Can Smoking Harm Your Long Term Saving Decisions?

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ABSTRACT

Previous research suggests that smoking is considered to be a major preventable risk to human health. One explanation for smoking, provided by the literature, is that it could be explained by differences in time preferences; Smokers are considered to have higher discount rates, implying asking for higher compensation in order to postpone any consumption from the present to the future. Concerns that are related to time preference and individual choices are also related to long term saving decisions. One of the long standing puzzles, with regard to long term saving choices, is the "Annuity Puzzle". Theory suggests that annuities have substantial value, and that retirees should generally use annuities to increase their consumption in retirement. However, empirical work finds little evidence of the purchase of annuities.

We extend this line of research, investigating annuitization decisions of smokers, by using data from an Israeli insurance corporation, finding that, surprisingly, smokers, as compared with non-smokers, do not prefer the lump-sum option. A possible explanation for this finding could be that even though literature finds a close relation between smoking and medical condition, smokers do not perceive themselves as having a shorter horizon, meaning that smokers experience self-illusions regarding life expectancy. We support this conjecture with a survey we conducted that investigated the life expectancy of smokers and non-smokers.

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1. Introduction

Smoking is a common behavior in the western world, and was estimated to be responsible for about 20 percent of the total mortality in the United States since the 1990s (Mokdad, Marks, Stroup and Gerberding (2004)). Thus, it considered to be the most significant preventable risk to human health (Wang (2014)). If smoking is indeed so unhealthy and such a major cause for early mortality, one should immediately ask: why do people smoke? One explanation provided by the literature (e.g. Thaler and Shefrin (1981), Becker and Murphy (1988), Lipkus, Barefoot, Williams and Siegler (1994), Daugherty and Brase (2010)) is that smoking behavior could be explained by differences in self-control, that are reflected in different time preferences.

According to this theory, smokers are considered to have higher discount rates, implying that they will ask for a higher compensation in order to postpone any cigarette consumption from the present to the future. Therefore, smokers are expected to be unwilling to give up the pleasure of smoking in the present in favor of health and longevity in the future. As a result of this theory, some empirical papers have used smoking as a proxy for present preferences (Munasinghe and Sicherman (2006), Huston and Finke (2003) and Scharff and Viscusi, (2011)). Nevertheless, there is an ongoing academic debate regarding the exact relationship between smoking and time preference (e.g Fuchs (1982), Adams and Nettle (2009) and Harrison, Lau, and Rutström (2010)). Empirical papers (most of them based on surveys) documented low relations between smoking and different measures of time preference (some have found a relation for male participants only), or have found an opposite relation, showing that smokers actually have lower discount rates than non-smokers (e.g. Reynolds, Richards, Horn and Karraker (2004), Chabris, Laibson, Morris, Schuldt, and Taubinsky (2008) and others).[3]

Concerns that are related to time preference and individual choices are also related to long term saving decisions. One of the long standing puzzles with regard to long term saving choices is the "Annuity Puzzle" (for a survey see Benartzi, Previtero, and Thaler (2011)). Starting with the

[3] Time preference is not the only explanation suggested in the literature to explain smoking behavior, Lipkus, Barefoot, Williams and Siegler (1994), reviewed characteristics of smokers and showed that smokers differ from the general population in features such as impulsiveness, rebelliousness, sensation seeking, gregariousness, self-presentational concerns, and hostility. Keough, K. A., Zimbardo, P. G., & Boyd, J. N. (1999) reviewed many previous explanations for substance use (including tobacco smoking) such as anxiety, neuroticism, lower impulse control, novelty seeking, and others, and concluded that time preference is an important feature to be considered in relation with health related behaviors, including smoking. Others, such as Ert, Yechiam, Arshavsky (2013) relate smoking behavior with a tendency to take risk.

theoretical work by Yaari (1965), it has been suggested that annuities have substantial value and that, under a set of assumptions, retirees should generally use annuities to increase their consumption in retirement. However, empirical work finds little evidence of the purchase of annuities.[4] Why does this anomaly exist? The academic literature offers a wide range of arguments to explain the low demand for annuities. The differing explanations generally relate to one of three aspects: market imperfections, product features, or customer features (either socio-economic or behavioral). In this work we investigate the possibility of different time preferences of smokers in the context of long term savings. Specifically, we will focus on the annuitization decision of smokers in Israel who are insured by pension insurance policies. In doing so we will exploit a special feature of this product – its pricing only considers gender, actuarial life expectancy, and expected rate of return. Pension insurance policy pricing does not take health condition (or smoking status) into account, and therefore could serve as an interesting test case for smokers' financial decisions.

If the 'smoking decision' is explained by different time preferences, then smokers, as opposed to non-smokers (all the rest equals) should be expected to prefer the lump-sum option. Moreover, the fact that past statistics suggest that smokers' life expectancy is significantly lower than that of non-smokers, in addition to the fact that smoking is not part of the pension insurance pricing mechanism, reinforce this hypothesis.

Our investigation relies on unique proprietary data from an insurance corporation in Israel, which contains detailed information regarding the decisions of retirees, as well as a rich set of parameters relating to these retirees, including information on smoking behavior.

This data set provides a unique opportunity to investigate real annuitization decisions and covers the decision of 18,860 retirees (i.e. men over the age of 65 and women over the age of 60) made between the years 2009-2013, including 1,556 retirees with accumulations above 500K NIS[5]. 26% of these retirees are female and 9.64% indicated that they are smokers. Each client from our sample could choose a withdrawal of a lump-sum, an annuity, or both, subject to the minimal mandatory

[4] Evidence from the US (Beshears, Choi, Laibson, Madrian and Zeldes (2014)) shows that during 2013 less than 10% of DC owners requested to purchase annuity and in Australia during 2008 only 19 people wanted to buy new annuities (Ganegoda and Bateman (2008)).
[5] Which is close to 130K US $ as of 2015.

annuity law[6] (that only applies to funds accumulated after 2008). Surprisingly, in our sample, smokers, compared with non-smokers, do not prefer the lump-sum option (the results suggest a non-significant preference for annuities while controlling for other relevant variables such as gender, retirement age, accumulated amount, marital status and others). This contradicts both the time preference theory mentioned above and our expectation regarding the life expectancy calculations made by the retirees in our data.

A possible explanation for this finding could be that even though the literature finds a close relation between smoking and medical condition, smokers do not perceive themselves as having a shorter horizon, meaning that smokers experience certain self-illusions regarding their own life expectancy. This observation led us to further investigate the life perception of smokers and its effect on financial decisions. To investigate life expectancy perception by individuals in Israel, we obtained the results of an online survey of 1000 Israeli residents, ages 50-70, collected during March of 2015. After omitting missing values we were left with a final set of 963 respondents.

Our results support the conjecture that smokers experience self-illusions regarding health and life expectancy. Namely, smokers, and past smokers, assess their health condition to be relatively similar and only slightly worse than non-smokers. Moreover, smokers believe their life expectancy is relatively similar to the average in the population[7]. We provide several robustness tests to support these findings.

Our project relates and contributes to the literature of time preference, life expectancy, smoking, and long term savings decisions. We discuss the relevant literature in sections 2 and 3.

The paper continues as follows; Section 2 reviews the setting in which our investigation takes place, section 3 discusses the "Annuity Puzzle", section 4 presents the data, and section 5 reports the empirical results. In section 6 we present the additional survey and its results and section 7 concludes.

[6] For further information regarding the Israeli pension legislation please see part 2.1.2 below.
[7] We could not reject the hypothesis that smokers' projection is different than the mean value.

2. The Setting

2.1 Smoking in Israel and around the globe

According to CDC analysis, as of 2014, the percentage of American adults aged 18 and over who were defined as "current cigarette smokers"[8] was 16.8%. This ratio was higher for men (18.9%) than for women (14.8%).[9] In Israel, according to a report on smoking, done by the ministry of health in 2014, the percentage of Israeli adults aged 21 and over who were "current cigarette smokers"[10] was 19.8%, with the percentage being higher for men (27.3%) than for women (12.6%).[11] There is vast research that indicates that smoking is an unhealthy activity. For this reason different countries around the world impose Tabaco messages warning of the harmful effects of smoking. In the United States, since the 1990s, the estimation is that smoking has been responsible for about 20 percent of the total mortality (Mokdad, Marks, Stroup and Gerberding (2004)), and it is thus considered to be the most significant preventable risk to human health (Wang (2014)).

The academic literature suggests that smokers are different in personal characteristics such as time preference, risk preference and impulsivity. Lipkus, Barefoot, Williams and Siegler (1994) concluded that indicators of impulsiveness, rebelliousness, sensation seeking, gregariousness, self-presentational concerns, and hostility, measured during college, best predicted people who were likely to begin smoking, and that people who continued to smoke were more hostile and engaged in sensation-seeking behaviors more often.

Theoretical work argued that smoking and time preference are closely linked, (e.g Becker and Murphy (1988)), yet the empirical work is ambiguous.

Some empirical papers found direct support for the theoretical relation between smoking and time preference (e.g fuchs (1982), Bickel, Odum, and Madden (1999), Munasinghe and Sicherman (2006), and Scharff and Viscusi, (2011)).

[8] Current cigarette smokers were defined as those who had smoked more than 100 cigarettes in their lifetime and now smoke every day or some days.
[9] Early Release of Selected Estimates Based on Data From the National Health Interview Survey, 2014, based on data from National Health Interview Survey, 1997–2014, Sample Adult Core component.
[10] Current cigarette smokers were defined as those who smoke every day or some days.
[11] Minister of Health report on smoking in Israel 2014, published may 2015.

Certain empirical papers presented ambiguous support, or only partial support, for the relation between smoking and time preference. For instance, Khwaja, Silverman and sloan, (2007), found that there is no significant difference between smokers and non-smokers in discount rates, but there is a difference in other measures of time preference, such as impulsivity and financial planning. Adams and Nettle (2009), documented that only one of the time preference measures, presented in their paper, was associated with smoking. Harrison, Lau, and Rutström (2010) found that there is a significant correlation between individual discount rates and smoking among men only.

Moreover, several empirical papers have found evidence that are inconsistent with the theory regarding smoking and time preference. These papers concluded that, in practice, smokers have lower discount rates than non-smokers (e.g. Reynolds, Richards, Horn and Karraker (2004), Chabris, Laibson, Morris, Schuldt, and Taubinsky (2008)), despite the clear theory regarding smokers' time preference stating the opposite. These findings are considered to be a longtime puzzle within the research community, as they contradict the assumed relation between time preference and smoking.

In the economic literature, smoking has been associated with risky behavior, and it was argued that smoking status contains precise information about individuals that is not captured by economic and psychological data alone (e.g Viscusi, 1991). It has also been suggested that there might be some personal characteristics, yet unrevealed, that are expressed in smoking and affect financial behavior (Adams, Bose and Rustichini, 2014).

Data from the Israeli Ministry of Health[12] demonstrates the mortality difference between smokers and non-smokers in selected countries. It is evident that there is a gap of more than 9 years in life expectancy between the two groups and the gap is even wider in the United States (12 years for men and 11 years for women)[13].

[12] Minister of Health report on smoking in Israel 2013, published may 2014

[13] Similar results were reported by Jha, Ramasundarahettige, Landsman, Rostron, Thun, Anderson, Peto (2013) who noted that "Life expectancy was increased 4 to 10 years among smokers who quit, depending on their age at the time of smoking cessation", Taylor, Hasselblad, Henley, Thun and Sloan (2002) concluded that "life expectancy among smokers who quit at the age of 35 exceeded that of continuing smokers by 6.9 to 8.5 years for men and 6.1 to 7.7 years for women", Streppel, Boshuizen, Ocké and Kromhout, (2007) mentioned that "Average cigarette smoking reduced the total life expectancy by 6.8 years, whereas heavy cigarette smoking reduced the total life expectancy by 8.8 years", and by others.

2.2 The long term savings market in Israel

This section describes the institutional and regulatory settings in which our empirical investigation takes place. We first describe the structure of the long term saving plans in Israel, and then discuss the extensive financial reforms that occurred in the Israeli pension system over the last three decades. Finally we will refer to the uniqueness of annuities in Israel.

2.1.1 Structure of the Israeli pension system

The Israeli pension system consists of two layers – one public and the other private. The public layer, known as the *Israeli National Insurance*, is designed to guarantee a minimal income for every citizen above the qualifying age and income (either 65 or 70 for men and either 60 or 65 for women). The public pension amount that is currently paid to retirees is approximately 17% of the average wage for a single citizen, and 25% for a couple[14].

The private layer is a much more complex pension system, which consists of five types of pensions / long term savings products: (1) "Old" pension funds[15], (2) "new" pension funds[16], (3) "new" general pension funds[17], (4) provident funds[18], and (5) pension insurance policies (also known in Israel as "Management Insurance")[19]. The focus of this project is on choices within the private layer that are related to the pension insurance policies (5).

These "Management Insurance" / pension insurance policies, some of which provide the saver with tax benefits from the state (the benefits differ between self-employed and salary workers), are managed by insurance companies that provide both operational management and investment of the funds.

It is important to emphasize that the unique form of the Israeli pension insurance policies differs from its contemporaries worldwide. In Israel, savers with a pension insurance policy that was

[14] During 2014 these amounts were equal to 1,531 NIS for a single citizen, and 2,301 NIS for a couple which is about 440 US $ and 660 US $ respectively. The Institute for National Insurance pays the minimal pension only to Israeli citizens that have been insured for a certain period of time, as required by the law (10 years of insurance).
[15] DB Pension funds that were closed to new clients by January 1, 1995.
[16] DC Pension funds that were first established on January 1, 1995, and must preserve actuarial balance.
[17] DC Pension Funds that operate a pension plan that is not entitled to the allocation of non-tradable preferred government bonds ("Meyoadot") from the government of Israel.
[18] Funds that are intended for long term savings and normally do not include any risk insurance. Historically a saver could withdraw his saving as a lump-sum according to the principles that will be described below.
[19] Trade name of pension insurance products designed for employees. It sets the terms of termination of the insured and includes pension rights and other financial rights. It should be noted that this policy included both a saving component and an insurance component (for different kind of risks such as death and disability).

bought prior to 2013 receive a contractual guarantee for a conversion factor from lump-sum to annuity, according to the terms that existed in the market at the time that the policy was issued.[20]

Table 1 describes the number of funds operating in different categories and volumes under management in the different pension entities in Israel (in million NIS, 2013), based on data from the Ministry of Finance[21]. The volume of funds under management is higher than 1 Trillion NIS, 47% of them are invested in pension funds, 23% in pension-insurance policies and 30% in provident funds.

[TABLE 1]

Due to historic differences in tax incentives, there was a tendency for employees to save using either a pension fund or a pension insurance policy while people who were self-employed saved mostly using provident funds or pension insurance policies. Moreover, the choice of saving tool differed between different industries and whether or not there was membership in an employee organization.

2.1.2 Three decades of structural reforms in the Israeli pension system

The Israeli private[22] pensions and capital markets have gone through massive regulatory changes and several reforms during the last three decades. These changes were generally designed to reduce the government support of the pension system, to enhance competition in the markets, and to compel a minimal level of pension in both the provision and withdrawal phases. We will focus only on the reforms that are relevant to the choice between annuities and lump sum in the "management" insurance product that we investigated.

In 2000, as part of the "omnibus law of arrangements in the state economy"[23], new principles concerning annuity plans were set. Prior to discussing these key changes, it is important to note that Israeli pension plans were divided into two groups by their primary designation – annuity

[20]Meaning that the insured could ensure the rate of the conversion factor into annuity at the time the policy was issued (for example the insured could purchase this guarantee at the age of 25). In the US for example if you buy an annuity at the age of 25 you do not ensure any conversion factor for the future. In Germany, a client could buy a guaranteed annuity before retirement but the insurance company is allowed to change the guaranteed conversion factor up to 30%.

[21] Source of data: Ministry of Finance, annual report, 2013.

[22] In the past, government employees were not insured in the private sector. Rather they were entitled to budgetary pensions that are not in the scope of this paper.

[23] These are legislative amendments for achieving budget reconciliations.

plans (mainly pension plans and some of the pension insurance policies [24]), and lump-sum plans (mainly provident funds and other types of pension insurance policies).

Prior to applying the new act, a member of each of the different pension plans could choose whether to withdraw an annuity or a lump-sum at the date of entitlement set by the law[25]. The new "law of arrangements" was the first step carried out in favor of annuities over lump-sum withdrawals. The law stated that a pension plan designated to pay an annuity, could only be paid as an annuity.

As a result of the new act, many owners of pension insurance policies have either changed their products into lump-sum designated insurance policies or acquired a "lump-sum appendix" enabling lump-sum withdrawals.

During 2003, the government increased the retirement age and reduced tax benefits for early retirement. At the end of 2005 a new regulation stated that Self-Employed workers could no longer withdraw lump-sum funds before reaching the age of 60 with at least 5 years of seniority in their fund. This was yet another step towards a complete cancelation of the privilege to receive a lump-sum amount from a long term saving plan.

Indeed, in 2008, the state of Israel adopted a new amendment to its codex of pension legislation, requiring a minimal annuity by law. The new law, also known as "the third addendum", stated that individuals will be required to save a sufficient amount in an annuity oriented account in order to ensure a minimal pension of approximately 4,503 NIS[26]. According to the new legislation, only after saving the sufficient amount for annuity would one be entitled to other tax benefits for additional savings, allowed to be withdrawn as a lump-sum (only upon retirement). It is important to note that the new addendum only referred to savings made after January 2008. Following a substantial protest, a new addendum, known as "the fifth addendum", stated that under certain circumstances accumulated funds could be transmitted into lump-sum withdrawls (mainly for those who were self-employed or as severance compensations) up until the end of 2011.

[24] Examples for pension insurance policies which were intended to pay annuity were "Adif" and "Gimla".
[25] Generally, a member could withdraw his fund as lump-sum after 15 years of seniority, or by the age of 60 with at least 5 years of seniority (or retirement). Please note that the Israeli law states some other specific cases in which lump-sum withdrawal is allowed. We will not discuss them in this framework.
[26] The minimum wage in Israel at the time, linked to CPI in 2014 prices.

Regulatory changes in the Israeli pension system continued, with new legislation enacted by the end of 2013, prohibiting insurance companies to sell pension insurance policies with guaranteed conversion factor into annuity. This new addendum intended to maintain the stability of the insurance sector, for it was exposed to a great longevity risk, due to binding conversion factor agreements.

3. Annuities Versus Lump-Sum – the Annuity Puzzle

3.1 Theory

Combining the trends of lengthening life expectancy, occupational instability, and the steady erosion of government support in retirement plans, raises many academic questions relating to savings and retirement phases.

Theoretical academic work starting with Yaari (1965), claims that annuities have substantial value, and that retirees should generally use annuities to increase their consumption in retirement. Nevertheless, previous empirical academic work finds little evidence of the purchase of annuities. Evidence from the US (Beshears, Choi, Laibson, Madrian and Zeldes (2013)) shows that during 2013 less than 10% of DC owners requested to purchase annuity, and in Australia during 2008 only 19 people wanted to buy new annuities (Ganegoda and Bateman (2008)). This unexpected result, deviating from economic theory, is known as the "Annuity Puzzle", andeconomic literature has been trying for some time to explain it.

The differing explanations generally relate to one of three aspects: market imperfections, product features, or customer features (either socio-economic or behavioral).

From the market and product side, previous research dealt with many reasons for the lack of annuities. These reasons ranged from problems in the pricing mechanism of annuities (Bütler, Staubli and zito (2008), Chalmers and Reuter (2009)), and efficiency of the available products (Scott, Watson and Hu (2006), Stevens (2009)), to accumulation size (Bütler and Teppa (2005), Benartzi, Previtero and Thaler (2011)), and a lack of confidence in the insurance company (Beshears, Choi, Laibson, Madrian and Zeldes (2013)). Others claimed that the minority of annuities could result from adverse selection in the markets (Finkelstein and Poterba (2004), Bütler

and Teppa (2005)), and the lack of products with protection against inflation risk (Zeithammer and Payne (2013)).

Other aspects of the literature have been trying to explain the annuity puzzle by examining personal characteristics, including socio-economic parameters, bequest motives and demographic characteristics. Parameters such as gender, marital status, having offspring, and risk aversion have been discussed with no definite conclusion (Cappelletti, Guazzarott and Tommasino (2011), Chalmers and Reuter (2009), Bütler and Teppa (2005), Agnew, Anderson, Gerlach and Szykman (2008)). Some literature presented other personal characteristics to try and explain the puzzle, such as medical condition (Sinclair and Smetters (2004), Gardner and Wadsworth (2004), Turra and Mitchell (2004)), already having social security annuity (Benartzi, Previtero and Thaler (2011), Chalmers and Reuter (2009)), and subjective discount rate (Warner and Pleeter (2001), Bütler and Teppa (2003)).

Additional research has begun to reveal psychological and irrational behavior barriers to annuitization such as complexity of the decision (Brown (2007), Brown, Kapteyn, Luttmer and Mitchell (2013), Brown, Kapteyn, Luttmer and Mitchell (2013)), acquiescence and default biases (Bütler and Teppa (2005), Agnew, Anderson, Gerlach and Szykman (2008)), difficulty in making irreversible decisions (Brown and Warshawsky (2001)), different biases arising from framing (Benartzi, Previtero and Thaler (2011), Beshears, Choi, Laibson, Madrian and Zeldes (2013), Brown, Kling, Mullainathan, Wrobel (2008), Goldstein, Hal, Hershfield and Benartzi (2014)), a difficulty to part from accumulated money (Benartzi, Previtero and Thaler (2011)), mental accounting (Benartzi, Previtero and Thaler (2011), Brown (2007)), ambiguity regarding self-life expectancy (D'Albis and Thibault (2012), Smith, Taylor and Sloan (2001), Payne, Sagara, Shu, Appelt and Johnson (2012)), and heuristics such as "insurance is only for bad events" (Brown (2007)).

3.2 Annuities versus lump-sum saving products in Israel

The extensive process of reforming the Israeli pension market has created a diverse market for annuities[27]. Unlike annuities in many other counties, in Israel all saving products are linked to inflation. We will describe the annuities available in Israel below.

[27] Annuities could either be for the retiree or in some cases for kin.

Pension funds in Israel pay annuities as a default. A member of a pension fund can withdraw a lump-sum from accumulated amounts originated after 2008 only if he can prove having at least the minimal amount of annuity set by the law. Moreover, amounts accumulated before 2008 can only be withdrawn as annuities, but one can capitalize an amount of 25% of one's annuity over the 5 first years.

In other provident funds, amounts accumulated before 2006 can be withdrawn as lump-sums after 15 years of seniority or at the age of 60. Amounts accumulated from 2006 to 2008 can be withdrawn as lump-sums only after the age of 60 and after 5 years of seniority. Amounts accumulated later than 2008 can only be withdrawn as an annuity by transmitting them to a fund for annuity purpose. Note that as for all long term saving products, a member can withdraw a lump-sum if he can prove he has a minimal annuity.

As for the pension insurance policies, as described before, since 2000 these polices have been divided into – polices aimed for a lump-sum and polices aimed for annuity. Note that the first category also includes polices aimed for an annuity with a "lump-sum" appendix. Savings, part of polices aimed for a lump-sum, prior to 2008 allowed a lump-sum payment according to the adequate law[28], while savings in such policies after 2008 allowed a lump-sum payment only for retirees with a minimal annuity as set by the law. Having a policy aimed for annuity prior to 2008 allowed mainly for an annuity withdrawal[29], while sums accumulated after 2008 could also be withdrawn as lump-sums for retirees with a minimal annuity as mentioned above.

In this work we will focus on the annuitization decision of smokers in Israel that are insured by pension insurance policies, and in doing so exploit a special feature of this product – its pricing only considers gender, actuarial life expectancy, and expected rate of return. Insurance policy pricing does not take health condition (or smoking status) into account, and therefore could serve as an interesting test case for smokers' decisions.

[28] The law changed by 2005. After this change one could withdraw a lump-sum only after the age of 60, while before one could withdraw it even at younger ages if the criteria set by the law were satisfied.
[29] Excluding funds originated before 2000.

4. The Data

We obtained proprietary data from an insurance corporation in Israel, regarding retirees with pension insurance policies (known as "management insurance"). Our dataset contains information on retirees' withdrawal schemes, between the years 2009-2013.

The investigated data covers 18,860 retirees (i.e. men over the age of 65 and women over the age of 60), including 1,556 retirees with accumulations above 500K NIS. Each client could choose a withdrawal of a lump-sum, an annuity, or both, subject to the minimal mandatory annuity law that only applies to funds accumulated after 2008, as previously mentioned.

Regarding the entire dataset, the average (client level) accumulation designed for annuity is 357K NIS, while the average annuity is 1,872 NIS per month[30] (where standard deviation is 1,904 NIS and the maximal annuity is 26,K NIS). The average (client level) accumulation designed for a lump-sum withdrawal is 85K NIS (where standard deviation is 177K NIS and the maximal lump-sum accumulation is 8 million NIS).

Since our purpose was to focus on choices related to meaningful sums of money in our empirical analysis, we focused on clients that accumulated funds of over 500K NIS. With regard to this population, the average (client level) accumulation designed for annuity is 794K NIS with standard deviation of 533K NIS (in accordance with public numbers published by "Old Mivtachim", the biggest pension fund in Israel, the average accumulation between the ages of 60 to 64 is 728K NIS), while the average annuity is 3,816 NIS (also similar to the average annuity reported by "Old Mivtachim", 4,177 NIS[31]). The average (client level) accumulation designed for a lump-sum withdrawal is 449K NIS, where the standard deviation is 583K NIS and the maximal lump-sum accumulation is 8 million NIS.

4.1 Summary statistics in the administrative data

The administrative dataset contains a rich set of socioeconomic and demographic data for each retiree, such as date of birth, date of purchase of the policy, date of repayment, gender, marital status, indication of smoking, annuity factor, age difference between spouses (only for joint-life

[30] Which is approximately 535 US $.

[31] See "Old Mivtachim" financial report, relevant for the year ending in 2013, appendix 5, pg 46. We are not able to test for statistical significance since "Old Mivtachim" did not publish the standard deviation.

policies), investment management method, medical and profession supplements to the policies, indication for residence, last practice, indication for insurance agent and other insurance additions to the policy (risk, work disability, long term care insurance and health insurance).

Table 2 contains descriptive statistics of the different variables in our dataset used in this paper.

[TABLE 2]

For our entire sample, the mean age is66.05 years (68 for males and 64.2 for females), 48% of participants are male, 54% are married while 8.3% are divorced and 4.5% are widows/widowers. 11.4% of the participants are classified as smokers by the insurance corporation[32]. For those with accumulated funds above 500K the mean age is 67.2, 74% of the participants are male, 75.5% are married while 9.64% are divorced and 4.82% are widows/widowers. 9.64% of these participants are classified by the insurance corporation as smokers.

[TABLE 3]

It should be noted, that in contrast to other empirical evidence (e.g Beshears, Choi, Laibson, Madrian and Zeldes (2014), Ganegoda and Bateman (2008)), over all, the majority of retirees (with substantial accumulations) choose at least some annuity. This can be explained by the Israeli legislation described above and by the fact that, in the past, owners of pension insurance policies have had preferred conversion factors that made annuities very attractive. Nevertheless, the aim of this paper is not to focus on patterns in annuity withdrawal in general in Israel, or to solve the annuity puzzle, rather, we focus on long term saving choices of smokers versus non-smokers, and females versus males.

Concerning substantial accumulations (over 500K NIS) women are significantly more likely to choose a full annuity than men (92.1% percent of women chose to annuitize, while only 81.2% of men chose to), although in Israeli pension insurance policies, gender is taken into account within the pricing of the policies (hence from the pricing perspective we did not expect any difference between males and females). Singles are very likely to choose annuity, consistent with previous literature (such as Butler and Teppa (2005).

[32]"Smokers" could be current or past smokers since we do not know how frequent the insurance companies update the socioeconomic data.

5. Interesting Lab for Investigating the Time Preference Argument about Smokers - Do Smokers Choose less Annuities?

5.1 Why it is an interesting lab?

The calculation of a certain retiree's monthly annuity, is usually through an annuity factor. This annuity factor, for the most part, considers elements affecting life expectancy such as gender. In Israel, health condition (unlike gender) is not part of the annuity pricing mechanism. This fact implies that two people who are exactly the same, besides their health condition, will be offered the same annuity by the insurance companies. Thus, we would expect that smokers and other less healthy people (either actual or in expectation) would realize that their life expectancy is somewhat lower than non-smokers, and that this realization would affect their annuity versus lump sum choice.

Our conjecture stems from literature such as Cappelletti, Guazzarott and Tommasino (2011) that shows that impaired health reduces annuity preferences. This result is consistent with two different explanations; First, retirees wish to avoid financial shocks often caused due to unusual medical expenses (see for example Sinclair and Smetters (2004)), and therefore will prefer the lump sum choice over the annuity. From a different point of view, un-well retirees should expect a lower life expectancy, and as a result should be more sensitive to bequest motives. Since the literature suggests that smoking status is a good estimate for impaired health, and also suggests that smokers may have a higher present preference (reflected in higher subjective discount rate), we hypothesis that smokers should choose less annuities compared with non-smokers, with all else equal.

5.2 Smoking and annuity choices - The empirical investigation

First, we divided our sample of clients with accumulations of over 500K NIS, into different groups of annuity withdrawals: *full annuity* - a client is defined as "full annuity" if all accumulations were converted into an annuity (regardless of the annuity value), *legal minimum* - a client is defined as "legal minimum" if only some of his accumulations were converted into an annuity, and the final annuity is between 3,800 and 4,500 NIS, *lower than minimum* - a client is defined as "lower than minimum" if only some of his accumulations were converted into an annuity and the final annuity is lower than 3,800 NIS, *partial yet higher than the minimal law* - a client is defined as "partial" if only some of his accumulations were converted into an annuity, and the final annuity is higher than 4,500 NIS.

We find that smokers significantly prefer annuities. As shown in figure 1 below, 61% of smokers chose full annuities, where only 47% of non-smokers chose this option This decision is not due to the difference in conversion factors between smokers and non-smokers (by comparing these conversion factors we find no significant difference between smokers and non-smokers)

[Figure 1]

Next we conduct a series of descriptive regressions examining the characteristics of retirees who choose to annuitize. Our characteristics consists of 3 groups: (1) personal characteristics; (2) pension policy characteristics; (3) macroeconomic FE.

5.2.1 Choosing an annuity

Equation (1) describes the potential main characteristics that may affect the decision to choose annuity:

$$(1)\ y_{ann} = \alpha + \beta_1 male + \beta_2 retirement\_age + \beta_3 gdp + \beta_4 rf + \beta_5 total\_amount + \beta_6 divorced + \beta_7 widoer + \beta_8 married + \beta_9 unknown\ marital\ status + \beta_{10} purcahse\_age + \beta_{11} no\_of\_policies + \beta_{12} percent\_post\_2008 + \epsilon_i$$

Where:

"y_ann" is a dummy variable for annuitization. "y_ann"=1 if the retiree chooses any portion of annuity versus a full lump-sum ("y_ann"=0).

"Retirement age" is the retiree's age at the time of decision. Retirees in our sample are allowed to postpone their retirement.

"GDP" is the Israeli GDP at the retirement year in fixed prices[33].

[33] Date from the Central Bureau of Statistics.

"RF" is the risk free rate at the retirement year[34].

"Total amount" is the total accumulation at retirement. A higher accumulation implies that the account in discussion is the main account of the client.

"Divorced", "Widower", "Married" and "Un-known marital status" are dummy variables for marital status (the category "Single" was omitted).

"Purchase age" is the average age of the client (over all of his policies) in which the policies were purchased.

"No_of_policies" represents the number of different policies for each client, in this insurance corporation.
"Percent_post_2008" is the proportion of money accumulated after 2008 and therefore must be withdrawn as an annuity up to the mandatory monthly annuity.

The results for probit and logit models are described in columns (1)-(4) in table 4 below. Overall, all models are significant with pseudo R^2 equals around 25%:

[Table 4]

Consistent with previous literature (such as Butler and Teppa (2005)), individual socioeconomic characteristics, such as marital status and gender, do not significantly affects individual preferences.

In order to understand the impact of seniority in the fund, we included "purchase age" which is the average age of the client (over all of his policies) at the time that the policies were purchased, into the regression. Its coefficient is negative and significant in all specifications implying that a one year delay in the purchase of a pension tool will reduce the likelihood of choosing an annuity. With respect to the specification of the year dummies (column (2) in table 4 below), holding all other

[34] The Bank of Israel declared effective rate of return.

variables at their mean, an increase of one year in the purchase year will reduce the probability to purchase an annuity by 1.6%.

As expected, as a result of the new reform in Israel, described above, the percent of accumulation after 2008 is significant and positive, implying a higher likelihood of purchasing an annuity with money accumulated after the new Israeli legislation.

Contrary to previous literature such as Butler and Teppa (2005), the stock of capital at retirement does not play an important role in all specifications (coefficients are very small and not significant). Nevertheless, it should be noted that all regressions refer to accumulations of over half a million NIS[35]. Age at retirement and number of policies are not significant.

Some may argue that using GDP and rate of return in order to capture macroeconomic FE is not accurate since we only refer to a short period of time, hence for a robustness test we use a year FE method, as indicated in equation (2), where we added dummy variables for the year:

$$\textbf{(2)}\quad y_{ann} = \alpha + \beta_1 male + \beta_2 retirement\_age + \beta_3 year\_dummies' + \beta_4 total\_amount + \beta_5 divorced + \beta_6 widoer + \beta_7 married + \beta_8 unknown\ marital\ status + \beta_9 purcahse\_age + \beta_{10} no\_of\_policies + \beta_{11} percent\_post\_2008 + \epsilon_i$$

Where:
Year_dummies are dummy variables for the years 2009-2012 respectively, indicating the year in which the retiree made the choice between annuity and lump-sum as defined above (year 2013 was omitted).

For most variables the modification from equation (1) did not make a difference.

[35] Close to 130K US $.

The 2009 year dummy (the year in which the annuitization decisions was made) is positive and significant, implying that a year after the financial crisis, , the likelihood to annuitize increased. Next we will omit the GDP and rate of return variables and use the year dummies.

5.2.2 Smoking and medical condition

Following the analysis above, we will now examine the impact of smoking and medical condition on the decision to annuitize.

Three variables were chosen for impaired health - smoker, mortality_increase and professional_increase. These variables represent smoking status, having an extension required by an insurance company against impaired health condition, and having an extension required by an insurance company from an insured with a risky profession. The variables were added to our previous specifications (equation 2). The results of the estimation of equation (3) are reported in table 5:

$$\textbf{(3)}\quad y_{ann} = \alpha + \beta_1 male + \beta_2 retirement\_age + \beta_3 year\_dummies + \beta_4 total\_amount + \beta_5 divorced + \beta_6 widoer + \beta_7 married + \beta_8 unknown\ marital\ status + \beta_9 purcahse\_age + \beta_{10} no\_of\_policies + \beta_{11} percent\_post\_2008 + \beta_{12} smoker + \beta_{13} mortality\_increase + \beta_{14} professional\_increase + \epsilon_i$$

Where:

"Smoker" is a categorical variable with the value of 1 for smoker and 0 for non-smoker.

"mortality_increase" is a dummy variable for having an extension required by an insurance company against impaired health condition. Please note that the increased premium is for the risk insurance and not for the annuity (for, in most of the world, health factors are not taken into account when pricing annuities). "mortality_increase" equals 1 for no extension and 2 for clients with extensions. We would expect that retirees with a mortality extension would be less likely to annuitize because of lower life expectancy.

"proffesioanl_increase" is a dummy variable for an extension required by an insurance company from an insured with a risky profession. Please note that the increased premium is for the risk insurance and not for the annuity (for, in most of the world, health factors are not taken into account when the pricing annuities). "proffesioanl_increase" equals 1 for no extension and 2 for clients with extensions. We would expect that retirees with a professional extension would be less likely to annuitize because of lower life expectancy (due to damaged health caused by the risky profession).

For robustness, in order to investigate the relation between smoking and the other health proxies that may affect the estimation, we estimated the same regression without the insurance tariff add-ons:

$$(4)\quad y_{ann} = \alpha + \beta_1 male + \beta_2 retirement\_age + \beta_3 year\_dummies + \beta_4 total\_amount + \beta_5 divorced + \beta_6 widoer + \beta_7 married + \beta_8 unknown\ marital\ status + \beta_9 purcahse\_age + \beta_{10} no\_of\_policies + \beta_{11} percent\_post\_2008 + \beta_{12} smoker + \epsilon_i$$

The results are reported in table 5 below:

[TABLE 5]

In table 5 we present the estimated results of the effect of medical condition on the annuity decision. For specifications with a binary dependent variable, results are qualitatively similar when using either logit, or probit models. In particular, our main coefficients of interest (capturing the effect of medical condition) have the same sign and similar levels of statistical significance within the two estimation techniques. The precise magnitudes of the estimated marginal effects from probit or logit estimations are sensitive to the point in the distribution at which marginal effects are evaluated and are calculated and reported at the mean. Overall, all models are significant with pseudo R^2 equaling around 25%

Specifically, examining both mortality and professional extensions it is clear that both coefficients are negative in the logit and the probit specification, but only the mortality extension is significant.

This means that retirees that were required to pay more for their life insurance (meaning that they are considered less healthy or at higher risk of being so) are less likely to purchase annuities at retirement. For instance, we can see that in the probit specification (table 5, columns), holding all other variables at their mean, being in the group required to pay extra for the risk insurance reduces the probability to annuitize by 14% (logit results are very similar). This result is consistent with the theory, and implies that ill people are indeed less likely to purchase annuities.

Surprisingly smoking does not have a negative significant effect on the demand for annuity. This neither fits with our predictions regarding smokers' time preferences, as presented above[36], nor with the assumption that since health condition is not a part of the pricing mechanism in these pension insurance policies, smokers would prefer the lump-sum option. These results hold when we include or do not include other variables for health condition as described above.

A possible explanation could be, that even though literature finds a close relation between smoking and medical condition, smokers do not perceive themselves as having a shorter horizon, meaning that smokers experience self-illusion regarding life expectancy. This observation will lead us to a further investigation into self-life perception of smokers and its effect on financial decisions. Columns (13) – (16) in table 5 show that this result is robust when adding only smoking status as a representation of medical condition as well.

[36] Regarding the entire population in our dataset 11.46% are smokers. Regarding the members with high accumulation (over 500K) only 9.64% are.

6. Additional Explanation: Optimism Regarding the Consequences of Smoking Activity on Health and Life Expectancy

6.1 The survey setting, sample and questions

6.1.1 Sample characteristics:

To investigate life expectancy perception by individuals in Israel, during March 2015, we obtained the results of an online survey of 1000 Israeli residents who were 50-70 years old. After omitting missing values we were left with a final set of 963 respondents.[37]

The mean age of those that responded to the survey is 58.17 years (median equals to 58, std. equals to 5.45). 40.6% of participants are male; hence our survey is more female concentrated compared to the population in Israel. The family status of the respondents is varied, 73.4% are married while 16.9% are divorced and 3.3% are widows/widowers.[38] On average our sample is more educated than the total population of Israel. Only 0.2% of participants have less than high school diploma, 22.0% have a high school diploma and 76.5% have a higher education (including college, graduate school, and other higher education such as rabbinical studies).[39] 88% of the sample believe that their health condition is good or very good, 17.4% of the survey participants reported that they currently smoke, and 31.5% reported that they had smoked in the past (in our research, a person is defined "smoker" if he smokes over three cigarettes per day)[40].

With regard to smokers and past smokers in our survey, it should be mentioned that out of the smokers 58% are female, while out of past smokers 53% are female and out of non-smokers 62.4% are female. 69.05% of smokers have a higher education compared to 78% for past smokers and non-smokers (the difference is significant in 3% significance level) implying that smokers are less educated than past and non-smokers. With regard to income, 64.29% of smokers report that they

[37] The survey was provided by "Sarid - Research Services and Training", using an online panel of registered potential participants with a wide residential distribution aged who registered voluntarily. In exchange for their response, they respondents gained points that are convertible into money or vouchers.

[38] Compared to true data from CBS for 2012, the family status of Israeli citizens over the age of 50 is as follows - 68% are married while 13% are divorced and 15% are widows/widowers. Please note that the CBS data also includes citizens aged over 70.

[39] According to the CBS social questionnaire, only 26.4% of the population have achieved academic studies, while 3% have studied in a rabbinical school (Yeshiva). The fact that the survey participants have, on average, higher education than the population can be explained by the choice of conducting survey on line to respondents that are older than 50 years old.

[40] According to a Minister of Health report on smoking in Israel 2014, published May 2015, 27.3% of male and 12.6% of female within the adult population smoke.

earn more than average income in the population; compared to 65.68% and 55.69% of past smokers and non-smokers respectively (the differences are not statistically significant).

6.1.2 The survey structure:

Our survey consisted of questions related to life expectancy estimations, demographic questions, long term savings decision choices and self-health assessments. Most of the questions were multiple choice questions, while some were open ended questions (such as occupation), and some questions included a scale of responses (i.e. probabilities). The median time taken to complete the survey was 6.5 minutes.

As the focus of our research is to obtain life expectancy perception, a question that is clearly not an easy one to answer, we asked the respondents several questions, all well accepted in the financial economics academic literature[41]. Specifically, we presented the respondents with the following questions:

- *In your opinion, what is the current life expectancy in Israel (each respondent for their own gender)?*
- This question was not intended to assess subjective life expectancy. Rather, it was designed to understand the perception of life expectancy of others (in the population). Please note that we did not ask about conditional life expectancy at the specific age of the respondent, since we were interested in asking a clear and relatively simple question that would not confuse our sample.
- *Do you expect your own life expectancy to be lower, identical or higher than the average life expectancy you have mentioned above?*

  Comparing self-life expectancy to the life expectancy of the population was used for example by Beshears, Choi, Laibson, Madrian and Zeldes (2014), who asked respondents "how much longer they expected to live relative to others their age".
- *Using numbers between zero (0) and ten (10), where zero represents "no chance" and 10 represents complete certainty, what is the chance you will reach the age of 85?*
- *Using numbers between zero (0) and ten (10), where zero represents "no chance" and 10 represents complete certainty, what is the chance you will reach the age of 95?*

[41] And each clearly has its advantages and disadvantages, either regarding the complexity of the question or with respect to the information obtained.

Asking respondents to state the probability they will reach the age of X is the common methodology of assessing subjective life expectancy used both by the HRS[42] and by the European SHARE[43] (which are the main sources of data for self-life expectancy research).

- *What is your father's age? If he died please specify the age of death*[44].
  Parental longevity was taken into account in some research such as Van Doorn, Carol, and Stanislav V. Kasl (1998), Balia (2011) and others.

6.2 The survey results

6.2.1 Survey results – Life expectancy

We asked the respondents for their opinion on the life expectancy in the population for their own gender (Table 6). The proximity of the median value that the respondent evaluated (81.1 for male and 82.54 for female), as compared to the actual life expectancy at birth in Israel according to CBS (80.3 for male and 83.9 for female), and to life expectancy at the age 58[45] (82.5 for male and 85.1 for female), is an indicator that the survey respondents took the survey seriously and devoted attention to answering the questions.

As mentioned above, we also asked the respondents for the subjective probability that they will live to the age of 85 and 95. The mean probability to reach these ages were 67.5% and 3.84% respectively, meaning that on average our respondents estimated the probability of reaching the age of 85 to be higher than the probability of reaching the age of 95, as expected.

We asked survey respondents if they expect to live more (category "3"), less (category "1") or the same (category "2") as the life expectancy in the population (that was specified by them in the previous question). 34.2% of the respondents believed they would live longer than the average life expectancy, whereas 52.7% thought that they would live the same time as average, and 12.9% suspected they would live less. On average our respondents believed they would live more than the life expectancy in the population (average score of 2.21, which is statistically different than 2,

[42] The U.S. Health and Retirement Study.
[43] Survey of health, aging and retierement in Europe.
[44] Papers such as Smith, Taylor Jr, Sloan, Johnson and Desvousges (2001) Khwaja, Sloan and Salm (2006), Elder (2013).
[45] The average age in our survey.

and represents the perception that a certain respondent will live the same time as the average in the population).[46]

Our results are very similar to the results reported by Beshears, Choi, Laibson, Madrian and Zeldes (2014), who conducted two surveys relating to U.S. respondents and stated that "In Survey 1, 36% of participants said they expected to live longer than the average person their age, 54% said they expected to live about the same amount of time as the average person their age, and 10% said they expected to die sooner than the average person their age. Responses to Survey 2 were similar: 34% of participants anticipated a relatively long life, 54% anticipated a life about as long as that of an average person of the same age, and 12% anticipated a relatively short life."

[TABLE 6]

Finding that only 12.9% think they will live less than the average life expectancy, is not necessarily an indication of over optimism. Beshears, Choi, Laibson, Madrian and Zeldes (2014) noted that the somewhat wide proportion of respondents projecting a relatively long life could result from the fact that the sample is more educated than average in the population, and since longevity is positively correlated with education (Meara, Richards and Cutler (2008).

6.2.2 Gender and life expectancy estimation

It is well documented in Israel, and in other countries, that on average women live longer than men (Figure 2). For instance, Xu, Kochanek, Murphy and Arias (2014) show that the gender mortality gap in the U.S during 2012 was 4.8 years at birth and 2.6 years at the age of 65 (conditional life expectancy).

Evidence from developed countries shows the same pattern of excess life expectancy of women compared with men. Solberg and Yotav (2014) noted that conditional life expectancy in OECD countries as of 2012 and at the age of 65 was 17.4 or 20.8 for men or women respectively[47]. In Israel, the country where our sample is from, conditional life expectancy at the age of 65 is even higher – 18.8 for men and 21 for women.

[46] Please see appendix 3.
[47] Meaning that a man who reached the age of 65 is expected to live on average 17.4 years to the age of 82.4.

Figure 2 demonstrates the differences in conditional life expectancy of men and women aged 60 in selected countries[48].

[FIGURE 2]

One would expect that this unambiguous result should therefore be reflected in respondents' perception of life expectancy. Yet, as previous academic literature documented, females tend to underestimate their life-expectancy. Perozek (2008), using data from the American 1992 Health and Retirement Study (HRS), presented that male participants' self-life expectancy is in line with social security actuary life tables, while female subjective assessment is to some extent lower than these actuary life tables. He suggested that these findings could either be an indication for future narrowing of the "gender-gap" in life expectancy, or that women overestimate mortality risk relative to men. Later on, Griffin, Loh and Hesketh (2013) conducted an online survey of 2,579 Australian respondents aged over 55 and concluded that women had significantly higher odds of being in the group who underestimated their self-life expectancy by five or more years (compared to actuarial estimates), even after controlling for health and other factors. Moreover, they noted that this could leave females vulnerable to under-funding their retirement. On the contrary, Teppa (2013), using data from the "De Nederlandsche Bank" (DNB), found that both males and females underestimate their survival probabilities at all ages. However, he concluded that men have a better view of their survival probabilities then women.

In our survey, the average life-expectancy forecast for male participants, is 81.11 years, while actual life expectancy at birth in Israel for men according to CBS was 80.3 in 2013. Additionally, the average forecast for female participants is 82.54 years, while actual life expectancy at birth in Israel for women according to CBS was 83.9 in 2013[49]. These results could imply that women in Israel are somewhat pessimistic regarding their subjective life expectancy compared to men.[50]

[48] Source of data: United Nations.

[49] As previously mentioned, we asked respondents for their projected life expectancy at birth. Please note, that by definition this life expectancy is lower than life expectancy at their age (since this number represent a conditional life expectancy under the assumption that the respondent has passed over some major mortality risk by reaching the age of 50-70).

[50] This implication is even stronger once we take into account that our survey participants are more educated than the general population and as education is positively correlated with longevity (Beshears, Choi, Laibson, Madrian and Zeldes (2014) and (Meara, Ellen R., Seth Richards, and David M. Cutler, 2008)).

6.2.3 Survey results – Life expectancy smokers and past smokers

First, we asked respondents in our survey to assess their *health condition* by rating their self-health status on a scale of 1-4. Value "1" reflects very good health, and value "4" reflects the poor health condition (8 people refused to answer and were omitted for this analysis).

Table 7 presents results for smokers, past smokers and non-smokers. Smokers and past smokers assess their health condition to be very close (average values of 1.849 and 1.815 respectively), and only slightly worse than non-smokers (the difference between average values of 1.849 and 1.739 is significant in confidence level of 95[51]%).

[TABLE 7]

We then investigated if current smokers or past smokers have a different estimation than non-smokers about the life expectancy of the total population. It seems that past-smokers are slightly more optimistic regarding the life expectancy of the total population, as they project a life expectancy of 82.15 years, while smokers project a life expectancy of 81.17 (the difference is statistically significant). A similar result is obtained comparing non-smokers to smokers. While non-smokers believe that the life expectancy is 82.11, smokers believe it to be 81.17 (the difference is statistically significant). Nevertheless, the different projections between past-smokers and non-smokers are statistically insignificant, as past-smokers project a life expectancy of 82.15 for the entire population, while non-smokers project one of 82.11.

Next we investigate their perception regarding their own life expectancy. On average we expect that smokers, if they are rational, will estimate that they will live less than the life expectancy of the general population.

The mean projection is 2.286 for non-smokers and is it significantly different from the mean "2". This is not surprising, if smoking negatively affects life expectancy, then conditioning on non-smoking and having a more educated population (education is positively correlated with life expectancy), will lead to obtaining a slightly higher self-life expectancy estimation on average. We also find that the mean projection for smokers is 2.011, which is not significantly different

[51] We also performed a nonparametric Wilcoxon rank sum test for the difference between the median of the different groups (smoking vs. past smoking and smoking vs. non-smoking). We failed to reject either of the null hypothesis that the median values are equal.

from the mean "2". This result can be an indication of over optimism as conditioning on smoking, since the average life expectancy should be lower. However, we also have the issue of higher education as mentioned above.

In order to test for robustness of the following results, we obtained a sub-sample from the full survey population, in which the proportions of education levels are compatible with education proportions in the Israeli population, as published by the CBS. We sampled 30 sub-samples of 100 observations each from the population, and tested for the average projections of smokers from the 30 different sub-samples. The average projection was discovered to be 1.99, which is not statistically different from "2". We made the same examination for other sub-samples of the 3000 examinees, and found that, for each and every sub-sample, the projection of smokers was not statistically different from "2", meaning that smokers do in fact believe that on average their life expectancy is similar to the average life expectancy of the population, implying the over optimism of smokers.

Further, the projection for past smokers is 2.204, and significantly different from the mean "2", this might imply some optimism, as conditioning on past smoking the average should reflect the health damage caused by the previous smoking behavior. This result is consistent with previous literature such as Khwaja, Sloan, and Chung (2007), who udes data from HRS[52] toshow that current smokers are relatively over optimistic. The difference between all three sub-groups is statistically significant, implying that non-smokers and past smokers significantly believe, that on average they will live longer than current smokers.

7. Conclusions

In this paper we took advantage of special settings in the pricing mechanism of Israeli insurance pension policies, in order to better understand properties of time preferences and long term savings decisions of smokers. In order to do so we used a unique dataset from an Israeli Insurance corporation, containing information regarding real annuitization decisions of retirees. Moreover, we focused on the annuitization decisions of smokers in Israel, who are insured by pension insurance policies, using a special feature of this product – its pricing only considers gender,

[52] The U.S health and retirement study.

actuarial life expectancy and expected rate of return. Insurance policy pricings do not take health condition (or smoking status) into account, and hence create a distinct advantage for the lump-sum option for less healthy retirees. These unusual settings comprise an interesting case study. Smokers should realize that health is not priced in annuities, and in addition smokers are expected to be unwilling to give up the pleasure of smoking in the present in favor of health and longevity in the future. Hence, smokers are expected to prefer a withdrawal of their pension accumulated funds as a lump-sum (in the present) rather than as an annuity (compared to non-smokers). Our findings suggest that, surprisingly, smoking does not have a significant effect on the annuity decision, and the effect found is different than expected, namely, smokers are more likely to annuitize.

A possible explanation could be, that even though the literature finds a close relation between smoking and medical condition, smokers do not perceive themselves as having a shorter horizon, meaning that smokers experience self-illusions regarding their life expectancy. This observation led us to a further investigation into self-life perception of smokers and its effect on financial decisions. We obtained the results of an online survey of 1000 Israeli residents, 50-70 years old. Our survey consisted of questions related to life expectancy estimations, demographic questions, long term savings decision choices and self-health assessment. The survey results suggested that smokers believe they will live to the average life expectancy.

In this study we find that, in contrast to time preference theory, smokers do not prefer the present, as they do not choose the lump-sum option when retiring. This result is interesting both for analyzing real decisions with data from an Israeli insurance corporation, and for the fact that in addition to the theoretical prediction, pension insurance policies in Israel do not take health consideration within the pricing process, and hence smokers are expected to choose the lump-sum option even more.

Our results suggest that smokers might be over optimistic regarding their subjective life expectancy, a fact that is expected to influence the decision making process in general, and financial decisions in particular. Moreover, our unique natural experiment shed light on the influence of unrealistic subjective life expectancy assessments on the annuitization decisions of smokers. This idea should be further investigated, as it could help us to better understand the annuity puzzle.

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Table 1 - Money under management by the different entities

Pension Entity	Number	Money under management, Millions, NIS	% out of total
Total Pension Funds	**43**	**533,191**	**47%**
Old pension Funds	18	372,915	33%
New Pension Funds (general, Comprehensive and others)	25	160,276	14%
Total Insurance Companies	**12**	**265,044**	**23%**
Total Provident Funds	**221**	**347,343**	**30%**
Provident Funds	88	203,301	18%
Educational Provided Fund and others	133	144,042	13%

Notes: The Israeli pension industry consists of 43 pension funds, 12 insurance companies and 221 provident funds, as of 2013. The volume of funds under management is higher than 1 Trillion NIS, 47% of these funds are managed by pension funds, 23% by insurance companies and 30% by provident funds.

Table 2 - Clientele characteristics andadministrative data

VARIABLES	(1) N	(2) Mean / %	(3) sd	(4) min	(5) max
The entire data					
Retirement age	18,860	66.05	4.054	60	101
Male	9,129	48.4%			
Marital status					
Divorced	1,580	8.38%			
Widower	861	4.57%			
Married	10,205	54.1%			
Smoking activity					
Smoker	2,161	11.46%			
Clients with accumulations over 500K NIS					
Retirement age	1,556	67.2	3.6	60	89
Male	1,151	74%			
Marital status					
Divorced	150	9.64%			
Widower	75	4.82%			
Married	1,175	75.5%			
Smoking activity					
Smoker	150	9.64%			

Notes: The mean age is 66.05 years, 48% of participants are male, 54% are married, while 8.3% are divorced and 4.5% are Widows/widowers. 11.4% of the participants are classified as smokers by the insurance corporation (please note that they could be past smokers since the insurance companies do not update socioeconomic data). For clients with accumulations of over 500K NIS, the mean age is 67.2 years, 74% of participants are male, 75.5% are married, while 9.64% are divorced and 4.82% are Widows/widowers. 9.64% % of the participants are classified as smokers by the insurance corporation (please note that they could be past smokers since the insurance companies do not update socioeconomic data).

Table 3 - Distribution of annuity choice over gender, marital status and smoking status Accumulations over 500K NIS, Number of clients				
		annuity_included	**lump_sum**	**Total**
gender	**female**	373	32	405
		92.10%	7.90%	100.00%
	male	936	215	1,151
		81.32%	18.68%	100.00%
	Total	1,309	247	1,556
		84.13%	15.87%	100.00%
Marital status	**Divorced**	136	14	150
		90.67%	9.33%	100.00%
	Married	1,029	146	1,175
		87.57%	12.43%	100.00%
	Widower	66	9	75
		88.00%	12.00%	100.00%
	Single	41	1	42
		97.62%	2.38%	100.00%
	unknown	37	77	114
		32.46%	67.54%	100.00%
	Total	1,309	247	1,556
		84.13%	15.87%	100.00%
Smoking status	**smoker**	135	15	150
		90.00%	10.00%	100.00%
	Non smoker	1,012	197	1,209
		83.71%	16.29%	100.00%
	Unknown	162	35	197
		82.23%	17.77%	100.00%
	Total	1,309	247	1,556
		84.13%	15.87%	100.00%

Notes: annuity_icluded means that the client chose some portion of annuity; Lump_sum means that the client chose the full lump-sum option (no annuity at all). With regard to smoking, for the analysis below we will omit the category of 'unknown'.

Table 4 – Annuity decisions regression

Dependent variable: choosing any part of annuity (rather than the full lump-sum choice)

	Basic regression with macroeconomic FE				Basic regression with year FE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Probit coeff	Marginal effects at mean	logit coeff	Marginal effects at mean	Probit coeff	Marginal effects at mean	logit coeff	Marginal effects at mean
Gender	-0.199	-0.0380	-0.377	-0.0358	-0.203*	-0.0386*	-0.386	-0.0365
	(0.122)	(0.0232)	(0.238)	(0.0224)	(0.123)	(0.0232)	(0.239)	(0.0224)
retirement_age	0.00567	0.00108	0.0130	0.00123	0.00524	0.000997	0.0128	0.00121
	(0.0163)	(0.00310)	(0.0294)	(0.00278)	(0.0163)	(0.00310)	(0.0294)	(0.00277)
total_amount	1.69e-08	3.22e-09	1.20e-08	1.14e-09	-1.97e-08	-3.74e-09	-1.86e-08	-1.76e-09
	(6.32e-08)	(1.20e-08)	(1.09e-07)	(1.03e-08)	(6.32e-08)	(1.20e-08)	(1.09e-07)	(1.03e-08)
Divorced	-0.547	-0.104	-1.275	-0.121	-0.523	-0.0995	-1.264	-0.119
	(0.476)	(0.0902)	(1.092)	(0.102)	(0.474)	(0.0896)	(1.094)	(0.102)
Widower	-0.508	-0.0968	-1.250	-0.118	-0.487	-0.0927	-1.243	-0.118
	(0.497)	(0.0942)	(1.121)	(0.105)	(0.495)	(0.0937)	(1.123)	(0.105)
Married	-0.543	-0.103	-1.300	-0.123	-0.528	-0.101	-1.304	-0.123
	(0.456)	(0.0863)	(1.057)	(0.0986)	(0.453)	(0.0856)	(1.059)	(0.0985)
Un-known marital status	-2.104***	-0.401***	-3.965***	-0.376***	-2.080***	-0.396***	-3.956***	-0.374***
	(0.471)	(0.0887)	(1.075)	(0.0987)	(0.468)	(0.0881)	(1.076)	(0.0985)
purcahse_age	-0.0848***	-0.0162***	-0.154***	-0.0146***	-0.0836***	-0.0159***	-0.152***	-0.0144***
	(0.0114)	(0.00213)	(0.0214)	(0.00197)	(0.0115)	(0.00214)	(0.0215)	(0.00197)
no_of _policies	0.0146	0.00279	0.0434	0.00411	0.0146	0.00277	0.0425	0.00402
	(0.0131)	(0.00249)	(0.0272)	(0.00257)	(0.0131)	(0.00250)	(0.0273)	(0.00257)
percent_post_2008	2.613***	0.498***	4.747***	0.450***	2.597***	0.494***	4.722***	0.446***
	(0.438)	(0.0817)	(0.823)	(0.0758)	(0.440)	(0.0817)	(0.826)	(0.0758)
GDP	-2.48e-06**	-4.74e-07**	-4.85e-06**	-4.59e-07**				
	(1.18e-06)	(2.25e-07)	(2.17e-06)	(2.05e-07)				
Rf	-5.905	-1.126	-7.340	-0.696				
	(6.248)	(1.189)	(11.57)	(1.097)				
year2009					0.460***	0.0875***	0.871***	0.0823***
					(0.173)	(0.0329)	(0.320)	(0.0301)
year2010					0.180	0.0343	0.354	0.0335
					(0.148)	(0.0282)	(0.271)	(0.0256)
year2011					0.0438	0.00833	0.155	0.0146
					(0.131)	(0.0250)	(0.243)	(0.0229)
year2012					0.137	0.0261	0.288	0.0272
					(0.134)	(0.0255)	(0.251)	(0.0237)
smoker								
mortality_increase								
professional_increase								
Constant	7.679***		14.17***		5.129***		9.275***	
	(1.375)		(2.610)		(0.944)		(1.820)	
Observations	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
Pseudo R^2	0.2425	0.2425	0.2423	0.2423	0.2438	0.2438	0.2436	0.2436

*Notes: Probit and logit, Standard errors in parentheses. Dependent variable, Y_ann is an indicator variable for choosing any part of annuity (rather than the full lump-sum choice). Main explanatory variables are gender, retirement age, GDP and rate of return (rf) in specifications (1) and (2), or year dummies in specifications (3) and (4), total accumulation amount (total_amount), marital status, purchase age, number of policies and the percentage of accumulation saved after 2008. Specification for retiaries with accumulated funds of more than 500K in this insurance corporation (N=1,556). *** p<0.01, ** p<0.05, * p<0.1*

Table 5- Medical condition – Probit and logit

Dependent variable: choosing any part of annuity (rather than the full lump-sum choice)

	Medical status regression with year FE (including smoking)				Smoking status regression with year FE			
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
VARIABLES	Probit coeff	Marginal effects at mean	logit coeff	Marginal effects at mean	Probit coeff	Marginal effects at mean	logit coeff	Marginal effects at mean
Gender	-0.179	-0.0297	-0.321	-0.0227	-0.203	-0.0340	-0.351	-0.0251
	(0.136)	(0.124)	(0.262)	(0.337)	(0.135)	(0.141)	(0.261)	(0.373)
retirement_age	-0.00181	-0.000301	-0.00235	-0.000166	0.00253	0.000424	0.00590	0.000421
	(0.0179)	(0.00323)	(0.0324)	(0.00336)	(0.0177)	(0.00343)	(0.0319)	(0.00665)
total_amount	7.68e-08	1.28e-08	1.11e-07	7.86e-09	7.28e-08	1.22e-08	1.02e-07	7.27e-09
	(7.21e-08)	(5.38e-08)	(1.23e-07)	(1.17e-07)	(7.41e-08)	(5.14e-08)	(1.26e-07)	(1.08e-07)
Divorced	-3.956	-0.658	-13.88	-0.979	-3.975	-0.667	-13.89	-0.992
	(120.5)	(17.35)	(680.5)	(33.47)	(120.5)	(17.48)	(681.9)	(33.97)
Widower	-3.969	-0.661	-13.95	-0.984	-3.977	-0.667	-13.96	-0.997
	(120.5)	(17.34)	(680.5)	(33.40)	(120.5)	(17.48)	(681.9)	(33.90)
Married	-3.917	-0.652	-13.84	-0.977	-3.941	-0.661	-13.89	-0.992
	(120.5)	(17.38)	(680.5)	(33.51)	(120.5)	(17.51)	(681.9)	(33.97)
Un-known marital status	-5.494	-0.914	-16.54	-1.167	-5.515	-0.925	-16.58	-1.184
	(120.5)	(16.30)	(680.5)	(30.68)	(120.5)	(16.43)	(681.9)	(31.12)
purcahse_age	-0.0776***	-0.0129	-0.140***	-0.00985	-0.0792***	-0.0133	-0.143***	-0.0102
	(0.0128)	(0.0530)	(0.0237)	(0.146)	(0.0127)	(0.0543)	(0.0235)	(0.152)
no_of _policies	0.00754	0.00126	0.0295	0.00208	0.00761	0.00128	0.0285	0.00204
	(0.0140)	(0.00566)	(0.0293)	(0.0310)	(0.0140)	(0.00572)	(0.0291)	(0.0303)
percent_post_2008	2.515***	0.418	4.514***	0.318	2.395***	0.402	4.312***	0.308
	(0.469)	(1.719)	(0.873)	(4.729)	(0.466)	(1.643)	(0.867)	(4.570)
GDP								
Rf								
year2009	0.716***	0.119	1.378***	0.0972	0.724***	0.121	1.391***	0.0993
	(0.199)	(0.490)	(0.381)	(1.444)	(0.199)	(0.497)	(0.380)	(1.475)
year2010	0.131	0.0219	0.247	0.0174	0.131	0.0220	0.248	0.0177
	(0.160)	(0.0936)	(0.290)	(0.259)	(0.159)	(0.0936)	(0.290)	(0.264)
year2011	-0.00360	-0.000599	0.0440	0.00311	-0.0164	-0.00275	0.0244	0.00174
	(0.143)	(0.0239)	(0.261)	(0.0497)	(0.142)	(0.0264)	(0.261)	(0.0318)
year2012	0.0975	0.0162	0.202	0.0142	0.0996	0.0167	0.196	0.0140
	(0.144)	(0.0707)	(0.267)	(0.212)	(0.143)	(0.0723)	(0.265)	(0.208)
smoker	0.173	0.0288	0.306	0.0216	0.152	0.0254	0.296	0.0211
	(0.172)	(0.122)	(0.329)	(0.321)	(0.169)	(0.108)	(0.329)	(0.315)
mortality_increase	-0.835**	-0.139	-1.450**	-0.102				
	(0.338)	(0.573)	(0.577)	(1.520)				
professional_increase	-0.254	-0.0422	-0.517	-0.0364				
	(0.248)	(0.178)	(0.434)	(0.542)				
Constant	9.780		24.19		8.517		21.88	
	(120.5)		(680.5)		(120.5)		(681.9)	
Observations	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359
Pseudo R^2	0.2569	0.2569	0.2563	0.2563	0.2512	0.2512	0.2506	0.2506

*Notes: Probit and logit, Standard errors in parentheses. Dependent variable, Y_ann is an indicator variable for choosing any part of annuity (rather than the full lump-sum choice). Main explanatory variables are gender, retirement age, year dummies, total accumulation amount (total_amount), marital status, purchase age, number of policies, and the percentage of accumulation saved after 2008. For medical condition we added smoking status (in all specifications) and mortality increase. Specifications for retirees with accumulated funds of more than 500K in this insurance corporation and information about smoking status (N=1,339). *** p<0.01, ** p<0.05, * p<0.1*

Table 6 – Projected life expectancy in the population for males and females

VARIABLES	(1) N	(2) Mean	(3) Sd	(4) Min	(5) Max	(6) Median
projected life expectancy in the population	963	81.96	4.45	40	100	82
projected life expectancy in the population (male)	391	81.11	3.98	65	100	81
projected life expectancy in the population (female)	572	82.54	4.67	40	96	83
self-life expectation	963	2.21	0.65	1	3	2
self-life expectation (male)	391	2.28	0.66	1	3	2
self-life expectation (female)	572	2.16	0.64	1	3	2

Notes: "Projected life expectancy in the population" is a variable indicating the respondent's perception of life expectancy in the population measured in years. "Self-life expectation" is a variable indicating if respondents believe they will live more (value "3"), equal (value "2"), or less (value "1") than the life expectancy in the population, as mentioned by the question "projected life expectancy in the population". No. of participants is 963 divided into 391 males and 572 females. The projected mean life expectancy of male and female participants is 81.11 and 82.54 respectively. Please note that Actual life expectancy at birth in Israel, according to CBS, is 80.3 for men and 83.9 for women (2013).

Table 7 – Self-life expectancy and self-health assessment compared with the population for smokers and non-smokers

VARIABLES	(1) N	(2) mean	(3) Sd	(4) min	(5) max	(6) Median
projected life expectancy in the population smokers	**168**	**81.17**	**5.57**	**40**	**95**	**81.5**
projected life expectancy in the population smokers (male)	70	80.1	4.24	65	90	80
projected life expectancy in the population smokers (female)	98	81.94	6.25	40	95	83
projected life expectancy in the population past smokers	**303**	**82.15**	**4.11**	**60**	**90**	**82**
projected life expectancy in the population past smokers (male)	140	81.70	3.68	70	90	82
projected life expectancy in the population past smokers (female)	163	82.5	4.42	60	90	83
projected life expectancy in the population nonsmokers	**492**	**82.11**	**4.20**	**67**	**100**	**82**
projected life expectancy in the population nonsmokers (male)	181	81.04	4.03	70	100	80
projected life expectancy in the population nonsmokers (female)	311	82.72	4.19	67	96	83
self-life expectation smokers	**168**	**2.011**	**0.656**	**1**	**3**	**2**
self-life expectation smokers (male)	70	2.071	0.728	1	3	2
self-life expectation smokers (female)	98	1.969	0.599	1	3	2
self-life expectation past smokers	**303**	**2.204**	**0.654**	**1**	**3**	**2**
self-life expectation past smokers (male)	140	2.257	0.661	1	3	2
self-life expectation past smokers (female)	163	2.159	0.647	1	3	2
self-life expectation nonsmokers	**492**	**2.286**	**0.639**	**1**	**3**	**2**
self-life expectation nonsmokers (male)	181	2.386	0.627	1	3	2
self-life expectation nonsmokers (female)	311	2.228	0.639	1	3	2
Health projection of smokers	**166**	**1.849**	**0.675**	**1**	**4**	**2**
Health projection of past smokers	**302**	**1.815**	**0.661**	**1**	**4**	**2**
Health projection of non-smokers	**487**	**1.739**	**0.663**	**1**	**4**	**2**

Notes: "projected life expectancy in the population" is a variable indicating the respondent's perception of life expectancy in the population. "Self-life expectation smokers" is a variable indicating if respondents believe they will live more (value "3"), equal (value "2"), or less (value "1") than the life expectancy in the population, as mentioned by the question "projected life expectancy in the population". No. of participants is 963 divided into 168 smokers, 303 past-smokers and 492 non-smokers. The projected mean life expectancies of smokers, past-smokers and non-smokers are 81.17, 82.15 and 82.11 respectively. All sub-groups of participants believe they will live above the average life expectancy. "Health projection" is a variable indicating the respondent's assessment of subjective health. If respondents believe they are in very good health they will report the value "1" and if they believe they are in bad health they will report the value "4". No. of participants that answered this question is 955 divided into 166 smokers, 302 past-smokers and 487 non-smokers. Non_smokers assess their health the best (value 1.739 which is the closest to "1"), however, the answers of smokers and past smokers are not statistically different, meaning that smokers and past smokers assess their health the same.

Figure 1 – Annuity withdrawal between smokers and non-smokers (among clients with accumulations over 500K NIS)

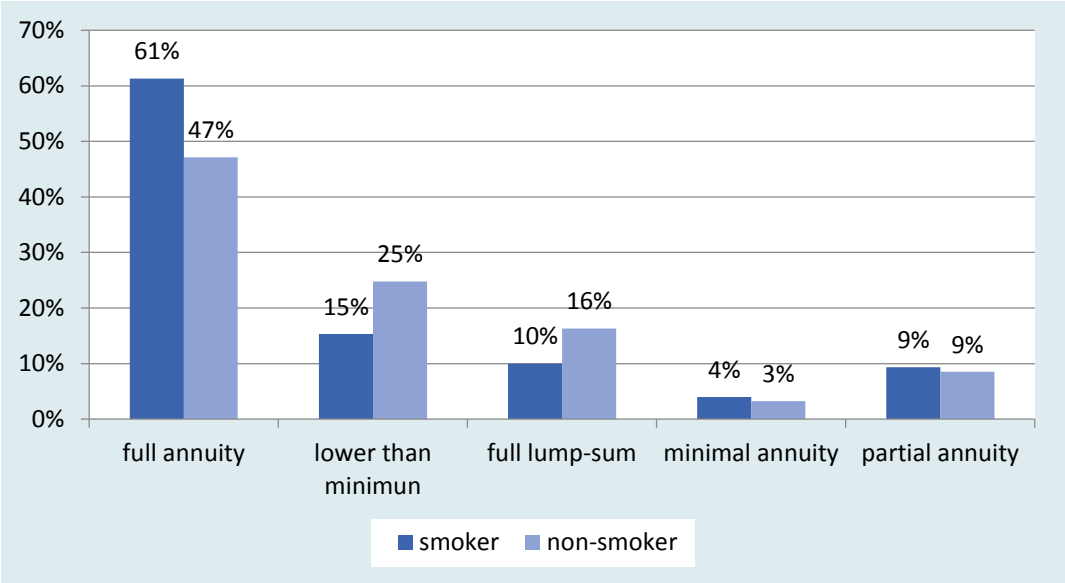
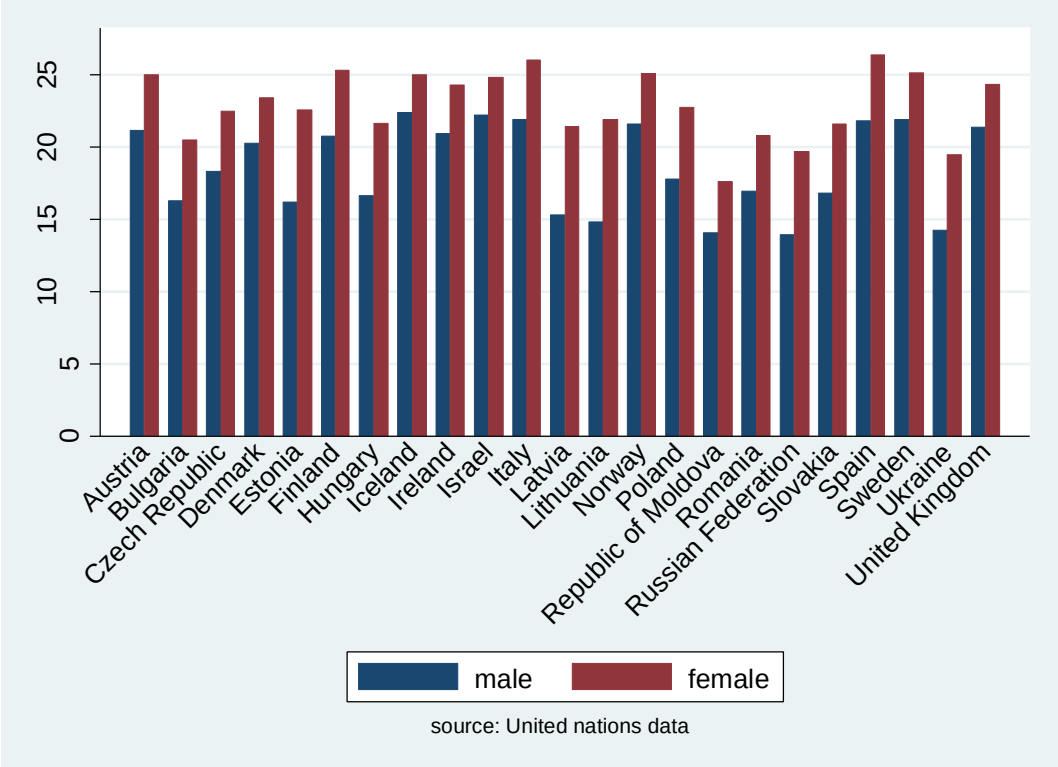


Figure 2 – Gender gap in conditional life expectancy, of people of the age of 60 in selected countries, 2000-2005



Notes: Figure 2 illustrates that the gender gap in life expectancy between males and females is consistent in many countries all over the world, and favors the females.