

Automatic Enrollment and choices of Pension Plans: an Experimental Study in Brazil

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Abstract

One alternative presented in the literature to increase adhesion to pension plans is to modify the default of choices from opt in (to adhere to the plan) to opt out (leave the plan), a nudge typical of the libertarian paternalism (Kahneman, 2002). An experimental design was adopted, adapted from a tool by Hey (2007). The research was made available with the assistance of Questionpro© and sent to respondents in Brazil through social networks from July to December 2015. 241 answers were obtained. The experiment was composed of a control group and two treatment groups. In both groups, individuals made decisions throughout nine periods: five in the work stage and four in the post-retirement stage. In the control group, the participant chose if he/she wanted to save part of the income (USD 260.00 per period, equivalent to BRL 1,000.00) as well as decide which of the pension plans to contribute to. Three possible plans were offered to the participants with different risk profiles: plan 1 (with the same probability of earning 1.4% or 5.2% per period), plan 2 (1.5% or 4.3%), and plan 3 (1.6% or 3.4%). In treatment group 1, the participant was automatically enrolled in the standard plan and could decide in the following periods, if he/she wanted to continue contributing to a plan, at which percentage, and for which of the plans offered. The results suggest that the pension funds with automatic enrollment, parity contribution of the sponsor, and absence of the element of risk, positively influence the decision of adhesion to the plan. In this scenario, there was a longer permanence in this plan compared to the control scenario in which the design of the plan did not present such characteristics (p-value < 0.01). This conclusion is in line with the work of the nudge theory (Orenstein, 2013; Thaler & Sustein, 2008).

1. INTRODUCTION

One of the functions of a pension system is to serve as a mechanism for worker's income reallocation, from the working period to the inactivity period, intertemporally smoothing its consumption. For this process to occur efficiently, a large set of decisions should be taken in an environment of uncertainty and an extensive time horizon. Of these, one of the most important is the amount of adequate funds to meet the needs in old age. It is likely that such choices might be incorrect if the individual is left in charge. One solution would be government intervention, defining the extent the subjects must save. In addition, the existence of intertemporal myopia can contribute to worsening these decisions (Feldstein & Liebman, 2002). Given this picture, an *pay-as-you-go* regime is an example of the State's paternalist intervention (Mulligan & Sala-i-Martin, 1999). In this arrangement, the old age benefits are paid at the same time as the contributions of the employed workers are collected. The State has the primary role of taxing a group of people (active workers) and transferring the funds to another group (the beneficiaries) in the same period. This way, PAYG regimes reallocate income and share the risks among generations.

However, this paternalist concept of enforced savings has been frequently rejected because it is based on differences in the discount rates between citizens and the government. It is implicitly assumed that the governments are more 'oriented to the future' and more patient than their citizens. On the other hand, another perspective of the paternalist-enforced savings is based on the gap between long-term goals and short-term behaviors, also known as time inconsistency. This argument seems to be broadly accepted (Cremer & Pestieau, 2011). Individuals, however, seem to discount the future in relation to the present more quickly than between different dates in the future (Strotz, 1955). Events derived from this phenomenon are procrastination and sub-savings (Cremer & Pestieau, 2011).

In the United States, evidence indicates that a great number of citizens have been saving very little for retirement. The explanation for this behavior seems to be that these subjects are unable to resist the temptation of an immediate reward (Laibson, Repetto; Tobacman; Hall; Gale & Akerlof, 1998; Mastrobuoni & Weinberg, 2009). In field and lab studies about time preferences, both individuals and animals seem to have a discount rate, which decreases as the time horizon increases (Loewenstein & Thaler, 1989). This issue of time inconsistency or failure in self-control is well documented in the literature (Frederick, Loewenstein & O'Donoghue, 2002).

In countries that transfer the responsibility of saving for retirement to the workers, either totally or partially, there has been a tendency to expand the funded regimes (FF), defined contribution (DC) with private management (partially funded by the employers or fully by the workers). In these plans, the participating employees save and accumulate resources for their own retirement through voluntary or mandatory contributions in their own pension plan account. As it is a DC plan, by nature, the amount of the benefits is not known a priori, being dependent on the amount accumulated by contributions and investment returns generated by the portfolio assets. Several Latin American countries made changes of this nature, the process being well described by Gill et al (2005).

According to The National Superintendence of Complementary Pensions (Previc), in Brazil in 2015, there were 317 private entities of supplementary pensions, which managed 1,099 benefit plans. Their total assets surpassed US\$ 183 billion, approximately 13% of the national Gross Domestic Product (GDP). In 2014, the system paid over US\$ 9.1 billion in benefits, corresponding to an average amount of US\$ 1,014.

Greater individual participation in the savings (voluntary or not) for retirement, represents a challenge because of educational aspects and even cognitive skills of the future

beneficiaries of private pension plans. Findings of classical behavioral studies such as of Kahneman and Tversky (1979) and Thaler and Sunstein (2008), provides evidence that many people are subject to cognitive deviations or biases, in general systematic and predictive. The presence of such biases in decisions related to the savings, investment or insurances entails many disastrous consequences for people and even for society as a whole.

Findings from the Behavioral Economy, such as of Shefrin and Thaler (1988) and Graham and Isaac (2002), have provided considerable insights for a better understanding of the individuals decisions for consumption and saving. This was possible through the incorporation of more realistic assumptions able to improve the life-cycle theory initially proposed by Modigliani and Brumberg (1954). The Behavioral Life-Cycle hypothesis was formulated considering the incorporation of behavioral aspects, such as self-control, mental accountability, and framing in the life-cycle theory. For Shefrin and Thaler (1988), important dimensions such as internal conflict, temptation and willpower (determinants for the self-control of the individual) were not discussed in the economic analysis and present regularity patterns in their applications, able to better describe (and even predict) the behavior of individuals in decisions about savings for retirement.

The hypothesis related to mental accountability indicates that, dissimilar to what the life-cycle theory assumed, income and wealth are not fungible, being subject to mental accounts more or less likely to the temptations for immediate use. According to the authors' hypotheses, in a general sense the current income is more likely to be used for current expenses, followed by current assets and, finally, by future wealth. In relation to framing, the hypothesis postulates that the savings rate can be affected by the way the increments in wealth are "framed" or described. In other words, the way the information is presented (required for the accumulation of resources for retirement), influences the cognitive and behavioral processes of the workers and consequently, the results of their decisions.

The non-adherence to the behavior, effectively verified in the life-cycle theory as well as in the permanent income model (Friedman, 1957), is also provided in Benartzi and Thaler (2007). These authors clarify that, in general, people use heuristics and "rules of thumb" to make decisions about savings for retirement and that the use of heuristics and shortcuts can lead to systematic biases. Such arguments are supported by the analysis of decisions made by the individuals in relation to whether to adhere to a pension plan or not, how much to contribute, and how to invest. In this sense, the authors list evidence that the adherence to pension plans (many times funded exclusively by the employer) which depend on an individual decision, end up having low participation. The alternative proposed is to modify the standard (default) choice from opt in (adhere to the plan) to opt out (leave the plan), a type of nudge typical of the libertarian paternalism with potential to help people make decisions serving their own interests (Khaneman, 2002). Similarly, there is evidence that individuals decide to save from certain "rules of thumb" (Benartzi & Thaler, 2007; Kling, Phaneuf & Zhao, 2012; Mullainathan & Thaler, 2000). One example would be the choice of a maximum percentage of contribution, which would receive a counterpart from the employer (if the maximum percentage receiving the counterpart from the employer is 8%, then the subject will decide to contribute with this percentage). In the case of choosing the investment portfolio in a certain plan, the evidence shows that the participation rate decreases when there is a larger number of options (Benartzi & Thaler, 2007). Therefore, strategies can be inserted in the retirement plans in order to make that certain behaviors can be "encouraged" and others be "restrained".

Based on this picture and the relevant literature, this paper seeks to identify arrangements of DC pension plans associated with continuity in the resource allocation for retirement, in the case of Brazil. Therefore, our intention is to answer the following research

question: **Which arrangements of defined contribution pension plans are associated with continuity in resource allocation for retirement?**

The article is divided into four sections in addition to this introduction. Section 2 presents the theoretical platform, focusing on the description of the behavioral economy contributions for the understanding of behavioral anomalies in decision-making. Section 3 describes the research methodology and experimental protocol. The description of research findings and the conclusions are presented in sections 4 and 5, respectively.

2. THEORETICAL REFERENCE AND EMPIRICAL LITERATURE

The study of optimal consumption decisions/savings trace back to Keynes, pass by contributions of Fisher, the classic life-cycle model of Modigliani and Brumberg (1954), the permanent income model developed by Friedman (1957), in addition to the stochastic models of Hall. More recently, Shefrin & Thaler (1988) have suggested what they have called the Behavioral Life-Cycle hypothesis, which represents an alternative to the life-cycle model. In this sense, the research agenda evolved from an approach that assumed that the individuals were capable of intertemporally maximizing the resources rationally to an approach where cognitive failures are incorporated.

2.1 Behavioral Life-Cycle Model and Bounded Rationality

One can consider that the work of Modigliani and Brumberg (1954) sets the fundamental framework to study the intertemporal behavior of individuals. The life-cycle model starts from the utility function of individual consumption. It is assumed that utility is a function of consumption in current and future periods. This implies that the individual maximizes its utility, subject to the restriction of available resources (given by the sum of current and future incomes), discounted throughout life and its stock of initial wealth. Because of this maximization, the current consumption of an individual can be expressed as a function of its intertemporal resources and of the capital return rate. This model assumes that there is perfect information and full rationality in decision-making.

Nonetheless, as discussed by Arthur (1994), human beings can be considered only reasonably good in the use of deductive logic and make only moderate use of it. However, they are very good at identifying, recognizing and associating patterns. Therefore, in complicated problems, people seek to identify patterns and tend to simplify problems, using these patterns to build temporary internal models or mental hypotheses or schemes to deal with them.

In this perspective, for Arthur (1994), individuals make deductions and act based on their current hypotheses. As feedback is received, human beings reinforce or question their beliefs in the current hypotheses, discarding some which stop working and replacing them, when necessary, by new hypotheses. Thus, when it is not possible to fully rationalize or there are failures in the complete definition of the problem, people make use of simple models to fill in the gaps in comprehension. However, when they face a system considered non-usual and there is no pattern noticed, people search for samples of values supposedly more plausible according to different subjective models. In this case, it can be noticed that there is heterogeneity in the strategies applied instead of a *continuum* of models already tested previously and commonly used.

Studies about decisions in various areas, from medical areas to financial and economic decisions, have shown that in moments of timely decision-making oriented by little information, the use of “mental shortcuts” or heuristics are necessary. Such elements are prerogatives of the mind, indispensable for instantaneous reactions and depend more on experience and less on analytical ability. The phenomena of intuition and mental shortcuts are

well characterized by Glöckner (2007) and Klein (1998), who approach studies carried out with various types of professionals, such as firefighters, nurses, paramedics, chess players, among others, who in their daily life depend on intuition to make decisions.

All these findings allow us to generate questions regarding the present research, such as: in which way do intuition and “mental shortcuts” work in contexts where the decisions are not opportune, as is the case of intertemporal decisions related to the pension plan? How do “mental shortcuts” contribute to the process of decision-making in situations of uncertainty, and how are they inserted into the information analysis by the individuals in the intertemporal decision-making process? These are some of the questions inserted in the discussion about the way individuals make intertemporal decisions related to the pension plan and work as benchmarks for the theoretical discussion and the formulation of the research hypotheses.

2.2 Deviations of the Rational Choice Theory and Endowment Effect

The deviations of the rational choice theory or human behavior boundaries can be grouped into three general categories: (i) *bounded rationality*; (ii) *bounded willpower*, and; (iii) *bounded self-interest* (Mullainathan & Thaler, 2000). Bounded rationality, described by Simon (1965), considers that people do not have the unlimited ability to process all the information required to make rational choices. On the contrary, they have inherent behavioral biases and make use of “rules of thumb” or mental shortcuts to make decisions. Bounded willpower, on the other hand, reflects the idea that people in certain circumstances lack self-control: one can consume a lot, save little, make hasty decisions, procrastinate, and so forth. Bounded self-interest considers that, under certain circumstances, people can be altruistic and not necessarily selfish. People are concerned about other people too. They have social preferences for emotional ideas such as reciprocity, altruism, paternalism, and aversion to inequality (Shogren & Taylor, 2008).

In regards to the perception that such aspects defined as “context-dependent” are significant to understand how people make decisions, Shogren and Taylor (2008) affirm that it is crucial to identify the economic circumstances, institutional designs, and social contexts in which the theory of rational choices work and those where the theory lacks to capture the behavior observed.

A deviation (or anomaly) broadly discussed when addressing behavioral aspects present in the economic decision-making process and of other natures, is the endowment effect. The deviation is contrary to the standard assumptions of economic theory, when it defines that if the income effects are small, the difference between the maximum tendency to pay for an asset and the minimum tendency required by the same right (tendency to accept) is insignificant (Willig, 1976). In the endowment effect, there is an overvaluation of the asset for the individual if this asset is part of his/her rights. This effect can be understood as deriving from aversion to loss. The endowment effect was evident in previous experiments, which identified some transactions carried out between buyer and seller in operations involving money and consumer goods and in operations involving two assets (Knetsch, 1989).

Experiments carried out by Kahneman, Knetsch and Thaler (1990) have confirmed that subnegotiation can happen even when the income effects are discarded. The results also demonstrated the occurrence of the endowment effect for an asset that was distributed to everyone in a class and therefore has no appeal as an award or trophy.

The evidence presented by Kahneman, Knetsch e Thaler (1990) support what may be called the instantaneous endowment effect: the value that the individual attributes to objects such as mugs, pens, binoculars and chocolate bars, seems to increase substantially as soon as that individual receives the object. The seemingly instantaneous nature of the reference point

changes and the consequent change in value induced by the transference of the ownership of an asset to a person goes beyond previous discussions of the endowment effect, which focus on assets that have remained under ownership of the individuals for some time.

The endowment effect can influence savings decisions for retirement, as illustrated by cases with a lack of a compulsory contribution to some pension system or the need for voluntary supplementation. In such situations, it is assumed that the reference point alters between the moment before the promise of salary and the moment of the effective receipt. It is possible to suppose that the reference point alters between such moments. While working, the individual is able to understand that part of the salary should be saved for the time of retirement, however, once the salary is received, the “sale” of part of this salary in exchange for a possible future benefit, difficult to be measured, can reduce the initial tendency to this type of transaction, causing a lesser number of transactions than would be expected.

2.3 Behavioral Anomalies and Pension Plan Design

Research about the discount of simple results indicates that the discount rate is not stable, yet it seems to vary due to several contextual factors (Soman et al., 2005), going against the assumptions of the standard discounted utility model. Some of these factors are discussed as follows: a) *the magnitude effect* suggests that the discount rates are higher in dollars for smaller amounts, compared to higher amounts (Kirby, 1997); b) *the direction effect* suggests that the discount rate obtained from increases in the delay for a result is higher than the one obtained from reductions in the delay (Loewenstein, 1988); c) *the signal effect* indicates that the discount rates are smaller for losses than for earnings (Thaler, 1981), although there are demonstrations of the reverse effect in other works, as of Read (2004); d) *the delay effect* suggests that the discount rate is smaller for bigger delays (Thaler, 1981); e) *the interval effect* indicates that the discount rate depends on the interval between the two results to input the discount rate – the higher the interval, the smaller the discount rate (Read, 2001).

Such evidences point in favor of the thesis that people are impulsive, inconsistent over time and are unable or not willing to conceptualize their long-term interests (Clark, 2011). Such an outline follows the reasoning proposed by Simon (1965) and others, in the sense that the behavior is better understood as a result of the interaction between predisposition and context (which he has defined as environment). The impulsive and timely inconsistent behavior of individuals can lead to sub-savings and procrastination in relevant intertemporal decisions. Actions oriented to encourage individual commitment are a way to prompt agents to maximize their future benefits (Tafner, 2007). Among the institutional mechanisms able to “force” an individual commitment, is the design of the pension plan.

A substantial body of research has shown that although the pension plan participants can choose, most of them accept the default option determined in the plans (Bütler & Teppa, 2007). Choi, Laibson, Madrian and Metrick (2003) shows that American employees tend to accept default options in their plans, even in relation to the critical characteristics, such as contribution rates and the choice of investments. In the study, it is observed that 80% of the assets in different plans are invested in the default fund. Hurd and Panis (2006), in turn, provide evidence that people adopt a behavior consistent with the *status quo* bias in their process of decision-making.

In a study conducted by Beshears, Choi, Laibson and Madrian (2013), approximately nine out of ten employees, which were subject to the automatic enrollment in the pension plan of the company, kept their assets invested in default funds, and approximately two-thirds placed all their assets in these funds. For Basu and Drew (2007), the reason for this failure by the participants to exercise their choices can be attributed to the lack of knowledge about investments, inadequacy of the alternatives presented, or anomalies in the human behavior,

and it represents a topic largely researched and debated in the last years. Along the same line, Chand and Stevens (2008) point out that individuals, in general, have reduced knowledge about their pension plans and tend to react to changes in the set of information about the pension plan. In addition, Brown, Kapteyn, and Mitchell (2016) indicate that an expressive group of individuals may be making inconsistent pension decisions. However, such decisions can be influenced and oriented by proper information. For this reason, it is possible to conclude that it is very important that the pension plan institutions transmit this information to the employers institutionally.

3. METHODOLOGICAL PROCEDURES

3.1 Research Hypotheses

In line with what has been discussed in the theoretical framework, there are studies which seek to lessen the effect of behavioral distortions or anomalies through pension plan designs, such as the automatic enrollment of the participants (Choi; Laibson; Madrian & Metrick, 2003) and the funds design (Basu & Drew, 2006; Agnew; Anderson; Gerlach & Szykman, 2008; Pang & Warshawsky, 2008; Beshears; Choi; Laibson & Madrian, 2013). Based on this referential, the following hypotheses were formulated:

H1 (a) A supplementary pension plan with lower risk receives more individual adhesion compared to other plans offered.

H1 (b) Individuals enrolled compulsorily in a supplementary pension plan do not change the decision in further choices.

H1 (c) A risk-free supplementary pension plan receives more individual adhesion compared to other plans offered.

3.2 Research Subjects

The group of research subjects consisted of people who had access to the questionnaire hosted on an online platform (Questionpro©) and made available by paid ads in social networks (Facebook© and LinkedIn©), or who were invited to participate in the research through links available in the researchers' social networks. In addition, invitations were sent to people registered in the researcher's electronic contact lists. The participation was voluntary and no criteria were used for the inclusion or exclusion of participants in the study.

This form of advertising of the research might have caused a sampling bias: a profile of both high education and average income per capita above the Brazilian. However, it is considered that this limitation does not invalidate the research findings. The relative homogeneity in the composition of the subjects did not prevent the segregation of decisions by the individuals due to noticeable characteristics, such as insertion in the pension plan system, and demographic information, among others.

Considering that the researchers chose to carry out the questionnaire via the internet using social networks as the advertising method, a simplified version of the Free and Clarified Consent Term (TCLE) was adopted. The beginning of the questionnaire introduced the research, disclosed the researchers' contacts, and requested the participant's consent. In compliance with Regulation 466/12 issued by the Brazil's National Health Council (CNS), which determines the voluntary participation in research involving human beings, it was opted to not carry out an experiment based on effective payments.

The advantages the use of the online research can offer to researchers and its subjects of the research have been summarized by Aerns (2005). For the researcher, it can be pointed

out: (1) to be less expensive; (2) to reach a large group of potential participants; (3) to increase the access to the study of sensitive questions, cultural groups and “hidden populations”; (4) to reduce the time of data collection; (5) to increase methodological control and accuracy; (6) to increase the accuracy and efficiency in both data collection and analysis. As to the advantages for the research subjects, they involve: (1) increase in anonymity; (2) possibility to provide information on his/her own pace; (3) increase of sense of control; (4) increase in the willingness to participate in the research because it is a recent approach and; (5) convenience and ease of use. Ramo and Prochaska (2012) found evidence of the usefulness and low cost of Facebook© as a recruitment resource for young smokers to complete an online survey.

3.3 Pilot Test

In order to test the semantic and contextual understanding of the scenarios to be used in the experiment, a pilot test was carried out. For that, a preliminary version of the questionnaires (control and treatments) was forwarded by e-mail to 25 persons, from March 9 to 28, 2015. They were all experts from the academic area. The version outlined for the control group was sent to eight persons, with a return of three questionnaires answered. The treatment version, with automatic enrollment and counterpart from the sponsor, was sent to seven persons and five answered completely. The treatment version, with automatic enrollment and sponsor counterpart, and the presence of a risk-free plan, was sent to nine persons receiving five answered questionnaires.

The considerations made by the evaluators/respondents in regards to the tool covered several aspects involving the understanding of some parts, from questions of logic and grammatical formulation to elements related to the layout and presentation.

3.4 Data Collection

An scenario-based experiment was carried out to identify the choices related to the supplementary pension defined contribution plans. At the end of the experiment, the participants answered questions in order to identify some social-demographic attributes of the sample. Both the collection and the experiment were carried out with the assistance of the online platform Questionpro©, and were available through the internet to the participants. In this sense, there was no experimental session in the laboratory and the participants were allowed to respond to the questionnaire from anywhere with internet access.

The tool was hosted on the platform used to manage the research; it received a virtual address (<http://www.decisoesdaeposentadoria.questionpro.com>). In the presentation of the research, the participant was informed that they should consider there was no inflation over time, i.e., all the amounts were real and not nominal. No minimum or maximum time was predetermined for the participant to answer the questionnaire, who could even save the answers and resume at a later time. The respondents spent, on average, 17 minutes and 13 seconds to complete the questionnaire.

3.5 Experiment Description and Experimental Scenarios

At first, a research support platform was used to randomly segregate the participants between the control group and the two treatment groups: every day the researcher changed the version available to the potential participant via the research management platform (Questionpro©), through the virtual address of the questionnaire. In other words, although the same virtual address published in social networks was kept, everyday new interested parties were forwarded different versions of the tool bound to the link available. Next, scenarios for the control group were defined (without manipulating the variables of interest) and for two treatment groups (whose variables of interest were manipulated). The objective is to identify

how the design of the pension plans affects the decisions of resource allocation by the individuals.

The participant had access to a set of information, which oriented the completion of the questionnaires and defined the rules of the decision-making process. The experiment began when the individual entered work life (period 1) and continued until he/she, experimentally, died. At that time, the experiment was over. Therefore, each individual remained in the experiment for nine periods (five periods whose scenarios referred to the working period and four simulating the retirement period). The participant was informed, however, that the number of periods each individual remained in the experiment was random, determined probabilistically, and based on the life table from The Brazilian Institute of Geography and Statistics (IBGE) for men and women.

In each period before retirement, the individual received a hypothetical income of USD 260. All the monetary amounts in this article were converted from Brazilian currency (BRL) to US dollars (USD), using the average exchange rate (3.8461) for the experiment period, August to December 2015. In the experimental five periods, the individual decided if his/her income would be converted into consumption (automatically converted by a table and which would compose the amount to be donated at the end of the experiment), and how much would be saved, i.e., contributed to the pension plan. If the individual decided to save some part of his/her income, he/she would choose among different plans to contribute. After retirement, the individual would indicate in each period, the percentage he/she intended to redeem from the accumulated amount during the working period of his/her life. The amount of the retirement was then automatically converted (through a conversion table) into the amount the researcher would donate to a philanthropic or care entity, to be chosen by the participant from a list available at the end of the research questionnaire (payments to the subjects are forbidden by law in Brazil). Therefore, the amount of the retirement consisted of the sum of an amount related to the basic insured retirement of USD 26 per period, and an additional amount which would depend on possible contributions made in any of the five periods prior to the retirement.

The conversion scale (i.e., the rate by which the money the participant earned was converted in an amount to be donated at the end of the research) was shown in a table. Should the amount consumed in any period be lower than USD 104, then the participant would “gain” a negative amount – that is, he lost money. For example, USD 26 consumed would become USD -0.41; USD 104 would become USD 0.00; USD 182 represented a gain of USD 0.30; and so forth. These amounts illustrated the conversion process of the “experimental money” into “real money” defined in the conversion table, extracted from Hey (2007) and reproduced in Annex I.

Tables 1 and 2 exemplify the conversion process. To contextualize, let’s suppose that the participant consumed all his/her income in each of the periods prior to the retirement, and, therefore, did not save anything. Therefore, the retirement would be only the basic retirement of USD 26. As the experiment lasted nine periods (five before and four after retirement), the conversion generated by this participation was:

Table 1 – Example of the application of the conversion table in the experiment (part I)

Period	1	2	3	4	5	6	7	8	9
Income (USD)	260	260	260	260	260	26	26	26	26

Source: Adapted by the authors based on Hey (2007)

Therefore, the participant’s earnings (using the conversion scale), in USD, would correspond to:

Table 2 - Example of the application of the conversion table in the experiment (part II)

Period	1	2	3	4	5	6	7	8	9
Earning (USD)	0.53	0.53	0.53	0.53	0.53	-0.41	-0.41	-0.41	-0.41

Source: Adapted by the authors based on Hey (2007)

In other words, as Table 2 presents, the participant had a gain of USD 1.01 (USD 0.53 in each of the five periods, less USD 0.41 in each of the remaining four periods). In this case, he/she could have donated to one of the previously defined philanthropic or care entities, an amount of total of USD 2.05 (USD 1.01 plus USD 1.04 obtained by the answers to the remaining questions of the research). It should be observed that the amount to be received (to be donated) in this second stage of the research, depended on the decisions the participant made during the experiment.

The participant was also asked if he/she wanted to remain in the plan chosen initially (attributed, in the case of experimental scenarios) or opt for an alternative pension plan. Once the pension plan was chosen, he/she could not withdraw any amount until retirement. Should the participant opt to save part of the income, he/she was also asked which of the three different types of plans they wanted to contribute to. The default plan was Plan 2. The difference between the plans was the interest rate on the accumulated resources.

In the treatment groups, in the initial period, each participant was enrolled in the default pension plan, which was the medium risk plan. If the participant remained in this plan, any contribution would have as a counterpart a contribution of same amount, paid by the experimenter (mimicking the mechanism of parity contributions, adopted by many private pension plans). The participant could, however, leave the pension plan defined by the experimenter or not contribute to the pension plan. In the event of leaving, the parity contribution was eliminated. At each period, the participant was asked if he/she wanted to remain in the pension plan or leave it.

If the participant saved part of the USD 260 hypothetical income, the amount would be capitalized with a certain interest rate. In this case, he/she was requested to define which of the pension plans they would contribute to. Three of the plans offered presented some level of risk. Plan 1 was riskiest, plan 2 intermediary, and plan 3 the least risky. Each had two possible interest rates, with a 50% probability, as Table 3 shows. When opting for a plan, the participant did not know, a priori, what the interest rate on his/her resources would be. The rate was randomly determined by the program, based on the amounts given in Table 3. For example, when opting for plan 1, there was a probability equal to 0.5 of the application to earn 1.4% per period and 0.5 to earn 5.2%. Plan 4 was risk-free and had an interest rate of 2.1%.

Table 3 – Real interest rate of the pension plans (%)

Rate probabilities	Plan 1	Plan 2	Plan 3	Plan 4
0.5	1.4	1.5	1.6	2.1
0.5	5.2	4.3	3.4	
Average	3.4	2.9	2.5	2.1

Source: Adapted by the authors based on Hey (2007)

Therefore, if the participant contributed USD 26 to Plan 1, this amount could increase up to USD 26.36 or USD 27.35; if he/she contributed USD 26 to Plan 2, the amount could increase to USD 26.39 or USD 27.12; if he/she contributed USD 26 to Plan 3, the amount could increase to USD 26.42 or could increase to USD 26.88. If the contribution were USD 26 for Plan 4, the amount would increase to USD 26.55. It is important to point out that the

interest rate in any period of a certain plan was independent of the rate in other periods and plans. It must be added that the participant was not able to change his/her choice of plan with respect to past contribution decisions. For example, if he/she decided to save USD 26 in period 1 in Plan 2, this amount remained invested in Plan 2 for periods 2, 3, 4 and 5.

Upon retirement, in period 6, the participant received a guaranteed amount of USD 26 per period (which can be understood as a basic pension benefit) plus an additional amount determined by his/her contributions during the five working periods and by the interest rate (which corresponds to the supplementary pension benefit).

After the experiment was completed by the participant, the researchers calculated the retirement amount for each subject and, concomitantly, the amount to be donated for each participation to one of the philanthropic or care entities indicated at the end of the research questionnaire. This amount was sent to the institutions selected and the receipt was available for interested parties upon request. The amount of the donations per institution was publicized in the social networks of one of the researchers.

3.6 Tool Application

The research tool consisted of two blocks: (i) eight questions about the profile of the participants and; (ii) the experiment itself, with eight experimental scenarios about the percentage of contribution for the retirement and the choice of the defined contribution pension plan (there were 10 experimental scenarios in the case of the control version, as the subject was not automatically enrolled in the early period) and four hypothetical situations of choice about the percentage to be redeemed in each period post-retirement.

Data collection started on July 29, 2015 through a post in Facebook© on the personal page of one of the researchers, and through six paid advertisements in this social network. The advertisements were maintained until August 25, 2015. At this stage, 192 answered questionnaires were obtained.

On August 26, 2015, data collection started through both a paid advertisement on LinkedIn© and the advertisement of the research on the personal page of the researcher on that network. Both the advertisement and the invitations were maintained until October 7, 2015. In this second social network, 31 answered questionnaires were obtained. The questionnaire was also made available in this same social network on the personal page of the other researcher, from December 12 to 29, 2015, where 18 answered questionnaires were obtained. On December 30, 2015, access to the virtual address of the research was shut.

241 fully answered questionnaires were obtained and distributed according to Table 4.

Table 4 – Distribution of Participants who Completed the Tool

Version	Control (CD)	Treatment (E0)	Treatment 2 (E1)	Total
Total	77	86	78	241

Source: Prepared by the authors

The following steps were adopted for the data treatment: a) procedures to identify absent, incomplete or inconsistent values, resulting in the exclusion of 33 respondents; b) the amount to be donated by each participant was calculated, following the conversion table available for the participants; c) the investigation of the descriptive statistics; d) the standardization of data was used when necessary, and; e) the evaluation of the suitability of the use of parametric statistical tests in the data analysis was carried out using inferential procedures. For inference and hypothesis testing, non-parametric tests for mean differences were used.

The characteristics of the participants (presented in Tables 5 and 6) enable us to affirm that the sample of respondents does not represent the Brazilian population, especially that which concerns education and per capita income. In 2015, the average income in Brazil was only USD 289.38 (PNAD, 2015).

In the final sample 38.9% of the respondents were women and 61.1% men. Most of them (55.8%) were married, while 37.5% were single, 5.3% were divorced, and 1.4% legally separated. Participants studied at least up to high school, with 93.7% concluding higher education and 73.0% a post-graduation course. The average age of the respondents was 35.76 years.

Table 5 – Characteristics of Participants

GENDER	N	%
Female	81	38.9
Male	127	61.1
Total	208	100.0
MARITAL STATUS		
Single	78	37.5
Married	116	55.8
Divorced	11	5.3
Legally Separated	3	1.4
Total	208	100.0
EDUCATION		
High School	13	6.3
Higher Education	43	20.7
Post-graduation	152	73.0
Total	208	100.0

Source: Prepared by the authors

Table 6 shows the distribution of the participants, by multiples of the minimum wage (MW). In Brazil, the government establishes the minimum wage value yearly, valid for the entire domestic territory. In 2015, this amount was USD 204.88. It was chosen to present the values by ranges of SM because this represents an important index in the country's economy. An expressive part of the Brazilian workers (over 80%) receives up to 2 MW monthly. The minimum wage is also important because no benefit (old age or survivors) from the Social Security General Regime (RGPS), the national pension scheme, can have a value lower than 1 MW. As can be seen in Table 6, most of the respondents (57.2%) reported having a monthly income equal or over five minimum wages. Only 5.3% of the sample reported having an income of up to one minimum wage. This is further evidence that the sample of respondents is not representative of the contingent of Brazil's workers.

Table 6 – Participants' monthly income (in multiples of Brazilian minimum wage)

INCOME (multiples of minimum wage)	N	%
Up to 1	11	5.3
1 a 2	17	8.2
2 a 3	24	11.5
3 a 5	37	17.8
5 a 7	37	17.8
Over 7	82	39.4
Total	208	100.0

Source: Prepared by the authors

After the description of the participants' characteristics is done, section 4 presents the results of the empirical work with the descriptive statistics and the tests of the relevant hypotheses.

4. RESULTS

In this section we present the findings regarding the effect of the experimental treatments. Due to a computational reason unknown to the researchers, the software did not register the answers for period 1. For this reason, all the analyses remained in the other periods of the research, being two, three, four and five.

4.1. Behavior of the Respondents in the Control Group (“CG”)

Tables 7 to 10 show basic descriptive statistics referent to the choices of the defined contribution pension plans in each period of the experiment, from 2 to 5, separated by gender. Therefore, for example, the plan chosen in period 2 (*Plano_p2*) highlights the plan the respondents chose in the period under analysis (in this case, period 2). This nomenclature was used both in the control and treatment group. It can be noticed that when people faced the three possibilities of defined contribution pension plans, with high, medium and low risk levels, in all periods, they opted for the plan of highest risk. In this context, it is possible to observe in Table 5, that 57.7% of the individuals submitted to the control scenario opted in period 2, for the plan defined as high risk. When segregated by gender, it is noticed that the medium risk plan was the only one presenting an equanimeous distribution between men and women, although the option for this plan represents 20% of the total of men who participated in the research and, approximately 35% of the total of women.

Table 7 – Pension Plans and Gender, period 2 (Plano_p2)

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	14	27	41
	% in Plano_p2	34.1	65.9	100.0
	% of the Total	19.7	38.0	57.7
Medium (1.5% or 4.3%)	N	9	9	18
	% in Plano_p2	50.0	50.0	100.0
	% of the Total	12.7	12.7	25.4
Low (1.6% or 3.4%)	N	3	9	12
	% in Plano_p2	25.0	75.0	100.0
	% of the Total	4.2	12.7	16.9
Total	N	26	45	71
	% in Plano_p2	36.6	63.4	100.0
	% of the Total	36.6	63.4	100.0

Source: Prepared by the authors

In period 3 (Table 8), it can be observed that most of the sample chose to maintain the risky behavior: 57.1% continued to choose the pension plan which can bring, with the same 50% probability, the highest return or the lowest return among the plans. Similarly, there is no alteration in the behavior of choice of pension plans by gender.

Table 8 – Pension Plans and Gender, period 3 (Plano_p3)

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	14	26	40
	% in Plano_p3	35.0	65.0	100.0
	% of the Total	20.0	37.1	57.1
Medium (1.5% or 4.3%)	N	10	12	22
	% in Plano_p3	45.5	54.5	100.0
	% of the Total	14.3	17.1	31.4
Low (1.6% or 3.4%)	N	2	6	8
	% in Plano_p3	25.0	75.0	100.0
	% of the Total	2.9	8.6	11.4
Total	N	26	44	70
	% in Plano_p3	37.1	62.9	100.0
	% of the Total	37.1	62.9	100.0

Source: Prepared by authors

In period 4 (Table 9), there is an inexpressive increase (3 respondents) in the number of individuals that chose the less risky pension plan. It is also observed that from the 11 respondents who chose the plan of lowest risk, nine were female. This is an expected behavior as the female gender is associated with a behavior more averse to risk than the male gender (Bajtelmita, Bernasek & Jianakoplos, 1999; Bernasek & Shwif, 2001; Sunden & Surette, 1998). In terms of proportion in relation to the total of male subjects, (approximately 20%) and females (approximately 7.7%), the difference is also considerable.

Table 9 – Pension Plans and Gender, period 4 (Plano_p4)

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	14	26	40
	% in Plano_p4	35.0	65.0	100.0
	% of the Total	19.7	36.6	56.3
Medium (1.5% or 4.3%)	N	10	10	20
	% in Plano_p4	50.0	50.0	100.0
	% of the Total	14.1	14.1	28.2
Low (1.6% or 3.4%)	N	2	9	11
	% in Plano_p4	18.2	81.8	100.0
	% of the Total	2.8	12.7	15.5
Total	N	26	45	71
	% in Plano_p4	36.6	63.4	100.0
	% of the Total	36.6	63.4	100.0

Source: Prepared by the authors

Finally, in period 5, the last period before retirement (Table 10), the individuals maintained a similar behavior to the previous periods, opting for the riskiest fund even with more probability of “experimental death” and a higher possibility of a retirement with a lower amount due to a possible loss by applying in a more risky plan.

Table 10 – Pension Plans and Gender, period 5 (Plano_p5)

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	16	27	43
	% in Plano_p5	37.2	62.8	100.0
	% of the Total	22.5	38.0	60.6
Medium (1.5% or 4.3%)	N	9	9	18
	% in Plano_p5	50.0	50.0	100.0
	% of the Total	12.7	12.7	25.4
Low (1.6% or 3.4%)	N	1	9	10
	% in Plano_p5	10.0	90.0	100.0
	% of the Total	1.4	12.7	14.1
Total	N	26	45	71
	% in Plano_p5	36.6	63.4	100.0
	% of the Total	36.6	63.4	100.0

Source: Prepared by the authors

Therefore, throughout the four periods in which the participants allocated to the control group were requested to indicate one among the three defined contribution pension plans, the overriding option was the high-risk plan.

4.1.1 Behavior of the Respondents in the Treatment Group 1 (“E0”)

In treatment 1, we manipulated the scenario so that the respondent would be automatically enrolled in one of the plans (Plan 2, medium risk), in the initial period, with a concurrent counterpart of the employer for each Brazilian Real saved by the employee in plan 2 (*default*). The purpose was to verify if the respondent kept a behavior of *status quo* (remaining in this plan) or if he/she would migrate to another plan in the subsequent periods.

In period 2 (Table 11), the expected effect of the scenario manipulation on the choice of the defined contribution pension plan was not verified: most of the respondents allocated in this treatment opted (as in the control scenario) for the riskiest pension plan. There was also a similar proportion in the choices of both men and women.

Table 11 – Pension Plans and Gender in Treatment 1 (E0), period 2 (Plano_p2)

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	17	22	39
	% in Plano_p2	43.6	56.4	100.0
	% of the Total	22.4	28.9	51.3
Medium (1.5% or 4.3%)	N	10	18	28
	% in Plano_p2	35.7	64.3	100.0
	% of the Total	13.2	23.7	36.8
Low (1.6% or 3.4%)	N	4	5	9
	% in Plano_p2	44.4	55.6	100.0
	% of the Total	5.3	6.6	11.8
Total	N	31	45	76
	% in Plano_p2	40.8	59.2	100.0
	% of the Total	40.8	59.2	100.0

Source: Prepared by the authors

In periods 3, 4 and 5 the profile of choices was generally maintained, with most of the respondents choosing the riskiest plan in the following percentages, respectively: 50.6%,

53.2% and 51.9%. Such results allow us to refute the hypothesis H1 for treatment 1. (b). This hypothesis affirms that “individuals compulsorily enrolled in a supplementary pension plan do not change their decision in subsequent choices”. This is confirmed by the non-parametric Mann-Whitney test, the results of which are shown in Table 12 for the periods 2, 3, 4 and 5.

Table 12 – Non-parametric test for the mean difference (Treatment 1 and Control)

	Treatment 1 (E0)			
	Período_2	Período_3	Período_4	Período_5
Z	-0.374	-0.816	-0.085	-0.821
p-Value (Two-tailed)	0.709	0.414	0.932	0.412

Source: Prepared by the authors

The results suggest that there is no statistically significant difference between treatment group 1 (compulsory automatic enrollment) and the control group to the level of 5% significance ($p\text{-value} > 0.05$), regarding the choice of pension plans in none of the periods for the scenarios presented to the respondents, contradicting the findings of Hey (2007).

4.1.2 Behavior of Respondents in Treatment Group 2 (“E1”)

In treatment 2, the respondent was automatically enrolled in the initial period in Plan 2 (medium risk), with counterpart by the employer of 100% of the amount saved by the employee (besides the offer of a fourth plan risk-free). This strategy sought to check if the respondent kept a *status quo* behavior (remaining in this plan) or if he/she would migrate to another plan in subsequent periods.

It is possible to observe (Table 13) that in the treatment 2 scenario there is a higher number of respondents who opted for the automatic enrollment plan (although the total of this plan and the riskiest plan is basically the same), showing a possible effect of this manipulation (confirming the findings of Hey, 2007). This finding is different from the observed in treatment 1 scenario, in which compulsory automatic enrollment seemed not to affect the choices of the respondents.

Table 13 – Pension Plans and Gender in Treatment 2 (E1), period 2

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	6	15	21
	% in Plano_p2	28.6	71.4	100.0
	% of the Total	10.2	25.4	35.6
Medium (1.5% or 4.3%)	N	10	12	22
	% in Plano_p2	45.5	54.5	100.0
	% of the Total	16.9	20.3	37.3
Low (1.6% or 3.4%)	N	2	2	4
	% in Plano_p2	50.0	50.0	100.0
	% of the Total	3.4	3.4	6.8
Risk-free (2.1%)	N	6	6	12
	% in Plano_p2	50.0	50.0	100.0
	% of the Total	10.2	10.2	20.3
Total	N	24	35	59
	% in Plano_p2	40.7	59.3	100.0
	% of the Total	40.7	59.3	100.0

Remarks: *Plano_p2 represents the plan chosen in period 2; ** the difference between the plans is the interest rate on the amount applied

Source: Prepared by the authors

Table 13 enables us to verify that only 20.3% of the respondents allocated to the treatment 2 scenario chose the risk-free plan. Results also indicate that men were more prone to risk in the scenario, ratifying the findings of the previous scenario. In the plan with automatic enrollment (medium risk), the number of individuals from both genders is basically the same, while in the riskiest plan the male gender prevails.

A similar behavior to period 2 is noticed in periods 3 and 4, with a higher proportion of respondents remaining bound to the plan in which they were enrolled automatically, although the difference from plan 1, the higher risk, is not very significant. In period 2, the percentage of those who chose the medium risk plan was 35.6%, compared to the percentage of 35.6% of those who chose the riskiest fund. In period 4, such percentages were 37.3% and 28.8%, respectively.

In period 5 of the treatment 2 scenario (last before the retirement), there is the migration of respondents from the high and medium risk pension plans to the risk-free plan, as Table 14 demonstrates.

Table 14 – Pension Plans and Gender in Treatment 2 (E1), period 5

Risk	Distribution	Gender		Total
		Female	Male	
High (1.4% or 5.2%)	N	5	9	14
	% in Plano_p5	35.7	64.3	100.0
	% of the Total	8.3	15.0	23.3
Medium (1.5% or 4.3%)	N	8	12	20
	% in Plano_p5	40.0	60.0	100.0
	% of the Total	13.3	20.0	33.3
Low (1.6% or 3.4%)	N	2	1	3
	% in Plano_p5	66.7	33.3	100.0
	% of the Total	3.3	1.7	5.0
Risk-free (2.1%)	N	9	14	23
	% in Plano_p5	39.1	60.9	100.0
	% of the Total	15.0	23.3	38.3
Total	N	24	36	60
	% in Plano_p5	40.0	60.0	100.0
	% of the Total	40.0	60.0	100.0

Source: Prepared by authors

This change observed in the respondents' behavior in view of treatment 2 is confirmed by the Mann-Whitney non-parametric test (Table 15). Results suggest that there is a statistically significant difference between treatment 2 group (compulsory automatic enrollment with the presence of a risk-free fund) and the control group to the level of 5% significance (p -value < 0.01) in all periods for the scenarios presented to the respondents.

Table 15 – Non-parametric test for the Difference of Means (Treatments 2 and 1)

	Treatment 2 (E1)			
	Período_2	Período_3	Período_4	Período_5
Z	-2.764	-3.046	-3.682	-5.111
P-Value (Two-tailed)	0.006	0.002	0.000	0.000

Source: Prepared by the authors

In addition, the Mann-Whitney test was carried out to check the difference in means between treatment 1 (compulsory automatic enrollment) and treatment 2 (compulsory

automatic enrollment and the presence of a risk-free pension plan), presented in Table 16. The results indicate that treatment 2 has an effect over the choices of pension plans also when this design is compared to the design proposed by treatment 1 to the level of 5% of significance ($p\text{-value} < 0.05$).

Table 16 - Non-parametric test for the Difference of Means (Treatments 2 and Control)

	Treatment 2 (E1)			
	Período_2	Período_3	Período_4	Período_5
Z	-2.543	-2.430	-3.900	-4.715
P-Value (Two-tailed)	0.011	0.015	0.000	0.000

Source: Prepared by the authors

Such results suggest an additional focus at the two characteristics of the design proposed by treatment 2: compulsory automatic enrollment and the presence of a risk-free pension plan. Although in treatment 2, more respondents opted for the pension plan in which they were automatically enrolled in period 1, such a result is different from that verified in treatment 1, which has the same characteristic. On the other hand, maybe the simple presence of a fourth option of choice in treatment 2 (the risk-free plan) has interfered in the choices over the pension plans as the risk-free plan was only the most chosen by the respondent in period 5.

Such results enable us to partially reject the hypothesis H1 (a) that a supplementary pension plan with lower risk receives more adhesions from temporarily inconsistent individuals compared to the other plans offered.

5. FINAL COMMENTS

This study attempted to identify arrangements of defined contribution pension plans related to the continuity in the resource allocation for retirement. The results suggest that the design of pension plan with automatic enrollment, parity contribution and presence of a risk-free plan seems to influence the decision of choice of the plan (Benartzi & Thaler, 2007; Choi *et al.*, 2004; Hey, 2007; Madrian & Shea, 2001), with a longer permanence in this plan compared to the control scenario in which the design of the plan did not present such characteristics. In contrast, the design of pension plan with only the automatic enrollment and parity counterpart of the sponsor seemed not to affect the decision of choice of pension plan. Therefore, in response to the research question, the main result indicates that the design of pension plan in which there is compulsory automatic enrollment with the presence of a risk-free plan has a longer permanence of individuals in this type of plan. The interpretation of such result is that the design of public policies in the pension plan area should be done in such a way that would provide incentives for people to take more adequate decisions regarding the contributions for retirement. This conclusion meets the studies of the nudge theory (Hausman & Welch, 2010; Orenstein, 2011, 2013; Thaler & Sustein, 2008).

Libertarian paternalism (Thaler & Sustein, 2008) foresees interventions oriented to “push” individuals towards what they would choose if they were not subject to the limitations of rationality, keeping the spectrum of available choices. In adherence to this concept of libertarian paternalism, this research offered evidence that the change implemented at the end of 2015 at Funpresp (a supplementary pension entity created in 2012 for the federal public servants), in which automatic enrollment (*opt out*) for workers, can be adequate. Therefore, the research results orient the understanding that the behavioral aspects captured empirically can be of great value in the definition of public policies in the pension plan field.

These results corroborate findings along the lines of behavioral economy, which point out that the tools of personal commitment (Thaler & Benartzi, 2004) and automatic

enrollment associated with the high default contribution rate (*default*) can increase the accumulated wealth for retirement (Choi *et al.*, 2004). On the other hand, the outcomes are aligned with the set of non-conclusive results about the effect of the employers counterpart on the savings of the workers, which indicate a null relation (Basset, Fleming & Rodrigues, 1998; Choi *et al.*, 2004), positive relation (Papke & Poterba, 1995) and non-linear relation (Engelhardt & Kumar, 2004) between such variables.

Finally, when evaluating the influence of the experimental treatments on the choice of pension plans, it is clear that:

- a) In experimental scenario 1 (automatic enrollment and full counterpart by the plan sponsor), most of the participants preferred the riskiest plan in all periods of the experiment. In addition, no statistically significant difference was observed between treatment 1 and the control groups, rejecting hypothesis H1(b).
- b) In experimental scenario 2 (automatic enrollment and full counterpart by the employer, in addition to the presence of a risk-free plan), it was verified that the majority of the participants preferred the risk-free plan in period 5. At the same time, most of the individuals participated in the plan in which they were automatically enrolled in periods 2 and 4. Such results allowed us to partially reject hypothesis H1(a).

These results together support, in part, the evidence that automatic enrollment (change from default of opt in to opt out) increases participation rates in pension plans (Benartzi & Thaler, 2007; Choi *et al.*, 2004; Madrian & Shea, 2001) and that individuals (usually with a profile adverse to the risk) prefer risk-free plans to riskier plans (Hey, 2007).

The research's findings can be relevant to public policies in the pension area, suggesting that compulsory automatic enrollment can be used as default in pension plans offered by the government, government agencies and other government bodies. The results encourage the inclusion of behavioral elements in the design of the pension system, paying attention to the nudges, as has already been happening in other countries, such as the United States and England.

REFERENCES

- Agnew, J. R., Anderson, L. R., Gerlach, J. R., & Szykman, L. R. (2008). Who chooses annuities? an experimental investigation of the role of gender, framing, and defaults. *The American Economic Review*, 418-422.
- Arthur, W. B. (1994). Inductive reasoning and bounded rationality. *The American economic review*, 84(2), 406-411.
- Basu, A. K., & Drew, M. E. (2007). Portfolio size and lifecycle asset allocation in pension funds. Retrieved from <http://eprints.qut.edu.au/14450/1/14450.pdf>
- Benartzi, S., & Thaler, R. H. (2007). Heuristics and biases in retirement savings behavior. *The journal of economic perspectives*, 81-104.
- Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2013). Simplification and saving. *Journal of economic behavior & organization*, 95, 130-145.
- Brown, Jeffrey R., Arie Kapteyn, and Olivia S. Mitchell. 2016. "Framing and Claiming: How Information-Framing Affects Expected Social Security Claiming Behavior." *Journal of Risk and Insurance* 83(1): 139–62. <http://doi.wiley.com/10.1111/j.1539-6975.2013.12004.x>.
- Bütler, M., & Teppa, F. (2007). The choice between an annuity and a lump sum: Results from Swiss pension funds. *Journal of Public Economics*, 91(10), 1944-1966.

- Chan, Sewin, and Ann Huff Stevens. 2008. "What You Don't Know Can't Help You: Pension Knowledge and Retirement Decision-Making." *Review of Economics and Statistics* 90(2): 253–66. <http://www.mitpressjournals.org/doi/abs/10.1162/rest.90.2.253>.
- Choi, J. J., Laibson, D., Madrian, B., & Metrick, A. (2004). *Employees' investment decisions about company stock* (No. w10228). National Bureau of Economic Research. Retrieved from <http://faculty.som.yale.edu/andrewmetrick/documents/cstock.pdf>
- Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2003). Optimal defaults. *American Economic Review*, 180-185.
- Clark, G. L. (2011). Myopia and the global financial crisis Context-specific reasoning, market structure, and institutional governance. *Dialogues in Human Geography*, 1(1), 4-25.
- Conselho Nacional de Saúde. (2012). *Resolução nº 466, de 12 de dezembro de 2012*. Recuperado de http://www.conselho.saude.gov.br/web_comissoes/conep/index.html.
- Cremer, H., & Pestieau, P. (2011). Myopia, redistribution and pensions. *European Economic Review*, 55(2), 165-175.
- [Feldstein, Martin, and Jeffrey B. Liebman. 2002. "Social Security." In Handbook of Public Economics. Vol. 4, eds. Alan J. Auerbach and Martin Feldstein. Amsterdam: North-Holland, 2245–2324.](#)
- [Ferreira, S. G. \(2007\). Sistemas Previdenciários no Mundo: Sem "Almoço Grátis". In P. Tafner, & F. Giambiagi \(Orgs.\). Previdência no Brasil: debates, dilemas e escolhas \(cap. 2, pp. 65-93\). Rio de Janeiro: IPEA.](#)
- Frederick, S., Loewenstein, G., & O'donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of economic literature*, 351-401.
- Friedman, M. (1957). *A Theory of the Consumption Function*. Princeton, NJ: Princeton University Press.
- Gill, Indermit, Truman Packard, Todd Pugatch, and Juan Yermo. 2005. "Rethinking Social Security in Latin America." *International Social Security Review* 58(2–3): 71–96. <http://doi.wiley.com/10.1111/j.1468-246X.2005.00217.x>.
- Glöckner, A. (2007). Does intuition beat fast and frugal heuristics? A systematic empirical analysis. *Intuition in judgment and decision making*, 309-325.
- Graham, F., & Isaac, A. G. (2002). The behavioral life-cycle theory of consumer behavior: survey evidence. *Journal of economic behavior & organization*, 48(4), 391-401.
- Hausman, D. M., & Welch, B. (2010). Debate: To Nudge or Not to Nudge*. *Journal of Political Philosophy*, 18(1), 123-136.
- Hey, J. D. (2007). *Report on the Pensions Experiment*. Retrieved from: <http://www-users.york.ac.uk/~jdh1/my%20papers/pension%20report.pdf>
- Hurd, M., & Panis, C. (2006). The choice to cash out pension rights at job change or retirement. *Journal of Public Economics*, 90(12), 2213-2227.
- Kahneman, D. (2012). *Rápido e devagar: duas formas de pensar*. Editora Objetiva.
- Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of political Economy*, 1325-1348.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 263-291.
- Kirby, K. N. (1997). Bidding on the Future: Evidence against Normative Discounting of Delayed Rewards. *Journal of Experimental Psychology: General*, 126, pp. 54-70.
- Klein, G. A. (1998). *Sources of power: How people make decisions*. Cambridge: MIT Press.
- Knetsch, J. L. (1989). The endowment effect and evidence of nonreversible indifference curves. *The American Economic Review*, 1277-1284.
- Laibson, D. I., Repetto, A., Tobacman, J., Hall, R. E., Gale, W. G., & Akerlof, G. A. (1998). Self-control and saving for retirement. *Brookings papers on economic activity*, 91-196.

- Loewenstein, G. F. (1988). Frames of mind in intertemporal choice. *Management Science*, 34(2), 200-214.
- Loewenstein, G. & Thaler, R. H. (1989). Anomalies: Intertemporal Choice. *Journal of Economic Perspectives*, 3(4):181-193.
- Mastrobuoni, G., & Weinberg, M. (2009). Heterogeneity in intra-monthly consumption patterns, self-control, and savings at retirement. *American Economic Journal: Economic Policy*, 1(2), 163-189.
- Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Franco Modigliani*, 1.
- Mullainathan, S., & Thaler, R. H. (2000). *Behavioral economics* (No. w7948). National Bureau of Economic Research.
- Mulligan, Casey B., and Xavier Sala-i-Martin. 1999. Social Security in Theory and Practice (II): Efficiency Theories, Narrative Theories, and Implications for Reform. Cambridge, MA. <http://www.nber.org/papers/w7119>.
- Orenstein, M. A. (2011). Pension privatization in crisis: Death or rebirth of a global policy trend? *International Social Security Review*, 64(3), 65-80.
- Orenstein, M. A. (2013). Pension privatization: evolution of a paradigm. *Governance*, 26(2), 259-281.
- Pang, G., & Warshawsky, M. J. (2008). Default investment options in defined contribution plans: A quantitative comparison. *Pensions: An International Journal*, 13(4), 221-226.
- Ramo, D. E., & Prochaska, J. J. (2012). Broad reach and targeted recruitment using Facebook for an online survey of young adult substance use. *Journal of medical Internet research*, 14(1), e28.
- Read, D. (2004). Intertemporal choice. *Blackwell handbook of judgment and decision making*, 424-443.
- Read, D. (2001). Is time-discounting hyperbolic or subadditive?. *Journal of risk and uncertainty*, 23(1), 5-32.
- Shefrin, H. M., & Thaler, R. H. (1988). The behavioral life-cycle hypothesis. *Economic inquiry*, 26(4), 609-643.
- Shogren, J. F., & Taylor, L. O. (2008). On behavioral-environmental economics. *Review of Environmental Economics and Policy*, 2(1), 26-44.
- Simon, H. A. (1965). *Comportamento administrativo: estudo dos processos decisórios nas organizações administrativas*. Rio de Janeiro: FGV.
- Soman, D.; Ainslie, G.; Frederick, S.; Li, X.; Lynch, J.; Moreau, P., ... & Zauberman, G. (2005). The psychology of intertemporal discounting: Why are distant events valued differently from proximal ones?. *Marketing Letters*, 16(3-4), 347-360.
- Strotz, R. (1955). Myopia and inconsistency in dynamic utility maximization. *The Review of Economic Studies*.
- Superintendência Nacional de Previdência Complementar. Ministério da Previdência Social. PREVIC: Atuação firme para proteger participantes e fundos de pensão (notícia). Disponível em <http://www.previdencia.gov.br/noticias/previc-atuacao-firme-para-protger-participantes-e-fundos-de-pensao/>. Acesso em 11 de maio de 2015.
- Tafner, P. (2007). [Seguridade e Previdência: Conceitos Fundamentais](#). In P. Tafner, & F. Giambiagi (Org.). [Previdência no Brasil: debates, dilemas e escolhas](#). Rio de Janeiro, IPEA.
- Thaler, R. H. (1981). Some empirical evidence on dynamic inconsistency. *Economics Letters*, 8, 201-207.
- Thaler, R. H., & Benartzi, S. (2004). [Save more tomorrow™: Using behavioral economics to increase employee saving](#). *Journal of Political Economy* (Suppl.), 112(S1), S164-S187.

- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
- Willig, R. D. (1976). Consumer's surplus without apology. *The American Economic Review*, 589-597.

Annex I – Conversion table

Please note that a negative value (for example, USD -0.46) means that you lose money, while a positive value (for example, USD 0.11) means that you gain money.

Amounts between USD 0.00 and USD 100.00

USD	0.00	2.60	5.20	7.80	10.40	13.00	15.60	18.20	20.80	23.40	0.00
Cents	-0.57	-0.56	-0.54	-0.52	-0.51	-0.49	-0.47	-0.46	-0.44	-0.43	-0.57

Amounts between USD 0.00 and USD 1,000.00

USD	0.00	26.00	52.00	78.00	104.00	130.00	156.00	182.00	208.00	234.00	0.00
Cents	-0.57	-0.41	-0.26	-0.12	0.00	0.11	0.21	0.30	0.38	0.46	-0.57

Amounts between USD 0.00 and USD 10,000.00

USD	0.00	0.26	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	0.00
Cents	-0.57	0.53	0.93	1.08	1.14	1.16	1.16	1.17	1.17	1.17	-0.57