Formats and metrics in pension offer selection: experiment on reducing errors

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Abstract

Financial illiteracy is a widespread problem that can have substantial impact on pensions decisions – which are themselves complex and can have life changing consequences (cf. Lusardi & Mitchelli 2007). In private and semi-private pension systems such as the one in Chile, individuals can tailor their pension modes to their needs – four different pension schemes, multiple providers, guaranteed periods in their annuities, among others. However, this flexibility requires retirees to make difficult decisions and more than 80% of people end up paying large sums for delegating those choices to a pensions advisor or a sales agent, and still not selecting the alternative that provides them the highest present value FNE (2018). We argue that one reason for these 'selections errors' is the way information is displayed to individuals and, that by simplifying information, these 'errors' can be reduced. To test this hypothesis we conduct an online experiment in which participants (aged 55-70) are incentivized to make decisions on pension offers, as if they were selecting a pension for a person of their gender and socio-economic profile. The treatments include the current format as a Control, three different variations on the metrics used for the comparison table and one change of format (table to figure). This study is being conducted in association with the *Superintendencia de Pensiones* (SP) and the *Comisión para el Mercado Financiero* (CMF), two of the public offices that oversee the pensions market in Chile.

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The issue of pensions, one of the top ten most salient issues for public public opinion in Chile and abroad, is here to stay (Olson 1982, De Beauvoir 1996, Drucker 2013).[1] Pensioners are among the most likely age group to turnout for elections (Jackman 1987, Aldrich 1993, Gerber & Green 2000, Green & Gerber 2015), their interests are important for politicians looking for reelection and, as the cost of living is constantly increasing – with a Central Bank target inflation rate of 2-4% a year (Banco Central de Chile 2000) – it is natural that the issue of how much money pensioners receive is of political interest. In Chile, this interest lead to a pensions reform in 2008 and became one of the most important topics of the 2017 presidential campaign.[2]

In an individual capitalization pension system, with a small minimum State guaranteed pension for people in the lower 60% of income, as the one that is currently in place in Chile, pensions are a market that needs to be competitive if pensioners are to get the best possible returns.[3] Not surprisingly, the Chilean National Economic Prosecutor's Office (Fiscalía Nacional Económica, or FNE) is interested in evaluating how the market works FNE (2018). Their results indicate there are inefficiencies in the market, with retirees opting, on average, for pensions that are 2% lower than what they could obtain from another provider – all other factors (e.g. pension mode and guaranteed periods) constant. This economic 'sacrifice' or 'selection error' increases to 3.4% in the quantile that sacrifices most. This situation translates into substantial economic losses for 80% of their sample (all pension offers made between 2004 - early 2017) (FNE 2018, p.13). The FNE concludes that the causes of these inefficiencies could be due to regulatory issues, the way pension offers are provided to retirees and the money spent on pension advisers and sales agents.

The FNE (2018) report is surprising if one considers that the retirement process in Chile is regulated by the *Sistema de Consultas y Ofertas de Montos de Pensión* (SCOMP),[4] an official cross comparison website where all retirees inform all pension providers that they want to retire and the amount of money they have accumulated in their official pension savings pot, as well as the pension modes for which they would like to receive offers. Pension providers, namely insurance companies and Pension Fund Administrators (AFP by their initials in Spanish), provide offers though SCOMP, which orders offers first by amount and then risk classification, with the highest monetary offers on top. Despite the intention of simplicity, the FNE (2018) reports people are accepting external offers which in many cases are lower than the highest offer on SCOMP for the same pension mode.[5]

We argue that one of the possible explanations for this phenomenon has to do with difficulties in people's understanding of complex financial issues and this financial illiteracy (Lusardi & Mitchelli 2007, Gathergood & Weber 2017) leads them to make inefficient decisions.[6] People have a hard time understanding the financial information provided to

[1]Survey available at https://cepchile.cl/cep/site/artic/20171025/asocfile/20171025105022/encuestacep_sep_oct2017.pdf, last accessed 10-Feb-2019.

[2]President Bachelet presented reform packages Mensajes presidenciales 117-365 to 119-365 in 2017 to Congress and pensions reform was an important part of the then candidate Sebastián Piñera http://programa.sebastianpinera.cl/, accessed 15-Feb-2018, who as president submitted his own reform to Congress in the Boletín number 12212-13, Nov 2018.

[3]For more information on how the pension system works visit https://www.spensiones.cl/portal/institucional/594/w3-propertyvalue-9897.html, last accessed 14 January 2019

[4]See http://www.scomp.cl/, last accessed 03-Jan-2018.

[5]The norm allows external offers, as long as they are higher than the original offer made by the same company on SCOMP, however these are not necessarily higher than offers by other companies.

[6]Se also the results of the global financial literacy survey https://www.forbes.com/

them when they have to chose a pension mode and provider, which, in combination with low levels of information (Chan & Stevens 2008, Martinez et al. 2009, Comisión Asesora 2015) and (we expect) high levels of anxiety about making the right decision, can generate conditions in which people are susceptible to non-rational influences – e.g. the 'help' of a insurance company sales agent who will get commission from selling an annuity. In this study we focus on simplifying the way information is provided to retirees, with the goal of identifying alternative metrics and formats that can lead to improving (in terms of net long term monetary returns that account for company risk) offer selection. We will leave the reduction of anxiety for future research.

Specifically, this study aims to:

1. Identify how changes in the metrics used in the pension offer report (aka SCOMP) impact offer selection. And, if there is a difference, which is associated with a higher percentage of efficient offer selections than the current SCOMP metrics.

2. To establish correlations between individual characteristics and offer selection, for example, mathemetic ability, age, socio-economic level, risk aversion, and non pension financial literacy measures, among others.

3. In the cases of non-maximal offer selection, establish if there are associations between familiarity with pension providers and offer selection.

4. Use the results from this experiment to generate proposals of potential changes to SCOMP.

To achieve this goals we conduct an online experiment using the Centre for Experimental Social Sciences (CESS) Santiago's online subject pool from December 2018 **to XX 2019 [recruitment is currently ongoing]**. The main experiment section asks participants to select their preferred pension offer from a list of real offers that were made to a person of their same gender and socio-economic status between 2017-8. Participants make choices on two different treatments/control, block randomized by gender and socio-economic status,[7] that vary the metrics and the format in which the pension offers are displayed. Offer selection is incentivised, with participants earning more for selecting offers with higher net present value. The survey also collects information on the participant's risk preferences, knowledge of the pension providers, age, health conditions, tests and provides information about the pension system.

The following sections provide summarised information on the Chilean pension system, for context, followed by literature on the impact of financial literacy, a detailed experimental design with each treatment, the specific treatment related hypothesis and a description of the data analysis plan.

Summary of the Chilean Pensions System

The Chilean individual capitalization pensions system was introduced in 1980 (law 3,500) as a reform to the pay-as-you-go pension scheme that was in place before. The main element of the individual capitalization - defined contribution (DC) pension plan is a

`sites/maggiemcgrath/2015/11/18/in-a-global-test-of-financial-literacy-the-u-s/#5b10409358f0`, last accessed on 06-Jan-2018.

[7] The control is the format currently used by SCOMP.

that a compulsory 10% of income is contributed by each employed worker (and starting 2019 self-employed workers as well) to their personal pension pot, that is managed by a set of private companies denominated *Administradoras de Fondos de Pension* AFP (Pension Fund Administrator). These companies invest the individual's savings a fee.[8] At the end of a person's active employment period (in usual circumstances ages 65 for men and 60 for women) each individual gets a report with the total amount they have accumulated over time, which they then have to use to 'purchase' a pension scheme.

There are currently four variations, or what we are calling modes, of these pension schemes:

- **Annuity.** With the individual buys the right to receive a fix and constant (inflation adjusted) amount from an insurance company. When the person dies they have the right to leave a portion of that pension to a beneficiary, if there are any that fulfill the eligibility requirements.

- **Draw-down.** The draw-down scheme allows the individual to maintain ownership of the money and withdraws a proportion of it every month. The maximum amount that is withdrawn is regulated by law and depends on the total funds available and the yearly adjusted life expectancy, which in practice means the monthly amount decreases over time. However, the person owns the money an can leave it as inheritance.

- **Sequential.** There is also a sequential draw-down and annuity scheme which is similar to the Mixed scheme. But in this case the annuity period comes into effect after a fixed number of years in the draw-down scheme.

- **Mixed.** There is a mixed scheme that combines a simultaneous draw-down and annuity scheme. Individuals can split their funds into a short draw-down period, that can increase the size of the pension for a few years, and an annuity for the rest of their lives

There are also other more nuanced variations of the pension modes, such as guaranteed periods that can be added to annuities in which one can identify other (non-legally defined) beneficiaries in case of an early death, and more, but the main components of the pension mode alternatives are as described above.[9]

There is also a State guaranteed component added to the pension system in the 2008 reform. A basic pension (*Pensión Básica Solidaria* - PBS) of approximately 160 USD[10] was introduced for people who had never contributed to their pension pot and are in the the lower 60% of income. A state contribution (Aporte Previsional Solidario (APS)) was also introduced to increase the pensions of people that had contributed, but were getting minimal pensions – for the same income group – and a bonus for each child a woman had, to help compensate for the loss of contributions associated with childcare. In late 2018 the president introduced a new reform project to Congress, that is currently under consideration and can still be modified.

[8] There are also alternatives for voluntary contributions to the pension pot called *Cuenta Dos* and *Aportes Previsionales Voluntarios* in which the individual has tax benefits for the increased contribution.

[9] The information presented in this section is available in the Pensions Superintendency website (Superintendencia de Pensiones 2019)

[10] exchange rate in Feb 2019

For any particular scheme, or pension mode, there will be various pension providers and products. The product offerings are regulated by SCOMP that provides a cross comparison website intended to simplify the identification and comparison of offers made by different authorized providers. SCOMP produces a table with all the offers per mode, separating each pension mode and special condition (nuanced variation) selected for a quote. This implies that more undecided one is – the more alternatives one asks information for – the larger the final report, producing the (unintended?) consequence of providing (what we expect is) too much information to process, leading to 'cognitive overload' (cf. Sweller 1988, Kahneman 2011), especially for people with lower levels of 'financial literacy' that have a hard time understanding the information they are asked to evaluate (cf. Lusardi & Mitchelli 2007, Gathergood & Weber 2017, McGrath 2015). It is, therefore, not surprising that between the years 2004–17, of the total of annuities sold, 47.7% were done through pension sales agents, 35% of people used a neutral pensions advisor and the rest selected their option independently (FNE 2018, p.52).

There are two government oversight organisms that regulate the market: the Pensions Superintendency (*Superintendencia de Pensiones* - SP), with authority over the AFPs, and the , Financial Market oversight Committee (*Comisión para el Mercado Financiero* - CMF), that regulates the securities market of which annuities are one of the relevant products. Both of these organisms participated in the design of the experimental treatments.

Financial Literacy

Lusardi, Mitchell, co-authors, and others, have conducted over a decade of research on the level of financial illiteracy in the population and the problems this has on relevant personal financial decisions, such as retirement savings (Lusardi & Mitchell 2007, 2011*b*, 2014, 2011*a*, Hastings & Mitchell 2011, Chen & Volpe 1998, J 200). Their results show that financial illiteracy is widespread among the population —in a measure of financial literacy composed of three questions, one on interest rate compounding, another on inflation and a last one on stock risk— only 30.2% of USA respondents answered all three correctly, with similar proportions in the France, while Germany (53.2%), Switzerland (50.1%) and the Netherlands (44.8%) are somewhat higher, but still only about half the survey population could answer simple financial literary questions correctly (Lusardi & Mitchell 2014).

Not only are levels of financial literacy low, but women, the elderly and the less educated tend to fare significantly worse than the rest, concentrating the problem on population that is already vulnerable in other mayor aspects of pension decisions (Lusardi & Mitchell 2011*a*). Women tend to accumulate smaller pension savings in Chile, in part due to lower proportions of women in the workforce, taking time off for childcare and gender pay gap, etc. The less educated also tend to be the poorer sections of the population (Contreras 1999) and, as Chile has a mandatory contribution scheme in which 10% of the person's wages are accumulated in an AFP, the less educated also accumulate lower pension savings. Most importantly, the financially illiterate are less likely to plan for retirement (Lusardi & Mitchell 2011*b*) and, one assumes, will have a harder time understanding complex retirement decisions, when the time comes to make them.

We argue that one alternative to address this issue is the simplification of the information presented to retirees, using metrics and formats that are more relatable, easier to understand and highlight relevant differences. This does not imply a paternalistic

approach of hiding relevant information, but rather changing the metrics and formats used to present the same information in a more accessible manner. For example, the current version of SCOMP presents pension offers in *Unidades de Fomento* (UF), a financial monetary unit that is adjusted daily by inflation and mainly used in loans, and while the use of the UF as is absolutely reasonable from a legal perspective – as a means to ensure the purchasing power of a pension is constant – the fact that people don't use it in their everyday transactions and that the conversion rate changes daily could be limiting retiree's comprehension of how different offers are from one another. For example an annuity offer of 9.26 UF a month is 240,377 CLP a month and 9.16 UF is 237,781 CLP a month, a 4 USD difference a month.[11] This may not be much in one given month, but the losses add up to substantial values over the course of a few years. The following section presents the details of the experimental design with all the proposed changes we test in this experiment.

Experimental Design

The study consists of an online experiment that last approximately 30 minutes and is implemented though a combination of Qualtrics integrated with R through PhP. The user interface is in Qualtrics, using a simple and easy-to-read layout, but treatments are generated automatically in R using information provided by the participant to generate treatments that are tailored to the individual's gender and socio-economic status. For external validity, we recruit female and male subjects between the ages of 55-70 that indicate they have not yet started their retirement process. Treatments are block random assigned by gender and socio-economic status, given the differences in financial literary indicated by (Lusardi & Mitchell 2011*a*) and the objective of running sensitivity analysis on these subgroups (Gerber & Green 2012). The treatment decisions are incentivised with participants earning more for selecting offers with higher net present value. Together with the main treatment and control groups described below, the study includes, financial literacy, auto reported health and mathematical ability, and risk measures.[12]

In Module 1 of the experiment participants are asked some basic socio-demographics, including: gender, age, income, education, if they have already applied for a pension, age at which their parents died, potential beneficiaries, knowledge about pension modes and providers.[13] The information they provide on their gender and income groups are used to customize the pension offers presented in the treatments.

In Module 2, following the provision of basic data, we provide the participant with basic information on the pension system, including descriptions of the different pension modes and examples of different retirement profiles. This is done to ensure a basic level of common knowledge. Each participant is then asked to rank the four pension modes in the order they believe is most relevant to a profile they have previously read and identified with (profile descriptions available in Online Appendix).[14]

[11] Conversions valid on 25-Feb-2019.

[12] The full questionnaire is available in the replication repository https://github.com/deniselaroze/Experimento-Metricas-y-Formatos-SCOMP

[13] If participants are not between 55-70 or have already obtain a pension, the experiments ends.

[14] The information included was obtained from the SP website (https://www.spensiones.cl/portal/compendio/596/w3-propertyvalue-2816.html, last accessed 26/Feb/2019) and revised by specialists from the SP and CMF. Details of the profiles included in the survey are available in the Supplementary material.

Pension Experimental Vignettes Module 3 of the experimental session consists of two pension decision-making vignettes. In each vignette, subjects are asked to select a pension provider. Each vignette is based on one of the four pension modes described earlier. Subjects are presented with the two vignettes corresponding to the top two pension modes they selected for their profile in Module 2. The offers for each vignette are presented in separate table/figure (depending on treatment) that includes: name of the company, monthly pension amount, risk classification of the company, net present value – variations depend of the treatments summarized in Table 1. Treatments are assigned vía block randomization without replacement, so each participant gets to make decisions using two different information-delivery formats.

The information provided to participants in the treatments are real pensions offers that have been made to individuals of their same gender and income category, between 2017 and mid 2018, and they include the true name of the company that made the offer.[15] The format is consistent across vignettes with the exception that risk classification is omitted for draw-down providers because these companies are not subject to risk classifications.

The offer selection is incentivized and participants are told that the amount of money they earn depends on how the offers were ranked by a group of experts. These experts based their rankings on the monetary value of the offer and the risk classification of the company (exact wording and payments in Online Appendix Fig. A.9). In practice the experts, together with representatives of the CMF, used the Estimated Net Present Value (NPV) of the offers provided by the FNE (2018) report. This NPV estimates the expected lifetime payments from each offer and weighs them by the riskiness of the company, the guaranteed periods selected for the annuity (if any) and the person's life expectancy.[16] Offers that were ranked highest paid 1,500 CLP decreasing by 100-400 CLP intervals and reaching zero for the lowest ranked offering – ties payed the same. As each subject made choices for two different vignettes, subjects could earn up to 3,000 CLP (approx. 4.5 USD) in this Module.

Treatments Each vignette consists of five treatments – these are basic variations in the presentation of performance metrics associated with the offers presented to the subject. Our conjecture is that the information treatments will affect decision making in a systematic fashion. The treatments vary in the metrics and formats used to present the data. Subjects make choices in two different vignettes – the vignettes differ primarily in terms of the overall investment strategies and the rules regarding beneficiary pay-out.

Table 1 summarizes the treatments implemented. Each row of Table 1 identifies the key dimensions that characterize the presentation of performance metrics: (a) the number of numeric columns, (b) the currency in which the offers are presented, (c) the first variable for sorting options, (d) the second sorting variable (if it exists), (e) the income period associated with that offer (e.g. if the amount is per month or over the entire life expectancy of the individual) (f) if there is a loss framework (g) the format in which the information is provided (as a table or as a colorful figure). In the Supplementary Annex we present visualization of all control and control and treatment variations.

[15]The median pension offer for the corresponding gender, income and mode combination is used to avoid biasing towards a particular company. The mode combination is used, as participants observer results for two modes and we wanted the origin of both offers to come from the same original retiree, for consistency.

[16]The calculation of the NPV is not trivial and was implemented by the FNE using the same function used for their report.

Table 1: Treatment variants for each pension mode

Mode	Variable	Control	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Annuity & Sequential*	Columns	Two	Two	Two	Three	One
	Currency	UF	CLP	CLP	CLP/NPV	CLP/NPV
	Sort 1	$ offered	$ offered	$ offered	NPV	NPV
	Sort 2	Risk	Risk	–	–	–
	Income Period 1	Month	Month	Month	Month	Month
	Income Period 2	–	–	–	Life Expect	Life Expect
	Loss Frame	–	–	Loss	Loss	Loss
	Format	Table	Table	Table	Table	Figure
Draw-Down**	Columns	One	One	Two	Three	One
	Currency	UF	CLP	CLP	CLP/NPV	CLP/NPV
	Sort 1	$ offered	$ offered	$ offered	NPV	NPV
	Sort 2	–	–	–	–	–
	Income Period 1	Month	Month	Month	Month	Month
	Income Period 2	–	–	–	Life Expect	Life Expect
	Loss Frame	–	–	Loss	Loss	Loss
	Format	Table	Table	Table	Table	Figure

*The Mixed mode is excluded from the experiment, because there are not enough original (real) offers to generate all treatment combinations.
** Providers of draw-down modes do not have a risk classification, that is the only substantive difference.

The first column of Table 1 presents the presentation profile for the control condition. For all modes it uses the current SCOMP format as a baseline or control group. The Treatment 1 in Table 1 simply replaces the value of the offer in UF for the conversion to CLP. We test whether changing from UF to CLP, a more commonly used currency, reduces selection errors. Treatment 2 incorporates a loss column, that highlights the amount of money a person would lose a year if they chose an offer different from the first. This alternative was chosen because the loss framework has been demonstrated to have a significant effect on behaviour (Tversky & Kahneman 1981). The treatment also removes the risk classification column and replaces it for a link (in Fig A.5 caption) to the risk classification of the insurance companies presented in Fig A.6, for annuities and combination modes – AFPs do not have risk classifications and therefore the link is not relevant for draw down products. Treatment 3 varies the metric completely, from a value in CLP to the estimated NPV, presented as a monthly figure, a total over life expectancy and a loss framework, with losses over the entire life expectancy. By incorporating risk into the estimated NPV eliminates the need to present the risk classification as an independent value, without eliminating the impact of risk from the information provided to the retiree, simplifying the information a person has to process in order to make an efficient selection. Treatment 4 alters the format in which the information is presented, changing the tables for figures with a green-yellow-red color scale to highlight the most valuable options (in terms of estimated NPV). The bars in the plot represent the total estimated NPV, the monthly estimations are incorporated next to the bars and vertical lines in the plot help participants visualize the differences in the amounts offered. The color coding is intended to help retirees identify the most valuable offers and deter the selecting of the lowest valued alternatives. The same figure is used for all pension modes.[17]

[17]We also incorporate an identification column labeled 'Option #' to identify each of the offers, which is used by participants to select their preferred option.

The names of the companies that make the offers and amounts change for each gender, income and mode group the participant is categorized in, as the offers shown are specific for each group. This tailoring process was programmed so each participant could see offers that correspond with their gender and income group. The income levels used are: Level 1 - lowest 10% (217,000 CLP or less) of income with regards to the 2017 national register of active contributors to the pension fund; Level 2 - between 10 y 50% of income (217,001 CLP 613,000 CLP), Level 3 - between 50 and 90% of income (613,001 CLP 1,651,000 CLP); and Level 4 - the top 10% de of income (1,651,001 CLP or more).[18] Hence, each vignette will have offers tailored to the subject's gender and income level. Table 2 summarizes these customized offerings. The mixed mode was excluded from the experiment, because there were very few cases of people who asked for a quote for that mode in the original SP data used to generate the treatments, and not all combinations of gender, income and mode existed in the data.

Table 2: Mean offers in pesos for each of the four pension modes

Gender	**Income Level**	**Draw-down**	**Annuity**	**Sequential 2 years delay**	**Sequential 4 years delay**
Female	217k <	162,943	154,648	139,234	135,455
	217k-613k	181,163	168,062	160,771	148,422
	613k-1,651k	251,836	238,429	228,416	226,883
	>1,651k	408,704	370,096	339,390	317,935
Male	217k <	182,871	175,438	157,060	159,547
	217k-613k	222,893	207,832	180,952	17,7879
	613k-1,651k	322,464	313,870	273,120	286,977
	>1,651k	717,134	691,026	606,617	574,311

As further examples of the treatments, Table 3 presents the mean offers (including all pension modes) presented to each gender-income group in the currency in which the participants saw the information. As can be observed, in the Control, the offers are presented in Uf, in treatments 1-2 the offer is presented in CLP (which is a simple conversion of UF to CLP) and in treatments 3-4, the offers are presented in pesos and VPN. The values in VPN are substantially larger, as they reflect the estimated gains over a person's life expectancy, weighted by risk and other factors.

[18]The percentiles 10 and 90 are chosen because they are used by the National Statistics Institute to measure income inequality and the 50th percentile is a simple mid point in the scale (INE 2017).

Table 3: Mean offers per treatment, in the treatment currency

Gender	Income Level	Control	Treatment 1	Treatment 2	Treatment 3	Treatment 4
	(CLP)	(UF)	(CLP)	(CLP)	(VPN)	(VPN)
Female	217k <	5.38	146,295	146,295	37,519,899	37,519,899
	217k-613k	5.95	161,893	161,893	41,021,085	41,021,085
	613k-1,651k	8.57	233,260	233,260	54,824,364	54,824,364
	>1,651k	12.87	350,247	350,247	84,703,361	84,703,361
Male	217k <	6.10	165,862	165,862	36,209,110	36,209,110
	217k-613k	7.09	192,776	192,776	40,666,945	40,666,945
	613k-1,651k	10.82	294,255	294,255	63,119,505	63,119,505
	>1,651k	23.38	635,986	635,986	129,649,469	129,649,469

After the two offer selection decisions, participants enter Module 4 where we ask subjects a battery of questions regarding their risk and time preferences,[19], self-perceptions of mathematical ability and complexity of financial services, standard financial literacy measures on compound interest rates, the bat-and-ball mathematical ability questions,[20] and an incentivised risk aversion test using a one question Holt & Laury (2002) style measure.

Subject payments All subjects are paid 5,000 pesos for finishing the survey plus the amount they earn in each of the two pension offer tasks, and the result of the risk preference lottery. The payments on the pension offer tasks depend on the estimated NPV ranking of the offers for each specific mode and payment varie between: 1,500 CLP for the offer with the highest estimated NPV, then decreasing to 1,400 CLP, 1,200 CLP, 900 CLP, 500 CLP, 100 CLP and 50 CLP for the seventh ranked alternative, and 0 CLP after that. Fig. A.9 in Appendix presents the payment table show to subjects and exact wording of the instructions. This uneven ranking is intended to resemble the (usually) small monetary differences between the first few offers, and disincentivise selecting offers in the lower end of the estimated NPV ranking. All ranking are done withing each pension mode and both selection tasks are independent.

Following Holt & Laury (2002), we have included a risk preference lottery where participants are asked to choose between one of five options: a) a risk less 100% chance of winning 720 CLP, b) 50% chance of winning 1,080 CLP and 50% chance of winning 540 CLP, c) 50% chance of winning 1,440 CLP y 50% chance of winning 360 CLP, d)50% chance of winning 1,800 CLP y 50% chance of winning 180 CLP, e) 50% chance of winning 2,160 CLP y 50% chance of winning 0 CLP. Given these alternatives, option e) has the higest expected payoff of 1,080 CLP.

Total payoffs can vary between 5,000 CLP and 10,160 CLP, depending on the decisions made and luck. Subjects are informed of their total payment at the end of the experiment.

Subject recruitment Subject recruitment is conducted through the Centre for Experimental Social Sciences (CESS) Santiago online subject pool (`https://online.cessnuffield.org/`), for which the CESS Santiago team conducted special recruitment campaigns using

[19]Measured using the Spanish wording of the "2018 Global Preferences Survey elicit risk, time, and social preferences" Falk et al. (2018), Armin et al. (2016)

[20]Re-phrased as a football and sneakers, as baseball is not a well known sport in Chile and football is the national sport.

social media (Facebook, Twitter, Instagram), email campaigns and face-to-face recruitment.

Expectations

The overall goal of this experiment is to demonstrate that in fact information framing affects, in a systematic fashion, the choices made by average consumers. And more specifically, we expect that there are ways of presenting information about retirement investment options that result in average consumers making more profitable choices. These seem like reasonable expectations given widespread financial illiteracy and the complexity of retirement investment decisions. The simplifications concern changing the currency employed; incorporating risk classifications into the metrics, adding loss frameworks and incorporating visual cues. Hence, each of our treatments incorporates designed elements to help understand what information frames would improve consumer decision making:

a) A **change in currency** from UF to to Chilean pesos is intended to reduce demands on financial literacy by replacing a banking monetary unit (UF) with the standard currency (CLP).

b) **Reducing** the types of **information**, by removing risk from the offer table (Treatment 2) and by incorporating it in the metric (treatments 3-4) are intended to simplify the decision making process, by focusing information on the amount offered. This is especially relevant, given the low risk of offer selection. In the years 2017-2018 only one company had a BBB rating, which is the only one to substantively impact the NPV of an offer, making the risk classification less salient for offer selection. Furthermore a large proportion of annuities have a State guarantee in case a company goes bankrupt.

c) The incorporation of a **loss framework** in Treatments 2-4 is added with the expectation that it will induce loss aversion, that will translate into the average consumer selecting higher return products than they do in Treatment 1 and Control, which do not include loss information.

d) We also expect that changing the presentation **format** of offers, from a table to a color coded graph, will simplify offer selection even more and reduce selection errors. That is, we expect Treatment 4 to improve offer selection relative to Treatment 3, and other treatments.

We have three broad expectations regarding treatment effects:

H1) First, the status quo, the Control Treatment, will result in the lowest percentage of maximal return offers being selected (measured in NPV) – which is equivalent to lowest average experimental payoffs. All alternative four treatments should result in better choices. We anticipate that Treatment 4 might be particularly high, given the graphical presentation of offers.

H2) Second, we expect heterogeneous treatment affects related to financial literacy – high literacy results in better decisions; income – high income associated with better decisions; and gender – male subjects associated with better decisions. These expectations are driven by the gender and income differences in financial literacy indicated by Lusardi & Mitchell (2011*a*).

H3) Third, we expect heterogeneity on the groups of gender, income, risk aversion and familiarity with provider to matter for the Control Treatment, but to be relatively weak for Treatments 1-4, as it gets easier to identify the maximal return offer.

Data collection and analyses plan

As part of the experimental design out intention is to collect in the vicinity of 1000 individual observations. Data collection is difficult given the desired subject pool, the 30 minute length of the survey and the fact it is filled out online, in a population that is less internet savvy than younger age groups. However, internet penetration in Chile is relatively high at 71.3% of households in 2015; 74.2% in urban areas; 55% in rural, areas; and a 62,1% in the lowest income quantile of households (Ipsos Chile 2015).

We have tested the experimental design and the block randomization protocols. We will conduct balance tests of treatment allocation. For these we have incorporated measures of financial literacy, familiarity with pension providers, risk aversion, reading comprehension, pension knowledge and socio-demographic variables into the survey. If necessary, we will incorporate any unintended imbalance adjustments to the statistical analyses.

As with many experimental designs we will start the data analyses with a simple difference in means in offer selection, using the monetary gains from offer selection (or it's equivalent, offer ranking) as the main dependent variable of interest. We expect to find obvious differences in average treatment effects, without the need to conduct sensitivity analyses. However, to address issues of clustered observations and to incorporate more sophisticated statistical evaluations we will also estimate some variant of MLE estimations on offer selection.

Pilot

Before committing to a final version of the experimental treatments we conducted a pilot using treatments described, with the objective of testing responses to the treatments themselves, ensuring that wording of instructions and information provided to participants is correct, and stress testing the experiment code under real conditions.

We conducted three pilot sessions, the first two on Nov 6, 2018 and the third on Nov 15, 2018. All were done in person using tablets at the SP auditorium with participants recruited from the SP and CMF workforce – that complied with the 55-70 age bracket. A total of 47 people participated in the pilot, each providing two offer selection observations. Because of internal public office regulations we did not pay participants for their decisions, but rather offered a breakfast and a chance to provide feedback after the pilot (photos in Appendix). As a result of the pilot we identified corrections that needed to be made to the wording of a few survey questions and adjustments to payment calculations in the Draw-down pension mode.

In terms of treatment results, the number of observations is low so we do not attempt to conduct statistical analyses on the data, however, Fig 1 presents a bar plot of the mean option selected by participants that observed each treatment. As options are ranked either by monetary value or estimated NPV, a good offer selection is in the 1-2 range.

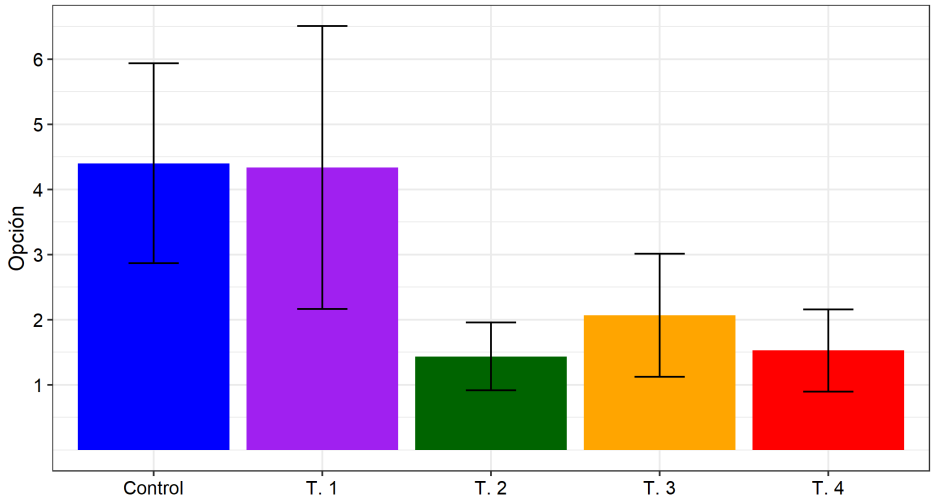

Figure 1: Bar plot of mean option selected by treatment in pilot.

Fig 1 suggests there is a potential for finding significant treatment effects. There appears to be no differences between Control and T1 (the simple change in currency). Treatments 2 through 4 have essentially identical responses – their averages are in the range of about 1.5 to 2. Recall that all three of these treatments share the feature of removing the risk classification from the information frame. We expect though to find differences amongst these treatments once we are sufficiently powered in the main experiment. The significant differences between the Control and Treatment 1, on the one hand, and Treatments 2 through 4, on the other, are consistent with our expectations. Control and Treatment 1 were least likely to result in optimal choices while Treatments 2 through 4 were most likely to generate optimal choices. Again, this is one set of results we had anticipated – Control and Treatment 1 incorporate information features that we anticipated would be the least user-friendly.

These results are encouraging, especially considering that SP and CMF participants have above-average pension knowledge; as a result, we expect them to be better at selecting the optimal offers, independent of the treatments (a.k.a. lower treatment), than a more general population sample. For this reason, the experimental team decide to run the online experiment on a general population sample, without introducing changes to the experimental treatments.

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Appendix

Treatments

Renta Vitalicia Inmediata

Opción	Razón Social	Pensión mensual en UF sin retiro de excedentes	Clasificación de Riesgo de la Compañía de Seguros*
1	RENTANACIONAL	7,24	BBB+
2	BTGPACTUALVIDA	7,21	A
3	PENTAVIDA	7,18	AA
4	METLIFE	7,18	AA+
5	PRINCIPAL	7,17	AA
6	SECURITY	7,11	AA-
7	OHIONATIONAL	7,07	AA
8	CONFUTURO	7,02	AA
9	BICEVIDA	7	AA+
10	SURA	6,98	AA
11	CONSORCIOVIDA	6,96	AA+

* Las categorías de Clasificación de Riesgo que permiten a las Compañía ofrecer Rentas Vitalicias, ordenadas de mejor a inferior clasificación, son las siguientes AAA (mejor clasificación), AA, A, BBB (inferior). Cada una de estas categorías puede tener subíndices "+" o "-", siendo el subíndice "+" mejor que el "-".

Figure A.1: Control treatment for annuities and combination modes - current SCOMP format.

Retiro Programado

Monto de pension mensual durante el primer año					
Opción 1	Opción 2	Opción 3	Opción 4	Opción 5	Opción 6
AFP HABITAT	AFP PROVIDA	AFP CUPRUM	AFP PLANVITAL	AFP CAPITAL	AFP MODELO
5,72 UF	5,7 UF	5,7 UF	5,7 UF	5,7 UF	5,7 UF

Figure A.2: Control treatment for draw-down products - current SCOMP format. These companies do not have a risk classification.

Renta Temporal con Renta Vitalicia Diferida de 4 años

Opción	Razón Social	Pensión mensual en pesos†	Clasificación de Riesgo de la Compañía de Seguros*
1	PRINCIPAL	331.902	AA
2	BTG PACTUAL VIDA	331.086	A
3	OHIO NATIONAL	330.814	AA
4	PENTA VIDA	328.910	AA
5	CN LIFE	324.557	AA
6	METLIFE	321.564	AA+
7	CONSORCIO VIDA	320.748	AA+
8	SURA	319.660	AA
9	BICE VIDA	311.499	AA+

† Valor calculado en base a UF del día 03/08/2018.
* Las categorías de Clasificación de Riesgo que permiten a las Compañía ofrecer Rentas Vitalicias son las siguientes AAA (mejor clasificación), AA, A, BBB (inferior). Cada una de estas categorías puede tener subíndices "+" o "-", siendo el subíndice "+" mejor que el "-".

Figure A.3: Treatment 1 for annuities and combined modes, changes value to CLP.

Retiro Programado

Opción	Razón Social	Monto de pension mensual durante el primer año†
1	AFP HABITAT	180.352
2	AFP MODELO	179.809
3	AFP PROVIDA	179.809
4	AFP PLANVITAL	179.809
5	AFP CAPITAL	179.809
6	AFP CUPRUM	179.809

† Valor de UF en pesos al día 03/08/2018

Figure A.4: Treatment 1 for draw-down products, changes value to CLP

Renta Temporal con Renta Vitalicia Diferida de 4 años

Opción	Razón Social	Pensión mensual en pesos†	Pérdida anual*
1	PRINCIPAL	331.902	0
2	BTG PACTUAL VIDA	331.086	-9.792
3	OHIO NATIONAL	330.814	-13.056
4	PENTA VIDA	328.910	-35.904
5	CN LIFE	324.557	-88.140
6	METLIFE	321.564	-124.056
7	CONSORCIO VIDA	320.748	-133.848
8	SURA	319.660	-146.904
9	BICE VIDA	311.499	-244.836

† Valor calculado en base a UF del día 03/08/2018.
* Monto que dejaría de ganar cada año de vida.

Figure A.5: Treatment 2, adds a loss column and eliminates the risk column replacing it with the sentence: "Para obtener mayor información sobre la clasificación de riesgo de las compañías de seguro haga click aquí" – for more information on the risk classification of insurance companies click here

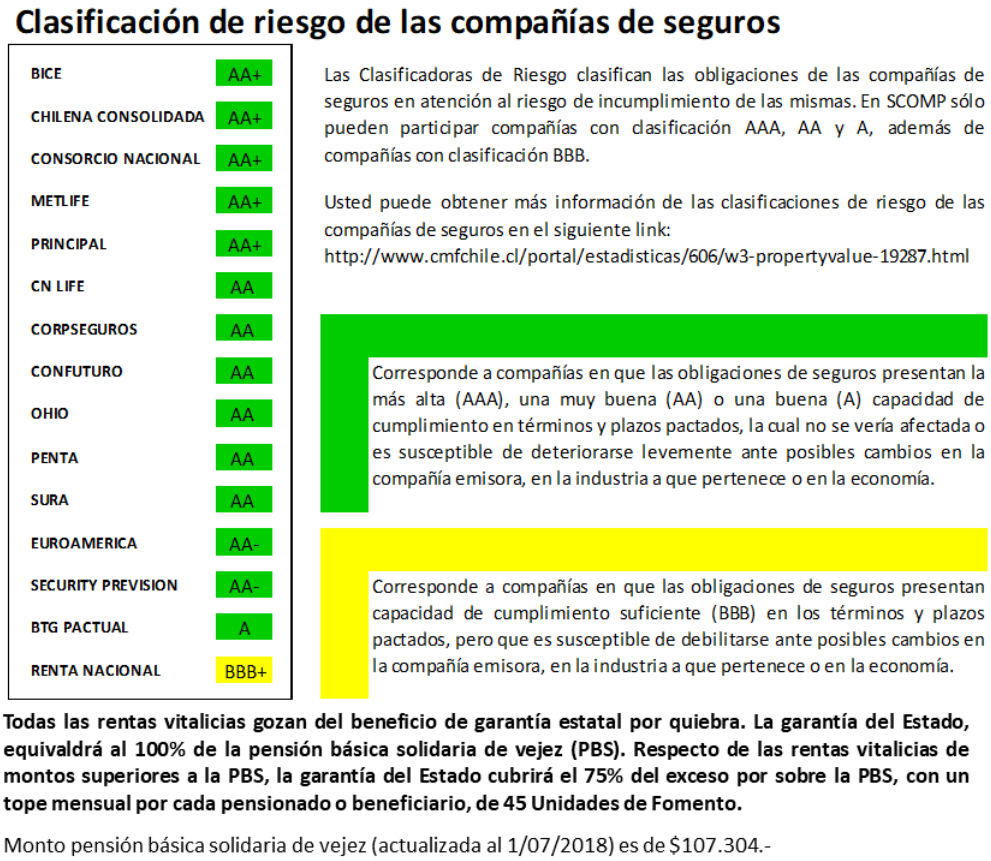

Figure A.6: Risk classification used in Treatment 2

Renta Temporal con Renta Vitalicia Diferida de 4 años

Opción	Razón Social	Pensión mensual en pesos†	Valor total estimado a recibir (largo plazo)*	Pérdida total estimada**
1	PRINCIPAL	331.902	74.122.826	0
2	BTG PACTUAL VIDA	331.086	73.948.929	-173.898
3	OHIO NATIONAL	330.814	73.882.649	-240.177
4	PENTA VIDA	328.910	73.462.338	-660.488
5	CN LIFE	324.557	72.501.631	-1.621.195
6	METLIFE	321.564	71.861.587	-2.261.239
7	CONSORCIO VIDA	320.748	71.681.373	-2.441.453
8	SURA	319.660	71.420.839	-2.701.987
9	BICE VIDA	311.499	69.638.998	-4.483.829

† Valor calculado en base a UF del día 03/08/2018.
* Estimación del valor total de la oferta de pensión, considerando esperanza de vida, riesgo de quiebra de la compañía de seguros y la tasa de descuento de los períodos garantizados, si corresponde.
** Estimación del dinero que dejaría de percibir de no elegir la opción 1.

Figure A.7: Treatment 3 for all pension modes, incorporates the estimated NPV in monthly, total and loss framework.

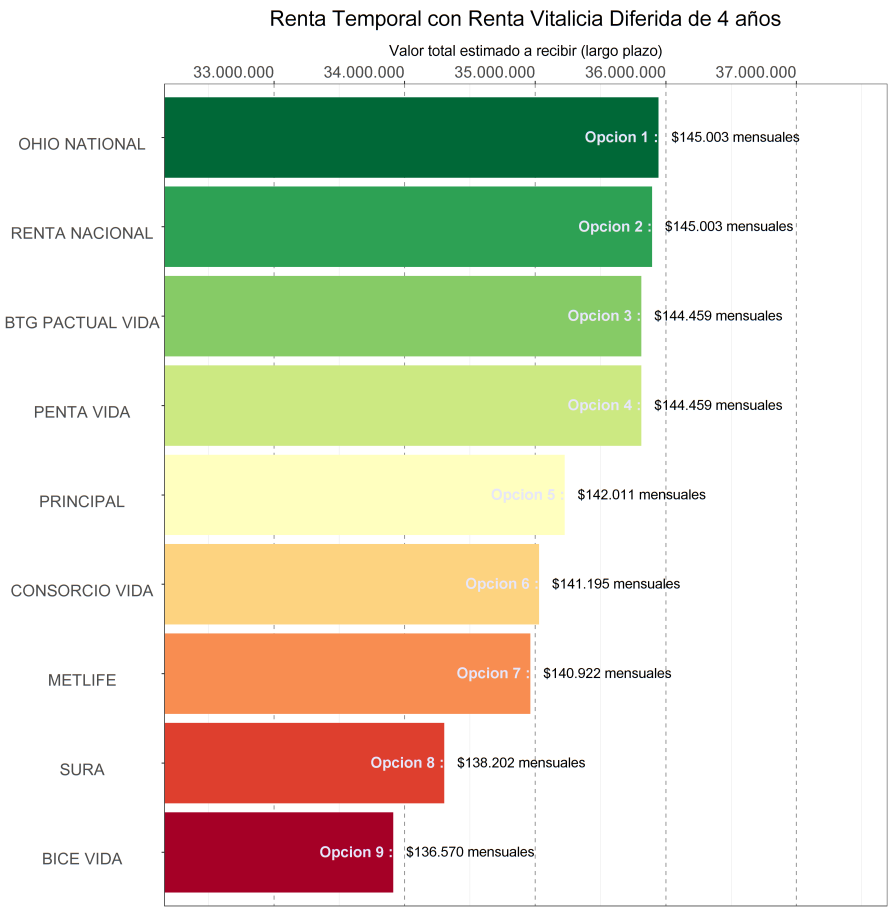

Figure A.8: Treatment 4 Rentas Vitalicias y combinados, incorpora VPEa Total y mensual, más valor en pesos de la oferta con más alto VPEa.

Informed Consent

informed consent was obtained through two mechanisms, a standard CESS Online experiment consent video https://www.youtube-nocookie.com/embed/Kn0M_t20e38?, that visually and verbally expresses the CESS ethics guidelines, and a consent form/question incorporated in the Qualtrics survey. This is the exact wording of the survey question:

Nosotros (CESS Santiago) somos un grupo de investigadores que estamos asociados a la Universidad de Santiago de Chile y a la Universidad de Oxford, Reino Unido. Nos hemos asociado con la Superintendencia de Pensiones, entidad fiscalizadora de las Administradoras de Fondos de Pensión (AFP), para realizar un estudio acerca de decisiones de pensiones, para ello se le mostrarán diferentes escenarios se le pedirá responder preguntas acerca de usted, de pensiones y de conocimiento financiero. Los datos recolectados en esta encuesta sólo serán usados para los propósitos de este estudio, y se mantendrán en reserva sus datos privados e identidad. Sin embargo, al tomar parte de este estudio y hacer click en "Sí, he leído y entendido las reglas" Usted decide hacer parte de este estudio de acuerdo con los principios establecidos en este consentimiento informado. Es muy importante para el éxito de este estudio que usted llegue hasta el final de la encuesta, esto debería tomarle (en promedio) alrededor de 30 minutos. Por favor, lea los siguientes enunciados cuidadosamente y conteste la pregunta que sale al final.

Nuestros compromisos y políticas de privacidad

- En esta encuesta, aunque los escenarios de jubilación que se le presentarán serán hipotéticos, toda la información que obtienen los participantes es verídica. Esto implica que:

- Nunca engañamos a los participantes. Por ejemplo, si le informamos que otro participante está haciendo una elección en base a la que usted debe tomar decisiones, este es realmente el caso.

- Mantenemos las promesas hechas a los participantes. Por ejemplo, si prometemos un pago determinado, los participantes lo recibirán.

- En caso de que seamos responsables de un error que vaya en perjuicio de los participantes, informaremos y compensaremos a los participantes respectivos.

- Diseñamos, conducimos e informamos nuestra investigación de acuerdo con estándares científicos reconocidos y principios éticos.

La política de uso de datos y privacidad a la que adherimos:

- Esta investigación se encuentra financiada por el John Fell Fund de la Universidad de Oxford y el FONCEDYT de Iniciación a cargo de la Dra. Denise Laroze de la Universidad de Santiago de Chile. La Superintendencia de Pensiones que forma parte del equipo investigador, NO ha contribuido con dinero al desarrollo de la investigación y no tiene responsabilidad en el pago a participantes.

- El investigador principal del proyecto financiado por el John Fell Fund de la Universidad de Oxford es el Prof. Raymond Duch, de Nuffield College, Universidad de Oxford, quién ha obtenido aprobación ética del Comité de Ética de Investigación Central de la Universidad de Oxford (CUREC) mediante la autorización de ética R53453/RE001. La investigadora principal del proyecto financiado por el Fondecyt de Iniciación N° 11180281 es la Dra. Denise Laroze, de CESS Santiago y del Departamento de Administración, Facultad de Administración y Economía, USACH, quién ha obtenida aprobación ética para este estudio mediante el Comité de Ética Institucional del Informe aprobado N° 720.

- Este proyecto de investigación se encuentra normado por la Ley 19.628 de Protección de Datos de Chile y la Data Protection Act 2018 del Reino Unido. De acuerdo con estas normas, la Universidad de Santiago de Chile (USACH) y la Universidad de Oxford regulan y certifican el adecuado cumplimiento de las normas y el uso de los datos. Dada la naturaleza internacional de los fondos e interinstitucional del estudio, los datos recabados serán ser compartidos entre los miembros del equipo investigador que incluye a académicos de ambas universidades y la Superintendencia de Pensiones de Chile.

- Los datos recabados solo se utilizarán con fines académicos, con el objeto de explorar decisiones sobre pensiones. **NO serán utilizados con fines comerciales**.

- Al tomar parte de este estudio y contestar que sí a la pregunta siguiente, también está autorizando a que la Superintendencia de Pensiones entregue información anónima sobre sus decisiones en materias de pensiones (ej. cambios de fondos, modalidad de pensión seleccionada, etc.) desde el 2018 hasta fines del 2028, a los investigadores

de la USACH y Oxford. Es decir, los datos que entregue la Superintendencia de Pensiones **NO tendrán sus datos personales y estos NO se podrán vincular a usted personalmente**. La forma en la que se entregarán los datos ha sido revisada y autorizada mediante la Resolución 2228 del 29 de octubre de 2018 de la Superintendencia de Pensiones que aprueba el convenio de colaboración entre la Superintendencia y la Universidad de Santiago de Chile.

- Los datos registrados en este estudio serán anonimizados, extrayendo cualquier información personal de la base de datos que será utilizada para analizar los resultados. CESS realizará todos los esfuerzos razonables para mantener sus datos confidenciales, por lo que **NO se entregarán sus datos personales a nadie** fuera del equipo de investigación, excepto en circunstancias muy excepcionales en las que una orden judicial nos obligue a entregar esa información, situación que no ha ocurrido hasta el momento. Adicionalmente, su nombre, pero no sus decisiones, podrán ser conocidos por las personas involucradas en el proceso administrativo involucrado de este estudio.

- Las conclusiones a las que se llegue con la información recabada, se usarán para escribir un informe y para hacer presentaciones en foros académicos y de políticas públicas. Estos estudios, que presentarán datos estadísticos agregados de la investigación como por ejemplo promedios y regresiones (no sus datos personales), se pondrán a disposición del público.

- Por motivos de la adecuada implementación del estudio existen preguntas que usted deberá responder de forma obligatoria, sin que existe una opción "no sabe/ no contesta". Estas preguntas no son de índole privada y si usted no desea responderlas se puede retirar del estudio. Su participación es voluntaria y puede retirarse en cualquier momento durante el cuestionario por cualquier motivo, simplemente cerrando el navegador, sin ningún costo para usted. Cualquier dato recolectado hasta ese punto será descartado. Sin embargo, sólo podremos realizar el pago a los participantes que hayan completado la encuesta.

Nota: Si tiene alguna pregunta sobre este estudio, contáctenos a través del correo cess@usach.cl, denise.laroze@usach.cl o raymond.duch@nuffield.ox.ac.uk. Si permanece descontento o desea presentar una queja formal, se puede comunicar al Comité de Ética de la Universidad de Santiago de Chile, correo: comitedeetica@usach.cl teléfono: 227180294 dirigido al Presidente Interino Claudio Martínez, claudio.martinez@usach.cl o con el Presidente del Comité de Ética en Investigación de la Universidad de Oxford, Presidente del Comité de Ética de Investigación Inter-divisional de Ciencias Sociales y Humanidades; Correo electrónico: ethics@socsci.ox.ac.uk. Dirección: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD.

◉ Sí, he leído y entendido las reglas. Chile, 2018-9

○ No

Profiles

Participants were presented with five different profiles that exemplify different types of people and the reasons why they choose a particular pension mode, participants were then asked to select the profile that they identify with most. The objective of this task was to get participants to think about the different pension modes and understand some of the reasoning behind the different alternatives. The profiles presented are the following:

Perfil 1: RV Nombre1 está contento con la idea de pensionarse. El/Ella y su marido/esposa están satisfechos, terminaron de pagar los dividendos de la casa y sus hijos son independientes y están haciendo sus propias vidas. Además Nombre1 logró ahorrar algo de dinero por separado, que piensa usar para cubrir los gastos extras que puedan ocurrir más adelante, como por ejemplo: una enfermedad o el nacimiento de un nieto. A Nombre1 no le gustan los cambios y no tiene contemplado dejarle herencia a nadie, salvo su marido/esposa que ya es beneficiario/a de su pensión, por lo cual el/ella tiene pensando contratar una renta vitalicia.

Una de las dudas que tiene Nombre1 es si le agrega Períodos Garantizados a la Renta Vitalicia. Estos períodos garantizan el pago de la pensión total adeudada por ese período a los beneficiarios o herederos y Nombre1 sabe que esos períodos se pueden agregar a cualquier Renta vitalicia, simple o en combinación con un retiro programado, pero también sabe que tienen un costo.

Perfil 2: RT-RVD 2 años Nombre2 está pensando contratar un retiro programado con renta vitalicia diferida de 2 años para su pensión. El/Ella está un poco delicado/a de salud y no quiere trabajar más, pero todavía tiene que terminar de pagar el dividendo de la casa y tiene una hija en la universidad. Como los padres de Nombre2 murieron después de los 90 años, el/ella no quiere arriesgarse a quedar sin dinero, pero necesita tener ingresos más altos algunos años más para poder pagar esos gastos. Sí le preocupa que, una vez que se le acabe el retiro programado, tendrá una pensión más baja y deberá reducir sus gastos cuando se acabe el retiro programado.

Perfil 3a: RP Nombre3 tiene prácticamente decidido contratar un retiro programado. Todavía le quedan algunas dudas, pero el/ella no tiene buena salud y tiene un nieto al que quiere mucho y que tiene problemas de desarrollo. Nombre3 actualmente cubre parte de los gastos de su nieto y quiere asegurarse que no le vaya a faltar ese apoyo si es que el/ella fallece. Como su nieto no puede ser beneficiario de una renta vitalicia, Nombre4 quiere tener la posibilidad de dejar el dinero que tiene acumulado en su fondo de pensión como herencia para ese nieto. Lo que le complica del retiro programado es que potencialmente se puede quedar sin ingresos, pero sabe que si su salud mejora y aumenta su expectativa de vida, en cualquier momento podrá contratar una renta vitalicia con los recursos que queden en su fondo de pensión.

Perfil 3b: RP Nombre3 tiene prácticamente decidido contratar un retiro programado. Todavía le quedan algunas dudas, pero el/ella vive de los ingresos que recibe por concepto de arriendo. Por el momento, Nombre3 no requiere de su pensión para cubrir sus gastos de vida. El/Ella sabe que más adelante podrá tener gastos inesperados y prefiere tener control sobre sus fondos. Además podría dejar esos fondos como herencia, si le llegase a pasar algo antes que se consuman.

Perfil 4: RP-RVD 4 años A Nombre4 le gusta trabajar y no quiere quedarse en la casa sin hacer nada productivo, pero está cansado/a de tener tanta responsabilidad y quiere relajarse. Por lo mismo ha pensado en contratar un retiro programado con renta vitalicia diferida de 4 años. Piensa usar la parte de retiro programado para asegurarse un nivel mínimo de ingresos, pero en paralelo va a buscar un trabajo de tiempo parcial donde

no tenga que levantarse temprano ni tener que estresarse mucho. Con la renta vitalicia diferida va a asegurarse una pensión razonable más adelante cuando ya no quiera trabajar, pero por ahora cree que puede seguir generando algunos ingresos y contribuyendo a sus fondos de pensiones.

Payment instructions

The exact payment instructions that participants observed are presented in Fig. A.9. There is information on how offers are ranked and a table indicating the amount of money to be paid for each offer selected. Each participant makes two offer selections that pay based on the same scale, and they get paid for both decisions. The wording of the instructions was an agreement between the authors and experts from the CMF.

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Tarea de pensiones

En esta sección se le solicitará tomar decisiones respecto de ofertas de pensiones otorgadas por distintos proveedores. Usted ganará dinero dependiendo del lugar en el cual ha sido clasificada la oferta de acuerdo a un grupo de expertos. Si usted selecciona **la opción clasificada como aquella de mayor valor, considerando el riesgo de quiebra de la compañía (entre otros factores)**, obtendrá el **pago máximo de $1.500.** En cambio, si elige uno de los **proveedores peor catalogados** usted ganará **$0**. Los datos que se le mostrarán son ofertas reales que se le hicieron a una persona de su perfil entre 2017 y la primera mitad del 2018. El siguiente cuadro presenta un ejemplo de las posibles de ganancias, dependiendo del proveedor que seleccione.

Opción	Ganancias
1	$1.500
2	$1.400
3	$1.200
4	$900
5	$500
6	$100
7	$50
8	$0
9	$0
10	$0
11	$0
12	$0

Atrás Siguiente

Figure A.9: Payment instructions for main experimental task.

Pilot

Descriptive data

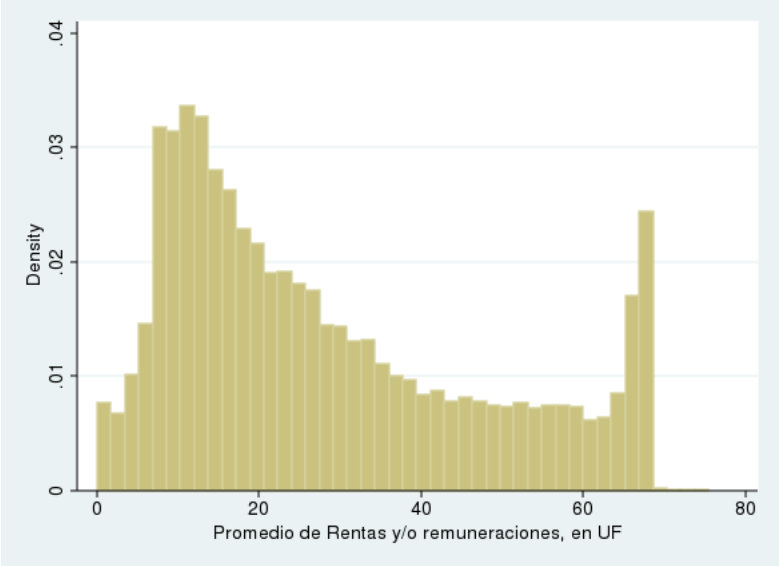

Figure A.10: Histogram of income distribution among Chileans that contributed to their pension funds in 2017. The maximum is capped off because there is a maximum income over which one has to contribute.