the universal National Insurance and the private pension funds. Those with occupational pensions have higher income than the rest of the population. This suggests that there is little offset between pension saving and other savings. As is found in many other developed countries, the young and poor barely save. Younger cohorts enjoy higher lifetime income and consumption, reflecting economic growth in Israel and more specifically in labour productivity. Thus in cross-section comparisons the elderly appear to be relatively poor.

The major goal of this paper is to clarify the contribution of pension funds to the well-being of the elderly, and more generally to national saving. We use both a macro and micro approach. In the former, the institutional effect of pension funds is included as one of the

variables that explain the saving rate using time series data. The lower bound of the effect is one-half, so the offset coefficient is 0.5 or less. In the micro approach we use over 1100 observations from the 1979 consumer expenditure survey to determine the negative effect of pension fund saving on other private voluntary saving. Again, the offset coefficient is 0.5 or less.

These results about Israeli consumers, which are compatible with results from other developed countries, deviate from the predictions of the simple life cycle model. As with other countries, the theory can be retained if the results are explained by liquidity constraints and large coefficients on time preference. A further explanation to reconcile the data with the theory is that rationality is bounded by insufficient information and awareness about pension rights and inability to make complicated actuarial calculations about the future.

The rest of this paper is organized as follows. In section 2 the basic data are presented. In section 3 we discuss the theoretical framework. And section 4 contains the main empirical findings.

2. The Data

Below we present a number of characteristics of the general population and of the 65 and over age group that are relevant to the determination of saving for retirement and overall saving. These data are particularly important for the examination of potential changes to the institutional set-up for pension savings and the effect they might have on overall saving.

We begin by surveying the extent of the employed labour force insured to receive a pension, whether by a Labour Union pension fund or an unfunded public sector pension. Table 1

shows that only about half of those employed - about 800 thousand people - are insured to receive a pension.

Table 1: Employed Persons, Employees and Those Covered by Pension Plans (including funded pensions) for the year 1992 (thousands)

1. = 2 + 3	Israeli Employed Persons	1,650
2.	Self-Employed	295
3.	Employees (a+b+c)	1,355
From this:	a. Those covered by a pension fund	500
	b. Those with funded pepsins (estimate)	300
	c. Those with no pension coverage*	555

* Some have savings for pensions in mutual funds.

The proportion of salaries covered by pension insurance is lower still: only about 40 per cent (see Table 2 below). The proportion is not homogeneous across sectors. In the business sector, in which pension insurance occurs only within the framework of the pension funds and not as unfunded public sector pensions, less than a third of wage income is insured.

Table 2: Wage Payments to the Civilian Sector, the Proportion of Wages Covered by Pensions, and Total Contributions to Pension Schemes, 1992

1.	Cost of civilian labor	74,024 million NIS
2.	Civilian wage payments**	58,000 million NIS
3.	Proportion of salaried workers covered by pension schemes (funded or through a pension fund)***	41%
4.	Proportion of salaried income insured by pension funds as a proportion of total insured salaried income****	68%
5.	Total pension contributions (= 2*3*4*0.175)	2,800 million NIS

* In 1992, 1 US$ = 2.44 NIS was the rate of exchange for the New Israeli Shekel.

** Cost of labor net of 28.5%.

*** The proportion of income of those covered by pension funds and funded pensions that constitute 58%, net of 30% that represents constituents of wage income not covered by pension insurance (such as car allowances), i.e., (1-0.3)*58.

**** The 32% remaining are covered by funded pensions.

At the same time it should be pointed out that for some employed the provident funds are the only institutional saving for retirement, while for others it is only a complement for the pension fund. For the self-employed, the provident funds have the advantage that they are more liquid than the pension funds. In other words, some proportion of those employed are covered by both the pension funds and provident funds, while the rest, whose size is unknown, is covered only by one of the two methods of insurance. It should also be noted that contributions to mutual funds are significant. In 1992, for instance, contributions were in the order of about NIS 5.6 billion compared to NIS 2.8 billion of contributions to the pension funds.

The relatively restricted pension coverage is also expressed in its overall contribution to households' savings; savings in pension funds constitute only about 11 per cent of total households' saving. However, as mentioned above, savings in mutual funds are to a great extent complementary to pension saving, and its weight in total saving is about 24 per cent (see Table 3 below). It follows that the direct institutional saving that can be attributed to life-cycle smoothing constitutes 35 percent of the total savings of households. Similar findings were reported in American studies, indicating that most of the accumulated wealth is due to the precautionary motive, bequest motive and liquidity constraint discussed in Section IV. (See e.g. Kotlikoff and Summers 1981, and Deaton 1991, p. 53.) In the same vein, our age cohort data show a close association of consumption and income throughout the life cycle, with only little smoothing of consumption. (See Diagram 2.)

The saving rate obtained from the Consumer Expenditure Surveys is very low; in the 1992 survey it is practically zero (when durable goods are included in consumption, see Table 4 for the 1992 survey). This contradicts the National Accounts figures, reported in Table 3. It appears that the income data from surveys are biased downwards, and consequently so too

are the savings data. Moreover, the survey data for savings do not include employers' contributions to the various savings funds (pension, provident and other funds). Their inclusion would boost income and savings significantly; at a rough estimate, the savings ratio would rise by about 5 percentage points.

Table 3: Gross Private Sector Saving and Its Principle Constituents

		Gross Private Saving		Distribution of Household Saving (%)
		Billion NIS	Share of Disposable Income (%)	
1.	Total Saving from All Sources	36	26.9	
2.	Saving by Firms-Estimate	15	11.2	
3 = 1-2	Saving by Households	21	15.7*	100.0
	A. In Pension Funds	(2.4)	(1.8)	(11.5)
	B. In Provident Funds**	(8.4)	(6.3)	(40.0)
	C. Study Funds	(1.5)	(1.1)	(7.1)
	D. Other	(8.7)	(6.5)	(41.4)

* Share similar to that found in Canada, Japan, Italy. See Poterba, Table 1.
** Some of this saving is not allocated for retirement (thus the estimate of about 40%).
Note: Saving in pension and provident funds is defined as: contributions + the funds' profits - payments.

As expected according to the theory, saving is not uniform across the life cycle, but its variance is even greater between the various income groups (the higher the income group, the higher its savings - see Table 4 below). Much research abroad has found that income distribution had a strong influence on the savings ratio; income distribution was generally found to have greater impact than age. This, for example, is the case in the collection of research papers that appear in Poterba (1994). They cover Italy, Britain, the USA, Germany, Japan and Canada. As we mentioned, the survey data on income and savings (see Table 4) do not include employers' contributions to the various savings funds. Their inclusion would greatly increase the savings ratio in the intermediate age groups. This correction to the development of savings during the life cycle improves the theory's fit to the data.

Table 4: Income, Consumption and Saving by Age and Income Group According to the Family Expenditure Survey 1992/3 (cross section data) (current prices)

A. Disposable Income of Average Individual (NIS)
Monthly average divided into income quintiles for each age group

Quintile/ Age Group	20-30	31-50	51-64	65+	Total
1	671	739	776	764	
2	1023	1160	1285	1219	
3	1394	1595	1776	1659	
4	1842	2171	2490	2265	
5	2828	3388	4236	4298	
Total	1564	1819	2132	2071	1904

B. Consumption (excluding durables) of Average Individual (NIS)
Monthly average divided into income quintiles for each group

Quintile/ Age Group	20-30	31-50	51-64	65+	Total
1	870	916	1020	957	
2	1170	1261	1382	1413	
3	1576	1639	1739	1674	
4	1962	2067	2336	2189	
5	2684	2796	3523	3153	
Total	1663	1741	2013	1895	1820

C. Saving of Average Individual (NIS)
Monthly average divided into income quintiles for each age group

Quintile/ Age Group	20-30	31-50	51-64	65+	Total
1	-199	-177	-244	-193	
2	-147	-100	-97	-193	
3	-182	-43	38	-16	
4	-120	105	155	76	
5	143	592	713	1145	
Total	-99	78	118	176	84

D. Share of saving out of Total Disposable Income (percent)
Monthly average divided into income quintiles for each age group.

Quintile/ Age Group	20-30	31-50	51-64	65+	Total
1	-22.9	-19.3	-23.9	-20.2	
2	-12.5	-8.0	-7.0	-13.7	
3	-11.5	-2.6	2.2	-0.9	
4	-6.1	5.1	6.6	3.5	
5	5.3	21.2	20.2	36.3	
Total	-5.9	4.5	5.9	9.3	4.6

Source: Family Expenditure Survey 1992/93

Until now we have surveyed the age groups preceding retirement age, some of which are supposed to save for retirement. We now proceed to survey the 65 and over age group, examining the share of pension income out of total pensioners' income, and attempting to estimate its impact on the savings of this age group. First we establish the size of this group and the ratio of those who receive pension income. One can see from Table 5 that in 1992 the 65 and over age group comprised almost half a million people, just under 10 per cent of the total population. About 40 per cent of this group receive a pension. The family expenditure survey gives a slightly higher ratio (see Table 6), but it pertains to families, and not individuals.

Table 5: Population Aged 65 and Over and Pensioners

1.	Total Population	5195.9
2.	Aged 65 and over	487.2
3.	Recipients of pensions (citizens) Of Whom: Those with pensions from pension fund Those with funded pensions - estimate	260 (170) (90)
4.	Pensioners age 65 and over	200

Table 6: Proportion of Householders Receiving a Pension, Out of all Householders Aged 60-80, According to Survey Years (percent)

Quintile	1968	1975	1979	1986	1992
1	10	15	20	18	15
2	13	20	27	38	34
3	28	31	38	53	57
4	18	37	53	53	62
5	23	44	53	55	63
Total	18	30	38	44	46

The average monthly pension is about NIS 1000 (see Table 7); it accounts for about 38 per cent of total income of those in the 65 plus age group who receive a pension. The average monthly pension of those who receive a pension from one of the Labour Union Federation's pension funds as reported in their publication "Labour Union (1991)" is slightly higher (about NIS 1100 per month). The average total per capita income of those who do receive a

Table 7: Income, Sources of Income, Consumption and Saving of Those Aged 65 and Over, Family Expenditure Survey 1992
(NIS, current prices)

	Quintile	Gross per Capital Income							Net per Capita Income	Consumption per Capita			Saving per Capita		
		Total Gross	Of This:							Total	Excl. Durables	Excl. Durables and Housing	Total	Excl. Durables	Excl. Durabl and Housin
			Labor	Other Income	Income from Residential Property	Pension	Old Age Allowance	Other National Insurance Allowances							
Recipients of Pension Income	1	1200	48	73	207	418	419	36	1067	1366	1317	1077	-299	-250	-10
	2	1611	89	43	355	622	449	53	1577	1751	1667	1259	-174	-90	318
	3	2129	245	120	440	800	452	71	2018	2094	1958	1461	-77	60	557
	4	2829	303	224	567	1201	486	48	2668	2645	2506	1858	23	163	810
	5	5164	970	970	765	1884	517	59	4588	3624	3413	2550	964	1175	2039
	Total	2591	332	287	467	987	465	54	2388	2298	2174	1643	89	213	745
Those Without Pension Income	1	644	59	42	58	0	443	42	632	868	826	764	-236	-194	-132
	2	955	104	165	192	0	435	61	946	1059	1027	816	-112	-80	130
	3	1263	177	208	351	0	469	57	1246	1521	1451	1058	-275	-205	188
	4	1860	464	499	427	0	375	96	1781	1872	1809	1325	-92	-29	456
	5	4512	1337	1968	758	0	368	82	4019	2989	2844	1994	1030	1176	2025
	Total	1851	429	578	358	0	418	68	1729	1664	1594	1193	64	135	536
Total Population	Total	2235	379	427	415	512	442	60	2071	1993	1895	1426	77	176	644

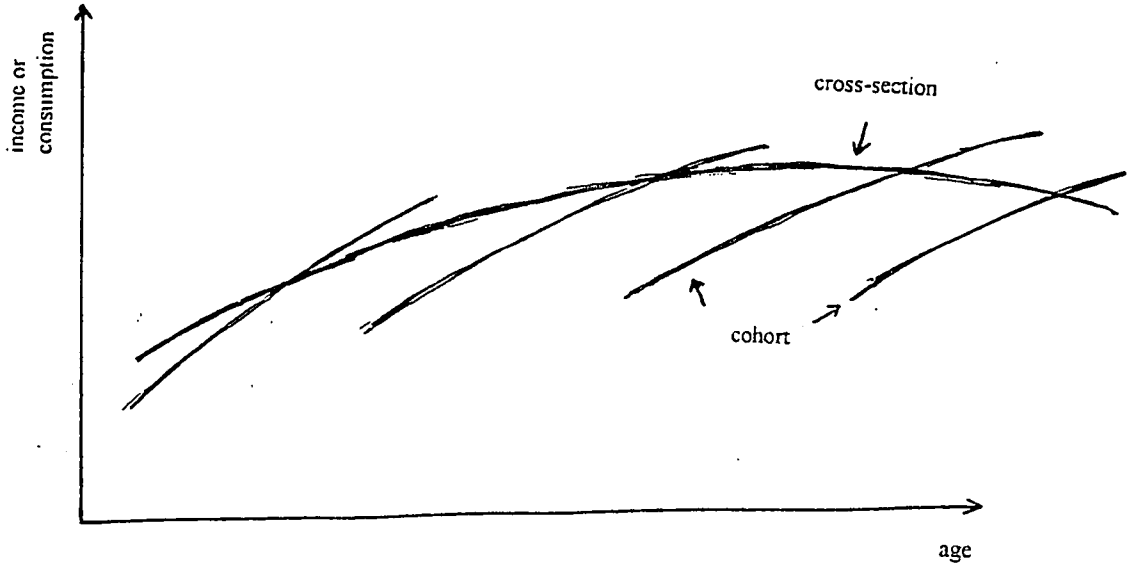
pension is about 40 per cent higher than those who do not receive a pension (see Table 7). Their disposable per capita income is also higher than that of the 20 to 64 age group: about NIS 2400 per month compared to about NIS 1860. That is a gap of 30 per cent! It therefore appears that pension cover is linked to the standard of economic well-being during retirement age. Nonetheless, there is no significant difference in the savings ratio of those who receive a pension and those who do not. In both of these population groups, the savings ratio is positive (Table 7). Positive saving by those age 65 and over does not fit the simple life cycle theory. It is possible that other factors are at work, as we pointed out above. At the same time, saving by the section of the population under age 65 does not include employers' contributions to pension funds as explained above, and their inclusion would greatly enhance the savings ratio of this group.

3. Estimation of Changes to Income and Consumption Across the Life Cycles Based on Cohorts

The aim of this section is to build a picture of changes in the average individual's income, consumption and saving across the life-cycle, so that the data may be verified against the economic theory. In addition, it might be desirable to obtain some knowledge on the effect of the institutional pension saving on the income and consumption of the elderly. Our anlaysis stresses the usefulness of cohort data. A cohort is a sector of the population born in a given year, that may be tracked as it ages; its income and consumption at different stages may be specified from survey data. Cross-section data are nothing but observations for different cohorts at the same point in time, when the cohort members are at different ages. Cross-section data are not a reliable source for constructing income and consumption age-profiles, because different cohorts are not comparable for various reasons, e.g. post economic experience, labour productivity, time preference, and life expectancy. Only studies that employ relatively long panel data on households can fully disentangle individual behaviour

Diagram 1:

Illustrations of the difference between cross-sectional analysis and analysis based on cohort data to the variance of consumption or income with age



from cohort effects. Since no such data are available for Israeli households, one must rely on repeated cross-sectional data, i.e., exploit the variation in the behaviour of each cohort over time to estimate cohort-specific profiles from several waves of cross-sectional data. We have only five observations for each cohort, because we utilize data from surveys, from 1968 to 1992, so we cannot construct a full age profile from the data alone with further assumptions. However, a number of cohorts may be combined to produce a profile of income and consumption across the life cycle if the following conditions hold:

- that the consumption profile with respect to time of the typical household differs only by a constant or equivalently;
- that schedule with respect to time, has the same slope for cohorts at any given age.

Taking these conditions as assumed, we estimated equations for: consumption (CO), disposable income (YD) and disposable income from economic activity (YDE), which is defined as YD minus income from pension and old age allowances. The explanatory variables treated as exogenous in the equations are: the cohorts (groups representative of given birth years), where all cohorts are represented by a dummy variable C_i (i = number of the cohort). Similarly, the effect of age (AGE) expressed by a polynomial of order X (generally 3). Other explanatory variables used in the estimation are: educational level (EDUC) and family size (HSIZE). The observations are households. (For a detailed discussion of this model see Deaton-Paxson, 1993). The number of observations used for this estimation were 11,399 from the last five surveys (to 1992). The cohorts are defined at three year intervals. The estimated equations appear in Tables A, B and C (following). An alternative estimation is based on observations representing an average household belonging to a particular cohort. In this case, the number of observations used for the estimation of the equation is 70. The results of the two types of estimation are similar. The income and consumption profiles which appear in Diagram 2 were derived from the equations in the Tables A, B and C following, by setting the influence of the cohorts to zero in the estimated equations. In other words, the level was determined by the 'youngest' cohort.

The dummy variables that express the influence of the cohorts can be interpreted as the effect of wealth, for example the accumulation of greater human capital by the younger cohorts at any given age point (Paxson & Deaton, 1993). Thus in practice the income and consumption level of younger cohorts is higher. It should also be pointed out that a cross-section by age is essentially a collection of observations of different cohorts, and the slope will therefore be biased downwards (see diagram below). A cross-section is therefore an inaccurate representation of the income and consumption profile across time. Further, it is possible that a given year group displays relatively higher saving (to other groups) across the whole life

Dependent Variable: YD

Table A

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	18	4320022810.7	240001267.26	203.676	0.0001
Error	11380	13409587409	1178346.8725		
C Total	11398	17729610220			

Root MSE	1085.51687	R-square	0.2437
Dep Mean	1715.72821	Adj R-sq	0.2425
C.V.	63.26858		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	-1372.036763	438.72009173	-3.127	0.0018
AGE	1	109.429550	27.28939088	4.010	0.0001
AGE2	1	-1.184928	0.53569658	-2.212	0.0270
AGE3	1	0.004983	0.00335383	1.486	0.1374
C2	1	-72.588869	47.59457868	-1.525	0.1272
C3	1	-172.616514	50.14698993	-3.442	0.0006
C4	1	-199.853844	48.61501058	-4.111	0.0001
C5	1	-151.372786	50.26669603	-3.011	0.0026
C6	1	-286.141061	52.87963680	-5.411	0.0001
C7	1	-321.774574	52.84293816	-6.089	0.0001
C8	1	-414.440038	55.01342624	-7.533	0.0001
C9	1	-556.864996	56.03988990	-9.937	0.0001
C10	1	-631.386044	58.18096944	-10.852	0.0001
C11	1	-771.884298	64.72330301	-11.926	0.0001
C12	1	-814.461658	64.22224138	-12.682	0.0001
C13	1	-1010.259990	65.92254957	-15.325	0.0001
C14	1	-1120.382637	71.28303642	-15.717	0.0001
EDUC	1	83.786124	2.10993646	39.710	0.0001
HSIZE	1	-130.303515	5.60035806	-23.267	0.0001

Durbin-Watson D	1.965
(For Number of Obs.)	11399
1st Order Autocorrelation	0.017

Dependent Variable: YDE

Table B

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	18	3475030234	193057235.22	164.799	0.0001
Error	11380	13331349567	1171471.8425		
C Total	11398	16806379801			

Root MSE	1082.34553	R-square	0.2068
Dep Mean	1478.01926	Adj R-sq	0.2055
C.V.	73.22946		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	-2673.826506	437.43836975	-6.112	0.0001
AGE	1	185.778570	27.20966485	6.828	0.0001
AGE2	1	-2.324603	0.53413154	-4.352	0.0001
AGE3	1	0.007153	0.00334403	2.139	0.0324
C2	1	-72.865566	47.45553098	-1.535	0.1247
C3	1	-170.282736	50.00048535	-3.406	0.0007
C4	1	-192.417005	48.47298169	-3.970	0.0001
C5	1	-126.949670	50.11984174	-2.533	0.0113
C6	1	-265.383368	52.72514879	-5.033	0.0001
C7	1	-289.837796	52.68855737	-5.501	0.0001
C8	1	-428.795537	54.85270436	-7.817	0.0001
C9	1	-562.107504	55.87616921	-10.060	0.0001
C10	1	-609.543296	58.01099357	-10.507	0.0001
C11	1	-668.792117	64.53421370	-10.363	0.0001
C12	1	-625.497075	64.03461592	-9.768	0.0001
C13	1	-696.889957	65.72995666	-10.602	0.0001
C14	1	-747.665382	71.07478283	-10.519	0.0001
EDUC	1	73.169050	2.10377227	34.780	0.0001
HSIZE	1	-112.435496	5.58399660	-20.135	0.0001

Durbin-Watson D	1.945
(For Number of Obs.)	11399
1st Order Autocorrelation	0.027

Dependent Variable: CO

Table C

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	18	3704527113.5	205807061.86	263.198	0.0001
Error	11380	8898578765.2	781948.92489		
C Total	11398	12603105879			

Root MSE	884.27876	R-square	0.2939
Dep Mean	1621.80360	Adj R-sq	0.2928
C.V.	54.52440		

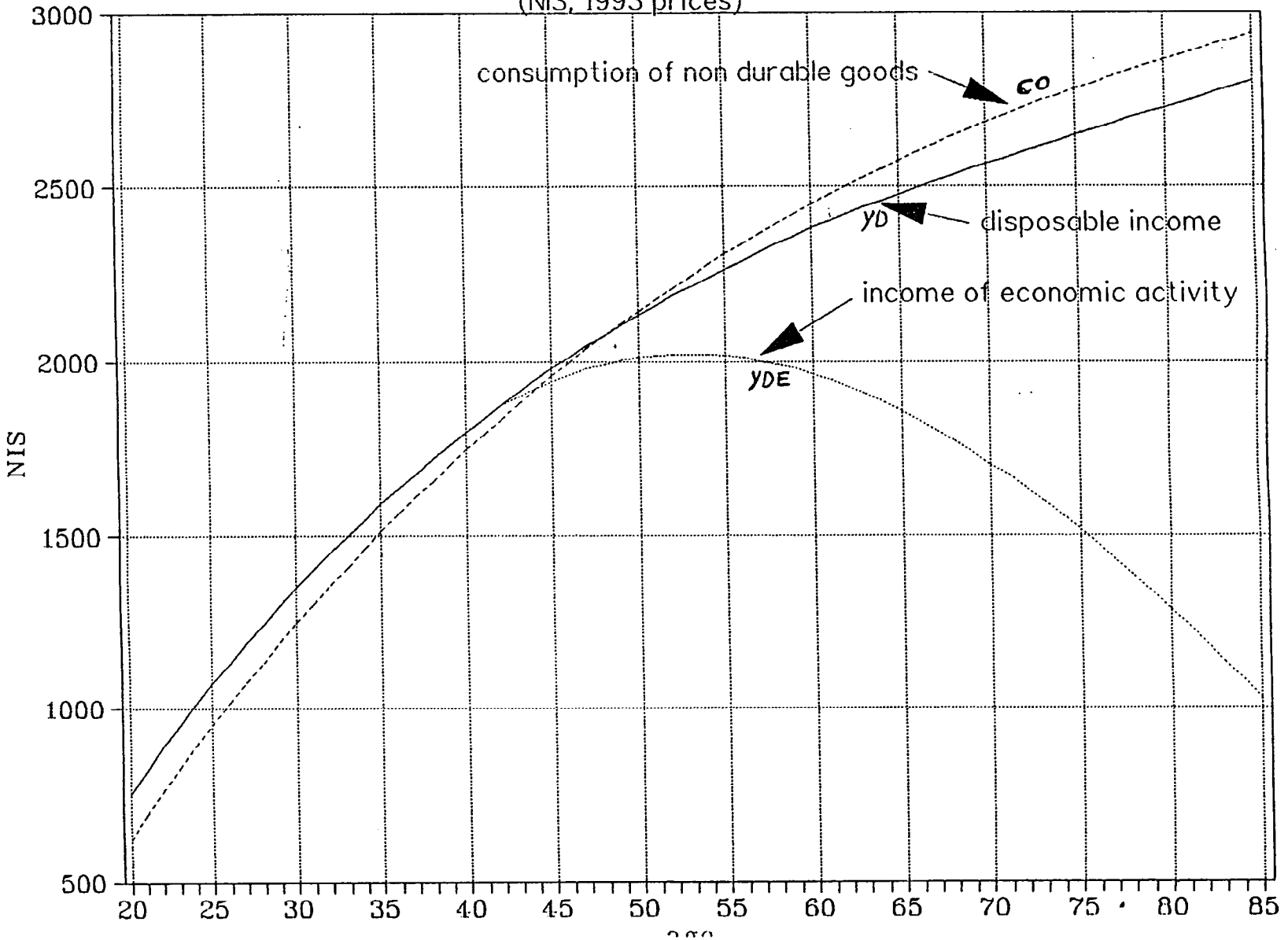
Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	-1297.623276	357.38814359	-3.631	0.0003
AGE	1	101.391046	22.23035810	4.561	0.0001
AGE2	1	-0.892383	0.43638668	-2.045	0.0409
AGE3	1	0.002990	0.00273208	1.094	0.2739
C2	1	-35.364908	38.77127681	-0.912	0.3617
C3	1	-180.638695	40.85051032	-4.422	0.0001
C4	1	-229.729302	39.60253635	-5.801	0.0001
C5	1	-295.387199	40.94802476	-7.214	0.0001
C6	1	-346.079504	43.07656655	-8.034	0.0001
C7	1	-448.847865	43.04667128	-10.427	0.0001
C8	1	-544.192616	44.81478429	-12.143	0.0001
C9	1	-740.483946	45.65095740	-16.221	0.0001
C10	1	-858.427972	47.39511377	-18.112	0.0001
C11	1	-1013.095484	52.72459946	-19.215	0.0001
C12	1	-1120.295379	52.31642693	-21.414	0.0001
C13	1	-1248.510739	53.70152417	-23.249	0.0001
C14	1	-1361.570690	58.06825932	-23.448	0.0001
EDUC	1	67.218562	1.71878673	39.108	0.0001
HSIZE	1	-121.993729	4.56213793	-26.740	0.0001

Durbin-Watson D	1.974
(For Number of Obs.)	11399
1st Order Autocorrelation	0.013

Diagram 2:

Profile of income and consumption
(estimation – using cohorts)
(NIS, 1993 prices)



cycle as a result of lack of confidence caused by particular historical factors, such as economic crises or wars, in which case its consumption level will be biased downwards not as a result of the effect of age. And indeed, in the cross-section data we obtain a smaller slope of the income and consumption schedule with respect to age, as compared to the age-cohort data. In addition, saving at higher ages is positive in the cross-section analysis and negative in the age-cohort analysis (see Table 4). The reason for the difference in saving is that the older age groups save more than their younger counterparts, probably due to their adverse experience as immigrants to Israel. Nonetheless, in both types of analysis consumption tracks income to a high degree, in other words, the smoothing of consumption across age is lower than the life cycle theory would lead one to expect.

4. The Conceptual Framework

In this section we describe the conceptual relationship that determines the effect of the type of pension scheme on individuals' savings over the life cycle, and from there the effect on total saving in the economy.

Individuals' savings are determined by a number of factors, the most important of which are: the bequest motive, the precautionary motive, and the desire to guarantee an appropriate level of consumption during retirement, namely the desire to smooth consumption over the life cycle. Pension savings are an important mechanism for ensuring appropriate income during retirement (whether partial or total retirement). We therefore focus on the effect of these life cycle motives on households' private saving, and the contribution of pension savings to this. For this purpose we review the life cycle model that determines income and consumption, and therefore savings; and we examine how pension savings can be incorporated into the model.

An earlier paper by one of the authors of this paper (Spivak 1994) contains a detailed discussion of the effect of the pension programme on savings in the economy, using a model of overlapping generations in which the interest rate and all the variables were determined endogenously. The conclusion was that in this model, which assumed full certainty and no liquidity constraint, the pension scheme impacted on savings only if operated with pay-as-you-go financing, and not a fully funded pension scheme. In these circumstances, the first generation goes into pension-supported retirement, but there is no parallel saving by that generation to create the capital assets that would provide the returns to fund those pensions, and the level of savings in the economy thus falls. The other scenario, that of a funded pension scheme whereby savers' funds are invested in the market, should have no effect on savings. The effect of a State subsidy to pension savings, for example by designated government bonds with a subsidised rate of return, was not discussed.

4a. The Standard Life-Cycle Model

Our starting point will be the regular model of the Life Cycle theory, with the following simplifying assumptions:

- complete certainty
- no motive to bequeath
- individuals face no liquidity constraint, in other words they are able to borrow against future income or to save for retirement.

Wage income is fixed according to the marginal product of labour. The longer the period of preparation and training of the work force, the higher the return on human capital (Deaton, 1992). Another factor that results in an increase in the productivity of labour with age is "learning by doing". The longer he has been in employment, the greater the efficiency of the

worker, up until a certain age when it reaches its peak after which it falls, reflecting age limitations, in other words the ability to learn versus the ageing of knowledge. Finally, when the worker retires, his wage income falls to zero. It follows that wage income is not fixed throughout a person's working life; rather, it starts relatively low, peaks, and then declines towards retirement.

Given the model's assumptions, and the standard assumption of a separable utility function over time, the consumer maximizes his utility subject to his budget constraint.

with the assumption that:

$r = \delta$ it follows that at the optimum: $c_0 = c_1 = \ldots = c_T = \bar{c}$.

The assumption that the utility function is separable is critical to this result.

We define permanent income (y_p) as income received throughout one's life which is equal in terms of present value to wage income (y), i.e.

$$y_p = \frac{\sum_{t=0}^{t^*} \frac{y_t}{(1+r)^t}}{\sum_{t=0}^{T} \frac{1}{(1+r)^t}}$$

and then: $\bar{c} = y_p$.

in other words, private consumption (c_t) is fixed over the life cycle and is equal to permanent wage income (y_p) (Modigliani, 1986).

For the above assumptions it follows that income in youth y_t is lower than permanent income y_p, consumers will therefore want to borrow against future earnings, and their saving will

thus be negative, the same as the segment of the population in retirement. Only the intermediate generation will save (see Diagram 1). This mode of behaviour is known as consumption smoothing. In Diagram 2 we see the actual relationship in practice between income and consumption across the life cycle (for the method of estimation see note 4 above). Consumption largely tracks current income, and consumption smoothing is far lower than one would expect from the theory.

That consumption behaves this way has been the finding of much empirical research on consumption across the world (see for example: Poterba 1994). Similarly, an additional finding that contradicts the simple life-cycle hypothesis is the high savings ratio among the top fifth of those aged 65 and above - 36.3% of disposable income (see Table 4). If the purpose of all accumulated wealth is consumption, then they should consume all of their income. This finding is also shared by other countries. Our results, that the young and the poor do not save, are also a part of the world picture of consumption behaviour (see Hubbard, Skinner, Zeldes 1995).

The incompatibility of the empirical data and the simple life cycle theory leads to the addition of elements that attempt to make the theory more realistic. The main ones are:

- a liquidity constraint, recognizing the difficulty of borrowing against human capital.
- a motivation for insuring against income (and consumption) uncertainty. This causes the individual to build up a buffer stock of financial assets so that consumption may be smoothed during short periods of crisis.
- strong preference for the current period. This causes a strong desire to lend, which means that a liquidity constraint is effective.
- a short planning horizon. This strengthens the link between consumption and income.

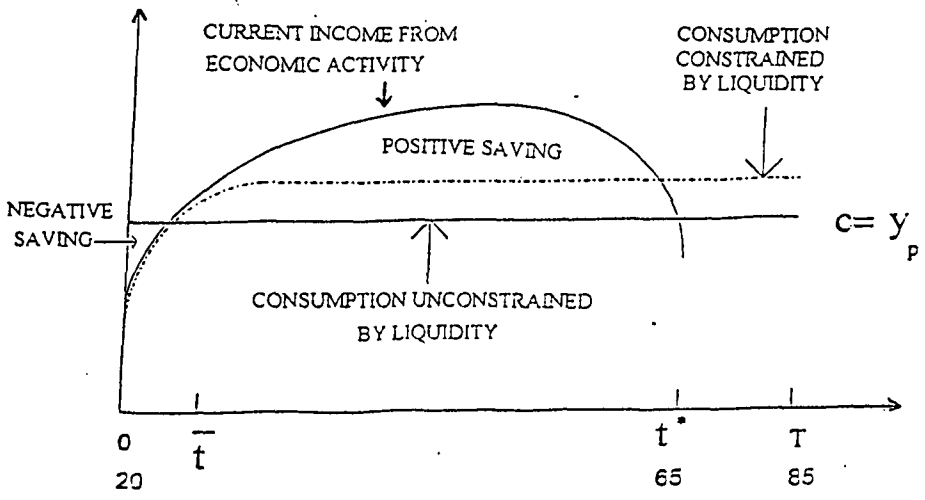
- the bequest motive. This explains why the poor do not save: they assume that their children will be better off than they are.

The papers by Hubbard et al., Samwick (1994) and Gale-Scholtz (1994) on substitution between IRAs (Individual Retirement Accounts) and other forms of saving use elements 1-3. These new models also achieve the result that substitution between pensions and private saving may be partial; this contrasts with the classical model presented above, in which a fall in voluntary private saving is totally offset by a rise in saving for pensions[2].

4b. The liquidity constraint and its implication for saving across the life cycle, particularly for pension savings

It is well known that it is difficult to borrow against human capital. The consumer may consume only what he has saved.

Diagram 3: Income and Consumption According to the Life Cycle Hypothesis



[2] See Juster-Gustman's 1995 survey.

The graph presented in Diagram 3 describes consumption with a liquidity constraint. We see that, the liquidity constraint prevents negative saving by the younger segment of the population and therefore increases assets and permanent income for $t > \bar{t}$.

Nevertheless, according to the graph shown here, income smoothing does occur: after the area where consumption equals income, consumption is equal in all periods, and is not close to income. For this reason one cannot accept this model as an accurate representation of reality. In contrast to this, a model of consumers whose planning horizon is limited and who face a liquidity constraint does succeed in matching the data that we cited in Diagram no. 2. Formally, this model is the same as the one shown in this section, but with a restricted planning horizon. It is easy to see that in this model there is less income smoothing. The closer agents are to retirement, the greater is voluntary saving for retirement. Mandatory saving for pensions imposed on the younger segment of the population is to no degree offset by a fall in their private saving, since the latter is intended for a few years hence and not for the retirement period. The older the population segment, the greater the offsetting of mandatory pension saving by individuals.

4c. Precautionary motivated saving , and the extent to which it is offset by saving for retirement.

Another approach, that provides a better explanation for the close relationship between consumption and income across the life cycle is to include the precautionary motive in the behavioural model. The following survey is based primarily on Carroll's paper (1991) and the survey by Deaton (1992). Below we address the implications of this model on saving during the retirement period, and we derive empirical conclusions about the extent of offsetting between these different types of saving as they are presented in Samwick's model

(1994). According to Carroll, US income surveys suggest that zero income is a real possibility, and therefore many individuals prefer not to borrow. Therefore when income uncertainty exists, risk-averse individuals, whose utility functions display constant relative risk-aversion, will tend to save in a period of the life cycle that is relatively early in comparison to the behaviour that would fit the permanent income hypothesis with complete income certainty. This is because individuals require liquid assets so that they can protect themselves against a large temporary fall in income or a lack of employment. In principle they would prefer not to accumulate assets and thus to enjoy a higher standard of living, were it not for this fear. They compromise by holding the smallest possible portfolio of assets that can suffice as a buffer against temporary shocks to income. This saving cannot therefore be used to raise current consumption against future income in the long run. The result is that under these circumstances consumption tracks income to a far greater extent. According to Modigliani (1986), the demand for savings due to the precautionary motive has grown during our lives as a result of the direct move from private assets to saving in pension funds and National Insurance. Annuity income is illiquid and cannot be used as a guarantee for loans, and thus cannot be used as a buffer stock. Engen and Gale (1991) also dealt with this subject; they demonstrated how a model that includes a precautionary motive for saving can explain why individuals adopt saving schemes for retirement together with other forms of saving. This is because saving schemes for retirement have higher returns but lower liquidity because of the penalty on early withdrawal of the savings.

The model which explains savings using the precautionary motive is further enhanced by inclusion of a liquidity constraint, since the ability to borrow during hard times provides a certain level of insurance for some people. Thus the greater the extent to which this option does not exist, the greater the need for extra saving for such circumstances (Deaton, 1992).

Samwick (1994) discusses the degree of offsetting between saving for retirement and other forms of private saving. He deals with this question both by simulation, using a model mainly based on Deaton, and also by estimating the relationship between pension assets and other forms of private assets owned by workers close to retirement. The two methods result in a coefficient on the offsetting variable that varies between 0.1 and 0.2. The model which he used for the simulation is multi-period; these are the assumptions on which it is based:

- individuals' utility functions are characterised by constant relative risk aversion (CRRA);
- income uncertainty exists (both in permanent and transitory income);
- retirement leads to a sharp fall in income from economic activity (up to half its previous level);
- during retirement there is complete certainty regarding income.
- a liquidity constraint exists, expressed by the fact that individuals cannot borrow against future earnings or against pension income.

By estimating the coefficients for the equations of the model he obtains the results described above.

5. The Effect of Institutional Saving for Retirement on Total Saving in the Economy: Empirical Results

In order to estimate the effect of a change in policy regarding institutional saving for retirement (mainly in the pension funds and to a lesser degree in the Provident funds) on total savings in the economy, it is important to know how much one type of saving is offset by another. The theoretical aspect of this problem was dealt with at length in the previous section. We shall recap only the main points here, as an introduction to the empirical results.

If individuals voluntarily save for retirement in any case, then a rise in mandatory institutional saving, either by legislation or by collective agreement to widen the scope of pensions will be largely offset by a fall in voluntary saving. However, it is often the case that individuals who are forced into institutional saving do not save a corresponding amount, nor do they have corresponding liquid assets that they are able to reduce, and certainly not the ability to take loans against the rise in institutional savings for retirement. In other words, the extent to which institutional saving for retirement is offset by a reduction in other forms of saving depends also on the volume of liquid assets held by individuals. Moreover, even when individuals do hold liquid assets, some of them are designated to be a buffer stock and cannot be used for this purpose. In conclusion, the combination of strong time preference, income uncertainty and a liquidity constraint results in a small coefficient on the offsetting variable.

This topic has been on the research agenda in the USA for over two decades, since Feldstein's seminal work (Feldstein 1974). Research methods and the underlying models have changed, the quality and detail of macro-economic statistics has improved considerably, but there is still no agreed answer.

The most recent research in the USA focuses on the effect of various assumptions regarding income tax on saving, for example IRAs (Individual Retirement Accounts). Using this scheme, the individual may exempt a given quantity of savings from income tax, and to pay income tax when he withdraws the money later in life, primarily during retirement. The tax break exists because the marginal tax rate during retirement is generally lower, since taxable income is lower. In contrast to a mandatory pension, the individual is completely aware of the amounts under discussion, and he decides on them himself. The mechanism by which the

individual is given the incentive to save is that he is asked to designate a portion of his savings as IRAs in his income tax return, and this sum is then exempted from income tax. The savings are relatively liquid - he is able to use them immediately in the coming year if he is willing to pay the penalty plus the marginal tax for that year. For these reasons, it is reasonable to assume that the offsetting effect on other savings from a mandatory pension would be less than from IRAs. However, researchers have reached varying conclusions even about the offsetting effect on other forms of savings from IRAs: Dicks, Mireaux and King (1984) obtained a coefficient of 0.15, while Hubbard (1986) obtained one of 0.4. Venti and Wise (1990) came to the conclusion that the offsetting effect is almost non-existent, but the effect of institutional saving on national saving was only 64 per cent, because of the large tax breaks. Gale and Scholtz (1994) found that the coefficient of substitution between IRAs and other assets rises with age, since the young face greater liquidity constraint. Imrohoroglu and Joines (1994) obtained a coefficient of offsetting of 0.5. Samwick concludes that the general value of the coefficient of offsetting found in the literature is between 0.2 and 0.5 (i.e. that a rise of one dollar in pension wealth reduces other wealth by between 20 and 50 cents).

We now proceed to explain the econometric test of whether there is an offsetting effect between institutional saving for retirement and other types of saving, and if so how large this effect is. The following is an introduction to the time series quantitative analysis. Later we present a somewhat different analysis based on cross-section data. We term the vector of explanatory variables[3] X and the private saving ratio (S), so that:

$$(1) \qquad S = \alpha_0 + \alpha_1 X$$

[3] For example: income distribution, age distribution, changes in the rate of inflation, and rates of return.

This assumes that the private saving ratio is fixed endogenously by individuals maximizing their utility. At the same time, the composition of saving, for example the shares of institutional saving for retirement (SR) and other saving (SO) is determined by other factors once the total level of saving is established.

The composition of saving is:

(2) $S = SO + SR$

If we assume that SR is exogenously determined, for example by wage agreements, then:

(3) $SO = \alpha_0 + \alpha_1 X - SR$

In other words, in this case there is perfect substitution between SR and SO.

In the event that the substitution between the two is not total for the reasons described above, then:

(4) $SO = \alpha_0 + \alpha_1 X - \alpha_2 SR \qquad , \alpha_2 < 1$

By substituting (4) into (2) we get:

(5) $S = \alpha_0 + \alpha_1 X + (1 - \alpha_2) SR$

Below we present the empirical estimation of this equation.

The test for offsetting is thus $0 < (1-\alpha_2) < 1$. In this case, $0 < \alpha_2 < 1$. In other words, the coefficient of offsetting is partial.

We do not know of any empirical research in Israel that has investigated the effect of institutional saving in the pension and provident funds on total saving.

Data in Israel are less detailed than in the USA. On the macro level, statistical data collected by the Bureau of Statistics is available for assets held by the pension and provident funds,

and the source of changes to these assets: contributions by those insured, the funds' pension payments, inflation indexing contributions and net profits. The change in assets net of indexing contributions is defined as the funds' saving, as used above. We were able to define a consistent set of data for the years 1975-1994, serving for the econometric estimation below. Diagram 4 includes also the years 1971-1994, whose data are less reliable. From the macro data, presented in Diagram 4, there appears a strong parallel between changes in the total private savings ratio and changes in savings in the pension and life assurance funds, though the change is always stronger in overall private savings. This linkage is interesting in light of the fact that the sources of the two sets of data are different and independent.

The statistical link between total private savings S and savings in the pension and provident funds SR (both variables are measured as percentages of GNP) is expressed in the following regression:[4]

(6) $S = 12.15 + 0.80SR + 0.30S_{-1}$ adj $R^2=0.295$

(2.4) (2.8) (1.5) D.W.=1.67

S-1 is the savings ratio with a one year lag. The t values are given in parentheses. The effect of SR is significant at a 5% level. The Durbin-Watson statistic shows that there is no serial correlation.

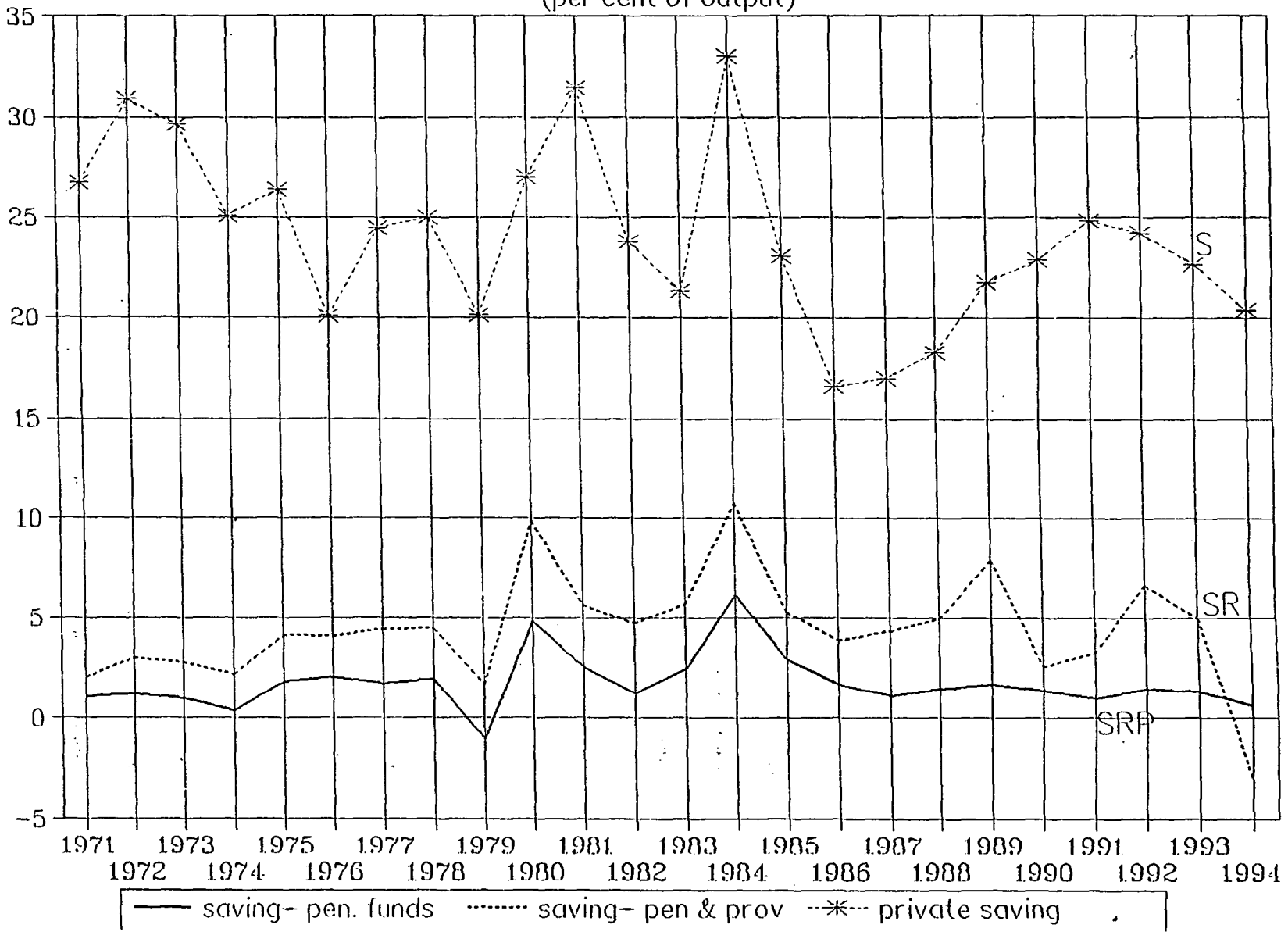
In order to estimate the effect of institutional saving for retirement on total private saving, expression needs to be given to the other factors that affect private saving, such as: the distribution of income between wage and non-wage income (WYD); the change in the rate of inflation (DDP) which causes uncertainty and an unforeseen erosion of real income; the real

---

[4] It is well known that the saving rate S time-series follows a random walk. We did not test for unit roots due to the small number of observations (20).

Diagram 4

Private saving and direct saving in pension and provident funds, 1971–1994
(per cent of output)



interest rate; the real return on capital stock; and finally changes to the age composition of the population. Only some of these variables were found to have a significant impact on savings. The equation that we obtained was:

(7) $S=16.46 - 1.41\ WYD + 1.02WYD_{-1} + 0.017DDP + 0.24SR + 0.54S_{-1}$ $adjR^2=0.83$

(1.8) (-5.8) (5.1) (3.6) (1.5) (4.1) D.W.=1.76

The problem that arose in this equation was that institutional saving SR is not an exogenous variable since it is partially influenced by the same variables described above that influence other forms of private saving. For this reason, we estimated an equation in which investment for retirement was represented by institutional savings in pension funds (SRP) alone. This variable is determined principally by collective wage agreements, and is hardly influenced at all by the variables listed above. The estimated equation is as follows:

(8) $S=16.36 - 1.06.WYD + 0.95WYD_{-1} + 0.017DDP + 0.64SRP + 0.51S_{-1}$ $adjR^2=0.85$

(1.9) (-5.4) (4.8) (3.7) (2.1) (4.1) D.W.=1.42

The estimation of this equation, however, suffered from the problem of serial correlation. The problem was solved by the exclusion of the variable for the change in the inflation rate (DDP). The equation that we obtained was:

(9) $S=25.67 - 1.13.WYD + 0.92WYD_{-1} + 0.86SRP + 0.33S_{-1}$ $adjR^2=0.71$

(2.3) (-4.2) (3.4) (2.1) (2.1) D.W.=1.74

Taking into account that institutional saving in pension funds accounts for only about 40 per cent of total saving for retirement, it follows that the coefficient on offsetting in the long run derived from equation (4) above is about 0.5, similar to the result given by the Family Expenditure Survey (see below).

Statistical data about contributions to pension funds by households **on the micro level** in the Family Expenditure Survey cover only the year 1979. The survey's data allow one to compare the savings ratio of the section of the population that makes contributions to pension funds to that which doesn't, and to examine these groups in terms of their characteristics, such as income group (decile) and age. From Table 8 it is evident that the average savings ratio of households is clearly higher in the section of the population that makes contributions compared to the section of the population that does not, whose average savings ratio is zero. What is the reason for the difference in the savings ratio between these two sections? One might have thought that the reason is the income disparity, since the average income of the section that makes contributions to institutions for pension saving is almost fifty per cent higher than that of the non-contributing section. To check this claim we attempted to isolate the effect of income by dividing the population into income deciles, because within each decile income distribution is more homogeneous. Then we split each decile into contributors and non-contributors. The result was that in 7 of the deciles the savings ratio of the contributors was higher than the non-contributors (Table 8). The conclusion is that even if we isolate the effect of income, the result is that the savings ratio of contributors is higher.

The degree of offsetting between different types of saving was mainly tested by the estimation of consumption and saving equations based on survey data, for the population that contributes to pension saving. The unit under examination is the family. The number of families that appear in the sample on which the equation was estimated is 1166. It is clear from the Expenditure Survey that the marginal tendency to save rises with income, and this effect outweighs the effect of age. (Research on savings by households for the 6 main OECD countries published in the book edited by Poterba, 1994, obtained similar results.) For this reason, the equations were estimated using a polynomial, to capture the marginal effect that

changes with the level of income and age. Nonetheless, we obtained good results using a simple estimation with log linear specification. It is clear from the estimated equations that pension contributions have a significant positive effect on private savings (namely a reduction in consumption). The consumption equations (in Table 9) imply that pension contributions have a negative marginal effect on consumption of 0.5. This figure is obtained by dividing the coefficient on pension contributions estimated in the equation, which is the elasticity, by the share of pension contributions in consumption, which is about 4% (see the table for details). This result is thus similar to the that obtained from analysis of the time series. In the savings equations (Equation 2 in table 10), the marginal propensity regarding pension contributions derived from the coefficients of the estimated equations is unitary, at the mean values of the variables. Hence, there is no decline of other private saving so the offset coefficient is zero.

To summarize the findings of the cross-section analysis we conclude that the offset coefficient lies between zero and one-half.

Table 8: Comparison between the Saving Ratio of Those who Make Pension Contributions to Those Who Do Not, by Decile, Age 20 to 64, 1979 Survey

	Rate of Savings that Includes:			The Difference in Rate of Savings between "Contributor" and "Non-contributors"	Proportion of Income as Pension Contributions (of Those Who Contribute)
Quintile	Of Total Population	Of Thos Who Make Pension Contributions	Of Those Who Do Not Make Pension Contributions		
	Percentages				
1	-10.3	-15.4	-7.3	-8.1	2.7
2	-9.5	-5.5	-16.4	10.8	3.3
3	-4.2	-4.4	-3.5	-0.9	4.1
4	1.3	1.7	0.3	1.4	3.7
5	0.7	2.2	-7.7	10.0	3.9
6	4.1	5.2	-0.6	5.8	3.6
7	9.7	12.3	-8.7	21.0	3.5
8	12.7	13.1	8.2	4.9	3.7
9	14.6	14.6	14.7	-0.1	4.9
10	20.1	21.0	13.7	7.2	4.3
Total	9.0	10.9	-0.2	11.0	4.0

Table 9: Explanations of Consumption Per Standardized Individual (logarithmic) of Those Who Make Pension Contributions According to the 1979 Family Expenditure Survey

quation umber	Explantory Variables											Statistics	
	const.	ln PEN	lnYD	ln FAMS	E-A	A-A	A	$(A)^2$	$(A)^3$	$(A)^4$	$(A)^5$	adj. R^2	D.W.
.1	1.730	-0.021	0.779	-0.083	-0.104	-0.102						0.676	2.00
	(11.0)	(-2.0)	(36.9)	(-4.5)	(-2.7)	(-2.6)							
.2	24.787	-0.021	0.773	-0.111			-3.121	0.163	-0.0041	0.00005	-0.0000002	0.681	2.03
	(3.4)	(-1.9)	(36.7)	(-5.5)			(-3.2)	(3.2)	(-3.2)	(3.2)	(-3.1)		

Explanation of Symbols

lnPEN	log of contribution of pension savings
lnYD	log of disposable income per standardized individual
lnFAMS	log of size of family
E-A	European/African origin
A-A	Asian/African origin
A	age of head of family
const.	the equation's constant
adj R[sym]	coefficient of explanation adjusted for degrees of freedom
D.W.	Durbin-Watson statistic.

$$\frac{\partial NCONS}{\partial PEN} = -0.5 \Leftarrow \begin{cases} \dfrac{\partial NCONS}{\partial PEN}\dfrac{PEN}{NCONS} = -0.02 \\ \dfrac{PEN}{NCONS} = 0.04 \end{cases}$$

Table 10: **Explanation of Saving Per Standardized Individual of Those that Make Pension Contributions, According to the 1979 Family Expenditure Survey**

Equation Number	Explanatory Variables												Statistics	
	const.	PEN	$(PEN)^2$	$(PEN)^3$	(YD)	$(YD)^2$	$(YD)^3$	A	$(A)^2$	$(A)^3$	FAMS	A-A	adj. R^2	D.W.
1.	1014.3	-1.576	0.026	-0.00007	0.179	0.00004	-0.000001	-96.5	2.0	-0.014	32.1	130.5	0.562	2.00
	(1.1)	(-1.2)	(2.2)	(-2.8)	(2.7)	(2.5)	(-1.1)	(-1.4)	(1.2)	(-1.0)	(3.6)	(1.9)		
2.	-499.3		0.012	-0.00004	0.240	0.00002					28.7	135.4	0.651	2.01
	(-5.9)		(3.0)	(-3.2)	(9.1)	(13.0)					(3.6)	(2.0)		

Explanation of Symbols

PEN contributions to pension savings (average 57.5 per unit)

YD disposable income per standardized individual (average value 1574.5 per unit)

A age of head of family (average value 40.8 years)

FAMS size of family

E-A European/American origin

A-A Asian/African origin

const. the equation's constant

adj R (sym) coefficient of explanation adjusted for degrees of freedom

D.W. Durbin-Watson statistics

References

Carroll, Christopher D. (1991), "Buffer Stock Saving and the Permanent Income Hypothesis", Board of Governors of the Federal Reserve System.

Deaton, Angus S. (1992), *Understanding Consumption*, Oxford University Press.

Engen, Eric M. and William Gale (1993), "IRAs and Saving in a Stochastic Life Cycle Model, University of California at Los Angeles.

Dicks -Mireaux, Louis and Mervyn King (1984), "Pension Wealth and Household Savings: Tests of Robustness", *Journal of Public Economics* 23, pp. 115-139.

Feldstein, Martin S. (1974), "Social Security, Induced Retirement, and Aggregate Capital Accumulation," *Journal of Political Economy* 82, pp. 905-926.

Gale, William G. and John K. Scholz (1994), "IRAs and Household Saving", *American Economic Review*.

Gustman, Alan L. and Juster, Thomas F. (1995), "Income and Wealth of Older American Households: Modelling Issues for Public Policy Analysis", National Bureau of Economic Research Working Paper No. 4996.

Hubbard, Glenn R. (1986), "Pension Wealth and Individual Saving," *Journal of Money, Credit and Banking* 18(2), pp. 167-178.

Hubbard, Glenn R., Jonathan Skinner and Stephen P. Zeldes (1995), "Precautarionary Saving and Social Insurance," *Journal of Political Economy* 103(2), pp. 360-399.

İmrohoroğlu, Ayse, Selahattin İmrohoroğlu and Douglas H. Joines (1994), "The Effect of Tax-Favored Retirement Accounts on Capital Accumulation and Welfare," Federal Reserve Bank of Minneapolis Discussion Paper No. 92.

Kotlikoff, Laurence J. and Lawrence H. Summers (1981), "The Role of Intergenerational Transfers in Aggregate Capital Formation," *Journal of Political Economy* 89(4), pp. 297-313.

Modigliani, Franco (1986), "Life Cycle, Individual Thrift and the Wealth of Nations," *American Economic Review* 3 76, pp. 297-313.

Poterba, James M. (1994) (ed.), *International Comparisons of Household Savings*, The University of Chicago Press.

Samwick, Andrew A., (1994), "The Limited Offset Between Pension Wealth and Other Private Wealth: Implications of Buffer-Stock Saving," unpublished, Cambridge.

Spivak, Avia (1994), "The Pension Crisis in Israel: A Conceptual Framework and Possible Solutions," *The Economic Quarterly* 41, pp. 484-523, October (Hebrew).

Venti, Steven F. and David A. Wise (1990), "Have IRAs Increased US Saving? Evidence from Consumer Expenditure Survey," *Quarterly Journal of Economics* 105 (August), pp. 661-698.

רשימת המאמרים בסדרה

M. Beentstock and S. Ribon- The Market for Labor in Israel. 91.15

ד. אלקיים, - השפעת המדיניות המוניטרית על פער הריביות במגזר השקלי הלא צמוד 1986 עד 1990. 91.16

מ. דהן, - בחינת מדד הדחף הפיסקאלי של ה-IMF עבור המשק הישראלי לשנים 1964 עד 1990. 92.01

O. Bar Efrat - Interest Rate Determination and Liberalization of International Capital Movement: Israel 1973 - 1990. 92.02

Z. Sussman and D. Zakai - Wage Gaps between Senior and Junior Physicians and Crises in Public Health in Israel, 1974-1990. 92.03

צ. ויס, ע. לויתן - התפתחות תשלומי העברה בישראל, 1965 עד 1989. 92.04

O. Liviatan - The Impact of Real Shocks on Fiscal Redistribution and Their Long-Term Aftermath. 92.05

A. Bregman, M. Fuss and H. Regev - The Production and Cost Structure of the Israeli Industry: Evidence from Individual FiRm Data. 92.06

M. Beenstock, Y. Lavi and A. Offenbacher - A Macroeconometric Model for Israel 1962-1990: A Market Equilibrium Approach to Aggregate Demand and Supply. 92.07

ס. ריבון, - מודל חודשי לשוק הכסף. 92.08

R. Melnick - Financial Services, Cointegration and the Demand for Money in Israel. 92.09

מ. ברון, - העליות לארץ והשפעתן על הפסיפס הדמוגרפי של האוכלוסייה והן ההון האנושי. 92.10

ד. זינגר, - גורמים הקובעים את ההסתברות של פירמות להיסגר. 92.11

R. Melnick - Forecasting Short-Run Business Fluctuations in Israel. 92.12

K. Flug, N. Kasir and G. Ofer - The Absorption of Soviet Immigrants into the Labor Market from 1990 Onwards: Aspects of Occupational Substitution and Retention. 92.13

א. ארנון, ח. פרשטמן, - הפרטת מונופולים טבעיים: הריצה אחר הבלתי מוכח. 92.14

B. Eden - How to Subsidize Education and Achieve Voluntary Integration: An Analysis of Voucher Systems. 93.01

א. ברגמן, א. מרום, - גורמי צמיחה בסקטור העסקי בישראל (1958 עד 1988). 93.02

מ. דהן, - צמיחה כלכלית תחת איום ביטחוני. 93.03

ק. פלוג, נ. (קלינר)קסיר - קליטה בתעסוקה של עולי חבר המדינות - הטווח הקצר. 93.04

מ. דהן, - האם קיימת יריבות בין שיויון בחלוקת ההכנסות להתפתחות כלכלית? : המקרה של ישראל. 93.05

צ. הרקוביץ, ל. מרידור - ההשלכות המקרו-כלכליות של עלייה המונית לישראל: עדכון ובחינה מחודשת. 93.06

A. Arnon, D. Gottlieb - An Economic Analysis of the Palestinian Economy: The West Bank and Gaza, 1968-1991. 93.07

צ. הרקוביץ, ל. מרידור, נ. קנטור - הגירה וצמיחה בתנאים של ניידות הון בלתי משוכללת: גל העלייה לישראל בראשית שנות התשעים. 93.08

K. Flug, N. Kasir - The Absorption in the Labor Market of Immigrants from the CIS - the Short Run. 93.09

R. Ablin – Exchange Rate Systems, Incomes Policy and Stabilization Some Short and Long-Run Considerations. 94.01

B .Eden - The Adjustment of Prices to Monetary Shocks When Trade is Uncertain and Sequential. 94.02

94.03 מ. ברון, - התחזית הדמוגרפית ולקחיה.

94.04 K. Flug, Z. Hercowitz and A. Levi - A Small-Open-Economy Analysis of Migration.

94.05 R. Melnick and E. Yashiv - The Macroeconomic Effects of Financial Innovation: The Case of Israel.

94.06 צ. הרקוביץ, מ. סטרבצ'ינסקי, - מדיניות חוב ציבורי בישראל.

94.07 א. בלס, - חוזים כחסמי כניסה בשיווק דלק לתחנות תילדוק: בחינת החלטת הממונה על הגבלים עיסקיים לפיה מערכת ההסדרים הקיימת היא בגדר הסדר כובל.

94.08 מ. דהן, - צמיחה כלכלית, פעילות בלתי חוקית והתחלקות הכנסות.

94.09 A. Blass - Are Israeli Stock Prices Too High?

94.10 א. ארנון, ג'. וינבלט, - פוטנציאל הסחר בין ישראל, הפלסטינים וירדן.

A. Arnon and J. Weinblatt - The Potential for Trade Between Israe the Palestinians, and Jordan.

94.11 מ. דהן, מ. סטרבצ'ינסקי, - תקציב הסקטור הציבורי וצמיחה כלכלית בישראל.

94.12 ק. פלוג, נ. (קלינר) קסיר - הציות לחוק שכר המינימום בסקטור העסקי.

94.13 B. Eden - Inflation and Price Dispersion: An Analysis of Micro Data

94.14 א. ספיבק, - משבר קרנות הפנסיה בישראל: מסגרת מושגית ובחינת ההמלצות לפתרון.

94.15 ל. מרידור, ש. פסח - שער החליפין הריאלי בישראל: פרספקטיבה של שלושה עשורים.

94.16 B. Eden - Time Rigidities in The Adjustment of Prices to Monetary Shocks: An Analysis of Micro Data.

94.17 O. Yosha - Privatizing Multi-Product Banks.

B. Eden - Optimal Fiscal and Monetary Policy in a Baumol-Tobin Model 95.01

B. Bar-Nathan, M. Beenstock and Y. Haitovsky - An Econometric Model of The Israeli Housing Market. 95.02

מ. דהן - אוכלוסיה אנדוגנית והתחלקות הכנסות. 95.03

A. Arnon and A. Spivak - A Seigniorage Perspective on the Introduction of a Palestinian Currency. 95.04

י. לביא, - האם השינוי בהכנסה השוטפת תורם להסבר השינוי בתצרוכת בישראל? בחינה אמפירית של תיאוריית ההכנסה הפרמננטית עם צפיות רציונאליות. 95.05

M. Bruno and R. Melnick - High Inflation Dynamics: Integrating Short-Run Accommodation and Long-Run Steady-States 95.06

ע. יושע, י. יפה - הרפורמה בשוק ההון והשפעתה: ניתוח מזוית "המבנה הענפי" 95.07

M. Strawczynski - Capital Accumulation in a Bequest Economy. 95.08

ז. שיפר - על סעיף הדיור בבעלות הדיירים במדד המחירים לצרכן. 95.9

א. בן בסט - משטר שער החליפין, המדיניות המוניטרית ויעד האינפלציה. 95.10

A. Arnon and A. Spivak - Monetary Integration Between the Israeli, Jordanian and Palestinian Economies 95.11

נ. לויתן - המשבר במכסיקו - פירושים ולקחים. 95.12

ר. כהן, ב. סורני - איתור יעד ביניים למדיניות מוניטרית בישראל 1988-1994. 95.13

א. בלס - ביצועי קופות הגמל ומבנה שוק: 1987-1994. 96.01

ח. בר, ע. יושע, י. יפה - פיקוח על בנקים, בורסה ובעלי עניין: עדויות על פירמות בישראל. 96.02