Evidence on Annuity Choices in Chile

José Luis Ruiz
Facultad de Economía y Negocios
Universidad de Chile
jlruiz@unegocios.cl

Abstract

This study analyzes the empirical determinants of the annuity choice using data on retirees from the Chilean labor market. We find that sales agents, knowledge about the pension system, and greater education will be associated with an increase in the annuitization probability. Also, we expect that people in poor health are less likely to annuitize, which is supportive of the traditional view of adverse selection in the annuity market. Finally, we analyze the effects on annuity choices of the introduction of a Minimum Pension Guarantee.

Keywords: Annuities, financial choice, welfare.

Resumen

Este estudio analiza los determinantes de la elección de rentas vitalicias haciendo uso de información de pensionados del mercado laboral chileno. Se encuentra que los agentes de ventas, el conocimiento acerca de los sistemas de pensiones y una mayor educación estarán asociados con un incremento en la probabilidad de contratar rentas vitalicias. También se espera que las personas en peor estado de salud sean menos probables de contratar rentas vitalicias, lo que sustenta el punto de vista tradicional de selección adversa en los mercados de rentas vitalicias. Finalmente, analizamos

los efectos en la elección de rentas vitalicias de la introducción de la garantía mínima de pensión.

Palabras clave: Rentas vitalicias, elección financiera, bienestar.

1. Introduction

In Chile, two thirds of the retirees chose to purchase an annuity at retirement. This is one of the highest annuitization rates in the world. In Chile, a retiree must decide between two pure modalities of pensions: Purchase an annuity in a life insurance company that gives him a stream of pension benefits that are indexed to the variation of the price index. So, this modality eliminate the longevity and the capital market risk making the payments constant in real terms; or take a Phased Withdrawal in his Pension Fund Administrator (aka AFP) keeping the property rights of the funds, is subject to specific rules of decumulation, and is risky since people keep the capital market risk and the longevity risk.

This paper investigates the determinants of annuitization in Chile using a static model. Yaari (1965), shows that annuities dominate any other asset if individuals have no bequest motives at retirement. Also, he shows that people will prefer to fully annuitize their wealth when the only source of uncertainty is their date of death. However, there is a gap between this prediction and real decisions. Then, there is still an important way to run in this field.

Another important characteristic of the Chilean pension system is the existence of a special commitment to guarantee a minimum standard of living to the retirees from the government. This policy tool is known as a Minimum Pension Guarantee (MPG) and it is focused on poor people that satisfy contribution requirements.

The Chilean pension system is based on private administration of the funds provided by institutions called AFPs. One of the system roots is the free choice of customers between

these providers, so these institutions have incentives to hire sales agents for competition among them since they receive salary based fees. The experience shows that sales agents have been very effective at switching people between AFP's during the build-up phase. However, the AFP does not have special incentives to retain customers in the decumulation phase since they are seen as expensive to keep. AFPs are allowed to charge fees on retirees' benefit paid, but they must keep a 1% of their own resources as reserves in case of bad performance in returns. In addition, life insurance companies are allowed to charge a front loaded fee once they sign a new contract with a retiree. As a result, these companies have incentives to hire sales agents to promote the annuity modality of retirement.

The hypotheses we want to explore in this paper are related with the role of sales agents and the financial literacy. Our prediction is that financially literate people might value more the annuities that give then protection to longevity and capital market risk. Our second hypothesis is related with the positive and significant role played by sales agents in the annuity choice. We expect that once they reach people with enough balance to support early retirement it is easy for them to incentive this choice.

In what follows, we first review related studies. Next we present issues relevant to the decumulation process at retirement in the Chilean case. Following this we present the methodology to be employed in the analysis. After a discussion of the data set to be used in the paper, we present the empirical results using a probit model. Finally, we offer conclusions and discussion.

2.   Literature Review on Annuities

A.   General Studies

The seminal paper of Yaari (1965) discusses consumer behavior regarding annuities when they decide to retire. His main contribution was to establish that people will full annuitize if the only source of uncertainty is related to the date of death. Davidoff, Brown, and Diamond (2005) generalize the result of full annuitization under the absence of bequest motives and an actuarially fair annuity market under less restrictive assumptions used in Yaari's model.

Many studies have emphasized the adverse selection issue on annuities markets (Abel (1986), Finkelstein and Poterba (2004), McCarthy and Mitchell (2003)). Finkelstein and Poterba (2004) examine annuity policies in the U.K. annuity market and show that, in both the compulsory and the voluntary markets, there is strong evidence that longer-lived individuals buy more back-loaded annuities. This is consistent with adverse selection, because individuals have private information about their risk-type and therefore use this to select the insurance contract. McCarthy and Mitchell (2003) provide international evidence of adverse selection in annuities[1]. They compare the mortality patterns using the A/E method that compares the number of deaths in a population with a given age structure using one table compared with the number of deaths in a population of the same size using a second mortality table. Other studies have emphasized the money's worth ratios as a way to understand the value of purchasing an annuity (Mitchell et al. (1999)). Brown (2003) acknowledges that annuities are valuable longevity insurance for individuals with uncertain lifetimes. In his model, however, mandating annuities for all individuals will not be

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[1]The countries studied are the United States, the United Kingdom and Japan.

optimal because the existence of different mortality distributions across groups and purchase costs. Mackenzie (2006) recognizes that the optimal portfolio should include some part in annuities and some precautionary savings. Abel (1986) examines the implications of adverse selection in the private annuity market for the pricing of private annuities and their implications for individual consumption and bequest motives. Using an overlapping generations model in which individuals are utility maximizers but are uncertain regarding the date of death, he shows that the introduction of actuarially fair social security will increase the rate of return on purchased annuities.

Brown and Poterba (2000) examine the market for annuities in the United States. They find that the utility gain from annuitization is bigger for single individuals than for couples. As more potential buyers are couples, this fact could help to explain the low level of annuitization in the country. They also find no evidence of bequest motives are a significant factor.

Using dynamic programming techniques, Brown (2001) examines the household decisions about whether to purchase an annuity at retirement. He analyzes the value added to the utility function under the possibility of buying a fair annuity. The empirical analysis uses the Health and Retirement Study, where he divides the sample into couples and single individuals. He implements a measure called the Annuity Equivalent Wealth first used by Mitchel et al. (1999) to report the utility value of gaining access to an actuarially fair annuity market. This variation in utility arises from differences in marital status, risk aversion or mortality risk. He finds different planning horizon and health states influence the decision. Again, he finds no empirical support for bequest motives.

Dus, Maurer and Mitchell (2005) examine different alternatives for the retirement asset decumulation process using a risk-value approach. Here, return is the expected level of benefits (including possible bequests) and risk pertains to uncertainty of reaching the desired level of consumption. They mention that

phased withdrawal plans have the advantages of flexibility and bequest motives, but they also require effort from individual to formulate asset allocation and withdrawal rules. Horneff et al. (2007) point out that utility mazimizers will not necessarily annuitize 100% of their funds at the retirement age. They find that the optimal path is to gradually annuitize the portfolio, even if retirees do not have strong bequest motives.

B.   *Chilean Studies*

James, Martinez and Iglesias (2006) studied the Chilean pension annuity market with individual information for annuitants provided by the regulator. They found evidence of adverse selection based on individual private information about short-run health status. But they also mentioned that this did not seem to deter the high percentage of annuitization for retirees. In addition, they found that the Money's Worth Ratio[2] (MWR) was close to 100 percent for price-indexed annuities in 2004. Rocha and Thorburn (2006) report MWR's were higher for people with higher pension accumulations for the period 1999 to 2004. Edwards and James (2006) study the determinants of annuitization choice in Chile using micro level data (EPS 2002) and a probit model. They split the sample between early retirees and those who retire at the normal retirement age. They build a measure of knowledge about the pension system and find that this variable takes higher values for annuitants. Also, they include a time horizon variable that proxies for individual's planning horizons.

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[2] Calculation of the expected present discounted value of payouts for annuities in relation to the premium cost of the annuity (Mitchell et al. 1999).

3.   Understanding the retirement choice
in the Chilean context

The Chilean pension system in place since 1981 creates individual accounts in which private companies (AFPs) collect and register required personal contributions. These AFPs invest the resources and pay benefits to retirees who decide to take phased withdrawals (PW). They were initially allowed to charge fees based on salary (when people make contributions) and also on the asset balances. However, changes in regulation during the 1980's have constrained AFPs so they can now only collect fees on contributions. Therefore, people who retire have two options to begin their decumulation phase: phased withdrawal, or annuity[3]. The normal retirement age is 60 for females and 65 for males. Individuals can retire earlier if they have accumulated sufficient assets to finance a pension in accordance with their salary and minimum pension guarantee (MPG)[4].

A.   *Phased Withdrawal (PW)*

The PW pays benefits by disbursing each worker's individual account over his life expectancy. The formula calculates the required necessary capital units (NCU) for paying one unit of pension to the affiliate. The formula gives an annual payout that is then divided into 12 months of payments. One of the advantages of the PW is that the retiree does not transfer his right to the funds to the life insurance company, but of course, he retains the longevity and market risk.

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[3]Strictly speaking, they have other two choices from the combination of these modalities according to recent changes in the regulation. But in practice, few people make these combinations.
[4]The details of the conditions will be presented later in the chapter.

The formula for the NCU requires the use of mortality tables. The RV-85 tables[5] were used until the year 2004. As mortality risk depends on sex, age, and changes in life expectancy, updated tables were necessary in order to reflect the new conditions in the population. PW generates a decreasing stream of income as the pensioner ages[6]. After the update to the tables, the decreasing benefit slope became less severe than before, but it still persists. The new RV-2004 tables exclude in the calculation of the probabilities of death those pensioners who were receiving a pension lower than the MPG. Therefore, it could be expected that the new tables overestimate the life expectancy for people who are receiving PW. This is due to the constraint that people who are not able to finance a MPG or a pension equivalent to 110% of their working salary are not allowed by law to purchase an annuity. So, it is expected that many poor people will be receiving PW and they have a lower life expectancy as a group[7].

The following expression shows the formula for the PW:

$$PW_{i,t} = \frac{Balance_{i,t}}{12 \cdot NCU_{i,t}}$$

where

$PW_{i,t}$ corresponds to the pension under PW for individual i in period t,

$Balance_{i,t}$ is the balance of the personal account at the moment of calculation, and $NCU_{i,t}$ is the necessary capital required to finance one unit of pension payout considering the family composition of the pensioner[8].

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[5]Theses tables were built to be used for the United Sates population. However, they were adjusted for the Chilean population.

[6]The benefit computation is re-done every year and uses updated death probabilities and changes in beneficiaries' conditions.

[7]People who are poor usually live less time than rich do.

[8]More details are available in the Circular 1,302 of Superintendence of Pension Funds of Chile and Pino (2005).

B.   Annuities

Individuals can purchase annuities from life insurance companies using their balances accumulated during their accumulation phase. Before 2004, if individuals decide to retire before the normal retirement age, they face the constraint that the annuity purchased must exceed the maximum of 50% of their own salaries, or 110% of the MPG. After 2004, the regulation gradually increases the requirement for the pension level to be at least 150% of the MPG and 70% of the salaries over the last 10 years of affiliation (it can be reduced at most 16 months without contributions). This gradual modification will be operating in full from September 2010. If people decide to retire at the normal age, the only constraint is that the annuity to be purchased should be at least equivalent to the MPG.

There are three types of annuities. In an immediate annuity the affiliate transfers his funds to the life insurance company which commits to pay benefits until his death and his survival benefits. In a temporary withdrawal with deferred annuity, the person purchases a deferred annuity and also receives a PW between his retirement date and the start date of the annuity purchased. An immediate annuity with Phased withdrawal is a combination of the two pure modalities. Any of the modalities of annuity may be fixed or variable. The fixed case is the normal immediate annuity in which the pension value remains the same expressed in UF. The variable case has two components: a fixed part that cannot be lower than the MPG for normal age retirement or 150% of the MPG for early retirement; and a variable part composed by the remaining balance that can be invested by the life insurance company in some index (like foreign money index, Dow Jones, etc.).

Table 1 shows a descriptive comparison between the PW and the annuity modalities.

Table 1

Retirement payout choice in Chile

	Normal Ret.	Early Ret.	Total
Annuities	15.2%	49.8%	65.0%
PW	29.6%	5.4%	35.0%
Total	44.8%	55.2%	100%

Source: Superintendence of Pension Funds, Chile (www.safp.cl). Information until august 2008.

C.   *Survivorship pensions*

In Chile, annuities and PW also protect widows, giving them a benefit equivalent to 60% of their husband's pension. If they have children, widows will receive a pension equivalent to 50% of their husband's pension and each child will also receive an additional 15% of the male's pension. On the other hand, if the wife dies before the husband, she generates a survivorship pension only for a disabled husband or children. All of these potential benefits are incorporated in the PW formula and into the individual's annuity quotation.

Under PW, the NCU formula includes a discount for eventual survivorship pensions. In that case, individuals receive a lower payout when they are married or have children, to cover the associated survivorship benefits. Also, life insurance companies require all information about possible survivor beneficiaries when making their quotations.

D.   *Minimum Pension Guarantee (MPG)*

It is established by law that people who make contributions for at least 20 years and who are poor in old age will receive a benefit that covers at least the MPG. In practice, the 20 year requirement is the most important requirement given the patterns of employment/unemployment in the Chilean population (Arenas et al 2008).

The government must make up any difference between the annuitant's own benefit and the MPG. In the case of people receiving PW benefits, the government first requires the pensioner's own funds to be spent to cover the MPG. After these funds run out, the government will cover any shortfalls up to the MPG from general revenues. In the case of annuities, life insurance companies receive as compensation the required payment benefit in order to reach the MPG.

The MPG is in nominal value, it is paid monthly and it is readjusted in annual frequency. Also, its value differs according to the age of the pensioner. The MPG values from December 2007 are: for people younger than 70 is $96,391 Chilean pesos ($174 dollars)[9]; for people from 70 and younger than 75 is $105,396 ($191 dollars); and for people from 75 or older is $112.454 ($204 dollars).

In the next section we will present the methodology to be employed to model choice behavior as influenced by the differences in expected utility between purchasing an annuity and taking PW.

[9]$1 dollar is equivalent to $552.47 Chilean pesos at september 30, 2008.

4.   **Methodology**

A.   *The Model*

Assuming that individuals are expected utility maximizers, it is optimal for an individual to choose an annuity instead of a PW payment at retirement if $E\big(U\big(\text{Annuity}\big)\big) \geq E\big(U\big(PW\big)\big)$. There is also a regulatory constraint that people could take an annuity only if the annuity payment is greater or equal to the minimum pension guarantee ($A_i \geq MPG$).

If the individual chooses to buy an annuity, he signs a contract in which he pays an initial up front amount to the insurer in exchange for a lifelong income annuity stream. The pension that the person will be offered will depend on his age, marital status, ages of children who are eligible to receive a pension benefits, and accumulated balance. The pension under PW modality will also depend on the same variables, but individuals keep the property of the funds, the investment risk and the longevity risk. So, the probability to annuitize will be[10]:

$$PA_i = \begin{cases} 1 & \text{if } EU(A_i) > EU(PW_i) \\ 0 & \text{Otherwise} \end{cases}$$

B.   *Empirical Specification*

Given the difference continuous between the expected utility for Annuity and the expected utility for the PW we will proceed using a probit instead of tobit model.

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[10]This will be done only for people who can decide between purchasing an annuity or taking PW.

In a reduced form model the probability to annuitize will be:

$$P(Annuity_i = 1) = f(a_i, sex_i, Married_i, \rho_i, B_i, EG_i) \qquad (1)$$

Where

a_i is age,
sex_i is the respondent's sex,
$Married_i$ is a binary variable that takes value one if the person is married,
ρ_i is the subjective discount rate,
B_i is the balance for individual i,
EG_i indicates whether the person is eligible for MPG.

There could be more variables that affect the decision to annuitize. Such variables could, for example, relate to financial literacy or conditions in the annuity market. Thus, our second model considers these variables on the annuity demand:

$$P(Annuity_i = 1) = f(a_i, sex_i, Married_i, \rho_i, B_i, EG_i, Z_{1i}) \qquad (2)$$

The additional variables capture characteristics not present in the pension calculus, since NCU is not reflecting full actuarial adjustments. H_i is the health status, ra_i is the risk aversion parameter, B_i captures bequest motives. We can expect that the probability of annuitization increases with better health status reported and more risk aversion. By the other hand, we expect that the probability of annuitization decreases with bequest motives.

$$P(Annuity_i = 1) = f(a_i, sex_i, Married_i, \rho_i, B_i, EG_i, Z_{1i}, Z_{2i}) \quad (3)$$

These additional variables capture the heterogeneity in financial literacy, like level of education or knowledge about the pension system (Brown 2001, Edwards and James, 2006) and conditions in

the annuity market proxy by sales agents. We can expect that people with more financial literacy give an extra value for the coverage of longevity risk given by annuities and then they might value more annuities. Sales agents receive compensation from insurance companies when they assist people and they purchase an annuity. In general, we can expect people will increase the decision to annuitize after being contacted by a sales agent. Then, we will expect $f_{z_2} > 0$.

C.   *Groups of Estimation*

Normal retirement age is 65 for males and 60 for females in Chile. However, people may retire before the normal retirement age if they have accumulated enough balance to finance a pension benefit that must exceed 100% of the MPG or half the average of their working income in the last 10 years of contributions. This fact breeds three types of retirees: some decide to retire earlier and they have accumulated pension funds enough to opt between purchase an annuity of take a PW; some of them who wait to start claiming pension benefits and they have accumulated enough resources to opt between the two modalities of pension; and a third group of retirees who are not able to retire earlier because they did not accumulated enough pension funds to satisfy early retirement, and also when they decide to retire at the normal retirement age they did not receive a pension equal or higher the MPG. The latter group is eliminated from our analysis because they are assigned directly to PW modality by law.

In addition, we run the analysis using three samples of individuals. The first sample includes all individuals who can choose; the second includes people who satisfy all the requirements to be early pensioners and take that option; and finally the third subset only those who retire at the normal age or later.

Table 1 shows the composition of the groups in August 2008[11]. We observe that 55 percent make the decision to retire early and 2/3 of the population choses annuities. Also, most people who retire at normal retirement age take a PW. The majority of people who retire early annuitize. We can see that pension benefits for those who purchased annuities were almost the same if they retire earlier or postpone their choice. However, people who take PW earlier receive on average higher pension benefits in comparison with people who also take PW but from the normal retirement age. The reason is that most people who take PW at the normal retirement age lacked the chance to chose between an annuity, due to their low pension balances. Therefore their level of pension should be lower.

5.   Data and Variable Definitions

A.   Data

We use the EPS[12] survey to explore patterns that help explain the choice between purchasing an annuity or taking a PW at retirement. The survey was developed by the Microdata Center of the Department of Economics of the Universidad de Chile. Specialists from the University of Pennsylvania and Universidad de Chile participated in the design of the survey. It was first taken in 2002 for a sample of 17,246 households that represent a population of 8 million people (6.5 million affiliated with the new system and 1.5 million affiliated with the old pension system). The survey was taken again in 2004, following-up the households chosen initially and adding more households to the sample. The variables collected constitute a unique dataset for the Chilean pension system which is one of the countries with the longest tradition of using a private

[11]Information provided in www.spensiones.cl

[12]Encuesta de Proteccion Social (In Spanish).

pension system in the world. The information relies on both individual and household responses, including variables like sex, marital status, and age of household members. It also includes information about the worker's educational status, employment status, and some indicators of personal health. Furthermore, administrative data collected by the AFPs was appended, providing information about contributions, charges, and withdrawals. Therefore, it is possible to know the level of PW that people received or the exact moment when retirees purchased an annuity. Finally, information is available about the annuitants in the sample, in specific about their levels of pension collected from the insurance companies.

B.   Variables

The Dependent Variable: The linked administrative data indicates when each individual began to receive the PW. For those who annuitized, the AFPs send the person's balance to the insurance companies registering the code of that movement. In addition, the information on annuitizants was crossvalidated with the information collected for this specific group from the insurance companies. Accordingly, in our analysis, the dependent variable is equal to one if the individual annuitized or zero if he took the PW.

Male: Insurance companies compute benefits using mortality tables differentiated by sex. Therefore, men who expect to live less long would be expected to value the pension less. Thus, we can expect that the probability of annuitizing is lower for men.

Marital status: Being married generates lower levels of pension for men because they are forced by law to purchase a joint annuity covering their wives in case they die before them. Also, married people can pool mortality risk within the family, therefore they

should assign to annuities less value than single individuals (Kotlikoff and Spivak (1981)). So, we anticipate married people would be less likely to annuitize than singles.

Health: People interviewed in the EPS surveys self report their health status (excellent, very good, good, regular, poor or very poor). This variable is important as a source of private information, in the sense that the decision to annuitize or take PW should be sensitive to this. This is one of the classical sources of private information linked to adverse selection in the annuity market (Turra and Mitchell, 2008). We can expect that people with better health status would show more preference for annuities, since they can expect to live longer. However, the correlation between a person's "permanent" health status and self reported status in 2002 may be low. Then, we can expect bias for the parameter associated to this variable, but we cannot predict the direction. We use question 25, module VI from EPS 2002, as source of health information. Specifically, we create dummy variables for health status reported: $He1$ for excellent; $He2$ for very good; $He3$ for good; and $He4$ for regular and bad.

Risk Aversion: People who are risk-averse prefer to smooth consumption, so we expect they will prefer to annuitize their balances and get a constant income stream in real terms. Also, as the longevity risk is not covered by PW, the possibility to run out funds will increase the value for them of being an annuitant. This variable was also included in the Brown (2001) study[13].

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[13]The surveys ask in question 1 (module J) from EPS 2004 and question 30 (module VI) from EPS 2002: Suppose that you, as the only source of household income, have to choose between the following two jobs: Alternative A: A fixed income job that is stable for life. Alternative B: A job where you have the same possibility of earning double or only a quarter of your income for the rest of your life.

Using a question related to preferences for safety in the job, we create a dummy called *risk averse*, with value 1 if people choose conservative option and 0 otherwise. Our hypothesis is risk-averse people prefer to smooth consumption, so they will value higher an annuity. Thus, the expected sign for changes in probability of annuitizing with respect to risk aversion is positive.

Education: We expect that more educated people have higher salaries, which is highly correlated with expected pension levels. People with more education should therefore know more about the pension system and value longevity insurance (this control variable was also used by Brown (2001) and Edwards and James (2006)). Specifically we use three categories for education: primary level (default), high school level (ed1), and technical or university studies (ed2). This variable was extracted from EPS 2004, question 10 in module A. We hypothesize that the probability of annuitize is increasing with the education level based on James et al., 2006.

Knowledge about the pension system [14]: It is logical that knowledgeable people are more likely to take an annuity since we can expect they value protection against longevity risk (a similar approach was followed by Edwards and James (2006)). Yet knowledge about the pension system is likely to be positively correlated with education, this can crowd out the power explanation of the variable. Thus, the expected sign associated with this variable is positive.

Contacted by a Sales Agent: It is well known that agents play a key role in the Chilean pension market by switching actual workers across AFPs (Berstein and Ruiz (2004), and Mitchell, Todd and Bravo (2009)). Although AFP sales agents receive high monetary

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[14]The construction of this variable appears in details in appendix.

incentives for switching people, they do not receive payment for encouraging retirement. Accordingly, we predict that sales agents contacts will not influence taking the PW. However, agents of insurance companies do receive compensation according to the number and size of the pension balances brought to their parent company. In addition, the marketing incentives for early pensions are strong and effective (about 2/3 of the retirees retire early). Thus, we predict that this variable will have a positive effect for purchasing an annuity. This variable was used in Edwards and James (2006) and proved to be significant as predictor of annuitization[15].

Table 2 summarizes the variables used in the present analysis. In our sample, 75% of the sample annuitized, 57% of the sample were married man (62% of the annuitant and 39% of those who took PW), 79% of the sample were male (80% of the annuitants and 74% of those who took PW), 92% of the people self reported being in a good health (95% of the annuitants and 82% of those who took PW). For the variables that proxy financial literacy, 29% had secondary studies (33% of the annuitants and 17% of those who took PW), 10% had technical or university studies (11.9% of the annuitants and 6.2% of those who took PW), 91% had a right to the MPG (94% of the annuitants and 82% of those who took PW).15 Finally, 23% of the people were contacted by sales agents as proxy for conditions in the annuity market (28% of the annuitants and 8% of those who took PW).

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[15]Information for this variable was collected from question 16 in EPS 2002 or question 84 (module E) in EPS 2004.

Table 2

Summary statistics of the variables used in Models

VARIABLE	OBS	MEAN	STD. DEV.	MIN	MAX
Age	590	58.80	4.81	51	78
Male	590	0.79		0	1
Married	590	0.65		0	1
Married male	590	0.55		0	1
Right to MPG Guarantee	590	0.91		0	1
W = wealth (UF)	590	2076.05	1,724.67	500.13	14,000
Wealth no Ret	588	2530.96	20,483.52	0	52,351
Risk Aversion	590	0.95	0.38	0	2
Children	590	0.67		0	1
he1	560	0.09		0	1
he2	560	0.48		0	1
he3	560	0.35		0	1
he4	560	0.06		0	1
he5	560	0.01		0	1
Myopic	560	0.10		0	1
Sales Agents	590	0.23		0	1
K1	590	0.05		0	1
K2	590	0.45		0	1
ed1	590	0.29		0	1
ed2	590	0.02		0	1
ed3	590	0.09		0	1

NOTES: he "i" is health status reported (1 for excellent, 2 for very good, 3 for good, 4 for regular, 5 for bad), K1 and K2 are the knowledge proxies; educ1, educ2, and educ3 are the education levels.
SOURCE: Encuesta de Proteccion Social, EPS 2004.

6.   Results and Comments

A.   *Whole sample*

Table 3 presents the results of marginal probit estimation for the annuity choice using the entire sample of retirees. Reported

coefficients and standard errors are provided for the marginal effects evaluated in the sample means of probit model. The canonical model (Model 1) includes only the variables that directly enter the PW formula. Columns 2 and 3 report the results for Models 2 and 3, respectively.

Table 3 reports evidence that married men annuitize more; the probability of annuitizing increases from 16% to 24%. We had expected a priori that married people would annuitize less, since it is highly probable they can better diversify pension income when both spouses have pension benefits. But, it is possible that married men annuitize more, to be sure that their family has income after they die. The reported results suggest that the second effect prevails. The latter result is consisting with the finding in Edwards and James (2006).

We can see that good health as predictor of health status is strongly positively significant in models 2 and 3. The sign is as predicted, since we expect that people in good health status will live longer (Edwards and James (2006) did not find significant this variable). In Model 3, the probability of annuitizing increases when we control financial literacy. Specifically, people who are really literate about the pension system (proxy by answering correctly the characteristics about the pension modalities) increase the probability of annuitization in 12%. When we control on conditions in the annuity markets, proxy by the presence of sales agents, we find that the probability of annuitization increases in 10%. The later results is consistent with our hypothesis that sales agents play a key role in the annuity choice in the Chilean market.

Table 3

The impact of variables on the annuitization choice* (Probit regression, marginal effects)

	FULL SAMPLE			EARLY RETIREMENT			NORMAL RETIREMENT		
	MODEL 1	MODEL 2	MODEL 3	MODEL 1	MODEL 2	MODEL 3	MODEL 1	MODEL 2	MODEL 3
Age	-0.019***	-0.017***	-0.015***	-0.011**	-0.014***	-0.015***	0.028*	0.013	0.010
	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.017)	(0.019)	(0.020)
Male	-0.096**	-0.031	-0.020	-0.027	0.062	0.136*	-0.488***	-0.378***	-0.429***
	(0.044)	(0.049)	(0.043)	(0.048)	(0.065)	(0.099)	(0.104)	(0.122)	(0.121)
Married	-0.045	-0.115	-0.066	-0.010	-0.035	0.012	-0.093	-0.238*	-.201
	(0.064)	(0.053)	(0.046)	(0.074)	(0.061)	(0.069)	(0.127)	(0.127)	(0.121)
Married Male	0.235***	0.160**	0.085	0.134	0.040	-0.029	0.360**	0.357**	0.361**
	(0.075)	(0.074)	(0.063)	(0.093)	(0.075)	(0.059)	(0.135)	(0.139)	(0.133)
Right to Guarantee	0.199***	0.176**	0.177***	0.196**	0.167**	0.240***	0.183	0.171	0.326**
	(0.083)	(0.082)	(0.080)	(0.101)	(0.104)	(0.109)	(0.132)	(0.139)	(0.148)
W = Wealth (1,000 UF)	-0.001	0.072***	0.049**	-0.014	-0.003	-0.004	0.017	0.248***	0.228***
	(0.012)	(0.024)	(0.020)	(0.010)	(0.018)	(0.020)	(0.033)	(0.056)	(0.055)
W2 = W * W		-0.007***	-0.004**		-0.0004	-0.0002		-0.025***	-0.021***
		(0.002)	(0.002)		(0.001)	(0.002)		(0.006)	(0.005)
WNR (1,000 UF)		-0.001**	-0.001***		0.006*	0.006		0.002**	0.002
		(0.0004)	(0.0003)		(0.003)	(0.004)		(0.001)	(0.002)
Risk Aversion		0.073	0.057		0.158***	0.103**		-0.212*	-0.176
		(0.073)	(0.052)		(0.077)	(0.066)		(0.106)	(0.122)
Children		0.076*	0.060*		0.018	0.018		0.108	0.210*
		(0.043)	(0.037)		(0.035)	(0.037)		(0.100)	(0.112)

(Continue)

	FULL SAMPLE			EARLY RETIREMENT			NORMAL RETIREMENT		
	MODEL 1	MODEL 2	MODEL 3	MODEL 1	MODEL 2	MODEL 3	MODEL 1	MODEL 2	MODEL 3
He 1		0.136**	0.111**		0.093**	0.100**		0.075	0.220
		(0.039)	(0.028)		(0.024)	(0.023)		(0.180)	(0.108)
He2		0.160**	0.128**		0.150**	0.162***		0.152	0.238*
		(0.067)	(0.061)		(0.064)	(0.073)		(0.155)	(0.136)
He3		0.092	0.067		0.075	0.078		0.046	0.104
		(0.058)	(0.050)		(0.044)	(0.046)		(0.157)	(0.142)
Myopic			0.033			-0.029			0.239**
			(0.040)			(0.054)			(0.087)
Sales agents			0.101**			0.096**			0.188
			(0.035)			(0.022)			(0.132)
Sales agents*K1			-0.202			-0.422			-
			(0.210)			(0.345)			-
Sales agents*K2			0.104			-			0.181
			(0.045)			-			(0.187)
Dummies Knowledge			Yes			Yes			Yes
Dummies Education			Yes			Yes			Yes
Log Likelihood	-281.6	-232.3	-201.6	-154.1	-121.9	-102.0	-112.0	-88.9	-74.3
Obs.	590	560	560	409	397	330	181	163	162

*Standard errors of the marginal effects are reported in parenthesis.
NOTES: He "i" is health status reported (1 for excellent, 2 for very good, 3 for good, 4 for regular and bad), K1 and K2 are the knowledge proxies; educ1, educ2, and educ3 are the education levels for secondary school, technical and professional, respectively. WNR is the no retirement wealth.
SOURCE: Author's calculations.

We find evidence that the probability of purchasing an annuity falls with the respondent's age (one year of postponing retirement decreases by 1.5 to 1.9% the probability of annuitizing). This may be because people who can claim benefits sooner purchase an annuity and people who cannot do it before the normal retirement age will be forced to take a PW. The results show that being eligible for the MPG is significant and positive in all the models (the probability of annuitization increases between 18 to 20%). It was expected that people eligible for the MPG could be more likely to purchase an annuity since the requirement of that guarantee is having contributed for 240 months. Then, people who annuitize are more likely to satisfy this requirement as they accumulate more balance on average.

We find a U-inverted shape in pension assets that reflects that the probability of annuitization increases in a first stage with pension assets and after some value the probability start decreasing. The latter result means that people with low pension values value more PW payments since they are able soon to start using this guarantee, but when start to receive a pension far away this value they are less likely to use the guarantee and start appreciating the annuity. For large pension assets, people are likely to prefer to make their own investment decisions and then prefer to keep the property of their own funds. Also, it is likely they are more diversified in their portfolio, and then might benefit of keeping the capital market risk.

B.   Sub-samples

Next, we report the results of the estimations after we divide the sample into two groups: people who retire at the normal retirement age, and people who retired early. The evidence suggests some degree of differentiation between these groups.

For the early retirement group there is a positive and significant evidence that people having right to guarantee annuitize more (the probability of annuitization increases between 17 to 24%). The probability also increases for people who are risk averse (between 10 to 16%). In the full model that captures the effect of financial literacy and market conditions, we find that more knowledgeable people about the pension system increases the probability of annuitization in 12% and sales agents explain 10% of higher annuitization rate. The last two are important for policy analysis. People who report to have excellent or very good health status increase the probability of annuitization in 10%. Finally, we also find evidence that the probability of purchasing an annuity falls with the respondent's age (one year of postponing retirement decreases by 1.1 to 1.5% the probability of annuitizing).

For the normal retirement group there is a positive and significant evidence that people having right to guarantee annuitize more only for the model 3. The probability also increases for people who are married male (around 36%). In the full model that captures the effect of financial literacy and market conditions, we find that more knowledgeable people about the pension system increases the probability of annuitization in 21% and sales agents are not relevant for this group. The latter result is consistent with our prediction that sales agents play a key role when they are able to reach people who fulfill requirements to annuitize earlier. However, people who annuitize later is likely people that they did not reach, with more knowledge about the pension system (knowledge increases with age in this market), and then they need less the service provided by sales agents. Health status is in general not significant for this subsample (we find only significant reporting very good health for model 2 at 10% of significance). Finally, we also find evidence of a U-inverted shape in pension assets that reflect that people with a pension lower value more the PW payments, people start appreciating annuities as they are going further away the MPG value, and finally people with large balance prefer to keep the property of their funds making their

own investment choice. Edwards and James (2006) show that the probability of annuitization increases with the use of sales agents to make choices and people who are long term planner, and decreases for males and married woman. Our results are consistent with their results, but we get also significant a U-shape inverted in pension assets and a positive and significant explanation for health status.

7.   Conclusions

This paper explores the determinants of annuity choice in the Chilean case. When we analyze the entire sample of retirees, we find evidence that people who annuitize more are married males, in good health, with higher financial literacy, and who are contacted by sales agents. When we separate the sample into two groups, early retirees and normal retirees, we find differences in choices for these groups. While we find no significant evidence for the normal retirement group related with health status, we find a positive and significant correlation for the early retirement group. This result is not consistent with our prediction that people who retire earlier is likely people who were contacted by sales agents, satisfy the funding requirements to claim anticipated pension benefits. Then, the health status is less important in their decisions. However, people who retire at normal age take a more conscious decision about the modality of start the decumulation process, and then put more attention about their health status in making the choice. One possible explanation is related with the fact that healthy people are expected to accumulate more and they are able to claim earlier pension benefits.

       From the policy analysis perspective, there are three ways to affect the annuitization rate. The more direct is moving the MPG value in the direction wanted. Since people receiving a pension benefit around this value prefer to take PW and this does not look to be a social desire answer, there is a challenge to find the right

incentive to guarantee a minimum future income. The second instrument is to control the sales agents. We find supportive evidence that they play a key role in the decision to annuitize. Then, giving them enough attention about the information they give to people would be crucial. The third tool to consider is the impact of knowledge in the annuitization decision. However, this is the variable that we can less impact in the short run, but it is a challenge to increase the financial literacy in the population.

Appendix

Knowledge Variable

Knowledge was proxied by the variable score that was built using EPS 2002 and 2004. For example using the EPS 2004 we have the questions E14 and E15 that ask respectively:

E14. Do you know that there is a minimum state guaranteed old age pension for people aged 65 and over?
1. Yes
2. No

What are the requirements needed to obtain the minimum old age pension guaranteed by the state? Mark all that apply
1. Have a minimum number of contributions
2. Have a pension less than the minimum
3. Be poor
4. Others
5. Don't know

If the interviewee answered yes correctly in E14 he received a 1, and 0 otherwise. The requirements for receiving the MPG are to have 240 months of contributions, having an actual pension level lower than the MPG and showing been poor. Thus, the interviewee received one point for each marking options 1,2 or 3 for question E15.

From EPS 2002 we have the question 17, module I that ask:

E15. Why did you choose that modality of pension?
1. The pension was higher
2. The pension was for the whole life
3. The pension values were higher at the beginning
4. I could not access the other modality

5. I was afraid overliving my balance and receive no pension
6. I received gift from sales agents
7. I was allowed to bequest
8. I did not know other options
9. Another reason

People who take PW will have a higher pension value at the beginning and leave bequest associated with the remaining balance in case of sooner death. Thus, the coherent answers are 1, 3, or 7. We also know that annuities provide a real pension income constant over the time that is guaranteed for the whole life of the pensioner. Then, people who purchase an annuity should provide as correct answer options 2 or 5. Finally, we got that the variable score will be between values 0 and 6 by adding the answers to the mentioned questions. A different approach could follow the PRIDIT methodology that gives a higher weight to correct answers that few people have reported correctly. One application for the Chilean case was developed by Mitchell, Todd and Bravo (2007). We plan to assess this in future analysis.

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