

Life Cycle and Retirement Choices

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Abstract: The life cycle is used to explain the long-term motivation for retirement and understand people's financial behaviour as they grow old. This study aims to analyze how the life cycle affects the retirement choices in Brazil. Data collection consisted of a survey targeting Brazilian adults. The statistical methods included descriptive measures, correlational analysis, as well as tests of means and proportions. Responses revealed that the concern about social security depends on age, which is a relevant explanatory variable, with older individuals tending to show a more forward-looking behaviour. By suggesting an interface between behavioural sciences and public policies, this study points out that governments should both keep track of the citizen's behavioural aspects and promote educational activities oriented to raise awareness of the need to both avoid low savings toward the end of the life cycle and save up for retirement as early as possible.

Key words: life cycle; intertemporal choices; retirement

JEL codes: J1, J17

1. Introduction

Social security can be seen as planning of well-being for the upcoming years, which can vary depending on the time elapsing from the present decision making to the future retirement (Noone, Stephens & Alpass, 2009). Considering the rise in number of the elderly citizens worldwide and in Brazil as well, the promotion of well-being has to be a priority for a healthy aging (Gragnolati M., O. Jorgensen, R. Rocha, & A. Fruttero, 2011; Halaweh, Dahlin-Ivanoff, & Svantesson et al., 2018). This study seeks to analyse the influence of age (as a proxy of life cycle) on the choices for social security-related retirement.

Modigliani and Brumberg developed the Life Cycle Hypothesis (LCH) to explain the individual's consumption patterns. It states that the individual reduces consumption throughout time, saving up during their productive working stage, to cover their expenses at an old age. In this process, choices concerning retirement change over an individual's life and a share of wages or income is withheld for future retirement (Ando, Modigliani, 1963; Modigliani, 1986).

The LCH is a relevant instrument to understand social security decisions in different age groups as it assumes that people's financial choices vary with time (Deaton, 2005). The LCH assumes that the individual consumer's behaviour in the long run is inherent to the aggregate consumption during current and future periods, and also

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assume that the individuals increase their consumption habits once they have more resources available (Ando & Modigliani, 1963). In a general way, the life cycle model does a rather satisfactory job at reproducing the empirical retirement distribution (Jiménez-Martín & Sánchez Martín, 2007). Considering that savings are the result of the individuals' desire to support their own consumption when their income reduces significantly, age has shown it a relevant factor influencing financial decisions (Green et al., 1996).

Deaton (2005) pointed out that the most fundamental challenge to the life-cycle model has been directed at its basic underlying assumption, that people make rational, consistent, intertemporal plan, and several scholars state that economic decisions are not rational (J. H. Kagel, R. C. Battalio, L. Green, 1995). Blau (2008) argues that alternative behavioral models of saving show that consumers have limited ability or willingness to plan for the future or to carry out their plans. According to Loewenstein (2000), an understanding of people's behaviours should consider that they are influenced by their long-term rational concerns and the short-term emotional motivations.

An alternative explanation to the LCH when it comes to the savings-time relationship is the concept of hyperbolic discount, i.e., several individuals would rather receive earlier rewards than wait for long-term rewards (Laibson, 1997). The hyperbolic discount has been used to explain people's behaviours related to drugs use (Bickel & Marsch, 2001) gambling (Petry, 2001) and retirement (Diamond & Köszegi, 2003). In the hypothesis of hyperbolic discount the importance of immediate consumption drops as the time horizon expands, therefore, there is the phenomenon described as reversal of preference. In addition, in the phenomenon of reversal of preferences, the proximity to receiving a reward induces impulsivity (Tversky, Slovic & Kahneman, 1990).

Impulsivity was well documented in a typical Mischel and Underwood (1974) experiment, where children should choose between immediate and inferior or late and superior rewards. Impulsivity is measured from the capacity of the waiting time. The empirical result of the test proved to be strongly linked to age, with the proportion of children who are willing to wait until the end of the experiment comes close to 60% for the oldest, while the youngest invariably do not wait for the end of the test.

Saving and investing for retirement can be especially difficult as it involves making large long-term commitments in an area in which many individuals will never develop significant expertise. This financial decisions can be overwhelming for many individuals, especially those with little financial expertise and experience (Beshears, Choi, Laibson, & Madrian, 2011). It is important to highlight that the future retirement also depends on the amount of pension accumulated, which is affected by the design of the pension system and by individual decisions. If the pension system does not ensure the maintenance of people's living patterns, as in the case of Brazil, they should protect themselves through retirement savings (Piotrowska, 2019).

The Social Security itself is an issue of concern, as it is the best retirement alternative in some places worldwide. Any crisis in this system, or even the possibility of changes in its rules, can change the citizens decision. To sustain the Social Security system, the economically active people must produce enough capital to support the retirement of the elderly population. However, the further the population grows old and the elderly percentage increases faster than the workforce, higher are the concerns about the sustainability of the Social Security system (Lee & Mason, 2011).

Fast population aging is a worldwide tendency: the ratio of people at the age of 60 or older will double worldwide from 11% in to 22% in 2050, with absolute numbers increasing from 605 million to 2 billion in the same period (World Health Organization, 2014). While in Brazil, currently, there is a large portion of young citizens, the aging of the population has been significant: almost 20 million people are over 65 years old and it is

estimated that this number will increase to 58 million by 2020 (Total Population, 2019).

As a result, the Brazilian Social Security system is deficient and has affected the public budget. It is estimated that under the current rules, pension spending could reach almost 17% of GDP by 2060 (20% of GDP including the public sector regime). The combined annual deficit of the pension schemes is close to 4.5% of GDP, contributing substantially to the general government budget deficit (OECD, 2015a; OCDE, 2015b).

In this environment, each person's stage in the life cycle is relevant. The young workers should be worried about security and retirement, because some benefits may be restricted in some scenarios. The old workers should be concerned about rule changes that may impact their retirement expectations. The LCH provides an insightful theoretical framework to analyse the social impact of insufficient income and lack of social security in Brazil.

Given the association between people economic behavior and their life cycle, changes in the population age structure have a major impact on economic development of Brazil. The needs of an elderly population require rethinking the economic and social institutions needed to realize income security and provide adequate health care and other services for an aging society (Gragnolati, Jorgensen, Rocha & Fruttero, 2011).

2. Materials and Methods

A survey was carried out to analyze how the age (life cycle proxy) influences the retirement choices in Brazil. Before the survey's application, a pre-test was performed to ensure intelligibility and correction. The participants were invited to give their opinion on the wording and the comprehensibility of the items, thus, it was sought to identify possible inconsistencies and make adjustments.

A questionnaire was applied to a representative sample contained individuals of the most different age groups, educational levels, gender, positions, and functions. The survey was released through social media for two months, from July to August 2018. The initial number of responses was 656, but the final sample comprised 608 respondents, because some participants withdrew consent or were retired yet.

The survey's most relevant point was age. The participants were divided into three age groups related to the three stages of the life cycle as traditionally used in the literature: youth, maturity, and old age (Giannetti, 2003). This division into three age groups also occurred because of the similar numbers of participants between the three groups. Of the 608 participants, the youngest is 17 years old and the oldest 73 years old.

The first group ("youth") consisted of the youngest individuals, aged up to 29 years old, and represented 34% of the sample. These participants may witness a Social Security reform whereby the contribution time may be longer, while the time of pension income may be much shorter than the current practice. The deeper the reform is, the larger its future burden is expected to be.

As these workers are starting their careers, the impact of postponing a reform is expected to be greater, with a transfer of revenue from this generation to the other groups, particularly the pensioners or those close to retirement. However, due to a long path before their retirement and the potential hyperbolic discount, perhaps this may not be reflected in the concerns and behavior of this age group.

The second group ("maturity") included participants aged 30 to 39 and represented 35% of the sample. As they are already contributing to the Social Security system, their burden may be smaller compared to the first group. However, the potential delay in a Social Security reform may also entail a larger burden in terms of contribution or active work years. The third group ("old age") consisted of individuals at the age of 40 or older. As they have been in the labour market for a longer period, the impact of a reform may not be substantial due to

acquired rights.

Five sets of questions were asked to the three groups. The first set was about their attitude toward the Social Security system, i.e., if they had a more or less proactive attitude. The responses were divided into attitude levels: "It's not a current concern" (level 0); "I'm starting to worry, but I haven't done anything yet" (level 1); "I'm worried and looking for alternatives of savings" (level 2), and "I'm really worried, and I already have my savings" (level 3). The expected pressure over the Social Security systems has caused an increase on the individuals' active planning for retirement (Noone, Stephens & Alpass, 2009). Therefore, it is relevant to identify the more or less proactive attitudes in the different stages of the life cycle.

The second set of questions was related to contribution, i.e., whether the participants contributed to any kind of pension plan, and which was it. Participants were allowed to select more than one of the following options: "I don't contribute to any plan"; "I contribute to the official Social Security provided by the Brazilian Government"; "I contribute to the civil servant's pension plan", and "I contribute to a supplementary pension plan". Economic factors, such as the retirement plans, or structural changes in the Social Security system influence the decision and preparation for this life stage. The aim was to analyze the contribution or its lack in the different life cycle stages and identify whether there is a great number of participants contributing to the supplementary pension plan, which is an option in Brazil. When the respondents selected the alternative "I contribute to Social Security", their answers were used as a proxy of forward-looking behaviour.

The third set of questions was about whether the respondents make their own investments to support their life at a later age. The aim was to relate the provident (or improvident) behaviour to the different stages in the life cycle. Among the different aspects of the security planning, ensuring an income before retirement is closely related to the future well-being. As such, financial planning is a significant predictor of well- being, as the individuals who planned their retirement are more likely to be satisfied in this area than those who did not (Noone, Stephens & Alpass, 2009). The variable "saving money for an older age", too, was used in this study as a proxy of forward-looking behaviour.

The fourth set of questions was about participants perception of future retirement. This variable explores notions of financial stability, increase in the expenses, and the concern about obtaining and supplementing income during retirement period. Perceptions and attitudes have been shown to influence the planning behaviours and have a significant impact on the individuals' lifestyle and financial planning (Noone, Stephens & Alpass, 2009).

The "perception of future retirement" was based on the following statements, with answers following a five-point Likert scale: Q1. I believe it's going to be hard to live on my pension; Q2. I believe I'll have financial stability in my retirement even if I have a smaller income than my current wage; Q3. I believe I'll probably have to search for new ways to earn money to keep myself financially stable during my retirement; Q4. I believe I'll have a pleasant financial life even though the pension may be small; Q5. I believe I'll have a comfortable life considering my future income. This statement was adapted from the Retirement Future Perception Scale — EPFA (in portuguese), developed in the study by Rafalski & Andrade (2017).

High scores in Q2, Q4 and Q5 would point out that the participants identified themselves as successful and financially stable during retirement, but high scores in Q1 and Q3 would point to the opposite direction. As such, a rate was produced for "negative perception of future retirement" (Q1 + Q3), and a second one was produced for an "positive perception" (Q2 + Q4 + Q5). The general preception rate was calculated as (Q2 + Q4 + Q5 – Q1 – Q3 + 8). The score of the general rate ranges from 0 to 20 points, because each item follows a scale from 0 to 4 (0 – I totally disagree; 1 – I disagree; 2 – I neither disagree nor agree; 3 – I agree; 4 – I totally agree). The final result

was added 8 to find a positive value for the general perception of future retirement rate.

Finally, the fifth set of questions incorporated into the study was related to a behavioral variable. The Barratt Impulsivity Scale (BIS) was used to capture the respondents' impulsivity/impatience. According to Malloy *et al.* (2010), BIS is one of the most influential models in explaining the impulsive behavior already validated in Brazil. Impulsivity is characterized by cognitive and behavioral patterns that leads to immediate and medium and long-term dysfunctional consequences. In addition, impulsivity, from the point of view of intertemporal choice, reveals a strong behavior preferred by the present in relation to the future, that is, a high rate of time discount.

BIS allows the calculation of partial scores related to three subdomains of impulsivity, namely: motor impulsivity, attentional impulsivity and impulsiveness for not planning. For the purposes of this research, it seems more coherent to analyze impulsiveness through non-planning, considering that this impulsiveness encompasses behaviors that are more oriented to the present to the detriment of the future.

An impulsive behavior index was created, with the highest scores showing the presence of that behavior. For the calculation of the index, the participants answered the questions: 1) I plan tasks carefully. 2) I plan to travel well in advance. 3) I have self-control. 4) I save regularly. 5) I think about things carefully. 6) I make plans to stay in the job. 7) I say things without thinking. 8) I like to think about complex problems. 9) I get bored easily when I am solving problems mentally. 10) I am more interested in the present than in the future. 11) And I like games and mental challenges. Which one of the 11 items has a gradation of up to 3 points (0- Rarely or Never; 1- Every time from time to time; 2- Frequently; 3- Almost always/always).

Each variable, "Attitude Toward Social Security", "Provident Behaviour", "Perception of Future Retirement" and "Impulsivity" was analyzed to each life cycle. The relationship between the variables was measured through cross-tabulation and tests of means and proportions. As usual in the field, the significance level was set at 1%, 5%, and 10%, as appropriate. In the Levene's Test for Relative Variation, necessary for the test of means, the level was set at 5% to define equality of variances. The results had Cronbach's Alpha Based on standardized items equal to 0.692, adequate for this kind of research. The main limitation of the results stems from the instrument used, where the self-assessment process may not express the respondent's real feelings or his actions.

3. Results and Discussion

3.1 Age and Attitude Toward Social Security

It was found that for "attitude towards social security", 39.9% of participants are starting to worry, but have done nothing about it (level 1). Those who are concerned and looking for savings alternatives (level 2) represent 36.3% of the sample. The extremes, that is, those that are not concerned (level 1) and that are very concerned (level 3), represent 13% and 10.7%, respectively.

A cross-tabulation was performed to analyze how the life cycle influences the attitude toward social security (see Table 1). The test was carried out for each age group: 0 ("youth"), 1 ("maturity"), 2 ("old age"). The result show that the attitude toward Social Security is level 2 for most of the participants in the "old age". This means that the oldest respondents have a more proactive attitude toward this subject, i.e., they are concerned and searching for alternatives. Meanwhile, the youngest participants either had not taken any actions (44%) or were not worried about it (15%).

Table 1 Elever of Concern per Ene Cycle					
Life Cycle	0	1	2	3	Total
Youth	31	90	74	10	205
Maturity	23	90	69	30	212
Old Age	25	63	78	25	191
Total	79	243	221	65	608

Table 1 Level of Concern per Life Cycle

Note: 0 = minor concern; 3 = high concern.

Another way to test the relationship between the variables was by determining the average age of the respondents according to their attitude level. A test of means was performed for age to assess if the results were identical in each age group. If the age did influence the attitude, the test was expected to point to different means.

Table 2 Average Age of Farticipants by Concern About Social Security						
Concern	Age Mean	Ν	Deviation	1	2	3
0	35.49	79	11.43	0.088	0.41	0.073
1	33.76	243	9.27		0.012	0.005
2	35.81	221	10.03			0.049
3	38.15	65	10.04			

 Table 2
 Average Age of Participants by Concern About Social Security

Note: the three last columns show the p-values in the mean test.

The result indicated that the participants who chose level 0 (Not a current concern) have an average age of 35.49 years. Those who marked "I'm starting to worry, but I haven't done anything yet" had an average age of 33.761 years. From this answer, as the respondents' concern grows, the average age also increased, to 35,805 and 38,154. The mean test values indicate that the participants who were more concerned with social security (levels 2 and 3 of attitude towards social security) had a higher average age than those who were more carefree.

The results also show that the age gap between the extremes is significant. For example, the average age of those who answered that the pension plan is not of their concern was 35.49 years. Meanwhile, the average age of those who said they are really worried about the subject was 38.15. The two-sample test for the difference of means showed a p-value of 0.073, according to Table 2.

3.2 Age and Perception of Future Retirement

It was found that for "future perception in relation to retirement", 32% of participants believe that it will be difficult to live with retirement; it is also important to note that 39% of respondents say that they will probably have to look for new ways to earn income to remain financially stable during this period. In general, the participants do not perceive success, financial stability and a financially pleasant life in the future retirement period.

To analyze how the life cycle affects the "perception of future retirement", a test of means was conducted, and every rate of perception (general, negative, and positive) was related to the respective age. As a result (see Table 3), the mean rates for "general perception" was sensible to age group, i.e., the higher is the age group, the higher is the perception of the the individuals.

Life Cycle	Mean	Ν	Standard Deviation	Youth	Maturity		
General Perception							
Youth	7.62	205	3.89				
Maturity	7.98	212	4.38	0.187			
Old Age	8.57	191	4.22	0.010	0.086		
Total	8.04	608	4.18				
Negative Perception							
Youth	5.56	205	1.85				
Maturity	5.23	212	2.04	0.043			
Old Age	4.52	191	2.31	≤0.001	0.001		
Total	5.12	608	2.11				
Positive Perception							
Youth	5.18	205	2.82				
Maturity	5.21	212	2.93	0.455			
Old Age	5.09	191	3.00	0.384	0.345		
Total	5.16	608	2.91				

 Table 3
 Perception of Future Retirement

Note: the three last columns show the p-value in the test of means.

The general perception of future retirement was dramatically different between groups "youth" and "old age" (p-value = 0.010) but close to the limit of significance between groups "maturity" and "old age" (p-value = 0.086), considering a significance level of 10%. This result means that the oldest respondents think they are more successful and financially stable for retirement. Besides, the negative perceptions were relevant to explain the results of the general perception rate.

However, the positive perception rate was not enough to distinguish the age groups, with differences between the means having no statistical significance. This finding is confirmed by the correlation between age and rates (general perception, negative and positive). Whereas the correlation of age with general perception was 0.075, the correlation with negative perception was negative (i.e., -0.17) and showed a higher significance (This numbers are not shown in the Table 3). The correlation with positive perception was close to zero.

3.3 Age and Forward-looking Behaviour

Forward-looking behaviour was based on two variables: "save money for an old age" and "contribution to Social Security". Most of the survey participants reported that they make contributions to the general social security — INSS (49.9%), a significant part of the sample declared no scheme (19.2%) and 18.7% of the participants said they made contributions to complementary pension plans, which are optional in Brazil.

Most participants (54.2%) stated that they keep money saved in the form of investments to ensure old age. Tests of proportion were carried out to assess if the proportion of those who stated they save money and contribute to Social Security varied with age group. The test was carried out for each pair of age group: 0 ("youth") and 1 ("maturity"); 0 and 2 ("old age"), 1 and 2.

The results for variable "save money for an old age" showed that the proportion of positive answers increased with the age group (51.71%, 52.83%, and 58.12%, for groups 0, 1, and 2, respectively), but the p-value for the difference across those proportions was slightly above 5% (see Table 4).

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Life Cycle	Proportion	Ν						
Save money for an old age								
			Youth	Maturity				
Youth	51.71%	205						
Maturity	52.83%	212	0.4095					
Old Age	58.12%	191	0.1002	0.1431				
	Do r	not contribute to Social S	ecurity					
Youth	33.66%	205						
Maturity	12.74%	212	≤ 0.001					
Old Age	8.38%	191	≤ 0.001	0.0785				
	(Contribute to Social Secu	rity					
Youth	52.20%	205						
Maturity	54.25%	212	0.3374					
Old Age	41.48%	191	0.0164	0.0052				
	Contribute to Private Social Security							
Youth	12.20%	205						
Maturity	32.55%	212	≤ 0.001					
Old Age	51.31%	191	≤ 0.001	≤ 0.001				
Supplementary Security Plan								
Youth	9.27%	205						
Maturity	25.47%	212	≤ 0.001					
Old Age	21.47%	191	≤ 0.001	0.1724				

Table 4 Forward-Looking Behaviour

Note: the three last columns show the p-value for the test of means.

The number of those who do not contribute to Social Security was 33.66% for group 0, and above 8.38% for group 2. This difference between the results is significant. Besides, the number of those who contribute to the private pension system and to the supplementary security plan was significantly higher among those at a higher age. These findings might be indicative that part of the sample included young people who were not in the job market yet, while it also seems to show that ageing calls for saving up. This result responds to study reports that the discount rates decrease with ageing (Green, Fry & Myerson, 1994). In other words, older participants seem to ascribe a higher value to pension money in the present study.

The same test was performed for those who informed that they contributed to the mandatory Social Security, which represented a subsample. Those were 52.2% of the youngest respondents, while this percentage dropped to 41.48% among the oldest participants, with the difference between the proportions being significant (p = 0.0052). This might be indicative that the oldest respondents do not contribute as much as the youngest ones to the National Social Security system for workers in the public sector. This result was not expected. Part of the explanation may be that the oldest participants have the option of a supplementary pension plan or even because they are saving up by themselves. In general, the oldest respondents showed a more forward-looking behaviour in this study.

3.4 Age and Impulsive Behavior

The results of the impulsive behavior scale showed that most participants plan tasks carefully (44%), plan

trips well in advance (33%), claim to have self-control (45%), save regularly (31%), believe in thinking about things carefully (53%) and make plans to stay in employment (44.74%). In general, there is a tendency towards less impulsive or more controlled behavior revealed by the research participants.

To analyze how the life cycle affects "impulsive behavior", the average impulsivity response for each age group was first calculated and, subsequently, an average test was performed to check if there is a difference between the averages. Thus, for each age group, the level of impulsivity was calculated and the mean values were tested to see if they differ from each other, using the mean test for independent samples.

Life Cycle	Mean	Ν	Standard Deviation	0	1	2	
0	12.76	205	4.70	-	0.7550	0.329	
1	12.61	212	4.94	-	-	0.230	
2	12.97	191	4.81				
Total	12.77	608	4.81				

Table 5 Impulsive Behavior

Note: the three last columns show the p-value for the test of means.

The test results indicate that the impulsive behavior does not change according to the age group, which was not previously expected by the research. Giannetti (2005) attributes to youth the dominant vector of impulsivity and, to maturity, in turn, the relaxation of impulsivity in the formation of individuals' temporal preferences. On the other hand, however, it also emphasizes that old age harbors vectors that work by intensifying the willingness to discount the future, with a view to shortening the horizon ahead. Thus, the impact of maturation on impulsive behavior seems to be undetermined.

In a non-tabulated test, using impulsive behavior as a dependent variable and age groups as independent variables and others variables as control, there is a 6.7% significance, close to the 5% limit. The sign of the variable is positive, showing that the older the age, the greater the impulsive behavior. This result was also not expected, since impulsivity is more related to younger age. However, a possible reason is the fact that, for this research, respondents with older age were generally also employed in the public sector. In this sense, the stability of the public service could allow more impulsive behavior. Future research may help in understanding.

4. Conclusion

Retirement is a growing topic in Brazil due to demographic, socioeconomic and social security factors. To understand the phenomenon of savings decisions in relation to retirement, it is necessary to pay special attention to the behavioral dimension and how retirement is affected by this dimension.

In this context, Social Security is seen as a forward-looking tool for a long-term resource allocation in order to avoid the lack of income in the future retirement. As for the theoretical basis of the present study — Life Cycle Theory, it can help explain the trajectory of intertemporal allocation of financial resources, being relevant for illuminating the effect of age on resource allocation over time.

This study aimed to analyze how the life cycle affects the retirement choices in Brazil. It was possible tested variables about the participants' attitudes toward future retirement and the understand of the Social Security system as a means to gain a better understanding of the more or less forward-looking actions in three stages in the life cycle.

The results showed that the oldest respondents are in general the ones with a more active attitude toward the

Social Security system, being worried about and looking for alternatives to save up. Nonetheless, the youngest participants tended to have a less active or concerned behaviour. This result is contradictory in the current Brazilian context, since changes in the Social Security system are likely to affect the youngest workers in a larger scale than the oldest workers.

The future perception of retirement also showed sensitivity to the age group, so that older participants had a higher index of future perception. This result means that older participants perceive greater success and financial stability in the retirement period, compared to younger participants. The forward-looking behaviour was also more frequent among the oldest participants, and the number of participants who said they did not contribute to Social Security was much higher in the youngest group. It might be expected that aging shall come with more sobriety about the need to save up for retirement.

Interestingly, the share of workers who contribute to their own private pension system and a supplementary pension plan was higher among the oldest participants, and the number of participants who contribute to the State Social Security system decreased with age. This result was not expected but might be indicative that the oldest workers will not contribute to such a system as much as the youngest workers because most of them are civil servants and, therefore, have their own security system.

For this research, in general, older people are also linked to the public sector. This fact can help explain the issue of indeterminate impulsivity, because if on the one hand youth is a vector that influences impulsivity, on the other hand the security that public service provides to the elderly can also be a vector that influences impulsive behavior.

In non-tabulated tests, it was found that an interactive variable linking public sector and age group presented an interesting result. The model with the interactive variable does not substantially improve the R2 of the regression, but in compensation the significance of the coefficients are all adequate, including the interactive variable. In this way, the age group together with the fact that the participant works in the public sector becomes relevant to explain attitude towards social security. The solution of the interactive variable was calculated for the variable impulsive behavior, but the model did not improve and for this reason it was not presented. Future research may help in understanding.

Bearing in mind that the connection between the theme of retirement and the life cycle is not limited to the national context, further research should both target a broader demographic and assess the relationship between social security and life cycle in further geographic contexts.

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References

Ando A. and Modigliani F. (1963). "The 'life cycle' hypothesis of saving: Aggregate implications and tests", *The American Economic Review*, Vol. 53, No. 1, pp. 55-84.

Deaton A. (2005). "Franco Modigliani and the life cycle theory of consumption", Quartely Review, Vol. 58, pp. 91-107.

Beshears J., Choi J. J., Laibson D. and Madrian B. C. (2011). "Behavioral economics perspectives on public sector pension plans", No. w16728, National Bureau of Economic Research. Blau D. M. (2008). "Retirement and consumption in a life cycle model", Journal of Labor Economics, Vol. 26, No. 1, pp. 35-71.

- Kahneman D. and Tversky A. (2013). "Prospect theory: An analysis of decision under risk", in: *Handbook of the Fundamentals of Financial Decision Making: Part I*, pp. 99-127.
- Giannetti E. (2005). "O valor do amanhã: Ensaio sobre a natureza dos juros", São Paulo, SP, Companhia das Letras.
- Modigliani F. (1986). "Life cycle, individual thrift, and the wealth of nations", *The American Economic Review*, Vol. 76, No. 3, pp. 297-313
- Loewenstein G. (2000). "Emotions in economic theory and economic behavior", *American Economic Review*, Vol. 90, No. 2, pp. 426-432.
- Gragnolati M., Jorgensen O., Rocha R. and Fruttero A. (2011). Growing Old in an Older Brazil: Implications of Population Aging on Growth, Poverty, Public Finance and Service Delivery, World Bank.
- Halaweh H., Dahlin-Ivanoff S. and Svantesson U. et al. (2018). "Perspectives of older adults on aging well: A focus group study", Journal of Aging Research.
- Jiménez-Martín S. and Sánchez Martín A. R. (2007). "An evaluation of the life cycle effects of minimum pensions on retirement behavior", *Journal of Applied Econometrics*, Vol. 22, No. 5, pp. 923-950.
- Kagel J. H., Battalio R. C. and Green L. (1995). "Economic choice theory: An experimental analysis of animal behavior", Cambridge University Press.
- Noone J. H., Stephens C. and Alpass F. M. (2009). "Preretirement planning and well-being in later life: A prospective study", *Research on Aging*, Vol. 31, No. 3, pp. 295-317.
- Paim J., Travassos C. and Almeida C. et al. (2011). "The Brazilian health system: history, advances, and challenges", *The Lancet*, Vol. 377, No. 9779, pp. 1778-1797.
- Green L., Fry A. F. and Myerson J. (1994). "Discounting of delayed rewards: A life-span comparison", *Psychological Science*, Vol. 5, No. 1, pp. 33-36.
- Zhang L. (2013). "Saving and retirement behavior under quasi-hyperbolic discounting", *Journal of Economics*, Vol. 109, No. 1, pp. 57-71.
- Green L. et al. (1996). "Temporal discounting in choice between delayed rewards: the role of age and income", *Psychology and Aging*, Vol. 11, No. 1, p. 79.
- Malloy-Diniz L. F., Mattos P., Leite W. B., Abreu N., Coutinho G., Paula J. J. D. and Fuentes D. et al. (2010). "Translation and cultural adaptation of the Barratt Impulsiveness Scale (BIS-11) for application in Brazilian adults", *Brazilian Journal of Psychiatry*, Vol. 59, No. 2, pp. 99-105.
- Mischel W. and Underwood B. (1974). "Instrumental ideation in delay of gratification", Child development, pp. 1083-1088.
- N. M. Petry (2001). "Delay discounting of money and alcohol in actively using alcoholics, currently abstinent alcoholics, and controls", *Psychopharmacology*, Vol. 154, No. 3, pp. 243-250.
- OECD (2015a). OECD Economic Survey of Brazil 2015, Paris: OECD.
- OECD (2015b). Pensions at a Glance 2015, Paris: OECD, available online at: http://oe.cd/pag.
- Diamond P. and Köszegi B. (2003). "Quasi-hyperbolic discounting and retirement", *Journal of Public Economics*, Vol. 87, No. 9-10, pp. 1839-1872.
- Piotrowska M. (2019). "The importance of personality characteristics and behavioral constraints for retirement saving", *Economic Analysis and Policy*, Vol. 64, pp. 194-220.
- Lee R. D. and Mason A. (2011). "Population aging and the generational economy: Aglobal perspective", Edward Elgar Publishing.
- Rafalski J. C. and Andrade A. L. D. (2017). "Development of the Retirement Future Perception Scale (EPFA) and psychosocial correlates", *Psycho-USF*, Vol. 22, No. 1, pp. 49-62.
- United Nations Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section (June 2019). "Total population Both sexes", in: *World Population Prospects: The 2019 Revision*, retrieved 17 June 2019.
- Tversky A., Slovic P. and Kahneman D. (1990). "The causes of preference reversal", The American Economic Review, pp. 204-217.
- Bickel W. K. and Marsch L. A. (2001). "Toward a behavioral economic understanding of drug dependence: Delay discounting processes", *Addiction*, Vol. 96, No. 1, pp. 73-86.
- World Bank (2019). World Development Indicators, retrieved 15 October, 2019.
- World Health Organization (2014). "Facts about ageing", September 2014, available online at: http://www.who.int/ageing/about/facts/en/.

Laibson D. (1997). "Golden eggs and hyperbolic discounting", The Quarterly Journal of Economics, Vol. 112, No. 2, pp. 443-478.