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Transparency and Adverse Selection: Evidence from an Electronic Platform for Annuities ^{*}

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Abstract

In this letter we show robust evidence that the introduction of an electronic platform in the Chilean annuity market in 2004 exacerbated adverse selection. Male and female annuitants who retired after 2004 live around two years longer than non-annuitants, while before the difference was smaller or non statistically significant. Post 2004, the fraction of annuitants decreased despite the fact that the deals offered by insurance companies improved. These facts are consistent with the electronic platform bringing transparency, competition, and reducing the scope for sales agents to affect retirees' choices.

Keywords: Adverse selection, annuities, market transparency, Chilean pension system.

JEL: G14, G22, J32, D82.

1 Introduction

Upon retirement, Chilean workers choose between two main payment options: an annuity or a programmed withdrawal (PW) schedule. In the first case, retirees transfer their funds to an insurance company in exchange for a monthly inflation-adjusted payment until death. Under a PW schedule, funds remain invested in a pension fund and retirees receive decreasing payments until death or fund depletion. Remaining balance upon death is used to finance

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survivor’s benefits or become part of the worker’s inheritance. The choice implies a trade-off between insurance against longevity and financial risks and leaving funds as bequest in the event of an early death.

Since August 2004 all retirees must use an electronic platform (SCOMP) in a three-stage process:¹ the retiree requests quotes for different types of annuities, insurance companies make sealed offers, and then the retiree chooses between PW, one of the annuity offers, or attempts to bargain a better deal with one or more firms.

The introduction of SCOMP pursued two main goals: to increase competition and to help workers make better-informed decisions; it drastically reduced search costs for the workers and it significantly improved the information available to the retiree. Pre-SCOMP, workers were responsible for getting their own quotes from insurance companies and they were advised mainly by insurance companies’ sale representatives, whose remuneration depended on the worker choosing an annuity.² Post-SCOMP, retirees receive a report including standardized information on the advantages and disadvantages of PW and annuities, a pension projection over time under a PW schedule, and the different annuity offers received from insurance companies, ordered from the highest to the lowest.

As agents make better-informed decision, it is expected that adverse selection may emerge or exacerbate (Handel, Kolstad, and Spinnewijn (2019); Lester et al. (2019)). We find empirical support for this hypothesis. Using a data-set that comprises all Chilean retirees between 1991 and 2014 we find mild evidence of adverse selection during the pre-SCOMP period and strong evidence of it after its introduction. We confirm that the SCOMP had a relevant impact on selection by restricting the analysis to workers who retired three years before and three years after SCOMP.

Moreover, evidence presented in Morales and Larraín (2017) show that after the introduction of SCOMP the deals for annuitants improved and, at the same time, the fraction of retirees that chose to annuitize decreased. These puzzling stylized facts can be reconciled with a simple adaptation of the Handel, Kolstad, and Spinnewijn (2019) model.

In Section 2 we present such model, in Section 3 we briefly describe our data and present the empirical evidence, and in Section 4 we present the conclusions.

¹SCOMP is the Spanish abbreviation for System of Inquiries and Quotations of Pension Amounts (*Sistema de Consultas y Ofertas de Montos de Pensión*).

²As described by the pension authority of the time, before the introduction of SCOMP the decision process and the market for annuities had several important shortcomings: (a) potential retirees didn’t have enough information about the product they were choosing, (b) intermediary commissions were excessive, and (c) there were obvious conflicts of interests between retirees and the intermediaries who advised them (Stewart and Reyes (2008), Morales and Zucal (2009), and Ferreiro (2015)).

2 A simple model

We consider a competitive market for a standardized annuity product that is sold to individuals that would otherwise receive the PW option. All individuals are identical to the eyes of insurers, but each one holds private information regarding their expected longevity.³

Denote by w_i the minimum annuity that individual i is willing to accept. It is equal to a correct or true valuation of the annuity (v_i) plus some individual specific noise (ϵ_i); i.e., $w_i = v_i + \epsilon_i$. Since sales agents had the incentives and the ability to steer workers, a natural assumption would be that ϵ had a negative mean before SCOMP. By facilitating the comparison between the two products and by forcing the individual to compare them in a structured decision-making process (and therefore reducing the influence of sales agents), SCOMP reduced the mean (in absolute value) and variance of the distribution of ϵ .

Figure 1 illustrates the equilibria pre and post-SCOMP, where we assume noise is reduced or eliminated. In the x-axis, individuals are sorted according to the minimum annuity they are willing to accept, represented by the solid line WW. Curve MA (long-dashed line) represents the marginal actuarially fair annuity, which is increasing because individuals are ordered according to the minimum annuity they would accept, which is negatively correlated with expected longevity (if there were no noise and no bequest motive, the correlation would be perfect). The curve AA (short-dashed line) is simply the average actuarially fair annuity, which is also increasing and below the MA curve. The competitive equilibrium of the market is where AA and WW intersect and firms obtain no profits.

If we integrate curve MA from zero up to q_{eq} and from q_{eq} up to q_{max} and divide by q_{eq} and $q_{max} - q_{eq}$ respectively, we would obtain the average actuarially fair annuity for those individuals that choose to annuitize and for those that opt for the PW; AA_{ann} and AA_{non-an} on the y-axis. The difference between these two averages reflects the difference in expected longevity between the two groups.

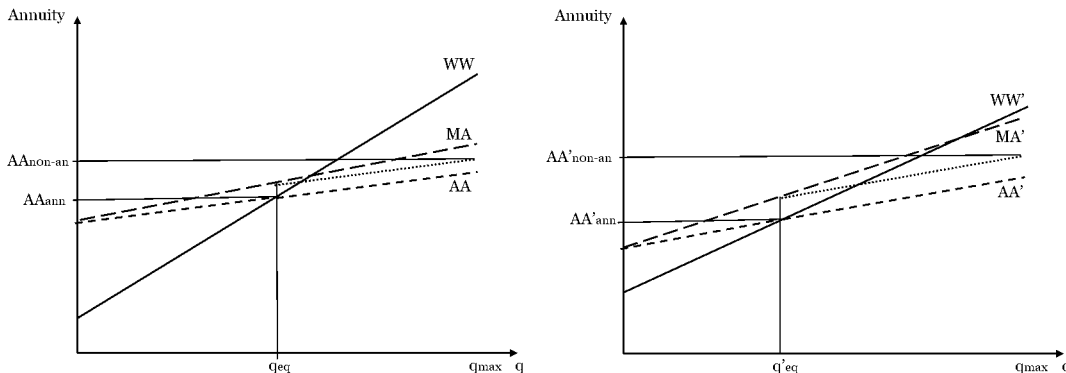
What is the effect of reducing or eliminating the noise that affects the decision? Naturally it depends on the nature of the noise (i.e., the distribution of ϵ). For example, if we believe that before SCOMP insurance company representatives were able to oversell the advantages of annuities and $\epsilon_i = \epsilon < 0$ for all individuals, then curve WW should be shifted upwards after the introduction of SCOMP.

More interestingly, when the noise is heterogeneous among individuals, its reduction implies that there will be a re-sorting of individuals along the x-axis and the curves WW and MA will rotate: WW clockwise and MA anti-clockwise, as represented in the right panel

³More generally, the results of the analysis can be interpreted as conditional on the observable variables that may affect longevity and the annuity decision.

of Figure 1. As a direct consequence, the expected difference between the average actuarially fair annuities of the groups of annuitants and non-annuitants will be increased. Moreover, if the mean of the noise is also reduced in absolute value, we can expect a lower fraction of individuals choosing to annuitize (even if annuity deals improve after SCOMP).

Figure 1: **Competitive Equilibrium and the Effect of a Noise Reduction**



Note: The left figure represents the equilibrium pre SCOMP and the right one the equilibrium post SCOMP.

The intuition why the difference in expected longevity increases is simple when one analyzes what happens at the margin. When the noise is reduced, those who were buying an annuity in the pre SCOMP scenario and whose true value v_i were above the equilibrium value of the annuity would not buy in the post SCOMP scenario. And those who were initially not buying but whose v_i was below the equilibrium, would switch and buy an annuity. As a consequence, some individuals that expect to live longer would start buying annuities, and some that expect to live less would stop buying annuities, increasing the difference in expected longevity between the two groups.

3 Data and empirical results

We have data on retirement decisions, age at death (if it happened before June 2014), dates of birth and retirement, gender, and the initial pension of all workers who had the option of choosing between annuity and PW and retired at the normal retirement age between 1991 and 2013 (a total of 173,612 women and 194,598 men). In the Appendix we present a table with descriptive statistics.

To assess adverse selection, we compare individual mortality of annuitants and those who choose PW. In the vein of [Finkelstein and Poterba \(2004\)](#), we estimate a parametric continuous-time duration model with a Gompertz distribution, and include as a control, in

addition to cohort, age and pension effects, a variable that takes the value of one if the retiree chose an annuity.

In Table 1 we present the results for all retirees pre and post SCOMP while in Table A.2 we focus on those who retired within three years before and after the introduction of SCOMP.⁴ In Panel A of both tables we report the marginal effect of the annuitization dummy on longevity, in specifications that also include a full set of fixed effects for the age in 2004, retirement age, and initial pension decile variables. In panel B of each table these fixed effects are replaced by the original variables (age in August 2004, age at retirement, and initial pension) and their corresponding marginal effects are also presented.

For example, the first specification in panel B of Table 1 suggests the following: women who annuitized between 1991 and 2004 live 0.718 years longer than those who chose PW; being one year older in August 2004 is associated with 0.167 less survival years; increasing initial pension by 1UF is associated with an additional longevity of 0.14 years;⁵ etc.

Focusing on the marginal effect of the annuity dummy, we observe that post SCOMP the marginal effect for women is 2.1 years and it is statistically significant at 5%, while pre-SCOMP the coefficient is statistically non-significant (Panel A) and positive but smaller than post-SCOMP (Panel B).

The results are stronger for the larger (and older) sample of men. Pre-SCOMP the correlation between longevity and annuitization is negative and significant, in the post-SCOMP period all marginal effects are positive and significant at 1% (between 1.3 and 1.9 years). This positive sign is consistent with the adverse selection hypothesis that the annuity product tends to attract individuals with better longevity prospects.

These results are confirmed when we focus on a narrower time window around SCOMP (see Appendix). The marginal effect of the annuity coefficient systematically increases with the introduction of SCOMP, particularly for men.

4 Conclusion

Our empirical findings are consistent with the view that SCOMP increased transparency in the annuity market. We consistently find strong evidence of adverse selection after 2004, while the evidence for pre-SCOMP retirees is either mild or non-existent.

A natural concern when interpreting our results, however, is whether SCOMP may have

⁴As a robustness check, this second table also includes results for a subsample of retirees who were in the top six pension deciles, a group that should not have been affected by a regulatory change that affected eligibility for early retirement around the time that SCOMP was introduced.

⁵Annuities and many other contracts in Chile are expressed in *Unidades de Fomento* (UF), a unit of account that closely follows the CPI. On August 2004, 1 UF was approximately equivalent to US\$ 27.

Table 1: Continuous Time Duration Models / Pre and post-SCOMP
Average Marginal Effects on Median Duration (Years of Life)

	Pre-SCOMP		Post-SCOMP	
	Women	Men	Women	Men
Panel A - Models with year of birth, retirement age, and initial pension decile fixed effects				
Annuity dummy (0 if PW)	0.456 (0.346)	-0.884*** (0.202)	2.113*** (0.685)	1.299*** (0.333)
Panel B - Models controlling for year of birth, retirement age, and initial pension				
Annuity dummy (0 if PW)	0.718** (0.320)	-0.448** (0.177)	2.049*** (0.655)	1.934*** (0.329)
Age at start of SCOMP	-0.167*** (0.0487)	-0.0869*** (0.0257)	-0.598*** (0.203)	-0.300*** (0.0904)
Retirement age	0.0713 (0.0710)	0.0499 (0.0793)	0.713*** (0.169)	0.210 (0.145)
Initial pension	0.141*** (0.0198)	0.147*** (0.00934)	0.0704** (0.0334)	0.135*** (0.0168)
Observations	29,626	40,308	71,993	77,145

Standard errors in parenthesis (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

brought other changes to the market that could explain the increased correlation between longevity and annuitization or that other changes introduced around the same time could explain our findings. Although we cannot completely rule out that other factors may have played a role, we briefly argue here why we consider that it is indeed the increased transparency what is behind our results.

First and foremost, one of the explicitly declared objectives of the introduction of SCOMP was to bring transparency to the annuity market. SCOMP indeed provides retirees with quote certificates that clearly compare the different annuity and PW offers, and succinctly describes the main differences between the two kinds of pension products. Pre-SCOMP, individuals certainly faced larger search costs and many may not have been aware of the PW option (or its advantages).

Although the auction-type mechanism implemented thru SCOMP clearly increased the intensity of competition among insurers, there is no obvious argument why increased competition would increase the longevity gap between annuitants and non-annuitants. The key insight of the model discussed is that the policy must alter the correlation between expected longevity and the minimum annuity the individual is willing to accept to induce a change in the longevity gap between annuitants and non-annuitants. Even though the model discussed is one of perfect competition, this insight is obviously more general.

Furthermore, the introduction of SCOMP brought a slight reduction in the share of retirees choosing annuities (see Table A.1). This is hard to reconcile with a competition effect only since better deals for annuitants, *ceteris paribus*, should lead to increased annuitization. Increased transparency can reconcile these facts, specially considering that one of the dimensions of the increased transparency was to give more visibility to the PW option.

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Table A.1: Average and Standard Deviations by Gender and Sample Period

	Mortality Tables Dataset					
	1991-2013		Pre-SCOMP		Post-SCOMP	
	Women	Men	Women	Men	Women	Men
Annuitized	0.695 (0.460)	0.621 (0.485)	0.658 (0.474)	0.668 (0.471)	0.633 (0.482)	0.601 (0.490)
Birth year	1944.813 (6.073)	1940.164 (6.529)	1941.292 (2.153)	1936.943 (1.385)	1943.840 (2.418)	1940.009 (1.375)
Deceased	0.058 (0.233)	0.175 (0.380)	0.072 (0.259)	0.225 (0.418)	0.053 (0.223)	0.143 (0.351)
Age at retirement	61.693 (2.083)	65.673 (1.007)	61.227 (1.950)	65.565 (1.013)	61.706 (2.150)	65.659 (0.974)
Age at death or last observation**	68.765 (5.822)	72.626 (5.710)	72.274 (2.503)	75.834 (2.800)	69.863 (2.544)	73.362 (1.985)
Age at death***	70.873 (6.092)	74.428 (5.637)	68.717 (4.206)	72.198 (3.404)	66.775 (3.220)	70.410 (2.622)
Initial pension all (US\$)	460.828 (354.150)	485.784 (482.173)	559.602 (475.361)	599.462 (574.318)	576.516 (478.287)	656.878 (628.847)
Initial pension annuitants (US\$)	439.682 (258.411)	476.116 (409.744)	484.147 (300.050)	534.929 (465.308)	471.457 (255.858)	531.603 (434.469)
Initial pension PW (US\$)	509.039 (505.757)	501.620 (581.292)	704.755 (674.943)	729.427 (730.016)	757.757 (677.223)	845.936 (805.000)
Months of exposition	84.264 (67.425)	82.858 (67.995)	131.998 (20.563)	122.681 (31.813)	97.348 (15.531)	91.905 (20.712)
Observations	102,682	117,453	9,464	10,392	13,939	13,025

Source: own calculations. Standard deviations in parenthesis.

(**) The end of the observation window is June 1st, 2014

(***) Only considers individuals who died during the observation window

Table A.2: Continuous Time Duration Models / 3 Years pre and post-SCOMP
Average Marginal Effects on Median Duration (Years of Life)

	Pre-SCOMP 3 years				Post-SCOMP 3 years			
	Women	Women top deciles	Men	Men top deciles	Women	Women top deciles	Men	Men top deciles
Panel A - Models with year of birth, retirement age, and initial pension decile fixed effects								
Annuity dummy (0 if PW)	1.587** (0.792)	0.488 (1.064)	0.515 (0.569)	-0.101 (0.639)	2.269** (1.037)	2.184 (1.352)	1.861*** (0.508)	1.936*** (0.616)
Panel B - Models controlling for year of birth, retirement age, and initial pension								
Annuity dummy (0 if PW)	1.895*** (0.726)	0.994 (1.029)	0.968** (0.487)	-0.106 (0.602)	1.961** (0.982)	1.920 (1.325)	2.474*** (0.501)	1.958*** (0.611)
Age at start of SCOMP	0.415 (0.306)	0.709* (0.381)	0.0423 (0.227)	-0.0976 (0.270)	0.701 (0.472)	0.657 (0.596)	0.261 (0.233)	0.187 (0.271)
Retirement age	-0.621 (0.421)	-0.769 (0.507)	-0.402 (0.301)	-0.210 (0.335)	-0.555 (0.547)	-0.287 (0.674)	-0.171 (0.319)	-0.0582 (0.378)
Initial pension	0.150*** (0.0373)	0.134*** (0.0469)	0.149*** (0.0207)	0.0754*** (0.0200)	0.0931** (0.0450)	0.0765 (0.0546)	0.114*** (0.0192)	0.0711*** (0.0196)
Observations	9,464	5,698	10,392	6,207	13,931	8,300	13,025	7,874

Standard errors in parenthesis (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$.