Do the Rich Save More? Evidence from Brazil

Udilmar Carlos Zabot[1] and Fabio Augusto Reis Gomes[2]

[1]UNEMAT and PPGE - FEA-RP/USP
[2]PPGE - FEA-RP/USP

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Abstract

This paper investigates whether rich households have a relatively higher saving rate. We consider a recent comprehensive household data set available for Brazil (POF 2018) to estimate several *proxies* for household lifetime income, and assess the saving rates across income groups. Although there is some evidence of a positive association between lifetime income and household saving rates, the results are sensitive to the prediction of lifetime income and the measure of household saving, in particular at the highest deciles of the income distribution.

Key-Words: Lifetime Income; Household Saving Behavior.
JEL Classification: E21.

Resumo

Neste artigo, investigamos se famílias ricas apresentam taxas de poupança relativamente mais altas. A análise empírica considera a mais recente Pesquisa de Orçamentos Familiares (POF 2018), e com base em diversas estimativas para a renda permanente das famílias, examina a taxa de poupança entre os grupos de renda. Embora as evidências indiquem uma associação positiva entre renda permanente e taxa de poupança, os resultados são sensíveis à estimativa de renda permanente e também à medida de poupança considerada, principalmente nos grupos mais altos da distribuição de renda.

Palavras-Chaves: Renda Permanente; Poupança Familiar.
Classificação JEL: E21.

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1 Introduction

Are the saving rates of the rich households higher than that of the poor households? Given its implications on welfare and policy issues, this empirical question has received considerable attention in the saving literature, especially after Dynan et al. (2004). A stylized fact is that higher current income households save relatively more (Bozio et al., 2017). Indeed, forward-looking agents attempting to smooth transitory income fluctuations induce a strong correlation between current income and saving rates, but this is uninformative about the association of saving behavior with permanent income (Friedman, 1953). Since it is inherently unobserved, the households' permanent income is frequently estimated, leading to a disagreement in empirical findings. Therefore, whether the rich households do save more remains a controversial issue in the literature.

Theoretically, the presence of uncertainty and liquidity constraints suggest that the poorest households should have a greater incentive to save (Deaton, 1989). However, Dynan et al. (2004) and Chakrabarty et al. (2006) indicated that, after controlling for household lifecycle characteristics, the saving rate increases with permanent income. In contrast, Allan et al. (2015) suggested that, except for the poorest households who normally do not save, the saving rates are not substantially different across lifetime income groups.

An understanding of the relationship between household saving rates and lifetime income matters for several policy issues. For instance, distinct saving rates between income groups imply that the effects of income shocks on aggregate consumption depend on its distribution across income groups (Dynan et al., 2004; Hori et al., 2016). Besides, this relationship is relevant to wealth inequality persistence and the related impact on aggregate savings (Alvarez-Cuadrado and Vilalta, 2018; Nardi and Fella, 2017).

In this paper, we address such a question focusing on Brazilian households. To accomplish the empirical analysis, we consider the most recent Consumer Expenditure Survey (i.e., the POF 2017-2018), a comprehensive data set covering the entire country, which provides detailed information about household consumption and income distribution. Particularly, we attempt to provide evidence on the relationship between saving rates and lifetime income for a developing economy with a remarkable level of inequality, along with economic uncertainty and liquidity constraints.

As already mentioned, an empirical limitation is that lifetime income is not directly observed, and consequently, a reliable *proxy* is required. We define lifetime income as the present value of expected lifetime resources (Brady et al., 2018; Allan et al., 2015), which includes both human capital and physical wealth. Therefore, considering data on housing characteristics and ownership of durable goods, we derive an asset-based wealth index and use it as an additional set of information for assessing household lifetime income.

Another question concerns the definition of household saving. The literature often assumes the spending on health and education as an investment and exclude it from expenditure to obtain a broader household saving definition (Gandelman, 2017). This is important since potentially increases the differences in saving rates across income groups. Brazil has both comprehensive health and education public programs, though the overall quality is noteworthy inferior to the same services offered by the private sector. Assuming that this quality difference is widely known, households that value these services the most, and are not liquidity constrained, have a greater incentive to spend on them. Thereby, we carry out the investigation considering two distinct household saving measures.

The overall results indicate that indeed rich households save a larger share of their current income. However, when considering *proxies* for lifetime income, although the evidence keeps

suggesting a positive association with saving rates, the results are more sensitive to the measure of household savings and the differences between saving rates across lifetime income groups are relatively less distinguishable. Moreover, these results are similar among the several *proxies* for a household lifetime income.

The paper is organized as follows. Section 2 presents a brief review of the empirical literature that assesses the relationship between household saving rates and lifetime income. Section 3 details the empirical strategy, and Section 4 describes the data and variables considered. Section 5 reports and discuss the estimated results. Section 6 concludes and provides final remarks.

2 Literature Review

There is an important strand in the literature that investigates the saving behavior across income and wealth distribution (Nardi and Fella, 2017). The relationship between saving rates and household income is important given that differences in saving behavior may explain the heterogeneity in wealth distribution (Francis, 2009). As stated, a stylized fact in the empirical literature is that rich households usually save a larger share of their current income. However, the economic literature has dedicated attention to the association of household saving rates with permanent income.[1]

In an influential paper, Dynan et al. (2004) considered different U.S. household data sources and several identification strategies and found evidence of a positive association between saving rates and permanent income (and also between marginal propensity to save and permanent income). This empirical relationship was confirmed for Australian households by Chakrabarty et al. (2006). However, the estimated relationship between saving rates and permanent income is sensitive to the instrument used to *proxy* the permanent income (Allan et al., 2015). In fact, this is an empirically hard question to assess due to the difficulty to properly measure both the saving rate and permanent income (Bozio et al., 2017). The recent literature has explored several available household-level data sets, either cross-sectional and panel data, and instrumented permanent income with variables related to education, non-durable consumption, or lagged earnings. The empirical evidence though are not conclusive about differences in household saving rates.

Based on Canadian household data and distinct instruments for permanent income, Allan et al. (2015) reported that saving rates are quite flat above the bottom quintile of predicted permanent income. On the other hand, Bozio et al. (2017) considered survey and administrative data for the United Kingdom and reported a positive relationship between household saving rates and permanent income, in line with Dynan et al. (2004). Besides, their findings suggest that the top quintile of permanent income households exhibits a higher wealth to income ratio. Hori et al. (2016) found similar results for working-age households in Japan, though the estimated relationship was rather sensitive to the choice of permanent income measure. Moreover, Hori et al. (2016) claimed that the relationship between saving rate and permanent income depends on the households' life stage. Recently, Alvarez-Cuadrado and Vilalta (2018) reported more evidence for the United States indicating that household saving rates increase with permanent income, although conditional on demographic characteristics.

In a study for Latin American and Caribbean countries, Gandelman (2017) addressed the question of whether richer households save a higher proportion of their permanent income. The author argued that the region is particularly interesting due to the inequality conditions and

[1]Following Allan et al. (2015), by permanent income, it is understood the income purged of measurement error and transitory fluctuations.

the low saving rates that hinder economic growth. For most countries considered, excepting Argentina, Colombia, and Uruguay, the empirical findings indicate that indeed rich households save more, and the households in the highest quintile group of permanent income have a statistically larger saving rate than poorer households. For Brazil, in particular, Gandelman (2017) considered the 2008 Consumer Expenditure Survey, and estimated saving rates that range from 5 percent in the lowest to 20 percent in the highest quintile of permanent income.

3 Empirical Methodology

In this paper, we investigate whether the saving rates of richer households are higher than those of the poorer. Dynan et al. (2004), and most of the subsequent related studies, assumed that the relationship between saving rates and lifetime income is given by

$$s_i = \frac{y_i - c_i}{y_i} = f(\bar{y}_i) + \mathbf{x}_i\boldsymbol{\beta} + \epsilon_i \tag{1}$$

where s_i is the household saving rate, y_i and c_i represent, respectively, current income and consumption, $\bar{y}_i$ stands for lifetime income and $\mathbf{x}_i$ is a vector of observable determinants of saving behavior. The term ϵ_i is a well-behaved disturbance that captures both unmeasured determining factors and measurement errors in the saving rate. The index i refers to households.

There are important issues that arise from such an approach. The first one, as mentioned, is related to the definition of saving. Dynan et al. (2004) examined two distinct definitions. Initially, they considered a wide description of savings, including realized and unrealized capital gains, and alternatively, they considered saving as the difference between disposable income (excluding capital gains) and consumption, namely active saving. Although Dynan et al. (2004) argued that neither is a superior concept, Allan et al. (2015) stated that the latter definition is appropriate in analyzing the relationship expressed in (1). Moreover, from excluding capital gains, the active saving might better reflect the household intentions toward saving-consumption decisions (Gandelman, 2017; Dynan et al., 2004). Furthermore, some components of household expenditure can be considered as an investment or store of value, and active saving allows to properly capture such features. Accordingly, in this paper, we consider the latter definition to measure household savings.

An additional empirical difficulty is related to the fact that the lifetime income $\bar{y}_i$ is not observed.[2] As stated by Allan et al. (2012), current income is not a good *proxy* for lifetime income due to either measurement error or transitory income fluctuations. The literature has followed Dynan et al. (2004), and employed a two-stage estimation procedure. Specifically, in the first stage, a lifetime income *proxy* is constructed by regressing current income on an instrument z_i and a vector of covariates $\mathbf{w}_i$. We consider the following specification,

$$\ln y_i = z_i\alpha + \mathbf{w}_i\boldsymbol{\gamma} + \varepsilon_i. \tag{2}$$

The predicted values $\hat{y}_i$ from (2) are then used as a *proxy* for lifetime income in the second stage, in which (1) is estimated by median regression. It is worth noting, though, that the simply exponentiation of the fitted values from (2) underestimate $\hat{y}_i$, and the distribution of the error term has also empirical implications.[3] Duan (1983) demonstrated that inappropriately

[2] Allan et al. (2015) formally define lifetime income as an annuitization of the present value of current and future consumption possibilities. Informally, they define as the household income without measurement error and short-run fluctuations. Brady et al. (2018) refers to as a long-term average income.

[3] For example, assuming that $\varepsilon_i \sim \mathbb{N}(0, \sigma^2)$, than y_i follows a log-normal distribution, which implies that

assuming a normal distribution can lead to inconsistent prediction results, and proposed a non-parametric adjustment for the predicted values. Assuming that the ε_i is independent, Duan (1983) *smearing estimate* is given by

$$\hat{y}_i = \exp\left\{\widehat{\ln y_i}\right\}\left(n^{-1}\sum_{i=1}^{n}\exp\left\{\hat{\varepsilon}_i\right\}\right) \tag{3}$$

where $\widehat{\ln y_i}$ are the fitted values, and $\hat{\varepsilon}_i$ the residuals from the ordinary least squares estimate of (2). Besides, if the error distribution is indeed normal, the estimate (3) is also consistent, though less efficient (Duan, 1983).

An important aspect in this empirical strategy, that has been emphasized in the literature, is regarded to the instrument z_i for the prediction of lifetime income. According to Dynan et al. (2004), a good instrument should be highly correlated with true anticipated lifetime income at the time of the saving decision, and should also be uncorrelated with the error term, such that affects saving rates only through lifetime income.[4]

The literature has long considered education as an important predictor for a true lifetime income. In particular, household head's education is an instrument that is strongly correlated with lifetime income, although may be correlated with the error term. For example, if education is related to preferences heterogeneity that influences saving behavior, then it is not a valid predictor, given that produces an upward bias in the estimated relationship between lifetime income and saving rates. For this reason, Allan et al. (2015) and Gandelman (2017) considered the education of the spouse as an instrument for lifetime income and argued that it is likely correlated with the education of the household head, and less likely correlated with unobservable determinants of saving rates. The drawback of this approach is that it can be applied only to a restricted sample of households with couples.

Regarding the vector of covariates $\mathbf{w}_i$, it usually includes demographic characteristics. In this paper, as an additional control variable, we consider an asset-based household wealth index, derived from information on ownership of durable goods and housing characteristics. This index allows to assess a dimension of household wealth that reflects long-term economic conditions (Wittenberg and Leibbrandt, 2017).[5] Specifically, an asset index is an aggregated measure of household wealth based on a set of variable indicators. Several methodologies to construct such indices have been proposed in the literature, differing essentially on how to specify weights to each indicator and aggregate them in order to achieve a score to each household (Filmer and Scott, 2012).

A common approach employs the principal component analysis directly on a set of indicators for household durable goods ownership and housing characteristics. However, Kolenikov and Angeles (2009) argued that the principal components analysis has the assumption of mul-

$\mathbb{E}[y|z,\mathbf{w}] = \exp\left\{\mathbb{E}[\ln y_i]\right\}\exp\left\{\frac{1}{2}\sigma^2\right\}$. In this case, the predicted lifetime income can be obtained by

$$\hat{y}_i = \exp\left\{\widehat{\ln y_i}\right\}\exp\left\{\frac{1}{2}\hat{\sigma}^2\right\},$$

where $\hat{\sigma}^2$ is the unbiased estimator of σ^2.

[4]The authors considered consumption, education, lagged and future labor income as instruments for the lifetime income. However, the cross-section nature of POF data does not allow for lags and leads of income as alternative predictors. Moreover, according to Allan et al. (2015), these are not necessarily superior instruments.

[5]Asset indices have been widely considered as a measure of household wealth or socioeconomic status, particularly in economic development literature. Filmer and Pritchett (2001) proposed an aggregated asset index based on household ownership of durable goods and housing characteristics, that was quickly adopted by World Bank and by Demographic and Health Surveys (DHS Program) to assess household socioeconomic status.

tivariate normality, and the discrete nature of these variables involves empirical implications. Therefore, the authors recommended the use of a polychoric correlation matrix, defined as the maximum likelihood estimates of the correlation between unobserved normally distributed continuous variables underlying their discretized versions. Based on the estimated polychoric correlation matrix, the principal components analysis can be employed appropriately. In this paper, we follow the approach proposed by Kolenikov and Angeles (2009) to construct the wealth index, and included it as an additional covariate in $\mathbf{w}_i$.

Having estimated a *proxy* for $\bar{y}_i$, we proceed with the empirical analysis. To allow for non-linearities in lifetime income and saving rate relationship, the function $f(\cdot)$ in (1) is specified as a set of binary variables capturing quantiles of lifetime income to which each household belongs. Although Dynan et al. (2004) and Allan et al. (2015) considered quintiles, we proceed with deciles of lifetime income for a detailed analysis along the distribution. More specifically, in every estimate, we suppress the constant term and include dummies for all income deciles. For the main specification, the vector $\mathbf{x}_i$ comprises only dummies for 10-years age groups, with the 45-55 years-old group as the reference.[6] Thereby, the estimated coefficient on a given decile corresponds to the median saving rate of a household at the reference age group, and that belongs to that decile. Bootstrapped standard errors are computed based on 1000 replications.

4 Data Description

We consider data from the Consumer Expenditure Survey, conducted by the Brazilian Institute of Geography and Statistics (IBGE). This is a cross-sectional sampling survey, covering the entire national territory, which provides detailed information about household consumption, expenditure allocation, income distribution, and household characteristics. The survey adopted a two-stage stratified sampling design, with geographic and statistical stratification of the primary sampling units, which correspond to sectors of the Demographic Census.[7] The primary sampling units were selected with probability proportional to the number of residences in each sector, and a subsample for the survey was randomly selected in each stratum. The secondary sampling units were the permanent private residences, also selected randomly without replacement, within each selected primary sampling unit.

In this paper, we use information from the most recent available survey, henceforth POF 2018. The survey collection was carried out in the urban and rural areas, in the period from June 2017 to July 2018, and the final sample contained 58,039 households.[8] However, following the literature, we restricted the analysis to working-age households whose head is aged between 25 and 65 years. This is important since younger households are more likely to be in transitional stages or subjected to liquidity constraints, and in the case of older households, the examination is complicated by the noncomparability of those on the verge of retirement and those that are beyond retirement (Allan et al., 2015).

Furthermore, we also exclude observations with missing income information. In particular, Dynan et al. (2004) and Allan et al. (2015) do not consider households with income below US$ 1,000. However, such a restriction could be problematic for a developing country (Gandelman,

[6]The average and the median age of household heads are 45.3 and 45 years, respectively.

[7]The IBGE works with a common sample for all its surveys, namely the master sample, which consists of a set of primary sampling units (PSU) compound by census sectors. The sample of primary sampling units for the POF survey is one of the possible subsamples of the master sample (IBGE, 2019).

[8]Every household in the sample represents a certain number of permanent private households, and an associated sample weight (expansion factor) allows obtaining estimates for the population. In fact, the survey sample represents 69,017,704 households.

2017). Instead, we restrict the sample to households where the total expenditure does not exceed four times the current disposable income.

Finally, we exclude households with unreported head's schooling information, as well as those for which it was not possible to compute the wealth index. Therefore, our sample is reduced to 42,447 households. Moreover, following Allan et al. (2015), part of the empirical analysis focuses on a subset of couples, for which we further restrict the sample to households with spouse's schooling information, comprising 27,828 households.

Household total income includes gross monetary earnings of all its members obtained from work, transfers and other income, plus the non-monetary income and equity variation, which includes property sales, inheritance receipts and the positive balance of financial transactions. The household after tax income is computed deducting taxes and compulsory public pension payments. In turn, household consumption equals total expenditure plus imputed rent for home owners. Both income and consumption expenses were adjusted in the survey for inflation, given the prices of January 15, 2018.

We consider two measures of household active saving. The first excludes from household expenditure the spending on home capital improvements, durable goods, and vehicles (S_1), while the second excludes also the spending on health and education services (S_2). Note that both differ only by the share of household current income spent on human capital, assumed as an investment in the latter saving measure. The saving rate is defined at the household level, as the active saving divided by after-tax household income.

5 Empirical Results

In this section, we assess the saving behavior across income groups. As described above, we estimate median regressions with the saving rates as the dependent variable and include dummies for all income deciles, along with dummies for age groups, except for the reference one. We begin the empirical analysis by documenting the stylized fact that the saving rate increases with current income, and then, proceed with the investigation of the relationship between saving rates and predicted lifetime income.

5.1 Savings Rates and Current Income

As mentioned, the saving rate increases with current income. Table 1 reports the estimates that support this positive relationship, and those for the full sample are also represented in Figure 1. For both the full and the couples samples, the coefficients are monotonically increasing in current income. Besides, although the estimated median saving rates differ in level terms, the association observed along the current income distribution is similar for both saving measures.

Concerning the first saving measure (S_1), which excludes from total expenditure the spending on home improvements and durable goods, the estimates range from -19.2 percent in the lowest current income decile to 37.7 percent in the highest. However, a more comprehensive measure in literature corresponds to the second saving measure (S_2), excluding from total expenditure also the spending on human capital, on which the estimates range from -15.5 percent at the bottom to 45.0 percent at the top of the current income distribution.

Although this result may be due to measurement errors or temporary shocks, it indicates that households with higher current income have larger saving rates. As stated by Bozio et al. (2017), there is no controversy about this stylized fact. Despite that, the interest is to investigate

Tabela 1: Regressions of Saving Rate on Current Income

	Full Sample		Couples Sample	
	S_1	S_2	S_1	S_2
Decile 1	-0.1920	-0.1549	-0.1843	-0.1454
	(.0118)	(.0130)	(.0164)	(.0145)
Decile 2	0.0806$^\bullet$	0.1132$^\bullet$	0.0539$^\bullet$	0.0983$^\bullet$
	(.0090)	(.0091)	(.0107)	(.0104)
Decile 3	0.1016$^\bullet$	0.1418$^\bullet$	0.1210$^\bullet$	0.1688$^\bullet$
	(.0098)	(.0077)	(.0095)	(.0094)
Decile 4	0.1743$^\bullet$	0.2145$^\bullet$	0.1807$^\bullet$	0.2276$^\bullet$
	(.0075)	(.0068)	(.0101)	(.0089)
Decile 5	0.2063$^\bullet$	0.2494$^\bullet$	0.1980	0.2466$^\bullet$
	(.0086)	(.0066)	(.0092)	(.0071)
Decile 6	0.2215	0.2672$^\bullet$	0.2269$^\bullet$	0.2775$^\bullet$
	(.0067)	(.0062)	(.0076)	(.0080)
Decile 7	0.2385$^\bullet$	0.2891$^\bullet$	0.2531$^\bullet$	0.3106$^\bullet$
	(.0061)	(.0063)	(.0074)	(.0072)
Decile 8	0.2789$^\bullet$	0.3355$^\bullet$	0.2919$^\bullet$	0.3505$^\bullet$
	(.0064)	(.0059)	(.0072)	(.0058)
Decile 9	0.3074$^\bullet$	0.3714$^\bullet$	0.3147$^\bullet$	0.3834$^\bullet$
	(.0056)	(.0054)	(.0078)	(.0074)
Decile 10	0.3767$^\bullet$	0.4497$^\bullet$	0.3842$^\bullet$	0.4581$^\bullet$
	(.0056)	(.0056)	(.0080)	(.0074)
Ages 25-35	-0.0043	-0.0033	0.0140	0.0115
	(.0064)	(.0059)	(.0077)	(.0070)
Ages 35-45	-0.0099	-0.0034	-0.0035	0.0015
	(.0053)	(.0052)	(.0064)	(.0063)
Ages 55-65	0.0400	0.0292	0.0444	0.0329
	(.0054)	(.0050)	(.0068)	(.0065)
Pseudo R^2	0.063	0.080	0.064	0.082
Income	0.1604	0.1713	0.1669	0.1759
	(.0026)	(.0023)	(.0031)	(.0028)

Note: Bootstrapped standard errors reported in parenthesis. The superscript • indicates that the coefficient is statistically different from the coefficient on the preceding income decile at 5% level.

the household saving rates across income groups. Thereby, we calculate bootstrapped standard errors for the difference between each two subsequent estimated coefficients and assess whether the difference is statistically significant (based on a one-sided test). In this case, the differences are mostly statistically significant. In addition, Table 1 also reports the estimated coefficient from a median regression of saving rates on the logarithm of current income, which suggests that a ten percent increase in income is associated with an increase between 1.60 and 1.76 percentage points in the saving rate, depending on the saving definition.

5.2 Saving Rates and Lifetime Income

We now turn to the saving rate and lifetime income association. As already mentioned, an empirical problem is related to the unobservable household lifetime income. Therefore, following the procedure described above, in the first stage, we construct a set of *proxies* for lifetime income

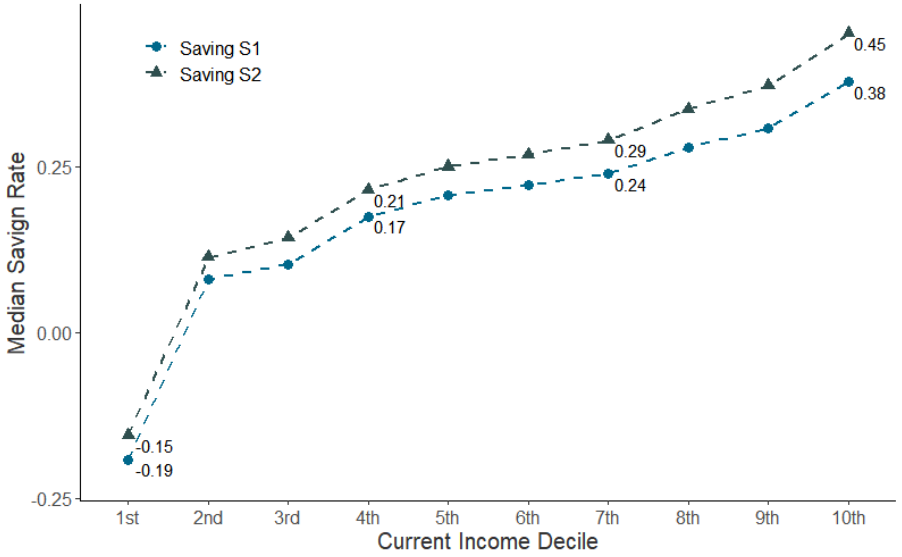

Figura 1: Median Saving Rates and Current Income (Full Sample)

by regressing current income on a predictor and some control variables. As predictor z_i in (2), we consider education and non-durable consumption.[9] As stated by Allan et al. (2015), both are strongly correlated with lifetime income, though not necessarily uncorrelated with unmeasured determinants of saving and with measurement error in the saving rate. The first stage estimates for lifetime income are reported in Table 5, in the appendix A. As control variables, we include the head's age (and age squared), household size, number of workers, number of children, and number of retirees, as well as dummies for Brazilian State.

However, the lifetime income definition includes both human and physical capital (Belke et al., 2015). Therefore, we also consider the wealth index as an additional variable in the set of controls $\mathbf{w}_i$ for estimation of households lifetime income. Such wealth measure is an asset index constructed using information on the housing quality, facilities and ownership of durable goods, and allows to aggregate a substantial amount of information for household relative comparisons.

Education is measured by years of formal schooling. We use the household head's education when considering the full sample, and the spouse's education when considering the couples sample. In the second stage then, given the household predicted lifetime income, we investigate its relationship with saving behavior. Table 2 presents the estimates of saving rates by lifetime income deciles, also summarized in Figures 2 and 3. Although the estimates indicate that the median saving rates generally increase with the lifetime income, this association is more pronounced when considered the second saving measure, especially in the highest deciles of the distribution.

For the full sample estimates, the median saving rate of households at the reference age group range from 14.0 percent in the lowest decile to 26.4 percent in the highest for the first saving measure (S_1). When considering the second saving measure (S_2), the estimates range from 15.7 to 34.5 percent over the distribution of lifetime income. Besides, the differences between each estimated coefficient with that of the preceding decile are statistically significant more usually at the bottom and at the top of the distribution, especially when considering the second saving measure (S_2). Moreover, all age dummies are significant and indicate that younger households tend to save less than the reference age group, while the older households often save more. From median regressions of saving rates on the logarithm of predicted lifetime

[9]We define non-durable consumption according to Classification of Individual Consumption According to Purpose, from United Nations (COICOP, 2018).

income, the estimated linear impact suggests an increase of 0.6 and 0.8 percentage points given a ten percent increase in lifetime income.

With respect to the couples sample estimates, the median saving rates range from 14.8 in the lowest decile to 26.7 in the highest, when considering the first saving measure (S_1). In turn, when the second saving measure (S_2), the estimates range from 17.3 to 35.0. In terms of statistical comparison of saving rates across income groups, the findings are comparable to those for the full sample. Moreover, all the age dummies are also significant and allow the same previous interpretation, and the estimated linear impact suggests similar increases of saving rates in response to a ten percent increase in lifetime income.

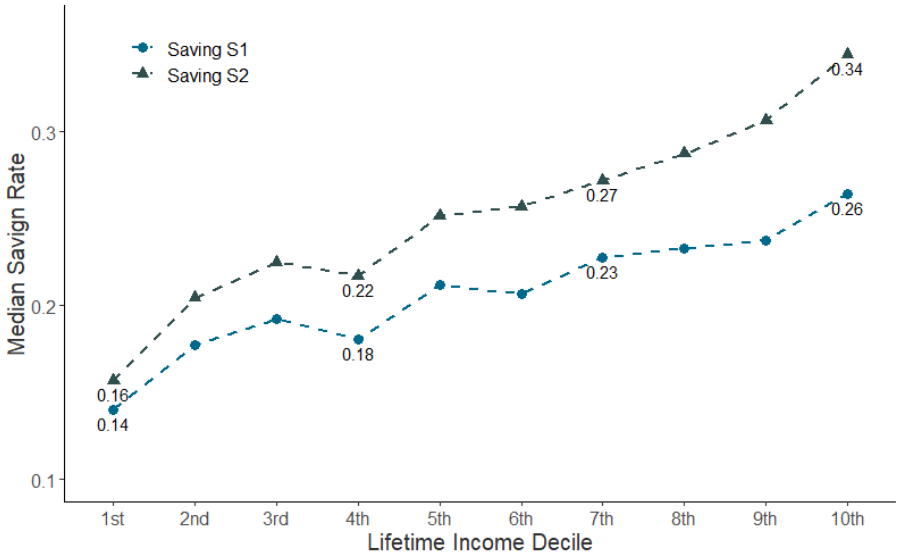

Figura 2: Median Saving Rates and Predicted Lifetime Income (Full Sample)

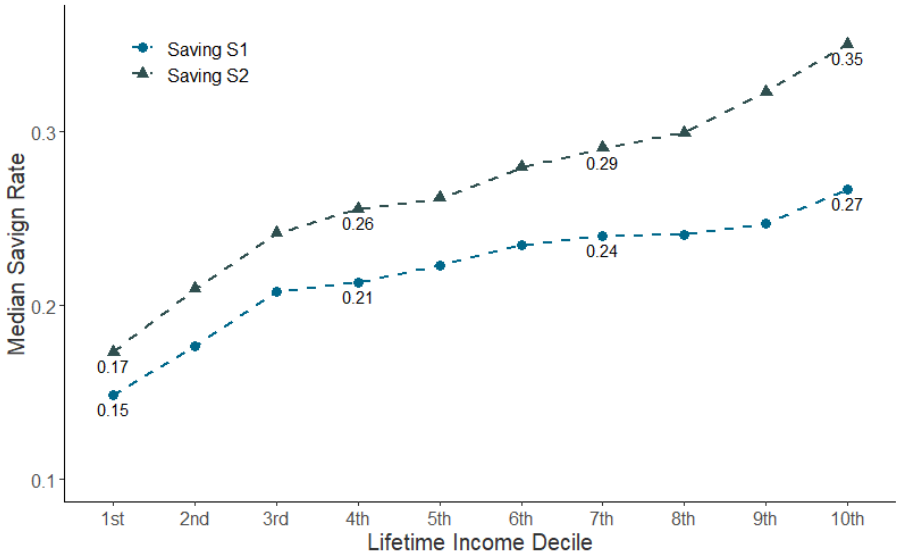

Figura 3: Median Saving Rates and Predicted Lifetime Income (Couple Sample)

Therefore, the estimated results are similar for both samples considered and indicate that households in higher lifetime income deciles have larger saving rates, though the differences depend on the saving definition. Besides, although differing in level terms, these findings are comparable with those reported by Allan et al. (2015) and Dynan et al. (2004). Nevertheless,

Tabela 2: Regressions of Saving Rate on Lifetime Income

	Full Sample		Couples Sample	
	S_1	S_2	S_1	S_2
Decile 1	0.1399	0.1572	0.1484	0.1732
	(.0089)	(.0101)	(.0119)	(.0122)
Decile 2	0.1775$^\bullet$	0.2045$^\bullet$	0.1769$^\bullet$	0.2097$^\bullet$
	(.0097)	(.0089)	(.0110)	(.0097)
Decile 3	0.1928	0.2249$^\bullet$	0.2079$^\bullet$	0.2417$^\bullet$
	(.0082)	(.0081)	(.0079)	(.0096)
Decile 4	0.1806	0.2172	0.2132	0.2558
	(.0081)	(.0085)	(.0108)	(.0093)
Decile 5	0.2119$^\bullet$	0.2517$^\bullet$	0.2230	0.2619
	(.0082)	(.0068)	(.0099)	(.0072)
Decile 6	0.2069	0.2569	0.2347	0.2796$^\bullet$
	(.0087)	(.0072)	(.082)	(.0079)
Decile 7	0.2276$^\bullet$	0.2719$^\bullet$	0.2402	0.2908
	(.0069)	(.0071)	(.0082)	(.0081)
Decile 8	0.2329	0.2874$^\bullet$	0.2411	0.2995
	(.0072)	(.0061)	(.0089)	(.0075)
Decile 9	0.2378	0.3065$^\bullet$	0.2472	0.3232$^\bullet$
	(.0078)	(.0062)	(.0096)	(.0077)
Decile 10	0.2642$^\bullet$	0.3445$^\bullet$	0.2671$^\bullet$	0.3504$^\bullet$
	(.0070)	(.0058)	(.0085)	(.0065)
Ages 25-35	-0.0350	-0.0263	-0.0285	-0.0210
	(.0068)	(.0064)	(.0081)	(.0073)
Ages 35-45	-0.0262	-0.0157	-0.0277	-0.0171
	(.0063)	(.0052)	(.0070)	(.0064)
Ages 55-65	0.0410	0.0323	0.0447	0.0370
	(.0059)	(.0052)	(.0069)	(.0062)
Pseudo R^2	0.007	0.012	0.007	0.013
Income	0.0613	0.0858	0.0609	0.0865
	(.0036)	(.0036)	(.0046)	(.0336)

Note: Bootstrapped standard errors reported in parenthesis. The superscript $\bullet$ indicates that the coefficient is statistically different from the coefficient on the preceding income decile at 5% level.

as the estimates for both samples are relatively similar, we proceed with the empirical analysis considering the full sample of households.

Now we consider non-durable consumption as the instrument z_i in (2) to predict lifetime income. It is worth mentioning that in this case, given our saving measures, any measurement error will enter on both sides of the equation (1), resulting in biased estimates. Unfortunately, from the POF database, it is not possible to construct a saving rate as net changes in assets, as in Dynan et al. (2004) and Allan et al. (2015), which could reduce this bias. Hence, with this caveat in mind, the following results must be viewed with reservation.

In order to examine this further, we consider several specifications, including expenditure components other than non-durable as the predictor for a household lifetime income. According to Allan et al. (2015), this may reduce the downward bias due to measurement error in consumption. The estimates of lifetime income for these specifications are reported in Table

5, in the Appendix A, where we consider the same previous set of control variables along with each alternative predictor z_i. Given the distinct predictions for household lifetime income, we proceed with estimating the median saving rates by income deciles. The results are reported in Table 3, and summarized in Figures 4 and 5, suggesting a different association between saving rates and lifetime income in this case, according to each saving measure.

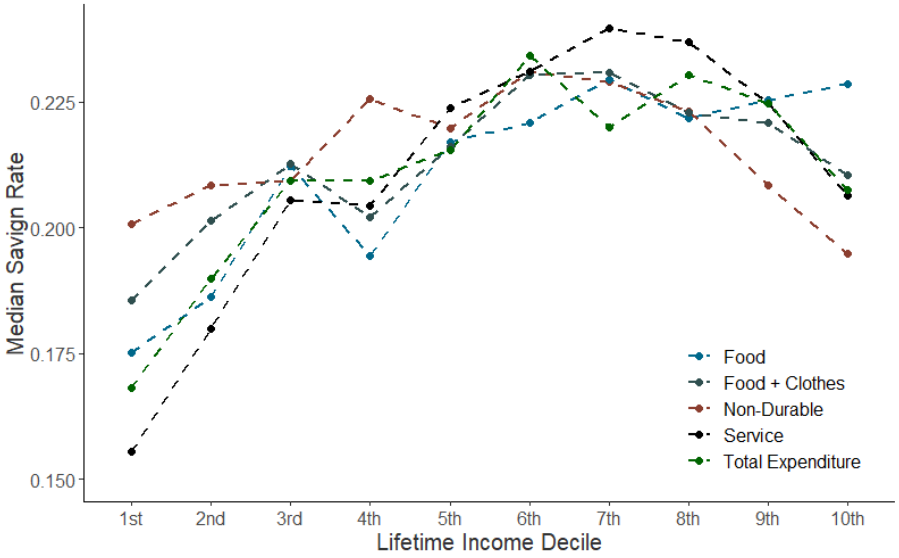

Figura 4: Median Saving Rates (S_1) and Lifetime Income Predicted by Consumption

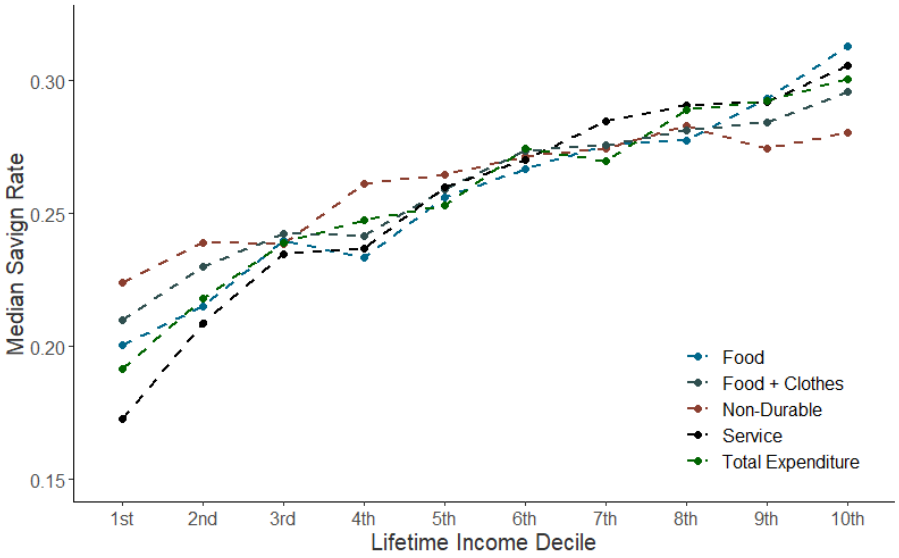

Figura 5: Median Saving Rates (S_2) and Lifetime Income Predicted by Consumption

Focusing on the results based on lifetime income predicted by non-durable consumption, the relationship between saving rates and lifetime income is slightly flat. When considering the first saving measure (S_1), the estimated median saving rates range from 19.5 to 23.1 percent. Although not monotonically, the relationship is increasing until the sixth decile of lifetime income, and then turns to negative in the highest deciles. Besides, except for the fourth decile, the difference between median saving rates is not statistically significant throughout the distribution. To some extent, these results are similar to those presented by Allan et al. (2015) and Hori et al. (2016). However, given the mentioned data restrictions and the overall results so far, we attribute these downward biased estimates due to measurement error in consumption, especially at the highest levels of the income distribution.

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Tabela 3: Regressions of Saving Rate on Different Lifetime Income Predictions

	Non-Durable		Food		Food + Clothes		Service		Total Expenditure	
	S_1	S_2	S_1	S_2	S_1	S_2	S_1	S_2	S_1	S_2
Decile 1	0.2008	0.2241	0.1753	0.2007	0.1856	0.2098	0.1555	0.1728	0.1682	0.1918
	(.0079)	(.0078)	(.0098)	(.0087)	(.0095)	(.0078)	(.0084)	(.0096)	(.0094)	(.0095)
Decile 2	0.2085	0.2391	0.1862	0.2153	0.2015	0.2299$^{\bullet}$	0.1800$^{\bullet}$	0.2088$^{\bullet}$	0.1899$^{\bullet}$	0.2183$^{\bullet}$
	(.0088)	(.0078)	(.0088)	(.0076)	(.0093)	(.0079)	(.0091)	(.0078)	(.0098)	(.0078)
Decile 3	0.2094	0.2388	0.2124$^{\bullet}$	0.2399$^{\bullet}$	0.2128	0.2425	0.2056$^{\bullet}$	0.2349$^{\bullet}$	0.2093	0.2390$^{\bullet}$
	(.0079)	(.0071)	(.0082)	(.0072)	(.0082)	(.0069)	(.0083)	(.0077)	(.0085)	(.0077)
Decile 4	0.2258$^{\bullet}$	0.2613$^{\bullet}$	0.1944$^{\bullet}$	0.2335	0.2021	0.2414	0.2045	0.2368	0.2094	0.2476
	(.0080)	(.0071)	(.0080)	(.0080)	(.0081)	(.0078)	(.0066)	(.0083)	(.0077)	(.0079)
Decile 5	0.2199	0.2645	0.2171$^{\bullet}$	0.2564$^{\bullet}$	0.2162	0.2590$^{\bullet}$	0.2239$^{\bullet}$	0.2599$^{\bullet}$	0.2156	0.2532
	(.0076)	(.0068)	(.0083)	(.0071)	(.0077)	(.0066)	(.0076)	(.0068)	(.0078)	(.0072)
Decile 6	0.2311	0.2715	0.2209	0.2667	0.2303	0.2738$^{\bullet}$	0.2310	0.2704	0.2343$^{\bullet}$	0.2744$^{\bullet}$
	(.0077)	(.0065)	(.0081)	(.0072)	(.0066)	(.0070)	(.0061)	(.0067)	(.0067)	(.0063)
Decile 7	0.2289	0.2745	0.2294	0.2758	0.2309	0.2758	0.2396	0.2846	0.2199	0.2699
	(.0078)	(.0067)	(.0072)	(.0068)	(.0082)	(.0065)	(.0077)	(.0073)	(.0084)	(.0067)
Decile 8	0.2232	0.2831	0.2219	0.2774	0.2229	0.2813	0.2369	0.2906	0.2304	0.2891$^{\bullet}$
	(.0076)	(.0072)	(.0078)	(.0075)	(.0072)	(.0067)	(.0066)	(.0067)	(.0072)	(.0072)
Decile 9	0.2084	0.2744	0.2255	0.2933$^{\bullet}$	0.2209	0.2945	0.2247	0.2922	0.2247	0.2926
	(.0080)	(.0064)	(.0088)	(.0079)	(.0074)	(.0073)	(.0076)	(.0073)	(.0074)	(.0078)
Decile 10	0.1949	0.2804	0.2287	0.3133$^{\bullet}$	0.2106	0.2958	0.2063$^{\bullet}$	0.3056	0.2075$^{\bullet}$	0.3006
	(.0065)	(.0070)	(.0068)	(.0076)	(.0071)	(.0066)	(.0063)	(.0074)	(.0069)	(.0077)
Ages 25-35	-0.0500	-0.0425	-0.0434	-0.0406	-0.0453	-0.0383	-0.0421	-0.0325	-0.0424	-0.0358
	(.0071)	(.0060)	(.0069)	(.0064)	(.0065)	(.0062)	(.0064)	(.0064)	(.0071)	(.0065)
Ages 35-45	-0.0362	-0.0255	-0.0333	-0.0318	-0.0348	-0.0236	-0.0329	-0.0202	-0.0334	-0.0224
	(.0062)	(.0054)	(.0063)	(.0058)	(.0063)	(.0058)	(.0058)	(.0058)	(.0063)	(.0059)
Ages 55-65	0.0416	0.0329	0.0397	0.0409	0.0412	0.0336	0.0425	0.0333	0.0428	0.0326
	(.0058)	(.0054)	(.0060)	(.0054)	(.0054)	(.0049)	(.0055)	(.0054)	(.0057)	(.0054)
Pseudo R^2	0.004	0.004	0.005	0.007	0.004	0.006	0.006	0.008	0.005	0.007

Note: Bootstrapped standard errors reported in parenthesis. At the top of the table, are described the predictor z_i considered in each specification. The superscript $\bullet$ indicates that the coefficient is statistically different from the coefficient on the preceding income decile at 5% level.

However, when considering the second saving measure (S_2), which includes expenditure on health and education as part of household savings, we observe a different relationship. Indeed, for these estimates, the saving rates are nearly strictly increasing in lifetime income, contrasting with the previous results. The estimated median saving rates range from 22.4 percent in the lowest decile to 28.0 percent in the highest. Nevertheless, the differences between each coefficient with that of the preceding decile are mostly not statistically significant. Again, all age dummies are statistically significant and indicate that the saving rates of younger households are lower than those households in the reference age group, while the older households usually save a relatively larger share of lifetime income.

Concerning the lifetime income predicted by others consumption components, the findings are comparable and differ slightly in level terms for both saving measures considered. Overall, these results illustrate the differences from considering distinct saving measures in such an analysis, particularly in the highest deciles of lifetime income. As mentioned, richer households usually spend a greater proportion of their disposable income on health and education, and therefore, using a more comprehensive saving measure strengthens the relationship between saving behavior and lifetime income.

5.3 Saving Rates and Lifetime Income across Occupations

In this section, we extend the previous analysis for different groups of labor occupations. Although the details regarding the household's labor features are limited in the POF, we can identify general occupation groups for individuals in the labor market based on earnings information. Therefore, we consider the occupation of the head to arrange the households across the groups. Specifically, we categorize the households into the following groups: private sector, public sector, military, employer, self-employed, domestic work, unpaid work, and retired.

We emphasize the analysis across the occupation groups. Hence, in addition to the sample restrictions described in Section 4, we exclude here observations without such information for the household head. Moreover, given its reduced subsample, we do not consider the military and unpaid workers. Therefore, the sample remains with 37,326 households. We estimate lifetime income considering the household head's education as the predictor, including the same set of control variables considered before. Given the predicted lifetime income, we divide the households in each occupation group by income deciles and proceed with the analysis separately. The estimation results for both saving measures are reported in Table 4, and summarized in Figures 6 and 7.

Three central aspects are worth mentioning from these results. First, for both saving measures, the relationship between saving rates and lifetime income is roughly positive for all occupation groups, though less pronounced for retirees. Second, throughout the income distribution, the saving rates of the self-employed and domestic workers are usually smaller, while the household saving rates of the workers in the public sector are greater. Since the unemployment risk is comparatively lower for the latter, and it is often considered as a *proxy* for uncertainty in the precautionary saving literature, these findings are somewhat intriguing. And finally, the relationship between saving rates and lifetime income has a higher slope when considered the second saving measure (S_2), which includes health and education expenditure as household saving. As expected, the median saving rates based on the first saving measure are lower, but the difference between both saving rates increases with the lifetime income, which indicates that the richer household generally spends more on human capital.

Tabela 4: Regressions of Saving Rates on Lifetime Income by Occupation

	Private Sector		Public Sector		Employer		Self Employed		Domestic Worker		Retired	
	S_1	S_2	S_1	S_2	S_1	S_2	S_1	S_2	S_1	S_2	S_1	S_2
Decile 1	0.1993	0.2207	0.2130	0.2399	0.2060	0.2453	0.1072	0.1232	0.0405	0.0815	0.2921	0.3056
	(.0147)	(.0122)	(.0222)	(.0240)	(.0462)	(.0482)	(.0170)	(.0165)	(.0351)	(.0364)	(.0287)	(.0264)
Decile 2	0.2335$^\bullet$	0.2568$^\bullet$	0.2143	0.2387	0.1948	0.2401	0.1332	0.1485	0.1072	0.1406	0.2482	0.2732
	(.0116)	(.0117)	(.0209)	(.0186)	(.0489)	(.0536)	(.0169)	(.0167)	(.0327)	(.0371)	(.0228)	(.0224)
Decile 3	0.2320	0.2628	0.2019	0.2619	0.2118	0.2864	0.1510	0.1780	0.0967	0.1268	0.2534	0.2886
	(.0160)	(.0141)	(.0206)	(.0191)	(.0447)	(.0412)	(.0163)	(.0188)	(.0280)	(.0272)	(.0202)	(.0232)
Decile 4	0.2131	0.2699	0.2375	0.2873	0.1799	0.2517	0.1709	0.2143	0.1665$^\bullet$	0.1974$^\bullet$	0.2530	0.2891
	(.0137)	(.0124)	(.0185)	(.0172)	(.0393)	(.0388)	(.0197)	(.0161)	(.0318)	(.0298)	(.0227)	(.0230)
Decile 5	0.2370	0.2817	0.2599	0.3209	0.1633	0.2204	0.1709	0.2043	0.1193	0.1537	0.2569	0.3028
	(.0140)	(.0119)	(.0191)	(.0240)	(.0471)	(.0455)	(.0172)	(.0144)	(.0390)	(.0308)	(.0249)	(.0255)
Decile 6	0.2199	0.2763	0.2397	0.3287	0.2256	0.2982	0.2139$^\bullet$	0.2562$^\bullet$	0.1345	0.1722	0.2443	0.2805
	(.0150)	(.0124)	(.0237)	(.0228)	(.0512)	(.0428)	(.0194)	(.0119)	(.0273)	(.0262)	(.0224)	(.0221)
Decile 7	0.2375	0.2915	0.2768	0.3017	0.2352	0.2931	0.2069	0.2541	0.2185$^\bullet$	0.2489$^\bullet$	0.2457	0.2909
	(.0116)	(.0137)	(.0206)	(.0192)	(.0398)	(.0374)	(.0156)	(.0137)	(.0253)	(.0220)	(.0225)	(.0266)
Decile 8	0.2478	0.3003	0.2564	0.3371	0.2003	0.3307	0.2121	0.2562	0.1452$^\bullet$	0.1888	0.2110	0.2738
	(.0116)	(.0110)	(.0202)	(.0158)	(.0509)	(.0416)	(.0154)	(.0128)	(.0384)	(.0370)	(.0250)	(.0198)
Decile 9	0.2279	0.2966	0.2828	0.3732$^\bullet$	0.2452	0.3495	0.2401	0.3089$^\bullet$	0.2019	0.2534	0.2498	0.3232$^\bullet$
	(.0140)	(.0118)	(.0146)	(.0140)	(.0290)	(.0312)	(.0153)	(.0142)	(.0347)	(.0282)	(.0215)	(.0273)
Decile 10	0.2686$^\bullet$	0.3436$^\bullet$	0.2809	0.3756	0.2153	0.3249	0.2157	0.3038	0.2245	0.2740	0.2792	0.3573
	(.0121)	(.0092)	(.0167)	(.0139)	(.0421)	(.0366)	(.0150)	(.0142)	(.0263)	(.0209)	(.0269)	(.0196)
Ages 25-35	-0.0426	-0.0357	-0.0275	-0.0179	-0.0268	-0.0137	-0.0313	-0.0264	-0.0468	-0.0498	0.0314	0.0403
	(.0098)	(.0092)	(.0201)	(.0189)	(.0397)	(.0426)	(.0135)	(.0124)	(.0327)	(.0287)	(.0485)	(.0577)
Ages 35-45	-0.0216	-0.0173	-0.0342	-0.0164	-0.0140	-0.0196	-0.0313	-0.0304	-0.0016	-0.0081	-0.0105	0.0025
	(.0099)	(.0089)	(.0156)	(.0136)	(.0306)	(.0278)	(.0126)	(.0114)	(.0221)	(.0202)	(.0326)	(.0372)
Ages 55-65	0.0374	0.0269	0.0558	0.0413	0.0460	0.0217	0.0450	0.0404	0.0522	0.0379	0.0253	0.0265
	(.0118)	(.0106)	(.0136)	(.0133)	(.0314)	(.0287)	(.0126)	(.0115)	(.0230)	(.0218)	(.0156)	(.0158)
Pseudo R^2	0.004	0.007	0.010	0.017	0.005	0.007	0.009	0.014	0.014	0.015	0.002	0.004
Sample Size	13,720		4,682		1,541		11,076		2,612		3,695	

Note: Bootstrapped standard errors reported in parenthesis. The superscript • indicates that the coefficient is statistically different from the coefficient on the preceding income decile at 5% level.

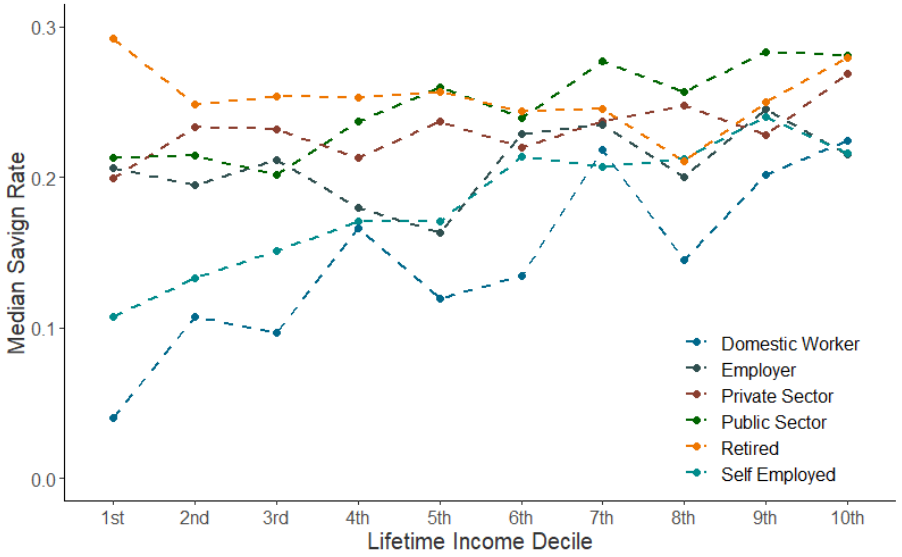

Figura 6: Median Saving Rates (S_1) and Lifetime Income Predictions by Occupations

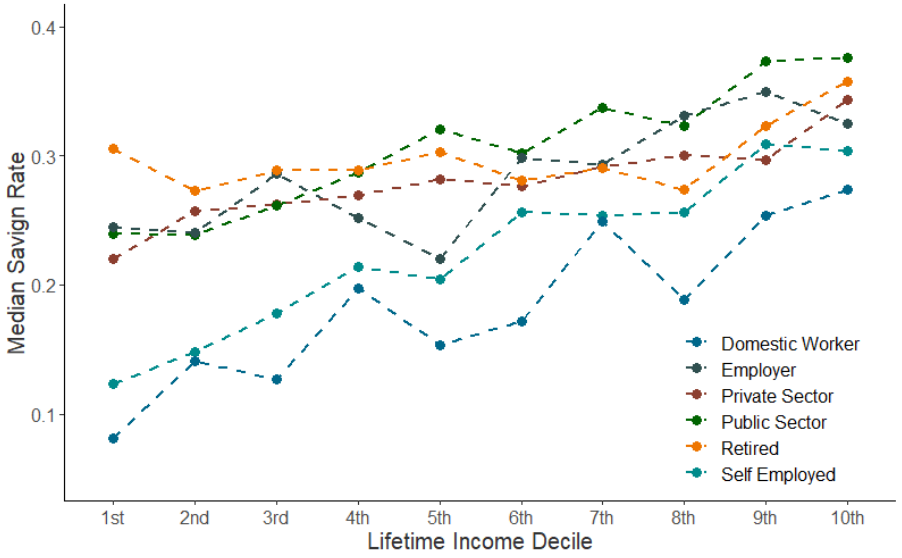

Figura 7: Median Saving Rates (S_2) and Lifetime Income Predictions by Occupations

5.4 Saving Rates and Household Wealth

As a robustness exercise, we consider the asset-based wealth index as a *proxy* of household lifetime income instead of a covariate in estimating it. As mentioned, these indices capture a dimension of wealth condition, reflecting the household's long-term economic perspective.[10] Therefore, as before, we estimate a median regression of saving rates on dummies for all wealth deciles, along with dummies for age groups. The results of this estimation are represented in Figure 8, which indicates a positive relationship between household saving and wealth.

The foremost feature of these results is that, although not strictly but increasing, this relationship has a less steep slope than that observed between saving rates and lifetime income

[10] Gandelman (2017) also constructed wealth indices based on durable goods ownership, with the weights computed by the relative scarcity of the good. However, in the case of Brazil, the author argued that such information was not available in the 2008 Consumer Expenditure Survey.

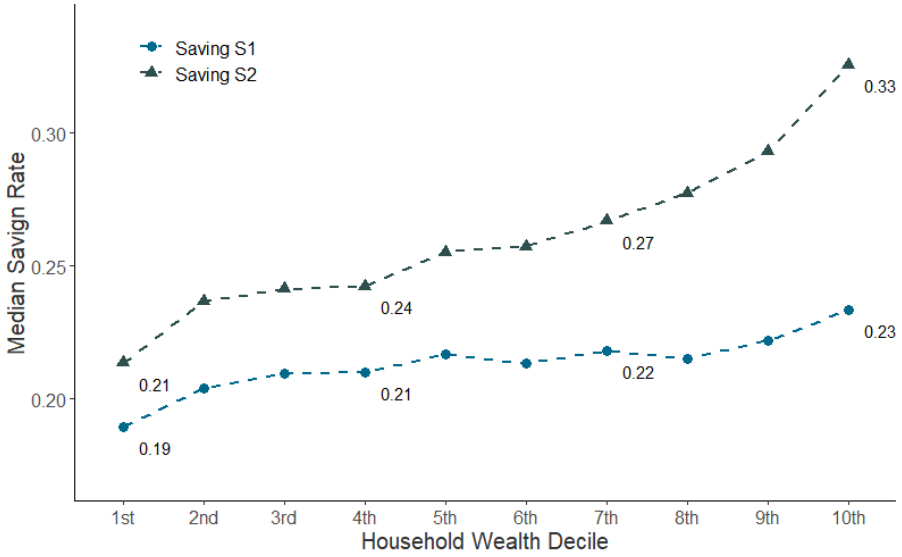

Figura 8: Median Saving Rates and Household Wealth

predicted by education. Besides, the slope of this relationship depends heavily on the saving definition, especially at the top of the wealth distribution. Particularly, for the saving measure S_1, the estimates range from 18.9 percent in the lowest decile to 23.3 percent in the highest, and no coefficient is statistically different from that estimated for the preceding decile. On the other hand, when considering the saving measure S_2, the estimates range from 21.4 percent to 32.5 percent, and the differences between subsequent coefficients are statistically significant at the bottom and at the top of wealth distribution. Finally, all age dummies are significant and support foregoing interpretation.

6 Final Remarks

We investigate in this paper whether wealthy households save a larger fraction of their income relative to low income households, considering the most recent household survey data available for Brazil, the 2018 Consumer Expenditure Survey. Initially, our results support the stylized fact of a positive association between current income and households saving rates, though this is likely due to smoothing of transitory income shocks. However, in this analysis, a relevant empirical aspect concerns to the household lifetime income, which is unobserved and hence requires a reliable *proxy* to be considered.

Therefore, we consider a set of instruments to predict household lifetime income. When we consider education as the predictor, the results suggest a positive relationship between saving rates and lifetime income, and a positive marginal effect. However, when we use non durable consumption as predictor, the saving rates do not increase in lifetime income, and households at the top income quintile have a relatively lower median saving rate. It is worth mentioning that this is probably due to measurement error in consumption, which cause a negative bias on the estimates.

To summarize, the results so far are in line Allan et al. (2015). We provide some evidence indicating that rich households do indeed save a larger fraction of their income, as suggested by Dynan et al. (2004). However, the distinct results across different lifetime income measures demonstrate that the question demands further investigation.

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Appendix

A Household Lifetime Prediction

Tabela 5: Estimates of Different Specifications for Household Lifetime Income Prediction

	Schooling		Non Durable	Food	Food + Clothes	Service	Total
	(01)	(02)	(03)	(04)	(05)	(06)	(07)
Intercept	6.8064	6.7550	7.2190	7.2780	7.2622	7.1153	7.1509
	(.0539)	(.0653)	(.0500)	(.0520)	(.0511)	(.0475)	(.0512)
Predictor z_i	0.0298	0.0361	0.0002	0.0002	0.0002	0.0001	0.0001
	(.0009)	(.0010)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Age	0.0221	0.0303	0.0148	0.0164	0.0157	0.0116	0.0114
	(.0022)	(.0027)	(.0021)	(.0022)	(.0021)	(.0021)	(.0020)
Age Squared	-0.0002	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Household Size	0.0486	0.0165	0.0141	0.0284	0.0247	0.0390	0.0340
	(.0030)	(.0039)	(.0029)	(.0030)	(.0029)	(.0027)	(.0027)
Workers	0.1670	0.1554	0.1448	0.1605	0.1506	0.1421	0.1361
	(.0027)	(.0032)	(.0026)	(.0027)	(.0026)	(.0029)	(.0040)
Retirees	0.2538	0.2497	0.2210	0.2433	0.2369	0.2244	0.2169
	(.0051)	(.0068)	(.0050)	(.0051)	(.0051)	(.0054)	(.0063)
Children	-0.0286	-0.0012	-0.0177	-0.0235	-0.0251	-0.0340	-0.0347
	(.0044)	(.0053)	(.0042)	(.0044)	(.0043)	(.0041)	(.0039)
Wealth	0.5036	0.4972	0.4996	0.5800	0.5499	0.4170	0.4220
	(.0050)	(.0056)	(.0044)	(.0040)	(.0040)	(.0103)	(.0018)
Adjusted R^2	0.564	0.570	0.595	0.566	0.580	0.637	0.645
Jarque-Bera	6856*	3909*	6024*	6093*	5769*	56275*	574691*
Sample Size	42,447	27,828	42,447	42,447	42,447	42,447	42,447

Note: Models estimated by OLS, with the robust standard errors reported in parenthesis. At the top of the table, are described the predictor z_i considered in each specification. For example, in column (01), the predictor is the years of formal schooling of the household head, while in the column (02), is the years of formal schooling of the spouse. For columns (03) through (07) the predictor is one of the expenditure components. All estimates consider the full sample, except the column (02), which are based on the couples sample. Although not reported, all the specifications include dummies for States.