

# Longevity during retirement: A first approach using survival analysis

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## Abstract

Most of the mandatory pension systems in the world are public, defined-benefit (DB) systems. Under this model, benefits depend on the number of years worked, life expectancy and last wages; the only decision variable is the age of retirement. However, for countries with private pension systems, people usually face different alternatives for retirement, which depends on personal estimates of life expectancy, wealth, market returns and family composition. The Chilean pension system is a defined-contribution (DC) plan based on individual accounts. Because of this, it is a helpful example to explore which are the most relevant characteristics of the people who choose between two of the most popular alternatives of retirement in Chile: (i) annuity and (ii) programmed withdrawal.

## Introduction

I believe that studying these choices, and in particular, the characteristics of those who make them is important and even more relevant nowadays. Since most countries are having to deal with an aging population this poses increasing challenges for governments and policy makers regarding seniors' quality of life, their health outcomes, housing situation, income and pension benefits. On this final issue, pension systems need to avoid the longevity risk in order to ensure that a person's funds are sustainable during retirement. In this context, annuities rise as an attractive market alternative in order to eliminate longevity and market volatility risks (Mitchel et al, 1999).

However, people in Chile are still choosing programmed withdrawals instead of annuities. These are monthly payments drawn from a person's individual account; recalculated every year based on survival rates and market returns estimates. Because of this they do not cover any risk and, by definition, are decreasing over time. In Chile, all workers above an income threshold are eligible to choose whether they want to receive their pension benefits as an annuity or as a programmed withdrawal. Arguably, there are several factors behind this choice. In particular, I believe that a person does not only take into account their life expectancy, but that their education, income and health are also things that influence their decision.

For instance, we know from literature that wealth usually has a strong correlation with income and other sources of savings. As a result, people with a higher income will have alternative saving mechanisms besides their retirement account, thus influencing their retirement choices. Additionally, retirement choices are also based on expected market returns; with this, it is possible to use investment information during the active and retirement phase as a proxy of risk exposure, yet, we will not be capturing financial literacy and retirement choices (Lusardi & Mitchell, 2007).

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Kinship is also intrinsically related to retirement decisions especially in cases like the Chilean one, since one of the retirement alternatives is to pass it along as inheritance. In fact, there are specific rules for this, depending on whether a person has a spouse, or children below 25 years of age (Gustman, 2004). Also, literature already work on spouses and colleagues on retirement decision (Duflo & Saez, 2003; Casanova, 2010), which can be understood as a sort of contagious or peer effect among people retiring.

Considering all the above, the aim of this paper is to give a first approach using survival and hazard trends for this population, in order to address patterns based on demographic characteristics, income and retirement choice. I am only able to address disparities between these two alternatives only on life expectancy by income among the group of retirees. However, the results should give us ideas of what we are losing without including personal wealth, market returns and family composition effects.

### **Strategy**

I plan to study the 30% of people who can choose - that is, the richer 30% - because data shows that even though they are allowed to choose an annuity and be covered against longevity and market variation, most of them still choose the programmed withdrawal option. It is this counterintuitive results that I want to explore further by using observed differences among demographic variables. In particular, I am aiming to exploit the possible heterogeneity on socioeconomic status for these people using survival analysis. Chile is a good case to analyze this; in 1981 the system started offering these alternatives and since then, the annuities market has developed widely.

Up to this point, I have stated that only the richer population has the option of choosing they way in which they will receive their retirement benefits, and because they do not always choose what appears to be the rational option they are an interesting group to characterize. However, It is important to note that those who are entering retirement, since 2004, enter a public system of bidding for pension benefits<sup>2</sup>. Here, insurance companies and pension fund administrators (PFA)<sup>3</sup> make offers to the people, based on demographic characteristics, amount of funds and possible beneficiaries<sup>4</sup>.

Due to this, most of these findings will be based on the outcome of the retirement benefit chosen since I do not have information on whether a person who entered the bidding system actually received an offer. If someone did not receive an offer (essentially, this means that an insurance company is willing to “buy” a person’s individual account and offer an annuity for it they will go back to the original PW setting. This means that, at least for some<sup>5</sup>, I could be concluding that they had a choice when that is not the case. This is just a caveat that what I observe may have some sort of selection bias.

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<sup>2</sup> Supply and Demand System of Pension Benefits (SDSPB)

<sup>3</sup> They are only allowed to offer PW.

<sup>4</sup> All the companies have the same information for the retirees

<sup>5</sup> Usually for the lower funds.

## Data

For this initial approach I will be using using public data from the “Previsional History of Contributors” (PHC), which is an administrative longitudinal database sample based on a representative survey of the working and retired population in 2005. This has microdata records for people during their active life and after retirement, with all of their wages and pensions payments. This will easily allow me to develop a survival analysis broken down by the demographic characteristics available and retirement choices.

Future developments of this study will be based on the possible merge of this administrative sample with the survey-based data. As a result, I will have other sources of income, possible insights on financial literacy and arguably the most important variable in order to test networks hypothesis, is the possibility to characterize people’s choices related to their family composition: that is, the number of people in the household, kinship, presence of children below 25 and spouses work participation. With this, I will be able to gain some insight for family networks and how their composition may affect retirement decisions in order to test the initial hypothesis.

## Results

Figure 1 shows our first important conclusions. First, we have the expected results on a larger number of women than men in our sample, since the first retire earlier. Second, there are more people with PW than annuities, this is as a result of the requirement based on the amount of funds that allow only the upper 30% of people to enter the bidding system and receive an offer, which can be seen clearly on the bottom left graph, that shows that only people from the 7th decile have annuities<sup>6</sup>.

Likewise, the number of people choosing annuities increases after 2004, as a result of the introduction of the bidding system. Regardless that most of this flows were expected at some point, the main finding is that among those who can choose, there are more people choosing PW than annuities, without any coverage against longevity and market returns, which can be considered as counterintuitive.

After that, we can see some preliminary results for an estimation based on Kaplan-Meier method. We can observe from Figure 2, that survival by gender does not show significance difference for our sample, however we can see an open ended on the survival for females. The interesting case is survival by retirement choice, showing a clearly higher survival for people with annuity compare with programmed withdrawal. It is important to say that this is considering all the retirees. Hence, the programmed withdrawal seems to be a proper alternative for people who live less.

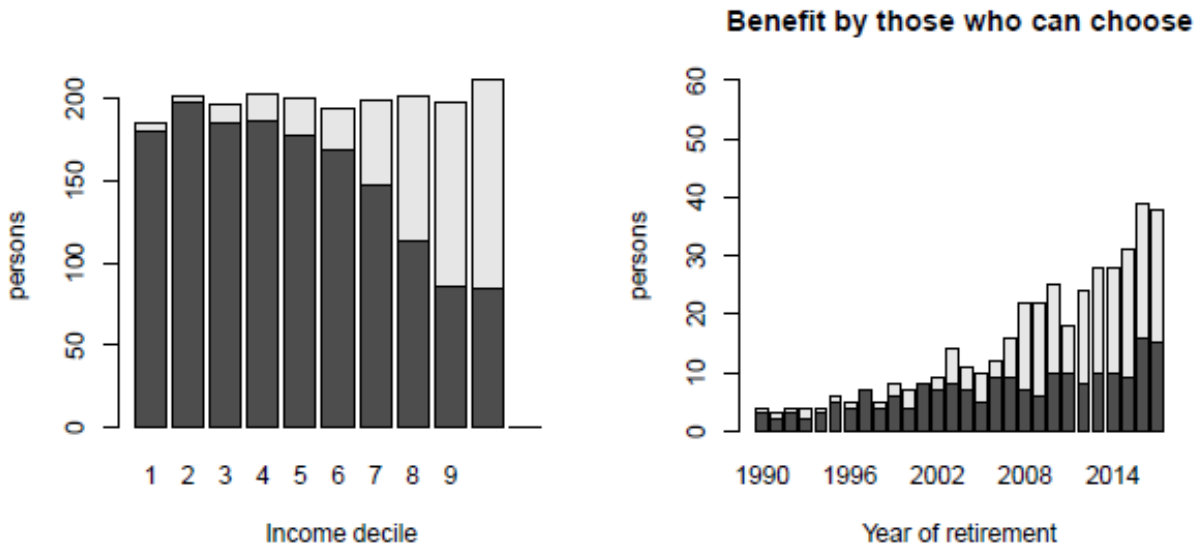
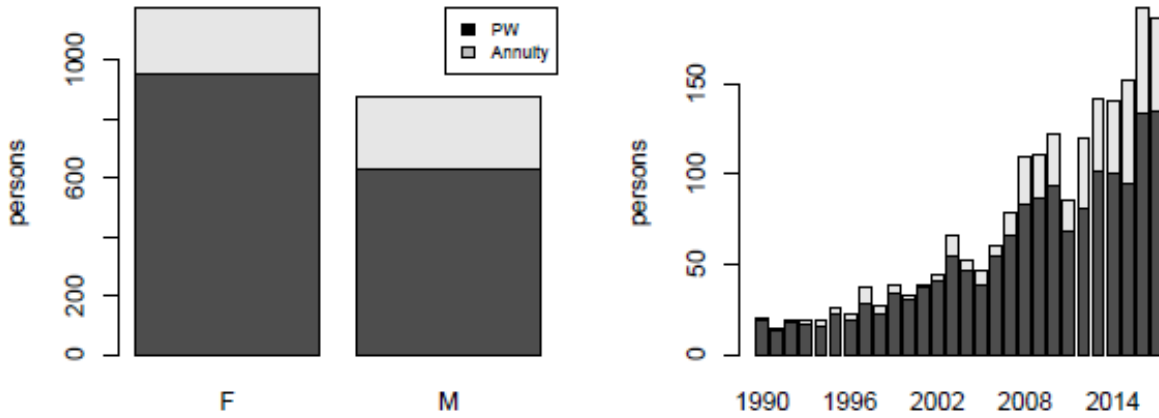
However, when I restrict the sample only for those who can choose between the benefits, we ended up finding the interesting case of people who choose programmed withdrawal live longer than those with annuities on the bottom right graph. This is a strong

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<sup>6</sup> It is possible to observe some annuities below decile 7, this is possible since we are using a proxy to address the exact requirement to enter the bidding system. There are little amount of annuities for deciles below 7, this are possible annuities buyed

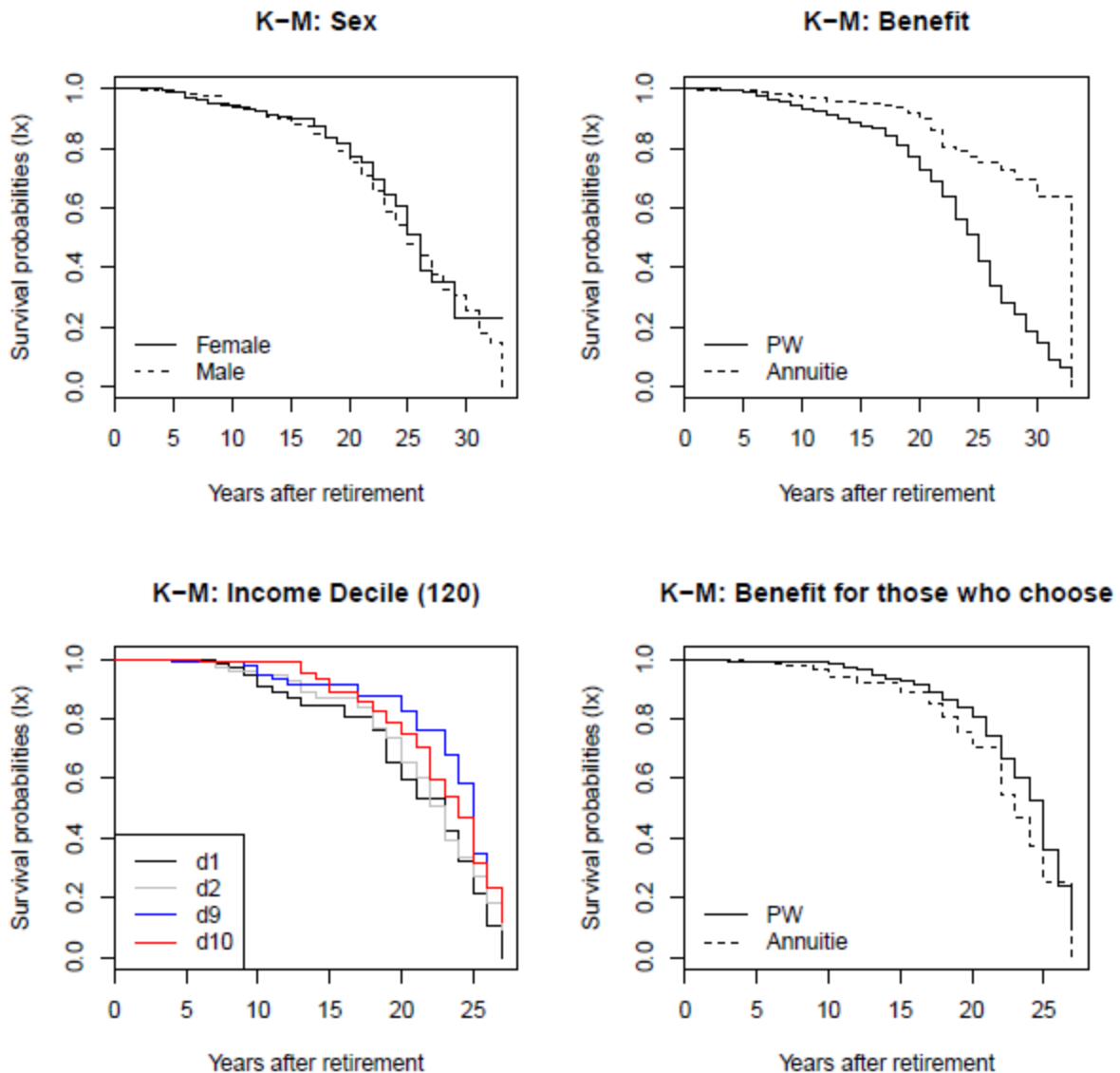
preliminary conclusion in order to explore other sources of effects that drive this decision. In fact, this contradiction is reinforced by our survival curve showing us that rich people live longer than poor people. Arguably, we can say that there is not enough information based on life expectancy explaining this phenomena I observed.

Figure 3: Retirees by benefit



Source: Own calculations based on PHC.

Figure 5: Kaplan - Meier estimation



Source: Own calculations based on PHC.

## Conclusions

Considering this as a result of a first approximation based on survival analysis, we confirmed that there are outside mechanism driving retirement choices among retirees in the Chilean private pension system. I started with evidence and a summary of the main characteristics of the system that could be triggering this outcomes. In particular, the most interesting to work further, is the one based on the household composition.

In this context, it could be said that rich people are choosing programmed withdrawal sacrificing their protection against longevity and market return risks in order to leave an inheritance for their families. In other words, people are willing to see their own pension

benefits drop as they get older, if that means that their family income will be positively impacted upon their death.

Additionally, most of this future work can be done using the survey information available to merge with the sample administrative data used for this paper. Along with the network hypothesis based on household, it would be possible to address the financial literacy, as well as, other sources of income that will be crucial in address to keep making this result more clearly.

Finally, it seems unrealistic to propose an alternative to address the lack of information based on the offers that people receive on the bidding system to isolate the sample selection bias. However I will of this possible alternatives to keep studying this decision I would be able to find some possible causal effects on this retirement choices.

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