POPULATION AGING AND THE PROBABILITY OF SAVING: A LIFE CYCLE ANALYSIS OF THE BRAZILIAN CASE

Pedro Tonon Zuanazzi[1]

Adelar Fochezatto[2]

Resumo

O presente estudo analisa o ciclo de vida da poupança privada dos indivíduos no Brasil, refletindo sobre a evolução da proporção de poupadores dado o processo de envelhecimento da população. Para isso, através das POFs 1995-1996, 2002-2003 e 2008-2009, compararam-se as probabilidades de poupar e de despoupar[3] dos indivíduos conforme suas idades, empregando um modelo logit multinomial. Como sugere a hipótese do ciclo de vida, os resultados confirmam uma incidência maior de poupadores em idades intermediárias da fase adulta, frente a um percentual maior de despoupadores entre os idosos. Entretanto, dada a estrutura etária brasileira, a mudança demográfica ainda deve ser positiva nos próximos anos para o crescimento do número de poupadores.

Área 12 - Economia Social e Demografia Econômica

Classificação JEL: J10, D10

Palavras-chave: Poupança; Ciclo de vida; Brasil; Pesquisas de Orçamento Familiar.

Abstract

This study analyzes the life cycle of private individuals' savings in Brazil, reflecting on how the proportion of savers changes as the population ages. To this end, a multinomial logit model is used to compare the probability of savings and dissavings for individuals, according to their ages, based on data from the Household Budget Surveys (HBS) of 1995-1996, 2002-2003 and 2008-2009. As the life cycle hypothesis suggests, the results confirm a greater incidence of savers among middle-aged adults, compared to a greater percentage of dissavers among the elderly. However, given the age structure of the Brazilian population, demographic change is still expected to result in an increase in the number of net savers over the coming years.

Keywords: Savings; Life Cycle; Brazil; Household Budget Surveys.

[1]Ph.D. in Economics (PPGE/PUCRS). Researcher in Statistics (FEE) . E-mail: pzuanazzi@hotmail.com

[2]Ph.D. in Economics. Professor, Pontifical Catholic University of Rio Grande do Sul. Researcher of the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq). E-mail: adelar@pucrs.br

[3] The word "despoupar" does not exist in the Portuguese language, although it exists in English as "dissave", meaning the act of spending more than income.

1. INTRODUCTION

Savings is a key macroeconomic variable, despite theoretical controversies about its real role in economic growth. The issue has drawn even more attention with the Solow growth model (1956), which holds that, leaving technology constant, economic growth will be determined by a country's population growth rate and national savings rate. Subsequently, other models have continued to include savings among the variables that influence economic growth.

In this context, the demographic transition is especially significant because household savings, an important component of national savings, will be directly impacted by population aging. This relationship received attention in the mid-20th century, when two closely related theories linking the age of individuals to their savings and consumption behavior became prominent: the life cycle hypothesis (MODIGLIANI and ANDO, 1957; ANDO and MODIGLIANI, 1963) and the permanent income hypothesis (FRIEDMAN, 1957). Both assume that individuals seek to maximize their utility through a consumption profile compatible with their lifelong earnings.

Because consumption needs and income vary with an individual's age, the life cycle hypothesis holds that young people's consumption needs exceed their income, due mainly to education and housing expenses, while in adult middle age, higher incomes allow individuals to save more. Finally, during retirement, reduced income requires individuals to spend the savings they have accumulated during middle age. According to the permanent income hypothesis, individuals would prefer to distribute their consumption uniformly over time, without having to reduce it because of lower income during their retirement. Therefore, it states, they consume only that portion of their income that will persist over their lifetime. In other words, just as in the life cycle model, adults will save during the period of their maximum income.

Against the background of the life cycle model, and in view of the rapid demographic transition Brazil is currently undergoing, with a marked reduction in fertility and mortality rates in recent decades, the present study aims to estimate the effect that age has on the probability that individuals will be savers or dissavers. This makes it possible to reflect on the effects of demographic transition on the private savings of individuals and the country. To accomplish this, the three most recent Household Budget Surveys (HBS) were analyzed with regard to trends over time, and the results are compared with the existing literature.

2. Review of the literature

Leff (1969) was among the pioneers in empirical studies that sought to examine the relationship between savings and aging. Through a linear regression model using a set of 74 countries, the author estimated the savings rate in relation to income (S/Y) and savings per capita (S/N), using the dependency ratio of young people[4] and the dependency ratio of elderly people [5] as regressors, as well as the rate of economic growth and per capita income. The author found that in both the total sample and the subset of developing countries, a greater proportion of young and elderly people had a negative effect on savings, but with differing

[4]Ratio between the population of youths (0 to 14 years of age) and the population of potentially economically active individuals (15 to 64 years of age).

[5]Ratio between the population of elderly people (65 years or older) and the population of potentially economically active individuals (15 to 64 years of age).

degrees of elasticity: a 1% increase in the proportion of young people reduced the savings rate four times more than a 1% increase in the proportion of elderly people.

Gupta (1975) sought to discover not only the direct effect of dependency ratios on the savings rate but also their indirect effects through variations in income. To do this, the author used the two-stage least squares model for 40 developing countries. His results indicate that the total effects of the dependency ratios were even greater than those found by Leff (1969).

However, while studies using aggregated data have found dissavings with increases in the dependency ratio of elderly people (Leff, 1969; Gupta, 1975; Wachtel, 1984; Bosworth, Burtless, and Sabelhaus, 1991), studies using individual data have found little statistical significance (Heller, 1989; Masson and Tryon, 1990). Seeking explanations for this difference, Weil (1994) used data from a 1984 American study entitled "*Panel Study of Income Dynamics*" to examine the intergenerational relations among households. The hypothesis was that an elderly person might affect the savings not only of his or her own household but also the savings of other households. The results suggested that, assuming constant income, the prospect of an inheritance could increase consumption; that is, while the elderly person might not be spending savings, there could be a reduction of savings in a younger generation in expectation of receiving an inheritance.

Lee et al. (2000) attempt to explain the marked increase in the savings rate in Taiwan in the second half of the 20th century. Using a simulation model, the authors argue that the answer to the phenomenon is the dramatic increase in life expectancy, which requires funding a longer period of retirement. Subsequent studies using panel data corroborated these findings for various countries: Bloom et al. (2003), who note the exception that while the rate of savings among all ages may be increasing, decades of growth in the proportion of elderly people may cause a reduction in aggregate savings; and Kinugasa and Mason (2007), who argue that the gains in savings due to people's increasing life expectancy are much higher than the gains due to the smaller proportion of young dependents.

Thus, Mason and Lee (2006) define the period which the demographic transition contributes to an increase in savings as the second demographic bonus. In turn, Bloom et al. (2007) argue that longer life expectancy affects savings only in countries whose social security systems are capitalized but would not apply to countries that adopt a system of simple distribution, as is the case of Brazil. As the authors note, this is because the system of simple distribution reduces individuals' concern for saving enough to support themselves in their old age.

Nonetheless, Neri, Carvalho and Nascimento (1999) used a qualitative study conducted by the Brazilian Credit and Savings Association (Associação Brasileira de Crédito e Poupança - Abecip) in 1996 that aimed to examine the process of accumulation and dissipation of financial wealth over the life cycle, especially the need for assets in old age. The main reason for savings among the Brazilian elderly is precaution, with almost half of savers wanting to be prepared for any emergencies. Among young people, the most cited reason for saving was to accumulate funds for the future, which is consistent with the life cycle hypothesis. Finally, the habit of saving to ensure the future of the next generation was not found, indicating that the occasional inheritances left to family in the Brazilian context were unexpected rather than planned. Still in the Brazilian case, Stampe (2013) estimates that, with population aging, consumption declines in some sectors, but grows in others, making overall consumption stable at more advanced ages.

3. Methodology

The economic definition of savings is the difference between income and consumption. However, it is difficult to apply this concept using the HBS data, as some part of each individual's consumption occurs within the household, making it impossible to arrive at an exact calculation of each individual family member's savings. Therefore, an initial estimate of savings and dissavings was arrived at by examining financial investments and withdrawals, including savings accounts, fixed income funds, bank Certificates of Deposit, stock holdings and private pension funds. Those who invest sums greater than their withdrawals are assumed to be savers, while those who withdraw more than they invest are classified as dissavers.

Because this study focuses on individuals' private savings, another challenge faced is how to treat the acquisition of real estate, as many people consider the purchase of a primary home as a form of savings for retirement. Thus, a second scenario included in the category of savers those individuals who invested more in the purchase of homes and land than the total value of real estate property sold, while those who reduced the total value of their real estate holdings were considered dissavers.

Finally, a third and final scenario combined the first two, taking into account both financial transactions and real estate dealings. That is, savers were defined as individuals whose combined financial investments and real estate purchases exceeded their combined financial withdrawals and real estate sales.

Thus, in the first scenario (considering only financial transactions), micro-data of the Household Budget Survey (HBS) were used to calculate the sum of the investments and withdrawals made over the past 12 months by individual i, with the financial balance for the period given by the following equation:

$$Balance_i = Investments_i - Withdrawals_i. \quad (1)$$

The dependent variable is given, then, by the following classification for each individual:

If $Balance_i > 0$, the individual was a saver over the past 12 months (category Saver),
If $Balance_i < 0$, the individual was a dissaver over the past 12 months (category Dissaver),
If $Balance_i = 0$, the individual was neither a saver nor a dissaver over the past 12 months (category NSND).

It is important to underscore that according to the classification above, an individual whose total deposits and total withdrawals were equal would have a balance of zero. For example, someone who invested R$ 1,000 in stocks and withdrew R$ 1,000 from a savings account has zero balance, being neither a saver nor a dissaver (NSND). On the other hand, someone who invested R$ 1,000 in a bank CD and withdrew R$ 800 from a savings account is considered a saver because the balance is positive.

In the second scenario (real estate acquisition), the method is very similar, as it is also possible to identify the amounts spent and received in the real estate market over the last 12 months through the HBS, including both financed purchases and cash transactions. However, this case presents an extra wrinkle, as the purchase or sale of a primary residence appears in the HBS as a collective transaction, making it impossible to attribute the acquisition or sale to a specific family member or members. It is therefore assumed that the acquisition or sale of the property is conducted only by the head of household and that person's spouse (if

applicable), dividing the value of the property proportionally according to the total income of these two family members. Finally, in the third scenario, which includes both financial and real estate transactions, the balance is derived simply by summing the other two scenarios.

Once the three categories (Saver, Dissaver and NSND) had been established for each scenario (financial, real estate and total transactions), a multinomial logit model was constructed, according to the equation below:

$$P(y_i = j) = \frac{\exp(X_i' \beta_j)}{\sum_{j=0}^{2} \exp(X_i' \beta_j)}, j = 0, 1 \; e \; 2. \quad (2)$$

Where $P(y_i = j)$ is the probability of individual i be of category j – assign 1 for the Saver category and 2 for the dissaving category, while NSND is the reference category 0 –, X is the matrix of characteristics of individuals and β_j is the vector of parameters to be estimated.

We can thus estimate, for each age, the probability that an individual is a saver or a dissaver. In the present work, the matrix X was estimated using age and age squared as regressors. In addition, in one of the sections of results, the estimates were tested with the presence of control variables of socioeconomic, educational and demographic characteristics, which, when employed, assigned the national averages for the calculations of probability.

4. Results

An initial descriptive analysis (Table 1) shows that between 1995/1996 and 2002/2003, there was an increase in the proportion of savers in both the financial scenario (from 5.6% to 6.2%) and the real estate scenario (from 0.9% to 1.4%), while between 2002/2003 and 2008/2009, the number of savers declined in the financial scenario (from 6.2% to 5.7%) but continued to grow in the real estate scenario (from 1.4% to 1.7%). So, adding the financial and real estate scenarios, the percentage of savers rose from its 1995/1996 level of 6.2% to reach 7.3% in 2002/2003, then declined to 7.0% during the final period.

It is possible that the explanation for this decline in the number of savers between 2002/2003 and 2008/2009 lies in the economic context, considering that the 2008-2009 HBS was conducted during a global economic crisis to which the Brazilian government responded by stimulating consumption through tax reductions and public spending, while household income fell (TCU, 2009). Although the POF 2002-2003 was also collected in a period of uncertainties, when the election for the first term of former President Lula took place.

Table 1 also shows that in all the scenarios and all the periods analyzed, those who had depleted their savings over the previous 12 months had a higher mean age than those who had added to their savings. The savers, in turn, are older than those who were neither savers nor dissavers.

A simple analysis of the sample averages indicates that younger people are less likely to engage in financial and real estate transactions, the reasons for which will be explored in more detail in the following subsections. Moreover, the fact that dissavers are older than savers in all the periods and scenarios confirms the suspicion that the demographic transition could have an impact on the net difference between savers and dissavers.

Table 1

Percentages of Savers, Dissavers and NSND, with their respective mean ages, by scenario, 1995/1996, 2002/2003 and 2008/2009

SCENARIO	HBS	CATEGORY	N (UNWEIGHTED)	N (WEIGHTED)	PERCEN-TAGE	MEAN AGE	SD
Financial	2008/2009	Saver	8,090	7,920,146	5.7%	40.11	15.86
		Dissaver	2,767	2,722,661	2.0%	44.77	17.24
		NSND	138,685	128,777,566	92.4%	33.81	17.99
	2002/2003	Saver	6,325	9,507,874	6.2%	43.19	15.98
		Dissaver	1,976	3,423,428	2.2%	47.67	16.79
		NSND	133,753	139,731,234	91.5%	36.20	18.70
	1995/1996	Saver	2,552	2,087,021	5.6%	40.58	15.72
		Dissaver	1,538	1,322,699	3.5%	43.24	16.26
		NSND	45,235	33,905,482	90.9%	33.48	17.81
Real Estate	2008/2009	Saver	1,700	2,418,936	1.7%	38.62	12.91
		Dissaver	466	724,840	0.5%	45.09	13.91
		NSND	147,376	136,276,597	97.7%	34.25	18.05
	2002/2003	Saver	2,344	2,171,023	1.4%	40.41	13.47
		Dissaver	843	509,232	0.3%	48.12	14.97
		NSND	138,867	149,982,281	98.2%	36.80	18.71
	1995/1996	Saver	479	334,826	0.9%	41.01	13.51
		Dissaver	108	60,940	0.2%	42.03	14.19
		NSND	48,738	36,919,436	98.9%	34.15	17.83
Financial + Real Estate	2008/2009	Saver	9,376	9,803,794	7.0%	39.65	15.27
		Dissaver	3,071	3,249,288	2.3%	44.95	16.75
		NSND	137,095	126,367,291	90.6%	33.70	18.05
	2002/2003	Saver	8,163	11,109,313	7.3%	42.64	15.65
		Dissaver	2,666	3,677,349	2.4%	48.11	16.73
		NSND	131,225	137,875,874	90.3%	36.13	18.74
	1995/1996	Saver	2,883	2,318,923	6.2%	40.40	15.42
		Dissaver	1,562	1,327,496	3.6%	43.22	16.26
		NSND	44,880	33,668,783	90.2%	33.45	17.84

Source of raw data: IBGE (micro-data of the Household Budget Surveys of 1995/1996, 2002/2003 and 2008/2009).

Note: N (unweighted) represents the number of respondents in the study in each category, while N (weighted) represents the number of individuals in the Brazilian population represented by these respondents. All the other columns are weighted.

In the next two subsections, multinomial logit models are used to more accurately measure the effects of age on an individual's propensity to save. First, estimates of the propensity to save or dissave are calculated for each of the three scenarios without using control variables, that is, a real scenario of the ages most and least likely to save in Brazil.

In the second subsection, however, control variables are used in an effort to understand how the propensity to save or dissave by age would behave if variables such as income, educational level, gender, etc., are held constant.

4.1. Results without the use of controls

Table 2 shows the estimates of the multinomial logit model coefficients for the three scenarios, using only age and age squared as explanatory variables and NSND as the reference category. It can be seen that in all scenarios and periods, both the odds ratio of being a "Saver" and the odds ratio of being a "Dissaver", in relation to being an NSND, have an association with age that appears as an open-bottom parabola because the coefficients are positive for age and negative for age-squared, indicating that there is a maximum point in both bases. It is also worth noting the relative similarity among the coefficients in all three periods studied.

Table 2

Coefficients estimated for the multinomial logit model, using Neither Saver Nor Dissaver over the Past 12 Months as the reference category, Brazil, 1995/1996, 2002/2003 and 2008/2009

Scenario	Coefficient	Saver/NSND			Dissaver/NSND		
		2008/2009	2002/2003	1995/1996	2008/2009	2002/2003	1995/1996
Financial	Intercept	-4.2262	-4.0047	-4.2350	-5.8320	-5.4391	-5.0989
	Age	0.0735	0.0637	0.0726	0.0817	0.0638	0.0816
	Age^2	-0.0007	-0.0006	-0.0007	-0.0006	-0.0004	-0.0007
Real Estate	Intercept	-6.7638	-6.6382	-7.6705	-9.2280	-9.3091	-9.1418
	Age	0.1405	0.1473	0.1494	0.1454	0.1817	0.1318
	Age^2	-0.0016	-0.0017	-0.0016	-0.0012	-0.0017	-0.0013
Financial + Real Estate	Intercept	-4.1622	-4.0257	-4.2756	-5.9200	-5.6530	-5.0925
	Age	0.0815	0.0795	0.0815	0.0880	0.0832	0.0820
	Age^2	-0.0008	-0.0008	-0.0008	-0.0006	-0.0006	-0.0007
Observations		128,193	119,323	41,222	128,193	119,323	41,222

Source of raw data: IBGE (micro-data from the Household Budget Surveys of 1995/1996, 2002/2005 and 2008/2009

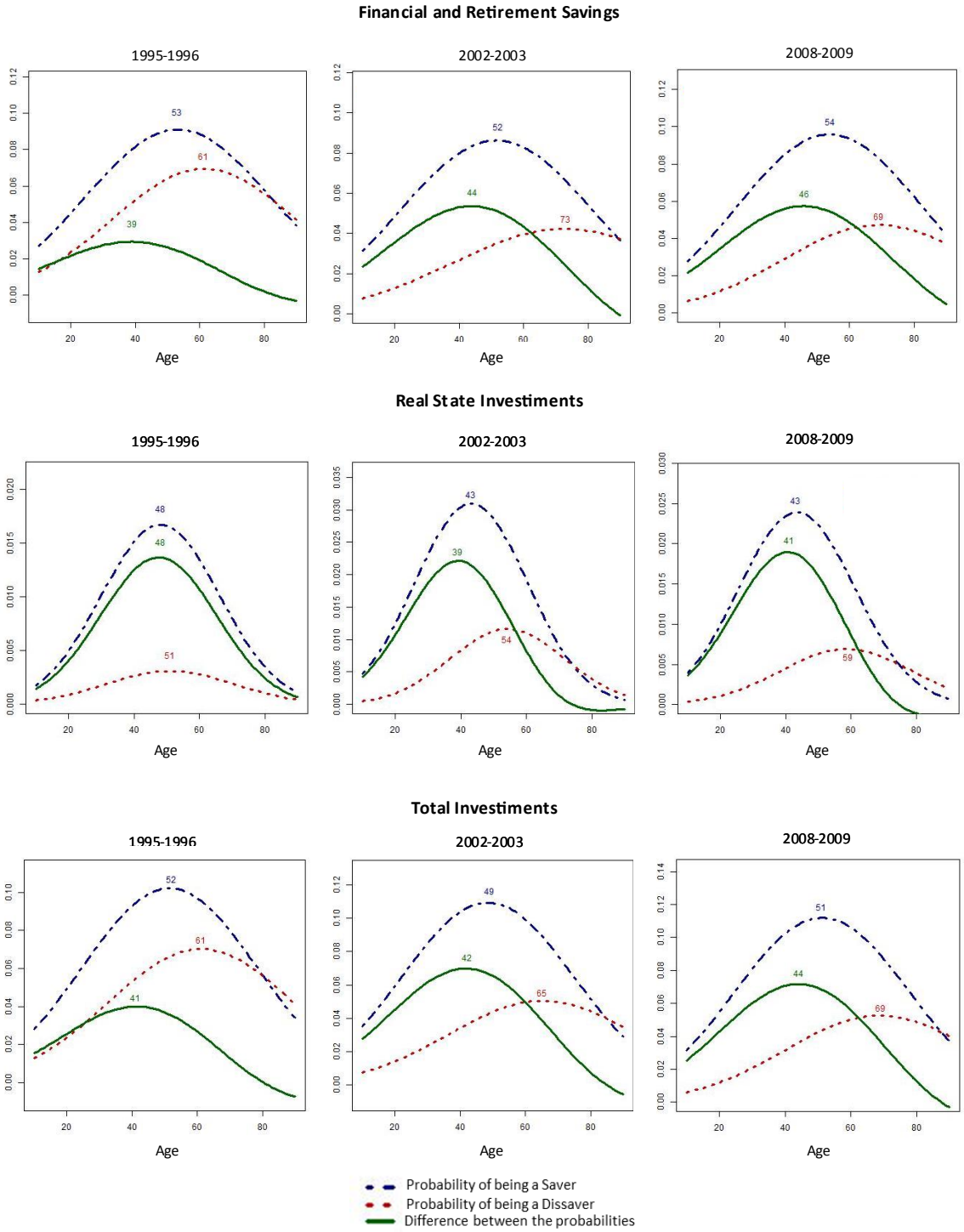
By transforming the coefficients, as described in Section 3, we can calculate the estimated probability that an individual will be a saver or dissaver, given his or her age, as shown in Figure 1. The probability of saving remains fairly stable during the periods studied in both the financial scenario (with a peak of 54 years in 2008/2009) and the real estate scenario (where the age of greatest propensity for savings was 43 in the final period).

In contrast, the likelihood of dissaving, which always reaches its high point at an older age than that of the likelihood of saving, occurs increasingly later over the years (with the exception being in the financial scenario between 2002/2003 and 2008/2009). Thus, in the final period, the highest point occurred at the age of 69 years in the financial scenario, at the age of 59 years in the real estate scenario, and at the age of 69 years in the scenario that combined financial and real estate transactions.

As a result, the net difference between the two probabilities in the scenario that combines financial and real estate transactions has also advanced over the periods, rising from 41 to 42, and later to 44 years of age. This figure deserves particular attention in the analysis because it represents the net effect of new savers. For example, if in every 100 individuals at age i, eight are savers and five are dissavers, the net balance is three additional savers.

Figure 1

Probability of saving, probability of dissaving and net difference, over a 12-month period, Brazil, 1995/1996, 2002/2003 and 2008/2009



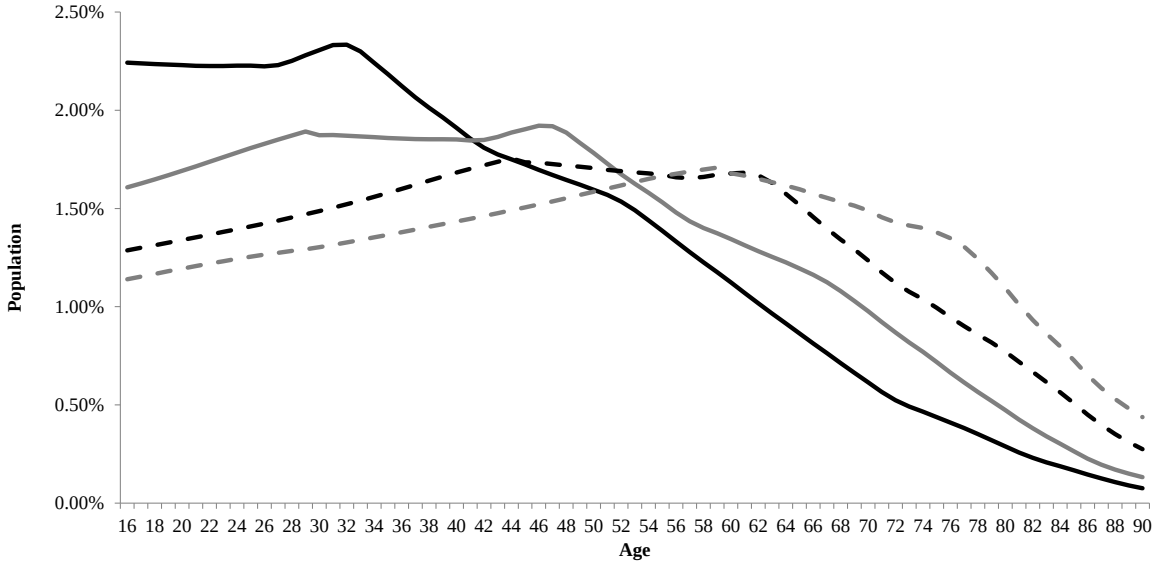
Source: Prepared by the author

According to the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística - IBGE) (2013), the mean age of the population between 16 and 90 years was 41 in 2015; it is increasing and expected to reach 45 in 2030, as shown in Figure 2. Thus, because the probability of saving in both scenarios (financial + real estate) reached its maximum at 44 years in 2008/2009, with a tendency to rise from one survey to the next, there are indications that, at least until 2030, the population structure should contribute to a rise in the percentage of savers, as Bloom (2010) has also observed.

In fact, the projections for 2045, with a mean age of 49 years, could also represent a positive contribution to private savings because the age for maximum savings may be higher, as the trend shows. Only in 2060, when the mean age reaches 52 years and a large percentage of the population is elderly, if the trend continues, would the demographic structure contribute negatively to the number of savers.

Figure 2

Projections by age of the Brazilian population between 16 and 90 years old, with their respective Mean Ages (MA), 2015 to 2060



Source: IBGE - Population Projections (Revised 2013)

4.2. Results with the use of controls

The previous subsection demonstrated that in the three periods examined, there is a quadratic relationship between age and the net difference in the probabilities of saving and dissaving, in keeping with the life cycle hypothesis: people tend to save less during their youth, save most during adulthood, and then save less again after they pass that age. However, if everyone, regardless of age, had the same income, level of education, gender, etc., would this relationship change?

To answer this question, the present subsection recalculated the same dependent variable, but with the following controls: the logarithm of the individual's annual income, the logarithm of household income per capita, number of household members, years of education, gender and two dummies (whether the person is a civil servant or an employee of a private company). Table 3 shows the estimated coefficients using the multinomial logit model.

Table 3

Coefficients estimated for the multinomial logit model using Neither Saver Nor Dissaver over the past 12 months as the reference category, Brazil, 1995/1996, 2002/2003 and 2008/2009

Scenario	Coefficient	Saver/NSND			Dissaver/NSND		
		2008/2009	2002/2003	1995/1996	2008/2009	2002/2003	1995/1996
Financial	Intercept	-9.4187	-7.7426	-8.1508	-10.6728	-9.8538	-7.5368
	Number of residents	-0.0758	-0.0482	-0.0716	-0.0517	-0.0040	-0.1448
	Ln of annual income	0.3894	0.3830	0.4346	0.2612	0.2660	0.3726
	Ln of annual Pc Income	0.4876	0.3571	0.2371	0.5399	0.5177	0.1088
	Years of education	0.0380	0.0445	0.0374	0.0346	0.0349	0.0491
	Male	0.0060	0.1046	0.0025	0.2631	0.1537	-0.0295
	Age	0.0055	-0.0167	-0.0061	0.0360	0.0112	0.0284
	Age^2	-0.0001	0.0002	0.0001	-0.0002	0.0001	-0.0002
	Private comp. Employee	0.1798	0.1230	0.1726	-0.0440	0.2048	0.0558
	Civil servant	0.1007	-0.1224	0.2556	-0.1514	-0.5638	-0.2560
Real Estate	Intercept	-11.6872	-9.3117	-11.2898	-17.4993	-15.6088	-9.4721
	Number of residents	0.0059	-0.0471	-0.0727	0.1700	0.1483	-0.1088
	Ln of annual income	0.3272	0.2748	0.4804	0.1101	0.1152	0.3194
	Ln of annual Pc Income	0.6044	0.4247	0.2399	1.3917	0.9919	-0.0673
	Years of education	-0.0314	-0.0422	-0.0040	-0.1702	-0.0902	0.0980
	Male	-0.0585	0.1408	-0.1493	0.8474	0.9050	-0.2281
	Age	0.0791	0.0791	0.0667	0.0955	0.1403	0.0718
	Age^2	-0.0012	-0.0011	-0.0008	-0.0011	-0.0014	-0.0008
	Private comp. Employee	-0.0630	-0.0306	0.1106	-0.5905	-0.1324	-0.8267
	Civil servant	-0.2987	0.0875	0.2450	0.1721	-0.0372	-0.4226
Financial + Real Estate	Intercept	-9.4564	-7.6487	-8.2322	-11.1110	-10.5672	-7.4641
	Number of residents	-0.0613	-0.0496	-0.0684	-0.0294	0.0310	-0.1395
	Ln of annual income	0.3883	0.3693	0.4339	0.2291	0.2490	0.3726
	Ln of annual Pc Income	0.5152	0.3877	0.2569	0.6591	0.6336	0.0968
	Years of education	0.0298	0.0233	0.0312	0.0077	0.0073	0.0558
	Male	-0.0232	0.1118	-0.0271	0.3470	0.3228	-0.0323
	Age	0.0158	0.0026	0.0026	0.0446	0.0323	0.0289
	Age^2	-0.0002	-0.0001	0.0000	-0.0003	-0.0002	-0.0002
	Private comp. Employee	0.1319	0.0843	0.1757	-0.0977	0.0864	-0.0051
	Civil servant	0.0137	-0.0533	0.2653	-0.0969	-0.4463	-0.3521
Observations		128,193	119,323	41,222	128,193	119,323	41,222

Source of raw data: IBGE (micro-data from the Household Budget Surveys of 1995/1996, 2002/2005 and 2008/2009

Carrying out the same transformation performed in the previous subsection and attributing the national average to the control variables, we can calculate the probability that a person is a saver or dissaver, given the person's age. Figure 3 shows a marked change in behavior in the financial scenario, in that the net difference between the probabilities is greater in the youngest age group. In other words, if young people had the same income and other characteristics as people in the more mature group, they would be the group with the greatest difference between savers and dissavers.

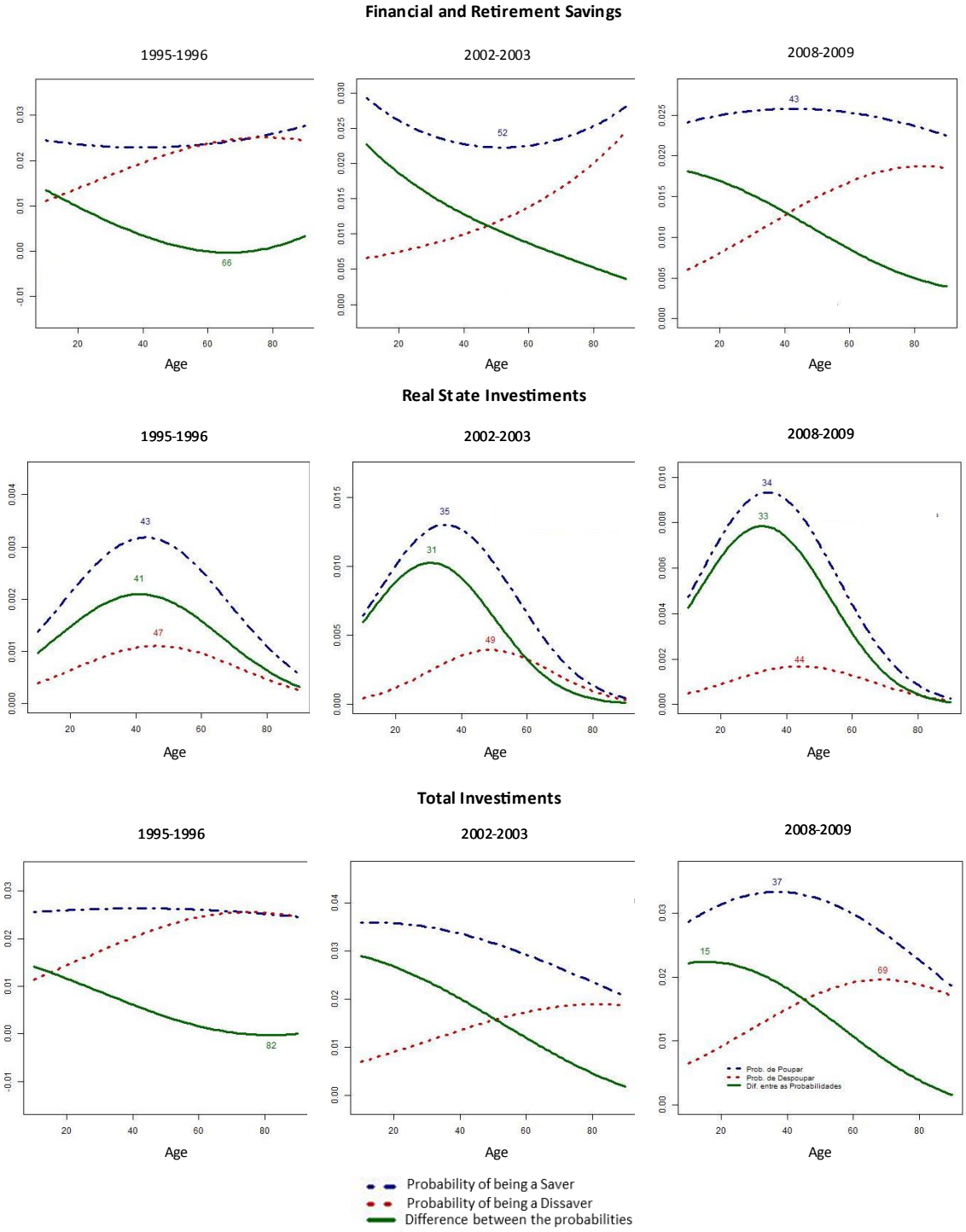
In the real estate scenario, however, the analysis changes, returning to the maximum points for savers, dissavers and net differences. This means that even when all the controls are in place, there would be a middle age group, consisting of people between 34 and 44 years of

age, with greater propensity to purchase or sell real estate, with the net difference peaking at 33 years old.

The results of this section show that young people would show a high propensity to save if their other characteristics resembled those of older generations. The explanation for this probably lies in their long life expectancy and their desire to maintain an appropriate standard of living throughout the entire period.

Figure 3

Probability of saving, probability of dissaving and net difference over a 12-month period, for an individual with the average national profile for Brazil, 1995/1996, 2002/2003 and 2008/2009



Source: Prepared by the author

5. Conclusions

For all three periods analyzed, the results found for savings in the financial scenario and in the combined financial scenarios and real estate scenarios are consistent with the cycle of life hypothesis. When no control variables are used, the propensity to save is small among young people, increases among mature adults and declines again in old age. The main cause of a low savings rate among young people is that their needs are greater than their income, while older people deplete the savings they accumulated during their adult lives in order to maintain their pattern of consumption over their lifespan.

When control variables such as income are introduced, this hypothesis is strengthened, as young people would become the biggest savers if they had the same characteristics as individuals of other ages. In other words, young people save less not as a matter of choice but due to their high needs and their budget constraints. Elderly people, on the other hand, are less likely to save, even when control variables are introduced, once again corroborating the life cycle hypothesis.

Without the use of controls, the three periods showed very similar results in the financial scenario. The age at which individuals' propensity to save peaked varied between 53 and 52 years old in the first two household budget surveys and reached 54 years old in the final survey. The net difference increased by slightly more, from 39 to 44, and finally to 46 years of age, while the probability of the points of maximum probability remained around 10% in all three surveys. These results are similar to the conclusions reached by Bloom et al. (2007), who show that the effect of longer life expectancy on savings is very small in countries where the pension system is based on simple distribution.

Although the elderly have a lower propensity to save, there are indications that, at least for the next several decades, the aging of the population should increase the number of savers because the largest segment of Brazil's population structure is still approaching the age at which individuals are most likely to save. However, as Bloom et al. (2010) have also shown, beyond that point, the large number of elderly individuals is expected to weigh negatively on the number of net savers.

Bibliographic References

ANDO, A.; MODIGLIANI, F. The "life cycle" hypothesis of saving: Aggregate implications and tests. **The American Economic Review**, v. 53, n. 1, p. 55-84, mar. 1963.

BLOOM, D. E.; CANNING, D.; GRAHAM, B. Longevity and life-cycle savings. **The Scandinavian Journal of Economics**, v. 105, n. 3, p. 319-338, sep. 2003.

BLOOM, D. E.; CANNING, D.; MANSFIELD, R. K.; Moore, M. Demographic change, social security systems, and savings. **Journal of Monetary Economics**, v. 54, n. 1, p. 92-114, jan. 2007.

BOSWORTH, B.; BURTLESS, G.; SABELHAUS, J.; POTERBA, J. M.; SUMMERS, L. H. The decline in saving: Evidence from household surveys. **Brookings Papers on Economic Activity**, v. 1991, n. 1, 183-256, 1991.

FRIEDMAN, M. The permanent income hypothesis. In: **A theory of the Consumption Function**. Princeton University Press. p. 20-37. 1957.

GUPTA, K. L. Foreign capital inflows, dependency burden, and saving rates in developing countries: A simultaneous equation model. **Kyklos**, v. 28, n. 2, p. 358-374, jan. 1975.

HELLER, P. S. Aging, Savings, and Pensions in the Group of Seven Countries: 1980—2025. **Journal of Public Policy**, v. 9, n. 2, p. 127-155, apr. 1989.

KINUGASA, T.; MASON, A. Why countries become wealthy: the effects of adult longevity on saving. **World Development**, v. 35, n. 1, p. 1-23, 2007.

LEE, R.; MASON, A.; MILLER, T. Life cycle saving and the demographic transition: The case of Taiwan. **Population and Development Review**, v. 26, supl. 1, p. 194-219, 2000.

LEFF, N. H. Dependency rates and savings rates. **The American Economic Review**, v. 59, n. 5, p. 886-896, dec. 1969.

MASON, A.; LEE, R. Reform and support systems for the elderly in developing countries: capturing the second demographic dividend. **Genus**, v. 62, n. 2, p. 11-35, apr. 2006.

MASSON, P. R.; TRYON, R. W. Macroeconomic effects of projected population aging in industrial countries. **Staff Papers**, v. 37, n. 3, p. 453-485, 1990.

MODIGLIANI, F.; ANDO, A. K. Tests of the life cycle hypothesis of savings: comments and suggestions. **Oxford Bulletin of Economics and Statistics**, v. 19, n. 2, 99-124, may. 1957.

NERI, M.; CARVALHO, K.; NASCIMENTO, M. Ciclo da vida e motivações financeiras (com especial atenção aos idosos brasileiros). Ipea. **Texto para discussão nº 691**, Rio de janeiro. 1999.

SOLOW, R. M. A contribution to the theory of economic growth. **The Quarterly Journal of Economics**, v. 70, n. 1, p. 65-94, feb. 1956.

STAMPE, M. Z. **Três Ensaios Sobre Mudança Demográfica e Seus Impactos nas Economias Brasileira e Gaúcha**. Tese de doutorado. Universidade Federal do Rio Grande do Sul, Programa de Pós Graduação em Economia. 2013.

TCU. Tribunal de Contas da União. **Ações do Governo Para Reduzir os Efeitos da Crise.** Versão simplificada das Contas do Governo da República, 2009. Disponível em: http://portal.tcu.gov.br/tcu/paginas/contas_governo/contas_2009/Textos/Ficha%201%20-%20Analise%20da%20Crise.pdf. 2009.

WACHTEL, P. Household saving and demographic change 1950-2050. **Research in Population Economics**, v. 5, p. 217-33. 1984.

WEIL, D. N. The saving of the elderly in micro and macro data. **The Quarterly Journal of Economics**, v. 109, n. 1, p. 55-81, feb. 1994.