

WHO IS SAVING AND HOW MUCH? NEW EVIDENCE FROM BRAZIL

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This paper examines the economic and social factors that influence individual savings in Brazil. Based on the Life Cycle Hypothesis (LCH), we use data sourced from 2017-2018 Household Budget Surveys to analyse the individual savings of Brazilian aged from 18 to 80. Using a conventional logistic regression model, our results suggest that several demographic characteristics, education, economic and social factors influence individual savings in Brazil. For instance, we find a nonlinear relationship between age and individual savings, following Life-Cycle Hypothesis (LCH) concepts. Thus, social policies should be designed to promote savings, especially in groups with a lower likelihood of savings.

Keywords: Individual Savings; Brazil; Life Cycle Hypothesis, Intertemporal Choice

1 INTRODUCTION

According to the World Bank (2021), gross national savings in Brazil as a percentage of gross domestic product (GDP) was 12 percent in 2019. This value is well below East Asia and Pacific (42 percent), South Asia (28 percent) and even Latin America (16 percent). In essence, national savings are the aggregates of heterogeneous households' (or individuals') personal savings decisions (Gandelman, 2016).

The low level of individual savings generates a deficient supply of private savings, which is not enough for the normal interest rate's investment demand. Thus, the interest rate needs to be higher (Lopes, 2014). From the individual perspective, savings are essential because they generate financial safety during retirement, unexpected financial expenditures, and helping in difficult situations such as disease and job losses (Iregui-Bohórquez et al. 2018). Therefore, understanding household saving behaviour, specifically its determinants, has focused on a lot of empirical research (Hua and Errygers, 2019).

Due to Brazil's economic and demographic changes, especially the extensive discussion about the Brazilian social security system, which tends to increase the minimum age for retirement (Freitas and Paes, 2019), private savings have to receive more attention from society. From a demographic perspective, aging in Brazil is another important issue as the country needs to be prepared for population-ageing needs (Miranda, Mendes and Silva, 2016). Against this background, understanding individual savings determinants are particularly important in the current Brazilian economic scenario (Moreira and Silveira, 2019).

The macroeconomics factors also influence individual savings, such as economic growth, inflation, unemployment, interest rate. However, the analysis of the determinants of individual savings based on a microeconomic perspective gives a complete understanding of the determinants of a family's savings (Hua and Errygers, 2019).

Therefore, this paper aims to reveal the effects of economic and demographic individual characteristics on Brazil's individual savings. Our first empirical approach attempts to identify the determinants of savings in Brazil and then how these factors contribute to the amount of savings. Thus, recognising the economic and demographic factors that may influence individual savings in Brazil can be used by policymakers to design and implement targeted programs to increase savings participation and, by extension, promote economic growth and socioeconomic development.

We use data drawn from the 2017-2018 Household Budget Surveys (POF), which contains information on expenditure, earnings as well as detailed information on the cultural, demographic, economic, and social characteristics of its participants. These data provide us with a unique opportunity to investigate the determinants of individual savings in Brazil. In examining this question, our study contributes to the literature by providing new evidence to help the current political debate about the Brazilian social security system.

The balance of this journal article is organised as follows. After this introduction, we review the previous empirical studies. Next, we outline our data source and empirical strategy. Thereafter, we discuss the results of our empirical analysis. The article concludes with an enumeration of the possible explanations for our findings.

2 PREVIOUS EMPIRICAL STUDIES

From a macroeconomic perspective, private saving has contributed to economic growth (Deaton and Paxson, 2000; Niculescu-Aron and Mihaescu, 2014; Hua and Erreygers, 2019) for reducing dependence on external resources (Moreira and Silveira, 2019; Paiva and Jahan, 2003). Private saving also may provide financial security for unexpected events from a microeconomic context.

Based on its importance, we notice an increasing number of studies analysing private saving worldwide divided into two streams (Gandelman, 2016). Given that the national saving rates differ substantially across countries (Poterba, 1994; Kirsanova and Sefton, 2007), the first stream analyses cross-country saving differences. In that approach, we observe studies comparing some OECD countries, like United Kingdom, Italy, German, Netherlands, and the United State (e.g., Kirsanova and Sefton, 2007; Borsch-Supan, 2003), as well as some studies from Latin American (e.g., Bebczuk et al. 2015; Gandelman, 2016; 2017). Private saving studies is especially important in Latin America countries because they present two characteristics that support private saving studies: i) most unequal regions in the world; and ii) low savings rates that delay economic growth (Edwards, 1996).

The second stream that evaluates each country individually may be divided into macro and micro levels' studies. Based on macroeconomic data, there are empirical papers for Mexico (Swiston and Bulir, 2006), Colombia (Lopez-Mejia and Ortega, 1998), Brazil (Paiva and Jahan, 2003) and India (Athukorala and Sen, 2004). However, although relevant in some cases, the macroeconomic variables could not precisely define the elements behind why and how much households save (Bebczuk et al. 2015). Against this background, microeconomic studies present an important contribution to the literature on savings to improve the understanding of the Life Cycle Hypothesis (LCH) (Butelmann and Gallego, 2001).

The LCH, which originated theoretical work on saving (Borsch-Supan, 2003), implies a negative savings rate in youth and old age when income is relatively low and a positive middle age when income is high (Modigliani and Brumberg, 1954). Therefore, individuals' savings behaviour would differ by age (Gandelman, 2016), being a way to smooth individuals' consumption by borrowing when income is low and by saving when it is high (Kirsanova and Sefton, 2007; Deaton, 2005).¹

For microeconomic studies, it is also essential to characterise whether the decisionmakers are individuals or households (Gandelman, 2016). The reason is that computing household saving rates requires to attribute them by characteristics of the household head, which may not be demographically illustrative of the household unit (Gandelman, 2016; Kirsanova and Sefton, 2007). Another issue discussed on considering households instead of the individual as the unit of analysis is that the former are transient entities that may be transformed and disappear over time due to changes in the family environment (Gokhale, Kotlikoff and

¹ Subsequent refinements to the LCH are present in the literature with savings motivated by precaution in the face of uncertainty (e.g., Kimball, 1990, and Lusardi, 1998) and due borrowing constraints (e.g., Campbell and Mankiw, 1990, and Deaton, 1991).

Sabelhaus, 1996; Deaton and Paxton, 2000). Due to data limitation² or different study aim³, we observe papers taking household as the unit of analysis. Examples of these works are Dynan, Skinner and Zeldes (2004), for United States, Alan, Atalay e Crossley (2015) for Canada, Bozio et al. (2011) for UK, among others.

In the midst of these debates, the number of studies about the determinants of private savings in Brazil is limited. The few existing evaluating Brazilian case, in general, falls within the microeconomic data approach⁴ with the information collected from the Household Budget Surveys (POF). For example, Silveira and Moreira (2014) analysed the evolution of the Brazilian family's savings over the life cycle using the POF of 2008-2009. They found that barriers to access the credit market are the main explanation for the inability of families with low education level to smooth their consumption as predicted by life cycle as already noted by Browning and Lusardi (1996) and Deaton (2005). Thereby, part of the Brazilian household savings effort is allocated to the purchase of durable goods (Silveira and Moreira, 2017).

In another work, Silveira and Moreira (2015), using POF of 2002-2003 and 2008-2009, focused on the demographic and socioeconomic determinants of the Brazilian household's savings rate. In that case, they found that the savings rate follows a concave path in the life cycle and that, in general, characteristics such as retirement, public and formal employment increase the chances of positive savings and the expected savings value. Rodrigues, Menezes Filho, and Komatsu (2018) found, using POF of 1995-1996, 2002-2003 and 2008-2009, that savings was extremely concentrated in the highest tenths of the income distribution. Lastly, using POF of 2002-2003 and 2008-2009, Zuanazzi and Fochezatto (2020) analysed how the proportion of savers would change as the population ages. They found that, in Brazil case, there was a higher incidence of middle-aged adults' savers when compared to the elderly.

Against this background, this paper uses the most recent POF dataset (2017-2018), analysing Brazil in an environment of social security system reform. Moreover, given our main purpose, this paper applies a microeconomic data approach, considering the individual as our analysis unit. This gives us the opportunity to empirically test the life-cycle hypothesis, which is better supported by assuming individual as decisionmakers (Gandelman, 2016; Deaton and Paxson, 2000).

3 DATA AND EMPIRICAL STRATEGY

The data used in this study were sourced from the 2017-2018 Household Budget Surveys (POF). The POF is a nationally representative survey, which collects data on a range of topics, including detailed household expenditure, earnings, as well as information on the cultural, demographic, economic, and social characteristics of its participants (POF, 2021). In addition to collecting information on these topics, it also contains information on the Brazilian population's savings. Our sample comprised of those individuals between the age of 18 and 80. Furthermore, observations with no earnings were dropped since we considered these values as improbably low. Thus, our final analytical sample consists of 99,585 individuals.

² The data limitation may be related to the database itself, available only at the household level, or in the difficulty of computing consumption, necessary to calculate savings and which is generally available only at the household level, for all household members (Gandelman, 2016).

³ Normally these studies are focused in understand if richer people save a higher proportion of their income than their poorer counterparts.

⁴ An exception is Paiva and Jahan (2003) that, analyzing the determinants of private saving in Brazil during 1965-2000, focused in the relation between private and public saving.

3.1 Individual savings

Following previous studies considering the Brazilian context (e.g., Moreira and Silveira, 2019; Menezes Filho and Komatsu, 2018), our dependent variables are separated into two great groups. In order to find the determinants of savings, we have to construct three dependent variables, by individual level, as follow:

- (1) 'S1': a binary variable which receives "1" if the net value of the purchase of purely financial assets is positive and "0" if otherwise;
- (2) 'S2': a binary variable which receives "1" if the sum of savings S1 plus net purchase of real estate is positive and "0" if otherwise;
- (3) 'S3': a binary variable which receives "1" if the sum of savings S2 plus net purchase of vehicles is positive and "0" if otherwise;

These variables represent different dimensions of savings and would help to identify the characterises of Brazilian savers. The additional question is directed to these savers and objective to know how much they are saving. Thus, secondly, we have constructed three dependent variables as follow:

- (1) 'S1_value': the logarithm of the net value of the purchase of purely financial assets;
- (2) 'S2_value': the logarithm of the net value of the sum of savings S1_value plus net purchase of real estate;
- (3) 'S3_value': the logarithm of the net value of the sum of savings S2_value plus net purchase of vehicles;

3.2 Independent variables

We used three vectors of variables as the determinants of the savings in each estimated model. The first vector is related to demographic effects (i.e., age, age squared, gender, whether the respondent is non-white and resides in an urban area). It includes the age in years (18 to 80) and age squared to capture the evolution of the savings rate in the life cycle hypothesis (LCH) (Silveira and Moreira, 2017). In that case, it is expected that middle-aged individuals have a higher probability of saving compared to younger and older individuals (Modigliani and Brumberg, 1954). A nonlinear relationship may be expected (Zuanazzi and Fochezatto, 2020; Iregui-Bohórquez et al. 2018; Bebczuk et al. 2015).

Another important demographic aspect included in this first vector is saving rates differences between male and women, which contrasts could be explained by life span, permanent income component, wealth, and risk tolerance (Hua and Erreygers, 2019; Fisher, Hayhoe and Lown, 2015). Race or ethnicity is another variable that may affect savings due to differences in savings behaviours (Altonji and Doraszelski, 2005; Dal Borgo, 2019) where factors that influence saving are found to contrast between Black-White people (Fisher, 2010). Finally, we also incorporate a dummy variable to indicate if the household is located in the rural area once income in this area is more volatile and less stable due to the risks related to climate (Hua and Erreygers, 2019; Bebczuk et al. 2015), implying in a positive effect on saving rates, or because financial services are more concentrated in urban areas (Gandelman, 2016), what can make urban individuals to save more.

The second vector of variables is related to the education of the individuals. The positive effect of education on savings is twofold (Gandelman, 2016). First, more educated individuals get into the labour market latter than their counterparts and postponement the highest income-generating phase of their life. Secondly, education may act as a proxy for permanent income, where more rich individuals would save more (Dynan, Skinner and Zeldes, 2004; Bozio et al. 2011; Gandelman, 2017). In our case, to capture the effect of education on saving rates, we use

dummy variables related to the education of the individual, where the reference is individuals with 0 to 4 years of education, and we compare this class with another three levels of education (5-11, 12-15 and more than 16 years of education).

Finally, the last group of variables contains the social variables, including whether the individual is a public employee or retired. In the Brazilian context, being a public worker or retired would affect savings rates because they are synonymous with income stability (Silveira and Moreira, 2015).

We also included a proxy to control the position in the household. Specifically, if the individual is the head of the house, in this case, people tend to have higher precautionary savings once unexpected events may affect other household members. The number of jobs is also included as a measure of the current effort. An individual who does not have a job at present may have fewer savings capacity (Metzger, 2017).

Another important issue is related to current income. As already stated, rich people tend to save more than poor and, therefore, there is a positive relationship between income and savings (Bebczuk et al. 2015). However, considering the direct effect of income on savings, the inclusion of this variable would create endogeneity problems. Thus, we decide not to include this variable following (Silveira and Moreira, 2015; Gandelman, 2017; Bebczuk et al. 2015). Thereby, we included proxies for the household income: the number of durable goods, the number of cars, and the number of motorcycles.

3.3 Empirical strategy

In order to investigate the economic and social determinants of savings, we estimated the following regression models for Brazilian individuals.

$$Y = \alpha_0 + \beta_1 D + \beta_2 E + \beta_3 W + \mu \quad (1)$$

In equation (1) above, **Y** represents the different metrics of savings (e.g., S1, S2, S3), **D** is a vector of demographic controls (i.e., age, age squared, gender, whether the respondent is non-white, and resides in an urban area), **E** is a vector of respondent's education, **W** is a vector of economic and social variables (i.e., whether the respondent is public worker, whether the respondent is the head of household, whether the respondent is retired, the number of durable goods per capita in the household, the number of cars per capita in the household and the number of motorcycles per capita in the household) and μ is an error term. We also include a dummy for fixed regional effects controlling by the Federal States.

The empirical strategy is divided into two steps. Firstly, we identified who is saving, and our dependent variable is binary (1=net savings is positive; 0=otherwise). Given the nature of our dependent variable, we employed a conventional logistic regression model to find the effects of our economic and demographic variables on individual savings. In addition to presenting the coefficients from our logistic model, we also report the associated marginal effects, which illustrate how marginal changes in our explanatory variables influence individual savings in Brazil. Secondly, we exclude who is not saving, and our dependent variable is the log of net savings, estimated by Ordinary Least Squares (OLS).

4. RESULTS

In Table 1 we present the definitions and summary statistics for the variables used in our regression analysis. Our dependent variable, individual savings, is divided into six different categories.

Table 1: Definitions and summary statistics of variables.

Variable	Definition	Mean	Std. Dev.	Min	Max
Dependent variables					
Savings 1 (S1)	1 = net savings in S1 is positive; 0=otherwise.	0.08	0.28	0	1
Savings 2 (S2)	1 = net savings in S2 is positive; 0=otherwise.	0.09	0.29	0	1
Savings 3 (S3)	1 = net savings in S3 is positive; 0=otherwise.	0.16	0.37	0	1
S1_value	The log of net savings in S1 (only for who has positive S1)	7.52	1.86	-1.97	15.63
S2_value	The log of net savings in S2 (only for who has positive S2)	7.66	1.87	-1.97	15.55
S3_value	The log of net savings in S3 (only for who has positive S3)	8.29	1.79	-1.97	15.58
Demographics variables					
Age	Age in years	44.42	15.88	18	80
Age squared	Age in years squared	2,225	1,503	324	6,400
Gender (male)	1 = Male; 0 = Female.	0.51	0.50	0	1
Non-white	1 = Non-white; 0 = otherwise.	0.61	0.49	0	1
Urban	1 = Urban; 0 = otherwise	0.77	0.42	0	1
Respondent's education					
0-4 years (ref.)	1 = Yes; 0 = otherwise.	0.20	0.40	0	1
5-11 years	1 = Yes; 0 = otherwise.	0.36	0.48	0	1
12-15 years	1 = Yes; 0 = otherwise.	0.32	0.47	0	1
16+ years	1 = Yes; 0 = otherwise.	0.12	0.33	0	1
Economic and social variables					
Public worker	1 = Public worker; 0 = otherwise.	0.10	0.30	0	1
Head	1 = Head of household; 0 = otherwise.	0.52	0.50	0	1
Number of jobs	Number of jobs	0.91	0.64	0	10
Retired	1 = Retired; 0 = otherwise	0.21	0.41	0	1
Durable goods	The number of durable goods per capita in the household	8.09	4.94	0	72
Car	The number of cars per capita in the household	0.19	0.26	0	4
Motorcycle	The number of motorcycles per capita in the household	0.11	0.20	0	3

The overwhelming majority of people reported no individual savings for S1 (92%), S2 (91%) and S3, (84%). Those respondents who reported no individual savings received 0 in our binary variable and 1 otherwise. In our other three individual savings variables, we analysed only the respondents who reported any level of savings. In this case, the estimated mean of the net value of the purchase of purely financial assets (S1_value) is BRL 1,844 (7.52 in the log). The estimated mean of S1_value plus net purchase of real estate (S2_value) is 7.52, which represents BRL 2,121. Finally, the estimated mean of S2_value plus net purchase of vehicles (S3_value) is BRL 3,983.

Turning to our demographic variables in Table 1, the average age in years is 44, and the proportion of males is (51%). The proportion of respondents classified as non-white is (61%), and the major part of respondents live in urban areas (77%). Looking at respondent's education, (20%) of respondents have from 0 to 4 years of education, (36%) of respondents have from 5 to 11 years of education, (32%) of respondents have from 12 to 15 years of education, and (12%) of respondents have more than 16 years of education. In terms of our economic and social variables, 10% of our sample is made up of public worker, 52% is the head of household (i.e., have the responsibility to pay most bills, such as the rent), the average number of jobs is 0.91, and retired people compose 21% of our sample. Finally, 8.09 is the average number of durable goods per capita in the household, 0.19 is the average number of cars per capita in the household, and 0.11 is the average number of motorcycles per capita.

Table 2. Logistic regression models for S1, S2 and S3.

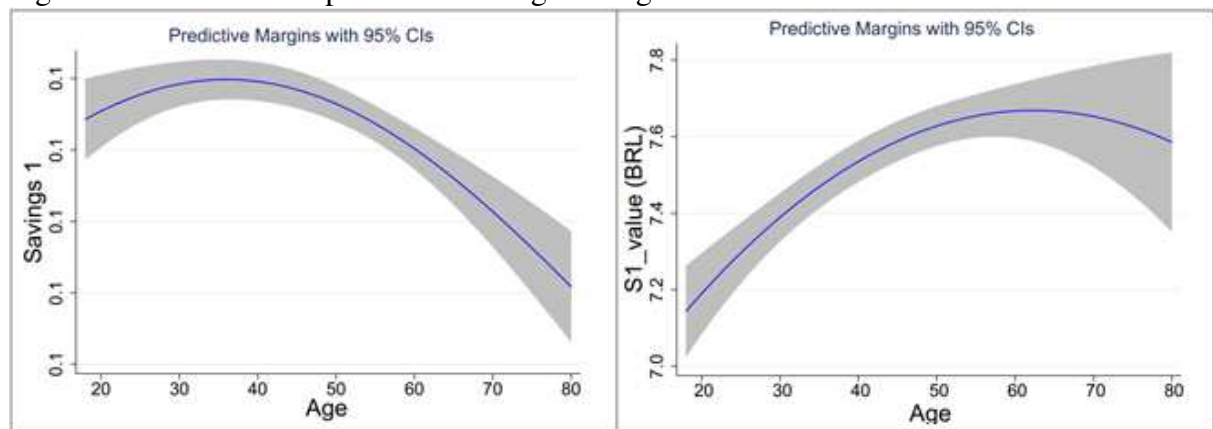
	Savings 1		Savings 2		Savings 3	
<i>Demographics variables</i>	β	SE	β	SE	β	SE
Age	0.017***	(0.005)	0.025***	(0.005)	0.021***	(0.004)
Age squared	-0.000***	(0.000)	-0.000***	(0.000)	-0.000***	(0.000)
Gender (male)	0.156***	(0.025)	0.192***	(0.024)	0.531***	(0.020)
Non-white	-0.116***	(0.026)	-0.124***	(0.025)	-0.107***	(0.020)
Urban	-0.016	(0.032)	-0.004	(0.031)	-0.033	(0.024)
<i>Respondent's education</i>						
5-11 years	0.380***	(0.044)	0.378***	(0.042)	0.321***	(0.032)
12-15 years	0.837***	(0.046)	0.808***	(0.044)	0.595***	(0.034)
16+ years	1.287***	(0.052)	1.272***	(0.049)	0.929***	(0.040)
<i>Economic and social variables</i>						
Public worker	0.135***	(0.037)	0.155***	(0.035)	0.156***	(0.030)
Head	0.150***	(0.026)	0.156***	(0.025)	0.350***	(0.020)
Number of jobs	0.268***	(0.020)	0.277***	(0.019)	0.302***	(0.016)
Retired	0.471***	(0.043)	0.507***	(0.041)	0.491***	(0.035)
Durable goods	0.050***	(0.002)	0.047***	(0.002)	0.017***	(0.002)
Car	0.381***	(0.044)	0.436***	(0.042)	1.183***	(0.037)
Motorcycle	0.380***	(0.054)	0.408***	(0.051)	1.031***	(0.042)
State dummies	Yes		Yes		Yes	
Constant	-4.411***	(0.152)	-4.438***	(0.145)	-3.590	(0.115)
R-squared	0.0774		0.0772		0.1002	
N. of cases	99,585		99,585		99,585	

* p<0.1, ** p<0.05, *** p<0.01

In Table 2 we report the results from our logistic regression to examine how our demographic, educational, economic, and social factors influence Brazilians' individual savings. It is worth noting that the coefficient of age and age squared is very small and consists of a nonlinear relationship.

The basic concept of this inverted U-shaped curve is that, as age increases, the probability of having savings increases, but only to a point, beyond which increases in age lead to a reduction of the probability of having savings. In Figure 1, we illustrate this nonlinear relationship. We observe that the age increases the probability of the net value of purely financial assets being positive only until 42 years old, beyond which increases in age reduce the probability. The same interpretation can be observed in S2 and S3 in Figure 1.

Figure 1. The relationship between savings and age



However, to assist in the interpretation of our results, we present the marginal effects of our logistic regression models in Table 3. The estimated coefficient in Table 3 shows the marginal effect in our explanatory variables on influencing the individual savings. For each

dependent dummy variable reported in Table 3, the marginal change represents a movement from the base or reference category (i.e., no individual savings) to a positive response category (e.g., any level of individual savings). The estimated marginal effects that are reported in Table 3 can be interpreted as percentages.

Table 3. Marginal effects for logistic regression models for S1, S2 and S3.

	Savings 1 (S1)		Savings 2 (S2)		Savings 3 (S3)	
	β	SE	β	SE	β	SE
Demographics variables						
Age	0.001***	(0.000)	0.002***	(0.000)	0.003***	(0.000)
Age squared	-0.000***	(0.000)	-0.000***	(0.000)	-0.000***	(0.000)
Gender (male)	0.011***	(0.002)	0.016***	(0.002)	0.064***	(0.002)
Non-white	-0.008***	(0.002)	-0.010***	(0.002)	-0.013***	(0.002)
Urban	-0.001	(0.002)	-0.000	(0.002)	-0.004	(0.003)
Respondent's education						
5-11 years	0.028***	(0.003)	0.030***	(0.003)	0.039***	(0.004)
12-15 years	0.061***	(0.003)	0.065***	(0.004)	0.072***	(0.004)
16+ years	0.094***	(0.004)	0.103***	(0.004)	0.113***	(0.005)
Economic and social variables						
Public worker	0.010***	(0.003)	0.013***	(0.003)	0.019***	(0.004)
Head	0.011***	(0.002)	0.013***	(0.002)	0.042***	(0.002)
Number of jobs	0.020***	(0.001)	0.022***	(0.002)	0.037***	(0.002)
Retired	0.034***	(0.003)	0.041***	(0.003)	0.060***	(0.004)
Durable goods	0.004***	(0.000)	0.004***	(0.000)	0.002***	(0.000)
Car	0.028***	(0.003)	0.035***	(0.003)	0.143***	(0.004)
Motorcycle	0.028***	(0.004)	0.033***	(0.004)	0.125***	(0.005)
N. of cases	99,585		99,585		99,585	

* p<0.1, ** p<0.05, *** p<0.01

Looking across Table 3, we observe that men have a positive effect on savings in financial assets, increasing the probability by 1.10 percent points than the reference category (women). In a similar vein, the probability of a non-white person being a saver (S1) is 0.80 percent points lower than a white person. In contrast, no differences were found between individuals living in urban and rural areas.

However, we verify the higher marginal effects of the respondent's education. Compared to the reference category (0-4 years of education), the chance to have positive savings (S1) is 2.80 percent points higher to people who have from 5 to 11 years of education. Similarly, compared to the reference category, the chance of being saver (S1) is (6.10) and (9.40) percent points higher to people who have (12-15 years) and (16 years or more) of education.

Regarding the economic and social variables, being public workers increases by 1 percent point the likelihood of having net positive savings (S1). Also, individuals who assume the head of their household have a 1.1 percent more probability of being saver (S1) than other residents. The number of jobs also contributes to this relationship. Each additional job increases the chances of being a saver by 2.0 percent points. Finally, the likelihood of being a saver (S1) is 3.4 percent higher to retired people than others. The other variables used to control by income level (durable goods, car, and motorcycle) present a positive relationship. The same interpretation can be made when interpreting the remaining columns for the sum of savings S1 plus net purchase of real estate (S2) and the sum of savings (S2) plus net purchase of vehicles (S3).

In Table 4, we report the results from our OLS regression model in a selected sample (only those who have net positive savings). This strategy enables the investigation of the effect of demographic, educational, social, and economic variables on the amount of money saved. Similarly to the previous analysis, a nonlinear relationship is identified between savings and

age, which indicates an inverted U-shaped curve. In Figure 1, we illustrate this nonlinear relationship. We observe that the age increases the amount of money saved (S1_value) only until 62 years old, beyond which increases in age reduce the amount of money saved. A similar interpretation can be made in looking at S2_value and S3_value.

Regarding our other independent variables, men save 80% more than women, non-white Brazilian save 25% less compared with its counterpart, and no differences can be observed between urban and rural residents. Similar to previous results, the higher impact can be observed based on the respondent's education. Compared to the reference category (0-4 years of education), individuals from 5 to 11 years of education save 16% more. Similarly, compared to the reference category, individuals from 12 to 15 years save 56% more. Finally, people with 16 years of education or more save 245% more compared to people from 0 to 4 years of education.

Table 4. Estimation of positive net saving.

	Savings 1 (S1_value)		Savings 2 (S2_value)		Savings 3 (S3_value)	
<i>Demographics variables</i>	β	SE	β	SE	β	SE
Age	0.033***	(0.007)	0.039***	(0.007)	0.044***	(0.006)
Age squared	-0.000***	(0.000)	-0.000***	(0.000)	-0.000***	(0.000)
Gender (male)	0.590***	(0.039)	0.612***	(0.038)	0.695***	(0.031)
Non-white	-0.223***	(0.041)	-0.223***	(0.040)	-0.176***	(0.029)
Urban	-0.001	(0.049)	-0.017	(0.048)	0.028	(0.033)
<i>Respondent's education</i>						
5-11 years	0.148**	(0.067)	0.148**	(0.066)	0.173***	(0.046)
12-15 years	0.450***	(0.071)	0.413***	(0.071)	0.388***	(0.050)
16+ years	1.239***	(0.081)	1.192***	(0.079)	0.935***	(0.059)
<i>Economic and social variables</i>						
Public worker	0.015	(0.055)	0.016	(0.053)	0.053	(0.043)
Head	0.075*	(0.041)	0.075*	(0.040)	0.156***	(0.030)
Number of jobs	0.084***	(0.032)	0.093***	(0.030)	0.049**	(0.023)
Retired	0.409***	(0.070)	0.413***	(0.068)	0.360***	(0.054)
Durable goods	0.036***	(0.004)	0.030***	(0.004)	-0.001	(0.003)
Car	0.675***	(0.074)	0.705***	(0.073)	1.296***	(0.055)
Motorcycle	0.109	(0.079)	0.106	(0.077)	0.059	(0.053)
State dummies	Yes		Yes		Yes	
Constant	5.354***	(0.234)	5.470***	(0.228)	6.164	(0.165)
R-squared	0.229		0.200		0.181	
N. of cases	8,410		9,273		15,446	

* p<0.1, ** p<0.05, *** p<0.01

The analysis of economic and social variables shows no differences between public workers and other individuals but reveals that the head of the household tends to save 7.80% more than other residents. The number of jobs also contributes positively to the savings, and each job increases about 8.76% of the savings (S1_value). Retired people tend to save more than their counterparts. Finally, the other economic controls (durable goods, cars, and motorcycles) also demonstrate a positive impact.

5 DISCUSSION

In this paper, we examined the economic and social determinants of individual savings in Brazil. Drawing on data from the 2017-2018 Household Budget Surveys (POF), we contribute to the literature by providing – to the best of our knowledge – the first results for Brazil. In essence, our results highlight that: (i) the majority of Brazilians (84%) do not save;

and (ii) there are, in fact, a number of economic and social factors that influence individual savings, which, in turn, gives rise some important public policy implications, mainly considering the contemporary political debate has arisen over the social security in Brazil. Against this background, the federal government has indicated that Brazil's current expenditure on social security is very high and must be reduced in the long-run. The possibilities include increasing the minimum age to retire, reducing benefits, and others (Freitas and Paes, 2019; Beltrao and Pinhanez, 2014). Therefore, it is evident that the importance of individual savings is particularly important in the present context.

Although individual savings is an essential resource for individual financial stability, which provides security during uncertainty times (Iregui-Bohórquez et al. 2018), our results show that the majority of Brazilian does not save, and it is consistent with the current literature (e.g., Moreira and Silveira, 2015, 2019; Menezes Filho and Komatsu, 2018, Zuanazzi and Fochezatto, 2020). From a social perspective, this is worrying because, with no savings, Brazilian people tend to depend on bank loans during difficult times. Therefore, it is a social fragility, mainly due to Brazil's high-interest rates (Lopes, 2014). This result highlights the importance of more studies to understand the determinants of savings in Brazil.

Looking at the demographic variables, we observed a nonlinear relationship between savings and age. This result is consistent with other empirical investigations (Zuanazzi and Fochezatto, 2020; Iregui-Bohórquez et al. 2018; Bebczuk et al. 2015). This result is also supported by the Life Cycle Hypothesis (LCH), which indicates a negative savings rate in youth and old age when income is relatively low, and a positive rate in middle age when income is high (Modigliani and Brumberg, 1954).

Other impressive results may be observed in the relationship between gender and individual savings. Our results show that men tend to save more than women and it is consistent with similar studies to Brazil (Zuanazzi and Fochezatto, 2020; Iregui-Bohórquez et al. 2018; Silveira and Moreira, 2015), although gender does not seem to be a crucial factor in the savings behaviour in other countries (Hua and Errygers, 2019; Metzger, 2017).

While some international evidence shows that the racial gap in savings rates is almost null (Gittleman and Wolff, 2004), our results show a negative relationship between non-white and savings, which is similar to other studies (e.g., Fisher, Hayhoe and Lown, 2015; Doraszelski and Altonji, 2001). To reduce the observed racial inequality in savings would be an important tool to develop policies to reduce inequality in income and education between these two racial groups (Dal Borgo, 2019).

Although some papers indicate that those who reside in rural areas save more than their counterparts (Bebczuk et al. 2015; Hua and Errygers, 2019), this result is quite ambiguous. Our results also show that living in urban areas does not affect individual savings than rural areas, as Swiston and Bulir (2006) found for Mexican individuals. This non-significant result may be due to the fact that there are relevant reasons to increase savings in urban (e.g., greater accessibility to financial services) and also reasons to increase savings in the rural area (e.g., greater unpredictability with respect to income), where it is not possible to confirm exactly the real impact (Galdeman, 2016).

Regarding the educational level, the results show that the likelihood of saving and the amount of savings is positively related to educational level, similarly to other studies (Zuanazzi and Fochezatto, 2020; Iregui-Bohórquez et al. 2018; Gandelman, 2016). Thereby, the results show that individuals with a high level of education are more likely to save and tend to save more money than others. It is worth mentioning that the higher coefficient, the econometric estimations are found for the respondent's education, highlighting the importance of this variable.

Against this background, education may help individual savings due to some reasons. First, increasing the earnings and, therefore, the possibilities of savings (Dynan, Skinner and

Zeldes, 2004; Bozio et al. 2011; Gandelman, 2017). Second, formal education may help to in personal finance (Brounen, Koedijk and Pownall, 2016). Also, a high level of education may change individuals' intertemporal choices, leading to a profile more patient, which consider the future (Bebczuk et al. 2015).

We also observe a positive impact of being employed in the public sector. It may occur given Brazilian public employees have higher income, be better educated, older, and have a more extended experience than workers in the private sector, influencing the savings behaviour (Foguel et al. 2000). However, it worth noting that these results are unexpected from the theoretical perspective, given that as public employees have more work stability, the demand for precautionary savings tends to be lesser.

The head of the household tends to save more following the prediction. It would happen because savings may protect the family from unexpected events like sickness, job losses, bad harvests, and the household's head tends to have more responsibility for the household's stability than other members.

In order to control income factors, we used three variables (durable goods, car and motorcycle ownership) as proxies for income as applied by Bebczuk et al. (2015). The positive relationship observed shows that people with higher income tend to save more than the poor, as discussed by the literature (Dyan, Skinner and Zeldes, 2004; Bozio et al. 2011; Gandelman, 2017).

The number of jobs and the positive impact observed may be due to the higher available income of who is working. Therefore, unemployed individuals save significantly lower than their counterparts, and participating in the labor market tends to increase the likelihood of savings (Metzger, 2017).

In terms of public policies, formal employment incentive could increase savings (Bebczuk et al. 2015; Iregui-Bohórquez et al. 2018). Additionally, savings may be stimulated by financial education campaigns that promote changes in individuals' behaviour towards spending their income (Iregui-Bohórquez et al. 2018). Public policies may also be designed to stimulate savings in a particular group of society, such as non-white women, once the likelihood of savings is lower for these women. Our results also justify the new educational changes implemented in Brazil, which introduced financial education in schools in 2020 (BNCC, 2021).

6 CONCLUSION

This paper investigated the relationship between individual savings and some economic and social factors using data of 99,585 Brazilians. Our empirical analysis found a nonlinear relationship between age and savings, following the Life-Cycle Hypothesis (LCH). By analysing individual savings, we sought to break new ground on Brazil's empirical analysis of savings. Moreover, our paper represents the first attempt at extending this line of inquiry into Brazil. Although some paper analyses savings in Brazil, the efforts were allocated to investigate the household savings in 2008 and earlier years.

Our results shed light on this particular issue during the current discussion of Brazil's social providence, a particularly crucial moment. From the literature review, it is clear that Brazilian individuals save less than other countries and are derived from many economic, social and demographic factors. In policy terms, our analysis provides empirical support for efforts aimed at incentive the savings, especially by those groups who have a lower likelihood to save (e.g., young people, women, non-white and poorer).

While our study adds to the empirical evidence of individual savings and contributes to the current Brazilian policy debate, further work is required in the Brazilian context. For example, how these characteristics are changing according to the decades? We view this as an important area for future research.

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