Is One Plus One Always Two? Insuring Longevity Risk While Having Multiple Savings Accounts

Abigail Hurwitz[a,b] **and Orly Sade**[c]

[a]The Wharton Business School, University of Pennsylvania, Philadelphia, PA, (visiting).
[b]Finance Department, College of Management Academic Studies, Rishon LeZion, Israel.
[c]Finance Department, Jerusalem School of Business Administration, Hebrew University of Jerusalem, Israel.
For correspondence: orlysade@huji.ac.il

ABSTRACT

In this paper, we investigate the possible consequences of having multiple savings accounts on pay out decisions at retirement. Our results contribute to the literature on individual annuitization decisions and the discussions about Asset, Liabilities and Reserves management of long-term savings providers. Our study is based on proprietary data comprising 15,293 Israeli retirees' annuitization decisions during the years 2009–2013. We document a significant size effect of the accumulated funds on the decision to annuitize. We find that retirees with smaller accounts have a significantly higher propensity to cash out their accounts upon retirement (controlling for related variables). These findings may be driven either by specific characteristics and attitudes of individuals who save less, or by behavior arising from managing multiple accounts possibly related to mental accounting, or both. Our results were obtained using a unique identification strategy that regards occupation as an instrument variable, and are consistent with the mental accounting argument. Our data also reveals that large accounts are likely to be annuitized. Hence, our findings also suggest that insurance companies may consider treating small and large accounts differently in their ALM strategies. We further conduct an internet survey experiment that confirms these empirical results, and suggests that the composition of the multiple accounts affect the annuitization rates of the total saving portfolio.

Keywords: Asset and Liabilities Management (ALM), Mental Accounting, Annuitization

Introduction

Imagine the following scenario: you just retired, and you need to decide how to withdraw your savings. How much of it will you invest in an annuity (insuring your longevity risk) and how much will you cash out as a lump sum? Your goal is to be able to not exhaust your assets too soon, and enable you to face potential future liquidity shocks. This intricate decision made by individuals at an older age can have significant consequences on their well-being. Given both its complexity and importance, there is growing academic and practical interest in the household financial literature aimed at enhancing both long-term savings and demand for longevity insurance products.

Imagine now that you saved your retirement savings via different products and providers (like many other individuals). Will the distribution of your funds according to the size of the accounts affect your annuitization decision of the various accounts? If you are rational, and there are no frictions, it would be expected for you to allocate your savings to annuity versus lump sum according to the accumulated amount and your financial needs, and not according to the size distribution of the different accounts. Given the dynamic job market and the fact that most individuals will save for retirement via different products and accounts, there is a clear need to better understand the effect of multiple accounts not only on savings decisions and assets allocation, (as discussed in Choi, Laibson and Madrian, 2009) but also the decision on how to withdraw the funds. Yet, there is relatively little empirical evidence on that.

Now, imagine that you manage the investment strategy of a long-term savings provider. You understand that most individuals have multiple saving accounts and most likely you manage only a fraction (large or small) of the total portfolio of each of your clients (in one account or more). As a long-term saving provider, you also provide the longevity insurance to those clients that annuitize their funding at retirement which is the case for financial institutions in many

countries (e.g. Switzerland and Israel). Hence, better understanding of the relation of holding multiple saving accounts and the annuitization decision should be of great importance to your Asset Liability Management (ALM) and reserve management.

In this paper, we investigate empirically and experimentally if the distribution of pension saving across various providers as well as the relative size of each specific savings account managed by a particular long-term saving provider, affect the decision to annuitize or cash out at retirement.

Our empirical investigation relies on a unique and very detailed proprietary dataset from a leading insurance company in Israel including information regarding the annuitization decisions of retirees as well as a rich set of parameters describing them.[1] Our sample consists of 15,293 retirees' choices during the years 2009–2013. We document a correlation between the size of the accumulated fund and the decision to annuitize. In particular, retirees with small accounts had a significantly higher propensity to choose the (full) lump-sum option. To ensure that our results are not driven by accounts with very small, relatively negligible amounts, we also test a subsample only containing observations for retirees who had accumulated over NIS[2] 50,000 in a single account with this insurance company[3]. Even in this sample of 8,759 individuals, our results hold true; retirees with lower accumulated amounts have a significantly higher propensity to choose the (full) lump-sum option, and those with large amounts have a higher tendency to annuitize.

The fact that annuitization rates differ with account size is puzzling and can be related to the possibility of having multiple savings accounts. The global trends in the workplace, resulting

[1] Each client in our sample could choose to withdraw a lump sum, an annuity, or both, subject to Israeli government regulation. The annuitization decision is made by each retiree only once.

[2] New Israeli shekels.

[3] This threshold was set in consultation with financial industry experts in Israel.

in substantial work mobility for each worker throughout his or her career, together with frequent changes in long-term savings policies employed in different countries, affect the structure of individuals' long-term saving composition. In Israel (as in other countries), it is very common to have several long-term savings accounts and products. Hence, a particular small account can be the main savings account or just part of a larger diversified portfolio[4] of products or providers. We obtained data from a single and particularly large Israeli insurance company. One challenge that this data imposes is the ability to determine if individuals included in the sample have additional accounts with other insurance companies or pension providers. Hence, the relation between the account size and the documented annuitization decision can result from (1) different preferences for annuities by individuals with different total saving amounts or (2) from different preferences that are driven from the distributions of funds over several accounts, or both. In the latter case, cashing out (annuitizing) the accumulations from small (or large) accounts may be an indication of a well known behavioral bias, the mental accounting.. Mental accounting can cause retirees to perceive smaller and larger pension accounts differently, and hence lead this population to make varying decisions about disbursements.

To further investigate this phenomenon and to distinguish between these possible explanations, we employ an identification strategy that consists of several steps. First, we use occupation as an instrument variable. Given that the data contains occupation information for each individual[5], we screen the sample according to very high versus very low expected income occupations. Our assumption is that the very high expected income observations should be associated with higher total long-term savings (which can be divided across providers or products).

[4] A pension portfolio would be consisted mostly of financial assets. Reverse mortgages are very rare in Israel.

[5] Individuals have the incentive to report changes in their occupational status, since otherwise they may not be covered by other insurance policies in this company or might have to pay a premium on other products.

Accordingly, for individuals with high income, having a small account in our sample suggests that this account is likely to be merely a part of an individual's diversified portfolio. While very low expected income observations should be associated with lower overall savings. Our results suggest that while high expected income individuals are indeed more likely to annuitize, they are less likely to annuitize small amounts.

Second, in order to mitigate the potential concern of annuity choices being influenced by differences in characteristics or a selection bias, we also conduct a matching analysis in which we use a propensity score matching on the socioeconomics attributes (the only difference being the amount accumulated) to pair selected individuals. Again, the smaller accounts have a higher tendency to be distributed as a lump-sum. Our conjecture, given these additional tests, is that mental accounting and possibly other frictions affect annuitization decisions. Specifically, individuals do not treat small and large accounts in a similar manner.

In order to further study the overall effect on the entire portfolio and in order to provide additional robustness to our previous results obtained from the data, we conducted an internet experimental survey. The experimental framework not only allows us to overcome some of the caveats of the data (specifically the lack of information regarding the entire portfolio) but also enables us to elicit preferences towards annuitization in various controlled allocations of the accumulated funds. We employed an internet survey experiment in which we randomized the accounts' size distribution as our investigated treatments. The subjects were asked to divide a total sum of money that was saved for retirement between a monthly annuity and a lump sum. A total of 1,971 participants (from a representative sample of the Israeli population) were randomly assigned to one of five conditions. In the first condition the respondents were asked to split their (virtual) accumulated funds (of NIS 2 million) between an annuity and a lump sum (one account

that serves as the control condition). In the other four conditions participants were required to perform a similar task, only now their funds were split between two accounts (sum to NIS 2 million in the various conditions): (1) a small account of NIS 30,000 and a large account of NIS 1,970,000; (2) a small account of NIS 100,000 and a large account of NIS 1,900,000; (3) a small account of NIS 500,000 and a large account of 1,500,000; and (4) two equal accounts worth NIS 1,000,000 each. If individuals are rational, they should treat all five treatments in a similar manner and divide the total NIS 2 million to annuity versus lump sum only according to their preferences, while not accounting for how the amount is divided across different accounts.

Our results indicate that regardless of the treatment (distribution of funds across accounts) or size, the mean proportion of money participants are choosing to withdraw as a lump sum out of their larger account, is about one third implying a preference for the annuity option[6] (a result that is similar to actual annuity take-ups in Israel found in a recent paper by Hurwitz and Sade, 2019). However, the small accounts are significantly more likely to be withdrawn as lump sum and the smaller the amount, the greater the propensity to choose the cash option. For the NIS 30,000 accounts, we document an average lump-sum withdrawal of 71.2% (median of 100%), of the NIS 100,000 accounts, an average of 57.6% of the funds was cashed out (median of 60%), out of the NIS 500,000 accounts we find an average lump sum cash out of 43.6% (median of 30%), decreasing to 37.9% (median of 20%) in the equal accounts condition. Interestingly, the analysis of the withdrawal strategy out of the total accumulated amount (that is NIS 2,000,000 in total for all participants, regardless of the treatment), suggests that the median chosen cash withdrawal is about 10% in the treatments in which participants were introduced to a distribution with a relatively very small account (both NIS 30,000 and NIS 100,000) and lower than in the one account case

[6] While the median of lump sum proportion withdrawals are even smaller (about 10%-20%).

(20%) and the equal distribution (about 30%), suggesting that having a very small account to cash out (as an immediate cash withdrawal) may in turn effect the decision to annuitize the other (large) account.

To sum, our findings suggest that mental accounting does indeed play a role in retirement payout choices. We recognize that mental accounting is very relevant for the valuation of the costs and benefits associated with pension multiple accounts across several providers, and for promoting the potential need of fintech innovation that can overcome the documented tendencies (e.g an app that aggregate the accounts information and present the overall accumulations before the annuitization decision) and for suggesting potential regulatory interventions. Our findings suggest that insurance companies that provide products with an option of longevity insurance embedded in them should consider size distribution in their reserve calculations and AML strategy.

Our work is directly related to the following literatures: long-term savings, reserve management and ALM management, the annuity puzzle, and mental accounting.

Firstly, academic studies emphasize the complexity of ALM of long-term savings providers. Pension funds' board members face many dilemmas when making decisions related to ALM and to investment, contribution and indexation policy. Actuarial considerations such as retirement age, job discharges and mortality rates may influence the length of the future cash flow series (Bauer et al., 2006). Furthermore, annuity purchase assumptions are also part of the calculation process (Bloom et al., 2007). We add to this literature by suggesting that the composition of the size of the managed accounts should also be taken into account.

Secondly, with respect to the annuitization puzzle literature, Yaari (1965) was the first to note that a rational retiree with no bequest preferences in a world of fairly priced annuities will gain more from purchasing said annuities, compared to withdrawing a lump-sum. Yet, recent

studies from varying countries allude to an annuity puzzle, where little evidence is found that retirees follow this advice in actuality (e.g., Beshears et al., 2014, Ganegoda and Bateman, 2008). While there are studies that attempt to explain this annuity puzzle through market imperfection and product feature arguments, there is a growing body of literature that focuses on customer characteristics and attitudes (socioeconomic or behavioral). Examples of explanations include the complexity of the decision (Brown et al., 2013, Brown et al., 2017), default biases (Agnew et al., 2008, Butler and Teppa, 2007), difficulty in making irreversible decisions (Brown and Warshawsky, 2001), biases related to framing (Benartzi et al., 2011, Beshears et al., 2014, Goldstein et al., 2016), difficulty parting with accumulated money (Benartzi et al., 2011), availability errors (Hu and Scott, 2007), ambiguity about life expectancy (Smith et al., 2001), and the belief that annuities have a "smell of death" (Statman, 2017). While we do not aim to solve the annuity puzzle in this current work, we contribute to this literature by showing that saving via multiple accounts can influence the annuitization choice, hence it is an additional parameter for insurance companies, decision makers and regulators to consider

A final and third possible mechanism for explaining our result is related to mental accounting. The mental accounting theory (Thaler, 1985) suggests that a set of cognitive actions is used by individuals to perform financial activities. The theory is based on the notion that individuals tend to treat financial outcomes in different ways related to several decision heuristics and biases (Thaler, 1985). Findings from past studies demonstrate that people treat small gains (relative to income) in a different manner compared to large gains. Thaler (1990), suggests that in contrast to larger gains, smaller gains are coded as current income, hence spent, rather than saved. Loewenstein and Thaler (1989) further determine that subjective discount rates for small amounts are high, compared to discount rates for larger amounts. Though it has already been suggested that

mental accounting influences annuitization decisions, it was with respect to different contexts. Benartzi et al. (2011) argue that economists mostly view annuitization as longevity insurance, but many consumers do not. Rather, consumers regard annuities as a "gamble", i.e. whether the individual will live long enough for it to be paid off, and not as insurance against longevity. Brown et al, (2008) suggest that annuitization choices are influenced by a mental separation of investment choices from consumption choices. Hu and Scott (2007) illustrate that an annuity may be segregated into its own mental account rather than integrated with all retirement consumption funds. We add to this literature by studying the potential effect of the different account size composition resulted from savings via multiple accounts

Our results are consistent with those of previous papers. Bütler and Teppa (2007) use data of individuals collected from 10 Swiss pension funds to investigate the decision to annuitize. They find that small accumulations are more likely to be withdrawn as a lump sum. A similar result is presented by Benartzi et al. (2011) in a paper investigating annuitization puzzles. They suggest that people consider small accumulations to be insufficient to annuitize. We add to these findings by testing alternative explanations and studying the effect of the distribution of funds on pay out decisions.

This paper is structured as follows: We first review the setting in which our investigation take place. We then present the data and report the empirical results of our analyses followed by a description of an additional experimental survey. We conclude with a brief discussion of the consequences of diversification in the context of the annuitization decision.

The Setting: Structure of the Israeli Pension System

The Israeli pension system comprises from public and private layers. The private layer is a complex system that consists of five types of long-term savings products: (a) "old" pension funds,[7] (b) "new" pension funds,[8] (c) "new" general pension funds, (d) pension insurance policies,[9] and (e) provident funds. The focus of this project is only on choices in the private layer that are related to pension insurance policies. These policies, some of which provide the saver with tax benefits, and many of which are part of common salary agreements, are managed by insurance companies that provide both operational management and investment of the funds. Typically, in Israel, the institution managing the funds during the saving phase will also provide an annuity upon retirement.

Due to differences in tax incentives, historically there was a tendency for employees to save using either a pension fund or a pension insurance policy (these policies were usually offered to higher wage employees) and for self-employed individuals to save mostly using provident funds or life insurance policies. Moreover, the choice of a savings product differed between different industries and was influenced by whether one belonged to an employee organization.

Israel is an interesting setting for study since individuals can and do diversify their long-term savings through several plans and products. This can be done simultaneously or over time, actively or passively. For example, one might experience a change in the menu of available long-term savings products following a change in one's workplace if the new employer has associations

[7] Defined benefit pension funds in Israel, that were closed to new clients after December 31, 1994.

[8] Defined contribution pension funds that were first established on January 1, 1995; these funds must preserve actuarial balance.

[9] Also known in Israel as managerial insurance policies, the trade name of pension insurance products designed for employees. These policies include both a savings component and an insurance component (for different kinds of risks such as death and disability).

with different long-term providers. Hence, a typical retiree who changes jobs every few years will most likely have more than one pension (or insurance policy) account.

Since 2000, pension insurance policies in Israel are divided into two categories: those designated for an annuity and those designated for a lump sum. Prior to 2008, lump-sum accounts allowed a lump-sum payment according to current law[10]; after 2008, such policies allows a lump-sum payment only for individuals who had saved a sufficient amount of money to be able to withdraw a minimum annuity as set by the revised law (this legislation only applies for funds saved after 2008).

The Data

We obtained proprietary data from a large insurance company in Israel regarding retirees with pension insurance policies[11]. Our dataset contains information on retirees' withdrawal schemes between the years 2009 and 2013. We received information regarding 15,293 retirees[12]. The amount of accumulated funds varies widely. The mean accumulation is NIS 173,000[13] and the median is NIS 65,000. The minimum is NIS 1 and the maximum is NIS 12.9 million[14]. The 75th percentile of the accumulated accounts is NIS 188,000. Because of the historical environment of long-term savings in Israel (in which many employers choose a default pension fund for their employees), it is very likely that small pension accumulations are merely a part of an individual's pension portfolio, while larger accounts are likely to be the individual's significant pension

[10] The law changed in 2005, after which one could withdraw a lump sum only after the age of 60 years, whereas previously it could be withdrawn even at a younger age if other criteria set by the law were satisfied.

[11] The insurance company that provided us with the data is one of the five largest insurance groups in the country. The population that is insured in this company is very diversified in terms of occupation.

[12] We initially received information on 18,860 retirees but for some observations we did not have sufficient sociodemographic information (missing data).

[13] Approximately USD 50,000.

[14] The four largest accumulations were NIS 5.4 million, NIS 6.5 million, NIS 9.5 million, and NIS 12.9 million.

account[15]. Fig. 1 shows the distribution of client-level accumulations: The number of clients in our sample declines, with the increase in accumulated funds.

[FIGURE 1]

The dataset contains socioeconomic and demographic information for each retiree, such as date of birth, date of purchase of the policy, date of disbursement, gender, marital status, smoking status, annuity factor (an annuity factor is pricing of the annuity; it is generally specified in terms of either years or months of annuity to be paid out of a certain lump sum amount), investment management method, medical and professional supplements to the policies, residence, last occupation, and other insurance tariff surcharges (risk, work disability, long-term care insurance, and health insurance). The mean retirement age is 65.9 years, and 48% of the retirees are male; the majority of retirees are married (57.1%). At retirement, each client could choose a withdrawal of a lump sum, an annuity, or both, subject to the minimal mandatory annuity law (applying only to funds accumulated after 2008). In all, 26.7% chose to annuitize at least some of their accumulated funds, and 73.4% chose not to annuitize any amount of the accumulated funds. The mean monthly annuity for those who annuitized is NIS 1,902.5 and the annuity factor is 13.5[16] (see Table 1).

[TABLE 1]

Interesting Setting for Investigating Mental Accounting. Do People Annuitize Regardless of Their Total Accumulated Funds?

Diversification and Annuitization Decisions

[15] We compared our data to public information published by Old Mivtachim, the largest Israeli "old pension fund" (historically, members of these funds usually did not change employers frequently and hence they did not have other pension accounts). The average accumulation for clients between the ages of 60 and 64 years was NIS 728,000.

[16] In yearly terms; this equals 161.6 in monthly terms.

Diversification—usually referring to portfolio selection (Markowitz, 1952)—is common advice for investors. This advice is applicable not only for financial assets and portfolios but also for long-term savings money managers and product providers, mainly because it would provide diversification in the investment philosophies and strategies and potentially access to different non-tradable financial assets. Clearly, the money manager's solvency can be an issue as well. As indicated above, in Israel, for structural and historical reasons, pension savings are likely to be split between several pension funds and insurance companies. As a result of this diversification strategy, it may turn out that some individuals hold multiple saving accounts and have relatively small amounts managed by some long-term-savings money managers.

Conversely, mental accounting theory suggests that people treat small amounts and gains differently from large amounts. Hence, it is of interest to test if this effects retirees' withdrawal choices. In other words, we are interested in testing the hypothesis that diversification leading to multiple saving accounts will lead individuals to treat small and large pension accounts differently when making their annuitization decisions. **Annuitization Decisions—The Empirical Investigation**

While the focus of our investigation is to learn if the distribution of funds across accounts[17] predicts the annuitization decision, it is important to control for all other relevant information. Hence, we conduct a series of descriptive regressions to examine the characteristics of retirees who choose to annuitize. Our main controls are based on past literature findings and can be divided into three main groups: personal (e.g., Butler and Teppa, 2007, Warner and Pleeter , 2001), pension policy, and year-fixed effects.

[17] A retiree may have his or her funds in one or more accounts. We looked at the total sum of money in all funds together.

Choosing an annuity

In our first examination, we investigate the proportion of retirees who choose to annuitize any portion of their accumulated funds. Fig. 2 presents this proportion for individuals with accumulations below and above the median amount in our data. We document a significantly higher proportion of decisions to annuitize among individuals with accumulated funds that are above the median amount in our data. This result is consistent with findings for individuals invested in 10 different Swiss pension funds (Butler and Teppa, 2007). Small accumulations are more likely to be withdrawn as a lump sum.

[FIGURE 2]

Next, we conduct a reduced form analyses to examine the characteristics of retirees who chose to annuitize. Specifically, we are interested in the effect of the size of accumulated funds on the propensity to annuitize.

In Equation 1 we estimate the effect of the total amount saved with this specific pension provider on the decision to annuitize.

$$y_{\text{ann}} = \alpha + \beta_1 \text{male} + \beta_2 \text{retirement age} + \beta_3 \text{year dummies}' + \beta_4 \text{total amount} + \beta_5 \text{divorced} + \beta_6 \text{widowed} + \beta_7 \text{married} + \beta_8 \text{unknown marital status} + \beta_9 \text{purchase age} + \beta_{10} \text{no. of policies} + \beta_{11} \text{percent 2008} + \epsilon_i \quad (1)$$

where y_{ann} is a dummy variable for choosing to annuitize (y_{ann}= 1 if the retiree chooses any portion of the whole as an annuity; as a robustness check we also look at the propensity to annuitize and the choice of full annuities and find a similar effect); retirement age is the retiree's age at the time of decision; year dummies are dummy variables for the years 2009–2012, indicating the year in which the retiree made the annuitization choice as defined above (2013 was omitted); total

amount is the total sum an individual accumulated upon retirement and is the main variable of interest; divorced, widowed, married, and unknown marital status are dummy variables for marital status (the category "single" was omitted); purchase age is the average age of the retiree (over all of the retiree's policies) when the policies were purchased (this variable is correlated with the client annuity conversion factor and hence can serve as a proxy for it; we do not have information about the annuity conversion factor for clients who chose the full lump-sum option); no. of policies is the number of different policies for each client with this particular insurance company; and percent 2008 is the proportion of money accumulated after 2008 that had to be withdrawn as an annuity to satisfy the minimum mandatory annuity law of 2008.

The results for the logit model are displayed in column 1 in Table 2. Overall, all models are significant with pseudo R^2 equal to between 30% and 40%.

[TABLE 2]

We find that gender[18], retirement age, and macroeconomic status (year dummies) are related to the annuitization choice, but marital status does not significantly affect individual preferences. This is consistent with previous literature (e.g., Butler and Teppa, 2007).

To understand both the impact seniority and the conversion factors, we include "purchase age" in the regression. Its coefficient is negative and significant in all the different specifications, implying that a 1-year delay in the purchase of a pension product will reduce the likelihood of choosing an annuity (this could result from the increase in the conversion factor).

Our main variables of interest are the accumulated amount variables. In specification 1 the effect is minor (by definition, it is the marginal effect of an additional NIS 1 to the accumulated amount on the propensity to annuitize).

[18] It should be mentioned that in Israel the annuity conversion factors are different across gender.

We estimated Equation 2 with a similar specification:

[2]

$$y_{\text{ann}} = \alpha + \beta_1 \text{male} + \beta_2 \text{retirement age} + \beta_3 \text{year dummies}' + \beta_4 \text{amount dummies} + \beta_5 \text{divorced} + \beta_6 \text{widowed} + \beta_7 \text{married} + \beta_8 \text{unknown marital status} + \beta_9 \text{purchase age} + \beta_{10} \text{no. of policies} + \beta_{11} \text{percent 2008} + \epsilon_i$$

This time, instead of using the accumulation size, we use a dummy variable for the accumulated amount being less than NIS 50,000 (Table 2, column 2), NIS 100,000 (Table 2, column 3), NIS 300,000 (Table 2, column 4), and NIS 500,000 (Table 2, column 5). In column 2 (accumulated pension amount of less than NIS 50,000), the effect is negative and significant. This implies that an individual who accumulated a relatively low amount at this insurance company (although such retiree is likely to have more savings with other pension providers) would tend to prefer the lump sum choice. In columns 3–5, we report the results of similar analysis with different threshold, the results support the conjecture that when the accumulated funds are lower, the tendency to prefer an annuity is lower.

Identification Strategy

Since we have data only from one insurance company, we do not know if an individual in our sample had additional accounts with other insurance companies or pension providers. We offer and test two nonexclusive mechanisms: (1) that individuals with smaller pension accounts in our sample are those who overall saved less, and those who saved less tend to prefer the lump-sum choice; and (2) that many of the smaller accounts in our sample have little accumulated funding in this insurance company because the owner diversified her or his long-term savings via different products and providers.

To identify the determinants of the different behavior related to the size of the accumulation we use occupation as an instrument variable. The reason we can use occupation as our identification strategy is that the common practice in Israel during the investigated period for the product was to save a similar percentage of the salary, for each employee, with a matching from the employer. Furthermore, saving for pension entitles a substantial tax benefit. Hence, it is very uncommon to save less than the threshold entitling tax benefits. For these reasons, an individual working in a high salary occupation is also expected to save more.

In our investigation, we first aim to learn if the size of the accumulations correlates with personal characteristics. Specifically, we study a binary model in which the dependent variable is having a small amount of saving in a specific account, defined as accumulating less than NIS 100,000. Our main independent variables are personal characteristics (age at retirement, purchase age, gender, marital status, smoking, paying an extra premium on other insurance policies for impaired health, and age difference between partners), policy characteristics (number of policies and annuity conversion factor), and macroeconomic fixed effect (year at retirement). Most of the personal characteristics do not have a significant effect on the size of the accumulated funds. In total, the explanatory power of the model is sufficient ($R^2 = 18.18\%$) and the only variables with a significant effect are policy and macroeconomics related characteristics; the total number of policies, annuity conversion factor, purchase age, and retirement year. This analysis suggests that the size of the accumulated funds is not statically related to personal attributes.

For the second test, we generate a subsample of the population consisting of individuals in relatively high-wage occupations[19], whom we would expect to have comparatively large

[19] Such as managers, computer programmers, engineers, software engineers, general managers, and chief executive officers. For a full list of occupations please see appendix 1.

accumulated savings amounts (N = 1,895). In addition, we also generate a subsample of individuals with relatively low-wage occupations. We expect these people to have relatively low accumulated funds; hence having a small account would likely relate to economic status rather than diversification. This subsample consists of 528 individuals.[20] We re-estimate equation 2 for the combined datasets of 2,423 individuals with expected high and low income occupations, and add a dummy variable for being in the high expected income group and an interaction variable for being in the high income group and having a small account (lower than NIS 50,000[21]).

The results for the logit model are displayed in column 1 in Table 3.

[TABLE 3]

The coefficient of the dummy variable for high income is positive and statistically significant. The interaction coefficient of high income and low amount significant and negative.

This implies that individuals with high expected pension accumulations are more likely to annuitize in general, and less likely to annuitize small amounts, meaning that they treat small savings differently than large savings.

For an additional test, we conduct a matching analysis in which we match on socioeconomics attributes (while the only difference is the amount accumulated in one or more accounts at that particular insurance company). We use propensity score matching to pair selected individuals by the exact gender, retirement age, retirement year, marital status, purchase year, number of policies, and proportion of funds accumulated after 2008 (thus subject to the mandatory minimum annuity law[22]). The only difference is the amount saved at this insurance company

[20] With professions such as daycare providers or housekeepers. For a full list of occupations please see appendix 1.

[21] We increased this level for robustness. The sign of the effect remains, while at some point the result is not significant (for larger amounts).

[22] Only for money saved after 2008.

(higher or lower than NIS 100,000). We end up with a subsample of 2,749 matched pairs (of individuals with savings of over NIS 50,000).[23] We estimate[24] the propensity score followed by an estimation of the accumulation size effect on the tendency to choose any portion of the disbursement as an annuity. Annuity purchase is significantly higher for individuals with large accumulated funds in both the matched and unmatched samples. Specifically, individuals in the matched sample are more likely to purchase an annuity if they have a larger sum. Our results suggest that the tendency to annuitize is driven by the size of the account and not personal characteristics. If we assume that given the long-term savings mechanism in Israel, individuals with similar characteristics should have similar total accumulated savings (though to some of them we only observe a fraction of that), This result can provide additional support to the argument that small amounts are indeed likely to be part of a larger portfolio that is not observed and is treated differently by retirees.

Robustness Tests

We conduct additional robustness tests. In particular, to overcome the concern that very small amounts are negligible, we report in Table 2, column 6 the results of the analysis of a subsample that contains observations of only retirees who accumulated over NIS 50,000 in total in pension insurance policies at this insurance company. In this subsample we find similar results: The sign of the dummy variables for accumulations that are lower than NIS 100,000 (between NIS 50,000 to NIS 100,000) is significant and negative, implying that for this sample as well, individuals treat smaller accumulated amounts differently from how they treat large accumulations.

[23] We used the Psmatch2 procedure in Stata, with only one match and no replacements.

[24] Using Psmatch2 (22) in Stata.

Large Accumulations and multiple policies in one insurance company

We conduct a similar analysis to the one presented in equation 2 but focus our examination on the behavior of individuals with high accumulated amounts (large portfolios), and those with multiple policies in one insurance company. Specifically, we include a dummy variable for accumulations higher than NIS 500,000[25] (the complementary group of column 5 in table 2). Results suggest that retirees with substantial funds are indeed more likely to annuitize.

Finally, we study a subsample of 4,433 with more than one policy (and a total accumulation above the trivial threshold NIS 50,000). Results are presented in figure 3.

[FIGURE 3]

We find that annuitization rates in the maximal account are higher compared to the results in the minimal. We also note that annuitization rates related to the minimal account are relatively high, possibly because most individuals treat accounts in one pension fund as the same account.

This behaviour raises further questions – is it solely related to personal characteristics or to the diversification of the portfolio? Since we do not have the entire portfolio information, we rely on an experimental framework.

Experimental Survey

The major caveat of our data is that we only observe behaviour related to one provider. To overcome this limitation, we further conduct an experimental survey, aimed to control the information and, ultimately, to elicit a decision in a task for which we can control the size and composition of the entire pension portfolio. We carry out an online survey using a research

[25] This threshold was chosen in comparison to public information published by Old Mivtachim, the largest Israeli "old pension fund" (historically, members of these funds usually did not have other pension accounts). As of December 2017, the mean accumulation of individuals insured in this fund, aged 60-64 is NIS 749,622.

company of 1,971 Israeli residents aged 18–79 years (n = 390 in Condition 1; n = 394 in Condition 2; n = 391 in Condition 3;n=398 in condition 4; n=398 in condition 5) mean age was 39.1 years; 48.7% male) in October 2018 and February 2019.[26] With regards to income, 13.6% reported a very low income, while 39% reported a high income.

The main task each subject faced was to split (virtual) accumulated funds between an annuity that would pay every period (until the end of life) and a lump sum. The control group (Condition 1) was told that they had a single account with an accumulated fund of NIS 2,000,000. The second group (Condition 2) was told that their total pension savings are managed in two accounts, a small account (of NIS 30,000) and a large account (of NIS 1,970,000). The third group (Condition 3) faced the same task only this time the small account consisted of NIS 100,000 and the large account was NIS 1,900,000. The fourth group (condition 4) faced a small account of NIS 500,000 and a large account of NIS 1,500,000, while participants in the fifth group (condition 5) were told of two equal accounts of NIS 1,000,000 each. Given that the total in all treatments was NIS 2,000,000, we assume that if individuals only care about the total, the division should not matter to the overall decision. Respondents were randomly assigned to the five conditions; hence our samples are well-balanced in terms of gender, age, income, and other demographic variables.

Our findings are consistent with the results we report above. Regarding the larger account, there is no significant difference in the proportion lump-sum withdrawals across the three conditions.

[FIGURE 4]

[26] The survey was administered by Geocartography using an online panel of voluntarily registered potential participants with a wide residential age distribution.

As clearly demonstrated in Fig. 4, whether the large account consists of NIS 2,000,000, NIS 1,970,000, NIS 1,900,000, NIS 1,500,000 or NIS 1,000,000, the average lump-sum withdrawal is about 30%.[27] However, the propensity to choose a lump sum for any part of the small accounts was much higher. For the NIS 100,000 account, an average of 57.6% of the funds was cashed out (taken as a lump sum). For the NIS 30,000 account, we document an average lump-sum withdrawal of 71.2%. Finally, for the NIS 500,000 account we find an average lump sum cash out of 43.6%, decreasing to 37.9% in the equal accounts condition. As further presented in figure 4 (b)-(c), we find that the composition of the accounts does matter. An unequal diversification of the funds, with a large sum in one account and a relatively small amount in the other yields choosing lower lump sum withdrawals out of the total accumulation (the total amount of money in both funds). In these cases, we also observe higher volatility of the chosen lump sum. In cases in which the two accounts are relatively large, and the amount is more equal, we find that participants withdraw higher lump sum amounts. These findings suggest that in cases in which individuals hold multiple accounts, mental accounting may affect not only the decision regarding the small account but also they may affect the total amount saved.

Conclusions

In this paper, we test whether holding multiple savings accounts affects retirement pay out decisions. Specifically, we examine the annuitization decisions of retirees in Israel who have had a pension insurance product at a leading Israeli insurance corporation. Our investigation relies on a unique and very detailed proprietary dataset from an insurance company that contains, in addition

[27] Lump-sum withdrawal in all the conditions was the following: Condition 1 was 32.3%; Condition 2 was 32.9%; Condition 3 was 30.1%, condition 4 was 32.9% ,and condition 5 was 32.3% (we should note that it was 37.9% in second account, that was equal). The difference between the ratios is not statistically significant.

to information about annuitization decisions upon retirement, a rich set of socio-demographic parameters, including information on occupation.

We document a significant and positive effect of the size of the accumulated funds on the decision to annuitize. Particularly, the larger the accumulated sum of money in the pension account, the higher the propensity to annuitize upon retirement. In a further set of experiments, we also provide evidence that the very existence of a small account within a portfolio, may in fact alter annuitization rates related to that total amount. In other words, we show that diversification across accounts may lead to different decisions, and in turn, different financial outcomes for both individuals and financial institutions.

Our findings suggest that mental accounting plays a role in the annuitization choice, presumably by causing retirees to perceive smaller and larger pension accounts differently and hence lead them to make different decisions about disbursements. These findings are very relevant for the valuation of the costs and benefits associated with pension diversification across several providers.

Our results have important policy implication to the discussion about asset and liabilities management of financial institutions. These institutions are expected to forecast both the propensity to annuitize and the longevity risk embedded in their portfolio. Systematic individual biases may influence choices. and as a result may also have consequences related to the future reserves needed for stability of annuities providers.

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Figure legends

Fig. 1. Accumulation distribution by number of clients. The majority of clients accumulated low amounts. Amounts are in New Israeli shekels.

Fig. 2. Proportion of retirees who chose to annuitize any portion of their accumulated funds, separately for those who had saved more than the median and those who had saved less than the median amount.

Fig. 3. Proportion of annuitized policies. Retries with multiple accounts. Total accumulation above NIS 50,000.

Fig. 4.

(a) Proportion of total accumulation withdrawn as lump sum in the experiment, separately for small and large accounts.

(b) Mean chosen lump-sum of the total amount in the experiment.

(c) Median chosen lump-sum of the total amount in the experiment.

(d) Standard deviation of chosen lump-sum of the total amount in the experiment.

Figure 1.

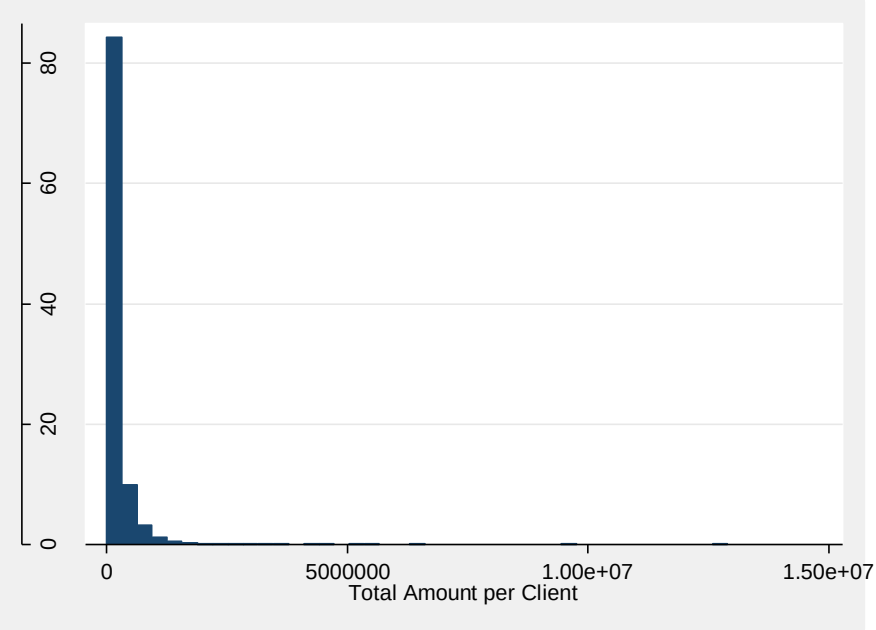


Figure 2.

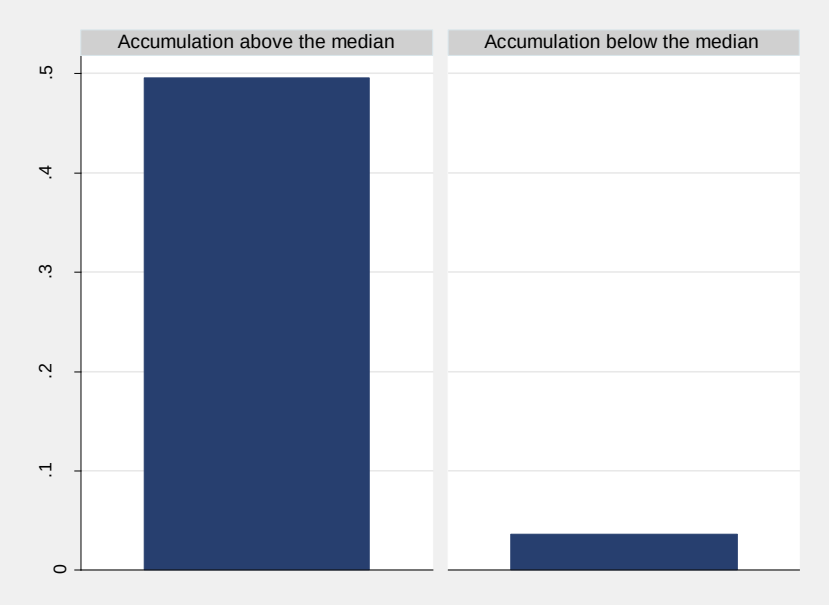

Accumulation above the median
Accumulation below the median
0
.1
.2
.3
.4
.5

Figure 3.

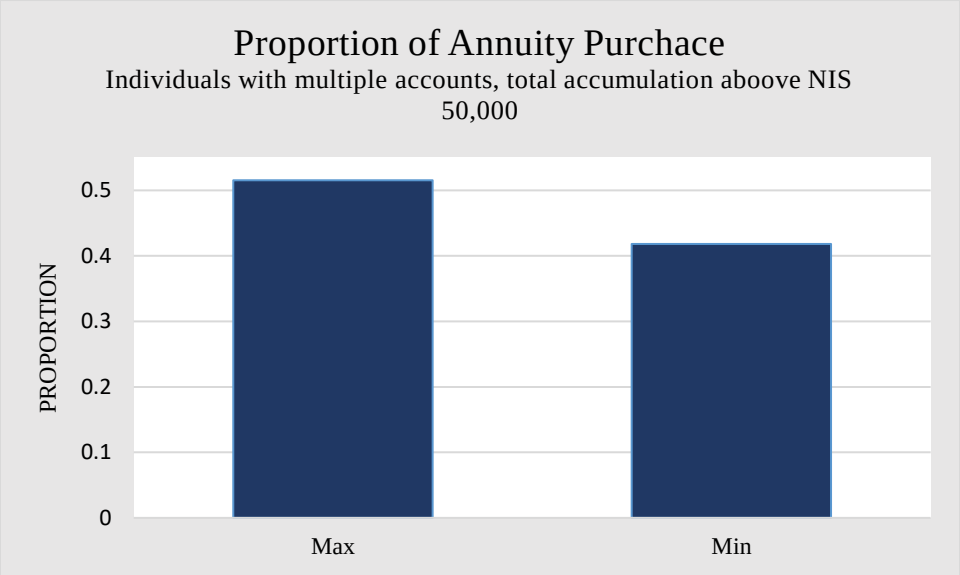
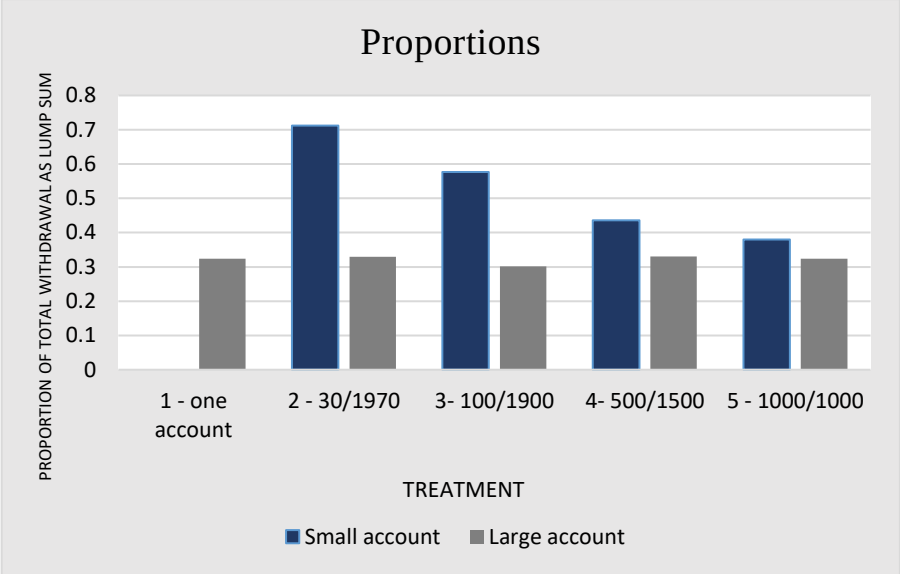
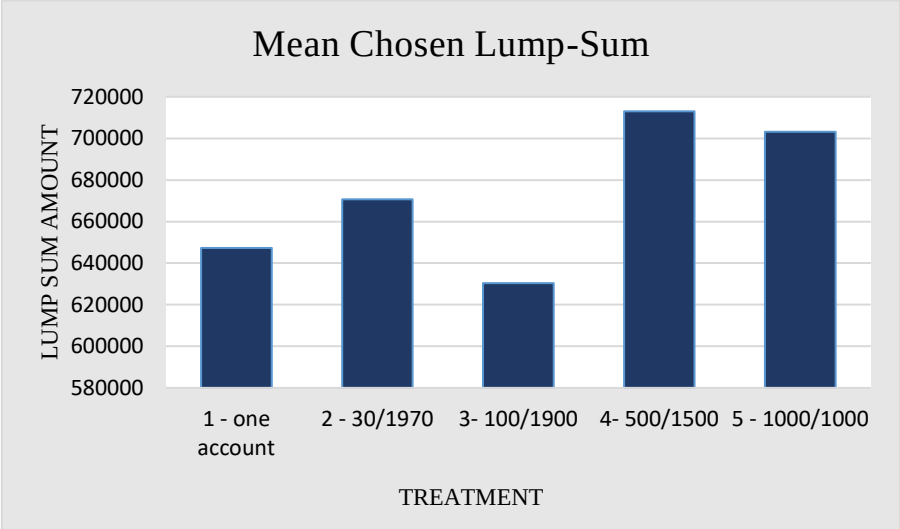

Proportion of Annuity Purchace
Individuals with multiple accounts, total accumulation aboove NIS 50,000
PROPORTION
0.5
0.4
0.3
0.2
0.1
0
Max
Min

Figure 4.

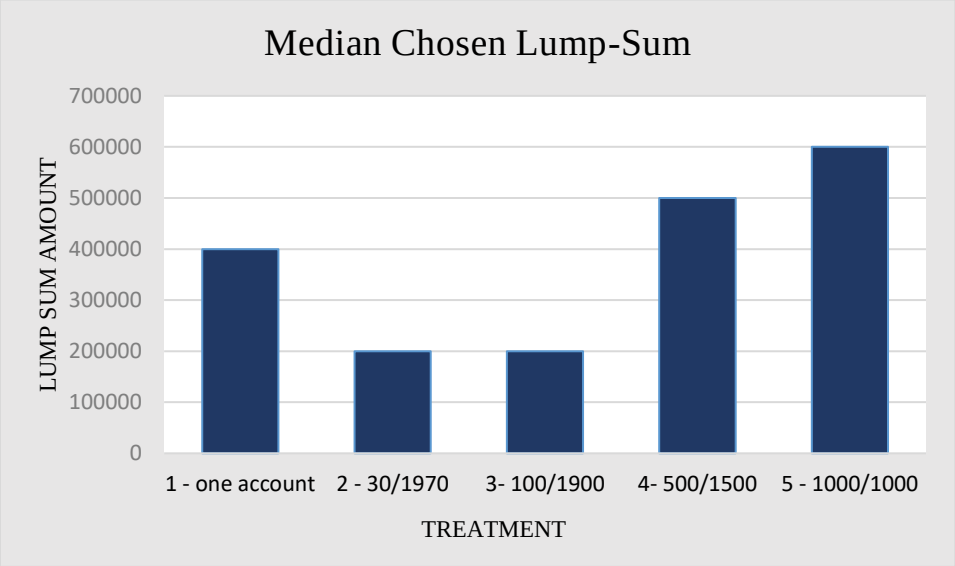
(a)


Proportions
PROPORTION OF TOTAL WITHDRAWAL AS LUMP SUM
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1 - one account
2 - 30/1970
3- 100/1900
4- 500/1500
5 - 1000/1000
TREATMENT
Small account
Large account

(b)


Mean Chosen Lump-Sum
LUMP SUM AMOUNT
720000
700000
680000
660000
640000
620000
600000
580000
1 - one account
2 - 30/1970
3- 100/1900
4- 500/1500
5 - 1000/1000
TREATMENT

(c)


Median Chosen Lump-Sum
LUMP SUM AMOUNT
700000
600000
500000
400000
300000
200000
100000
0
1 - one account
2 - 30/1970
3- 100/1900
4- 500/1500
5 - 1000/1000
TREATMENT

(d)

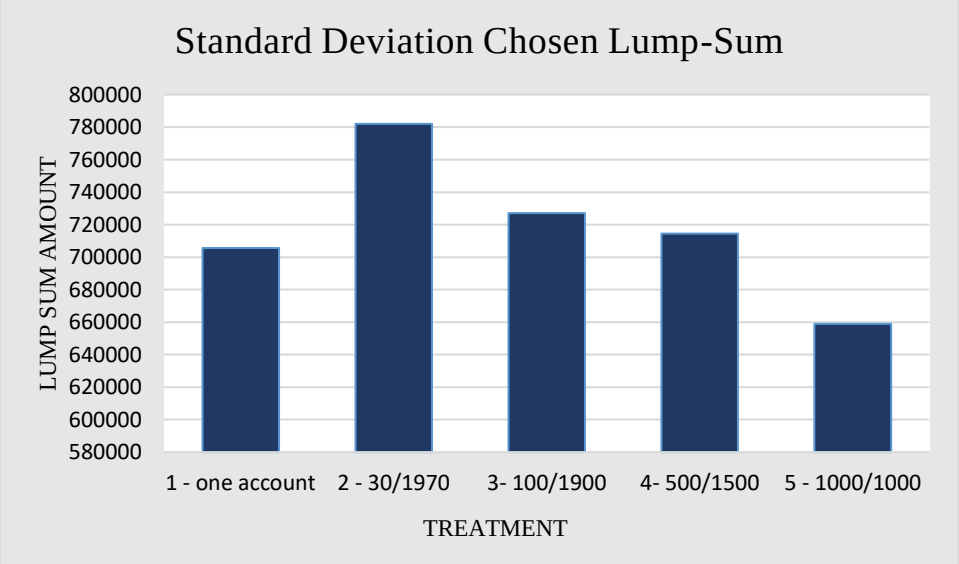

Standard Deviation Chosen Lump-Sum
LUMP SUM AMOUNT
800000
780000
760000
740000
720000
700000
680000
660000
640000
620000
600000
580000
1 - one account
2 - 30/1970
3- 100/1900
4- 500/1500
5 - 1000/1000
TREATMENT

Table 1. Descriptive statistics of the data

Variable	*N*	Mean	SD	% of total sample
Individuals in sample	15,293			
Accumulated funds (NIS)		173,742.3	327,496.1	
Retirement age (years)		65.9	3.9	
Male	7,401			48.4
Marital status				
Divorced	1,364			8.9
Widowed	720			4.7
Married	8,731			57.1
Annuitization				
Retirees choosing annuity	4,084			26.7
Monthly annuity		1,902.5	1,958.9	
Annuity conversion factor		13.5	2.07	

Note: Accumulated funds refers to the total funds accumulated by each retiree. Retirees choosing annuity are retirees who chose any portion of disbursement as an annuity. Monthly annuity is the monthly annuity for retirees who chose to annuitize. Annuity conversion factor (in yearly terms) is the conversion rate from lump-sum to annuity for retirees who chose to annuitize. NIS = New Israeli shekels.

Table 2. Annuity decision regression. Dependent variable: Choosing any part of disbursement as an annuity (rather than the full lump-sum choice)

Variable	Basic regression with annuity amount	Basic regression with dummy for accumulated funds less than NIS 50,000	Basic regression with dummy for accumulated funds less than NIS 100,000	Basic regression with dummy for accumulated funds less than NIS 300,000	Basic regression with dummy for accumulated funds less than NIS 500,000	Basic regression with dummy for accumulated funds between NIS 50,000[a] and NIS 99,999
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient
Gender	0.113**	0.261***	0.205***	0.205***	0.260***	0.196***
	(0.0571)	(0.0563)	(0.0589)	(0.0563)	(0.0541)	(0.0623)
Retirement age	0.173***	0.195***	0.169***	0.193***	0.216***	0.154***
	(0.00885)	(0.00888)	(0.00921)	(0.00863)	(0.00837)	(0.0101)
Accumulated amount variables						
Total amount	5.05e-06***					
	(1.65e-07)					
Less than NIS 50,000		-2.857***				
		(0.0905)				
Less than NIS 100,000			-2.459***			-1.663***
			(0.0596)			(0.0677)
Less than NIS 300,000				-2.100***		
				(0.0678)		

Variable	Basic regression with annuity amount	Basic regression with dummy for accumulated funds less than NIS 50,000	Basic regression with dummy for accumulated funds less than NIS 100,000	Basic regression with dummy for accumulated funds less than NIS 300,000	Basic regression with dummy for accumulated funds less than NIS 500,000	Basic regression with dummy for accumulated funds between NIS 50,000[a] and NIS 99,999
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient
Less than NIS 500,000					-1.882***	
					(0.0937)	
Marital status						
Divorced	-0.0566	-0.0541	-0.129	-0.0383	-0.120	-0.149
	(0.161)	(0.164)	(0.171)	(0.161)	(0.154)	(0.184)
Widowed	-0.0448	-0.0963	-0.100	-0.00507	-0.0697	-0.186
	(0.174)	(0.178)	(0.186)	(0.175)	(0.167)	(0.200)
Married	-0.121	-0.127	-0.178	-0.110	-0.168	-0.220
	(0.147)	(0.150)	(0.157)	(0.148)	(0.141)	(0.169)
Unknown	-2.979***	-3.016***	-3.059***	-2.975***	-3.100***	-3.035***
	(0.174)	(0.173)	(0.179)	(0.172)	(0.167)	(0.189)
Purchase age	-0.165***	-0.184***	-0.166***	-0.177***	-0.195***	-0.169***
	(0.00581)	(0.00598)	(0.00604)	(0.00568)	(0.00554)	(0.00692)
No. of policies	0.123***	0.200***	0.133***	0.214***	0.298***	0.104***
	(0.0152)	(0.0131)	(0.0136)	(0.0144)	(0.0141)	(0.0133)
Percent post-2008	1.804***	1.844***	1.521***	1.907***	2.023***	1.863***
	(0.141)	(0.157)	(0.153)	(0.138)	(0.136)	(0.193)
Year 2009	0.807***	0.680***	0.730***	0.762***	0.735***	0.708***
	(0.0847)	(0.0872)	(0.0890)	(0.0834)	(0.0808)	(0.0993)

Variable	Basic regression with annuity amount	Basic regression with dummy for accumulated funds less than NIS 50,000	Basic regression with dummy for accumulated funds less than NIS 100,000	Basic regression with dummy for accumulated funds less than NIS 300,000	Basic regression with dummy for accumulated funds less than NIS 500,000	Basic regression with dummy for accumulated funds between NIS 50,000[a] and NIS 99,999
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient
Year 2010	0.513***	0.401***	0.418***	0.484***	0.513***	0.394***
	(0.0820)	(0.0822)	(0.0847)	(0.0810)	(0.0778)	(0.0921)
Year 2011	0.241***	0.129*	0.161**	0.256***	0.260***	0.113
	(0.0758)	(0.0752)	(0.0779)	(0.0743)	(0.0717)	(0.0835)
Year 2012	0.205***	0.123*	0.137*	0.197***	0.201***	0.0854
	(0.0747)	(0.0739)	(0.0764)	(0.0734)	(0.0706)	(0.0819)
Constant	-5.546***	-4.733***	-3.127***	-3.969***	-4.774***	-1.868***
	(0.491)	(0.489)	(0.515)	(0.489)	(0.478)	(0.553)
Observations	15,293	15,293	15,293	15,293	15,293	8,759
Pseudo R^2	0.4035	0.4180	0.4365	0.3856	0.3520	0.3059

Note. Standard errors in parentheses. Dependent variable, y_{ann}, is an indicator variable for choosing any part of the disbursement as an annuity (rather than the full lump-sum choice). Main explanatory variables are gender, retirement age, year total accumulation amount (total amount), marital status, purchase age, number of policies, and the percentage of accumulation saved after 2008. Specifications 1–5 are for all retirees in the data (N = 15,293). Specification 6 is for retirees with accumulated funds of over NIS 50,000 (N = 8,759). NIS = New Israeli shekels.

[a] Sums lower than NIS 50,000 were excluded from this regression.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

Table 3. Annuity decision regression. Dependent variable: Choosing any part of disbursement as an annuity (rather than the full lump-sum choice). Low vs. High wage occupations

Variable	Low vs. High wage occupations
	Logit coefficient
Gender	0.135
	(0.261)
Retirement age	0.159***
	(0.0302)
High wage occupation (=1)	1.439**
	(0.562)
Accumulated amount variables	
Less than NIS 50,000	-0.995
	(0.781)
High wage * Less than NIS 100,000	-1.831**
	(0.912)
Marital status	
Divorced	0.509
	(1.159)
Widowed	1.592
	(1.135)
Married	1.403
	(1.094)
Unknown	-1.240
	(1.146)
Purchase age	-0.154***

Variable	Low vs. High wage occupations
	Logit coefficient
	(0.0202)
No. of policies	0.148***
	(0.0339)
Percent post-2008	2.122***
	(0.610)
Year 2009	2.385***
	(0.414)
Year 2010	2.193***
	(0.402)
Year 2011	1.551***
	(0.401)
Year 2012	1.655***
	(0.395)
Constant	-9.466***
	(2.016)
Observations	2,423
Pseudo R^2	0.3359

Note. Standard errors in parentheses. Dependent variable, y_{ann}, is an indicator variable for choosing any part of the disbursement as an annuity (rather than the full lump-sum choice). Individuals with high wage occupations are more likely to annuitize, and more likely to cash out accumulated amounts lower than NIS 50,000.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

Appendix 1

High income occupations:

Manager, Computer Programmer, Engineer, Software Engineer, General Manager, Chief Executive Officer, Sales Manager/Vice President (VP) Sales/Chief Revenue Officer, Project Manager, Electronics Engineer, Attorney, Marketing Manager/ Chief Marketing Officer, Computer Systems Analyst/ Information Technology (IT) Analyst, Marketing Associate/Analyst, Accountant, Operations Manager/Chief Operating Officer, VP, Programmer, Mechanical Engineer, Economist, Insurance Broker, Computer Engineer, Physician/General Practitioner, Department Manager, General Surgeon, Electronics Practical Engineer, Lecturer, Software Tester/Quality Assurance Analyst, Chief Financial Officer/Director of Finance, Dentist, Bookkeeper, Product Manager/VP Product, Human Resources Manager/Director, Pharmacist, Electrical Engineer, Civil/Construction Engineer, Programmer/Developer, Owner/Business Owner, Production Manager, IT Manger/Chief Information Officer (CIO), Mechanical Practical Engineer, Hardware Engineer, Bank Teller, Civil/Construction Practical Engineer, Business Development Manager, Journalist, Chemical Engineer, Dental Technician.

Low income occupations:

Nanny. Childcare preschooler, Gardener, Nursing caregiver, Kindergarten teacher, Cleaner/ House cleaner, A kitchen worker.