Gender-based price discrimination in the annuity market: Evidence from Chile *

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Abstract

This paper provides the first evidence for discriminatory behaviour against female consumers in the annuity market. It focuses on Chile, where an electronic bidding system allows retirees to receive offers, simultaneously, from several firms in the market for the same standardised annuity product. By exploiting within-individual variation in initial offers across firms, the analysis shows that firms with market power offer more unfairly priced annuities to women than to men. The result is driven by highly rated firms. Gender differences in risk-aversion can explain why firms find it profitable to offer higher prices to women.

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1 Introduction

A significant gender pension gap exists in many countries (Figure A.1). On average, in the EU, women's pensions are 30% less than men's pensions (Eurostat, 2018). Such gap is the result of many factors relating to society, individual bias, employment, childcare and education (OECD, 2019). Women tend to have less attachment to the labour market, more interrupted carriers because of childbearing and lower earning levels. These facts combined with their longer life expectancy and, often, lower retirement age, mean that women's benefits are relatively low compared to men's. On top of this, behaviour elements, such as gender differences in risk-aversion and financial literacy, seem also to affect attitude towards savings in a way that contributes to increasing gender differences in pension benefits (Lusardi and Mitchell, 2008; Agnew et al., 2003). The gender pension gap is an issue of concern for policy-makers around the world, who are now seeking ways to design retirement saving arrangements that mitigate their effects on pension inequalities between women and men (OECD, 2019).

This paper studies whether a lack of competition in the annuity market, which leads to gender-based price discrimination, contributes to increase gender inequality in pension benefits. In the last three decades, there has been a growing interest in the annuity market and the role of pension funds in individual retirement life, as many countries have reformed their pension systems, switching from pay-as-you-go systems towards individual savings schemes. In countries with funded defined-contribution pension schemes, upon retirement, individuals face the decision of whether to convert their fund into a retirement income via the purchase of an annuity or to withdraw their pension savings as a lump sum. This decision represents one of the biggest decisions of

a person's lifetime as once purchased an annuity cannot be refunded and keeps paying the negotiated income for the rest of the individual's life.

Evidence for the tendency of firms to charge, for the same product, higher prices to women than to men, exists for several market (Ayres and Siegelman, 1995; Goldberg, 1996; Fitzpatrick, 2017; Alesina et al., 2013), but the annuity market. This is due to the fact that providing evidence for unfair treatment of women in the annuity market is particularly challenging because of the above-mentioned gender differences in life expectancy and retirement age. Even if women and men had accumulated the same amount of pension wealth, women need to cover more years with their pension savings than men, which translates in lower pension benefits. As a result, a direct comparison across genders of annuity values will not determine whether annuity prices are lower for men or women. A potential solution to this problem is to obtain sex-specific mortality tables and compute the fair price of an annuity for both groups. However, even the direct comparison of longevity-adjusted annuity prices can confound gender-based price discrimination with other factors (see Section 3).

I am able to overcome these limitations by leveraging the institutional features of the Chilean pension system. An interesting feature of this system is that people must use an electronic bidding system for annuities to access their pension savings (known as SCOMP). The system allows people to receive offers, simultaneously, from several firms in the market for the same standardised product. Individuals can access the market through three different channels (a sales agent at a firm, an independent financial advisor, or directly), which are characterised by different levels of competition among annuity providers. I claim that if there is gender-based price discrimination in the market, it should be more pronounced when the level of competition is low, namely

in the case of a sales agent.

By using a unique dataset consisting of administrative individual-level data on all annuity offers received by Chilean retirees for the 2011-2014 period, I exploit within-individual variation in annuity offers across firms and show that the offer made by the sales agent's firm is priced higher than the average offer that the same individual receives from other firms in the market for the same annuity product. Although this is the case for both women and men, the magnitude of the effect is much larger for women. The result is robust to using an alternative specification, which exploits within-firm variation across individuals with similar observable charcateristics and shows that the mark-up firms charge to those individuals who access the market through one of their sales agents is larger for women than for men. The effect is driven by highly rated firms, and it is larger for guaranteed annuities and middle-wealth individuals.

Overall, such evidence is consistent with statistical discrimination. Women seem to value the risk rating of the firm more than men. Consequently, firms in a high risk rating class and in a strong market position charge higher prices to women than to men in order to extract more rent from them.

My analysis focuses on the first round of offers, which firms make before any contact with the individual and only using observable individual characteristics transmitted by the system.[1] Therefore, my empirical strategy, which exploits variation within individuals across firms, allows me to address selection bias that might arise in the case of self-selection of individuals across channels based on unobservable characteristics, such as negotiation skills or mortality risk. Moreover, the second specification, which

[1] After the first round of *internal* offers, people can decide to enter a bargaining stage (see Section 2 for more details).

exploits variation within firms and products across similar individuals, allows me to exclude that the type of chosen annuity product or selected firm plays any role in explaining the results.

Finally, I find that although women accessing the market through a sales agent are able to negotiate larger adjustments in their offers compared to men, gender differences persist for transaction prices.

This paper is related to previous studies documenting the presence of gender-based price discrimination in different markets such as the automobile market (Ayres and Siegelman, 1995; Goldberg, 1996), the sports card market (List, 2004), the drug market (Fitzpatrick, 2017) and the credit market (Alesina et al., 2013). These studies document a strong tendency for women to receive prices that are higher than those received by men. Interestingly, larger differences are found in initial prices, while final prices are often equivalent across gender. Goldberg (1996), using survey data on dealer discounts for the US car market, found that even though transaction prices do not differ by gender, women obtain, on average, larger discounts, and their purchases are characterised by higher variance. She hypotheses that women might have more dispersed reservation values than men and that firms, by learning about these differences from previous transactions, offer prices that are higher for women than for men to extract a rent from high-reservation value individuals.[2] Similar evidence exists for the Ugandan malaria drug market. Fitzpatrick (2017) shows that initial prices are higher for women than men; however, women negotiate, on average, larger discounts so that final prices do not differ by gender. However, for the sports card market, List (2004) shows that only

[2]Further evidence for this hypothesis has been provided by List (2004), who use data on the willingness to pay from bilateral negotiations in the sports card market.

experienced minorities are able to obtain final offers that are statistically equivalent to the final offers received by their majority counterparts, while non-experienced minorities pay higher transaction prices. Finally, for the financial markets, the only relevant study focuses on credit markets (Alesina et al., 2013) and shows that, in Italy, female business owners pay higher interest rates than their male counterparts conditional to the same risk characteristics.[3]

This paper is also related to the literature that investigates the role of gender in annuitisation and financial choices and that has provided evidence for gender differences in risk-aversion and financial literacy. For instance, Lusardi and Mitchell (2008) and Dwyer et al. (2002) provide evidence for a gender gap in financial knowledge even conditional to the same age, education level, and income, which seems to also affect financial decisions. Women are found to take fewer risks in their retirement plans (Agnew et al., 2003) or their mutual fund investments (Dwyer et al., 2002). However, if the financial knowledge of financial markets and investments is controlled in the regression, the impact of gender on risk-taking is significantly smaller (Dwyer et al., 2002). Moreover, women are found to be less confident with their financial knowledge (Bucher-Koenen et al., 2017), which translates into seeking more external financial help or advice compared to men (Barber and Odean, 2001). The importance of wealth, education and financial literacy in financial decisions is also studied in Cappelletti et al. (2013) and Hurd and Panis (2006). Cappelletti et al. (2013) find that poor people annuitise less and are also characterised by a higher elasticity of annuity demand to prices. Moreover, Hurd and Panis (2006) show that cash-out rates are less common

[3]Another related and interesting paper is (Dobbie et al., 2020), which exploits bias against minority in consumer lending in UK.

among men as well as older, well-educated and richer individuals, while workers with short expected longevity are more likely to take a lump-sum.[4]

The contribution of this paper to the literature is threefold. First, it provides new insights into the functioning of the annuity market by analysing one of the most sophisticated annuity markets and by highlighting the important role of financial intermediaries in explaining individual annuitization choices. Second, it identifies the existence of gender-based price discrimination in a more convincing way – having at my disposal the entire sample of offers (not only accepted offers) received by the universe of retirees, I am able to exploit individual fixed-effects and, in turn, address omitted variables bias. Last, the Chilean annuity market provides a testing ground for examining the relationship between the level of competition in the market and gender-based price discrimination. It shows that, in a context of low competition, firms practice gender-based price discrimination and are able to extract a larger rent from women. The fact that gender differences in annuity prices are more pronounced for highly-ranked firms points to gender differences in risk-aversion and financial literacy in explaining the result. [5] This has important policy implications for the design of pension systems aiming to reduce, or at least, avoid increasing existing gender inequalities in pension benefits.

The paper is organised as follows. Section 2 presents an overview of the Chilean

[4]Other related and interesting papers on adverse selection in the annuity annuity market are (Brugiavini, 1993) andFriedman and Warshawsky (1990); Brugiavini (1993); Illanes and Padi (2019), Specifically, Illanes and Padi (2019) using the same dataset used in this paper estimate a flexible demand system for annuities built on top of the consumption-savings model. The authors use their estimates to simulate how the Chilean equilibrium would shift under alternative regulatory regimes.

[5]Despite this extensive literature on gender differences in financial markets, so far no studies have examined whether such differences also affect the pricing strategies of insurers. However, Bucher-Koenen et al. (2019) show how the level of financial sophistication affects the quality of the advice given by financial advisors. They suggest worse options, which may be more lucrative to themselves, to individuals who seem to have low financial literacy.

pension system and describes the dataset. Section 3 and Section 4 present the empirical strategy and summary statistics for the sample, respectively. Section 5 presents the results. Finally, Section 6 concludes.

2 The Chilean Pension System

The Chilean reform in 1980, which replaced the pay-as-you-go regime with a fully-funded pension system based on individual accounts run by private pension funds, has been considered for a long time one of the most successful reforms and an example for many other countries.

The Chilean pension system is based on two pillars. The first pillar consists of a non-contributory, publicly financed, means-tested PAYGO system, while the second one, the Pension Fund Manager program, is a nationally defined-contribution scheme. Individuals contribute 10% of their income, and the normal retirement age is 65 for men and 60 for women.[6] Early retirement is allowed at any age as long as individuals meet certain pension eligibility requirements.[7] At retirement, they can decide to gradually withdraw their pension benefits or purchase a life annuity. If they choose the programmed withdrawal option, funds remain in the individual account and are paid by PFAs (Administrators of the Pension Funds) through a decreasing pension until the funds are depleted. In the case of an annuity, the individual receives, from an insurance company, a real constant pension payment until their death.

Since 2004, workers must use an electronic quotation system, known as SCOMP,

[6]Individuals are not required to stop working to claim a pension benefit.

[7]The first requirement is that the benefit must be at least equal to 80% of the PMAS, the maximum welfare pension. The second requirement is that the pension must be at least equal to 70% of the average income in the ten years before the pension is claimed.

to access their accumulated pension savings. This means that there is no selection in the pool of people accessing the market.[8] To enter the system, the potential retiree or beneficiary must request a "certificate of balance" from their PFA and then sign the "Request for offers" form. The electronic market can be accessed directly by the individual at a PFA or through an intermediary, such as a sales agent, who works for a specific firm, or an independent financial advisor.[9] In the "Request for offers" form, individuals indicate the retirement products they are available to purchase (immediate life annuity, temporary income with a deferred life annuity, an immediate life annuity combined with a programmed withdrawal, a programmed withdrawal) as well as the length of the guarantee period or deferral period if this applies.[10] Annuity contracts for married individuals are regulated to be joint annuities.[11] The form also provides the system with the following information about the individual: age, sex, marital status, presence of beneficiaries, pension account balance, and pension type. Upon receiving the information, insurance companies can decide whether or not to make an offer to a specific individual and then, eventually, provide a quotation for some or all of the annuity products an individual is available to purchase.[12] The worker receives the

[8]The only requirement for using the market is that the total pension wealth needs to be enough to finance a pension at least equal to the Minimum Pension Guaranteed. Those who do not meet this requirement are entitled to a Basic Solidarity Pension and, therefore, do not need to use SCOMP.

[9]With the same certificate of balance, an individual can make up to three consultations in the system.

[10]Workers can take a partial lump-sum only if the remaining balance is sufficient to finance a pension equal to at least 70 percent of the average real wage of the worker in the 10 years preceding retirement and 150 percent of the MPG.

[11]This is only the case for married women after 2007. A joint annuity is an annuity that continues to make regular payments as long as one spouse lives. While the annuitant is still alive, the annuity is paid at the full level. After the death of the annuitant, if the spouse is still surviving, they receive 60% of the previous level.

[12]There is no regulation impeding price discrimination based on any of the characteristics firms observe through SCOMP. Moreover, firms do not observe offers made by the other firms in the market; they make the first round of offers simultaneously. Furthermore, firms do not observe whether the

offers through a "certificate of offers", which is valid for 15 days. I will refer to this first round of offers as *internal* offers. Once received, the worker can then accept one of the alternatives, make a new query in the system, request an auction, request an external offer, or decline all offers and go back to the market at some point in the future.[13] In the case of an external offer, the individual enters a bargaining stage. They can physically travel to one or more firms who had previously made an offer through SCOMP to try to negotiate a better price.[14] Upon receiving the external offers, the individual can choose either to buy a product from the final choice set, which includes internal and external offers, or decide to delay retirement.

All annuity offers received by those who consult an intermediary are net of commission, which is equal to up to 2% of the retiree's pension wealth. However, while in the case of an independent financial advisor, the intermediary gets paid in any event, in the case of a sales agent, the payment is required only if the individual purchases the annuity from the sales agent's firm.[15] Therefore, in the latter case, if the individual decides to buy the annuity from a firm, which is not the sales agent's firm, the accepted offer will increase by the value of the commission.[16]

individual is accessing SCOMP with the help of an independent financial advisor or a sales agent from a different firm. Certainly, the sales agent's firm knows this to be the case.

[13]During the period of validity of the certificate of balance (35 days), individuals can make up to three consultations.

[14]External offers cannot be lower than the respective initial offers. Only firms who had previously made an internal offer can make an external offer.

[15]Specifically, an independent financial advisor receives a commission equal to a maximum of 1.2% of the retiree's fund if the individual opts for the programmed withdrawal option and a commission equal to up to maximum 2% if the individual buys an annuity, regardless of which firm is providing the annuity. The system was reformed in November 2008. Before the reform, the maximum commission for annuities was 2.5% for both types of intermediaries, and there was no commission in the case of the programmed withdrawals option.

[16]The regulation has now changed and since 2019, for those who access the market through a sales agent, only those offers made by the sales agent's firm appear at the net of the commission.

In Figure A.2, I provide a diagram illustrating how the system works.

2.1 Data

I use administrative individual-level data concerning all the requests, quotes, and annuity choices for the entire population of individuals entering SCOMP from 2011 to 2014.[17] The dataset includes a firm identifier and information about bids as well as contract and firm characteristics. Moreover, for those individuals who decide to retire, I observe the date of birth, gender, wealth, municipality of residence, and beneficiaries. I restrict my analysis to annuity offers for an immediate life annuity – namely, an annuity without a deferral period and involving no withdrawal – and focus on individuals who are within 5 years from the normal retirement age (61-69 for men; 56-64 for women).[18] Moreover, I exclude those individuals entitled to disability pensions and requests and offers made to beneficiaries from my sample. My final dataset consists of 86,000 potential retiree and around 4 million annuity offers.

2.2 Annuity Prices

For each annuity offer in my sample, I compute the corresponding price of the annuity. The conventional measure used by economists to determine the price of an annuity is the Money's Worth Ratio (MWR), which is the expected present discounted value of

[17] Although the data are available starting from 2004, I begin my sample in 2011 as two reforms regarding the amount of commissions and join annuities for couples were implemented in 2007 and 2010, respectively. No reform took place in the 2011-2014 period.

[18] I decided to focus only on immediate life annuity offers because comparing the values of the offers across firms for deferral annuities would be less accurate as the offer may differ in two dimensions: the income received during the deferral period and the monetary value of the annuity received after that. Offers for immediate life annuity represent half of offers in my sample. Although I focus only on offers for immediate life annuities, I use data for the entire sample of individuals – each individual requests offers for both types of annuity products.

annuity payments divided by the initial premium. One minus the MWR represents the price of the annuity.

The MWR for a single annuity is defined as follows:

$$MWR_i = \frac{A_i}{P} \sum_{t=1}^{12(w-x)} \frac{{}_tp_x}{(1+i_t)^t}$$

here A is the monthly annuity payment[19], w is the ultimate age in the mortality table, ${}_tp_x$ is the probability that a life aged x is still alive at time t, it is the interest rate used for discounting future payments, P is the premium paid to the life insurance company. In the case of guarantee periods, ${}_tp_x$ assumes value 1 for the period covered by the guarantee.

Similarly, for a joint annuity, the MWR is defined as:

$$MWR_i = \frac{A_i}{P} \sum_{t=1}^{12(w-x)} \frac{{}_tp_x + 0.6_t(1-p_x){}_tp_y}{(1+i_t)^t}$$

where ${}_tp_x$ indicates the death probability of the wife/husband and all the variables are the same as before. For the survival probabilities, I use the 2014 mortality tables provided by Superintendencia de Pensiones, the Chilean pension supervisor, which consists of sex-specific period-tables based on the pensioner mortality data. Finally, in line with most other studies, I use the interest rates on central bank bonds as discount rates. Specifically, the data are obtained by the yield curve of indexed central bank bonds at 5-10 and 20 years. I increase the risk-free discount rate by 0.5 pp to account for the higher returns obtained by the insurance companies from their investments. An annuity is considered to be fairly priced when the MWR is equal to 1.

[19]For those who consult an intermediary, this is the net value of the annuity, i.e. after the deduction of the commission. The commission is deducted by the insurance companies from the individual pension wealth before making the offer. See Section 2

3 Empirical Strategy

This paper aims to investigate the presence of gender price discrimination in the annuity market. In this context, it is not possible to simply compare the value of annuity offers across genders, as women receive systematically lower offers given their longer life expectancy. Although annuity prices, which are computed using gender-specific mortality tables, take into account gender differences in life expectancy, their estimates might remain biased due to other factors. The publicly available mortality tables are constructed using data from pensioners. Consequently, they are representative of the population who is eligible to access SCOMP.[20] However, while only one mortality table exists for men, which includes pensioners who can afford an annuity and male survivor beneficiaries, two distinct mortality tables exist for women – one for pensioners and one for beneficiaries (SP, 2014).[21] This makes the two tables inconsistent across gender.[22] Moreover, the tables do not allow to control for selection into annuitisation, which can differ between men and women, and do not distinguish by marital status.[23] As a result, a direct comparison of annuity prices across gender is not enough to determine the presence of gender-based price discrimination.

I overcome this limitation by exploiting a particular feature of the Chilean annuity

[20] People eligible to access SCOMP are those who have enough pension savings to finance an annuity above the amount of the Basic Solidarity Pension.

[21] This difference is motivated by the fact that before 2008 male spouses were not entitled to survivors' benefits, unless they were disabled, unlike their female counterparts; thus, there is not much data on male survivor beneficiaries to calculate a different table for them. After 2008, all annuity contracts for married individuals (both women and men) are regulated to be joint annuities.

[22] Since the life expectancy of annuitants has been found to be higher than the average life expectancy in the population (Finkelstein and Poterba, 2004), the life expectancy estimates for men are likely to be biased downward as beneficiaries might come from groups with higher mortality risks.

[23] If, for instance, differences in life expectancy between annuitants and not-annuitants and between married and unmarried individuals are larger for men than for women, this might affect the estimates of the annuity price differently by gender.

market – that is, the fact that people can access the annuity market through three different channels (a sales agent at a firm, an independent financial advisor, directly), which are characterised by different levels of competition among firms. The data shows that most people accessing the market through a sales agent purchase an annuity from the sales agent's firm regardless of its price, which suggests a lack of competition among annuity providers. I claim that if there is gender-based price discrimination in the market, it should be more pronounced when firms have some market power – namely, when people consult sales agents.[24]

I will focus on the entire sample of *internal* offers made through SCOMP and will compare differences in the value of the offers across firms within individual and product. Specifically, I am interested in the difference between the offer made by the sales agent's firm and the average offer that the same individual receives, for the same annuity product, from the other firms in the market. If firms tend to offer higher prices to women than to men, the mark-up charged by the firm with market power – that is the firm the sales agent works for – should be larger for women than for men. The inclusion of individual fixed-effects will allow me to control for the fact that the selection into channel for market access might be differentially informative across genders of other unobservable characteristics of the individual– for instance, mortality.

Moreover, in a further specification, I will use firm-year fixed effects instead of individual-product fixed effects and I will compare the offers that a firm makes to individuals accessing the market through one of its sales agents with the offers that the same firm makes to other individuals with similar characteristics. If the evidence

[24]This follows from the fact that some market power is necessary for price discrimination: if the competition is intense enough, then there is little room for firms to price above the marginal cost (Varian, 1989).

is confirmed, this will indicate that gender differences in the selection of the entering firm cannot explain the result.

Finally, since I am looking at the *internal* offers – initial offers that firms before any contact with the individual and using only the information transmitted by the individuals through the system (such as gender, age, pension wealth, and beneficiaries) – the evidence for differences in initial prices across genders and channels cannot be driven by differences in negotiation skills; they will only be consistent with gender-based price discrimination.

3.1 Empirical Analysis

The first step of my analysis entails investigating differences in *internal* annuity offers across firms within individual and product.[25] I focus only on those individuals who access the market through a sales agent and specify a reduced-form relationship between the value of the offer and its determinants as follows:

$$Y_{ijt} = \alpha + \varphi_1 AgentFirm_j + \varphi_2 AgentFirm_j * Female_i + Year_t + n_i + \varepsilon_{ijt} \qquad (1)$$

where $AgentFirm_j$ represents a dummy for the offer made by the firm the sales agent works for, while $Female_i$ is a dummy for women. $Year_t$ indicate dummies for the year. Finally, n_i are individual-consultation-product fixed effects, which allow me to compare offers that the same individual receives at the same consultation for the same pension product.[26] Standard errors are clustered at the individual level.[27]

[25] Internal offers are offers that firm make through SCOMP before any contact with the individual.

[26] The fixed-effects also include the sequential number of the consultation as individuals can access the market more than once.

[27] In a further specification, I will also include firm fixed effects.

The dependent variable can be:

1. the rank of the offer relative to other offers received by the same individual for the same product and at the same consultation;[28]

2. the MWR of the offer.

Moreover, I also estimate an alternative specification, which includes firm-year fixed effects rather than individual-consultation-product fixed effects. Specifically, the form is as follows.

$$\begin{aligned} MWR_{ijckrt} = = \alpha + \varphi_1 Agent_j + \varphi_2 NoInter_j + \varphi_3 AgentFirm_j + \\ + \varphi_4 Agent_j * Fem_i + \varphi_5 NoInter_j * Fem_i + \varphi_6 AgentFirm_j * Fem_i + \\ + Product_k + NunCons_c + n_{rt} + \delta X_{it} + \varepsilon_{ijckrt} \end{aligned} \tag{2}$$

where $Agent_k$ and $NoIntermediary_k$ represent dummies for those who access the channel through a sales agent and for those who access the market directly, respectively. The omitted category consists of those who consult an independent financial advisor, who, according to some preliminary evidence (see Section 4.2), are those who obtain the lowest annuity prices. $AgentFirm_k$ is defined as before. Moreover, $Product_k$ represents dummies for the type of pension product purchased and $NunCons_c$ denotes dummies for the sequential number of consultation. A vector of individual characteristics including pension wealth, dummies for the number of years from or after the normal retirement

[28]Specifically, the rank variable is constructed by ordering all internal offers that an individual receives for the same product according to the monthly pay-out of the corresponding annuity. The offer providing the highest monetary value has the lowest rank.

age[29], for the presence of children, for the number of beneficiaries, for old age retirees, for the age of the spouse[30], is also included and denoted with X_{it}.[31] Finally, the firm-year fixed effects, n_{rt}, allow me to compare annuity offers made by the same firm in the same year. Standard errors will be clustered at the individual level.[32]

4 Descriptive statistics

Before presenting the results, this section presents the summary statistics and discusses stylised facts on the annuity choice.

4.1 Firms

I observe, in total, 16 firms operating in the annuity market. Firms differ in terms of the risk rating class they belong to. The risk-rating class of the firms ranges from BB+ to AA+. Those firms with a risk-rating lower than BB+ cannot access the market. From this, it follows that the risk of bankruptcy among firms operating in the annuity

[29]For instance, since the NRA for women is 60, for a woman who is 65 years old, the variable would be equal to 5, while for a woman ages 59, it would be equal to -1. I use this variable rather than the age of the individual because this variable is consistent across gender.

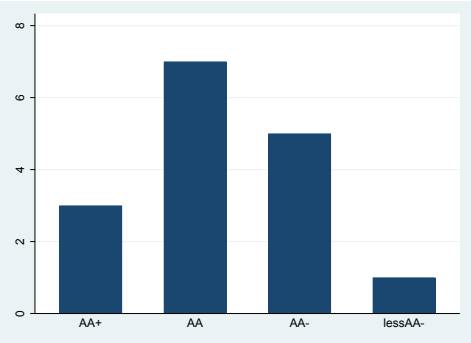
[30]The dummies are equal to 0 for unmarried individuals.

[31]I do not control for the location of residence of the individual as I want to control only for those variables used by firms to price annuities and firms do not observe this variable when they make their first round of offers through SCOMP. However, including a dummy for the region of residence of the individual does not affect the results.

[32]The low number of firms (16) does not allow me to use a two-way cluster at the individual and firm level. As discussed in MacKinnon and Webb (2018), inference based on cluster-robust standard errors in linear regression models, even using the wild cluster bootstrap, fail when the number of treated clusters is very small, especially in a multi-way clustering (Cameron and Miller, 2015) where the wild-bootstrap approach dramatically over-reject or under-reject (Roodman et al., 2019). Cameron and Miller (2015) (page 32) argues that there is not an ideal approach to deal with multi-way clustering and few clusters and that one potential solution is to add sufficient control variables so as to minimise concerns about clustering in one of the ways and then use a one-way cluster robust approach on the other way. Therefore, following Cameron and Miller (2015), I include firm-year fixed effects and cluster robust standard errors at the individual level.

market is very low.[33] In case of bankruptcy, the government subsidises a minimum pension. Figure 1 shows the distribution of firms by risk-rating class.

Figure 1: Firm Distribution by Risk-Rating Class



Note. The figure shows the distribution of firms by risk rating class. In total, 16 firms are included in the sample.

According to the figure, most of the firms are in the two highest risk rating classes, while only one firm has a risk-rating lower than AA-.[34] Moreover, Figure A.4 (a) and Figure A.4 (b) show the distribution of offers by firms. While Figure A.4 (a) regards the entire sample of offers, Figure A.4 (b) focuses only on accepted offers. According to the figures, the market share is not equally distributed across firms, suggesting a lack of competition in the market.

[33] In the last 50 years, only one firm declared bankruptcy.

[34] In addition, Figure A.5 (a) and Figure A.5 (b) focus only on those who access the market through a sales agent and analyses the distribution of individuals by the firm of the sales agent and by the risk-rating class of the sales agent's firm, respectively. The distribution does not appear homogenous across firms (Figure A.5 (a)). This suggests that not all firms in the market hire sales agents. Moreover, individuals seem to prefer sales agents working for highly-rated firms (Figure A.5 (b)).

4.2 Individuals and the Selection across Channel

Table 1 provides summary statistics on the characteristics of individuals accessing SCOMP. Panel 1 regards the entire sample, while Panel 2 focuses only on those who decide to purchase an immediate life annuity. Panel 1 reports that women represent 43% of the sample; pension savings, on average, amount to 99.000 dollars; 98% of the individuals are old-age retirees, and 71% of the sample consists of married individuals. It also shows that half of the individuals rely on professional advice. Specifically, 31% of the individuals consult a sales agent, while 17% consult an independent financial advisor. The remaining people access the market directly. This evidence suggests that the annuity decision does not appear to be a simple task. SCOMP produces a 10 page-long report and the comparison about annuity payments under different pay-out structures is not straightforward. Individuals might not be fully informed about the functioning of the market, or they might not have enough financial literacy to make this decision by themselves.

Table 1: Summary statistics: Individuals

Panel 1: All Individuals			
Variable	*Mean*	*Sd*	*Number individuals*
Female	0.43	0.50	86,188
Age	63.65	2.46	86,188
Pen Savings	99098	70777	86,188
Married	0.71	0.45	86,188
Child	0.12	0.33	86,188
Old-Age Retirees	0.98	0.16	86,188
Channel: Sales Agent	0.31	0.46	86,188
Channel: No Intermediary	0.52	0.50	86,188
Channel: Ind. Finacial Advisor	0.17	0.37	86,188
Panel 2: Individuals accepting an annuity offer			
Variable	*Mean*	*Sd*	*Number individuals*
Female	0.44	0.50	27,793
Age	63.67	2.48	27,793
Pen Savings	95150	67867	27,793
Married	0.69	0.46	27,793
Child	0.11	0.31	27,793
Old-Age Retirees	0.97	0.17	27,793
Channel: Sales Agent	0.38	0.49	27,793
Channel: No Intermediary	0.37	0.48	27,793
Channel: Ind. Financial Advisor	0.24	0.43	27,793

Notes. The table reports summary statistics for the individuals accessing SCOMP. While Panels 1 regards the entire sample, Panel 2 focuses only on those who decide to purchase an immediate life annuity. Pension savings are expressed in US dollars. Years: 2011-2014.

The channel used to access the market seems to predict the annuitisation choice. According to Table 1, Panel 2, the share of those who access the market directly is lower in the pool of annuitants compared to the entire sample (Table 1, Panel 1). This means that those who access the market directly (without an intermediary) are significantly more likely to opt for the programmed withdrawal option compared to those who consult an intermediary.[35]

To explore gender differences in self-selection across channels, Table A.1, presents the estimates of a multiple logit for the probability of accessing the market through an intermediary.[36] The table suggests that women are slightly more likely than men to access the market through a sales agent (columns 1-2). Moreover, for those who access the market through a sales agent, the table also analyses the probability of accessing the market through a firm in the highest risk-rating class. The results in column 3 show that such probability is higher for women than for men. Women are 2.5 pp (6% in percentage terms) more likely than men to access the market through a sales agent affiliated with a highly rated firm.[37] Table A.2 and A.3 also provide an analysis of differences in observables across channels for market access and gender. Specifically, Table A.2 reports summary statistics of the observable variables by gender and channel while Table A.3 estimates Equation 2 with different retiree observables as

[35]In addition, the choice of the channel seems also to be related to the level of pension wealth. Figure A.6, in the Appendix, reports the share of individuals by channel for market access, in each decile of pension wealth, for women and men. As pension wealth increases, the share of individuals accessing the market through an advisor increases, while the share of those entering through a sales agent decreases. This holds for both women and men.

[36]The base category consists of those who access the market directly–namely without an intermediary.

[37]Since most firms have high risk rating in the market, bankruptcy among life insurance companies is rare in Chile. Moreover, the government guarantees a minimum pension in case of bankruptcy. Therefore, retirees should not value risk-ratings too high.

outcome. The results show that although the difference in age, savings and probability of being married between those who access the market through an intermediary and those accessing directly is larger for women than for men, the selection across types of intermediaries (sales agent vs independent financial advisor) does not operate differently by gender–the coefficient of Female*Agent dummy is never statistically significant.

Finally, Table A.4, reports summary statistics for the list of products the individuals request an offer for. According to the table, individuals request offers for, on average, 9 products, of which four are immediate life annuities, four are deferral annuities and one is the programmed withdraw option. Annuity products differ in terms of the length of the guaranteed period and/or deferral period. The average guaranteed period is 100 months, while the average deferral period is equal to 9 months. According to the table, no clear differences across genders exist regarding the characteristics of the requested products.[38]

4.3 *Internal* Annuity Offers

Table 2 provides summary statistics on annuity offers. Panel 1 focuses on all internal annuity offers (namely, offers received through SCOMP), Panel 2 describes the negotiation process, and Panel 3 regards accepted (internal or external) offers.

[38]The offer for the PW option is made by the AFP. Only offers made for immediate life-annuities are included in my sample.

Table 2: Summary statistics: Annuity offers

Panel 1: All Offers				
Varaiable		*Mean*	*Sd*	*N*
N offers	Men	10.2087	3.0084	48,948
N offers	Women	10.8751	2.9838	37,240
N offers	Total	10.4962	3.0159	86,188
Payout	Men	547.2622	407.9482	2,326,236
Payout	Women	475.1588	248.3215	1,917,780
Payout	Total	514.6161	346.8122	4,243,906
Guaranteed Months	Men	129.0998	88.8741	2,326,236
Guaranteed Months	Women	131.3278	88.9684	1,917,780
Guaranteed Months	Total	130.1086	88.9237	4,243,906
MWR	Men	0.9009	0.0536	2,326,236
MWR	Women	0.9451	0.0331	1,917,780
MWR	Total	0.9209	0.0505	4,243,906
Panel 2: The Negotiation Process				
Variable		*Mean*	*Sd*	*N*
N Ext Off (per product)	Men	1.2300	0.6759	34481
N Ext Off (per product)	Women	1.2763	0.7465	29768
N Ext Off (per product)	Total	1.2514	0.7099	64249
% Increase (external offers)	Men	1.20	1.19	42226
% Increase (external offers)	Women	1.31	1.22	37846
% Increase (external offers)	Total	1.25	1.21	80072
Panel 3: Accepted offers				
Variable		*Mean*	*Sd*	*N*
Payout	Men	447.1780	363.6611	15,585
Payout	Women	430.1350	255.8832	12,208
Payout	Total	439.7095	321.0240	27,793
Guaranteed Months	Men	123.2060	78.9031	15,585
Guaranteed Months	Women	141.4953	83.0809	12,208
Guaranteed Months	Total	131.2206	81.2673	27,793
MWR	Men	0.9122	0.0542	15,585
MWR	Women	0.9601	0.0343	12,208
MWR	Total	0.9332	0.0523	27,793

Notes. The table shows the mean, the standard deviation and the number of observations for the following variables: number of internal offers received per product, monthly payout, length of the guaranteed period of the offers, and the MWR of the annuities, number of external offers received by an individual per a specific product, the percentage increase in the monetary value of the annuity offer negotiated outside SCOMP. While Panels 1 regards the entire sample, Panel 2 focuses only on those who decide to purchase an immediate life annuity. Pension savings are expressed in US dollars. Years: 2011-2014.

Panel 1 shows that, on average, individuals receive offers from ten firms for each pension product they are willing to purchase.[39] Since individuals, on average, request offers for 9 annuity products, they receive in total around 90 offers. Offers received for the same product differ only in terms of the monthly pay-out of the annuity and the risk-rating class of the firm.[40] Moreover, according to the table, the women's average pension benefit of the monthly annuity offer is 14% less than men's one (547 dollars for men and 475 for women).[41] The average length of the guaranteed period requested is instead 130 months. No large differences exist across gender. Finally, the table shows that firms mark up, on average, by 6-10% over the actuarially fair annuity– the average Money Worth's Ratio of the annuity offers is 0.94 for women and 0.90 for men. Although it is higher for women than for men, as discussed in Section 2.2, the comparison of the MWR across gender is not possible, as the gender-specific mortality tables used to calculate the MWR are not consistent across gender.[42]

[39]Figure A.7, in the Appendix, shows how the number of offers received changes according to the pension wealth, age, and gender of the individual. Individuals with higher pension wealth as well as people close to the normal retirement age receive a relatively higher number of offers compared to individuals with less wealth. This is partially explained by the fact that it is costlier for a firm to service annuities that are slightly above the guaranteed minimum pension (GMP), as in the future, the MPG will rise above the annuity payment, and they will have to start conditioning with the government to transfer the top-up amount to the annuitant. As a result, fewer firms bid on low-wealth annuitants (Illanes and Padi, 2019).

[40]Figure A.8 analyses the average difference in the pay-out of the annuity between the offers that an individual receives for the same product. The annuity offers are ranked according to their monthly payout. The figure shows that, for instance, the 3rd highest offer is, on average, 1 percent point lower than the best offer received.

[41]The value of the annuity, represents 0.5 (0.4) percent of the men's (women) total pension wealth. The lower value for women is partially explained by their longer life expectancy.

[42]In Figure A.3, I also provide the distribution of the MWR across gender.

4.4 The negotiation process

Once individuals are aware of the offers received via SCOMP, they can select one of the offers provided, negotiate with a provider outside SCOMP, request that SCOMP carry out an auction on their behalf, or decline all offers and go back to the market at some point in the future.[43] 82.72% of men and 86.61% of women negotiate contracts separately from SCOMP before accepting an annuity. Table 2, Panel 2, shows that conditional to requesting at least one external offer for a specific product individuals request, on average, 1.2 external offers per product.[44]

Moreover, Figure 2 analyses the characteristics of the firms from which individuals ask for the external offer, with respect to the rank of their *internal* offers. Specifically, all the *internal* offers that an individual receives for the same product are ranked according to their monthly pay-out. The offer in the first position is the offer providing the highest monetary value (and the lowest price).

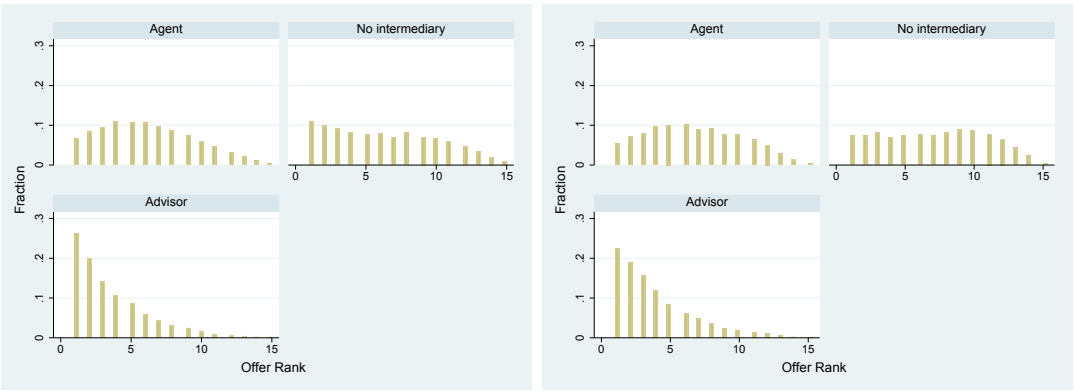
The figure distinguishes people with respect to the channel for market access and gender. Interestingly, it shows that it is much more likely that an individual chooses the firm that has made the offer providing the highest monthly payment when an advisor is involved in the process compared to the other two cases (sales agent and no intermediary). Among those who access the market through a sales agent, less than 10% of individuals purchase the offer from the firm that has made the best internal offer. This is the case for both women and men. Figure 3 reports the characteristics of the chosen firm with respect to the firm's risk-rating class instead and shows that those who consult an independent financial advisor are those who care less about the

[43] Data on auctions are not included in the dataset.

[44] The average number of external offers per consultation is 2.1.

Figure 2: Characteristics of the firms making the external offers: Rank of their internal offer.

(a) Men (b) Women

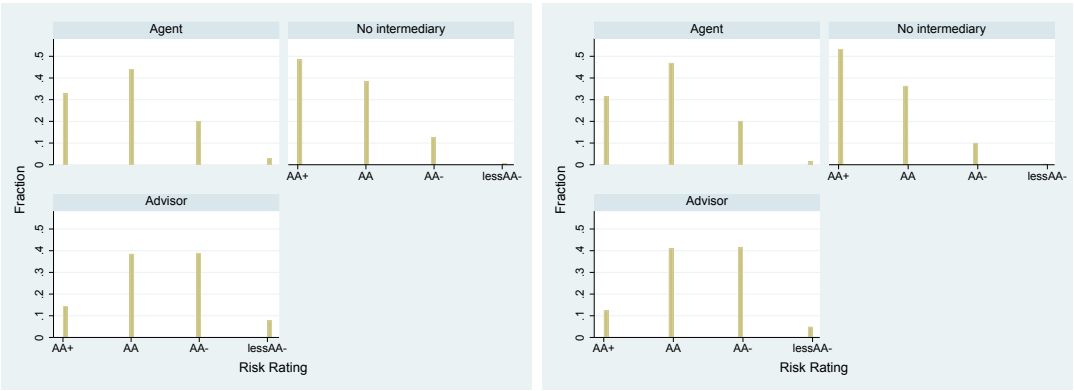


Note. The figure shows the share of individuals by the rank of the initial value of the accepted offer. Offers are ranked based on their monthly benefit payment. The lowest rank corresponds to the offer with the highest monetary value.

risk rating of the firm making the offer.

Figure 3: Characteristics of the firms making the external offers: Risk-rating class.

(a) Men (b) Women

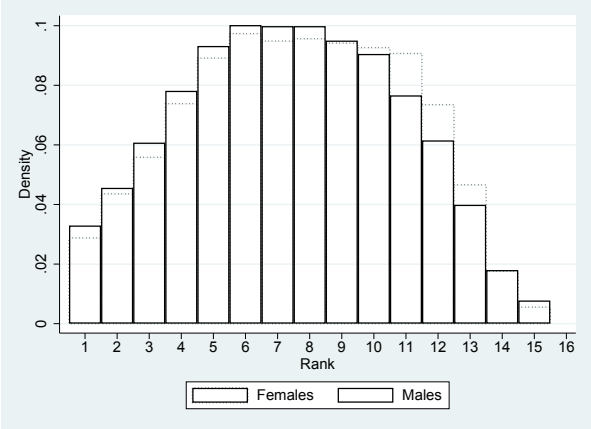


Note. The table shows the share of individuals by the risk-rating class of the firm making the accepted offer.

Such differences across channels can be explained by the different incentives of the

two types of intermediaries (see Section 2). While advisors have an incentive to recommend the best annuity offer, the advice of sales agents is likely to be biased towards the offer made by their own company, as this option is more more lucrative to the agent.[45] To better explore this issue, Figure 4 focuses only on those who access the market through a sales agent; it looks specifically at the rank of the *internal* offer made by the sales agent's firm with respect to the offers received from the other firms by the same individual for the same annuity product. The figure shows that the sales agent's firm does not make the best *internal* offer – its offer is likely to be the 6th or 7th highest offer. Moreover, for women, the distribution shifts to the right. This means that women receive, from the firm that is linked to their sales agent, even worse offers than men do.

Figure 4: Distribution of the rank of the offer made by the sales agent's firm



Note. The table shows the rank of the initial offer made by the sales agent's firm, for women and men. Annuity offers, received by the same individual, for the same annuity product, are ranked based on their monthly benefit payment. The lowest rank corresponds to the offer with the highest monetary value. The sample consists only of people accessing the market through a sales agent.

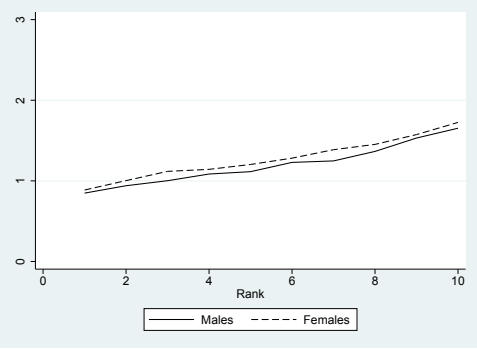
Finally, Table 2, Panel 2, examines the magnitude of the increases in the initial

[45] This hypothesis is confirmed by Figure A.9, which reports the share of those who access the market through an agent and accept the offer made by the sales agent's firm. See Section 4.5

offer that people obtain through the external offer. It show that individuals are able to negotiate, on average, a 1.25 percent increase in the monetary value of their offer.[46] However, the increase largely depends on the rank of the former internal offer made by the firm. Firms making lower benefit payment offers via SCOMP are willing to make larger adjustments in their offers compared to higher-benefit firms (Figure 5). Women seem to obtain slightly higher adjustment rates compared to men.

Figure 5: Percentage Increase in the Offer negotiated outside SCOMP

All external offers



Note. The table shows the average percentage difference in the MWR between the external offer and the initial offer made by the same firm to the same individual for the same product, by the rank of the initial offer. The lowest rank corresponds to the offer with the highest monetary value.

[46]Formally, the percentage change in the offer payout that individuals are able to negotiate separately from SCOMP is computed as follows:

$$Increase^{ijn}_{ext,scomp} = \frac{Payout^{ijn}_{ext} - Payout^{ijn}_{scomp}}{Payout^{ijn}_{scomp}} \tag{3}$$

where MWR^{ijn}_{ext} is the MWR of the offer made by firm n through SCOMP to individual i for product j, while MWR^{ijn}_{ext} is the payout of the offer negotiated, successively, separately from SCOMP, with the same firm by individual i for the product j. External offers cannot be lower than the payment offered by the same provider via SCOMP.

4.5 *Accepted Offers*

Table 2, Panel 3, reports the summary statistics for the accepted offers instead. The table shows that the average MWR for accepted offers is 1pp higher than for initial offers. Moreover, Figure 6 analyses the differences in the cumulative distribution of the Money Worth's Ratio across channels for market access.[47] The figure shows that those who access the market through a sales agent pay higher transaction prices compared to the other two groups of individuals, while those who access the market directly pay the lowest transaction prices. The last result can be simply explained by the fact that in the case of no intermediary, people do not pay any commission, which is deducted from the individual's pension wealth before computing the pay-out of the annuity. Therefore, they pay lower prices compared to the other two groups of individuals conditional to the other variables. The evidence that those who consult sales agent pay the highest price is instead explained by the fact these people are very likely to accept the offer made by the sales agent's firm[48], which, as discussed in the previous section, is not the best offer. This evidence suggests a lack of competition among annuity providers in the case of a sales agent.

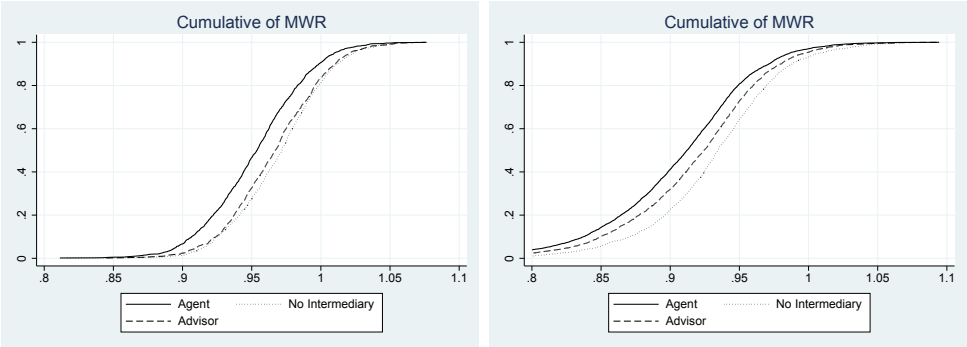
Figure 6 also shows that the difference in the MWR between those who consult a sales agent and those who consult an independent financial advisor is larger for women than for men. Yet, the difference in the MWR between those who access the market without any intermediary and those who consult an independent financial advisor is lower for women. This seems to suggest that both groups of women – women con-

[47] To make the sample of individuals more homogenous, the figure focuses only on those who retire at the statutory age, which is 65 years for men and 60 for women.

[48] Specifically, Figure A.9 shows that 90% of those who access the market through an agent accept the offer made by the sales agent's firm.

Figure 6: The Cumulative Distribution of MWR by Channel and Gender

(a) Women (b) Men



Note. The figure shows the cumulative distribution of MWR by channel for market access and gender. The sample consists only of accepted annuity offers. The Money Worth Ratio (MWR) is the discounted monetary value of the benefit payments of the annuity divided by the initial premium cost. To make the sample more homogenous, the figures is obtained using only data for individuals at the statutory retirement age (65 for men, 60 for women).

sulting a sales agent and women accessing the market directly – pay larger mark-ups – compared to those women consulting an independent financial advisor – than their male counterparts do.

Finally, Table A.5 analyses whether there exist gender differences in the probability of accepting an (immediate) annuity offer. The table shows that women are more likely than men to accept an annuity offer (column 1). Moreover, again, there is evidence that women have stronger preferences for the risk-rating of the firm. Women are 13% more likely than men to accept an offer from a firm in the highest risk-rating class (column 2).

5 Results

5.1 *Internal* Offers

In this section, I present the results of Equations 1 and 2.

The estimates of Equation 1 are reported in Table 3. Since the aim of the first part of the analysis is to compare the value of the offer made by the sales agent's firm to the average offer received by the same individual for the same product, the sample focuses only on those who access the market through a sales agent.

Table 3: Internal Annuity Offers, Individual FE, Channel: Sales Agent

	All			
	Rank Offer	MWR	Rank Offer	MWR
	(1)	(2)	(3)	(4)
AgentFirm	1.198***	-0.515***	0.105***	-0.164***
	(0.024)	(0.011)	(0.020)	(0.009)
Female*AgentFirm	0.260***	-0.050***	0.208***	-0.046***
	(0.036)	(0.018)	(0.030)	(0.014)
Observations	1,539,010	1,539,010	1,539,010	1,539,010
R-squared	0.014	0.027	0.376	0.409
Number of idgroup	143,910	143,910	143,910	143,910
Year FE	✓	✓	✓	✓
Indiv-Consultation-Product FE	✓	✓	✓	✓
Firm FE			✓	✓

Dependent variables: Rank of the offer (column 1,3), Money Worth's Ratio*100 of the annuity offer (column 2,4). Sample: All internal annuity offers made to individuals accessing the market through a sales agent. *Female* is a dummy for women, while *AgentFirm* is a dummy for the offer made by the sales agent's firm. Robust standard errors clustered at individual level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

The table shows that, for both women and men, the offer that an individual receives from the sales agent's firm is worse than the average offer received. This holds whether I consider simply the rank of the offer or its Money Worth's Ratio – the coefficient of the

$AgentFirm$ variable is positive in column 1 and negative in columns 2 .[49] More interesting is that the effect seems to be larger for women. The coefficient of the interaction term between the variable of interest and the dummy for women ($AgentFirm*Female$) is statistically significant and positive in column 1, and negative in column 2. Specifically, the results indicate that the MWR of the offer that the individual receives from the sales agent's firm is, on average, 0.52 pp lower (0.57% in percentage terms), than the average offer received for the same product (column 2).[50] The mark-up charged to women is 10% larger compared to men's one. Despite the small magnitude of the coefficient, this effect corresponds to a large amount of money as it applies to the entire pension wealth.

Since the specification includes individual-product fixed effects, the results cannot be driven by gender differences in the type of products for which individuals request offers (i.e., with respect to the guaranteed period) or by the fact that the selection into channel might be differentially informative of mortality across genders. In such cases all the offers received from women should be higher priced, while my variable of interest allows me to capture the mark-up charged by the sales agent's firm over the average offer received by the same individual for the same product.[51]

However, a possible confounding factor might be that women are more likely than men to access the market through firms that give worse offers– for instance, those more highly rated/prestigious or who spend heavily in advertising. To investigate this possibility, I proceed as follows. First, I include firm-year fixed effects in Equation 1.

[49]The offers are ranked according to their monthly pay-out. So the highest the rank, the lowest the payout and, in turn, the MWR.

[50]The average MWR for initial offers is 0.92.

[51]On top of that, Table A.4 shows that there are no differences in the characteristics of requested products across gender (see Section 4.2).

The results in Table 3, columns 3 and 4, show that this does not affect my results. Then, I analyse how the effect changes with the risk rating of the firm affiliated to the sales agent.

Table 4: Heterogeneity by Risk-Rating Class

Internal Annuity Offers, Individual FE, Channel: Sales Agent

	All			
	Rank Offer	MWR	Rank Offer	MWR
	(1)	(2)	(3)	(4)
AgentFirm	0.441***	-0.236***	0.130***	-0.116***
	(0.031)	(0.014)	(0.028)	(0.012)
Female*AgentFirm	0.071	-0.008	-0.016	0.016
	(0.046)	(0.022)	(0.039)	(0.018)
AgentFirm*AA+	1.826***	-0.672***	-0.061	-0.115***
	(0.045)	(0.023)	(0.043)	(0.021)
Female*AgentFirm*AA+	0.440***	-0.097***	0.538***	-0.147***
	(0.068)	(0.035)	(0.061)	(0.030)
Observations	1,539,010	1,539,010	1,539,010	1,539,010
R-squared	0.022	0.035	0.376	0.409
Number of idgroup	143,910	143,910	143,910	143,910
Year FE	✓	✓	✓	✓
Indiv-Consultation-Product FE	✓	✓	✓	✓
Firm FE			✓	✓

Dependent variables: Rank of the offer (column 1), Money Worth's Ratio*100 of the annuity offer (column 2), standardized Money Worth's Ratio*100 of the annuity offer (column 3). Sample: All internal annuity offers made to individuals accessing the market through a sales agent. *Female* is a dummy for women, while *AgentFirm* is a dummy for the offer made by the sales agent's firm. Robust standard errors clustered at individual level in parenthesis.

Table 4 reports the estimates for an equation similar to Equation 1 that also includes a dummy for those individuals who access the market through a firm in the highest risk-rating class (AA+) and its interaction with the three variables of interest (*AgentFirm, Female, AgentFirm*Female*), which are defined as they before. According to the table,

the coefficients *AgentFirm*Female*AA+* is statistically significant and negative, while the coefficient of *AgentFirm*Female* is close to 0. This means that gender differences in the choice of the sales agent's firm cannot explain the results and that the effect is larger among those individuals who access the market through a firm in the highest risk-rating class. This evidence points to statistical discrimination driven by gender differences in risk-aversion. According to Section 3.2, women have stronger preferences for the risk rating of the firm. Consequently, women might be believed to be willing to pay a larger mark-up than men for annuities provided by a highly rated firm. Therefore, firms in a high risk rating class and in a market power position might find it profitable to charge higher prices to women in order to extract a larger rent from them. Of course, this is only possible in a context of low competition among annuity providers, namely, in the case of a sales agent.

Table 5: Internal Annuity Offers, Firm FE

	Channel: Sales Agent		All	
	Rank Offer	MWR	Rank Offer	MWR
	(1)	(2)	(3)	(4)
Female	-0.400***	4.176***	-0.355***	4.121***
	(0.008)	(0.033)	(0.010)	(0.039)
AgentFirm	0.091***	-0.198***	0.102***	-0.207***
	(0.020)	(0.010)	(0.019)	(0.011)
Female*AgentFirm	0.197***	-0.085***	0.194***	-0.081***
	(0.029)	(0.016)	(0.029)	(0.017)
Agent			-0.068***	-0.047
			(0.008)	(0.029)
Female*Agent			-0.061***	0.044
			(0.012)	(0.045)
No Intermediary			-0.006	0.023
			(0.007)	(0.027)
Female*No Intermediary			-0.012	0.033
			(0.011)	(0.042)
Child	-0.010	-0.479***	-0.017	-0.524***
	(0.008)	(0.033)	(0.013)	(0.051)
Old Age Retiree	0.050**	0.229***	0.060*	0.185**
	(0.021)	(0.063)	(0.031)	(0.088)
Observations	1,539,010	1,539,010	4,243,906	4,243,906
R-squared	0.472	0.752	0.470	0.758
Firm-Year FE	✓	✓	✓	✓
Other Controls			✓	✓

Note. Dependent variables: Rank of the offer (column 1, 3), Money Worth's Ratio*100 of the annuity offer (column 2, 4). Sample: All internal annuity offers made to individuals accessing the market through a sales agent. *Female* is a dummy for women, *AgentFirm* is a dummy for the offer made by the sales agent's firm, *No intermediary* is a dummy for those who access the market without an intermediary, *Agent* is a dummy for those who access the market through an agent. The omitted category consist of those who access the market though an independent financial advisor. Finally, *Female* is a dummy for women, while *AgentFirm* is a dummy for the offer made by the sales agent's firm. Other controls include dummies for children, for old age retirees, for the age of the spouse, for other beneficiaries, for deciles of pension savings, for the length of the guaranteed period (in years), for the number of the consultation, and for the number of years from or after the Normal Retirement Age. Robust standard errors clustered at individual level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

In Tables 5, I exploit my second specification, which only includes firm-year fixed effects. Columns 1-2, focus only on those who consult a sales agent, while columns 3-4 extend the analysis to the entire sample. The results show that firms offer relatively lower offers to those individuals who access the market through one of their sales agents compared to other individuals with similar characteristics using another channel or firm – the coefficient of the $AgentFirm$ is again positive and statistically significant in columns 1-3, while it is negative in columns 2-4. According to the coefficient of the $Female * AgentFirm$, which is also statistically significant in all columns, the sales agent effect is 40% larger for women (columns 2-4), in line with the previous table. It is worth to note that since controls include dummies for the age of the spouse, the results cannot be explained by heterogeneity in expected beneficiary longevity between women and men. Moreover, according to columns 3-4, which regard the entire sample of individuals regardless of the channel used to access the market, the coefficient of $Agent$ is not statistically significant in column 4. This confirms that firms do not observe the channel used by the individual to access the market, so it does not affect their offers.[52] Of course, firms know when an individual accesses the market through one of their sales agents. Also, unlike the coefficient of $Female * AgentFirm$, the coefficients of $Female * Agent$ and $Female * NoIntermediary$ are not statistically significant.

Finally, in Table 6, I check whether the effect changes with the risk-rating of the sales agent's firm. The results confirms the evidence provided in Table 4 and shows that the gender effect is almost double among those who consult sales agents working for highly rated firms.

[52]For all individuals, firms make two offers, one is at the net of the commission fee and one is at the gross of the commission fee. Then, the system transmits net offers to those who consult an intermediary and gross offers to the others.

Table 6: Heterogeneity by Risk-Rating Class

Internal Annuity Offers, Firm FE, Channel: Sales Agent

	Channel: Sales Agent	
	Rank Offer	MWR
	(1)	(2)
AgentFirm	0.071***	-0.145***
	(0.027)	(0.013)
Female*AgentFirm	-0.022	-0.024
	(0.038)	(0.020)
AgentFirm*AA+	0.047	-0.125***
	(0.041)	(0.024)
AgentFirm*Female*AA+	0.526***	-0.149***
	(0.058)	(0.033)
Observations	1,539,010	1,539,010
R-squared	0.473	0.752
Other controls	✓	✓
Firm-Year FE	✓	✓

Note. Dependent variables: Rank of the offer (column 1), Money Worth's Ratio*100 of the annuity offer (column 2). Although the coefficients are not reported, the regressions also include the dummies *Female* and $AA+$, and the interaction between the two dummies. Sample: All internal annuity offers made to individuals accessing the market through a sales agent. *Female* is a dummy for women, *AgentFirm* is a dummy for the offer made by the sales agent's firm, and $AA+$ is a dummy for those individuals who access the market through a firm in the highest risk-rating class. Other controls include dummies for children, other beneficiaries, age of the spouse, old-age retirees, deciles of pension savings, length of the guaranteed period (in years), sequential number of the consultation, number of years from or after the Normal Retirement Age. Robust standard errors clustered at individual level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

5.2 Additional Heterogeneity

In this section, I provide an additional heterogeneity analysis, which explores how the results vary with the type of annuity product (i.e. the length of the guaranteed period), the marital status, and the amount of pension wealth of the individual.

To study how the effect changes with the type of annuity product, I create a dummy for guaranteed annuities and interact it with the my variables of interest (*AgentFirm, Female, AgentFirm*Female*). To investigate the effect of the marital status, the latter three variables are interacted with a dummy for married individuals. Finally, to study the heterogeneity with respect to pension wealth, I identify subsamples of individuals according to the decile of pension wealth distribution they belong to, and create a dummy for each of them. Then, I proceed as before. I run an equation similar to Equation 1, which also includes the new dummies and their interactions.[53]

Figures 7 (a)-Figures 7 (c) show the results for my main dependent variable, the MWR, while the results for the standardised version of the MWR are provided in Figures A.10 (a)-A.10 (c).

Figure 7 (a) analyses whether the effect varies between guaranteed and non-guaranteed annuities. The figure shows that although the coefficient of *AgentFirm*Female*Guaranteed* is low in magnitude, it is statistically significant and negative. This suggests that the effect is slightly larger for guaranteed annuities, which is again consistent with the risk-aversion hypothesis. Since women are found to be more risk-averse than men, they might be willing to pay a larger price for guaranteed annuities compared to their male counterparts.

[53] I obtain similar results if I use Equation 2 instead of Equation 1. The results are available upon request.

Figure 7 (b) investigates differences by marital status. The figure shows that while the coefficient of *AgentFirm*Female* is negative and statistically significant, the coefficient of *AgentFirm*Female*Married* is not. This finding suggests that the effect does not differ by marital status. Although this result might be less intuitive, as single women are expected to be more risk-averse than married women (Jianakoplos and Bernasek, 1998), it is important to note that this variable regards the marital status of the individuals at the time when they access the market. Therefore, the sample of unmarried individuals also includes widowers and widows, who might be receiving a surviving spouse's pension, which, in turn, would reduce their level of risk-aversion.

Finally, Figure 7 (c) provides evidence on how the effect varies by the decile of pension wealth.[54] According to the figure, the effect is larger among those individuals who are in the middle deciles of the pension wealth distribution. This result is again consistent with the financial literacy and risk-aversion hypothesis.[55] What is surprising is that the coefficients of the interaction term for the two lowest deciles are not statistically significant. However, this result might be explained by the fact that the firms cannot offer annuities that are lower than the minimum pension guaranteed, which, therefore, acts as a threshold for the offers.[56]

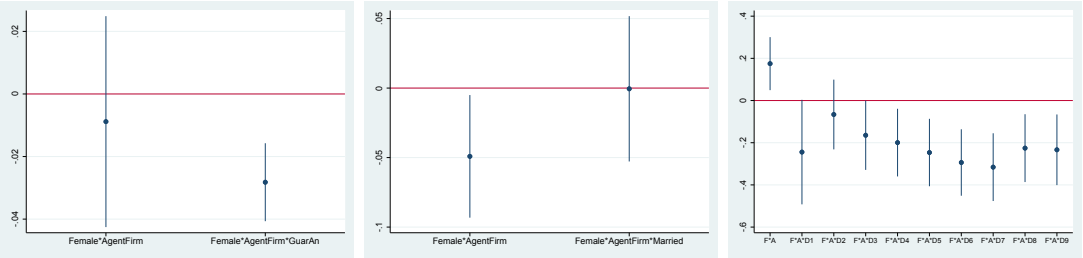
[54]The deciles are calculated using data from the entire population, so the cut-off points are the same for both sexes.

[55]Low wealth individuals are found to have a lower level of financial literacy and be more risk-averse than high wealth individuals (Jianakoplos and Bernasek, 1998).

[56]I obtain similar results if I use Equation 2 instead of Equation 1. The results are available upon request.

Figure 7: Heterogeneity (MWR)

(a) By Type of Product (b) By Marital Status (c) By Pension Wealth



Note. Figure 7 a) shows the coefficients of my variables of interest (Equation 1) interacted with a dummy for offers for guaranteed annuities (*GuarAnn*). Figure 7 b) shows the coefficients of my variables of interest (Equation 1) interacted with a dummy for married individuals (*Married*). Figure 7 c) shows the coefficients of my variables of interest (Equation 1) interacted with dummies for groups of individuals defined according to the decile of the pension wealth distribution they belong to (*D1-D9*). *Female* is a dummy for women, while *AgentFirm* is a dummy for the offer made by the sales agent's firm. *Female* and *AgentFirm* dummies, and their interactions are also included in the regression, but their coefficients are not reported. The dependent variable is the MWR. Sample: Individuals accessing the market through a sales agent.

5.3 Accepted Offers

Finally, I analyse whether differences across channels and genders persist for transaction prices. To do so, I focus only on accepted offers and re-estimate Equation 2.[57] This time, the *AgentFirm* dummy indicates those individuals who buy the annuity from the firm their sales agent works for, while the *Agent* dummy is equal to 1 for those who access the market through a sales agent and buy the annuity from a firm that is not the sales agent's firm. Since more than 90% of people consulting a sales agent end up accepting the offer made by the sales agent's firm, the latter group consists of a small sample of individuals. As in the previous section, *No intermediary* represents those who access the market without any intermediary and the omitted category consists of those

[57]I cannot estimate Equation 1 for the sample of accepted offers, as Equation 1 compares annuity offers across firms within individuals, and individuals accept only one offer.

who access the market through an independent financial advisor. Moreover, unlike for initial offers, for this analysis, the set of controls also includes municipal dummies as it is likely that firms during the negotiation process observe the municipality of residence of the individual and use this information to make their final offer (see Footnote 28).[58]

The results are provided in Table 7. Column 1 analyses differences across genders and channels in the rank of the initial offer made by the chosen firm. The results show that those who buy the annuity from their sales agent's firm accept higher-ranked offers, namely offers providing a lower benefit payment, compared to those who consult an independent financial advisor. Such difference is much larger for women than for men. This evidence is in line with the results of the previous section. Women receive– and, in turn, accept– relatively worse offer from the sales agent's firm compared to men – the coefficients of *AgentFirm* and *Female*AgentFirm* are statistically significant and positive. On the contrary, the coefficient of *Female*Agent* is not statistically significant.

Column 2 examines whether there exist differences across channels and genders with respect to the increase negotiated outside SCOMP. Specifically, the dependent variable is the percentage difference between the accepted and the initial offer made by the same firm for the same product. According to the results, those who access the market directly obtain higher increases compared to those who do not consult any intermediary. This is explained by the fact that since these individuals do not pay any commission there is more room for an adjustment of their offer. Moreover, women who buy the annuity from the sales agent's firm and those women who do not consult any intermediary receive higher adjustments in their offers. This may be due

[58]However, I do not include dummies for the age of the spouse because of the lower number of observations of this sample. The inclusion of dummies for the age-group of the spouse do not affect the results, which are available upon requests.

to the evidence provided in the previous column, which shows that these groups of women choose higher-ranked offers (namely, offers providing a lower monetary value). Consequently, they obtain higher adjustment when they negotiate outside SCOMP.[59][60]

Finally, column 3 analyses differences in the MWR of the accepted offer. The results show that the average MWR of accepted offers for those individuals who buy the annuity from the sales agent's firm are 0.4 pp lower, 0.43 in percentage term, compared to those who access the market through an independent financial advisor, while for those who access the market directly are 1.7 pp larger, 1.8 in percentage term.[61] The latter result is related to the commission fee, which is not paid by those who access the market directly. The fact that the difference in the MWR of offers between those who consult an intermediary and those who access the market directly appears much lower in this table than in Tables 5 suggests that, in the first round of offers, firms apply a lower commission in order to make better offers and attract consumers. Then, during the negotiation process, they concede lower discounts to those who consult an intermediary.

More interesting is that while the coefficient of *Agent*Female* is almost not statistically significant in all columns, the coefficient of *AgentFirm*Female* is statistically significant and negative in column 3. This shows that the difference in transaction prices between those who buy the annuity from the sales agent's firm and those who consult an independent financial advisor is again larger for women than for men (0.75 in percentage terms). This means that although women obtain larger adjustments in their initial offers from the sales agent's firm during the negotiation process, such discounts

[59] Figure 9 shows that the highest the rank, the highest the adjustment.

[60] 4,233 individuals accept *internal* annuity offers. This explains the difference in the number of observations between columns 1,3 and columns 2.

[61] The average MWR for the accepted offers is 0.93.

are not large enough to compensate the higher initial markup that the sales agent's firm charges to women – gender differences persist for transaction prices.

Overall, this evidence suggests that if the only type of intermediary in the market was the independent financial advisor, women's pensions would be almost 1% larger, which, over the entire lifespan, corresponds to 3 months of their pension.[62] The effect increases to 7 months in the case of no commission or no intermediary.[63] From the insurance companies point of view, this represents a large profit.

[62]The is expected to be even larger if composition effects associated with more unfair initial offers were taken into account.

[63]The conversion rate used to translate the total amount of pension wealth into annuities is about 0.004 for women.

Table 7: Accepted Annuity Offers

	(1)	(2)	(3)
VARIABLES	Rank Offer	% Increase.	MWR
Female	-0.526***	-0.016	4.360***
	(0.051)	(0.023)	(0.103)
AgentFirm	1.903***	-0.100***	-0.375***
	(0.057)	(0.025)	(0.095)
Agent	0.602***	-0.082*	-0.866***
	(0.108)	(0.048)	(0.167)
No Intermediary	0.547***	1.400***	1.680***
	(0.060)	(0.033)	(0.098)
Female*Agent	-0.124	0.125	0.413*
	(0.134)	(0.087)	(0.214)
Female*AgentFirm	0.236***	0.080**	-0.358***
	(0.065)	(0.031)	(0.112)
Female*No Intermediary	0.341***	0.113***	-0.536***
	(0.076)	(0.034)	(0.114)
Observations	27,698	23,560	27,793
R-squared	0.517	0.422	0.715
Other Controls	✓	✓	✓
Firm-Year FE	✓	✓	✓
Region FE	✓	✓	✓

Note. Dependent variables: Rank of the offer (column 1), Percentage Increase External offer*100 (columns 2), Money Worth's Ratio*100 of the annuity offer (column 3). Sample: All accepted offers (internal or external offers). *No intermediary* is a dummy for those who access the market without an intermediary, *Agent* is a dummy for those who access the market through an agent and buy the annuity from a firm that is not the sales agent's firm. *AgentFirm* is a dummy for those who access the market through a sales agent and buy the annuity from the sales agent's firm. The omitted category consist of those who access the market through an independent financial advisor. Finally,*Female* is a dummy for women. Other controls include dummies for other beneficiaries, dummies for deciles of pension savings, dummies for the length of the guaranteed period (in years), dummies for the sequential number of the consultation, the number of years from or after the Normal Retirement Age. Standard errors are clustered at the municipal level.

6 Conclusion

In this paper, I study gender-based price discrimination in the annuity market. Since the benefit payments of an annuity depend on the individual's life expectancy, and there are important differences in the mortality risk across gender, it is not possible, in this context, to compare annuity offers across genders in order to provide evidence for discriminatory behaviour. I am able to overcome this limitation by exploiting the fact that, in Chile, individuals can access the market through three different channels (a sales agent, an independent financial advisor, or directly), which are characterised by different levels of competition among firms. If there is gender price discrimination in the market, it should be more pronounced when firms have market power– that is when people access the market through a sales agent at a firm.

I use individual-level data on all annuity offers made to Chilean retirees in the period 2011-2014, and compare annuity offers across channels and genders. In order to address the concern that individuals might self-select into the three channels according to unobservable characteristics, which might, in turn, affect transaction prices, I focus on the first round of offers that people receive through an electronic market before any contact with the firm making the offer. By exploiting individual-level variation in annuity offers across firms, I show that firms with market power charge higher mark-ups to women than to men. The result is robust to an alternative specification that includes firm-year fixed effects instead of individual-product fixed effects. Additional evidence indicates that the effect is driven by firms in the highest risk-rating class, it is slightly larger for guaranteed annuities and for middle-wealth individuals.

This points to the gender gap in risk-aversion in explaining the results and is con-

sistent with firms' statistical inference about the consumer reservation price. Since women are found to have stronger preferences for annuities and the firm's risk-rating, it is profitable for highly-rated firms to offer initial prices that are higher for women than for men in order to extract a larger rent from high reservation value women. Of course, this sort of price discrimination is only possible when insurers have some market power. While advisors seem to help people to make better annuity choices, in the case of sales agents, the level of competition in the market is low and there is room for price discrimination.

There are several policy implications to draw from this analysis, which may help address the factors that increase gender inequalities in pension benefits. First, the data shows that most individuals require the service of intermediaries, as they are not well informed about the pension system or do not have the financial literacy to make this kind of financial choices. However, the service of intermediaries is associated with high commission fees and, in turn, a significant reduction in the monetary value of individual pension benefits. Women are especially hard-hit as they are more likely than men to consult an intermediary and accumulate, on average, lower pension wealth. This calls for increased investment in financial literacy programs to avoid consumers to strongly rely on profession advice to make their annuity choice. Moreover, the role of intermediaries should be investigated and, possibly, better regulated, especially that of sales agents, as it seems that they are not actually being helpful in assisting people in their choices and that the low level of competition in the market leaves room for price discrimination against women.

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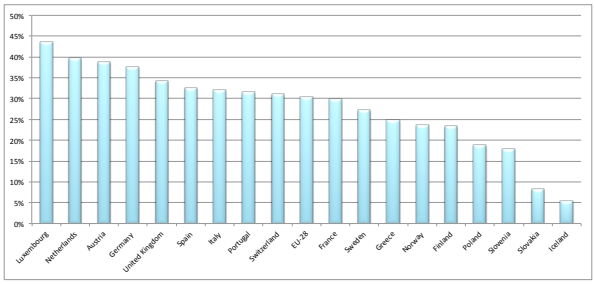
Appendix

Figure A.1: The Gender Pension Gap



Source: EU-SILC, 2018

Figure A.2: The SCOMP System

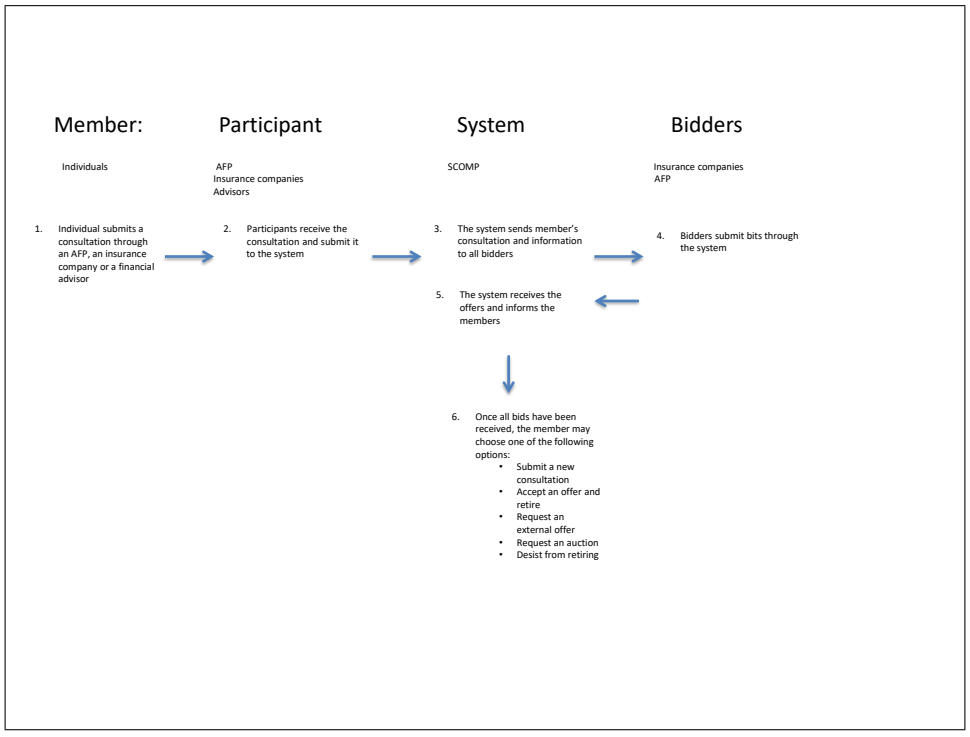
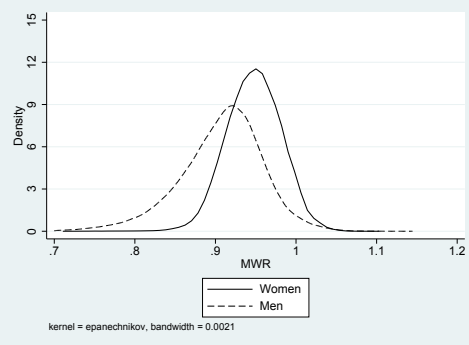
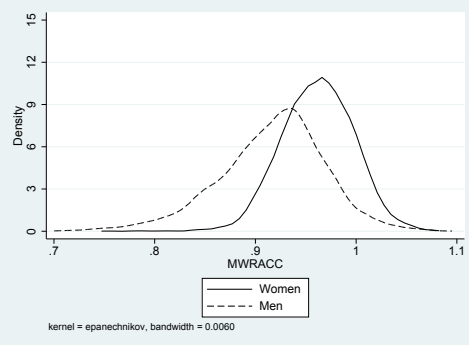


Figure A.3: The distribution of the MWR by Gender

(a) All offers



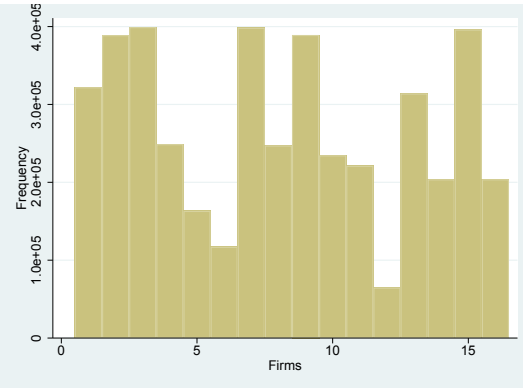
(b) Accepted offers



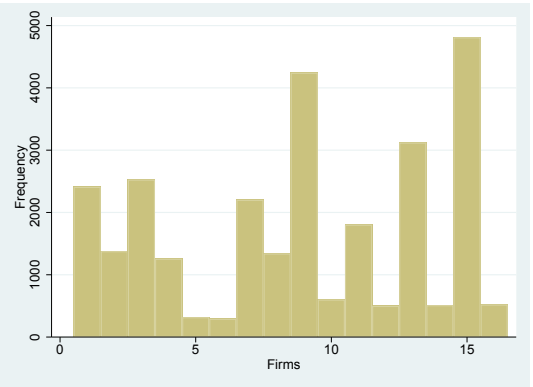
Note. The figure shows the MWR distribution by gender. Figure A.3 (a) regards the entire sample, while Figure A.3 (b) focuses only on accepted offers. The Money Worth Ratio (MWR) is the discounted monetary value of the benefit payments of the annuity divided by the initial premium cost.

Figure A.4: Annuity Offers by Firms

(a) All offers



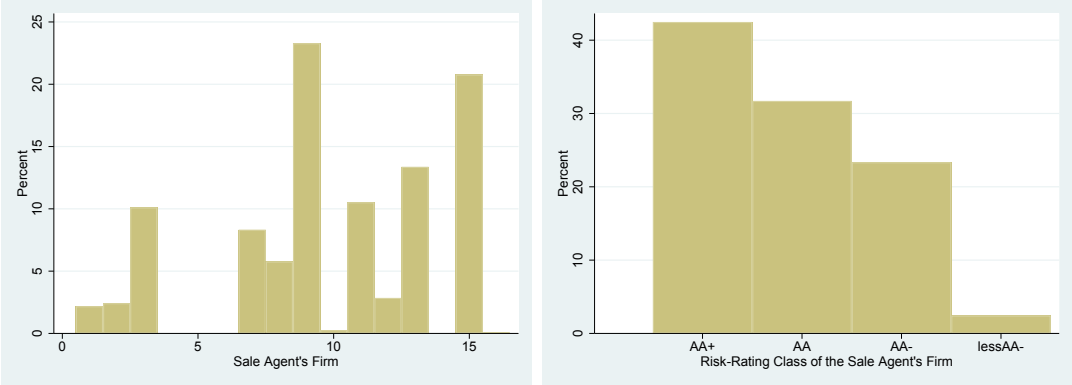
(b) Accepted Offers



Note. The figure shows the distribution of offers by firm. Figure A.4 (a) regards the entire sample, while Figure A.4 (b) focuses only on accepted offers.

Figure A.5: Individual Distribution

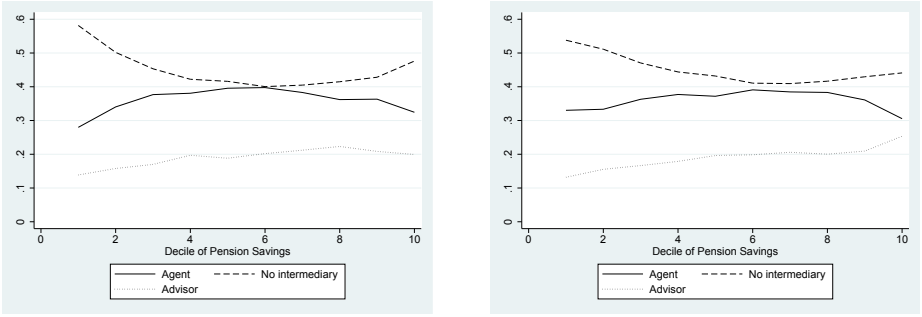
(a) By the Sales Agent's firm (b) By risk-rating cl. of the Agent's firm



Note. The figures focus only on those who access the market through a sales agent. Figure A.5 (a) shows the distribution of individuals by sales agent's firm, while A.5 (b) reports the distribution of individuals by the risk-rating class of the sales agent's firm.

Figure A.6: Share of individuals by channel used for market access

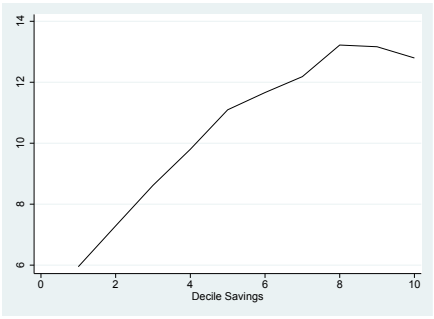
(a) Men (b) Women



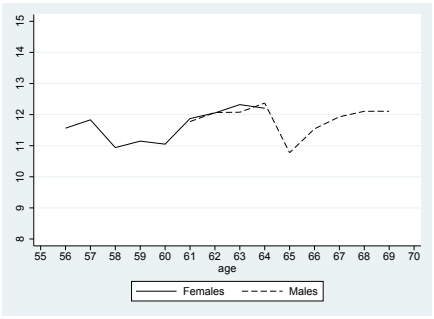
Note. The figure shows the share of individuals in each decile of pension wealth by access channel used.

Figure A.7: Number of internal offers per individual and pension product

(a) Decile of Pension Savings

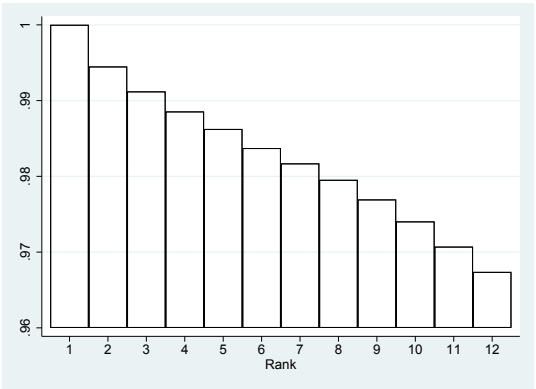


(b) Age and Gender



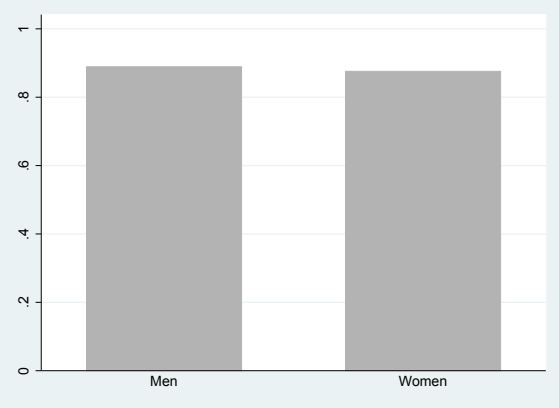
Note. The figure shows the average number of offers received by an individual, by decile of pension wealth or gender and age.

Figure A.8: Average differences in the benefit payment across offers



Note. The figure shows the percentage difference in the benefit payment between the highest offer and any other offer received by an individual for the same pension product, based on ranking of the internal offer. Offers are ranked according to their monthly benefit payment. The offer with the lowest rank (1) corresponds to the offer with the highest benefit payment.

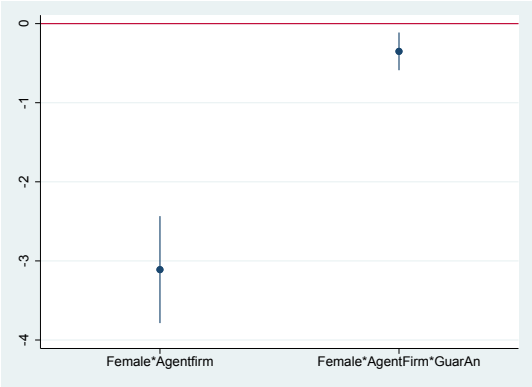
Figure A.9: Share of individuals accepting the offer from the sales agent's firm



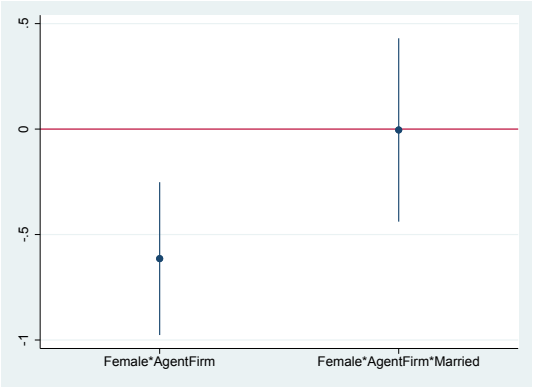
Note. The figure focuses only on those who access the market through a sales agent and shows the share of individuals purchasing the offer from the sales agent' firm.

Figure A.10: Heterogeneity-NMWR

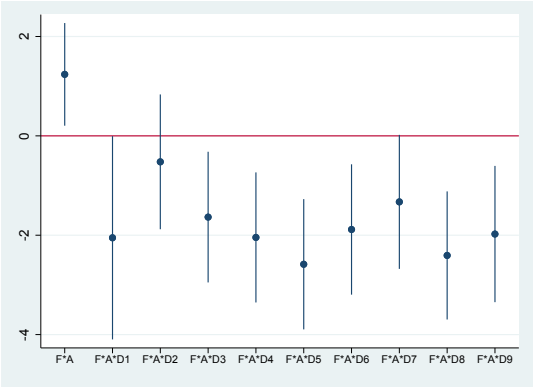
(a) By Type of Product



(b) By Marital Status



(c) By Decile of pension Wealth



Note. Figure A.10 a) shows the coefficients of my variables of interest (Equation 1) interacted with a dummy for offers for guaranteed annuities (*GuarAnn*). Figure A.10 b) shows the coefficients of my variables of interest (Equation 1) interacted with a dummy for married individuals (*Married*). Figure A.10 c) shows the coefficients of my variables of interest (Equation 1) interacted with dummies for groups of individuals defined according to the decile of the pension wealth distribution they belong to (*D1-D9*). *Female* is a dummy for women, while *AgentFirm* is a dummy for the offer made by the sales agent's firm. *Female* and *AgentFirm* dummies, and their interactions are also included in the regression, but their coefficients are not reported. The dependent variable is the standardized (by gender) MWR. Sample: Individuals accessing the market through a sales agent.

Table A.1: Probability of accessing the market through an intermediary

	All		Sample: Sales Agent
	MLogit		OLS
	(1)	(2)	(3)
VARIABLES	S Agent Odds Ratio	Advisor Odds Ratio	Highest Risk Rating
Female	1.075*	0.847***	0.025*
	(0.040)	(0.039)	(0.013)
married	1.026	1.000	-0.010
	(0.019)	(0.023)	(0.007)
Old Age retiree	0.529***	0.560***	-0.004
	(0.028)	(0.034)	(0.017)
Child	1.012	0.966	0.015
	(0.025)	(0.030) ì	(0.009)
Age	0.623**	0.555***	-0.023
	(0.115)	(0.125)	(0.065)
Age2	1.004**	1.004**	0.000
	(0.001)	(0.002)	(0.001)
Pen Savings	1.008***	1.010***	0.000
	(0.000)	(0.000)	(0.000)
Pen Savings 2	1.000***	1.000***	-0.000
	(0.000)	(0.000)	(0.000)
Baseline p	.	.	0.4242
Observations	86,188	86,188	30,030
Pseudo R2/R2	0.043	0.043	0.057
Other Controls	✓	✓	✓
Year FE	✓	✓	✓
Region FE	✓	✓	✓

Note. Multiple Logit estimates in columns 1-2, OLS estimates in column 3. Dependent variables: dummy variable for those who access the market through an intermediary (sales agent or advisor) in columns 1-2, dummy for those who access the market through a highly ranked firm in column 3. Column 3 focuses only on those who access the market through a sales agent. Other controls include: dummies for the number of beneficiaries and dummies for the sequential number of the consultation. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Characteristics of Individuals by Channel and Gender

		Women			Men		
Variable	Channel	mean	sd	N	mean	sd	N
Age	Agent	61.15	1.22	11972	65.57	1.06	14757
	No Intermediary	61.16	1.24	18657	65.56	1.00	26304
	Advisor	61.07	1.22	6611	65.53	1.06	7887
Married	Agent	0.55	0.50	11972	0.83	0.38	14757
	No Intermediary	0.56	0.50	18657	0.81	0.39	26304
	Advisor	0.54	0.50	6611	0.83	0.37	7887
Child	Agent	0.10	0.30	11972	0.14	0.34	14757
	No Intermediary	0.11	0.31	18657	0.13	0.34	26304
	Advisor	0.11	0.31	6611	0.13	0.34	7887
Old-Age Retiree	Agent	0.99	0.11	11972	0.95	0.21	14757
	No Intermediary	0.99	0.09	18657	0.97	0.16	26304
	Advisor	0.99	0.12	6611	0.95	0.22	7887
Pen Savings	Agent	1.0e+05	53066	11972	93329	71013	14757
	No Intermediary	99292	58243	18657	96202	81855	26304
	Advisor	1.1e+05	59155	6611	1.0e+05	79261	7887

Notes. Differences in observables by channel and gender. Sample: All individuals in the sample. Pension savings are expressed in US dollars. Years: 2011-2014.

Table A.3: Selection on Observables by Channel for Market Access

	(1)	(2)	(3)	(4)
VARIABLES	Age	log Savings	Married (dummy)	Age of the spouse
Female	-4.467***	0.108***	-0.289***	0.304***
	(0.019)	(0.010)	(0.007)	(0.111)
Agent	0.043***	-0.068***	-0.000	0.006
	(0.015)	(0.009)	(0.005)	(0.082)
No Intermediary	0.027**	-0.113***	-0.014***	0.317***
	(0.013)	(0.008)	(0.005)	(0.075)
Female*Agent	0.033	0.018	0.009	-0.089
	(0.024)	(0.012)	(0.009)	(0.137)
Female*No Intermediary	0.065***	0.026**	0.031***	-0.153
	(0.022)	(0.011)	(0.009)	(0.127)
Observations	86,188	86,188	86,188	61,065
R-squared	0.793	0.019	0.087	0.001
Year FE	✓	✓	✓	✓
Region FE	✓	✓	✓	✓

Note. OLS estimates. Dependent variables: age of the individual in column 1, pension savings of the individual (in log) in column 2, dummy for married individual in column 3, age of the spouse in column 4 (only for married individuals). Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Summary statistics: Requests

Variable		Mean	Sd	N
N offers	Men	8.8896	2.5744	54,853
N offers	Women	9.3041	2.3182	39,978
N offers	Total	9.0644	2.4781	94,831
Immediate Annuity	Men	3.8186	0.5965	54,853
Immediate Annuity	Women	3.8569	0.5237	39,978
Immediate Annuity	Total	3.8348	0.5673	94,831
Deferral Annuity	Men	3.9018	2.1084	54,853
Deferral Annuity	Women 1	4.2566	1.8487	39,978
Deferral Annuity	Total	4.0513	2.0107	94,831
PW+Im Annuity	Men	0.1693	0.7890	54,853
PW+Im Annuity	Women	0.1907	0.8397	39,978
PW+Im Annuity	Total	0.1783	0.8108	94,831
Guaranteed Months	Men	101.0716	93.4420	590038
Guaranteed Months	Women	102.0752	93.4360	45476
Guaranteed Months	Total	101.5085	93.4407	1044804
Deferral Months	Men	9.0005	15.5049	590038
Deferral Months	Women	9.3521	15.1890	45476
Deferral Months	Total	9.1536	15.3692	1044804

Notes. The table shows the mean, the standard deviation and the number of observations for the following variables: number of products individuals request offers for, number of immediate life annuities, number of deferral annuities, months of guaranteed period requested, months of deferral period requested.Years: 2011-2014.

Table A.5: Probability of accepting an immediate life annuity

	(1)	(2)
VARIABLES	Annunity	Annuity from Highly R. Firm
Female	0.0854***	0.0081**
	(0.0075)	(0.0036)
Married	-0.0133***	-0.0050***
	(0.0037)	(0.0018)
Old-Age Retiree	-0.0595***	-0.0021
	(0.0108)	(0.0054)
Agent	-0.0638***	0.1514***
	(0.0049)	(0.0021)
No Intermediary	-0.2521***	-0.0023***
	(0.0045)	(0.0007)
Child	-0.0253***	-0.0031
	(0.0049)	(0.0024)
Age	-0.0646*	-0.0060
	(0.0367)	(0.0178)
Age 2	0.0007**	0.0001
	(0.0003)	(0.0001)
Pen Savings	-0.0011***	-0.0006***
	(0.0001)	(0.0000)
Pen Savings 2	0.0000***	0.0000***
	(0.0000)	(0.0000)
Baseline p	0.3233	0.0595
Observations	86,188	86,188
R-squared	0.0628	0.1110
Other Controls	✓	✓
Year FE	✓	✓
Region FE	✓	✓

Note. OLS estimates. Dependent variables: dummy equal to 1 for those who purchase an immediate life annuity (column 1); dummy equal to 1 for those who buy the annuity from a highly rated firm (column 2). Other controls include: dummies for the number of other beneficiaries, and dummies for the sequential number of the consultation. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1 . Years: 2011-2014.