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Essays on households' consumption and saving

Ensaios sobre consumo e poupança das famílias

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Abstract

ZABOT, U. C. (2022) **Essays on households' consumption and saving**. Doctoral Dissertation - Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, 2022.

This doctoral dissertation consists of four self-contained essays that address income, consumption, and saving at the household level in Brazil. The common feature among them is the disaggregated data from the Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* - POF), considered for the empirical analysis. The first essay examines several dimensions of economic inequality, emphasizing the role of non-monetary income in compressing it. The results suggest that non-monetary income works as an insurance mechanism for low-income households. Nevertheless, Brazilian households seem to have difficulties in smoothing consumption. The second essay discusses further the measure of consumption at the microeconomic level and addresses the consumption patterns upon retirement. The results indicate no decline in "core" non-durable consumption (i.e., net of work-related). Moreover, accounting for the heterogeneity across households according to pension schemes, the core non-durable consumption increases upon retirement. The third essay addresses the effect of income inequality on conspicuous consumption by emphasizing how credit constraint operates in such a relationship. The results support the hypothesis of competitive status-seeking behavior and stand in line with evidence that relative comparisons deepen households' indebtedness. The fourth essay studies the relationship between saving rate and permanent income. The study highlights that such a relationship depends on whether household saving comprises the investment in human capital. Assuming the latter as part of household savings, the saving rate increases in permanent income.

Keywords: Brazil; Households; Inequality; Non-Monetary Income; Consumption; Retirement; Pension schemes; Conspicuous consumption; Credit constraint; Permanent income; Saving rate.

Resumo

ZABOT, U. C. (2022) **Ensaios sobre consumo e poupança das famílias**. Tese (Doutorado) - Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, 2022.

Esta tese de doutorado é composta por quatro ensaios independentes que abordam renda, consumo e poupança ao nível domiciliar no Brasil. A característica comum entre eles são os dados desagregados da Pesquisa de Orçamentos Familiares (POF), considerados na a análise empírica. O primeiro ensaio examina várias dimensões da desigualdade econômica, enfatizando o papel da renda não-monetária. Os resultados sugerem que a renda não-monetária funciona como um mecanismo de seguro para as famílias de baixa renda. No entanto, as famílias brasileiras parecem ter dificuldades em suavizar o consumo. O segundo ensaio discute a medida do consumo no nível microeconômico e aborda os padrões de consumo na aposentadoria. Os resultados indicam que não há declínio no consumo não-durável "*core*" (ou seja, líquido de gastos relacionados ao trabalho). Além disso, levando em conta a heterogeneidade entre os agregados familiares de acordo com os regimes de aposentadoria, o consumo não-durável *core* aumenta com a aposentadoria. O terceiro ensaio aborda o efeito da desigualdade no consumo conspícuo enfatizando como a restrição de crédito opera nessa relação. Os resultados corroboram a hipótese de comportamento competitivo de busca por status e estão em linha com evidências de que comparações relativas aprofundam o endividamento. O quarto ensaio estuda a relação entre taxa de poupança e renda permanente. O estudo destaca que tal relação depende se a poupança das famílias compreende o investimento em capital humano. Assumindo este como parte da poupança, as taxas de poupança aumentam com a renda permanente.

Palavras-chaves: Brasil; Famílias; Desigualdade; Renda Não-Monetária; Consumo; Aposentadoria; Regimes de previdência; Consumo conspícuo; Restrição de crédito; Renda permanente; Taxa de poupança.

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1 General Introduction

This doctoral dissertation consists of four self-contained chapters that study income, consumption, and savings at the household level in Brazil. The chapters are related to each other through the disaggregated dataset employed in the empirical analyses, the Consumer Expenditure Survey (from Portuguese, *Pesquisa de Orçamentos Familiares* - POF). The POF is a nationwide cross-sectional sampling survey that provides an extensive and detailed set of information on micro-level economic variables. All four chapters consider the most recent survey edition, the 2018 POF.

The first chapter undertakes a systematic investigation of the distributional properties of households' economic variables. In particular, it draws attention to the cross-sectional facts of labor earnings, disposable income, and consumption, emphasizing the features concerning monetary- and non-monetary-based income. It is of note the remarkable equalizing effect on disposable income distribution from the non-monetary component, especially at the bottom tail. This has critical empirical implications. At first, non-monetary income might appear to work as an insurance mechanism for low-income households (at least partly). In addition, assuming that the marginal propensity to consume from it is close to one, the non-monetary component might intensify the association between consumption and current income.

The second chapter discusses an approach to achieve a reliable measure of household consumption from expenditure data. It provides a measure of non-durable consumption that includes both monetary and non-monetary spending. Assuming that this measure is more likely to equate to actual consumption, the chapter revisits a well-known fact regarding consumption upon retirement. Economic literature documented a decline in consumption as the households transition to retirement, referred to as a puzzle (BANKS; BLUNDELL; TANNER, 1998; BERNHEIM; SKINNER; WEINBERG, 2001). The decline in consumption, however, seems to be driven by work-specific expenditures. In addition, monetary-based consumption does not change, while non-monetary increases at retirement. Further, an intriguing feature of Brazil is the differences in pension regimes within the social security system, which might matter for analyzing consumption at retirement. Taking into account such heterogeneity, there is a contrasting increase in consumption upon retirement, even for households adhering to the regime with lower pensions.

The third chapter addresses conspicuous consumption. Specifically, it investigates the effect of income inequality on visible consumption, examining the extent that credit matters in this. Assuming that conspicuous consumption is driven by status considerations, as inequality increases, it increases the marginal probability of acquiring a so-

cial status and thus, the marginal utility of visible consumption. Although households may support conspicuous consumption by allocating a larger share of their income, they might also achieve it by financing (BERLEMANN; SALLAND, 2016; GEORGARAKOS; HALIASSOS; PASINI, 2014). Therefore, if credit is not binding, the household that cares about social status can finance visible consumption through indebtedness. Access to credit, therefore, might work as a mechanism to attenuate the impact of income inequality on conspicuous consumption.

The fourth chapter investigates the relationship between saving rates and permanent income. In particular, it examines the importance of considering non-financial savings when assessing such a relationship. Decisions toward investment in human capital might correspond to saving when it reduces risks, attenuates uncertainty, and allows for a gradual improvement in living standards (DUPAS; ROBINSON, 2013; EROSA; KORESHKOVA; RESTUCCIA, 2010). Brazil has both healthcare and educational public programs, though the overall quality is noteworthy inferior to the same services offered by the private sector. Assuming these differences are known, households that value these services the most would have a greater incentive to allocate resources to them. Results indicate that the association between saving rate and permanent income depends on whether household savings include non-financial capital.

2 Cross-Sectional Facts on Income and Consumption: Insurance Mechanisms and Non-Monetary Income

Abstract

This chapter documents empirical facts on earnings, income, and consumption for Brazilian households based on the Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* - POF). At first, we examine several dimensions of economic inequality, addressing household heterogeneity. The most remarkable finding is the role that non-monetary income plays in compressing the degree of inequality that arises from the labor market, particularly at the bottom of the income distribution. We argue that this has implications to the extent that non-monetary income works as an insurance mechanism for low-income households. Inequality in consumption, however, resembles that in disposable income, indicating that Brazilian households might have difficulties in smoothing consumption.

Keywords: Brazilian Households; Economic Inequality; Heterogeneity.

2.1 Introduction

Theoretical models of incomplete markets and heterogeneous agents have become a constant feature of modern quantitative macroeconomic analysis.[1] The literature has continually emphasized the importance of micro-level heterogeneity, leading the focus from aggregate to the joint equilibrium distribution of earnings, income, consumption, and wealth (KRUEGER et al., 2010; HEATHCOTE; STORESLETTEN; VIOLANTE, 2009). At the same time, the increasing availability of disaggregated datasets has contributed to the research effort committed to understanding heterogeneity and how it matters for macroeconomics.

The literature concentrates largely on the relationship between individual-level risks and the distribution of economic outcomes. For instance, a strand has been investigating the sources of heterogeneity, focusing on several dimensions of cross-household economic inequality (HEATHCOTE; STORESLETTEN; VIOLANTE, 2005; GOTTSCHALK; DANZIGER, 2005; CUTLER; KATZ, 1992), since it provides information on the households' behavior when facing risks.[2] Households differ in respecting the initial endowment or innate characteristics and experience distinct exogenous shocks that produce heterogeneity in endogenous choices affecting economic inequality (HEATHCOTE; STORESLETTEN; VIOLANTE, 2009).

In addition, since the linkage between inequality dimensions is through mechanisms of insurance, another strand focus on these mechanisms available to smooth out income fluctuations at the household level. Credit markets and precautionary saving behavior are both usual means for households to proceed with such smoothing, though they clearly depend on credit constraints and assumptions on preferences (CARROLL; SUMMERS, 1989). Along with financial markets, the family often plays a critical role

[1] Heathcote, Storesletten and Violante (2009) review the developments in this literature, arguing that these models have become the norm, rather than the exception, in macroeconomics.

[2] In particular, the 2010 special issue of the *Review of Economic Dynamics* on Cross-Sectional Facts for Macroeconomists, summarized in Krueger et al. (2010), documented the level and evolution of cross-household economic inequality. The remarkable rise in income inequality and the relatively lower increase in consumption inequality are both stylized facts for most of the developed economies (HEATHCOTE; PERRI; VIOLANTE, 2010; BLUNDELL; ETHERIDGE, 2010; BRZOZOWISKI; GERVAIS; SUZUKI, 2010).

in risk-sharing (BLUNDELL; PISTAFERRI; PRESTON, 2008). By pooling off imperfectly correlated individual risks, enabling labor supply decisions to respond to income shocks, and given the possibility of *inter vivos* transfers and bequests, the household arrangement allows individuals to incorporate mechanisms of insurance (HEATHCOTE; STORESLETTEN; VIOLANTE, 2009). Accordingly, an empirical question that has received attention concerns the degree of partial insurance consumption (HEATHCOTE; STORESLETTEN; VIOLANTE, 2014; BLUNDELL; PISTAFERRI; PRESTON, 2008; KAPLAN; VIOLANTE, 2010).

The discussion is particularly interesting for Brazil. Despite advances in poverty reduction, the degree of economic inequality remains considerably high (ENGBOM; MOSER, 2021; FIRPO; PORTELLA, 2019; MEDEIROS; SOUZA; CASTRO, 2015b), and points to the importance of studying the sources of this heterogeneity. In addition, the institutional background affects severely households' saving-consumption decisions. In particular, the labor market has low flexibility in relation to the labor supply, and the credit market is underdeveloped compared to other countries, which may create difficulties for families to insure themselves through these channels. Although it provides an intriguing context for the analysis, however, the empirical literature for Brazil neglects most of these questions: research often emphasizes income inequality while not addressing questions related to household consumption.[3]

This gap can be at least partially filled through data from the Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* - POF), which has several interesting features. At first, it contains a detailed set of data on primary microeconomic variables, particularly earnings, income, and expenditure. In addition, the survey counts with better instruments to measure income, providing unique data on the non-monetary component of households' budgets. Since the survey has no panel component we can not address all the questions the economic literature stresses, but we can assess the importance of non-monetary income in analyzing household heterogeneity. Souza (2015), for instance,

[3] Perhaps, due to difficulties researchers face regarding the nature of the available disaggregated data. For instance, the most prominent longitudinal household survey, the Continuous National Household Survey (PNADc), entire lacks data on consumption and wealth. As stated by Dias et al. (2019), this explains the fact that income inequality has dominated the welfare debate in Brazil.

demonstrated that non-monetary income decreases the incidence of extreme poverty.

Our goal is two-fold: we revisit some stylized facts on household behavior and present an empirical analysis of economic inequalities from a macroeconomic perspective. Specifically, this chapter undertakes a systematic investigation of the distributional properties of several economic variables at the microeconomic level by considering data from the 2018 POF. We draw attention to the cross-sectional facts of labor earnings, disposable income, and consumption, emphasizing the empirical features concerning monetary- and non-monetary-based income.

Following Heathcote, Perri and Violante (2010), we define the household budget constraint as the arrangement framework to examine the association between several dimensions of economic inequality. Notwithstanding a large number of studies on income inequality in Brazil,[4] the economic literature still lacks an investigation of different extents of it at the household level. The spreading of earnings inequality to disposable income, for instance, matters for households' risk-sharing and affects the consumption distribution (BLUNDELL; ETHERIDGE, 2010). This empirical analysis, therefore, offers a meaningful set of information for the welfare debate.

Next, we briefly summarize the main findings. First, labor earnings afford distinctly to the household budget along the income distribution and are higher unequal among low-income households. In addition, the adult employment rate is lower at the bottom of the income distribution, indicating that the insurance mechanism through labor supply is not readily exploited. Conversely, disposable income is less concentrated. In particular, we document a remarkable equalizing effect on household income distribution from the non-monetary component. As expected, this extends to the distribution of consumption. Disposable income appears to be the primary determinant of consumption for Brazilian households, especially the low-income ones, which suggests a role for the liquidity constraint. However, inequality in consumption is close to that in disposable income, implying that the non-monetary component impacts both distributions similarly. We argue that these findings indicate that Brazilian households do not smooth consumption.

[4] See Firpo and Portella (2019), Neri (2019), and Medeiros, Souza and Castro (2015b), for instance.

The noteworthy result is the role the non-monetary component plays in compressing the degree of inequality. Further, we argue that this has important empirical implications. At first, given that it reduces inequality, it may be working as an insurance mechanism for low-income households (at least partly). Additionally, assuming that the marginal propensity to consume from non-monetary income is close to one (i.e., corresponds to the approximated market value of non-market transactions), its large share of households' budgets might intensify the association between consumption and current income, especially for low-income households. As the POF is one of the few surveys with this type of information, understanding the Brazilian households' heterogeneity might provide clues on the difference from other countries.

The remainder of the chapter is organized as follows. Section 2.2 presents a brief review of the macroeconomic background, underlining the major facts, shocks, and institutional reforms that characterize the recent Brazilian economic history. Section 2.3 presents the POF survey, describing the survey design and the main features of household income and expenditure. Section 2.4 describes the economic variables, as well as the sample selection. Section 2.5 discusses the empirical analysis, from labor earnings to disposable income and then to consumption. Finally, Section 2.6 presents some concluding remarks.

2.2 Brazilian Economy Background

Brazil experienced severe macroeconomic instability during the 1980s and early 1990s. Following the 1970s global energy crisis, the Brazilian economy faced a fierce recession from 1981 to 1984 as a result of both external constraints and internal orthodox economic policy (CARNEIRO; MODIANO, 2014). The aftermath was a unique inflation acceleration process in the late 1980s with distributive consequences, for which several stabilization programs were unsuccessfully implemented.[5] However, with the 1994's Real Plan, inflation decreases and becomes manageable. In addition to the new monetary

[5] Brazil had six stabilization plans during the high inflation period, from 1986 to 1991: Cruzado (1986), Cruzado II (1986-1987), Bresser (1987), Verão (1989), Collor (1990), and Collor II (1991) (MODIANO, 2014; ABREU; WERNECK, 2014).

pattern, important economic policies were implemented, including privatizations, market opening, financial liberalizations, inflation-target policies, and government reforms (WERNECK, 2014a).

In the 2000s, the economy had performed better, growing at a remarkable rate (around 4 percent annually), benefiting from a favorable external economic scenario (e.g., increasing commodities prices, foreign investment) and domestic expansionary fiscal policies (WERNECK, 2014b). The labor market went through favorable transformations, unemployment remained low-level, and real wages increased (ARABAGE; SOUZA, 2019; FIRPO; PIERI, 2018; LUSTIG; LOPEZ-CALVA; ORTIZ-JUAREZ, 2013). In addition, the government expanded and strengthened the welfare programs addressing income transfers to low-income households (DIAS et al., 2019). All these factors induced an expressive decline in inequality and, along with greater access to credit, allowed an expansion of household consumption (WERNECK, 2014b).

In the late 2000s, although the Global Financial Crisis brought economic instability, Brazil relied on foreign reserves and had been conducting economic policy well, retaining expectations toward fiscal equilibrium (WERNECK, 2014b). This contributed to softening the impacts of the crisis, and the economy showed a relatively quick recovery. However, in the wake of expansionary policies from the developed world, the government began to loosen restrictions and widen the fiscal deficit. An immediate consequence was the public accounts deteriorating and institutional weakening (WERNECK, 2014b).

In the 2010s, the Brazilian economy experienced a fall in output, unemployment rising, high inflation, and increasing uncertainty in a context marked by political and economic crises.[6] Specifically, an initial slowdown of economic growth was followed by a strong recession in 2014-2016: a fierce product contraction and a very slow recovery thereafter (DIAS et al., 2019; SERRANO; SUMMA, 2015). Further, the failure to proceed with structural reforms, accompanied by fiscal issues in the early 2010s, culminated in the country's worst economic crisis since the stabilization. From the mid-2010s onward, real

[6] The lack of fiscal control and political instability culminated in the president's impeachment on August 31, 2016.

wages dropped substantially, and unemployment almost doubled (FIRPO; PIERI, 2018). Despite the economic downturn, however, household consumption kept an upward trajectory based on indebtedness (VAZ; HOFFMANN, 2021; KOMATSO; FILHO; GANDRA, 2020).

A noticeable outcome of this macroeconomic background is that the degree of economic inequality remains considerably high in Brazil. Although the income inequality declined in the 2000s (ALVAREZ et al., 2018; AGéNOR; CANUTO, 2015; LUSTIG; LOPEZ-CALVA; ORTIZ-JUAREZ, 2013), more recent empirical evidence indicates that it has decreased little throughout the last three decades (HOFFMANN; VAZ, 2021; MEDEIROS; SOUZA; CASTRO, 2015b).[7]

In summary, following more than two decades of economic and social changes (advances and setbacks), Brazil remains on a path of relative macroeconomic instability. The recent recession undermined most previous socio-economic progress, with severe macroeconomic impacts. At the beginning of 2018, the unemployment rate was around 13 percent, the inflation rate was about 3 percent yearly, and the economy was growing at a modest rate of 1.3 percent annually. Moreover, this period witnessed an enlargement of inequality: the Gini coefficient rose from 0.60 in 2014 to around 0.63 in 2018. This chapter addresses the consequences of such background at the microeconomic level by looking at data from the 2018 edition of the POF survey, carried out between June 2017 and July 2018, which portrays recent household economic conditions.

2.3 Consumer Expenditure Survey (POF)

The POF is a nationwide cross-sectional sampling survey conducted by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE). Its central purpose is to provide information on the domestic budget composition and the population's living standards (IBGE, 2019).[8] By measuring the structure of

[7] In particular, there was a reduction in labor earnings inequality in the 2000s, contrasting to what were observed in many developed countries. However, after the 2014-2016 economic crises, labor income inequality has raised again persistently (NERI, 2019).

[8] The primary objectives of the survey in the national statistical system are twofold: *i*) determine and update the weighting structures of official price indices (INPC and IPCA), and *ii*) investigate the

households' income, expenditure, and demographics, the survey produces a detailed set of information about consumption, resource allocation, income distribution, and household characteristics.[9] In particular, the survey investigates all the budget components.

Household total expenditure is arranged into three classes: *i*) consumption expenditure; *ii*) current expenses; and *iii*) changes in assets and liabilities.[10] Consumption expenditure corresponds to the spending carried out in the acquisition of products, services, or any other good, as well as the housing rental service. Current expenses comprise taxes on income, properties, vehicles, or financial services, as well as compulsory public pension payments, labor union dues, cash donations, insurance, property fees, and bureaucracy services. Changes in assets and liabilities correspond to the household's equity variation (IBGE, 2019). The increase in assets includes the acquisition, construction, and improvement of real estate properties (except minor repairs), contributions to pension plans, social club membership acquisition, tombstones, burial sites, and other investments. The decrease in liabilities comprises the payment of debts, interest, personal loans, and housing financing.

On the other hand, the household total income comprises the gross monetary earnings of all its members obtained from work, transfers, rents, and other occasional revenues, plus the non-monetary component and the realized capital gains (IBGE, 2019). Concerning taxes and deductions, the survey discriminates three main groups: social security contributions, income tax, and other deductions (SILVEIRA et al., 2020).

Two features of the POF are of note. At first, as mentioned, it is the only source of microeconomic data on consumption for Brazilian households, consisting of a detailed structure of all expenditure components. Second, it has better instruments for determining

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share of household consumption into national accounts (DINIZ et al., 2007).

[9] The origin of the POF goes back to the 1974-1975 National Study of Family Expenditure (ENDEF), the first large-scale survey to produce information on income, expenditure, and food consumption for Brazilian households. Given its complexity and high cost, a new edition was held in 1987-1988, with a restricted scope and named Consumer Expenditure Survey. Thereafter, the survey occurred in 1995-1996, 2002-2003, 2007-2008, and more recently in 2017-2018. See Diniz et al. (2007) for a comprehensive review.

[10] The IBGE organizes the expenditures into current expenses, assets increasing, and liabilities decreasing, in which "current expenses" comprise both consumption expenditures and other current expenditures. We chose to organize into the three classes described in the text given our focus on consumption expenditure.

income, allowing for an extensive measure of household disposable income when compared with other surveys (HOFFMANN; VAZ, 2021; SOUZA, 2015). Specifically, the POF inspects both monetary- and non-monetary-based components, providing unique data on income.

The non-monetary component of household income has important implications for the empirical analysis. In particular, much of consumption expenditures might occur through non-market transitions (i.e., donations, transfers, home production, or exchanges between relatives and neighbors), especially for low-income households (SOUZA, 2015; DINIZ et al., 2007).[11] Then, computing these transactions into the household's income is important to address well-being. Most empirical literature for Brazil, however, restricts the analysis to monetary-based income.

2.3.1 Survey Design

The POF is a sampling survey on permanent private residences. It 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.[12] The primary sampling units are selected with probability proportional to the number of residences in each sector, and a subsample for the survey is randomly selected within each stratum. The secondary sampling units were the permanent private residences, randomly selected without replacement within each primary sampling unit.

At the residence level, the survey identifies the basic unit - the unit of consumption -, which comprises a set of residents (or a single one) that share the source of consumption. According to Diniz et al. (2007), the unit of consumption is a family-related concept, in the extent of the sharing of expenses on food or housing, rather than just parentage relations.

[11] In accounting terms, non-monetary expenses are equal to non-monetary income. An exception is the estimated rent, attributed to the household that owns their houses or that is allowed to live in. As stated by Diniz et al. (2007), there is a consensus to consider the estimated rent when measuring a household's well-being. In this case, the interviewees themselves estimate the amount of rent they would have to pay if they were to rent the residence.

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

Nonetheless, in most cases, it corresponds to an actual family (IBGE, 2019). Therefore, in what follows, we refer to it as the household. The person of reference (i.e., the household head) is the individual in charge of paying for the main expenditure on housing (rent, housing financing, real estate taxes) or so considered by the other residents.

Each residence in the sample represents a given number of permanent private residences and held a sample weight (or expansion factor) associated with it, allowing interpret the results for the entire population. The weights are computed such that it incorporates adjustments for non-response, and is assigned to each household. All statistics we report in this chapter are estimated considering the sample weights.[13]

Moreover, since the data collection takes place over twelve months - from June 2017 to July 2018 - and covers a reference period of up to twelve months for income and some expenditure items[14], the collected information is spread throughout twenty-four months. Given the absolute and relative price changes that may occur in this period, all the monetary values are adjusted for the prices of a reference date, defined within the survey to be January 15, 2018 (IBGE, 2019). In this chapter, all monetary values are expressed in Brazilian Real (BRL) at the prices of the reference data.

2.4 Data Description

2.4.1 Variable Definitions at the Household Level

To perform the empirical analysis, we follow close Heathcote, Perri and Violante (2010) and Krueger et al. (2010) by considering the household budget constraint to arrange the data, as in a standard macroeconomic model with heterogeneous agents. Specifically, we construct a set of economic variables that composes the budget constraint given by

$$c + s = (A + a) + y^l + \tau + r + q + \omega \tag{2.1}$$

[13] By performing such estimation, each observation is weighted by the inverse of its sampling probability. This allows precision estimates that incorporate the effects of stratification and clustering.

[14] Although reported on an annual basis, each expense item has a reference period according to a frequency of acquisition, which corresponds to 07, 30, 90, or 360 days.

where c denotes household consumption, and s represents a wide measure of household saving (or assets accumulated for the next period). A denotes the wealth at the beginning of the period, and a is the capital (or asset) income. Moreover, y^l corresponds to the *after-tax* labor earnings, τ to the net transfers, r to retirement pensions, and q denotes the sum of non-recurring revenues. Finally, ω stands for non-monetary income. This latter term is the major difference from the budget constraint in Heathcote, Perri and Violante (2010) and Krueger et al. (2010).

The right-hand side of (2.1) corresponds to household disposable income. In particular, household labor earnings (y^l) are set by aggregating the labor earnings of all its members.[15] Net transfers (τ) include the monetary income from social programs and private transfers, while retirement (r) comprises pensions and retirement income (public and private). Non-recurring revenues (q) account for occasional indemnities, taxes refunds, and insurance premiums. Non-monetary income (ω) corresponds to the market value of those acquisitions obtained through donation, exchange, home production, fishing, hunting, and gathering.

Unfortunately, due to the survey purposes, household wealth (A) and capital income (a) are poorly measured.[16] Therefore, we do not consider these components in the analysis. Although the POF provides data on realized capital gains (i.e., property sales, inheritance, and the balance of financial transactions), we exclude it from disposable income. We argue that it corresponds to occasional income and might not reflect ordinary intentions toward saving-consumption decisions.

The left-hand side of (2.1) corresponds to household budget allocation. Specifically, we define consumption (c) as the consumption expenditure class described above, given that it portrays a broad measure of household consumption from data. In addition, following closely the United Nation's *classification of individual consumption according to purpose* (COICOP, 2018), we organize these expenditures into five groups: non-durables,

[15] At the individual level, we define labor earnings as the average monthly monetary earnings, comprising salaries and extra payments for employees, and the labor share of income for employers and self-employed workers.

[16] Even the PNADc survey is incomplete regarding household wealth data (DIAS et al., 2019).

services, semi-durables, durables, and housing services. Finally, household savings (s) are set by the difference between disposable income and consumption expenditure (CROSSLEY; O'DEA, 2010). Likewise, we discount from savings the current expenses, given that they are not part of consumption, but a deduction from income (DEATON; ZAIDI, 2002), and hence, should not be included in savings either.

2.4.2 Sample Selection and Statistical Overview

Although the original survey sample consists of 58,039 household-level observations, we follow the literature in imposing some restrictions (JAPPELLI; PISTAFERRI, 2010; HEATHCOTE; STORESLETTEN; VIOLANTE, 2005). First, we do not consider the observations from multiple consumption units (i.e., more than one family living in the same house). Second, we exclude the consumption units reporting a non-positive disposable income. Third, we constrain the sample to those for which the reference person is aged between 20 and 65 (inclusive) and trim the top and bottom 0.25% of observations for disposable income distribution. As a result, our selected sample comprises 46,940 household-level consumption units. Empirically, we assume that each corresponds to a household.

Table 2.1 presents statistics characterizing the distribution of the economic variables described above, including the first and ninety-ninth percentile as thresholds indicating the extremes of each distribution. Furthermore, Table A.1, in the Appendix A.1, reports a set of other quantiles. In measuring the skewness of these distributions, we follow Pruitt and Turner (2018) and consider the Kelley statistic.[17] Notice that most of the distributions have positive skewness. It is of note that although consumption expenditure (c) accounts for 79.8 percent of disposable income (y) on average, about 32 percent of the observations in our sample report consumption expenditure greater than disposable

[17] The Kelley measure of skewness is given by

$$s_k = \frac{p_{90} + p_{10} + 2p_{50}}{p_{90} - p_{10}}$$

where p_{90}, p_{50}, and p_{10} are the percentiles 90, 50, and 10, respectively. This measure lies in $[-1, 1]$ and allows comparison between distributions with different scales.

income (we observe a similar result among total expenditure and total income). This highlights the empirical fact on savings: about 34.5 percent of the observations have negative savings.

Table 2.1 – Descriptive Statistics

	Mean	Median	Std. Dev.	Skewness	.01	.99
Total Income	5,062.10	3,260.56	6,417.66	0.552	408.00	30,602.03
	(65.45)	(29.91)			(6.48)	(993.94)
Disposable Income (y)	4,417.60	3,045.96	4,469.54	0.515	396.18	24,020.01
	(49.57)	(24.33)			(8.16)	(564.05)
Labor Earnings (y^l)	2,914.80	1,833.33	3,710.17	0.461	0.00	18,996.98
	(39.04)	(19.59)			(5.17)	(372.87)
Transfer (τ)	187.94	0.00	616.70	1.000	0.00	2,261.76
	(4.60)	(5.50)			(5.50)	(108.21)
Retirement (r)	519.18	0.00	1,680.88	1.000	0.00	7,413.01
	(12.36)	(41.05)			(41.04)	(340.36)
Non-Recurring (q)	34.71	0.00	353.27	-	0.00	619.61
	(2.49)	(2.17)			(2.17)	(48.19)
Non-Monetary (ω)	736.99	546.67	881.34	0.310	0.00	3,947.31
	(8.53)	(5.28)			(1.08)	(150.06)
Total Expenditure	3,946.10	2,639.54	4,976.82	0.528	388.94	22,192.90
	(52.73)	(24.95)			(8.95)	(703.77)
Consumption (c)	3,527.70	2,453.60	3,624.43	0.506	371.55	19,062.78
	(43.24)	(22.38)			(7.07)	(618.88)
Non Durable	1,287.40	982.33	1,206.23	0.414	111.94	5,355.07
	(11.17)	(8.54)			(3.76)	(86.72)
Service	1,116.10	567.30	1,708.83	0.616	0.00	8,242.84
	(20.44)	(8.54)			(0.47)	(381.05)
Semi-Durable	38.77	6.66	103.07	0.867	0.00	467.16
	(0.80)	(0.17)			(0.22)	(14.07)
Durable	373.16	74.74	1,021.18	0.820	0.00	5,098.62
	(8.01)	(1.95)			(0.62)	(174.62)
Housing Service	712.36	500.08	845.63	0.469	0.00	4,195.29
	(11.22)	(0.42)			(4.22)	(192.78)
Saving (s)	716.03	448.99	3,009.98	0.175	-6,567.45	11,394.95
	(26.52)	(11.76)			(339.07)	(368.49)

Note: All statistics are computed using sample weights, and the respective standard errors are reported in parenthesis. The monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018. Note that housing services include the rent paid for tenants and imputed rent for homeowners.

2.5 Empirical Analysis

In this section, we proceed with the empirical analysis. Specifically, we investigate the distributional properties of the economic variables in equation (2.1) across income groups, as given by the quintiles of the distribution of equivalized disposable income (i.e., we rank households into equivalized disposable income, and identify five distinct income groups). A common practice in the literature is to address the monetary-based component of the household's budget only. In contrast, we exploit and highlight the empirical facts on both monetary and non-monetary components and analyze how it matters in assessing household income and consumption.

We control the effect of household size by computing variables in equivalized terms using the OECD equivalence scale.[18] Adjusting for the family needs is a critical issue for the distribution of consumption, and assuming that it increases linearly with household size (e.g., in per capita terms) may overstate the relative consumption of the low-income households (CUTLER; KATZ, 1992). Moreover, if different size households are at different locations of any economic variable distribution, this might be relevant when measuring its inequality (KUHN; RÍOS-RULL, 2016).

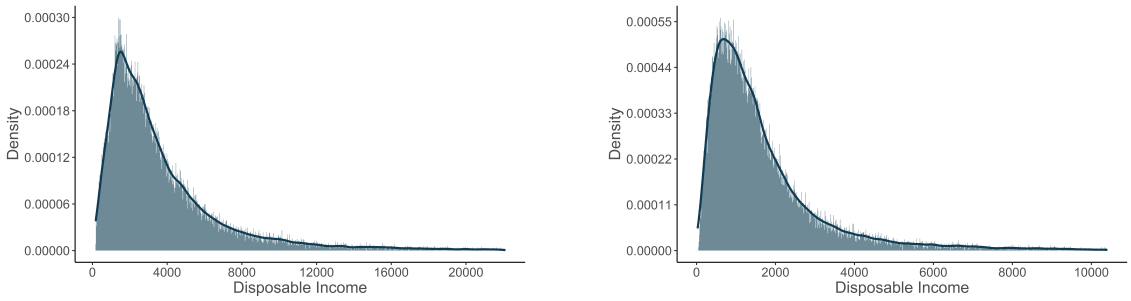
Regarding the cross-sectional dispersion, we compute distinct inequality metrics: the variance of the logarithm (λ) and the Gini coefficient (g). Both statistics are largely used in assessing the degree of inequality in economics, weighing differently across the distribution. While the variance of logarithms is sensitive to the bottom of the distribution (i.e., the shape of the log function to observations close to zero are amplified in their distance to the mean), the Gini coefficient accentuates differences where are most of the observations.

[18] This equivalence scale assigns 1.0 to the head, 0.7 to other adult members, and 0.5 to each child in the household. Following the definition in IBGE (2019), we assume any member aged 14 or under as children.

2.5.1 Disposable Income

Household disposable income is computed by deducting taxes and levies. It comprises labor earnings, transfers, retirement pensions, non-recurring revenues, and non-monetary income. In this section, we examine the main aspects of the disposable income distribution, underlying the importance of each component across household income groups. Since non-recurring revenues correspond to roughly 0.8 percent of disposable income, we consider it but do not address it in the analysis.[19]

At first, Figure 2.1 depicts the kernel density estimates of household disposable income (both raw and equivalized), for which we truncate the upper tails at five times the mean. The primary aspect of these distributions is their positive skewness, with thin and long right tails, such that 74 percent of the households have an equivalized disposable income below the average (BRL 2,080.32). Furthermore, Table 2.2 reports the mean and median of household disposable income by income groups.



(a) Not Adjusted (b) Equivalized

Figure 2.1 – Kernel Density of Household Disposable Income

Note: At the left panel, we truncate the upper tail at BRL 22,087.79, which implies a loss of 0.92% of the top observations. At the right panel, we truncate at BRL 10,401.61, resulting in a loss of 1.02% of the top observations.

As expected, the household size (in equivalized terms) decreases in income distribution: in general, low-income households are larger and have more children, which matters for the intra-household distribution of resources (IGLESIAS; COELHO, 2020). Moreover, notice the difference in income level at the top of the distribution: households in the highest quintile have an equivalized disposable income about 2.5 times greater than those in the preceding quintile (see Table 2.2). This suggests a significant dispersion

[19] Non-recurring revenues comprise indemnities, tax refunds, insurance premiums, and other refunds. Although considered as part of disposable income, it does not change the results qualitatively.

among high-income households. However, similar to other budget surveys, there is evidence of under-representation and under-reporting at the top of the income distribution in the POF (SOUZA, 2015; MEDEIROS; SOUZA; CASTRO, 2015a). Therefore, the results concerning the top of the distribution must be viewed with reservations.

Table 2.2 – Household Disposable Income by Income Groups

	Disposable Income			
	Not Adjusted		Equivalized	
	Mean	Median	Mean	Median
Quintile 1	1,165.34	1,110.05	419.09	436.89
	(8.42)	(13.45)	(2.14)	(2.82)
Quintile 2	2,140.40	2,052.26	840.86	842.91
	(12.01)	(14.15)	(1.69)	(3.12)
Quintile 3	2,974.99	2,872.89	1,284.90	1,282.11
	(16.99)	(21.23)	(2.10)	(4.11)
Quintile 4	4,273.98	4,080.07	1,935.83	1,908.78
	(24.32)	(28.51)	(3.86)	(6.40)
Quintile 5	9,672.66	8,000.92	4,929.82	3,812.54
	(119.17)	(95.44)	(62.34)	(41.58)

Note: Estimates within household income groups, as given by quintiles of the equivalized disposable income distribution. All statistics are computed using sample weights, with the standard errors reported in parenthesis. Monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018.

Furthermore, notice that labor earnings (y^l), transfers (τ), retirement pensions (r), and non-recurring revenues (q) compose the monetary component of disposable income. We are particularly interested, though, in non-monetary income (ω), which is often neglected in the empirical literature, and might reduce cross-sectional inequality. As to indicate the relative importance of the sources of household income, Figure 2.2 illustrates the share of disposable income due to each component across the entire income distribution.

A couple of empirical facts are of note from the results in Figure 2.2. First, the non-monetary share corresponds to a significant part of the low-income households' budgets. For the very poor, it equates to labor earnings and exceeds transfers. We estimate a weak but significant correlation between disposable income and its non-monetary com-

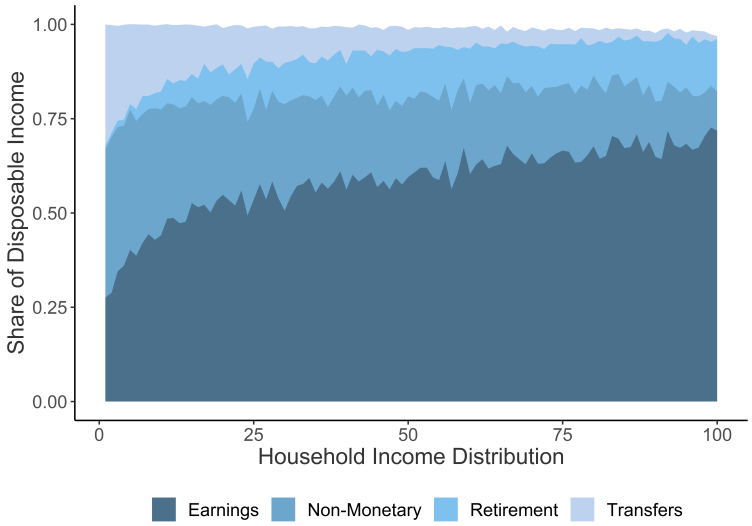


Figure 2.2 – Shares of Disposable Income Across Income Distribution

ponent (0.5093),[20] indicating their importance as for substitution effect for low-income households. In addition, less than half of disposable income comes from labor earnings among low-income households, while it represents over two-thirds of disposable income at the top of the income distribution. As expected, transfers contribute considerably to the low-income households' budgets and decrease sharply with income. The share of retirement pensions, in contrast, increases with income. This result reflects the fact that, although the social programs may be relevant at the bottom of the income distribution (HOFFMANN; VAZ, 2021), the middle- and high-income households usually have more retirees among their members.[21] Table 2.3 confirms these results by reporting the shares by income groups. Next, we address the distributional properties of these components individually.

2.5.1.1 Labor Earnings

The household labor earnings refer to all members. Specifically, we consider as members those individuals with a family relationship, excluding domestic workers, cohabitants, and pensioners (BAUMAN, 1999). Labor earnings correspond for roughly 60

[20] For complex surveys, weighting usually causes heteroskedasticity, violating distributional assumptions for hypothesis testing of the correlation coefficient. In this chapter, therefore, to test the null hypothesis $r = 0$, we set a bootstrap procedure in which the weights define sampling probability.

[21] Although to some extent both are monetary transfers, we consider them separately to provide a more detailed description of household disposable income.

Table 2.3 – Components of Household Disposable Income

	Labor Earnings		Transfers		Retirement		Non-Monetary	
	Mean	Share	Mean	Share	Mean	Share	Mean	Share
Quintile 1	555.28 (7.94)	.449	189.90 (4.33)	.178	73.30 (3.96)	.049	345.11 (4.29)	.324
Quintile 2	1,235.88 (12.99)	.563	191.24 (5.40)	.092	205.60 (7.17)	.096	493.24 (6.33)	.242
Quintile 3	1,873.10 (18.65)	.604	160.08 (4.84)	.059	317.90 (9.05)	.118	598.09 (7.54)	.210
Quintile 4	2,828.45 (25.69)	.639	175.52 (7.36)	.044	456.83 (14.12)	.115	767.75 (10.49)	.192
Quintile 5	6,728.12 (103.22)	.677	217.39 (15.78)	.025	1,280.23 (43.53)	.134	1,277.86 (26.36)	.148

Note: Estimates within household income groups, as given by quintiles of the equivalized disposable income distribution. All statistics are computed using sample weights, with the standard errors reported in parenthesis. Monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018.

percent of disposable income and are highly and significantly correlated with it (0.8831). Its participation in the household budget, however, differs across the income distribution (see Figure 2.2). Besides, around 8.9 percent of observations in our sample reported non-positive labor earnings.[22]

In the household, the family often provides a set of insurance mechanisms to mitigate income shocks (BLUNDELL; ETHERIDGE, 2010), and the literature has emphasized the labor supply as one of these mechanisms (BLUNDELL; GRABER; MOGSTAD, 2015; HEATHCOTE; STORESLETTEN; VIOLANTE, 2014). The insurance comes from other working members, which makes the household labor earnings not depend exclusively on the head (*intensive margin*), or from non-working members that can enter the labor market to offset earnings losses (*extensive margin*) (PRUITT; TURNER, 2018). For instance, in response to a temporary income loss from the household head (e.g., due to an unemployment spell), other adult members may increase their hours of work, or

[22] Particularly for this section, we consider a constrained sample of working households, excluding observations with non-positive labor earnings, remaining 42,757 households. Therefore, we ensure comparability of the inequality measures, allowing for the variance of logarithm to be estimated. We examine the impact of such restriction on the Gini coefficient, computing it on the sample that includes the zero values for labor earnings, and the outcome remains qualitatively analogous to that described in this section.

even enter the labor market. The choice to increase working hours, however, may not be readily available to Brazilian households, given that they face low flexibility in the labor market. The presence of other working-age members, instead, may work more directly for allowing households to dampen income shocks.

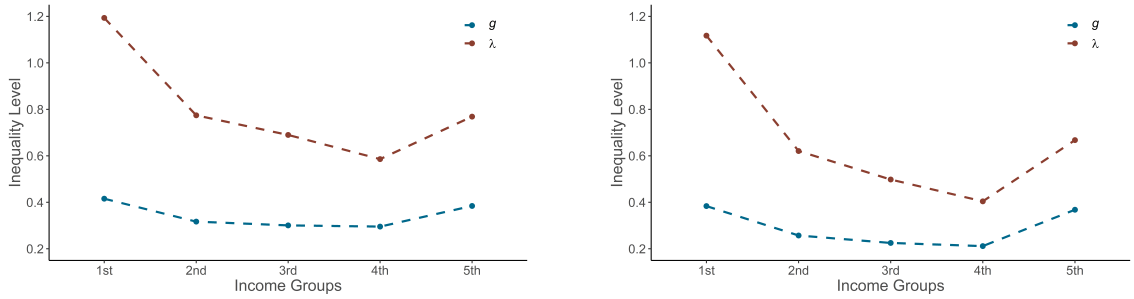
A closer look at the household structures indicates that, although the average number of adult members is 2.43, the number of workers is 1.58. That is, two-fifths of working-age adults do not contribute to household income through labor. Specifically, 41.5 percent of households have just one labor-earner member, while 49.5 percent have at least two labor-earners (and about 12 percent have three or more). We estimate a weak but significant correlation between labor earnings and the number of workers in the household (0.3492).

By following Bick, Fuchs-Schündeln and Lagakos (2018), we document the household employment rate as the share of adults who report having positive hours of work: on average, it is about 0.685. However, it should be noted that the size of the low-income households is usually larger, with a greater number of children and a few working members: the share of single-earner households is larger at the bottom of the income distribution.[23] Therefore, we compute the average employment rate within each income group and find that the number of adult working members increases with the household income: the employment rate ranges from 0.545 in the lowest to 0.776 in the highest quintile of the equivalized disposable income distribution.

Therefore, the insurance mechanism through labor supply might be limited due to the low labor market participation, especially among low-income households. In addition, if the working members within the household have similar occupations (e.g., in the same industry or even at the same firm), their earnings shocks could be positively correlated, and the insurance would not be straightforward. More specifically, for family arrangement works as insurance mechanism, the members have to select jobs where shocks are negatively correlated (BLUNDELL; GRABER; MOGSTAD, 2015).

[23] Indeed, 53 percent of households in the lowest quintile of the equivalized disposable income have just one working member, while this is the case for 38 percent of those in the highest quintile.

Concerning the labor earnings dispersion, the results in Panel A of Table 2.4 indicates a sizeable degree of inequality. For the equivalized measure, the variance of log is about 1.56, and the Gini coefficient is 0.54. As for comparison, considering a different dataset, Neri (2019) reported a Gini coefficient of around 0.62 for household per capita labor earnings during the same period. Moreover, inequality differs significantly throughout the income distribution: by assessing it across income groups we report that labor earnings are more unequally distributed among low-income households, as illustrated in Figure 2.3.



(a) Not Adjusted (b) Equivalized

Figure 2.3 – Household Labor Earnings Inequality by Income Groups

The inequality across households may be high as a result of the pooling over households with different number of working members (LISE et al., 2014). As stated, many households have a single labor earner. Therefore, we contrast the dispersion in labor earnings between households with different number of workers and document inequality significantly greater among those with one worker. Panel A of Table 2.4 reports inequality measures for three subsamples according to the number of workers (i.e., households with one, two, or at least three workers). This finding is particularly intriguing. Since the dispersion of the earnings distribution is a component of risk, it supports that single-earn households face higher labor income risks, which might be critical for low-income households. The employment rate is lower among these households, and the share of single workers is larger. As a result, we argue that low-income households may face higher labor income risks and relies on a limited ability to insure against income shocks through labor supply decisions. This points to the relative importance of non-labor (and, specifically, non-monetary) income at the bottom of the income distribution.

Table 2.4 – Income Inequality at the Household Level

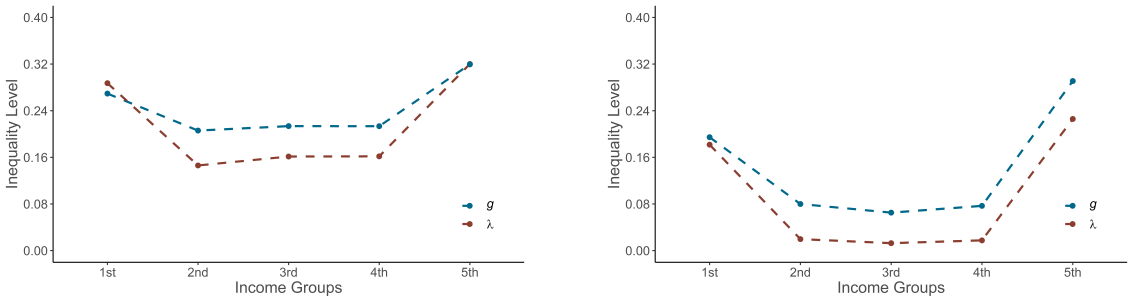
Panel A: Labor Earnings Inequality				
	Not Adjusted		Equivalized	
	λ	g	λ	g
Labor Earnings	1.505	0.522	1.565	0.539
	(.0219)	(.0033)	(.0241)	(.0041)
Among Households *with*				
Single Worker	1.644	0.553	1.916	0.601
	(.0321)	(.0055)	(.0379)	(.0061)
Two Workers	0.999	0.469	1.130	0.493
	(.0237)	(.0048)	(.0260)	(.0055)
Three or More Workers	0.835	0.418	0.953	0.444
	(.0345)	(.0071)	(.0366)	(.0075)
Panel B: Disposable Income Inequality				
	Not Adjusted		Equivalized	
	λ	g	λ	g
Disposable Income	0.708	0.452	0.755	0.467
	(.0097)	(.0033)	(.0110)	(.0038)
Disposable Income *net of*				
Transfers	0.917	0.473	0.974	0.488
	(.0129)	(.0032)	(.0139)	(.0038)
Retirement	0.881	0.471	0.891	0.485
	(.0123)	(.0034)	(.0132)	(.0040)
Non-Monetary	1.003	0.490	1.031	0.505
	(.0137)	(.0032)	(.0148)	(.0038)

Note: The estimates are computed using sample weights. The inequality measures are the variance of logarithm (λ) and the Gini coefficient (g). **Panel A:** The results are based on the restricted sample of households with strictly positive labor earnings, with 42,757 observations. **Panel B:** The result for disposable income is based on the entire sample, with 46,940 observations. When assessing inequality in disposable income net of each component, we exclude observations with non-positive values on the variable of interest (we exclude 53, 54, and 55 observations for disposable income net of transfers, retirement, and non-monetary, respectively). These restrictions ensure comparability of the inequality measures, allowing for the variance of logarithm to be estimated. We examine the impact of such a restriction on the Gini coefficient, computing it on the sample that includes the zero values for labor earnings, and the outcome remains similar.

2.5.1.2 Monetary and Non-Monetary Non-Labor Income

We now turn to the dispersion of the distribution of household disposable income at large. In particular, we expect it to be less concentrated than labor earnings, to the extent that the other components contribute to the income composition. Both statistics

indeed indicate that the degree of inequality in disposable income is considerably lower. Panel B of Table 2.4 reports the estimates. The variance of log equivalized disposable income is about 80 log points lower than the variance of log equivalized labor earnings, while the Gini coefficient is around 7 percentage points inferior. Moreover, when evaluating by income groups, as illustrated in Figure 2.4, the extent of inequality is relatively higher at the very top of the distribution, reflecting the highly positive skewness of disposable income.



(a) Not Adjusted (b) Equivalized

Figure 2.4 – Disposable Income Inequality by Income Groups

Therefore, the cross-sectional income inequality decreases when considering other than labor earnings components of households budgets, and such a decrease seems particularly relevant at the bottom of the income distribution. Notice that non-labor income consists of both monetary- and non-monetary-based parts. We address the impact of each of them on household income inequality.

Along with labor earnings, transfers and retirement pensions compose the monetary component of household disposable income. Since the labor earnings are highly unequally distributed, we investigate the contribution of both in the observed lower cross-sectional inequality in disposable income. Specifically, we subtract the transfers and the retirement (separately) from disposable income and assess the degree of inequality of the latter net of these components. The estimates are reported in Panel B of Table 2.4. Unsurprisingly, both contribute to the fall in the dispersion of disposable income. The degree of inequality, as measured by the variance of log disposable income, for instance, is about 0.21 log points higher when excluding transfers, and 0.17 log points higher when removing retirement. When measuring by the Gini coefficient, the inequality in disposable income

is around 2.0 percentage points higher when removing each one of these components.[24]

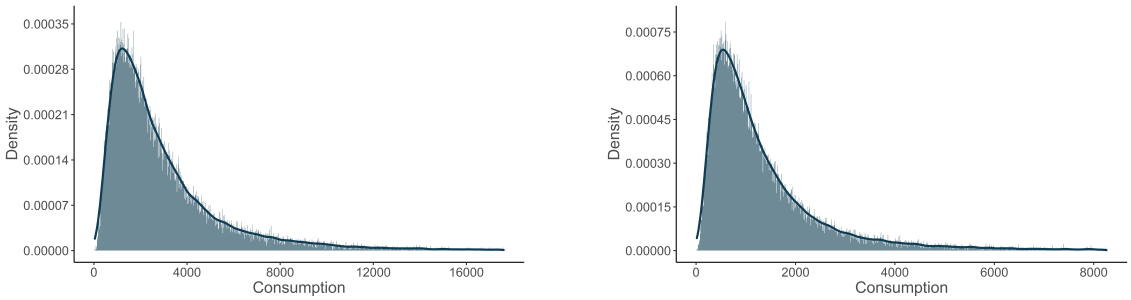
Nonetheless, we are interested in the non-monetary component of household disposable income. Likewise, we examine the extent to of it contributes to the fall in income inequality from labor earnings to disposable income. The results are summarized in Panel B of Table 2.4 and suggest a greater effect than that observed for transfer or retirement. The degree of inequality, as measured by the variance of log disposable income, is around 0.30 log points higher when removing its non-monetary share. The Gini coefficient indicates that the inequality in disposable income is 3.8 percentage points higher when we do not consider the non-monetary component.

This result is of note since non-monetary income accounts for a significant budget share of low-income households. Non-monetary income has a remarkable equalizing effect on income distribution and stands as crucial for analyzing both its level and variance. We argue that not considering non-monetary component, therefore, underestimates household income especially at the bottom of the distribution and overestimate the inequality.

2.5.2 Consumption Expenditure

We next turn to consumption. As mentioned, the POF is the only available dataset for Brazil with information on expenditure at the microeconomic level. Most of the data (e.g., utilities, housing, food), though, is organized into the survey according to the unit of consumption, and the analysis restricts to the household level. We define household consumption based on consumption expenditure (that is, excluding current expenses and changes in assets and liabilities (see Section 2.4)). Figure 2.5 depicts the kernel density estimates of household consumption (both raw and equivalized), for which we truncate the upper tails at five times the mean. Both distributions are highly dispersed and skewed to the right, such that 73.6 percent of the households have an equivalized consumption (i.e., consumption divided by the number of adult-equivalent) below the average (BRL 1,652.60).

[24] The literature for Brazil has emphasized the importance of transfers in reducing income inequality (BARROS et al., 2006).



(a) Not Adjusted (b) Equivalized

Figure 2.5 – Kernel Density of Household Consumption

Note: At the left panel, we truncate the upper tail at BRL 17,638.65, which implies a loss of 0.73% of the top observations. At the right panel, we truncate at BRL 8,263.10, resulting in a loss of 0.82% of the top observations.

We arrange consumption expenditures into five groups: non-durables, services, semi-durables, durables, and housing services. This classification is summarized in Table A.2, in the Appendix A.2. Moreover, Figure 2.6 illustrates the share of household consumption due to each component throughout the disposable income distribution.

Non-durable goods (e.g., food, clothing, personal care, medicine) correspond to the largest share of household expenditures, at about 42.0 percent on average. However, it is more representative of low-income households' expenditures: it responds to 52.2 percent at the bottom quintile of the income distribution and 32.5 percent at the highest quintile. In contrast, expenditures on services (e.g., transport, education, healthcare, personal services, entertainment) increase with disposable income. It accounts for 25.4 percent of household expenditures and ranges from 17.0 to 33.5 percent throughout the income distribution. Housing service responds to roughly 23.7 percent of households' expenditure and remains constant across the income distribution.[25] Lastly, durables goods (e.g., home appliances, jewelry, vehicles) account for 7.9 percent of the consumption expenditures, and semi-durables (e.g., home utensils, toys, sports equipment) for less than one percent, and both are steady across the income distribution.

It is worth noting that expenditure does not necessarily equate to consumption. While households' expenditures are defined as the nominal monetary outlay, consump-

[25] The POF provides data on housing for both homeowners and tenants who pay rent. In the case of homeowners, the survey asks for an estimate of the rental value of their home, which is very likely to correspond to approximate household consumption of housing services (ALESSIE; REE, 2009).

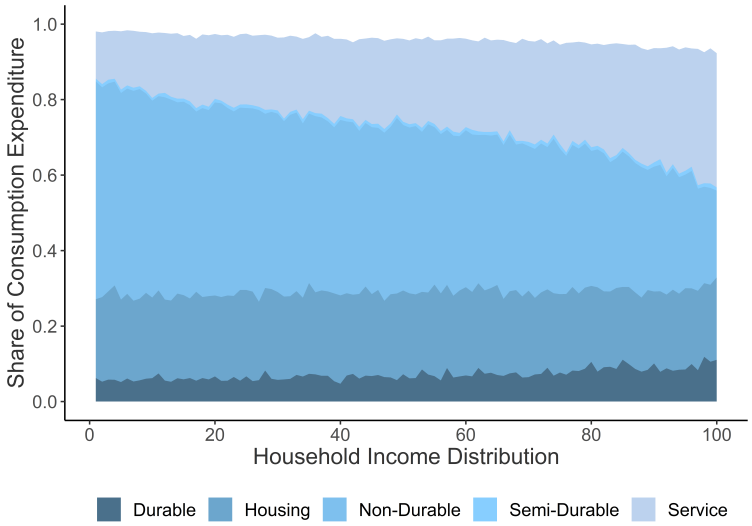


Figure 2.6 – Shares of Consumption Expenditure Across Income Distribution

tion is a basket of goods enjoyed in a given period (BROWNING; CROSSLEY; WINTER, 2014). Durable (and semi-durable) expenditures, for instance, do not correspond to the actual consumption of these goods, given that households derive utility from the service flow of their stock (ALESSIE; REE, 2009). Therefore, in addition to analyzing consumption expenditure at large (*consumption*), we consider a broad measure of non-durable consumption (*non-durable*), which includes only the spending on non-durable goods, services, and housing. We argue that such a measure of non-durables is likely to approximate household consumption to the extent that it comprises most expenditures toward actual consumption within the reference period. That is, non-durables consist of spending items depreciating within a year. According to Alessie and Ree (2009), it is reasonable to assume it equates to household consumption.

Table 2.5 reports the mean and median statistics describing household consumption by income groups, and a couple of empirical facts are of note. For low-income households, the average consumption expenditure exceeds the average disposable income (see Table 2.2). Moreover, the difference in the level of consumption is great at the top of the income distribution: the equivalized non-durable consumption of households in the fifth quintile is twice as greater as that of households in the fourth quintile. This assimilates to what we report for disposable income and suggests a strong income-consumption relationship. We address this question in the next section. Non-durable presents the same pattern.

Indeed, it accounts for roughly 88.3 percent of household consumption expenditure and tracks it closely across the income distribution.

Table 2.5 – Household Consumption Expenditure by Income Groups

	Consumption				Non-Durable			
	Not Adjusted		Equivalized		Not Adjusted		Equivalized	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Quintile 1	1,460.59	1,198.26	548.18	449.25	1,339.22	1,106.55	502.28	416.07
	(21.50)	(15.92)	(8.42)	(5.12)	(20.20)	(10.09)	(7.92)	(4.26)
Quintile 2	2,048.09	1,754.18	825.70	712.89	1,854.34	1,597.96	747.68	650.46
	(21.33)	(23.16)	(8.05)	(7.10)	(18.57)	(18.93)	(7.01)	(6.21)
Quintile 3	2,599.24	2,237.08	1,137.94	1,003.35	2,336.73	2,051.94	1,024.96	917.52
	(25.63)	(25.99)	(9.38)	(8.76)	(22.41)	(22.08)	(8.25)	(8.64)
Quintile 4	3,544.36	3,004.05	1,619.51	1,432.65	3,142.12	2,690.95	1,443.36	1,283.27
	(54.24)	(36.02)	(18.13)	(13.48	(49.36)	(29.87)	(16.87)	(11.86)
Quintile 5	6,808.29	5,487.47	3,483.52	2,721.76	5,901.99	4,726.87	3,023.87	2,382.06
	(119.34)	(86.69)	(62.97)	(43.12)	(107.62)	(85.52)	(57.04)	(33.80)

Note: Estimates within household income groups, as given by quintiles of the equivalized disposable income distribution. All statistics are computed using sample weights, with the standard errors reported in parenthesis. Monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018.

Regarding the second moment of the consumption distribution, Table 2.6 reports the estimates. The primary aspect to note is that the degree of dispersion of consumption expenditure is essentially identical to that observed for disposable income: all the inequality statistics are comparable, though slightly lower for consumption expenditure. In contrast, non-durable consumption is more equally distributed, which we expected since durable and semi-durable goods correspond to occasionally large expenditures that impact the cross-sectional dispersion. Hence, we next examine consumption inequality by considering the non-durable measure.

At first, non-durable inequality is lower than income inequality in according to standard economic theory (HEATHCOTE; PERRI; VIOLANTE, 2010). However, we document a difference in the magnitude of inequality between disposable income and non-durable consumption much lower than that observed for developed economies (BLUNDELL; ETHERIDGE, 2010; BRZOZOWISKI; GERVAIS; SUZUKI, 2010; JAPPELLI;

PISTAFERRI, 2010; PIJOAN-MAS; SáNCHES-MARCOS, 2010).[26] The degree of inequality in equivalized non-durable consumption, as measured by the variance of log, is about 0.07 log points lower than in equivalized disposable income. The Gini coefficient indicates inequality in non-durable consumption 1.6 percentage points lower.

Table 2.6 – Consumption Inequality at the Household Level

	Not Adjusted		Equivalized	
	λ	g	λ	g
Consumption	0.683	0.448	0.712	0.463
	(.0106)	(.0041)	(.0117)	(.0045)
Non-Durable	0.651	0.437	0.686	0.451
	(.0104)	(.0044)	(.0117)	(.0048)
Monetary Non-Durable	0.959	0.485	0.961	0.499
	(.0142)	(.0041)	(.0152)	(.0048)

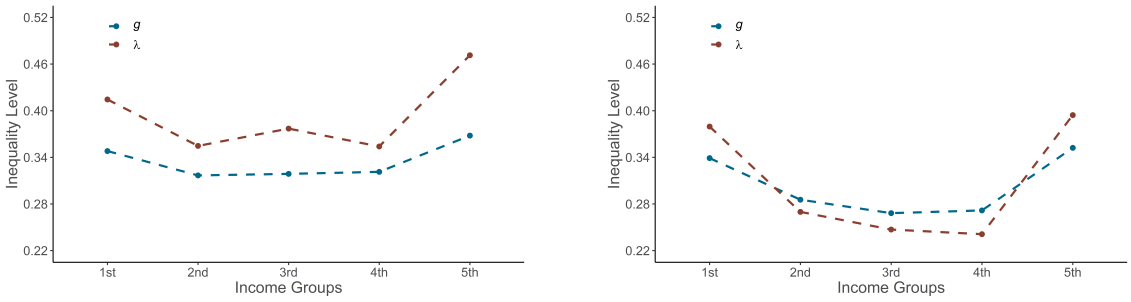
Note: The estimates are computed using sample weights, with the standard errors reported in parenthesis. The inequality measures are the variance of the logarithm (λ) and the Gini coefficient (g). For assessing inequality in monetary-based non-durable consumption, we exclude 33 observations with non-positive values on the variable of interest. These restrictions ensure comparability of the inequality measures, allowing for the variance of the logarithm to be estimated. We examine the impact of these restrictions on the Gini coefficient, computing it on the sample that includes the zero values for labor earnings, and the outcome remains similar.

Moreover, evaluating by income groups indicates that consumption inequality is greater among high-income households, as reported in Figure 2.7, reflecting the positive skewness of the consumption distribution. However, we also document a relatively higher inequality in equivalized non-durable consumption at the bottom of the income distribution, which might be due to differences in household size and heterogeneity in expenditure patterns.

Further, we address the effect of the non-monetary component by assessing inequality in monetary-based non-durable consumption. Table 2.6 reports these results. Similar to disposable income, removing the non-monetary part increases non-durable consumption dispersion. Specifically, the degree of inequality measured by the variance of log equivalized monetary non-durable consumption is about 0.27 log points higher than the

[26] Even for Mexico in the 1990s, Binelli and Attanasio (2010) estimated a larger difference between income and consumption inequality.

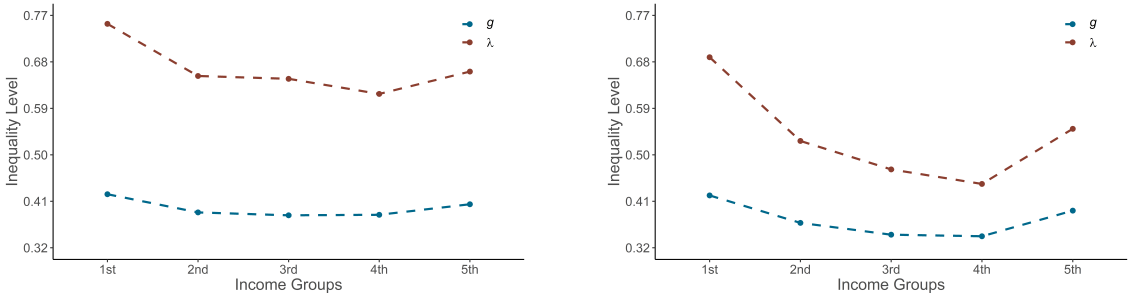
degree of inequality in equivalized non-durable consumption. By measuring with the Gini coefficient, inequality is 4.8 percentage points higher.



(a) Not Adjusted (b) Equivalized

Figure 2.7 – Non-Durable Consumption Inequality by Income Groups

In summary, as with disposable income, the non-monetary component of households' budgets has a significant equalizing effect on the non-durable consumption distribution. As expected, this is particularly important for the bottom tail of the income distribution. As for comparison, Figure 2.8 depicts the estimates of inequality within income groups. Notice that the effect on inequality from removing the non-monetary component of non-durable consumption is more pronounced among low-income households. For instance, the degree of consumption inequality, as measured by the variance of log equivalized non-durable, is 0.31 log points lower when computing the non-monetary share for households in the lowest quintile of the income distribution. This difference is about 0.16 log points for those in the highest quintile.



(a) Not Adjusted (b) Equivalized

Figure 2.8 – Monetary Non-Durable Consumption Inequality by Income Groups

Assuming that low-income households are usually larger and more prone to monetary income shocks, their consumption might differ according to the available insurance mechanisms. We argue that the non-market transactions might work as a mechanism for

smoothing out consumption, especially when the labor supply is not a readily available alternative. For example, when facing a decline in disposable income (e.g., due to member unemployment), they can count on home production and exchanges with relatives and neighbors. The non-monetary component, therefore, matters not only in the analysis of disposable income but also in the analysis of consumption, being particularly important in analyzing household heterogeneity.

2.5.3 Disposable Income and Consumption

In previous sections, we analyzed the distributional properties of household disposable income and consumption separately. Although we report a consumption inequality lower than income inequality, the difference is much smaller than the evidence from other countries. It might be informative, therefore, to investigate the joint distribution of both variables. In particular, we set disposable income and non-durable consumption as defined previously for household income and consumption.

Initially, we estimate a strong and statistically significant positive correlation between log equivalized non-durable consumption and log equivalized disposable income (0.7852). Figure 2.9 depicts the joint distribution of these variables. This relationship is in line with Silveira and Moreira (2014) that reported evidence of parallelism between expenditures and current income for Brazilian households. Such a cross-sectional association is rather informative. The existing literature based on aggregate data has often presented evidence that the current income is the primary determinant of consumption in Brazil, although whether due to myopia or credit restriction remains under discussion (LOPES, 2017; GOMES, 2010; GOMES; PAZ, 2010). The empirical findings often point to the fact that most households follow a rule-of-thumb consumer behavior, in which they consume according to disposable income.

To examine the relationship between income and consumption at the household level, we apply a quantile regression approach to estimate the impact of disposable (current) income across the distribution of consumption. Therefore, we address the heterogeneity and obtain a further description of the underlying relationship. Specifically, we

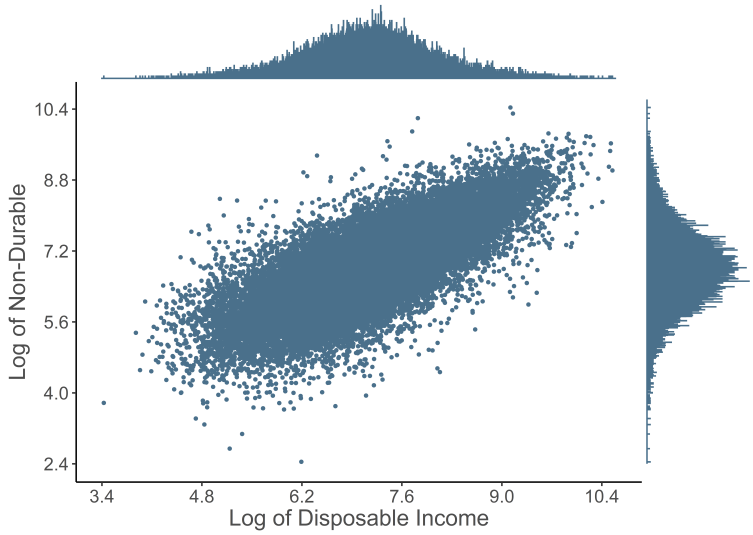


Figure 2.9 – Household Income and Consumption Joint Distribution

set the following baseline linear empirical model

$$\ln c_i' = \delta_0 + \delta_1 \ln y_i' + \mathbf{x}_i'\boldsymbol{\gamma} + \varepsilon_i \tag{2.2}$$

where c_i' stands for equivalized non-durable consumption and y_i' for equivalized disposable. The index i refers to households. As for control variables, the vector $\mathbf{x}$ includes the age of the head (and age squared), the schooling, gender, and marital status of the head, the number of children, a dummy variable that is equal to one if the household has any source of capital income, a dummy variable that is equal to one if the household resides in the urban area, and a set of dummies for the State of residence. From the linear specification (2.2), we estimate δ_1 for each percentile simultaneously such that

$$\delta_1^\tau = \arg\min_{\delta_1} \sum \rho_\tau \Big[\ln c_i' - \delta_1 \ln y_i' - \mathbf{x}_i'\boldsymbol{\gamma} \Big] \tag{2.3}$$

where $\rho_\tau(\varepsilon) = \varepsilon \times \{\tau - 1(\varepsilon < 0)\}$ (FRöLICH; MELLY, 2010; KOENKER; HALLOCK, 2001). Figure 2.10 depicts the estimated coefficient δ_1 for all conditional percentiles between the first and the ninety-ninth. The effect of (log) disposable income is significant across most quantiles of the conditional (log) non-durable distribution. Until the eighty percentile, a one percent increase in equivalized disposable income results in an increase of over 0.60 percent in equivalized non-durable consumption. For the higher percentiles, the estimated impact decreases sharply, though remains statistically significant and meaning-

ful. These results are in accordance with the estimates of income elasticity of consumption in Vaz and Hoffmann (2021).

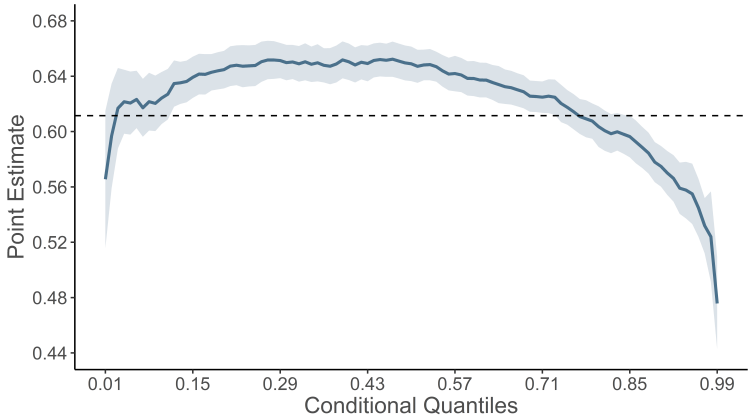


Figure 2.10 – Conditional Quantile Response of Non-Durable to Disposable Income

Note: Confidence interval computed from bootstrapped standard errors, based on 1000 replications. The horizontal line correspond to the ordinary least squares.

Table 2.7 reports the estimates of interest for selected conditional quantiles. For these cases, we test the hypothesis that the slope coefficient δ_1 from equation (2.2) are identical across the quantiles, by considering the Wald-type test described in Koenker and Bassett (1982). The joint null hypothesis of equality of slopes is rejected for all quantiles. In a pairwise comparison, it is not rejected when assessing the results for quantiles .10 and .75, and for quantiles .25 and .50.

Table 2.7 – Quantile Regression of Consumption on Disposable Income

	Results on Selected Quantiles				
	.10	.25	.50	.75	.90
Intercept	1.5512***	1.6992***	2.0995***	2.5617***	3.1890***
	(.0962)	(.0765)	(.0754)	(.0854)	(.1129)
Log Income	0.6242***	0.6477***	0.6489***	0.6174***	0.5749***
	(.0095)	(.0074)	(.0060)	(.0064)	(.0075)

Note: Models are estimated considering the sample weights. The dependent variable is the logarithm of equivalized non-durable consumption. Standard errors reported in parenthesis, computed by bootstrap, based on 1000 replications. All the estimates include the following control variables: the age of the head and age squared, the schooling, gender, and marital status of the head, number of children, a dummy for capital income, a dummy for urban residence, and dummies for State. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

The relationship between disposable income and consumption reflects on savings. To highlight this fact, we measure household savings as the difference between disposable

income and consumption expenditure (CROSSLEY; O'DEA, 2010; DYNAN; SKINNER; ZELDES, 2004).[27] Further, we discount the current expenses: the latter do not correspond to savings either. Table 2.8 reports the mean and median of household savings across income groups. Given how we measure it, the differences in level are an extension of previous findings. Therefore, we examine household savings by computing the saving rate as the ratio between savings and disposable income. Table 2.8 also reports the average saving rate within each income group, and a few results are of note. At first, we observe a wide negative saving rate for households at the bottom of the distribution, indicating that low-income households have a level of consumption of about two times the disposable income. Moreover, the difference in saving rates is greater at the top of the income distribution: households in the highest quintile save about 8.4 percentage points more than those in the preceding quintile.

Table 2.8 – Household Saving by Income Groups

	Saving				Saving Rate
	Not Adjusted		Equivalized		
	Mean	Median	Mean	Median	Mean
Quintile 1	-330.14	-115.79	-142.48	-46.04	-0.462
	(21.62)	(11.38)	(8.56)	(4.43)	
Quintile 2	29.36	233.02	-9.87	101.39	-0.016
	(19.93)	(14.92)	(8.25)	(6.16)	
Quintile 3	277.56	471.59	103.00	235.80	0.076
	(22.47)	(18.00)	(9.88)	(9.12)	
Quintile 4	575.23	807.88	246.47	428.95	0.126
	(49.84)	(25.15)	(18.32)	(11.44)	
Quintile 5	2,433.29	2,085.22	1,225.91	1,117.72	0.210
	(89.15)	(46.41)	(49.40)	(28.16)	

Note: Estimates within household income groups, as given by quintiles of the equivalized disposable income distribution. All statistics are computed using sample weights, with the standard errors reported in parenthesis. Monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018.

In summary, households save very little: on average, about 1.0 percent of the disposable income. Moreover, we document a significantly heterogeneity in saving behavior, especially at the bottom of the income distribution. These results might be, at least partly,

[27] The concept of saving is rather ambiguous. In particular, it depends on real and financial assets held by households as a store of value or for wealth accumulation.

due to the saving definition. However, they indicate that low-income households allocate the entire disposable income in consumption expenditure.

To some extent, these results are according to the empirical literature in showing that disposable income is the primary determinant of consumption for Brazilian households. A particular finding is that this relationship is persistent across most of the consumption distribution: only for high-consumption households (probably high-income households), disposable income has a minor effect on consumption. Otherwise stated, the impact of disposable income is greater at the bottom tail of the distribution. This suggests a critical role for liquidity constraint rather than myopia, given that low-income households seem more likely to respond to shocks in disposable (current) income.

Note that this has implications for household consumption insurance. As mentioned, inequality in consumption is just slightly lower than inequality in income, in contrast to other countries in which consumption is much more equally distributed than income. Theoretically, the dispersion in consumption being lower than dispersion in income implies that changes in wealth are used to smooth income fluctuations (HEATHCOTE; PERRI; VIOLANTE, 2010; PIJOAN-MAS; SáNCHES-MARCOS, 2010). Since the dispersion of consumption distribution reflects the risk faced by households (at least part of it), they might have difficulties in smoothing consumption, especially the low-income ones.

As described previously, labor supply seems to not work as an insurance mechanism (both through *intensive* and *extensive* margin). Even facing greater inequality in labor earnings, low-income households count on it for about half of disposable income. As a result, other non-work-related components of household income matter in the composition of the budget. However, although these other components reduce its dispersion, disposable income remains relatively high, and since consumption depends on it, the degree of inequality in consumption are high as well.

In particular, we emphasize the non-monetary income in such a relationship. Given its critical role in depressing income inequality, we argue that non-monetary income works as an insurance mechanism for low-income households. However, note that it corresponds

to the approximated market value of non-market transactions (i.e., donations, home production, exchanges), and hence, it is reasonable to assume that the marginal propensity to consume from it is close (if not equal) to one. This implies that non-monetary income impacts the level and dispersion of both the income and consumption simultaneously, and thus, does not reduces the gap between the inequality in income and consumption. In addition, for low-income households which rely significantly on it, the non-monetary income intensifies the association between disposable income and consumption. These findings indicates that Brazilian households does not smooth consumption.

2.6 Concluding Remarks

This first chapter undertakes a systematic investigation of distributional properties of economic variables at the household level by considering the most comprehensive dataset available for Brazil, the Consumer Expenditure Survey (POF). In particular, we emphasize cross-sectional empirical facts on earnings, income, and consumption, and examine several dimensions of economic inequality, addressing household heterogeneity.

The noteworthy finding is the role that non-monetary income plays in compressing the degree of inequality from labor earnings. In the household, most individuals are exposed to other members' risks (e.g., income shocks, medical expenses), but at the same time can share individual risks and dampen income shocks (ATTANASIO; SáNCHEZ-MARCOS; LOW, 2005). It would expect, therefore, that labor earnings correspond to the largest component of disposable income, given the extensive margin for insurance. Nevertheless, we document that non-monetary income account for one-third of the disposable income at the bottom of the income distribution.

These results have critical empirical implications. As with income, the non-monetary component of households' budgets has an equalizing effect on consumption distribution, which is particularly important for low-income households. Assuming that they are more prone to income fluctuations and face higher risks, non-market transactions might work as an insurance mechanism. When facing a decline in disposable income (e.g., due to an

unemployment spell), they may count on home production and exchanges with relatives and neighbors.

Nonetheless, the cross-sectional inequality in consumption resembles that in disposable income. Specifically, we document that such a difference is much lower than that reported for developed economies. The dispersion in consumption being lower than dispersion in income implies that changes in wealth are used to smooth income fluctuations. The fact that inequality in consumption is only slightly lower indicates that Brazilian households might have little space for such a mechanism.

This is a major empirical issue that economic literature sparsely addresses for Brazil, perhaps due to unavailable panel data on consumption expenditure. Given the low saving rates and the strong dependence on disposable income, however, it is reasonable to suppose that low-income households (especially) might have other mechanisms to smooth out consumption. In that regard, we stressed the importance of the non-monetary component of households' budgets and further argue that since it reduces inequality, it might work, at least partly, as an insurance mechanism. For an understanding of household heterogeneity, therefore, non-monetary-based income might be relevant and meaningful.

3 Consumption at Retirement: Is There a Puzzle in Brazil?

Abstract

This chapter revisits a well-known fact regarding consumption upon retirement. Economic literature documented a decline in consumption as the household transition to retirement, referred to as a puzzle. We investigate such an empirical question for Brazilian households. A critical issue, however, concerns the assessment of consumption at the microeconomic level. We consider data from the Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* - POF) and construct a measure of non-durable that includes both monetary and non-monetary consumption. We then estimate a decline in consumption at retirement due to work-specific expenditures: based on a "core" measure of consumption (i.e., net of work-related), we document no decrease at retirement for Brazilian households. Further, we assess heterogeneity across households according to different retirement schemes and report that the core consumption increases at retirement.

Keywords: Consumption; Retirement; Pension Schemes.

3.1 Introduction

Research on household consumption is a prominent strand in modern macroeconomic literature and made remarkable progress in the past two decades due (in large part) to the increasing availability of disaggregated data on expenditure, income, and wealth. As stated by Browning, Crossley and Winter (2014), household-level data underpin research on several questions that matter to economic theory and policy. For instance, the understanding of the households' consumption over the life cycle and its response to shocks has been enlarged based on disaggregated data on expenditure (PISTAFERRI, 2015).

The standard version of the life-cycle model, which precludes uncertainty and bequest motives, predicts that households accumulate wealth during the working life for support consumption at retirement (SUARI-ANDREU; ALESSIE; ANGELINI, 2019). There is a large body of microdata-based evidence, though, that indicates a decline in consumption upon retirement, which is hard to reconcile with the theoretical optimizing behavior (BANKS; BLUNDELL; TANNER, 1998; BERNHEIM; SKINNER; WEINBERG, 2001; ROBB; BURBIDGE, 1989; MARIGER, 1987; HAMERMESH, 1984). The economic literature refers to it as the *retirement consumption puzzle*.[1]

Despite the benefits of using micro-data, much of this puzzle appears to be related to the measurement of household consumption (HURST, 2008a). Aguiar and Hurst (2005), for instance, emphasized the importance of distinguishing between consumption and expenditure to explain changes in food expenditure at retirement. Measuring consumption at the micro-level is not a simple task though (PISTAFERRI, 2015; CROSSLEY; WINTER, 2014).[2] A budget survey is the traditional data source for it, providing a detailed set of information on expenditures in a reference period, with consumption computed through reported spending on several categories. There is no guarantee, however, that

[1] Equivalently, there is a *retirement savings puzzle*, which shows that households do not decumulate at retirement as the standard life-cycle model suggests (NARDI; FRENCH; JONES, 2016; OOIJEN; ALESSIE; KALWIJ, 2015; POTERBA; VENTI; WISE, 2011).

[2] According to Browning, Crossley and Weber (2003), consumption is understood as the purchase of non-durables and the flow of services from the stock of durables, corresponding to the best direct measure of material well-being.

household expenditure corresponds to consumption (ATTANASIO; PISTAFERRI, 2016; BROWNING; CROSSLEY; WINTER, 2014).

To assess this empirically, we consider the most important source of expenditure data for Brazilian households, the Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* - POF), and discuss an approach to achieve a reliable measure of household consumption. In particular, we address sporadic spending and non-market transactions, reaching a measure of non-durable that includes monetary and non-monetary spending. We argue that it is more likely to equate to actual consumption and then turn to household consumption at retirement.

Several features make Brazil an intriguing case for analysis of this empirical question. At first, a stylized fact is that Brazilian households save little for old age (AFONSO; ABREU; HECKSHER, 2019; KUNT; KLAPPER; PANOS, 2016), which implies that they are more likely to depend on retirement pensions. Another characteristic is that the social security system in Brazil has significant differences in pensions according to regimes. These differences might import for analyzing consumption at retirement since the income replacement may differ due to the retirement scheme. Further, it is of note that non-monetary income matters in households' budgets, particularly among low-income. It might as well be relevant to the discussion given that as households transition to retirement, it expects to increase non-market transactions, especially time-intensive home production and exchanges with relatives and neighbors (AGUIAR; HURST, 2005; HURD; ROHWEDDER, 2003).

To the best of our knowledge, the only study that addressed this question for Brazilian households is Stampe et al. (2017), analyzing consumption expenditure across household ages. The authors reported decreases in a few categories of expenditures as the population ages but did not examine the retirement puzzle directly. More specifically, they estimated consumption functions controlling for age effects, and not distinguished consumption and expenditure.

Following the approach in the literature, our findings suggest a decline in consumption at retirement driven by work-specific expenditures. Therefore, based on a reliable

measure for consumption (i.e., net of work-related), we document no decrease at retirement for Brazilian households. In addition, we report no evidence of a retirement *food* consumption puzzle. Nonetheless, taking into account the heterogeneity between households adhering to different retirement schemes, we find a contrasting increase in consumption as households transition to retirement. Moreover, we document that monetary-based consumption does not change, while the non-monetary increases at retirement.

The remainder of the chapter is organized as follows. Section 3.2 provides a literature review on the retirement consumption puzzle. Section 3.3 presents the primary source of micro-level data on expenditure for Brazilian households, the POF. Section 3.4 reviews the expenditure data toward a reliable measure of household consumption. Section 3.5 turns to the empirical analysis of the consumption at retirement, and Section 3.5.4 extends it to assess heterogeneity across households according to pension schemes. Section 3.5.5 examines the monetary and non-monetary consumption at retirement. Section 3.6 provides concluding remarks.

3.2 Literature Review

There is a large empirical literature documenting a decline in household expenditures upon retirement, which contrast with lifetime optimizing behavior. Banks, Blundell and Tanner (1998) reported that expenditure of England households decreases by about 10 percent at the incidence of retirement, and argued that only part of it is due to the increased leisure time. Similar results were found for American households.[3] Bernheim, Skinner and Weinberg (2001) documented a median decrease of about 14 percent, with a higher decline for low-wealth-to-income households, consistent with a *retirement with inadequate savings*. Laitner and Silverman (2005) estimated a drop in total expenditure of 16 percent upon retirement. Haider and Stephens (2007) found decreases of 2.5 percent in total expenditure and 5.7 percent in food consumption. Fisher and Marchand (2014) found a decline of about 6.2 percent in total expenditure at retirement. Moreover, for

[3] Hamermesh (1984) and Mariger (1987) earlier documented a strong decrease in consumption as households transition to retirement in the United States.

German households, Schwerdt (2005) documented that average consumption decreases by 8.5 percent at retirement. For Italian households, Battistin et al. (2009) and Miniaci, Monfardini and Weber (2010) reported a decrease in non-durable consumption of about 9.8 and 5.4 percent at retirement, respectively. For Spanish households, Luengo-Prado and Sevilla (2012) found a decline of about 13 percent in food expenditure, but no decrease in non-durable expenditures at retirement.

Further, the literature also demonstrated that a few consumption categories drive such a decrease. Banks, Blundell and Tanner (1998), for instance, documented that the decline in work-related expenditures is much larger than total non-durable expenditures. Hurst (2008b) stated that much of the declining expenditures at the time of retirement in the United States appears to be from work-specific and food consumption, while changes in other categories are close to zero. Fisher and Marchand (2014) found that most of the decrease in expenditures at the time of retirement occurs within the food categories. It is the case for other countries as well. Battistin et al. (2009) found a larger decline in expenditure on food away from home, clothing, and transportation. Miniaci, Monfardini and Weber (2010) reported a decrease at retirement mainly in work-related categories. These results highlight that an expenditure decline at retirement does not imply a decrease in the households' utility. From the life-cycle perspective, it is expected that work-related spending reduces as the household leaves the labor market (HURST, 2008a).

In addition, the increasing available time allows substitute market expenditures toward time-intensive activities. Hurd and Rohwedder (2003) showed that part of the decline in expenditure is due to increasing home production. Aguiar and Hurst (2005) emphasize the distinction between consumption and expenditure to explain the fall in food expenditure at retirement and reported an increase in time spent preparing meals at retirement among American households. Aguiar and Hurst (2007) argued that the extra time allows retired households to shop more efficiently, and reported that older households pay lower prices for identical goods in the same area and time. Luengo-Prado and Sevilla (2012) documented a similar result for Spanish households, in which they do more and cheaper shopping and intensify home production at retirement.

3.3 Consumer Expenditure Survey (POF)

The economic literature counts on numerous household-level datasets on expenditure for several countries. Examples include the Consumer Expenditure Survey (CEX) and the Panel Study of Income Dynamics (PSID) in the United States, the Living Cost and Food Survey (LCF)[4] and the British Household Panel Survey (BHPS) in the United Kingdom. Recently, there has been an effort toward using administrative data for assessing household consumption, such as retail scanner data, tax on income and wealth, or banking and credit card records (KOLSRUD; LANDAIS; SPINNEWIJN, 2020; EIKA; MOGSTAD; VESTED, 2020; KAPLAN; MITMAN; VIOLANTE, 2020). Administrative datasets, however, are often not representative or cover only subsets of expenditures.

A budget survey is the traditional source of data for measuring household consumption. However, although comprehensive, a drawback of this kind of survey is that it usually has a limited longitudinal component (or lacks it entirely). Most of the empirical research on consumption benefits when it observes expenditures of the same household throughout time (PISTAFERRI, 2015; BROWNING; CROSSLEY; WINTER, 2014; PARKER; SOULELES; CARROLL, 2014). Other-purposes panel surveys, for instance, have been expanded to include expenditure questions in attempting to assess household consumption (e.g., the PSID and the BHPS), but information typically covers a small range of spending items (ATTANASIO; PISTAFERRI, 2016; LUENGO-PRADO; SEVILLA, 2012). Alternatively, some budget surveys occur more frequently (e.g., the CEX and the LCF), which provides repeated cross-sectional datasets on household expenditure for constructing quasi-panels employed in the consumption literature (BROWNING; CROSSLEY; WEBER, 2003; BANKS; BLUNDELL; TANNER, 1998).

Another issue concerns the quality of data from budget surveys. Several studies, for example, demonstrated that nonresponse and measurement errors in traditional surveys have increased over time (SABELHAUS et al., 2015; MEYER; MOK; SULLIVAN, 2015; BEE; MEYER; SULLIVAN, 2015). As a result, the literature has dedicated effort

[4] Formerly, the Expenditure and Food Survey (EFS), which succeeded the Family Expenditure Survey (FES) and the National Food Survey (NFS).

to discussing improving the measurement of consumption expenditure at the disaggregated level (CARROLL; CROSSLEY; SABELHAUS, 2015; BROWNING; CROSSLEY; WINTER, 2014). At the same time, several budget surveys attempted to deal with these issues in some way, according to their purposes.

Researchers interested in studying consumption at the household level in Brazil face several empirical limitations. At first, in contrast with earnings and income, disaggregated data on expenditure is relatively scarce, with the Consumer Expenditure Survey (POF) as the only dataset with such information. The primary household survey in Brazil, the Continuous National Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios Contínua* - PNAD), has no data on expenditures. The POF is a pure cross-sectional survey with a large number of observations but without any panel component, and the available datasets, though very complete, were collected at long and irregular intervals. Moreover, similar to other budget surveys, like the CEX, there is evidence of under-representation and under-reporting at the top of the income distribution (SOUZA, 2015; MEDEIROS; SOUZA; CASTRO, 2015a).

Nevertheless, it is worth noting that the POF's methodology follows closely the widely recommended procedures for budget surveys (EDGAR et al., 2013; DINIZ et al., 2007), and it undertakes a remarkable effort in constructing a large and representative sample of Brazilian households. The latter matters since it increases the precision of estimates and allows for reducing type I and II errors when conducting inference (PISTAFERRI, 2015). Besides, the POF survey counts with good instruments for determining household income, allowing for both monetary and non-monetary components (HOFFMANN; VAZ, 2021; SOUZA, 2015), which is a critical feature for assessing low-income households' consumption capacities (DEATON; ZAIDI, 2002). In addition to household income (and its components), the survey provides a large set of economic variables such as labor supply, demographics, and household characteristics, which matters for analyzing consumption (PISTAFERRI, 2015). All these characteristics, therefore, support its use to address households' consumption behavior.

3.3.1 A Brief Description of Available Expenditure Data

The POF is a nationwide cross-sectional sampling budget survey that collects a detailed set of expenditure data in a reference period. The survey strategy focuses on permanent private residences, through face-to-face interviews with the residents, over nine consecutive days.[5] It records data through two specific questionnaires: for frequent acquisitions (e.g., food, urban transport), respondents are asked to keep a diary (*the diary approach*), while for other acquisitions, they inform according to their memories (*the recall approach*).[6]

Measuring any flow variable requires choosing a reporting period (CROSSLEY; WINTER, 2014). The survey set a reference period for each spending item of 7, 30, 90, or 365 days, which usually mitigates underreporting issues. Browning, Crossley and Winter (2014) argued that long reporting periods might lead to underreporting through forgetting (*recall*) or diary fatigue (*diaries*), while short reporting periods exacerbate problems arising from purchase infrequency. Hence, the strategy for collecting data based on both the recall and the diary approaches, along with specified reporting periods, indicates the survey's ability to collect high-quality data on expenditure.

To ensure consistency of the information, the survey follows a data review protocol which comprises variable coding (i.e., goods and services, unit of measurement, form of payment), analysis of inconsistencies, and data imputation.[7] Regarding disaggregation, the POF set a seven-digit code to detail all expenditures, which determines 4,563 general spending items, and another 8,321 food spending items, all arranged into 46 expenditure categories.

The survey organizes data into three questionnaires: individual, collective, and frequent expenses. The latter includes food, beverages, alcoholics, and cleaning products consumed in the domestic setting. However, for most expenditures (e.g., utilities, housing,

[5] The POF survey takes place over 12 months, divided into 52 sub-periods, and each selected household was assigned two consecutive sub-periods for information collection.

[6] Both the diary and the recall approaches are widely recommended for budget surveys (BROWNING; CROSSLEY; WINTER, 2014; EDGAR et al., 2013; CROSSLEY; WINTER, 2014).

[7] In addition to own routines, the POF uses the Canadian Census Edit and Imputation System (CANCEIS) from Statistics Canada.

food), the POF identifies the unit of consumption (i.e., a set of residents that share a source of consumption), measuring expenditures most at the household level, which limits the analysis of consumer behavior on the individual level. Nevertheless, although intra-household allocation is critical to understanding household consumption behavior (IGLESIAS; COELHO, 2020), even expenditures made by one individual might be on the behalf of the household (BROWNING; CROSSLEY; WINTER, 2014).

Further, these expenditures are organized into three main classes: *i*) consumption expenditure; *ii*) current expenses; and *iii*) changes in assets and liabilities.[8] These classes compose the total expenditure and portray the spending habits of Brazilian households. In particular, consumption expenditures are of greater interest since it comprises household spending on food, utilities, housing, transport, personal care, entertainment, education, healthcare, clothing, and other personal expenditures. Current expenses comprise taxes on income, properties, vehicles, financial services, compulsory public pension payments, labor union dues, cash donations, insurance, property fees (i.e., installation fees on electricity, sewage, gas, internet), and other bureaucracy services. The changes in assets and liabilities account for the household's equity variation. Specifically, the increase in assets includes the acquisition, construction, and improvement of real estate properties (except minor repairs), contributions to pension plans, social club membership acquisition, tombstones, burial sites, and other investments that grow household wealth. The decrease in liabilities comprises the payment of debts, interest, personal loans, and housing financing.

3.3.2 Consumption Expenditure

Assuming consumption as the goods and services enjoyed by the household in a given period (BROWNING; CROSSLEY; WINTER, 2014), it can argue that not all sorts of expenditures correspond to a consumption decision. While expenditure is the nominal monetary (or money-valued) outlay, consumption is a basket of goods and services enjoyed in a given period (BROWNING; CROSSLEY; WINTER, 2014). From those classes

[8] The IBGE organizes the expenditures into current expenses, assets increasing, and liabilities decreasing, in which "current expenses" comprise both consumption expenditures and other current expenditures. We chose to organize into the three classes described in the text given our focus on consumption expenditure.

specified within the POF survey, only data relating to consumption expenditure is more likely to coincide with household resources outlaid toward consumption. Changes in assets and liabilities can be seen as investments and should not compose a consumption measure (MEYER; SULLIVAN, 2012). Moreover, current expenses (i.e., taxes and levies) are not part of consumption but a deduction from disposable income, and should not be included as well (DEATON; ZAIDI, 2002).

We argue that consumption expenditure portrays a broad measure of welfare at the household level from the POF dataset. Hence, in what follows, we concentrate the analysis on these data. We set a more convenient arrangement that aggregates all the spending items into a five-digit code, which gives a set of 4,214 goods and services, composing 34 consumption categories. Following closely the United Nation's 2018 *classification of individual consumption according to purpose*, we organize the consumption expenditures into five groups: non-durables, services, durables, semi-durables, and housing service.

Furthermore, in constructing a measure of household consumption from expenditure records, there exist additional issues requiring attention from researchers. Depending on the empirical interest, one should consider the frequency of each acquisition, and the non-market transactions, for example. We next address such issues in more detail.

3.4 Expenditure *versus* Consumption

A common practice in the empirical literature consists in equating consumption with expenditure (AGUIAR; HURST, 2005). There is no guarantee, however, these two measures accurately match. Some issues impose challenges to studying household consumption from budget survey data.

First, consumption is overstated relative to expenditure for households who buy durable goods in the current period and understated for those who have bought them in the past (ATTANASIO; PISTAFERRI, 2016). In general, durable goods correspond to occasionally large expenditures: a household is likely to purchase such goods only once within several years. In a survey's reference period, some respondents report durable

goods expenditures, while others do not but might have the respective durable, probably purchased in some previous period. Hence, assigning a null consumption of durables to the latter understates their welfare since they are currently consuming its services. As stated by Alessie and Ree (2009), it assumes that households derive utility from the service flow of the stock of durables, and durable expenditures do not correspond to the consumption of its service. Household consumption should comprise the service flow of durables goods, based on information regarding ownership, quality, and resale price (DEATON; ZAIDI, 2002).

Second, households may receive some consumer goods in kind. More specifically, they might obtain goods through non-market transactions: donations, transfers, or exchanges between family members or neighbors. Such in-kind consumption certainly increases the households' well-off, though it not necessarily account for in the expenditures. Hence, in this case, the consumption of those households who receive these goods may be understated. It is worth noting that this is an important issue, particularly for low-income households (DEATON; ZAIDI, 2002).

Third, some goods are produced at home by using time as one of the inputs (AGUIAR; HURST, 2007). The home production provides consumer goods which otherwise have to be acquired in the market. Aguiar and Hurst (2007) stressed the importance of home production for explaining consumption behavior, in which the life-cycle time allocation implies that household consumption differs markedly from their expenditures (PISTAFERRI, 2015).

Fourth, some household expenditures occur due to necessity or urgency, and others may be seem as investment (MEYER; SULLIVAN, 2012; DEATON; ZAIDI, 2002). These are particular the cases with healthcare and educational expenditures. Note that it might be hard to measure the extent to which health expenditures increase household welfare (MEYER; SULLIVAN, 2012), and it is also hard to discriminate necessary from nonessential expenses (DEATON; ZAIDI, 2002). On the other hand, regarding educational services, the expenditure is usually seen as an investment since the resulting rise in welfare is not immediately enjoyed by the household (AGUILA; ATTANASIO; MEGHIR,

2011). Moreover, these expenditures are heavily subsidized or take tax offsets, and much of such consumption comes from healthcare and education public programs (ATTANASIO; PISTAFERRI, 2016). Considering these expenditures, therefore, might overestimate household consumption.

Finally, converting expenditure into consumption requires knowledge of prices paid for the goods, which usually requires the assumption that households face the same set of prices (ATTANASIO; PISTAFERRI, 2016; PISTAFERRI, 2015). A budget survey usually reports the monetary value outlaid by the household with each acquisition (i.e., the product of prices and quantities) and includes price, interest, fines, and discounts. The assumption of an identical set of prices might not hold, given that there may be price differences even for relatively homogeneous goods that incentives households to search, and these incentives might differ among those with different financial and time resources (PISTAFERRI, 2015). In addition, to make comparisons across periods meaningful, the monetary values are adjusted for inflation according to an overall price index.[9] As stated by Attanasio and Pistaferri (2016), however, the composition of the consumption basket may differ substantially across different households due to differences in resources, needs, and tastes, and the average weights of the price index may not be relevant for all of them.

3.4.1 From Expenditure to Consumption

Any measure of household consumption is, therefore, inherently inaccurate (ATTANASIO; PISTAFERRI, 2016). A budget survey, like the POF, often provides a thorough assessment of household expenditure, which consists of the primary input for evaluating household consumption (BROWNING; CROSSLEY; WINTER, 2014). Empirically, however, converting the former into the latter requires some adjustments to approximate the measure of consumption to the actual well-being (DEATON, 1992). We describe next our measure of household consumption from the POF. As mentioned, we consider only data on consumption expenditure, excluding current expenses and changes in assets and liabilities, to establish a more regular and suitable measure of household consumption.

[9] Due to absolute and relative price changes, the POF adjusts monetary values for the prices of a reference date, defined within the survey to be January 15, 2008, (IBGE, 2019).

We begin by excluding household expenditures on durables.[10] Although the POF provides an inventory of these goods, it has no further information regarding the stock of existing durables (i.e., quality, condition, or current value, either original purchase price or current replacement value).[11] An exception, similar to CEX, is for housing service. For tenants who pay rent, the monthly expenditure directly enters into the consumption of housing services. However, households who own their houses do not pay rent but consume housing services. The survey asks the latter for an estimate of the rental value of their home, which provides the service flow from the durable stock housing. It is worth noting that this assumes a nearly competitive local rental market and that the owners are likely to be well-informed about the value of their properties and the level of rent they would pay for similar housing services. Notwithstanding, according to Alessie and Ree (2009), it is a reasonable procedure to include this service flow into the non-durable consumption.

Further, we exclude expenditures on healthcare and education. In measuring household consumption, both categories require a detailed analysis. According to Deaton and Zaidi (2002), the inclusion of health and education expenditures in the measure of household consumption should be based on the analysis of the income elasticity. Specifically, if the income elasticity is low, the ranking of households is likely to be robust to such inclusion.[12] Moreover, the household utility of consuming these goods varies significantly over the life cycle (AGUIAR; HURST, 2013).[13]

Another issue concerns the expenditures carried out for other households. Goods acquired for such a purpose clearly increase expenditure but not necessarily consumption.

[10] Specifically, we set as expenditure on durables those on home appliances, home tools, furniture, musical instruments, jewelry, and vehicles (including engines and other parts). Moreover, a sub-category corresponds to the semi-durables, which include expenditures on home decor, home utensils, toys, and sports equipment. For this chapter, we consider it also as durable goods.

[11] Oliveira et al. (2016) proposes an approximated measure of the monetary value of durable goods considering data from the 2008 POF. The authors used State-level median prices, average real interest rate, and depreciation rate to compute the user cost of durable goods.

[12] We estimate income elasticities of 0.85 and 1.05 for healthcare and education, respectively, in line with Oliveira et al. (2016).

[13] In particular, one can separate expenditures on education and healthcare into distinct subcategories concerning different decisions in different stages of life. For instance, healthcare expenditures comprise expenses on medicines, healthcare plans and insurance, health treatments (i.e., medical appointments, exams, and health recovery equipment), and hospitalization (i.e., hospital and surgeries). The expenditure on education includes expenses on formal education (i.e., school, college, and university), school supplies, professional training courses, and hobby and recreation activities (i.e., gym and sports classes).

The survey identifies the form of acquisition of each good and service purchased by the household, and monetary spending is specified whether made for the household itself or another consumption unit. In particular, we consider only the outlays for the household's consumption.

A crucial characteristic of the POF survey is that it distinguishes between monetary and non-monetary expenditure, given the intention of evaluating living conditions. The non-monetary expenses comprise those acquisitions obtained through donation, exchange, home production, or that comes from own business. Thus, the survey provides a measure of non-market transactions toward consumption, in which the respondents are asked to estimate the correspondent monetary value.[14] Not considering non-monetary expenditures in the measure of consumption may underestimate household consumption Deaton and Zaidi (2002).

Hence, our measure of consumption consists of expenditures on food (at home and away from), utilities, home fuel, housing repairs and maintenance, pets, tobacco, games of chance, urban transport, postal, newspaper, stationery, personal care, personal services, entertainment, telephone, vehicles maintenance, clothing, travel and tourism, social events, and housing services. Specifically, we consider a definition of non-durable expenditures including monetary and non-monetary spending on non-durables, services, and housing. It is a reasonable assumption that non-durable expenditures are equivalent to non-durable consumption (ALESSIE; REE, 2009).

3.5 Empirical Analysis

We now turn to the retirement consumption puzzle. Our baseline measure of household consumption is non-durable expenditures, as described in the previous section. In addition, following Aguiar and Hurst (2013), we define a measure of "work-related" consumption (comprising adult clothing, telephone, food away from home, urban transport, and vehicle maintenance) and also a measure of "core" non-durable consumption (i.e.,

[14] Non-monetary expenses equals non-monetary income in accounting terms, except the rent estimated.

non-durables minus work-related expenditures). For the empirical analysis, we restrict the sample to non-single-person households with positive disposable income, in which the head ages between 55 and 85. This restriction excludes individuals who may have retired too early. We further restrict the sample to households that reported nonzero expenditure on food.[15] The selected sample remains with 17,329 households.

3.5.1 Empirical Patterns Around Retirement

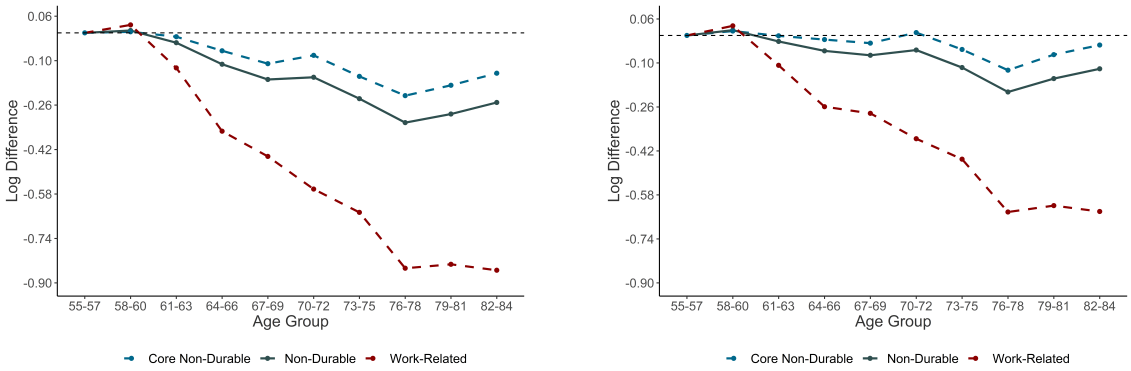
We begin by examining consumption conditional to the life stage around retirement. An intriguing empirical question concerns the life cycle profiles of consumption. However, the available dataset from the POF restricts the analysis: since it has no panel component, we cannot distinguish between cohort and age effects. Notwithstanding, following Bick, Fuchs-Schündeln and Lagakos (2018), we interpret the results as age effects, noting that we could be capturing cohort effects at least to some extent. Specifically, we estimate the following regression

$$\ln c_i = \gamma_0 + \boldsymbol{\gamma}_{age}\mathbf{A}_i + \varepsilon_i \tag{3.1}$$

where c_i denotes consumption of household i, and $\mathbf{A}_i$ is a vector of 3-year age dummies referring to the age of the head. The coefficients on the age dummies, $\boldsymbol{\gamma}_{age}$, account for the impact of the life stage on household consumption and should be interpreted as log deviation from the consumption of 55-57 years-old households. Figure 3.1 (the left panel) depicts these *profiles* for non-durable, work-related, and core non-durable consumption over the later stages of the life cycle. Further, we also estimate the equation (3.1) by adding a vector of controls for demographic characteristics (i.e., household size, marital status, a dummy for children, and a dummy for urban residence). The inclusion of control variables (the right panel of Figure 3.1) has basically a level effect on consumption patterns.

A couple of features are of note concerning the results from Figure 3.1. At first, we see that non-durable consumption (solid line) slightly decreases with household age,

[15] We assume that food is a strictly necessary good. At the household level, however, the POF's original dataset has 5,566 (9.5% of) observations with no data on food expenditure reported. It seems unlikely that those observations provide an accurate description of food consumption. It probably has been inaccurately collected due to *non-response* or measurement error or an inappropriate reference period.



(a) No Controls (b) With Controls

Figure 3.1 – Percentage Change in Consumption Around Retirement

Note: The Figure reports the estimates of the coefficients on age dummies, γ_{age}, from regression (3.1). The left panel depicts the specification that includes only the age dummies, and on the right panel, the specification we add controls for demographics. Notice that we set the younger age group to zero (omitted group). Therefore, the curve should be interpreted as a log deviation from the consumption of 55-57 years-old households.

even after controlling for demographics. In this latter case, non-durable consumption is up to 20 log points (i.e., about 18 percent) lower for households aged close to the eighties than those aged around the sixties. It is in line with the well-documented hump-shaped profile of non-durable consumption over the life cycle (FERNANDEZ-VILLAVERDE; KRUEGER, 2007). Moreover, the results suggest that there is significant heterogeneity across consumption categories. For instance, work-related consumption decreases dramatically with household age, while core non-durable declines little. The gap between these consumption measures accounts for the rising probability of the head leaving the labor market. This is according to Aguiar and Hurst (2013) and Battistin et al. (2009), who documented that the fall in non-durable consumption after middle age is driven basically by work-related expenditures.

In summary, the empirical pattern of the mean expenditure suggests that households reduce consumption over the latter stages of the life cycle. However, as expected, much of this is due to the adjustments in the work-related expenditure. Thus, we next delve deeper into such empirical facts and investigate the changes in consumption upon retirement.

3.5.2 Retirement Consumption Puzzle

The retirement status of the household is determined by the retirement status of the head. Specifically, we identify retirement according to the type of income received. The POF survey classifies the income of each household member into the following categories: (1) income from work; (2) transfers from public programs; (3) public pensions; (4) private pensions; (5) private transfers; or (6) capital income. We consider a household as *retired* if the head is in the third or fourth category (not exclusively).

Following the standard approach in the literature, we estimate the specification

$$\ln c_i = \alpha_0 + \alpha_1 R_i + \mathbf{Z}_i \boldsymbol{\phi} + \mu_i \tag{3.2}$$

where c_i denotes consumption, R_i is a dummy variable that equals to one if the head of the household is retired, $\mathbf{Z}_i$ is a vector of control variables, and μ_i is an error term. Retirement may be correlated with unobserved variables that affect household's consumption decision (AGUIAR; HURST, 2005), and therefore, we estimate specification (3.2) via instrumental variable approach. As instruments for retirement, following the literature (LI; SHI; WU, 2015; LUENGO-PRADO; SEVILLA, 2012; AGUIAR; HURST, 2005), we consider the head's age and a dummy variable which is equal to 1 if the head is aged above 65.

The vector of control variables, $\mathbf{Z}_i$, includes household size, gender, and marital status of the head, a dummy variable that is equal to 1 if the household has children, a dummy variable that is equal to 1 if the household has any source of capital income, a dummy variable that is equal to 1 if the household owns the residence, a dummy variable that is equal to 1 if the household is in the urban area, and a set of dummies for the State of residence. In addition, it also includes a dummy variable that is equal to 1 if there are other adult workers in the household.

Table 3.1 reports estimates of specification (3.2) for non-durable, work-related, and core non-durable. At first, notice that the evidence points to a decrease in consumption at retirement. A retired household has a 6.1 percent lower non-durable consumption than a non-retired household.[16] Much of such a decrease is due to the reduction in work-related

[16] The exact percentual change is given by $[\exp(\hat{\alpha}_i) - 1] \times 100$. We follow this procedure in interpreting the estimates throughout the chapter.

expenditure, which falls by 45.1 percent upon retirement. In contrast, core non-durable consumption appears to increase by about 3.5 percent at retirement, but the estimated coefficient for the retire dummy is not statistically different from zero.

These results support that the extent to which consumption falls in retirement depends on how it is measured. As stated by Hurst (2008b), most decreases documented occur in work-related and food categories. As households reduce their involvement in the labor market in old age, and their opportunity cost of time falls, these expenditures should decrease even if there is no change in income or preferences (AGUIAR; HURST, 2013). A standard life-cycle model with work-specific consumption will predict such a decrease as households exit the labor market (HURST, 2008b; BANKS; BLUNDELL; TANNER, 1998).

Table 3.1 – Effects of Retirement on Non-Durable Consumption

	Non-Durable	Work-Related	Core Non-Durable
Constant	7.8924***	5.6039***	7.7348***
	(.0482)	(.0984)	(.0469)
Retired	-0.0627**	-0.5996***	0.0348
	(.0292)	(.0593)	(.0284)
Sargan	1.096	3.583	0.334
	[.2950]	[.0584]	[.5633]
Observations	17,329	16,522	17,329

Note: Each specification is restricted to a subset of observations with a strictly positive value for the dependent variable. Results are from two-stage least squares regressions. The vector of instruments includes the head's age and a dummy variable which is equal to 1 if the head is aged above 65. All estimations include the following control variables: household size, gender, and marital status of the head, a dummy for children, a dummy for urban residence, a dummy for house property, a dummy for capital income, a dummy for other workers, and dummies for State of residence. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

In summary, we find evidence of a decline in non-durable consumption upon retirement for Brazilian households. The largest expenditure drop, however, occurs in work-related categories, which doesn't constitute a puzzle (LUENGO-PRADO; SEVILLA, 2012). Conversely, we document that the core non-durable consumption, a reliable measure for consumption at retirement, remains relatively steady as households transition to the later stages of the life cycle. Otherwise stated, there is no evidence of the puzzle for

the proper measure of consumption.

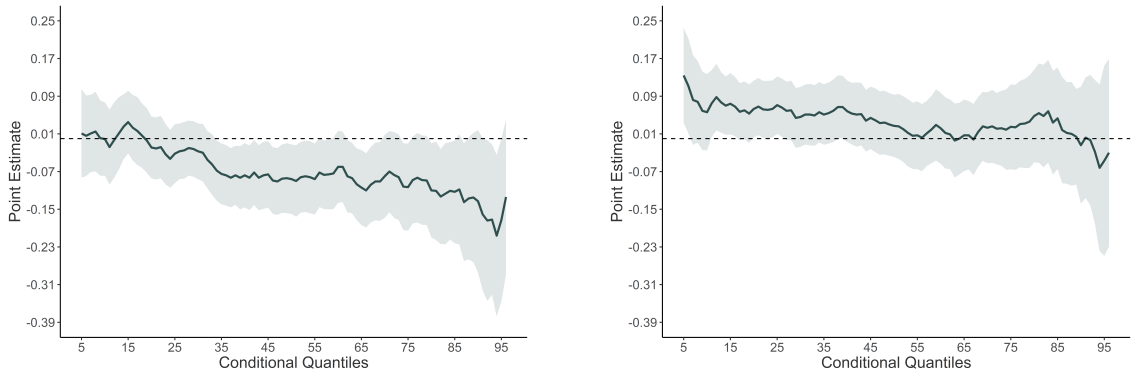
Furthermore, according to Fisher and Marchand (2014), there might be substantial heterogeneity across households, and the effect of retirement might differ in certain parts of the distribution. Assessing the change in consumption at retirement only at the mean does not provide an understanding of distributional impacts. Therefore, we estimate the heterogeneous effect over the distributions of non-durable and core non-durable household consumption by using the instrumental variable quantile regression (IVQR) procedure of Chernozhukov and Hansen (2005). Figure 3.2 illustrates both results with 95% confidence intervals.

Notice that the point estimates of the IVQR models show that the effect of retirement differs somewhat across quantiles of the conditional non-durable consumption distribution, though it is relatively steady across the conditional core non-durable distribution. Based on a Kolmogorov-Smirnov test, we reject the null hypothesis of no effect for non-durable consumption but do not reject it for core non-durable consumption. In addition, we reject the null hypothesis of constant effect across quantiles for non-durable consumption and do not reject it at all for core non-durable consumption.

Considering non-durable consumption, the decrease at retirement appears to be larger at the top of the distribution. Non-durable consumption does not change upon retirement at the bottom, decreases by 8.2 percent around the median, and drops by 14 to 19 percent at the highest quantiles. This is in line with the findings reported by Fisher and Marchand (2014). For the core non-durable consumption, on the other hand, the estimates are most positive but remain statistically insignificant throughout the conditional distribution. This corroborates the previous findings of no evidence of a consumption decrease upon retirement when measuring consumption without work-related expenditures.

3.5.3 Food Consumption at Retirement

Much of the documented consumption decline at retirement relates to the expenditures on food (HAIDER; STEPHENS, 2007; HURST, 2003; BERNHEIM; SKINNER; WEINBERG, 2001). Given that it corresponds to a necessary good with a small income



(a) Non-Durable (b) Core Non-Durable

Figure 3.2 – Heterogeneous Effect of Retirement on Non-Durable

Note: The curve shows the estimated coefficients at quantiles from 0.05 to 0.96. The shadow area corresponds to the 95% point-wise confidence interval. Based on a Kolmogorov-Smirnov test, we reject the null hypothesis of no effect, i.e., $\alpha(\tau) = 0 \ \ \forall \tau \in (0,1)$, at a 10% level of significance for non-durable consumption - panel (a) -, but do not reject it for core non-durable consumption - panel (b). Moreover, we reject the null hypothesis of constant effect across quantiles, i.e., $\alpha(\tau) = \alpha$, at a 10% level of significance for non-durable consumption - panel (a) -, and do not reject it at all for core non-durable consumption - panel (b). Finally, in both cases, we strongly reject at a 1% level of significance the null hypothesis of exogeneity, which implies that conventional quantile regression is inconsistent.

elasticity, analyzing food expenditure is crucial for addressing consumption smoothing during retirement (HURST, 2008b). Aguila, Attanasio and Meghir (2011), for instance, found no evidence of a decline in non-durable, yet reported a fall in food consumption at retirement. Hence, to extend our analysis, we address food consumption at retirement. Empirically, we consider the same household sample and estimate the specification (3.2) for total food, food away from home, and food at home. Table 3.2 summarizes the results.

These results are particularly interesting.[17] When considering total food consumption, the estimates indicate a decrease of 9.8 percent upon retirement, which is in line with the literature. Bernheim, Skinner and Weinberg (2001), Hurst (2003), and Haider and Stephens (2007) reported decreases in total food expenditures that ranges from 6 to 15 percent. When considering separated, food away from home and food at home show different behavior. Specifically, we estimate a substantial decrease of 25.8 percent at retirement for food consumption away from home. For food at home, however, we find no statistically significant evidence of change upon retirement.

[17] Notice that the specification (3.2) requires strictly positive values for the dependent variable. Estimating it for food away from home, therefore, imposes a large drop in sample observations, given that Brazilian households have a strong home-based food consumption, especially countryside.

Table 3.2 – Effects of Retirement on Food Consumption

	Total Food	Food Away	Food at Home
Constant	5.3218***	5.5033***	4.8661***
	(.0804)	(.1262)	(.0847)
Retired	-0.1029**	-0.2989***	0.0215
	(.0486)	(.0781)	(.0499)
Sargan	0.736	0.748	1.247
	[.391]	[.387]	[.264]
Observations	17,329	8,153	16,582

Note: Each specification is restricted to a subset of observations with a strictly positive value for the dependent variable. Results are from two-stage least squares regressions. The vector of instruments includes the head's age and a dummy variable which is equal to 1 if the head is aged above 65. All estimations include the following control variables: household size, gender, and marital status of the head, a dummy for children, a dummy for urban residence, a dummy for house property, a dummy for capital income, a dummy for other workers, and dummies for State of residence. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

Since we assume that food away from home (at least part of it) compounds the work-related consumption category, the estimated decline upon retirement is not surprising. The observed decrease in total food consumption could be explained by the reallocation of expenditures within the household budget (AGUILA; ATTANASIO; MEGHIR, 2011). On the other hand, food at home is the largest component of food consumption, accounting for roughly 80 percent of it, and remains constant as the household transition to retirement. The evidence points to the absence of a retirement *food* consumption puzzle among Brazilian households.

3.5.4 Does the Retirement Scheme Matters?

A frequent explanation for the retirement consumption puzzle relies on the changes in household income at the time of retirement. For instance, Bernheim, Skinner and Weinberg (2001) reported that households with low *income replacement rates*[18] have larger consumption reductions. As labor earnings reduce when households retire, it would be expected that the income begins to come from their savings and pensions. As stated by Luengo-Prado and Sevilla (2012), however, some households might have not saved

[18] The ratio of pre- and post-retirement income.

enough for retirement, and the income reduction translates into a fall in consumption as they adjust to the new reality.

A widely known stylized fact is that Brazilian households usually save little for old ages (AFONSO; ABREU; HECKSHER, 2019; KUNT; KLAPPER; PANOS, 2016). The retired households, therefore, are likely to depend on pensions to compose income. Indeed, according to Brito and Minari (2015), most Brazilian households receive significant state support in retirement. Brazilian Social Security System is organized around three different retirement schemes: *i*) the general regime, that covers private sector employees (urban, rural, and domestic workers); *ii*) the specific regime, covering public workers (with rules set by each public administration unit); and *iii*) the private or complementary regime (a market-based alternative). It is of note, though, that pensions from the general regime are, on average, smaller than those from the other regimes. Table 3.3 reports the averages of retirement pensions conditional to each regime, based on our household sample.

Table 3.3 – Average Pensions by Retirement Schemes

	General Regime	Specific Regime	Private Regime
Mean	1,895.98	4,492.24	4,545.63
Observations	10,275	1,946	238

Note: Conditional means for retired households. Monetary values are expressed in Brazilian Real (BRL) at prices of January 15, 2018. From the 11,279 retired household in the sample, there are 987 observations with positive values for both *general* and *specific* regimes, 181 observações with positive value for both *general* and *private* regimes, 39 observations with positive values for both *specific* and *private* regimes, and 27 observations with positive values for all three regimes.

In particular, Brito and Minari (2015) showed that, given the generous conditions of the general regime, Brazilian households expect to benefit from high replacement rates, especially that low-income. The straightforward implication is a lower incentive to saving for retirement.[19] Note that the high income replacement rate reflects the low income in the pre-retirement period. Retirement planning with perfect certainty, however, understates

[19] Brito and Minari (2015) report that only about 2.1 percent of the very-rich Brazilian households need to accumulate wealth to maintain retirement consumption. This result contrasts with those of American households reported by Skinner (2007).

financial risks, for instance from healthcare expenditures in old age (SKINNER, 2007; FRENCH; JONES, 2004). Therefore, even with income replacement, households that depend on the general regime might face a decline in consumption due to health expenses. Households engaged in the specific regime or with a complementary pension, on the other hand, are usually higher-income and are likely to retire wealthier, supporting consumption upon retirement.

We argue that such heterogeneity matters in analyzing consumption upon retirement. Therefore, we arrange our sample into two groups according to the retirement scheme. The first group, namely *general*, comprises retired households for which the retirement pension comes exclusively from the general regime, and non-retired households in which the head is not in the military or public server (i.e., households most likely to depend on the general regime at the time of retirement). Moreover, we do not include in this group households that have reported payments on (or contributions to) private or public pension plans. The second group, namely *specific*, includes the reminder households within our sample (i.e., retired households from specific and private regimes, retired households from the general regime which also receive a pension from another regime, non-retired households with the head in a public or military career, and households that contributes voluntarily to private or public regimes).

We are particularly interested in the consumption upon retirement for the first group. Since the average pension is less than one-half of that of the specific group, households from the general group might be more prone to negative income shocks as they transition from the labor market to retirement, which can impact the level of consumption. Table 3.4 reports the averages of consumption measures according to the retirement scheme group, for both retired and non-retired households. However, although we observe a substantial difference in the level of consumption between both groups, within each one the consumption appears to be steady among periods pre- and post-retirement.

To examine whether changes in consumption upon retirement depend on the retirement scheme, we estimate the following specification,

$$\ln c_i = \delta_0 + \delta_1 R_i + \delta_2 S_i + \delta_3 R_i S_i + \mathbf{Z}_i \boldsymbol{\psi} + \upsilon_i \tag{3.3}$$

Table 3.4 – Average Consumption by Retirement Scheme Groups

	General Group		Specific Group	
	Non-Retired	Retired	Non-Retired	Retired
Non-Durable	2,358.86	2,478.46	4,072.33	4,259.58
Work-Related	538.89	507.12	1,021.47	872.32
Core Non-Durable	1,819.97	1,971.35	3,050.85	3,387.26
Total Food	460.20	484.07	689.47	710.61
Food Away	114.97	104.40	212.36	198.39
Food at Home	345.23	379.67	477.12	512.21
Monetary	1,666.61	1,754.11	3,091.16	3,158.41
Non-Monetary	692.25	724.34	981.17	1,101.17
Saving Rate	0.022	0.225	0.153	0.280
Observações	4,774	10,138	1,276	1,141

Note: Notice that the sample comprises 17,329 households, where 11,279 are retired and 6,050 are non-retired. Monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018. The saving rate is given by the difference between disposable income and consumption expenditure divided by disposable income.

where, c_i is the consumption expenditure measure, R_i is a dummy variable that equals to one if the household is retired, $\mathbf{Z}_i$ is the same vector of controls considered to estimate (3.2), and υ_i is the error term. The variable S_i is a dummy that equals one if the household belongs to the specific group. Moreover, we let an interaction term between the dummies R_i and S_i into the specification to assess the differences due to the retirement scheme.

Table 3.5 reports the estimates of (3.3) for non-durable, work-related, and core non-durable consumption. At first, notice that the coefficient on retirement scheme is positive and significant, indicating a differential in the level of consumption between both groups. Given how we specified the dummies, the interpretation is on the level of consumption relative to that of non-retired households adhering to the general regime (i.e., for which $R_i = 0$ and $S_i = 0$). Compared with this reference category, being retired in the general scheme implies a lower consumption than being retired in the specific, for all consumption measures.

For non-durable consumption, the estimates indicate a slight but not significant decline upon retirement within the general regime. Conversely, households engaged in

Table 3.5 – Heterogeneous Effects of Retirement on Non-Durable Consumption

	Non-Durable	Work-Related	Core Non-Durable
Constant	7.8047***	5.5252***	7.6437***
	(.0492)	(.1021)	(.0479)
Retired	-0.0467	-0.6165***	0.0570*
	(.0328)	(.0678)	(.0319)
S_i	0.2740***	0.2245***	0.2861***
	(.0308)	(.0634)	(.0300)
Retired $\times$ S_i	0.1974***	0.4230***	0.1597***
	(.0504)	(.1042)	(.0491)
Sargan	1.041	3.818	0.344
	[.594]	[.148]	[.842]
Observations	17,329	16,522	17,329

Note: Each specification is restricted to a subset of observations with a strictly positive value for the dependent variable. Results are from two-stage least squares regressions. The vector of instruments includes the head's age and a dummy variable which is equal to 1 if the head is aged above 65. All estimations include the following control variables: household size, gender, and marital status of the head, a dummy for children, a dummy for urban residence, a dummy for house property, a dummy for capital income, a dummy for other workers, and dummies for State of residence. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

the specific scheme increase non-durable consumption at retirement: compared to the reference group, specific-retired households have a non-durable consumption 16.2 percent higher than specific-non-retired. On the other hand, work-related consumption decreases dramatically at retirement for households in both groups: by about 46 percent in the general, and by 17.6 percent within the specific scheme. Lastly, estimates for core non-durable indicate that consumption increases upon retirement. Specifically, being retired in the general scheme implies a core non-durable consumption 5.9 percent higher than being non-retired (significant at 10 percent), while within the specific scheme, being retired implies a 24.2 percent higher core non-durable consumption than being non-retired.

In summary, controlling for the heterogeneity from retirement schemes, we document no evidence of consumption decline upon retirement, except for the work-related category, which is in line with previous findings. In contrast, for those households within the specific scheme of retirement (i.e., high-income households), we report an increase in non-durable consumption at retirement. We argue that these households are more likely to have saved for old age and count on greater retirement pensions (in line with the

working-age income level), which could explain the increase in consumption. However, a noteworthy finding is that when considering core non-durable, even the households adhering to the general scheme of retirement (i.e., low-income households) increase consumption at retirement. This could be explained by the decrease in work-related expenditures, which allows for a rearrangement of the household budget.

Further, we assess the heterogeneity in food consumption at retirement, by estimating specification (3.3) for total food, food away, and food at home. The results are summarized in Table 3.6. As before, given the specified dummies, interpretation is on the differentials in food consumption relative to the reference category (i.e., for which $R_i = 0$ and $S_i = 0$). Regarding the differences in level across groups, the results are particularly illustrative. Being non-retired within the specific group does not imply greater food *away from home* consumption than being non-retired within the general group. This supports the fact that Brazilian households have a strong home-based food consumption behavior. As expected, we observe a substantial difference in consumption of total food and food at home.

Table 3.6 – Heterogeneous Effects of Retirement on Food Consumption

	Total Food	Food Away	Food at Home
Constant	5.2517***	5.4796***	4.8117***
	(.0834)	(.1323)	(.0881)
Retired	-0.0931*	-0.3554***	0.0558
	(.0555)	(.0939)	(.0571)
S_i	0.2185***	0.0359	0.2573***
	(.0522)	(.0825)	(.0538)
Retired × S_i	0.1808**	0.4369***	0.0241
	(.0853)	(.1399)	(.0876)
Sargan	1.297	1.850	1.235
	[.523]	[.396]	[.539]
Observations	17,329	8,153	16,582

Note: Each specification is restricted to a subset of observations with a strictly positive value for the dependent variable. Results are from two-stage least squares regressions. The vector of instruments includes the head's age and a dummy variable which is equal to 1 if the head is aged above 65. All estimations include the following control variables: household size, gender, and marital status of the head, a dummy for children, a dummy for urban residence, a dummy for house property, a dummy for capital income, a dummy for other workers, and dummies for State of residence. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

However, we are interested in the changes upon retirement. In particular, considering total food consumption, the estimates are the opposite: we report a decrease of 8.9 percent at retirement for households within the general scheme but document an increase of 9.2 percent for those engaged in the specific scheme. Likewise, when considering food away from home, the results indicate that general-regime households decrease by about 30 percent at retirement, while those in the specific scheme increase it by 8.5 percent upon retirement. In contrast, for food consumption at home, we find no statistically significant evidence of any change upon retirement for both groups.

Although a decrease in total food consumption among general-regime households is in line with the results in the literature (BERNHEIM; SKINNER; WEINBERG, 2001; HURST, 2003), the estimated increase for households in the specific group is somewhat intriguing. Note, however, that this greater total food is due to the higher food away from home consumption. Assuming, as before, that these households are more likely to have saved for old age and count on higher pensions, this could be explained by a higher leisure expenditure. Therefore, in line with previous findings, the evidence of a decline in food consumption at retirement depends on the retirement scheme, and when it occurs, it is mainly due to the decrease in food expenditure away from home, with is associated, at least to some extent, with work-related consumption.

3.5.5 Monetary and Non-Monetary Consumption

A primary feature of the POF is that it assesses the non-monetary share of household income, which is important given that it accounts for a significant part of the expenditures, especially among low-income households (see Table 3.4). Empirically, excepting the estimated rent, non-monetary income is accountably equal to non-monetary expenditure. Hence, it is opportune to investigate the effect of retirement on both of these expenditure shares. As the household retires, it would be expected to rise non-monetary expenditures relative to that monetary-based due, for example, to more time spent on home production (AGUIAR; HURST, 2005).

Therefore, we next document the effect of retirement on monetary- and non-

monetary-based consumption. Given our previous findings, we consider in this section non-durable and core non-durable consumption disaggregated into monetary and non-monetary. Table 3.7 summarizes the results from estimating (3.2) for each share. A noteworthy is that any decline in consumption upon retirement seems to be exclusively work-related.

Considering non-durable, we document a decline at retirement just for the monetary-based share, which reduces by 11.3 percent. For non-monetary non-durable consumption, we report no statistically significant change upon retirement. On the other hand, for core non-durable, we find that the monetary-based consumption does not change at retirement, while the non-monetary consumption increases by 10.8 percent. Assuming that work-related expenditures are mainly monetary-based, the estimates support the literature that relates the retirement consumption puzzle with work-specific consumption (HURST, 2008a).

Table 3.7 – Effects of Retirement on Non-Durable Components

	Non Durable		Core Non-Durable	
	Monetary	Non-Monetary	Monetary	Non-Monetary
Constant	7.7068***	5.3875***	7.5831***	4.7257***
	(.0597)	(.0573)	(.0587)	(.0687)
Retired	-0.1199***	0.0348	0.0202	0.1024***
	(.0361)	(.0332)	(.0356)	(.0377)
Sargan	2.600	0.930	0.484	1.708
	[.107]	[.335]	[.487]	[.191]
Observations	17,326	16,731	17,326	16,482

Note: Each specification is restricted to a subset of observations with a strictly positive value for the dependent variable. Results are from two-stage least squares regressions. The vector of instruments includes the head's age and a dummy variable which is equal to 1 if the head is aged above 65. All estimations include the following control variables: household size, gender, and marital status of the head, a dummy for children, a dummy for urban residence, a dummy for house property, a dummy for capital income, a dummy for other workers, and dummies for State of residence. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

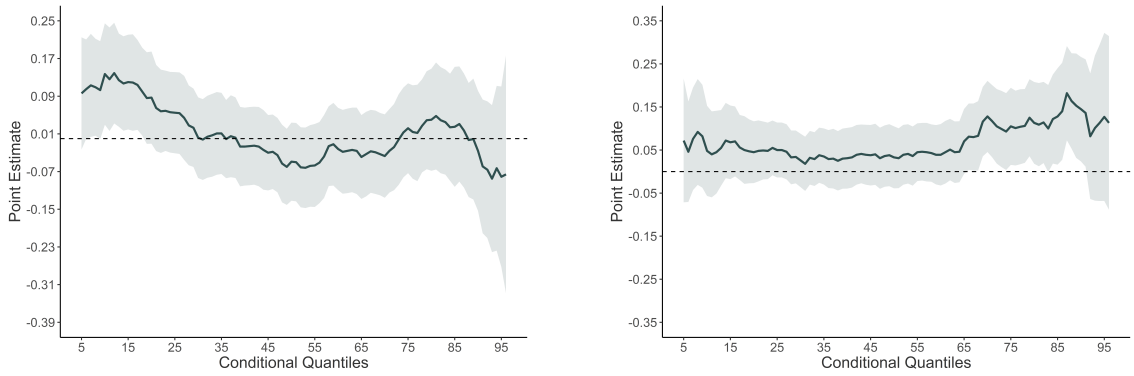
However, the increase in the non-monetary share of core non-durable at retirement is still an intriguing result. Non-monetary expenditure corresponds to a relevant portion of low-income households' budgets and seems to be also important for smooth-

ing consumption as they transition to retirement. Thus, we argue that these households are more prone to occupy themselves after retirement with time-intensive activities to substitute market-based consumption. In order to assess this hypothesis, we examine the effect of retirement on monetary and non-monetary core non-durable consumption across households. Figure 3.3 illustrates the heterogeneous effect over the distributions with 95% confidence intervals, based on the IVQR procedure of Chernozhukov and Hansen (2005).

The results show that the effect of retirement on monetary-based consumption does not differ across quantiles of the conditional distribution: throughout most of the distribution, the point estimates are not statistically different from zero. Conversely, for non-monetary consumption, the effect of retirement is positive over the entire distribution, and higher at the top. Specifically, the effect ranges between 10 and 20 percent in the higher quartile of the distribution. That is, the mean increase in non-monetary core non-durable upon retirement is driven most by high-level consumption households. We do not reject the null hypothesis of no effect for core non-durable monetary, though reject for core non-durable non-monetary consumption. Furthermore, we reject the null hypothesis of constant effect across quantiles for core non-durable monetary and do not reject it for core non-durable non-monetary.

Finally, we examine the differences in monetary- and non-monetary-based consumption at retirement between households from both schemes of retirement. Following the earlier arrangement, we estimate (3.3) for each component of non-durable and core non-durable consumption as the dependent variable (the right-hand side of the specification remains as before). Table 3.8 reports the results. As expected, the coefficient on the scheme is positive and statistically significant, indicating the differential in the level of consumption between both groups. Compared with the reference category (i.e., for which $R_i = 0$ and $S_i = 0$), being retired in the specific scheme implies a higher consumption than being retired in the general regime.

Moreover, the estimates also indicate that the change in consumption upon retirement differs in both components and depends on the scheme of retirement. When considering non-durable consumption, we find that the monetary-based part decreases by



(a) Monetary (b) Non-Monetary

Figure 3.3 – Heterogeneous Effect of Retirement on Core Non-Durable

Note: The curve shows the estimated coefficients at quantiles from 0.05 to 0.96. The shadow area corresponds to the 95% point-wise confidence interval. Based on a Kolmogorov-Smirnov test, we do not reject the null hypothesis of no effect, i.e., $\alpha(\tau) = 0 \ \ \forall \tau \in (0,1)$, for core non-durable monetary - panel (a) -, though reject it at a 5% level of significance for core non-durable non-monetary consumption - panel (b). Moreover, we reject the null hypothesis of constant effect across quantiles, i.e., $\alpha(\tau) = \alpha$, at a 5% level of significance for core non-durable monetary - panel (a) -, and do not reject it for core non-durable non-monetary - panel (b). Finally, we strongly reject at a 1% level of significance the null hypothesis of exogeneity for core non-durable monetary consumption - panel (a) -, which implies that conventional quantile regression is inconsistent but we do not reject it for core non-durable non-monetary consumption - panel (b).

10.2 percent upon retirement for households in the general regime, but increases by about 17.1 percent for those within the specific scheme. Regarding the non-monetary part, however, we find no statistically significant evidence of changes at retirement for households in the general regime, though it increases by 16.5 percent for those within the specific group.[20]

When considering core non-durable consumption, estimates show that the monetary-based part does not change upon retirement for households in the general regime, and increases by about 27.6 percent for those within the specific regime. For the non-monetary part, we report that it increases at retirement for households in both groups: a general-retired household has a 14.2 percent higher non-monetary core non-durable consumption than a general-non-retired, while the increase within the specific scheme group is about 19.7 percent.

To some extent, these last results corroborate our findings. In summary, we doc-

[20] Based on a Wald-based Chi-squared test, we do reject the null hypothesis of $\delta_1 + \delta_4 = 0$.

Table 3.8 – Heterogeneous Effects of Retirement on Non-Durable Components

	Non Durable		Core Non-Durable	
	Monetary	Non-Monetary	Monetary	Non-Monetary
Constant	7.6115***	5.3204***	7.4816***	4.6407***
	(.0612)	(.0592)	(.0603)	(.0708)
Retired	-0.1083***	0.0528	0.0421	0.1330***
	(.0407)	(.0379)	(.0401)	(.0430)
S_i	0.2954***	0.2060***	0.3181***	0.2584***
	(.0382)	(.0356)	(.0377)	(.0405)
Retired $\times$ S_i	0.2613***	0.0995*	0.2016***	0.0469
	(.0625)	(.0581)	(.0616)	(.0658)
Sargan	2.702	1.097	0.813	1.934
	[.259]	[.578]	[.666]	[.380]
Observations	17,326	16,731	17,326	16,482

Note: Each specification is restricted to a subset of observations with a strictly positive value for the dependent variable. Results are from two-stage least squares regressions. The vector of instruments includes the head's age and a dummy variable which is equal to 1 if the head is aged above 65. All estimations include the following control variables: household size, gender, and marital status of the head, a dummy for children, a dummy for urban residence, a dummy for house property, a dummy for capital income, a dummy for other workers, and dummies for State of residence. ***, **, and * correspond to the level of significance of 1%, 5%, and 10%, respectively.

ument a decline in non-durable consumption upon retirement driven by work-related expenditures that are most monetary-based. Further, we estimate a decrease for low-income households. For high-income households, who might count on greater pensions, we observe an increase in non-durable consumption, both monetary and non-monetary, as they transition to retirement.[21] When we consider a proper measure of consumption, excluding the work-related, we document no decrease in consumption at retirement, and even low-income households increase non-monetary consumption at retirement.

3.6 Concluding Remarks

Since the contributions of Hamermesh (1984), Mariger (1987), and Robb and Burbidge (1989), several authors have investigated the empirical evidence of a decrease in household consumption at the time of retirement. It has been referred to as a consump-

[21] A further investigation of this issue is outside this study's scope but could provide valuable insights into household consumption.

tion puzzle, since it does not correspond to the theoretical optimizing behavior. However, a closer review of this literature reveals that there is substantial heterogeneity across expenditure categories, and the decline in consumption upon retirement is driven by work-related and food expenditures (LUENGO-PRADO; SEVILLA, 2012; AGUIAR; HURST, 2007).

In this chapter, we examine this question for Brazilian households. At first, we discuss an approach to achieve a measure of household consumption from the POF. In summary, our findings indicates a decline in consumption at retirement driven by work-specific expenditures. With a reliable measure for consumption (i.e., net of work-related), we find no evidence of decrease in consumption at retirement for Brazilian households.

This result remains after controlling for retirement schemes: we report no evidence of consumption decline upon retirement, except for the work-specific spending. In contrast, for those households within the specific scheme of retirement (i.e., high-income households), we report an increase in non-durable consumption at retirement. Further, a noteworthy finding is that when considering core non-durable consumption (i.e., net of work-related), even households adhering to the general scheme of retirement (i.e., low-income households) increase consumption at retirement.

4 Conspicuous Consumption, Status-Seeking, Inequality and Credit Constraint

Abstract

This chapter addresses the effect of inequality on the conspicuous consumption of Brazilian households emphasizing how credit operates in such a relationship. We argue that access to credit attenuates this effect and supports visible (conspicuous) expenditures in a status-seeking behavior. Based on the Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* - POF), we document that income inequality decreases visible consumption only for non-credit-user households. Our findings support the hypothesis of competitive status-seeking behavior and stand in line with evidence that relative comparisons deepen households' indebtedness.

Keywords: Conspicuous Consumption; Income Inequality; Credit.

4.1 Introduction

The economic literature has long recognized that the *visibility* of consumption has a meaningful role in consumers' behavior. Veblen (1899) first introduced the term *conspicuous consumption* to describe the hypothesis that the expenditure on certain goods is motivated by individuals' desire to be distinguishable in society. The underlying idea is that once essential needs have been satisfied, other aspects become relevant in its decision-making, such as its relative condition in social interactions (WEISS; FERSHTMAN, 1998; RAUSCHER, 1997; CORNEO; JEANNE, 1997). Conspicuous consumption figures as the primary way to exhibit wealth and achieve social status (BAGWELL; BERNHEIM, 1996), since it intends to reflect and signalize relative attainment toward well-being.[1]

Assuming that individuals may derive utility from conspicuous consumption, one can argue that their incentive to consume conspicuously depends on the income dispersion within a reference group (HWANG; LEE, 2017; ROYCHOWDHURY, 2016). On the one hand, a greater inequality might increase conspicuous consumption, given that the poorer and the richer may spend more in a *keeping up with the richer* behavior (HARRIEGER-LIN; KHANA; PAPE, 2020; FRANK, 2007; CHRISTEN; MORGAN, 2005). On the other hand, a lower inequality might lead to increased competitive pressures, creating incentives for conspicuous consumption as it becomes easier to surpass the respective peers (HOPKINS; KORNIENKO, 2009).

This chapter addresses the effect of income inequality on conspicuous consumption in Brazil. To do so, we follow closely (HWANG; LEE, 2017) which states that a competitive status-seeking behavior implies that the utility attained from social status motivates conspicuous consumption. Concerning the effect of inequality, if status-seeking is the only reason for this expenditure, as inequality increases, conspicuous consumption tends to decrease since the worse-off households (might have to) reduce the spending on visible goods, and the required spending on visible goods of the well-off households for sustaining their social status reduces as well.

[1] Social status is often modeled in economics as a relative position in the distribution of conspicuous consumption within a reference group (FRANK, 1985; ROBSON, 1992).

Further, we examine the extent that credit matters for this relationship. Access to credit is critical for explaining consumer behavior in low-income countries, and the expenditure on conspicuous goods, in particular, might be severely impacted by liquidity constraints. We assume that visible consumption is driven by status considerations to the extent that conspicuous consumption regards as a status-seeking contest (GIORGI; FREDERIKSEN; PISTAFERRI, 2020; HWANG; LEE, 2017). As inequality increases, it increases the marginal probability of acquiring a social status and hence, the marginal utility of visible consumption. If credit is not binding, the household that cares about social status might use credit to remain in the contest, financing visible consumption through indebtedness (MOAV; NEEMAN, 2012). Access to credit, therefore, works as a mechanism to attenuate the impact of income inequality on conspicuous consumption. This is particularly important for those households whose situation worsens with increasing inequality (i.e., the poor).

To proceed empirically, we consider the Consumer Expenditure Survey (POF)[2], which corresponds to a unique source of expenditure data for Brazilian households. Brazil is an intriguing context for such an analysis given the high degree of income inequality (FIRPO; PIERI, 2018; MEDEIROS; SOUZA; CASTRO, 2015b) and the high degree of household indebtedness.[3] Moreover, there is a large number of firms providing their financial services, and the *buying on credit* has become a usual mechanism for consumption (CHRISTEN; MORGAN, 2005).

A primary step, however, consists of identifying what corresponds to conspicuous consumption. According to Hirsch (1978), it accounts for the spending on *positional* goods (i.e., for which social pressure influences their choice) and *visible* goods (i.e., easily observable in social interactions). In particular, we assume that conspicuous consumption resembles the expenditure on visible goods and follow closely Heffetz (2011) in arranging the POF expenditure categories into visible and non-visible consumption. Therefore, we set a measure of *visible consumption* as for conspicuous.

[2] From Portuguese, *Pesquisa de Orçamentos Familiares* (POF).

[3] According to Brazil's Central Bank, in 2018, the average household indebtedness was around 44% of the accumulated income over the last twelve months.

Unfortunately, the dataset from the POF is rather restrictive for measuring households' credit constraints. Hence, we rely on information regarding loan payments and define a variable indicating whether the household has used credit. Although we assume that credit users have no constraint in borrowing, it is worth noting that those who had not used credit are not necessarily credit-constrained.

The chapter contributes to the literature to the extent that credit matters to conspicuous consumption. We document a significant negative effect of income inequality on households' visible consumption. However, credit plays a critical role in such an outcome, with a positive effect on conspicuous consumption, not only on the level of visible expenditure but also on its response to inequality. In summary, for credit-user households, credit works as a mechanism to compensate for the negative effect of income inequality.

The remainder of this chapter is organized as follows. Section 4.2 briefly presents the related literature on income inequality and conspicuous consumption. Section 4.3 presents the household-level data and details our measure of visible consumption. Section 4.4 provides the empirical results and the respective analysis. Section 4.5 discusses the economic implications, and finally, Section 4.6 presents some concluding remarks.

4.2 Related Literature

Conspicuous consumption have been examined on several contexts. For instance, Charles, Hurst and Roussanov (2009) analyzed it for American households and documented that spending patterns on visible goods differ significantly between ethnic groups. Hicks and Hicks (2014) found an association between the distribution of conspicuous consumption and violent crimes in United States. Friehe and Mechtel (2014) examined the influence of political regimes on conspicuous consumption and found that East German households have given more importance to it (though they found some convergence).

This chapter, however, is related to the literature that addresses the impact of inequality on conspicuous consumption, for which both positive and negative impacts have been supported. Hopkins and Kornienko (2009) examined the effect of changes in

the income distribution on the distribution of conspicuous consumption, and argued that an increase in equality increases the degree of social competition, providing incentives to spend conspicuously. Bilancini and Boncinelli (2012) argued that the effect of inequality depends on how social status is computed and evaluated. Specifically, the authors found that when the households care only about the rank in the distribution of the status, an increase in income inequality decreases social competition and reduces conspicuous consumption, but the opposite occur when the household also care about the distance in the relevant distribution. Hwang and Lee (2017) states that if status-seeking behavior drives conspicuous consumption, the effect of inequality on visible expenditure depends on its marginal utility, which consists of the utility achieved from social status and the marginal probability of acquiring such a status. Harrieger-Lin, Khana and Pape (2020) argued that the observed differences in the relationship between conspicuous consumption and inequality is due to the heterogeneity in preferences.

For United States, Hwang and Lee (2017) documented a negative relationship between income inequality and conspicuous consumption. Harrieger-Lin, Khana and Pape (2020), on the other hand, found that following an increase in consumption inequality, American households (who have a *keeping up with the Joneses* behavior) increase its conspicuous consumption. For Australia, Huang and Shi (2015) found that greater income inequality is associated with fewer work hours, indicating concerns for conspicuous leisure rather than conspicuous consumption. For India, Jaikumar and Sarin (2015) reported that rising income inequality increases spending on conspicuous consumption (especially for low-income households), while Roychowdhury (2016) found that visible inequality has a negative impact on conspicuous consumption. For rural China, Brown, Bulte and Zhang (2011) found that the implications of status-seeking on socially observable spending differ across income groups and expenditure categories. For Chinese urban households, Jin, Li and Wy (2011) found that income inequality has a positive impact on status-seeking savings. In South Africa, Chai, Kaus and Kiedaisch (2019) reported that an increase in peer group inequality result in a decrease in households' conspicuous consumption.

Furthermore, recent studies have addressed the implications of this relationship on

the households' demand for credit. In particular, Georgarakos, Haliassos and Pasini (2014) documented that the higher the perceived income inequality, the greater the tendency for sizeable loans among Dutch households. For Germany, Berlemann and Salland (2016) found that individuals are more likely to hold debt when the comparison income is higher, and argued that conspicuous consumption is partly financed through debt. In Singapore, Lee and Mori (2021) reported that conspicuous consumption induced by status seeking is a critical determinant of households indebtedness.

4.3 Data Description

The empirical analysis relies on data from the Consumer Expenditure Survey (POF), conducted by the Brazilian Institute of Geography and Statistics (IBGE).[4] The POF is a nationwide cross-sectional sampling survey that provides an extensive household-level dataset on income, expenditure, and demographics. We consider data from the most recent survey's edition, carried out between June 2017 and July 2018.

The POF is a sampling survey on permanent private residences.[5] Each residence in the sample represents a given number of permanent private residences and held a sample weight associated with it, allowing interpret the estimates for the entire population.[6] At the residence level, the survey identifies the basic unit - the unit of consumption -, which comprises a set of residents (or a single one). The unit of consumption is a family-related concept, in the extent of the sharing of expenses on food or housing, rather than just parentage relations (DINIZ et al., 2007). Henceforth, we refer to it as the household. The person of reference (i.e., the household head) is the individual in charge of paying for the main expenditure on housing (rent, housing financing, real estate taxes) or so considered

[4] From Portuguese, *Instituto Brasileiro de Geografia e Estatística* (IBGE).

[5] The POF 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. The primary sampling units are selected with probability proportional to the number of residences in each sector, and a subsample for the survey is randomly selected within each stratum. The secondary sampling units were the permanent private residences, randomly selected without replacement within each primary sampling unit.

[6] The weights are computed such that it incorporates adjustments for non-response, and is assigned to each household. By performing such estimation, each observation is weighted by the inverse of its sampling probability. allowing precision estimates that incorporate the effects of stratification and clustering.

by the other residents.

Two features of the POF are worth noting. At first, it is the only source of microeconomic data on consumption for Brazilian households, consisting of a detailed structure of all expenditure components. In addition, it has better instruments for determining income, allowing for an extensive measure of household disposable income (HOFFMANN; VAZ, 2021; SOUZA, 2015). Specifically, the POF inspects both monetary- and non-monetary-based components of the households' budget.

Household total income comprises the gross monetary earnings of all its members obtained from work, transfers, rents, and other occasional revenues, plus the non-monetary component and realized capital gains (IBGE, 2019). In particular, non-monetary income corresponds to the approximated market value of non-market transactions (i.e., donations, home production, or exchanges between relatives and neighbors).[7] Realized capital gains consist of property sales, inheritance, and the balance of financial transactions. Concerning taxes and deductions, the survey discriminates three main groups: social security contributions, income tax, and other deductions (SILVEIRA et al., 2020).

Household total expenditure is arranged into three classes: *i*) consumption expenditure; *ii*) current expenses; and *iii*) equity variation.[8] Consumption expenditure corresponds to the spending carried out in the acquisition of products, services, or any other good, as well as the housing rental service. Current expenses comprise taxes on income, properties, vehicles, or financial services, as well as compulsory public pension payments, labor union dues, cash donations, insurance, property fees, and bureaucracy services. Equity variation correspond to the changes in households' assets and liabilities (IBGE, 2019).[9]

[7] In accounting terms, non-monetary expenses are equal to non-monetary income. An exception is the estimated rent, attributed to the household that owns their houses or that is allowed to live in.

[8] The IBGE organizes the expenditures into current expenses, assets increasing, and liabilities decreasing, in which "current expenses" comprise both consumption expenditures and other current expenditures. We chose to organize into the three classes described in the text given our focus on consumption expenditure.

[9] The increase in assets includes the acquisition, construction, and improvement of real estate properties (except minor repairs), contributions to pension plans, social club membership acquisition, tombstones, burial sites, and other investments. The decrease in liabilities comprises the payment of debts, interest, personal loans, and housing financing.

Since the data collection takes place over twelve months - from June 2017 to July 2018 - and covers a reference period of up to twelve months for income and some expenditure items[10], the collected information is spread throughout twenty-four months. Given the absolute and relative price changes that may occur in this period, all the monetary values are adjusted for the prices of a reference date, defined within the survey to be January 15, 2018 (IBGE, 2019). In this chapter, all monetary values are expressed in Brazilian Real (BRL) at the prices of the reference data.

4.3.1 Disposable Income and Consumption Expenditure

Empirically, we set some adjustments for defining household disposable income and consumption. Disposable income is given by the after-tax monetary income of all members (i.e., labor earnings, transfers, and capital income) plus the non-monetary component, and does not comprises realized capital gains. Household consumption accounts for the consumption expenditure only, and does not account for current expenses (i.e., taxes and levies) and equity variation (MEYER; SULLIVAN, 2012; DEATON; ZAIDI, 2002).

4.3.2 Sample Selection and Statistical Overview

The survey sample consists of 58,039 household-level observations. For the empirical analysis, however, we set some restrictions. At first, we do not consider the observations from multiple consumption units (e.g., more than one family living in the same house). Second, we restrict the sample to households with the head aged between 20 and 65 years old. Third, we exclude observations with no data on the head's schooling and also those with non-positive expenditure on food. Fourth, we trim the top and bottom 0.25% of the disposable income distribution. Finally, we exclude households with non-positive visible consumption. The selected sample comprises 39,887 observations. Table 4.1 presents the statistics describing the primary variables.

[10] Although reported on an annual basis, each expense item has a reference period according to a frequency of acquisition, which corresponds to 07, 30, 90, or 360 days.

Table 4.1 – Descriptive Statistics

	Mean	Median	Std. Dev.	.01	.99
Disposable Income	4,627.30 (54.18)	3,215.27 (29.76)	4,621.46	433.28 (9.46)	24,820.01 (597.84)
Consumption	3,754.30 (46.61)	2,650.15 (21.73)	3,730.99	464.88 (9.19)	19,558.09 (697.73)
Visible Expenditure	797.88 (11.11)	427.21 (4.26)	1,238.42	14.89 (0.64)	6,262.86 (207.32)
Non-Visible Expenditure	2,956.40 (38.82)	2,098.06 (18.10)	2,990.35	372.60 (5.76)	15,382.29 (663.87)
State-Level Income Inequality					
Variance of Log	0.5939	0.5913	0.0710	0.4428	0.8982
Gini Coefficient	0.4234	0.4201	0.0240	0.3608	0.4733
State-Level Consumption Inequality					
Variance of Log	0.5466	0.5508	0.0450	0.4428	0.6823
Gini Coefficient	0.4128	0.4177	0.0180	0.3639	0.4376
State-Level Visible Inequality					
Variance of Log	1.3963	1.3766	0.1250	1.1756	1.6123
Gini Coefficient	0.5741	0.5672	0.0210	0.5432	0.6190

Note: All statistics are computed using sample weights, and the respective standard errors are reported in parenthesis (standard errors of inequality statistics are all less than 0.000). The monetary values are expressed in Brazilian Real (BRL) at prices of January 15, 2018. The variance of the logarithm (λ_s) and the Gini coefficient (g_s) are both widely used statistics to measure the degree of inequality in economics.

4.3.3 Conspicuous Consumption

Conspicuous consumption is understood as the allocation of resources in the acquisition of visible goods to exhibit a relatively higher social status (VEBLEN, 1899). Goods that are particularly suited to this objective should *i*) be readily observable, *ii*) give the impression that individuals who consume more are, on average, better off than those who consume less, and also *iii*) be portable across social interactions (ROYCHOWDHURY, 2016; FRIEHE; MECHTEL, 2014; KAUS, 2013).

Identifying what corresponds to household spending on visible consumption is itself an empirical task (HICKS; HICKS, 2014). For the United States, Charles, Hurst and Roussanov (2009) and Heffetz (2011) conducted specific surveys for this purpose and classified expenditures on clothing, jewelry, personal care, and vehicles as highly conspic-

uous relative to others.[11] Such a classification has been largely used as a benchmark in this literature (HWANG; LEE, 2017; ROYCHOWDHURY, 2016; FRIEHE; MECHTEL, 2014).

In particular, Heffetz (2011) constructed a survey-based empirical measure of visibility (henceforth, the visibility index) and arranged thirty-one expenditure categories from the CEX survey according to it. Thus, we follow his ranking as a guideline to assign the POF expenditure categories into visible and non-visible consumption. Further, we are particularly interested in conspicuous consumption that households can achieve through financing services since access to credit is critical for explaining consumer behavior in low-income countries, and the expenditure on visible goods is more likely to be impacted by liquidity constraints. In addition, there is an increasing number of firms providing their financing services, for instance, and the *buying on credit* has become a usual mechanism for consumption (CHRISTEN; MORGAN, 2005).

Therefore, we set our baseline measure of conspicuous consumption based on visible goods that are likely to be financed (i.e., visible goods that can be bought and paid through installments, credit cards, loans, or financing). Specifically, we define as visible consumption the spending on clothing, jewelry, personal care, cellphone, hobby and leisure, and vehicles. In addition, we consider the spending on cigarettes and alcohol, given that these are goods often consumed during social interactions.

Clothing and jewelry expenditures are distinctly conspicuous and occupy third and fifth positions in the visibility index, respectively. Vehicles are as well as visible goods and stand in the second position. Hobby and leisure comprise expenditures on toys, games, sports equipment, camping, and musical instruments, and Heffetz (2011) define a similar category that occupies the sixth position in the ranking. Expenditures on personal care are also clearly conspicuous (i.e., cosmetics and beauty products, hairdressers, and barbershops), standing in the ninth position. The cellphone is the only category above the tenth position in the visibility index ranking that we consider visible consumption since it includes modern smartphones, apps, and accessories. Lastly, cigarettes stand in

[11] To the best of our knowledge, there is no similar survey for Brazil.

the first position of the index ranking, while alcohol for home use and alcohol at bars and restaurants occupy the eighth and tenth positions, respectively.

The other expenditure categories that Heffetz (2011) identifies as highly visible (i.e., below the tenth position in his ranking) are furniture (4^o) and food away from home (7^o). However, we do not consider these expenditures in our baseline measure of visible consumption. The expenditure on furniture and appliances indeed improve life standard, but it does not correspond to a readily observable consumption to indicate a higher social status. Food consumption away from home is rather ambiguous since it includes restaurants, fast foods, bakeries, and cafes. Nevertheless, although frequenting restaurants might indicate social status, it is a common practice in Brazil for employers to offer food vouchers as part of employees' compensation. Hence, it is not observable whether such an expenditure on food away from home is due to conspicuous consumption or daily routine.

4.3.4 Reference Group

We assume that conspicuous consumption is motivated by social interactions within a reference group, in which households compare their consumption levels with each other. Akerlof (1997) argued that such social interactions usually occur among households living nearby (e.g., in the same city), where relative comparisons directly affect decision-making. However, the survey's geographical stratification is according to the State and does not identify the city or municipality where the household resides, except when it is the State's capital. Therefore, we assume that the reference group for a household i comprises all the other households in their State of residence. Charles, Hurst and Roussanov (2009) and Hwang and Lee (2017) also considered reference groups based on State.

4.4 Empirical Results

In this section, we investigate the relationship between income inequality and household conspicuous consumption.[12] In particular, we are interested in how the use of

[12] Moreover, in the Appendix B.3, we address such relationship by considering visible inequality, defined as the dispersion in visible expenditure, as in Roychowdhury (2016).

credit operates in this relationship.

4.4.1 Income Inequality and Conspicuous Consumption

To proceed empirically, we consider the following baseline specification

$$\ln c'_{is} = \alpha_0 + \alpha_1 \lambda_s + \alpha_2 \ln \bar{y}_{is} + \delta_1 d^c_{is} + \delta_2 \lambda_s d^c_{is} + \mathbf{x}'_{is}\boldsymbol{\theta} + \varepsilon_{is} \tag{4.1}$$

where $\ln c'_{is}$ is the household spending on visible consumption, λ_s denotes the reference group income inequality faced by the household, $\ln \bar{y}_{is}$ stands for the household's permanent income, and $\mathbf{x}_{is}$ is a vector of observable demographic characteristics, including household size, the age of the head (and a quadratic term), the gender and the schooling of the head, the number of children, and a dummy variable that is equal to 1 if the household resides in an urban area. The index i refers to households and the index s to the reference group. The error term reflects other unobservable household characteristics and is given by

$$\varepsilon_{is} = \mu_s + \varsigma_{is} \tag{4.2}$$

where μ_s and ς_{is} are group- and household-specific components of the error, respectively.

The term d^c_{is} in (4.1) corresponds to a variable that indicates whether the household has used credit. More specifically, we consider information regarding loan payments and define a dummy that equals one if the household had had any expenses of this sort (i.e., installments, insurance, and interest). We argue that households with these expenditures are not credit-constrained, and therefore, are more likely to acquire visible goods through financing. Clearly, households that have not had such expenses are not necessarily credit-constrained.[13] In our sample, $d^c_{is} = 1$ for about 23 percent of the households. Table 4.2 reports the (unconditional) averages of disposable income and consumption measures for both groups of households.

Since permanent income is not observed, we use household consumption expenditure as a proxy for it. However, an identification issue arise from estimating (4.1) given that consumption expenditure is endogenous. Notice that visible consumption integrates

[13] Unfortunately, the data from POF does not allows to assess the actual household credit conditions.

Table 4.2 – Income and Consumption According to Credit Use

	Credit-Users		Non-Credit-Users	
	Mean	Median	Mean	Median
Disposable Income	5,840.27	4,277.76	4,237.21	2,914.21
	(104.33)	(80.86)	(54.25)	(26.83)
Consumption	4,530.77	3,402.80	3,504.59	2,447.21
	(76.83)	(54.18)	(48.57)	(24.27)
Visible Expenditure	1001.42	593.67	732.44	384.11
	(20.18)	(15.67)	(11.99)	(5.35)
Non-Visible Expenditure	3,529.35	2,616.42	2,772.15	1,948.66
	(64.62)	(45.16)	(40.36)	(18.05)

Note: All statistics are computed using sample weights, and the respective standard errors are reported in parenthesis. The monetary values are expressed in Brazilian Real (BRL) at prices of January 15, 2018.

consumption expenditure, and therefore, any unobserved idiosyncratic shock that impacts the former will also impact the latter (ROYCHOWDHURY, 2016). To handle this problem, we use a vector of instruments that includes the household's current disposable income and a dummy variable equal to one if the household has any source of capital income.

Table 4.3 reports the estimates of empirical model (4.1). Our preferred specification is in column (1), for which the primary explanatory variable is income inequality, λ_s, as measured by the variance of the logarithm of disposable income. For robustness, we also estimate the model by measuring inequality with the Gini coefficient, g_s, and further consider the share of visible consumption as the dependent variable instead. The models were estimated by the two-step GMM procedure, clustering standard errors at the state level. According to the overidentification test, all specifications perform properly such that we do not reject the joint null hypothesis that instruments are uncorrelated with the error. Moreover, at the bottom of Table 4.3, we report the respective estimates from ordinary least squares of the effect of inequality for each specification. The results are rather distinct from the GMM estimates (especially for specifications with the Gini coefficient), which suggests that the endogeneity problem is somewhat severe. Therefore, we next concentrate the analysis on results from the two-step GMM estimates.

Table 4.3 – Impact of Income Inequality on Conspicuous Consumption I

	Log of Visible		Share of Visible	
	(1)	(2)	(3)	(4)
Constant	-2.3808***	-2.0192***	0.1113***	0.1592***
	(.0995)	(.1313)	(.0167)	(.0217)
λ_s	-0.6175***		-0.0690***	
	(.0617)		(.0097)	
g_s		-1.6833***		-0.2028***
		(.1907)		(.0303)
$\ln \bar{y}_{is}$	1.1815***	1.1792***	0.0314***	0.0309***
	(.0104)	(.0106)	(.0017)	(.0017)
d_i^c	-0.2138***	-0.5764***	-0.0179*	-0.0609**
	(.0591)	(.1305)	(.0107)	(.0238)
$\lambda_s \times d_i^c$	0.5378***		0.0496***	
	(.0990)		(.0177)	
$g_s \times d_i^c$		1.6157***		0.1719***
		(.3091)		(.0561)
J-Test	0.301	0.365	0.005	0.011
	[.5834]	[.5456]	[.9449]	[.9169]
ϑ	0.467	0.467	0.016	0.016
λ_s^{ols}	-0.5826***		-0.0508***	
	(.0538)		(.0091)	
g_s^{ols}		-1.4250***		-0.1150***
		(.1593)		(.0271)

Note: Two-step generalized method of moments estimation procedure. Standard errors are in parenthesis. The vector of instruments includes the household's current disposable income and a dummy variable that is equal to 1 if the household has any source of capital income. The p-value of the overidentification test are in brackets. All estimations include the following control variables: household size, age of the head (and a quadratic term), gender and schooling of the head, number of children, and a dummy for urban residence. ***, **, and * correspond to a level of significance of 1%, 5%, and 10%, respectively.

Notice that the results are robust to using distinct dependent variables. The evidence suggests that greater income inequality decreases the average conspicuous consumption, particularly in those non-credit-user households. However, the use of credit is statistically significant and indicates a positive effect on conspicuous consumption, not only on the level of visible expenditure but also on its response to inequality. Therefore, the effect of income inequality on conspicuous consumption is negative but differs according to the household's credit conditions.

For instance, estimates in column (1) indicate that one log-point increase in income

inequality, as measured by the variance of logarithm, reduces the conspicuous expenditure of non-credit-user households by about 0.62 percent. However, for credit users, the effect of income inequality is rather attenuated, and conspicuous consumption reduces only 0.08 percent in response to the same shock. A similar result arises when measuring income inequality by the Gini coefficient: one-standard-deviation increase in inequality decreases conspicuous consumption of non-credit-user households by about 4.70 percent while credit-users reduces 0.19 percent their visible expenditures in response to the same one-standard-deviation increase in Gini coefficient. Otherwise stated, credit users are less affected by inequality, which suggests that the status-seeking channel is more relevant for this group.

Regarding the use of credit, results indicate a positive association with conspicuous consumption. Based on estimates of specification (4.1), we estimate that credit-user households expend about 46.7 percent more on visible goods than non-credit-users. This is given by the statistic ϑ in Table 4.3, that computes the difference in the conditional mean of the dependent variable according to the value of the dummy d_{is}^{c}. Moreover, for the dependent variable as given by the share of visible spending - columns (3) and (4) -, the estimates suggest that credit-user households allocate 1.6 percentage points more of consumption on visible goods (21.2 *versus* 19.6 percent).

These findings corroborate the statement that as income inequality increases, conspicuous consumption decreases since the poor reduce their expenditure on visible goods, and the rich are not required to have a higher expenditure to sustain their social status (HWANG; LEE, 2017; ROYCHOWDHURY, 2016). Nevertheless, the opposite effect of the use of credit is meaningful. We argue that while income inequality reduces competitive pressure for conspicuous consumption, it create opportunities to reach higher relative social status. In this case, the credit enables households to sustain the expenditure on visible consumption in a status-seeking behavior.[14]

Following Hwang and Lee (2017), we further check these results by estimating

[14] For instance, Christen and Morgan (2005) found evidence that when income inequality increases, low-income households increase debt to keep up their relative consumption.

(4.1) for consumption categories other than visible goods. Specifically, we consider the logarithm of non-visible consumption (i.e., consumption minus visible goods) as the dependent variable. Table 4.4 summarizes the estimates, which are likewise robust to using the share of non-visible consumption as the dependent variable, as well as to setting inequality as measured by the Gini coefficient. The overidentification test does not reject the null hypothesis for either specification, implying that the instruments are valid.

The effect of income inequality on non-conspicuous consumption is positive and modest though statistically significant. Specifically, it indicates that non-credit-user households increase the expenditures on non-visible goods by about 0.09 percent in response to one log-point increase in income inequality measured by the variance of logarithm. However, the coefficient associated with the use of credit is not statistically different from zero, which implies no distinct effect for credit-user households. By considering the Gini coefficient, the estimates indicate that one standard deviation higher income inequality increases the non-conspicuous consumption of non-credit-users by around 0.8 percent. The coefficient for the interaction term, however, is negative and offsets part of the effect for credit-user households.

Therefore, we document a significant negative effect of income inequality on household conspicuous consumption, in line with the literature (HWANG; LEE, 2017; ROY-CHOWDHURY, 2016). Greater inequality implies that some households are worse relative to others, which may induce a budget reallocation towards more essential goods (probably non-conspicuous goods). Otherwise stated, holding consumption expenditure constant, income inequality decreases conspicuous consumption and increases non-conspicuous consumption to the extent that households allocate more resources to aggregate non-visible expenditure. However, the credit plays an critical role in such an outcome. For credit-user households, it works as a mechanism to compensate for the negative effect of income inequality on conspicuous consumption.

Table 4.4 – Impact of Income Inequality on Non-Conspicuous Consumption

	Log of Non-Visible		Share of Non-Visible	
	(1)	(2)	(3)	(4)
Constant	-0.0913***	-0.1594***	0.8887***	0.8407***
	(.0255)	(.0329)	(.0167)	(.0217)
λ_s	0.0890***		0.0689***	
	(.0146)		(.0096)	
g_s		0.2738***		0.2028***
		(.0458)		(.0303)
$\ln \bar{y}_{is}$	0.9528***	0.9536***	-0.0314***	-0.0310***
	(.0026)	(.0027)	(.0017)	(.0017)
d_i^c	0.0199	0.0749**	0.0179*	0.0610**
	(.0161)	(.0364)	(.0107)	(.0238)
$\lambda_s \times d_i^c$	-0.0541**		-0.0496***	
	(.0266)		(.0177)	
$g_s \times d_i^c$		-0.2064**		-0.1719***
		(.0855)		(.0561)
J-Test	0.016	0.024	0.005	0.011
	[.8995]	[.8761]	[.9449]	[.9169]
λ_s^{ols}	0.0555***		0.0508***	
	(.0139)		(.0091)	
g_s^{ols}		0.1203***		0.1150*
		(.0413)		(.0175)

Note: Two-step generalized method of moments estimation procedure. Standard errors are in parenthesis. The vector of instruments includes the household's current disposable income and a dummy variable that is equal to 1 if the household has any source of capital income. The p-value of the overidentification test are in brackets. All estimations include the following control variables: household size, age of the head (and a quadratic term), gender and schooling of the head, number of children, and a dummy for urban residence. ***, **, and * correspond to a level of significance of 1%, 5%, and 10%, respectively.

4.4.2 Alternative *Proxy* for Permanent Income

Although consumption is usually considered a proxy for permanent income, this is likely to correspond to the case of non-restricted-to-credit households. Credit constraint implies that consumption depends on current income, which does not resemble permanent income due to measurement error or transitory fluctuations (ALLAN; ATALAY; CROSSLEY, 2015), and the existing literature has often point to the fact that Brazilian households follow a rule-of-thumb behavior (LOPES, 2017; GOMES, 2010). In this case, consumption might not accurately correspond to permanent income. Therefore, we follow Dynan, Skinner and Zeldes (2004) and employ a two-stage procedure, in which a

permanent income *proxy* is estimated in the first stage by regressing disposable income on instruments $\mathbf{z}_i$ and a vector covariates $\mathbf{w}_i$,

$$\ln y_i = \mathbf{z}_i\alpha + \mathbf{w}_i^{'}\boldsymbol{\gamma} + \varepsilon_i. \tag{4.3}$$

The predicted values $\widehat{\ln y_i}$ from (4.3) are then used as a *proxy* for permanent income in the second stage, in which (4.1) is estimated by ordinary least squares. As control variables in $\mathbf{w}_i$, we set the age of the head (and a quadratic term), household size, the number of children, and dummy variables for the State of residence. The vector of instruments $\mathbf{z}_i$ includes the schooling of the household head, the dummy variable that equals one if the household has any source of capital income, and an asset-based wealth index derived from information on ownership of durable goods and housing characteristics.[15]

Table 4.5 summarizes the estimates of specification (4.1) with $\ln \bar{y}_{is}$ given by predicted values from (4.3). Notice that the results corroborates the findings in Table 4.3 to the extent that greater inequality decreases the average conspicuous consumption. This results differ in two aspects though. First, the effect of income inequality on visible spending is about twice as large: one log-point increase in inequality as measured by the variance of logarithm, reduces the conspicuous expenditure of non-credit-user households by about 0.98 percent, and one-standard-deviation increase in inequality as measured by the Gini coefficient, decreases conspicuous consumption of non-credit-user households by about 9.51 percent. Second, the results regarding the use of credit depends on the inequality measure considered. For income inequality measured by the variance of logarithm, the credit-user households reduces conspicuous consumption by 0.45 percent in response to one log-point increase in inequality. In contrast, for income inequality measured by the Gini coefficient, the coefficient associated with the interaction term between inequality is not statistically different from zero, which implies no distinct effect for credit-user households.

Since permanent income is inherently unobservable, the differences in estimates due to a *proxy* for it are somewhat expected due to measurement errors. For our preferred

[15] An asset-based index is an aggregated measure of wealth based on variable indicators. Empirically, we follow the procedure proposed by Kolenikov and Angeles (2009) to construct this index.

Table 4.5 – Impact of Income Inequality on Conspicuous Consumption II

	Log of Visible		Share of Visible	
	(1)	(2)	(3)	(4)
Constant	6.3980***	7.0220***	0.3320***	0.3734***
	(.0975)	(.1599)	(.0125)	(.0205)
λ_s	-0.9773***		-0.4979***	
	(.0404)		(.0052)	
g_s		-3.3720***		-0.1886***
		(.2388)		(.0306)
$\ln \bar{y}_{is}$	0.0001***	0.0001***	0.0001	0.0001**
	(.0000)	(.0000)	(.0000)	(.0000)
d_i^c	-0.4233***	0.3403***	-0.0258	0.0103
	(.1221)	(.1166)	(.0157)	(.0149)
$\lambda_s \times d_i^c$	0.5245***		0.0311***	
	(.0872)		(.0112)	
$g_s \times d_i^c$		-0.0200		0.0053
		(.0835)		(.0106)

Note: Ordinary least squares estimates. All estimations include the following control variables: household size, age of the head (and a quadratic term), gender and schooling of the head, number of children, and a dummy for urban residence. ***, **, and * correspond to a level of significance of 1%, 5%, and 10%, respectively.

specification, however, based on income inequality as measured by the variance of logarithm, the results are qualitatively similar and support previous interpretations on the impact of inequality on visible consumption and the attenuated effect of the use of credit. Following the literature, therefore, we emphasize the quantitative results given in Table 4.3.

4.4.3 Alternative for Reference Group and Visible Measure

One can argue that a large reference group as the State of residence may not motivate relative comparisons, since social interactions are more likely to occur among households living nearby (AKERLOF, 1997). Therefore, as for robustness, we restrict further the sample to households living in State's capital cities and metropolitan areas. Although it reduces our sample to 14,430 observations, the reference group for each household i becomes those residing in the same locality. Empirically, we proceed by estimating the specification (4.1), considering both measures of income inequality and using the logarithm and share of visible consumption as the dependent variable. Table B.1, in

Appendix B.1, reports the results. The estimates are comparable to those in Table 4.3, and the overall interpretation is rather equivalent.

Another issue concerns the measure of visible consumption. Although we concentrate on visible goods more likely acquired through financing services, several other expenditure categories might be considered conspicuous from the household perspective. By definition, conspicuous consumption consists of spending on goods and services with high visibility or status effects. Hence, we consider a large measure by adding to the previous definition the expenditures on entertainment, travel, tourism, and commemorative events (i.e., parties, buffets, photography, tickets). Likewise, we consider the specification (4.1) with this new visible consumption measure as dependent variable. The results are summarized in Table B.2, in Appendix B.2, and do not differ substantially from previous results.

Therefore, we argue that the primary results reported in Table 4.3 are rather robust to changes in the inequality measure, reference group, and visible consumption definition.

4.5 Economic Implications

In this chapter, we address how inequality affects households' conspicuous consumption. At first, we assume that expenditure on visible goods is motivated by status-seeking behavior. Hence, as inequality increases, the average conspicuous consumption tends to decline given that, as the poor are compelled to reduce their expenditures on visible goods, the required expenditure level for the rich to sustain their social status also decreases (HWANG; LEE, 2017). The evidence confirms this hypothesis. However, we argue that access to credit works as a mechanism to compensate for this effect. Specifically, we document a large negative impact of inequality on conspicuous consumption for non-credit-user households.

This result has several economic and policy implications. Conspicuous consumption is often seen as *wasteful* from a social perspective (GIORGI; FREDERIKSEN; PISTAFERRI, 2020; HOPKINS; KORNIENKO, 2009). Although equality increases so-

cial competition, which provides an incentive to indulge in conspicuous consumption, any gain in social status cancels out by the higher conspicuous consumption of others (HOPKINS; KORNIENKO, 2004). Moreover, a decline in inequality might make low-income households better off. However, there is puzzling evidence that poor households allocate a significant share of their budget to conspicuous consumption while neglecting to invest in human capital (MOAV; NEEMAN, 2012; CHARLES; HURST; ROUSSANOV, 2009; KAUS, 2013).

Although one can argue that social competition can create positive economic outcomes, the status-seeking behavior may generate negative externalities that hinder movements toward socially beneficial equilibria (FRANK, 2008; COZZI, 2004; AKERLOF, 1997). The economic literature, for instance, emphasized that the trade-off between conspicuous consumption and saving (or human capital investment) may generate a poverty trap (MOAV; NEEMAN, 2012; BAGWELL; BERNHEIM, 1996).

Furthermore, access to credit may intensify this outcome since it enables households to maintain conspicuous consumption through financing services (CHRISTEN; MORGAN, 2005). As inequality increases, non-credit-constrained households might have incentives to increase their indebtedness to support visible goods expenditures on a status-seeking behavior. More specifically, as higher inequality reduces competitive pressure, it increases the marginal utility of visible goods, and status-seeking households resort to credit to achieve social visibility and exhibit wealth.

Therefore, given the externalities that come from conspicuous consumption in a status-seeking contest, economic policies have to consider this into account (AKERLOF, 1997). For example, policies attempting to reduce the degree of economic inequality by stimulating household expenditures might have adverse welfare consequences (ROY-CHOWDHURY, 2016) since evidence suggests that conspicuous consumption is, at least partly, financed through indebtedness (BERLEMANN; SALLAND, 2016). A policy promoting access to credit, therefore, might end up stimulating an inefficient allocation of resources.

4.6 Concluding Remarks

This chapter discusses the conspicuous consumption of Brazilian households. To the best of our knowledge, it is the first study that undertakes such an analysis of consumer behavior at the household level in this country. In particular, we address the effect of inequality on visible (conspicuous) expenditure by emphasizing the role that credit might plays in this relationship. Empirically, we provide evidence of the negative effect of inequality on conspicuous consumption, greater for non-credit-user households (more likely to be credit constrained). These findings support the hypothesis of competitive status-seeking behavior (HWANG; LEE, 2017; HOPKINS; KORNIENKO, 2009). Further, the evidence are in line with Berlemann and Salland (2016) and Georgarakos, Haliassos and Pasini (2014) who reported that relative income perceptions deepen household indebtedness and Christen and Morgan (2005) who documented that household indebtedness responds to income inequality more than to interest rates. The result of note, therefore, is that the effect of inequality on conspicuous consumption depends also on credit constraints.

It is worth mentioning some caveats. First, although we follow the literature benchmark to define visible consumption, several aspects of it might be influenced by cultural features. Therefore, this empirical issue for Brazil, in particular, requires some further debate. Second, we highlight the importance of credit constraints on visible expenditure decisions. However, the available data are somewhat restrictive on the measurement of household credit conditions, and the analysis relies on proxies. Further work should focus on better identifying credit constraints to confirm the results. Finally, inequality affects household well-being through several channels, and the effect on conspicuous consumption should not be viewed as an argument toward efficiency gains.

5 Do The Rich Save More? Evidence from Brazil

Abstract

Are the saving rates of the rich higher than that of the poor? We address this empirical question for Brazilian households by considering data from the Consumer Expenditure Survey (POF). Our study highlights that the relationship between permanent income and saving rates depends on whether household saving comprises the investment in human capital. Assuming the latter as part of household saving, we estimate a distinct positive relationship. In contrast, when saving measure accounts only for financial and physical assets, the saving rates are relatively steady across the income distribution. We argue that the accumulation of human capital is a critical aspect of households' saving decisions, especially when the returns of these investments are high. Households might value human capital accumulation, but liquidity constraint appears to limit such saving "*by accumulating human capital*" behavior.

Keywords: Permanent Income; Household Saving Rates.

5.1 Introduction

Are the saving rates of the rich higher than that of the poor? Given the implications on the welfare debate, this question has received considerable attention in the literature, especially after Dynan, Skinner and Zeldes (2004). Understanding the linkage between saving behavior and the permanent income matters for several economic and policy issues. Differences in saving rates, for example, imply that the effects of income shocks on aggregate consumption depend on its distribution across income groups (DYNAN; SKINNER; ZELDES, 2004; HORI et al., 2016). Moreover, the nature of such a relationship is relevant to the dynamics of wealth inequality and its impact on aggregate savings and economic growth (ALVAREZ-CUADRADO; VILALTA, 2018; NARDI; FELLA, 2017).

A well-known stylized fact is that high current-income households usually save more (BOZIO et al., 2017; ALLAN; ATALAY; CROSSLEY, 2015). Indeed, the forward-looking agents attempting to smooth transitory income fluctuations induce a strong correlation between current income and saving rates, though this is uninformative about the saving behavior and permanent income association (FRIEDMAN, 1953).[1] Since permanent income is inherently unobserved and saving is often not measured directly, whether the rich do save more remains a controversial issue in the literature.

Theoretically, uncertainty or liquidity constraints imply that the poorest should have a greater incentive to save (DEATON, 1989). A household's capacity for self-insure increases with its income, and after having accumulated enough to reach a given level of wealth (i.e., *buffer-stock saving*), their incentive to save might decrease (NARDI; FELLA, 2017). Dynan, Skinner and Zeldes (2004) and Chakrabarty, Katayama and Maslen (2006), however, showed that after controlling for lifecycle characteristics the saving rate increases with permanent income. Allan, Atalay and Crossley (2015), on the other hand, reported that the saving rates are not substantially different across permanent income groups, except for the poorest families who do not save.

[1] A direct result of the standard theories of consumption is the *independence* proposition, which states that the saving rate is independent of the permanent income. Empirical evidence, however, cast doubts on this result (ALVAREZ-CUADRADO; VILALTA, 2018; CARROLL, 1998).

We set a two-fold goal. First, we provide evidence on saving behavior and permanent income relationship in a developing economy with a remarkable degree of inequality (FIRPO; PORTELLA, 2019), economic uncertainty (FERREIRA et al., 2019), and evidence on liquidity constraints (LOPES, 2017; GOMES, 2010). Second, we investigate the importance of taking non-financial savings (i.e., human capital accumulation) into account when assessing this relationship.

Usually, the literature measures household saving as the residual between disposable income and consumption expenditure, an approach that we follow.[2] Nevertheless, decisions toward investment in human capital might be considered a form of saving, notably when it reduces risks, attenuates uncertainty, and allows for a gradual improvement in living standards (DUPAS; ROBINSON, 2013; EROSA; KORESHKOVA; RESTUCCIA, 2010). This matters since it increases heterogeneity in the saving rates across the income distribution. In particular, Brazil has both comprehensive healthcare and educational 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, would have a greater incentive to spend resources on them.

This chapter addresses such an empirical question for Brazilian households. To proceed with the analysis, we consider the most recent household dataset provided by the Consumer Expenditure Survey (POF 2018). The POF allows us to compute three saving measures. The first is the difference between disposable income and consumption expenditure. Given that durable goods correspond to occasionally large expenditures, likely to be purchased less frequently, the second saving measure adds to the spending on durable goods and vehicles to the previous. Finally, we set a saving measure that comprises household investment in human capital.

Our study, therefore, highlights that the relationship between permanent income and saving rates depends on whether household saving includes the investment in human

[2] Household saving could also correspond to the variation in accumulated wealth (CROSSLEY; O'DEA, 2010). However, such information is not available in the POF.

capital. More specifically, when considering a saving measure that comprises non-financial resources, the saving rates increase strongly with permanent income. Considering narrower saving measures, the association is relatively more steady along the permanent income distribution. Hence, the answer to whether the rich save more depends on how we define saving. Accordingly, we argue that the heterogeneity in the saving rates due to investment in human capital has important distributional implications.

The remainder of this chapter is organized as follows. Section 5.2 presents a brief review of the empirical literature that assesses the relationship between household saving rates and permanent income. Section 5.3 presents a theoretical background to motivate our empirical analysis. Section 5.4 details the empirical strategy, and Section 5.5 describes the data and variables considered. Section 5.6 reports and analyse the estimated results, while Section 5.7 discusses the macroeconomic and distributional implications. Section 5.8 provides some concluding remarks.

5.2 Literature Review

A critical question in the economic literature concerns saving behavior across income groups (NARDI; FELLA, 2017; CARROLL, 1998; HUBBARD; SKINNER; ZELDES, 1994). According to Francis (2009), this question matters since the differences in saving behavior may explain the heterogeneity in wealth distribution. A strand in the literature, therefore, has dedicated attention to the empirical relationship between saving rate and permanent income. Most of these studies, however, does not account for the investiment in human capital as part of the household saving. Table C.1 in the Appendix C.1 presents some details of the following studies that are close related to this chapter.

In an influential paper, Dynan, Skinner and Zeldes (2004) exploited different U.S. household-level data sources through several identification strategies and reported evidence of a positive association between saving rates and permanent income (and between marginal propensity to save and permanent income). Using a similar methodology, Chakrabarty, Katayama and Maslen (2006) confirms this empirical relationship for

Australian households. Allan, Atalay and Crossley (2015) argued, though, that such an empirical relationship is sensitive to the instrument used to *proxy* household permanent income.[3] Actually, this is a hard question to address due to the difficulty of measuring both saving rate and permanent income (BOZIO et al., 2017; ALLAN; ATALAY; CROSSLEY, 2015). Recent studies have considered several available household-level data sets, either cross-sectional or panel data, and instrumented permanent income with variables related to education, non-durable consumption, and lagged earnings. The evidence, however, is not conclusive about such differences in household saving rates.

Considering Canadian household-level data and different instruments for permanent income, Allan, Atalay and Crossley (2015) documented that saving rates are quite flat above the bottom quintile of predicted permanent income. Conversely, Bozio et al. (2017) considered survey and administrative data for the United Kingdom and reported a positive relationship between saving rates and permanent income, in line with Dynan, Skinner and Zeldes (2004). Additionally, the authors presented evidence that the top quintile of permanent income exhibits a higher wealth-to-income ratio than other quintiles. Hori et al. (2016) found similar results for working-age households in Japan, though the estimated relationship depends on the choice of permanent income measure. Moreover, Hori et al. (2016) argued that the relationship between saving rate and permanent income depends on the households' life stage. Alvarez-Cuadrado and Vilalta (2018) also reported evidence for the United States that household saving rates increase with permanent income, conditional on demographic characteristics. For Sweden, Bach, Calvet and Sodini (2018) document that saving represents a declining proportion of increasing net worth, on average. The authors show that the saving rate declines with the net worth up to the 80th percentile of the net worth distribution and stabilizes at the top.[4]

In a study for Latin American and Caribbean countries, Gandelman (2017) addressed whether wealthy households save a higher proportion of their permanent income.

[3] Following Allan, Atalay and Crossley (2015), we understood permanent income as income purged of measurement error and transitory fluctuations.

[4] Moreover, Bach, Calvet and Sodini (2018) argue that the poor hold relatively more human capital than wealth, such that even modest savings out of labor income yield large proportional increases in wealth.

The author argued that the region is particularly intriguing due to economic inequality and low saving rates hindering economic growth. For most countries considered, except Argentina, Colombia, and Uruguay, the results indicate that rich households save more and that those in the fifth quintile group of permanent income have great saving rates than the poorer. For Brazil, in particular, Gandelman (2017) considered the 2008 Consumer Expenditure Survey and documented saving rates that range from 5 percent in the lowest to 20 percent in the highest quintile of permanent income.

5.3 Theoretical Background

Consider a two-period setting where the household maximizes its lifetime utility. The utility is given by

$$U(x_1, z_1, x_2, z_2) = u(x_1) + \delta v(z_1) + \beta\Big[u(x_2) + \delta v(z_2)\Big] \tag{5.1}$$

where $x_t \geq 0$ is a continuous good and $z_t \in \{z_L, z_H\}$ a discrete good for $t = 1, 2$. Let $\delta > 0$ be the time preference rate and $\beta \in (0, 1)$ the discount factor.

Assumption 1. *The utility function* $u(\cdot)$ *satisfies* $u'(\cdot) > 0$, $u''(\cdot) < 0$, $\lim_{x\to 0} u'(x) = \infty$ *and* $\lim_{x\to\infty} u'(x) = 0$.

Suppose that z_L is a low-quality level of z provided by the public sector at a negligible price, and z_H is a high-quality level of z provided by the private sector at a positive cost.

Assumption 2. *The utility function* $v(\cdot)$ *satisfies* $v(z_H) > v(z_L)$.

The household budget constraints are

$$\begin{aligned} px_1 + e_{z,1} + s_1 &= m_1 \\ px_2 + e_{z,2} &= m_2 + Rs_1 \end{aligned} \tag{5.2}$$

where p is the price of good x, m_t is the household income for $t = 1, 2$, $R = 1 + r$ is the gross interest rate ($r > 0$), and s_1 is the saving from first period. Define

$$e_{z,t} = \begin{cases} c_H & \text{if } z_t = z_H \\ 0 & \text{if } z_t = z_L \end{cases} \qquad t = 1, 2. \tag{5.3}$$

in which $c_H > 0$ is the cost of z_H. Because $\lim_{x \to 0} u'(\cdot) = \infty$, we have interior solution for x. Hence, conditional to the choice $(z_1, z_2) = (\bar{z}_1, \bar{z}_2)$, the household problem consist of maximizing

$$U(s_1, \bar{z}_1, \bar{z}_2) = u\left(\frac{m_1 - s_1(\bar{z}_1, \bar{z}_2) - e_{z,1}(\bar{z}_1, \bar{z}_2)}{p}\right) + \delta v(\bar{z}_1) + \beta\left[u\left(\frac{m_2 + Rs_1(\bar{z}_1, \bar{z}_2) - e_{z,2}(\bar{z}_1, \bar{z}_2)}{p}\right) + \delta v(\bar{z}_2)\right]. \tag{5.4}$$

Assumption 3. $\beta R = 1$.

Given Assumption 3, the first-order condition conditional on $(\bar{z}_1, \bar{z}_2)$ implies that

$$s_1^*(\bar{z}_1, \bar{z}_2) = \frac{1}{1+R}\Big[m_1 - e_{z,1}(\bar{z}_1, \bar{z}_2) - m_2 + e_{z,2}(\bar{z}_1, \bar{z}_2)\Big] \tag{5.5}$$

The household chooses z_H or z_L in the first and second periods. Specifically, it might choose: *i*) z_H in both periods; *ii*) z_H in the first and z_L in the second; *iii*) z_L in the first and z_H in the second; or *iv*) z_L in both periods. Hence, optimal saving s_1^* differs according to these choices. This result can be summarized as follows:

Lemma 5.3.1 (Optimal Saving Conditional on $(\bar{z}_1, \bar{z}_2)$)**.** *Let the household utility be given by (5.1), subjected to restrictions in (5.2). Then, given the Assumptions 1-3, the optimal saving s_1^* conditional on $(\bar{z}_1, \bar{z}_2)$ is*

$$s_1^*(z_H, z_H) = \frac{1}{1+R}(m_1 - m_2), \tag{5.6}$$

$$s_1^*(z_H, z_L) = \frac{1}{1+R}(m_1 - c_H - m_2), \tag{5.7}$$

$$s_1^*(z_L, z_H) = \frac{1}{1+R}(m_1 - m_2 + c_H), \tag{5.8}$$

or

$$s_1^*(z_L, z_L) = \frac{1}{1+R}(m_1 - m_2). \tag{5.9}$$

Each expression for saving s_1^* in Lemma (5.3.1) leads to distinct expressions for x_1^* and x_2^*. Accordingly, household utility depends on the choices concerning spending on z in both periods. Our primary interest is on period $t = 1$, for which household chooses s_1 and might also choose $z_1 = z_H$. Clearly, the latter happens when the utility derived from choosing $z_1 = z_H$ is higher than that from choosing $z_1 = z_L$.

Proposition 1. *Given the Assumptions 1-3, for $z_H > z_L$ and $c_H > 0$, there exist a level of income m^* such that*

$$U\Big(s^*(z_H, z_2), z_H, z_2\Big) > U\Big(s^*(z_L, z_2), z_L, z_2\Big) \tag{5.10}$$

regardless of the choice $z_2 = z_H$ or $z_2 = z_L$. And the larger the distance between z_H and z_L, the lower the m^*.

Proof. See Appendix C.2. □

Proposition 1 states that there exists a level of income for which the household utility from choosing $z_1 = z_H$ exceeds its costs in terms of reducing consumption of other goods, which otherwise would induce choosing $z_1 = z_L$. Further, we assume that quality differences between z_L and z_H are widely known. Hence, for preferences given by (5.1), it can be argued that low-income households are compulsorily choosing $z_1 = z_L$. As income increases, however, the reduction in consumption of other goods is less costly, and the choice $z_1 = z_H$ is reasonable and more likely. Proposition 1 also states that the level of income for which the household chooses $z_1 = z_H$ is lower when the quality difference between z_H e z_L is significant, and higher when the quality of z_L provided by the public sector approximates the quality of the z_H.

5.4 Empirical Methodology

Dynan, Skinner and Zeldes (2004), and most of the subsequent related studies, assumed that the relationship between saving rates and permanent income is given by

$$s_i = \frac{y_i - c_i}{y_i} = f(\bar{y}_i) + \mathbf{x}_i^{'}\boldsymbol{\beta} + \epsilon_i \tag{5.11}$$

where s_i is the household saving rate, y_i and c_i are, respectively, measures of current income and consumption, $\bar{y}_i$ stands for permanent income and $\mathbf{x}_i$ is a vector of observable determinants of saving behavior. The term ϵ_i is a disturbance capturing both unmeasured determining factors and measurement errors in saving rate. Index i refers to households.

There are important issues that arise from this approach. The first is related to the definition of saving. Dynan, Skinner and Zeldes (2004) examined two distinct definitions. At first, they considered a wide description of savings that includes realized and unrealized capital gains, and else they considered saving as the difference between current income (excluding capital gains) and consumption, namely active saving. Although Dynan, Skinner and Zeldes (2004) argued that neither is a superior concept, Allan, Atalay and Crossley (2015) stated that the latter definition is appropriate in analyzing the relationship expressed in (5.11). By excluding capital gains, the active saving might better reflect the household intentions toward saving-consumption decisions (GANDELMAN, 2017; DYNAN; SKINNER; ZELDES, 2004). Accordingly, we consider this definition to measure household savings.

An additional empirical difficulty concerns the fact that the permanent income $\bar{y}_i$ is not observed.[5] As claimed by Allan, Atalay and Crossley (2015), current income is not a good *proxy* for permanent income due to either measurement error or transitory fluctuations. The literature has followed Dynan, Skinner and Zeldes (2004) and employed a two-stage estimation procedure. Specifically, in the first stage, a permanent income *proxy* is constructed by regressing current income on instruments $\mathbf{z}_i$ and a vector of covariates $\mathbf{w}_i$,

$$\ln y_i = \mathbf{z}_i\alpha + \mathbf{w}_i^{'}\boldsymbol{\gamma} + \varepsilon_i. \tag{5.12}$$

The predicted values $\hat{y}_i$ from (5.12) are then used as a *proxy* for permanent income in the second stage, in which (5.11) is estimated by median regression. It is worth noting, though, that the simply exponentiation of the fitted values from (5.12) underestimate $\hat{y}_i$, and the

[5] Allan, Atalay and Crossley (2015) define permanent income as an annuitization of the present value of current and future consumption possibilities. In practice, they define it as the household income without measurement error and short-run fluctuations. Brady et al. (2018) refers to it as a long-term average income.

distribution of the error term has also empirical implications.[6] Duan (1983) demonstrated that inappropriately 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

$$\hat{y}_i = \exp\left\{\widehat{\ln y_i}\right\}\left(n^{-1}\sum_{i=1}^{n}\exp\left\{\hat{\varepsilon}_i^2\right\}\right) \tag{5.13}$$

where $\widehat{\ln y_i}$ are the fitted values, and $\hat{\varepsilon}_i$ the residuals from the ordinary least squares estimate of (5.12). Besides, if the error distribution is indeed normal, the estimate (5.13) is also consistent, though less efficient (DUAN, 1983).

A critical aspect on the strategy based on specification (5.12) concerns the instrumental variables $\mathbf{z}_i$ used to predict permanent income. According to Dynan, Skinner and Zeldes (2004), a good instrument should be highly correlated with the actual anticipated lifetime income at the time of the saving decision, and uncorrelated with the error term such that affects saving rates only through permanent income.[7] The literature has long considered education as a strong predictor of actual household permanent income. In particular, the head's schooling is an instrument correlated with permanent income, though it might be correlated with the error term. For instance, if education is related to the preferences heterogeneity that influences saving behavior, it is not a valid predictor given that it produces an upward bias in the estimated relationship from specification (5.11). For this reason, Allan, Atalay and Crossley (2015) and Gandelman (2017) considered the spouse's schooling as the instrument for permanent income arguing that it likely correlates with the head's education and unlikely correlates with unobservable determinants of saving rates. A drawback of this approach is that it only applies to restricted sample of households with couples.

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[6] For example, assuming that $\varepsilon_i \sim \mathbb{N}(0, \sigma^2)$, than y_i follows a log-normal distribution, which implies that $\mathbb{E}[y|z, \mathbf{w}] = \exp\left\{\mathbb{E}[\ln y|z, \mathbf{w}]\right\}\exp\left\{\frac{1}{2}\sigma^2\right\}$. 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.

[7] Dynan, Skinner and Zeldes (2004) used consumption, education, lagged and future labor income as instruments for permanent income. However, the cross-sectional nature of the POF does not allow for lags and leads of income as alternative predictors. Moreover, according to Allan, Atalay and Crossley (2015), these are not necessarily superior instruments.

Further, as additional instruments in $\mathbf{z}_i$, we consider a dummy variable that equals one if the household has any source of capital income[8] and an asset-based household wealth index derived from information on ownership of durable goods and housing characteristics. This index allows for addressing a dimension of household wealth that reflects long-term economic conditions (WITTENBERG; LEIBBRANDT, 2017).[9]

An asset-based index is an aggregated measure of wealth based on variable indicators. Several methodologies to construct such indices have been proposed, differing essentially on how to specify the weights, and how to aggregate the variable indicators to achieve a score for each household (FILMER; SCOTT, 2012). The standard approach in this literature employs principal component analysis on indicators for durable goods ownership and housing characteristics. However, Kolenikov and Angeles (2009) argued that the principal components analysis assumes multivariate normality, and the discrete nature of indicator variables has empirical implications. Therefore, the authors recommended using instead a polychoric correlation matrix (defined as the maximum likelihood estimates of the correlation between unobserved normally distributed continuous variables underlying their discretized versions), for which principal components analysis is employed properly. Hence, we follow the procedure proposed by Kolenikov and Angeles (2009) to construct the asset-based wealth index.

Having estimated a *proxy* for $\bar{y}_i$, we proceed with the empirical analysis. Following the literature, to allow for non-linearities in permanent income and saving rate relationship, we specify the function $f(\cdot)$ in equation (5.11) as a set of binary variables capturing quantiles of permanent income to which each household belongs. Specifically, we suppress in every estimate the constant term and include dummies for all income quintiles. For the main specification, the vector $\mathbf{x}_i$ comprises only dummy variables for 10-year age groups,

[8] Specifically, we consider capital income as the income from real estate rental, property rights, interest, and dividends. Although such data is scarce in the POF, capital income should be significantly correlated with a household's permanent income.

[9] 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 the World Bank and by Demographic and Health Surveys (DHS Program) to assess household socioeconomic status.

with the 45-55 years-old group as the reference.[10] Thereby, the estimated coefficient on a given quintile corresponds to the median saving rate of a household in the reference age group that belongs to that quintile.

5.5 Data Description

The empirical analysis relies on data from the Consumer Expenditure Survey (POF), a cross-sectional sampling survey conducted by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE). The POF is a sampling survey on permanent private residences, which adopted a two-stage stratified sampling design, with geographic and statistical stratification of primary sampling units that correspond to sectors of the Demographic Census.[11] At the residence level, the survey identifies the basic unit - the unit of consumption -, which comprises a set of residents (or a single one) that share the source of consumption. We refer to the unit of consumption as the household.[12] The person of reference (i.e., the household head) is the individual in charge of paying for the main expenditure on housing (rent, housing financing, real estate taxes) or so considered by the other residents. Each residence in the sample represents a given number of permanent private residences and held a sample weight associated with it, allowing interpret the results for the entire population. The weights are computed such that it incorporates adjustments for non-response, and is assigned to each household. All statistics we report in this chapter are estimated considering the sample weights.[13]

The POF is the only available source of disaggregated data for studying Brazilian households' saving-consumption decisions. In particular, we consider the most recent survey edition, carried out between June 2017 and July 2018. Since the data collection takes place over twelve months and covers a reference period of up to twelve months for income

[10] The mean and median age of household heads are 45.3 and 45 years, respectively.

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

[12] According to Diniz et al. (2007), the unit of consumption is a family-related concept, in the extent of the sharing of expenses on food or housing, rather than just parentage relations.

[13] By performing such estimation, each observation is weighted by the inverse of its sampling probability. This allows precision estimates that incorporate the effects of stratification and clustering.

and some expenditure items[14], the collected information spread throughout twenty-four months. Given the absolute and relative price changes that may occur in this period, monetary values are adjusted for the prices of a reference date, defined within the survey to be January 15, 2018 (IBGE, 2019). In this chapter, the monetary values are expressed in Brazilian Real (BRL) at the prices of the reference data.

The survey investigates most of the households' budget components. Total expenditure is arranged into three classes: *i*) consumption expenditure; *ii*) current expenses; and *iii*) changes in assets and liabilities.[15] Consumption expenditure corresponds to the spending carried out in the acquisition of products, services, or any other good, as well as the housing rental service. Current expenses comprise taxes on income, properties, vehicles, or financial services, as well as compulsory public pension payments, labor union dues, cash donations, insurance, property fees, and bureaucracy services. Changes in assets and liabilities correspond to the household's equity variation (IBGE, 2019). The increase in assets includes the acquisition, construction, and improvement of real estate properties (except minor repairs), contributions to pension plans, social club membership acquisition, tombstones, burial sites, and other investments. The decrease in liabilities comprises the payment of debts, interest, personal loans, and housing financing.

On the other hand, the household total income comprises the gross monetary earnings of all its members obtained from work, transfers, rents, and other occasional revenues, plus the non-monetary component and realized capital gains (IBGE, 2019). It is of note the non-monetary income provided by the survey, which allows for an extensive measure of the household disposable income (HOFFMANN; VAZ, 2021; SOUZA, 2015; DINIZ et al., 2007). The non-monetary component corresponds to the expenditures occurring through non-market transitions (i.e., donations, transfers, home production, or exchanges between relatives and neighbors).[16] Concerning taxes and deductions, the survey discrim-

[14] Although reported on an annual basis, each expense item has a reference period according to a frequency of acquisition, which corresponds to 07, 30, 90, or 360 days.

[15] The IBGE organizes the expenditures into current expenses, assets increasing, and liabilities decreasing, in which "current expenses" comprise both consumption expenditures and other current expenditures. We chose to organize into the three classes described in the text given our focus on consumption expenditure.

[16] In accounting terms, non-monetary expenses are equal to non-monetary income. An exception is the estimated rent, attributed to the household that owns their houses or that is allowed to live in. As

inates three main groups: social security contributions, income tax, and other deductions (SILVEIRA et al., 2020).

5.5.1 Sample Selection and Statistical Overview

At the household level, the survey sample has 59,039 observations. We do not consider, however, those from multiple consumption units (i.e., more than one family living in the same house). Moreover, following the literature, we restricted the analysis to working-age households for which the head ages from 25 to 65. This is important since younger households are more likely to be in transitional stages or subjected to liquidity constraints, and for the older ones, it complicates by the noncomparability of those on the verge of retirement and those that are beyond retirement (DYNAN; SKINNER; ZELDES, 2004). In addition, we exclude observations with a non-positive disposable income and discard those for which the expenditure on healthcare or education exceeds fifty percent of disposable income. Finally, we exclude households with unreported information about the head's educational attainment, and also those for which it was not possible to compute the asset-based wealth index. The selected sample comprises 42,337 households.

Table 5.1 – Descriptive Statistics

	Mean	Median	Std. Dev.	.05	.95
Disposable Income	4,834.80	3,173.77	6,568.36	814.88	14,046.45
	(80.51)	(27.96)		(10.52)	(427.09)
Consumption	3,989.50	2,732.81	4,450.36	747.87	11,111.44
	(57.57)	(24.45)		(9.88)	(239.39)
Saving S_1	845.33	390.52	4,265.29	-2,646.60	5,280.21
	(41.36)	(12.77)		(67.54)	(165.60)
Saving S_2	1,243.00	599.02	4,391.97	-1,837.19	5,937.48
	(42.97)	(12.34)		(51.90)	(152.84)
Saving S_3	1,551.20	747.11	4,582.52	-1,498.19	6,641.97
	(46.46)	(12.86)		(36.93)	(235.32)

Note: All the statistics are computed using sample weights, and the respective standard errors are in parenthesis. The monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018.

stated by Diniz et al. (2007), there is a consensus to consider the estimated rent when measuring a household's well-being. In this case, the interviewees themselves estimate the amount of rent they would have to pay if they were to rent the residence.

Table 5.1 reports descriptive statistics for disposable income, consumption expenditure, and the saving measures considered. It presents the fifth and ninety-fifth percentiles as thresholds indicating the extremes of the respective distributions. The result of note is the positive skewness of the income, consumption, and savings distributions.

5.5.2 Saving Measures

As stated, we consider the concept of active saving, which corresponds to the difference between household disposable income and consumption expenditure (CROSSLEY; O'DEA, 2010; DYNAN; SKINNER; ZELDES, 2004). Disposable income is set by deducting taxes from total income and includes the non-monetary share. Although the survey has data on realized capital gains (i.e., property sales, inheritance, and the balance of financial transactions), we do not consider it in computing disposable income, since it correspond to occasional income and might not reflect ordinary intentions toward saving-consumption decisions. Consumption expenditure consists of the expenses on goods, services, and housing (rent paid by tenants or imputed rent for homeowners). We consider the budget share allocated on changes in assets and liabilities in the household saving.[17] Moreover, in computing household savings, we discount the current expenses given that are not part of consumption, but a deduction from income (DEATON; ZAIDI, 2002), and therefore, should not be included in savings either.[18]

We consider the following three distinct saving measures

$$S_{1i} = y_i - c_i \tag{5.14}$$

$$S_{2i} = y_i - [c_i - d_i] \tag{5.15}$$

$$S_{3i} = y_i - [c_i - d_i - hc_i] \tag{5.16}$$

[17] Asset increasing corresponds to the acquisition, construction, and improvement of own real estate properties, as well as other investments that rise wealth, while liability decreasing accounts for the payments of debts, interest, and insurance on personal loans or housing financing. Unfortunately, wealth data provided by the survey is scarce, lacking information on unrealized capital gains. However, as stated by Dynan, Skinner and Zeldes (2004), although saving measures that include capital gains are more comprehensive, if the latter are unanticipated at the time of the saving decision, then the saving measure might not reflect the ordinary intentions toward saving-consumption decisions.

[18] Current expenses comprise taxes on income, properties, vehicles, or financial services, as well as compulsory public pension payments, labor unions, cash donations, insurances, properties fees, and bureaucracy services.

where y_i is the household disposable income, c_i is the consumption expenditure, d_i is the durable expenditure, and hc_i the expenditure on healthcare and educational services. All three measures, by construction, comprise the investments in own real estate properties, which account for a relevant portion of household wealth in Brazil (DIAS et al., 2019; MARQUETTI, 2009). In particular, the difference between these measures encompasses the household decisions toward the expected stream of services from durable goods (CROSSLEY; O'DEA, 2010), and further, toward human capital accumulation (ORTHOFER, 2017; SILVEIRA; MOREIRA, 2015).

We are particularly interested in the broader saving measure, S_3, that comprises non-financial savings in the form of investment in education and health. Strictly, these services are acquired immediately but have a distinct forward-looking character as they increase the household stock of human capital (ORTHOFER, 2017). Hence, it is reasonable to consider them as saving from the household perspective. We next examine these expenses in more detail.

5.5.3 Healthcare and Education Expenditures

Regarding expenditures, the survey identifies 104 spending items for healthcare and 132 for educational services, and some of them may not correspond to a saving decision *per se*. To examine these expenditures, we arrange them into narrow categories. In particular, we separate health expenses into medicines, healthcare plans and insurance, and health treatments (i.e., medical appointments, exams, health recovery equipment, hospitals, and surgeries). On the other hand, we arrange educational expenses into formal education (i.e., school, college, and university, including school supplies), professional training courses, and hobby and recreation activities (i.e., gym and sports).

Each subcategory concerns different household decisions. The spending on healthcare insurance, for instance, has a forward-looking perspective, while out-of-pocket expenses on medicines are more likely to reflect households' everyday needs. Similarly, the expenditure on formal education intends to increase future welfare, while the spending on hobby and recreation activities might comprise leisure consumption. Hence, our saving

measure does not include expenditures on medicines and recreation activities.

In this vein, household expenditure on healthcare (i.e., health insurance plus health treatment) and educational services (i.e., formal education and professional training) are particularly interesting. At first, these expenditures correspond to a forward-looking decision. Further, both have imperfect substitutes provided by public programs and are accessible at a negligible cost.

This is particularly critical since it might impact the differences in saving rates across income groups. Assuming that a better quality service is accessible at a higher cost, those households that value these services the most would have a greater incentive to spend on them, if not liquidity constrained.[19] The implications of such behavior should be great at the upper tail of income distribution. Figure 5.1 depicts the average share of disposable income allocated to education and healthcare services by income groups.

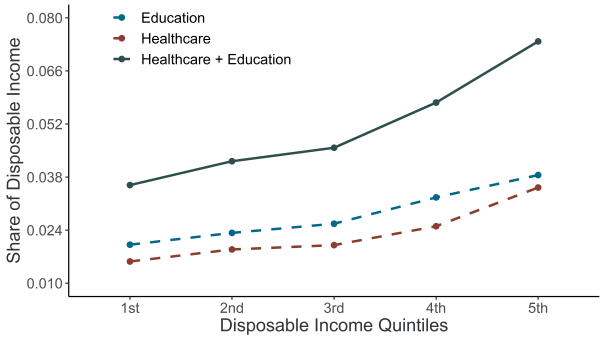


Figure 5.1 – Share of Disposable Income Allocated on Healthcare and Education

Note: Income groups are set as the quintiles of the disposable income distribution.

As expected, high-income households spend more on these services, on average. Indeed, households in the upper quintile allocate a share of income to healthcare and educational services twice greater as those in the bottom quintile. It is worth noting that, usually in Brazil, individuals working in the private sector have health insurance coverage provided by companies. In contrast, individuals in the public sector often charge for their health insurance. The average disposable income of the latter is high, which may explain part of the difference (i.e., public workers are among the high-income). Notice, however, that the difference also occurs in expenditure on education, which has no similar

[19] Chein and Pinto (2017) documented that Brazilians' household decision toward education is credit constrained.

counterpart by the companies from the private sector. Table C.2, in the Appendix C.3, reports the average expenditure on healthcare and education subcategories by income groups.

5.6 Empirical Results

In this section, we assess household saving behavior across income groups. Empirically, we define saving rates as the above saving measures divided by disposable income, denoted as $s_j = S_{ji}/y_i$ for $j = 1, 2, 3$. We estimate median regressions with the saving rate as the dependent variable and include in the specification dummies for all income quintiles, along with dummy variables for age groups, except for the reference one. The estimated coefficient for a given income group corresponds to the saving rate of households in this group with the head aged between 45 and 55.

5.6.1 Savings Rates and Current Income

We begin the empirical analysis by documenting the stylized fact that the saving rate increases with current income. Table 5.2 reports the estimates that support this positive relationship, also illustrated in Figure 5.2. Notice that the coefficients are monotonically increasing in the current (disposable) income groups. Although the median saving rates differ, the patterns are similar along the income distribution for all three saving measures.

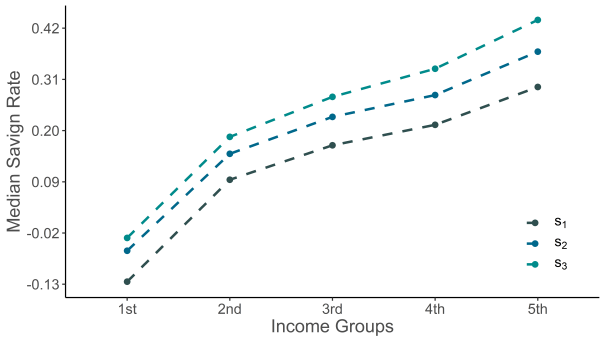


Figure 5.2 – Median Saving Rates and Current Income

Note: We set income groups as the quintiles of the disposable income distribution.

Concerning the first saving measure, the estimates for s_1 range from -12.5 percent in the lowest income quintile to 29.4 percent in the highest. Regarding the second measure, which includes spending on durables, estimates for saving rate s_2 range from -5.8 percent at the bottom to 37.0 percent at the top of the distribution. For the more comprehensive saving measure, which includes household investment in human capital, the estimates for s_3 range from -3.1 percent in the lowest to 43.7 percent in the highest income group. It is of note that the negative skewness of saving distribution affects the low saving rates estimated for the poorest quintile, which might reflect bias from measurement error and transitory income shocks (DYNAN; SKINNER; ZELDES, 2004).

To assess if saving rates increase along the income groups, we calculate bootstrapped standard errors for the difference between each of two subsequent estimated coefficients and test whether this difference is statistically significant (based on a one-sided test). The bold estimates in Table 5.2 indicates that the coefficient is statistically different from that for the preceding income quintile. Moreover, Table 5.2 also reports the estimated coefficient from a median regression of saving rates on the logarithm of household disposable income, which suggests that a ten percent increase in current income is associated with an increase between 1.83 and 1.96 percentage points in the saving rate, regardless the saving definition.

Although the positive association between saving rate and disposable income might result from measurement errors or temporary shocks, it corroborates that high-current income households have higher saving rates. As stated by Bozio et al. (2017), there is no controversy about this stylized fact. These findings are in line with empirical literature and accordingly to the standard theory of consumer behavior. As stated by Dynan, Skinner and Zeldes (2004), even if the saving rate does not differ concerning the permanent income, households with high current income would present a higher saving rate.

5.6.2 Savings Rates and Permanent Income

We now address the relationship between saving rate and permanent income. As stated, an empirical issue concerns that the latter is unobservable. Therefore, following the

Table 5.2 – Median Regressions of Saving Rate on Current Income

	$s_i = f(y_i) + \mathbf{x}_i^{'}\boldsymbol{\beta} + \epsilon_i$		
	s_1	s_2	s_3
Quintile 1	-0.1248	-0.0582	-0.0311
	(.0094)	(.0082)	(.0072)
Quintile 2	**0.0943**	**0.1500**	**0.1861**
	(.0073)	(.0064)	(.0060)
Quintile 3	**0.1687**	**0.2293**	**0.2721**
	(.0059)	(.0056)	(.0053)
Quintile 4	**0.2125**	**0.2765**	**0.3325**
	(.0059)	(.0052)	(.0050)
Quintile 5	**0.2938**	**0.3696**	**0.4376**
	(.0048)	(.0049)	(.0044)
Ages 25-35	-0.0434	-0.0173	-0.0153
	(.0079)	(.0066)	(.0051)
Ages 35-45	-0.0268	-0.0162	-0.0108
	(.0064)	(.0057)	(.0053)
Ages 55-65	0.0626	0.0475	0.0377
	(.0057)	(.0058)	(.0051)
Pseudo R^2	0.049	0.058	0.073
Observations	42,390	42,390	42,390
$\ln y$	0.1831	0.1833	0.1962
	(.0029)	(.0026)	(.0025)

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

procedure described, in the first stage, we construct a set of *proxies* for permanent income by regressing current income on predictors and some additional control variables. The vector $\mathbf{z}_i$ in the specification (5.12) includes education- or consumption-related variables along with the asset-based wealth index and the capital income dummy. According to Allan, Atalay and Crossley (2015), education and consumption are strongly correlated with households' permanent income, though not necessarily uncorrelated with unmeasured determinants of saving or the measurement error in saving rate. Table C.3, in the Appendix C.4, reports the first stage estimates. As control variables in the vector $\mathbf{w}_i$, we set the age of the head (and a quadratic term), household size, the number of children, and dummy variables for the State of residence.

Consider first the permanent income predicted by educational attainment, as mea-

sured by the years of formal schooling of the head. We examine the association between such a *proxy* for $\bar{y}_i$ and saving rate. Table 5.3 reports the median saving rates across permanent income quintiles, illustrated in the left panel of Figure 5.3. A result of note is that compared with current income, the relationship is flatter and differs among saving measures, though increases with permanent income.

Table 5.3 – Median Regressions of Saving Rate on Permanent Income I

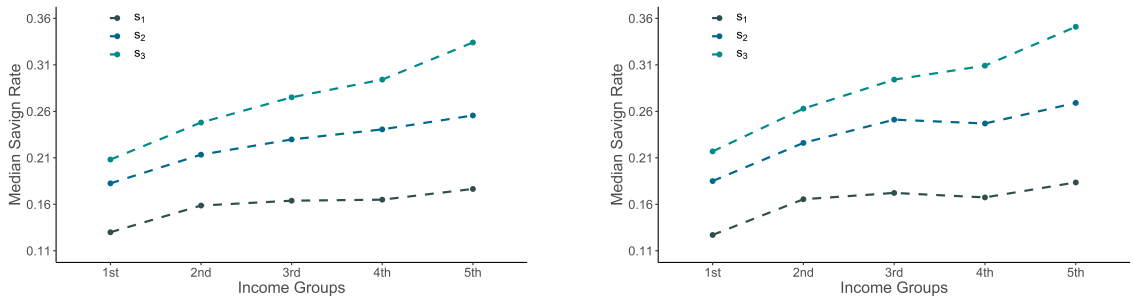
	$s_i = f(\bar{y}_i) + \mathbf{x}_i'\boldsymbol{\beta} + \epsilon_i$					
	Heads' Schooling			Spouses' Schooling		
	s_1	s_2	s_3	s_1	s_2	s_3
Quintile 1	0.1299	0.1826	0.2082	0.1270	0.1850	0.2169
	(.0074)	(.0069)	(.0068)	(.0081)	(.0090)	(.0069)
Quintile 2	**0.1586**	**0.2134**	**0.2480**	**0.1655**	**0.2260**	**0.2629**
	(.0071)	(.0059)	(.0069)	(.0079)	(.0084)	(.0068)
Quintile 3	0.1638	**0.2298**	**0.2751**	0.1722	**0.2511**	**0.2941**
	(.0059)	(.0061)	(.0061)	(.0080)	(.0069)	(.0069)
Quintile 4	0.1649	0.2406	**0.2941**	0.1674	0.2469	0.3091
	(.0062)	(.0055)	(.0054)	(.0076)	(.0070)	(.0068)
Quintile 5	0.1765	**0.2555**	**0.3341**	0.1835	**0.2691**	**0.3509**
	(.0062)	(.0057)	(.0054)	(.0083)	(.0079)	(.0061)
Ages 25-35	-0.0767	-0.0526	-0.0497	-0.0722	-0.0420	-0.0411
	(.0076)	(.0068)	(.0069)	(.0095)	(.0091)	(.0071)
Ages 35-45	-0.0443	-0.0317	-0.0222	-0.0414	-0.0284	-0.0207
	(.0062)	(.0060)	(.0060)	(.0075)	(.0071)	(.0067)
Ages 55-65	0.0645	0.0493	0.0395	0.0691	0.0528	0.0408
	(.0064)	(.0057)	(.0056)	(.0074)	(.0075)	(.0068)
Pseudo R^2	0.007	0.007	0.010	0.008	0.007	0.011
Observations	42,337	42,337	42,337	27,770	27,770	27,770
$\ln \bar{y}_{ols}$	0.0375	0.0517	0.0812	0.0481	0.0566	0.0876
	(.0040)	(.0040)	(.0033)	(.0056)	(.0047)	(.0044)

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

For the first saving measure, the relationship with permanent income is slightly stable, with estimates of saving rate s_1 between 13.0 and 17.6 percent throughout the predicted permanent income distribution. Regarding the second saving measure, the saving rate s_2 lies between 18.3 and 25.5 percent. For the third saving measure, which includes investment in human capital, the relationship is monotonically increasing, and the median saving rate s_3 of households in the reference age group range from 20.8 percent at the bot-

tom to 33.4 percent at the top of the distribution. Note that the difference between saving rates is statistically significant for most income quintiles when saving includes durables or durables plus human capital expenditure, but only at the bottom of the distribution when the measure does not include them.

All age dummy coefficients are significant and indicate that younger households save less than those in the reference group (i.e., 45-55 age group), while older usually save more. Further, from the median regressions of saving rates on the logarithm of the *proxy* for permanent income, the estimated linear impact suggests an increase of 0.37, 0.52, and 0.81 percentage points in saving rates s_1, s_2, and s_3, respectively, given a ten percent increase in permanent income. Accounting for investment in human capital in the household's decision increase the estimates. Although differing in level terms, this pattern is in line with those reported by Allan, Atalay and Crossley (2015).



(a) Heads' Education (b) Spouses' Education

Figure 5.3 – Median Saving Rates and Permanent Income I

Note: We set income groups as the quintiles of the permanent income distribution, predicted by the schooling of the head (left) and schooling of the spouse (right).

Allan, Atalay and Crossley (2015) and Gandelman (2017) argued that if the schooling of the head is related to the preferences that affect household saving behavior, it may produce an upward bias in the above-estimated relationship. Therefore, following these authors, we consider the educational attainment of the spouse for estimating households' permanent income in the first stage and use this alternative *proxy* to address its association with saving rates. Empirically, we impose the sample restrictions described in subsection 5.5.1 by excluding those observations with unreported information on spouses' schooling. This restricted sample consists of 27,770 households.

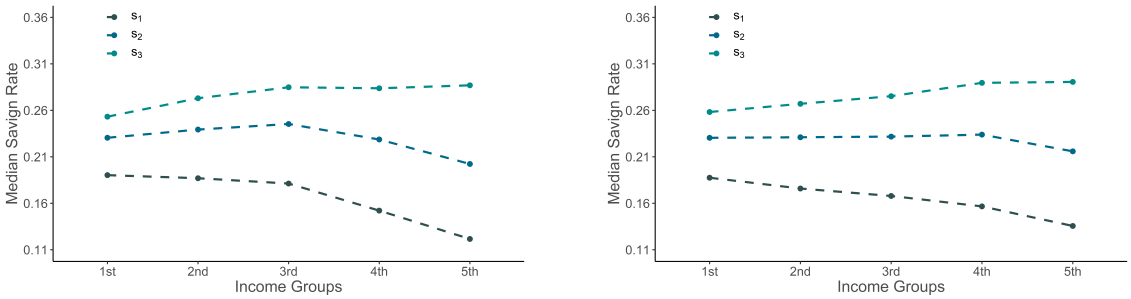
The results of these estimates are also reported in Table 5.3 and illustrated in the right panel of Figure 5.3. Notice that the relationship is comparable, with median saving rates varying in similar intervals. Moreover, the age dummies allow for the same previous interpretation, and the estimated linear impact suggests a similar response of saving rates to a ten percent increase in permanent income. Therefore, the overall outcome is similar for both *proxies* based on educational attainment.

These results indicate that the relationship between permanent income and saving behavior depends on saving measurement. For instance, except for the lowest quintile, the first and second measures are relatively steady across the permanent income distribution. The third measure, however, presents a strong positive association. Hence, the households' investment in human capital seems to matter in their saving-consumption decisions, especially in the highest income quintiles. Accordingly, we argue that assuming a saving definition that encompasses this leads to distinct evidence of saving behavior across the permanent income distribution.

Further, along with the wealth index and capital income dummy, we consider non-durable consumption as an additional instrument into $\mathbf{z}_i$ in the specification (5.12) to predict permanent income. It is worth noting that, in this case, given our saving measures, any measurement error will enter on both sides of the equation (5.11), producing biased estimates. From the POF survey dataset, however, an alternative saving measure (e.g., net changes in assets, as in Dynan, Skinner and Zeldes (2004)), which could reduce such a bias, is not available.

The estimated median saving rates across quintiles of permanent income predicted by non-durable consumption are reported in Table 5.4, and depicted in the left panel of Figure 5.4. Notice that, regardless of the saving measure, the relationship is roughly steady in the bottom tail of the distribution and differs in the upper tail. In particular, for the first saving measure, the saving rate s_1 sharply decreases in permanent income, from about 19.0 percent in the lowest to 12.2 percent in the highest quintile. Regarding the second saving measure, the median saving rate s_2 lies between 20.2 to 24.5 percent. For the third saving measure, the relationship increases in permanent income, and the

median saving rate s_3 ranges from 25.3 percent at the bottom to 28.7 percent at the top of the distribution.



(a) Non-Durable (b) Food

Figure 5.4 – Median Saving Rates and Permanent Income II

Note: We set income groups as the quintiles of the permanent income distribution, predicted by non-durable consumption (left) and food consumption (right).

To some extent, this negative relationship is in line with the results presented by (ALLAN; ATALAY; CROSSLEY, 2015) and Hori et al. (2016), when the permanent income is *proxied* by consumption. However, given the data restrictions, we argue that such downward biased estimates might be due to measurement error in consumption, especially at the highest levels of the income distribution.

To examine this further, we also consider food consumption (at home and away from home) as the additional predictor into $\mathbf{z}_i$ for estimating households' permanent income in the specification (5.12). According to Allan, Atalay and Crossley (2015), this may reduce the downward bias due to measurement error in consumption. The results are summarized in Table 5.4 and illustrated in the right panel of Figure 5.4. The result of note is that the downward bias is less pronounced than that for permanent income predicted by non-durable consumption, which supports the effects of measurement errors in the previous estimates. An intriguing finding, however, concerns the third saving measure, for which the relationship becomes close positive, with the estimated saving rate s_3 lying between 25.8 and 29.0 percent.

In summary, the results illustrate that differences in saving measures matter in such analysis, especially at the upper quintiles of the permanent income distribution. The investment in human capital seems to matter for households above the poorest quintile.

Table 5.4 – Median Regressions of Saving Rate on Permanent Income II

	$s_i = f(\bar{y}_i) + \mathbf{x}_i'\boldsymbol{\beta} + \epsilon_i$					
	Non-Durable			Food		
	s_1	s_2	s_3	s_1	s_2	s_3
Quintile 1	0.1903	0.2305	0.2532	0.1875	0.2304	0.2582
	(.0069)	(.0064)	(.0069)	(.0066)	(.0064)	(.0073)
Quintile 2	0.1870	0.2393	**0.2730**	0.1759	0.2310	0.2670
	(.0066)	(.0063)	(.0057)	(.0062)	(.0068)	(.009)
Quintile 3	0.1813	0.2453	0.2848	0.1679	0.2317	0.2753
	(.0062)	(.0053)	(.0053)	(.0059)	(.0060)	(.0058)
Quintile 4	**0.1521**	**0.2286**	0.2837	0.1567	0.2339	**0.2896**
	(.0056)	(.0058)	(.0054)	(.0060)	(.0060)	(.0055)
Quintile 5	**0.1216**	**0.2023**	0.2869	**0.1356**	**0.2159**	0.2906
	(.0064)	(.0052)	(.0053)	(.0059)	(.0057)	(.0056)
Ages 25-35	-0.0952	-0.0646	-0.0600	-0.0911	-0.0618	-0.0599
	(.0073)	(.0068)	(.0063)	(.0073)	(.0068)	(.0066)
Ages 35-45	-0.0516	-0.0356	-0.0293	-0.0495	-0.0348	-0.0278
	(.0065)	(.0055)	(.0059)	(.0063)	(.0060)	(.0058)
Ages 55-65	0.0671	0.0528	0.0419	0.0677	0.0515	0.0426
	(.0058)	(.0058)	(.0053)	(.0059)	(.0057)	(.0057)
Pseudo R^2	0.009	0.006	0.005	0.008	0.005	0.005
Observations	42,337	42,337	42,337	42,337	42,337	42,337
$\ln \bar{y}$	-0.0246	-0.0119	0.0217	-0.0134	0.0015	0.0283
	(.0045)	(.0037)	(.0031)	(.0040)	(.0040)	(.0034)

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

As the income increase, the households usually spend a large share of their income on health and education services, and therefore using a more comprehensive saving measure strengthens the relationship between saving behavior and permanent income.

5.6.3 Robustness Checks

As stated by Dynan, Skinner and Zeldes (2004), the dynastic model implies that wealthy households smooth consumption over generations by leaving bequests to their children. Moreover, decisions regarding investment in human capital, particularly in education, should be more important for a household with children. Therefore, we expect differences in saving behavior due to the presence of children, and such differences should be more pronounced between income groups depending on the saving measure considered.

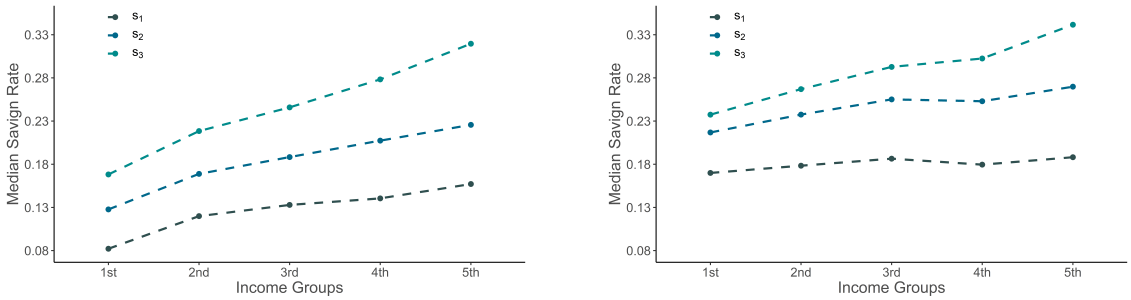
Rather than contrast saving behavior, we examine whether the presence of children affects the relationship between saving rates and permanent income. Therefore, we break out the sample into households with and without children and proceed with the previous estimation procedure separately. The subsample of households with children contains 20,172 observations, while that of households without children has 22,165 observations. Table 5.5 reports the results, also depicted in Figure 5.5.

Table 5.5 – Median Regressions of Saving Rate on Permanent Income III

	$s_i = f(\bar{y}_i) + \mathbf{x}_i^{'}\boldsymbol{\beta} + \epsilon_i$					
	Subsample With Children			Subsample Without Children		
	s_1	s_2	s_3	s_1	s_2	s_3
Quintile 1	0.0822	0.1277	0.1682	0.1699	0.2168	0.2374
	(.0110)	(.0095)	(.0096)	(.0103)	(.0095)	(.0087)
Quintile 2	**0.1199**	**0.1689**	**0.2184**	0.1783	0.2375	**0.2670**
	(.0105)	(.0110)	(.0092)	(.0083)	(.0086)	(.0073)
Quintile 3	0.1329	0.1883	**0.2458**	0.1865	0.2551	**0.2927**
	(.0101)	(.0097)	(.0093	(.0098)	(.0081)	(.0078)
Quintile 4	0.1405	0.2073	**0.2783**	0.1795	0.2530	0.3025
	(.0092)	(.0085)	(.0080)	(.0085)	(.0074)	(.0074)
Quintile 5	0.1571	0.2256	**0.3197**	0.1881	0.2699	**0.3416**
	(.0196)	(.0084)	(.0090)	(.0083)	(.0083)	(.0067)
Ages 25-35	-0.0520	-0.0206	-0.0293	-0.0654	-0.0455	-0.0465
	(.0100)	(.0098)	(.0088)	(.0132)	(.0123)	(.0094)
Ages 35-45	-0.0307	-0.0063	-0.0077	-0.0289	-0.0187	-0.0221
	(.0090)	(.0087)	(.0082)	(.0105)	(.0096)	(.0087)
Ages 55-65	0.0523	0.0555	0.0346	0.0556	0.0393	0.0322
	(.0121)	(.0120)	(.0114)	(.0075)	(.0071)	(.0065)
Pseudo R^2	0.005	0.005	0.010	0.005	0.004	0.007
Observations	20,1727	20,172	20,172	22,165	22,165	22,165
Income	0.0495	0.0601	0.0937	0.0191	0.0354	0.0646
	(.0053)	(.0050)	(.0056)	(.0054)	(.0046)	(.0048)

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

Regardless of the saving measure, saving rates are higher among households without children, especially at the bottom of the income distribution, but the relationship between saving rate and permanent income is steeper among those with children. It suggests that the presence of children shrinks low-income households' savings, but saving rates increase faster with permanent income for them. The two narrow saving measures, which



(a) With Children (b) Without Children

Figure 5.5 – Median Saving Rates and Permanent Income III

Note: We set income groups as the quintiles of the permanent income distribution, predicted by the schooling of the head.

do not include human capital investment, show a positive relationship with permanent income when children are present while remaining relatively steady among households without children. For the third saving definition, a positive association is observed and more pronounced among those households with children. These findings support the importance of considering the investment in human capital when assessing saving behavior throughout the income distribution. Households' decision toward expenditure on health and education appears to be relevant even when no children are present.

5.7 Economic Implications

The empirical results above corroborate that the relationship between saving rates and permanent income depends on saving measures. In particular, we document that for the saving measure that accounts for the decision toward human capital accumulation, the relationship increases significantly, suggesting that all but the poor households might save more on both financial and non-financial assets. The positive association indicates that both the level and the distribution of permanent income matter as determinants of saving behavior.

By considering narrow saving measures, the results indicate that saving rates increase slightly across the predicted household permanent income distribution, which contrasts with the evidence presented by Gandelman (2017) for Brazil. It is worth noting, however, that the author considered data from a different period. Moreover, the results

also differ somewhat from that reached by Dynan, Skinner and Zeldes (2004) and Bozio et al. (2017) to the extent that we report a more steady relationship, though still positive, when considering a similar saving measure.

The rather uniform saving rates for excluding non-financial savings are relatively consistent with standard models with borrowing constraints. The empirical fact of note is that the saving rate increases strongly with permanent income when accounting for the investment in human capital, especially at the upper tail of the distribution. Notice that the diverging gap between the saving rates is because the rich spend a large share of their income on human capital accumulation, which provides significant economic return over time in developing countries (DUPAS; ROBINSON, 2013).

These results have critical implications for the welfare debate. We further argue that the observed saving rates reflect optimizing behavior facing the returns of human capital accumulation. The households might value these investments, but the liquidity constraint appears to be the most relevant aspect restricting such *saving by investing in human capital* behavior. The effort to reach the desired level of human capital implies committing a significant fraction of the household budget, which may be impracticable for low-income households. Chein and Pinto (2017), for instance, reported that households' decisions toward education are credit constrained in Brazil. Therefore, this amplifies the heterogeneity in saving rates and further contributes to the persistence of inequality.

As stated by Dupas and Robinson (2013), worldwide, people usually do not save as much as they would like. In developing countries, however, households may access fewer alternatives to surmount these difficulties. Human capital accumulation is one such alternative. However, the findings in this chapter suggest that the poor have a relatively lower saving rate, especially when including non-financial savings. One would expect that a large portfolio of financial assets is available for the rich, but human capital accumulation seems to be as well as relevant in the household decision.

5.8 Concluding Remarks

In this chapter, we investigate whether the richer save a large fraction of their income relative to the poorer. Our findings support the stylized fact of a positive association between current income and household saving rates. However, the results are rather interesting concerning the association between saving rates and permanent income. They point to a significantly more steady relationship, which is not surprising since we expect that households can smooth out transitory income shocks, at least partly.

Whether the rich save more depends on how saving is measured. When considering the investment in human capital as part of the households' saving decision, we estimate a clear positive relationship between saving rates and permanent income. However, for more standard saving measures, which include only financial and physical wealth, the estimated differences in saving rates are lower, though a slightly positive association remains. Accordingly, we argue that the accumulation of human capital is a crucial aspect of households' decisions, especially when the returns of such investments are high. Moreover, the liquidity constraint seems to matter in explaining the heterogeneity in saving rates. This is in line with the results in Dupas and Robinson (2013) and Chein and Pinto (2017).

Finally, it is worth mentioning that our results are not informative about the saving behavior of the very rich. There is evidence that the top of the income distribution is underrepresented in the POF (SOUZA, 2015), and the lack of information about household wealth may represent a drawback in measuring saving and assessing permanent income. Future research should shed light on these empirical issues, addressing alternative data and approaches.

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APPENDIX A – From Chapter 2

A.1 Quantiles for Household Income and Consumption

Table A.1 – Selected Quantiles of Household Level Variables' Distributions

	Quantiles								
	.01	.05	.10	.25	.50	.75	.90	.95	.99
Total Income	408.00	807.49	1,143.72	1,858.89	3,260.56	5,856.83	10,584.12	15,445.42	30,602.03
Disposable Income	396.18	782.39	1,103.60	1,770.20	3,045.96	5,296.46	9,114.44	12,910.23	24,020.01
Labor Earnings[1]	0.00	0.00	63.37	716.48	1,833.33	3,663.98	6,634.69	9,616.83	18,996.98
Transfers	0.00	0.00	0.00	0.00	0.00	136.12	547.00	997.98	2,261.76
Retirement	0.00	0.00	0.00	0.00	0.00	0.00	1,641.00	2,722.83	7,413.01
Non-Recurring	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.55	619.61
Non Monetary	0.00	0.00	45.58	267.92	546.66	933.43	1,497.53	2,036.88	3,947.31
Total Expenditure	388.94	689.31	932.14	1,516.22	2,639.54	4,649.67	7,174.91	11,265.34	22,192.90
Consumption	371.55	657.62	880.50	1,428.20	2,453.60	4,259.50	7,256.67	9,895.64	19,062.78
Non-Durable	111.95	229.70	325.17	559.39	982.33	1,667.28	2,569.98	3,323.90	5,355.08
Service	0.00	24.29	66.63	213.95	567.30	1,330.33	2,671.63	3,939.74	8,242.84
Semi-Durable	0.00	0.00	0.00	0.00	6.66	33.04	100.40	182.78	467.16
Durable	0.00	0.00	0.00	4.85	74.74	250.43	830.05	1,953.62	5,098.62
Housing Service	0.00	98.24	150.04	299.27	500.08	806.05	1,468.02	2,030.36	4,195.29
Saving	-6,567.45	-2,602.89	-1,467.18	-338.72	448.99	1,496.72	3,180.05	4,953.19	11,394.95

Note: All statistics are computed using sample weights, though standard errors are not reported. The monetary values are expressed in Brazilian Real (BRL), at prices of January 15, 2018. Note that housing services include the rent paid for tenants and imputed rent for homeowners. [1] The quantiles reported in this Table are based on the entire sample, without the restriction of positive labor earnings.

A.2 Classification of Consumption Expenditures

Table A.2 – Consumption Expenditure Categories

Categories	Description
Non-Durables	
Utilities	Electricity, water and sewage, telephone, internet, cable TV.
Home Fuel	Cooking gas, firewood, charcoal, diesel.
Housing Repair	Small dwelling repair, gardening, fumigation, general services.
Tobacco	Tobacco, cigarettes, cigars, narcotics.
Food Out	Restaurants, fast-food, bakery, cafes, pubs, beverages.
Food Home	Cereals, oilseeds, vegetables, meat products, dairy, etc.
Newspaper	Newspapers, magazines, periodicals, comic books.
Personal Care	Cosmetics, perfumery, makeup, toiletries.
Stationary	Paper, notebooks, pens, pencils, school supplies.
Clothing	Clothing, shoes and accessories.
Medicine	Drugs, medicines, vitamins, medical products.
Services	
Home Maintenance	Maintenance and repair of furniture and appliances.
Personal Services	Hairdressing, nails care, tattoos, waxing, massage.
Domestic Services	Housekeeper, servants, driver, gardener.
Pets	Pets, pet food, veterinary and pet shop services.
Game of Chance	Lotteries, gambling, slot machine, gaming machines.
Urban Transport	Bus, taxi, metro, parking, vehicle fuel.
Postal	Mail, telegram, parcels send.
Entertainment	Cinema, theater, museum, concerts, streaming, tickets.
Banking Services	Banking services, credit card fees, overdraft.
Vehicle Maintenance	Vehicle overhaul, auto service, car wash.
Travel and Tourism	Tickets, hotels, tour packages.
Cell Phones	Phone bills, cellphone, apps.
Social Events	Commemorative events, buffet, photography, funeral.
Healthcare	Health plans, appointments, exams, surgeries, hospitalization.
Education	Private school, language courses, training courses, university.
Semi-Durables	
Home Decor	Rugs, curtains, decorative objects.
Home Utensils	Cutlery, crockery, pans, porcelain, lamps.
Toys and Sports	Toys, games, consoles, sports equipment, musical instruments.
Durables	
Appliances	Appliances, tools, furniture.
Jewelry	Jewelry, watches.
Vehicles	Automobile, motorcycle, bicycle, boat, truck.
Housing Service	
Housing Service	Rent or Estimated Rent.

Note: Some categories have both non-durable and service expenditures. Following COICOP (2018), we arrange each item appropriately. For this chapter, though, it does not make empirical difference, given that we consider a broad measure of non-durable consumption, including services.

APPENDIX B – From Chapter 4

B.1 A Closer Reference Group

We consider a narrow reference group based on States' capital cities and metropolitan areas, for which the working sample reduces to 14,448 household-level observations. Table B.1 reports the estimates of model specification (4.1) for both income inequality measures. Overall, the results are similar to those based on the entire sample, reported in Table 4.3.

Table B.1 – Closer Reference Groups

	Log of Visible		Log of Non-Visible	
	(1)	(2)	(3)	(4)
Constant	-2.2544***	-1.6348***	-0.1803***	-0.2964***
	(.1425)	(.1841)	(.0337)	(.0436)
λ_s	-0.4743***		0.0776***	
	(.0785)		(.0187)	
g_s		-2.0371***		0.3658***
		(.2903)		(.0699)
$\ln \bar{y}_{is}$	1.1641***	1.1597***	0.9662***	0.9670***
	(.0164)	(.0163)	(.0037)	(.0037)
d_i^c	-0.2176***	-0.7751***	0.0307	0.1087*
	(.0823)	(.2221)	(.0021)	(.0581)
$\lambda_s \times d_i^c$	0.5209***		-0.0674**	
	(.0824)		(.0317)	
$g_s \times d_i^c$		2.0313***		-0.2757***
		(.5045)		(.1311)
J-Test	0.454	0.368	3.209	3.071
	[.5002]	[.5442]	[.0732]	[.0797]
λ_s^{ols}	-0.4822***		0.0817***	
	(.0758)		(.0181)	
g_s^{ols}		-1.9040***		0.3274
		(.2661)		(.0633)
Obs.	14,448	14,448	14,448	14,448

Note: Two-step generalized method of moments estimation procedure. The vector of instruments includes the household's current disposable income and a dummy variable that is equal to 1 if the household has any source of capital income. All estimations include the following control variables: household size, age of the head (and a quadratic term), gender and schooling of the head, and the number of children. ***, **, and * correspond to a level of significance of 1%, 5%, and 10%, respectively.

B.2 A Large Visible Consumption Measure

We consider a large measure of conspicuous consumption, which slightly loosens the sample restriction (for visible positive consumption), remaining 39,906 observations. Table B.2 reports the estimates of model specification (4.1) for both income inequality measures. Overall, the results are similar to those based on the entire sample, reported in Table 4.3.

Table B.2 – Large Visible Measure

	Log of Visible		Log of Non-Visible	
	(1)	(2)	(3)	(4)
Constant	-2.8887***	-2.5649***	0.0501*	-0.0117
	(.0951)	(.1261)	(.0275)	(.0355)
λ_s	-0.5642***		0.0866***	
	(.0598)		(.0157)	
g_s		-1.5249***		0.2575***
		(.1858)		(.0494)
$\ln \bar{y}_{is}$	1.2650***	1.2630***	0.9259***	0.9266***
	(.0099)	(.0101)	(.0028)	(.0029)
d_i^c	-0.2086***	-0.5403***	0.0188	0.0676*
	(.0556)	(.1251)	(.0173)	(.0388)
$\lambda_s \times d_i^c$	0.5328***		-0.0568**	
	(.0932)		(.0285)	
$g_s \times d_i^c$		1.5356***		-0.1958**
		(.2965)		(.0913)
J-Test	0.138	0.102	0.541	0.503
	[.7105]	[.7497]	[.4618]	[.4782]
λ_s^{ols}	-0.5512***		0.0551***	
	(.0512)		(.0149)	
g_s^{ols}		-1.3780***		0.1158***
		(.1545)		(.0442)
Obs.	39,906	39,906	39,906	39,906

Note: Two-step generalized method of moments estimation procedure. The vector of instruments includes the household's current disposable income and a dummy variable that is equal to 1 if the household has any source of capital income. All estimations include the following control variables: household size, age of the head (and a quadratic term), gender and schooling of the head, number of children, and a dummy for urban residence. ***, **, and * correspond to a level of significance of 1%, 5%, and 10%, respectively.

B.3 Visible Inequality and Conspicuous Consumption

Assuming that households achieve utility from conspicuous consumption, one could argue that highly observable inequality might motivate further the expenditures on visible goods (ROYCHOWDHURY, 2016). Then, we define *visible inequality* as the inequality measured on visible expenditures and assess its effect on conspicuous consumption. Empirically, we consider a similar specification as in (4.1), with the visible inequality measure, λ'_s, as the main independent variable. Specifically,

$$\ln c'_{is} = \phi_0 + \phi_1 \lambda'_s + \phi_2 \ln \bar{y}_{is} + \gamma_1 d^c_{is} + \gamma_2 d^c_{is} \lambda'_s + \mathbf{x}'_{is} \boldsymbol{\psi} + \epsilon_{is} \tag{B.1}$$

where the remaining variables are defined similarly as in (4.1). As for robustness, we set the variance of logarithm and the Gini coefficient as measures of inequality and consider the consider also the log of non-visible consumption as the dependent variable.

However, an additional identification issue emerges in this case. Besides the endogeneity of consumption expenditure (i.e., as a *proxy* for permanent income), the visible inequality presents the same problem. There might be unobservable features specific to the reference group and common to all members. For model identification, we use as an instrument for visible inequality the measure of consumption inequality. It seems likely that consumption expenditure is a relevant instrument for visible expenditure (e.g., the correlation between log consumption and log visible expenditures is 0.7415). Moreover, consumption expenditure remains as *proxy* for permanent income, instrumented by household current disposable income and a dummy variable that equals one if the household has any source of capital income. The models are estimated by the two-step GMM procedure, clustering standard errors at the state level.

Table B.3 summarizes these estimates. As before, according to the overidentification test, all specifications perform properly, such that we do not reject the joint null hypothesis that instruments are uncorrelated with the error term. The results are robust to using the opposite dependent variable and indicate that visible inequality has a statistically significant and negative effect on conspicuous consumption. Measuring by the variance of logarithm, the estimated effect of visible inequality is similar to that estimated for income inequality: an increase of one log-point in visible inequality decreases by around 0.51% the conspicuous consumption for non-credit-user households. The credit, however, slightly increases in importance. For our baseline empirical results reported in column (1) of Table B.3, for instance, the use of credit compensates a large part of the negative effect of visible inequality: for credit users, the effect of income inequality is rather attenuated, and conspicuous consumption reduces only 0.12% in response to the one log-point increase in visible inequality. Measuring inequality by the Gini coefficient, one-standard-deviation increase in inequality decreases conspicuous consumption of non-credit-user households by 12.36% while credit-users reduces 3.95% their visible expenditures in response to the

same one-standard-deviation increase in Gini coefficient.

Table B.3 – Impact of Visible Inequality on Conspicuous Consumption

	Log of Visible		Log of Non-Visible	
	(1)	(2)	(3)	(4)
Constant	-2.0068***	-0.3264	-0.2213***	-0.5280***
	(.1793)	(.4770)	(.0452)	(.1196)
λ'_s	-0.5155***		0.1213***	
	(.0927)		(.0234)	
g'_s		-4.3832***		0.8766***
		(0.8008)		(.1965)
$\ln \bar{y}_{is}$	1.1778***	1.1984***	0.9550***	0.9503***
	(.0110)	(.0102)	(.0028)	(.0026)
d_i^c	-0.4472***	-1.6135***	0.1706***	0.4815***
	(.1462)	(.4981)	(.0376)	(.1254)
$\lambda'_s \times d_i^c$	0.3946***		-0.1307***	
	(.1049)		(.0269)	
$g'_s \times d_i^c$		2.9821***		-0.8577***
		(0.8665)		(.2182)
J-Test	0.393	0.775	0.029	0.121
	[.5307]	[.3786]	[.8632]	[.7276]
λ'^{ols}_s	-0.4347***		-0.0117***	
	(.0299)		(.0073)	
g'^{ols}_s		-2.3300***		0.1478***
		(.1769)		(.0432)

Note Two-step generalized method of moments estimation procedure. The vector of instruments includes the household's current disposable income and a dummy variable that is equal to 1 if the household has any source of capital income. All estimations include the following control variables: household size, age of the head (and a quadratic term), gender and schooling of the head, number of children, and a dummy for urban residence. ***, **, and * correspond to a level of significance of 1%, 5%, and 10%, respectively.

In summary, when addressing visible inequality, its effect on conspicuous consumption is comparable to that of income inequality, that is, credit users are less affected by inequality, which suggests that the status-seeking channel is more relevant for this group.

APPENDIX C – From Chapter 5

C.1 Summary of Related Literature

Table C.1 – Summary of the Related Literature

Authors	Country	Data	Saving Measure	Instrument[a]	Education and Health
Dynan, Skinner and Zeldes (2004)	United States	CEX (1982-1989); SCF (1983;1989); PSID (1984-1989)	Change in Real Net Worth; After-tax income minus consumption.	Lagged Income; Lagged Earnings; Future Earnings; Consumption; Education.	As Spending
Chakrabarty, Katayama and Maslen (2006)	Australia	HILDA (2001;2003)	After-Tax Current Income minus Consumption.	Head's Education	As Saving
Allan, Atalay and Crossley (2015)	Canada	FAMEX (1996)	After-Tax Current Income minus Total Expenditure; Assets Changes	Head's and Spouse's Schooling; Non-Durable Components.	As Spending
Hori et al. (2016)	Japan	FLS (2011-2012); FIES (2002-2012)	Current Income minus Consumption	Lagged Income; Education; Consumption; Net Asset Holdings.	As Spending
Bozio et al. (2017)	England	ELSA (2002-2003)[b]	Private wealth and state pension.	Earnings ability[c]	As Spending
Gandelman (2017)	Argentina; Brazil; Chile; Colombia; Costa Rica; Ecuador, Honduras; Mexico; Panama; Paraguay; Peru; Uruguay	ENGHo (2005); POF (2008); EPF (2012); ECV (2011); ENIGH (2013); ENIGHU (2004); MECOVI (2004); ENIGH (2005); EIGH (2008); EIGyCV (2012); ENAPREF (2009); ENGIH (2006)	After-tax income minus consumption.	Head's and Spouse's Schooling.	As Spending

Note: [a]Variable considered for permanent income estimates. [b]The authors linked ELSA data to administrative data from UK National Insurance System. [c] Earnings ability is measured as the present value of net real earnings since the start of working life divided by the number of years in work.

C.2 Proofs of Lemma 5.3.1 and Proposition 1

Let be the household utility given by (5.1). Assumption 1 implies that $x_1^*, x_2^* > 0$, such that $x_1^* + R^{-1}x_2^* > 0$. Therefore, using (5.2), we have that

$$e_{z,1} + \frac{e_{z,2}}{R} < m_1 + \frac{m_2}{R}. \tag{C.1}$$

Further, substituting (5.2) into (5.1), we have expression (5.4). Given the Assumption 3, for $(z_1, z_2) = (\bar{z}_1, \bar{z}_2)$, the first order condition for s_1 implies that $x_1^* = x_2^*$. As a result,

$$s_1^*(\bar{z}_1, \bar{z}_2) = \frac{1}{1+R}\Big[m_1 - e_{z,1}(\bar{z}_1, \bar{z}_2) - m_2 + e_{z,2}(\bar{z}_1, \bar{z}_2)\Big] \tag{5.3}$$

Given the available choices of z_t for $t = 1, 2$, we have four distinct cases, characterized in Lemma 5.3.1, which yields distinct expressions for x_1^* and x_2^*. Therefore, utility (5.4) assumes a different expression according to such a choice.

Lemma C.2.1 (Household Utility)**.** *Let be the Lemma (5.3.1). Then, conditional to the available choices for (z_1, z_2), the household utility is*

$$U\Big(s_1^*(z_H, z_H), z_H, z_H\Big) = (1+\beta)u\left(\frac{R}{p(1+R)}\left[m_1 - c_H + \frac{m_2 - c_H}{R}\right]\right) + \delta(1+\beta)v(z_H), \tag{C.2}$$

$$U\Big(s_1^*(z_H, z_L), z_H, z_L\Big) = (1+\beta)u\left(\frac{R}{p(1+R)}\left[m_1 - c_H + \frac{m_2}{R}\right]\right) + \delta\Big[v(z_H) + \beta v(z_L)\Big], \tag{C.3}$$

$$U\Big(s_1^*(z_L, z_H), z_L, z_H\Big) = (1+\beta)u\left(\frac{R}{p(1+R)}\left[m_1 + \frac{m_2 - c_H}{R}\right]\right) + \delta\Big[v(z_L) + \beta v(z_H)\Big], \tag{C.4}$$

or

$$U\Big(s_1^*(z_L, z_L), z_L, z_L\Big) = (1+\beta)u\left(\frac{R}{p(1+R)}\left[m_1 + \frac{m_2}{R}\right]\right) + \delta(1+\beta)v(z_L). \tag{C.5}$$

Now, we can examine the Proposition 1. Specifically, we have to establish the conditions that guarantee that, at the period $t = 1$, household choose $z_1 = z_H$, which happens when the inequality (5.10) is true. Otherwise stated, we have to compare the utility derived from (C.2) and (C.3) with the utility derived from (C.4) and (C.5), which yields the following conditions:

1. $U(s_1^*(z_H, z_H), z_H, z_H) > U(s_1^*(z_L, z_H), z_L, z_H)$ when

$$\frac{\delta}{1+\beta}\Big[v(z_H) - v(z_L)\Big] > u\left(\frac{R}{p(1+R)}\left[m_1 + \frac{m_2 - c_H}{R}\right]\right) - u\left(\frac{R}{p(1+R)}\left[m_1 - c_H + \frac{m_2 - c_H}{R}\right]\right) \quad \text{(C.6)}$$

2. $U(s_1^*(z_H, z_H), z_H, z_H) > U(s_1^*(z_L, z_L), z_L, z_L)$ when

$$\delta\Big[v(z_H) - v(z_L)\Big] > u\left(\frac{R}{p(1+R)}\left[m_1 + \frac{m_2}{R}\right]\right) - u\left(\frac{R}{p(1+R)}\left[m_1 - c_H + \frac{m_2 - c_H}{R}\right]\right) \quad \text{(C.7)}$$

3. $U(s_1^*(z_H, z_L), z_H, z_L) > U(s_1^*(z_L, z_H), z_L, z_H)$ when

$$\frac{\delta(1-\beta)}{1+\beta}\Big[v(z_H) - v(z_L)\Big] > u\left(\frac{R}{p(1+R)}\left[m_1 + \frac{m_2 - c_H}{R}\right]\right) - u\left(\frac{R}{p(1+R)}\left[m_1 - c_H + \frac{m_2 - c_H}{R}\right]\right) \quad \text{(C.8)}$$

4. $U(s_1^*(z_H, z_L), z_H, z_L) > U(s_1^*(z_L, z_L), z_L, z_L)$ when

$$\frac{\delta}{1+\beta}\Big[v(z_H) - v(z_L)\Big] > u\left(\frac{R}{p(1+R)}\left[m_1 + \frac{m_2}{R}\right]\right) - u\left(\frac{R}{p(1+R)}\left[m_1 - c_H + \frac{m_2 - c_H}{R}\right]\right) \quad \text{(C.9)}$$

Notice that we can generalize the expressions (C.6)-(C.9) as

$$\kappa_1\Big[v(z_H) - v(z_L)\Big] > u(\kappa_2) - u(\kappa_2 - \kappa_3) \quad \text{(C.10)}$$

such that $\kappa_1(\delta, \beta) > 0$, $\kappa_2(m_1, m_2, c_H, R) > 0$ and $\kappa_2(m_1, m_2, c_H, R) - \kappa_3(c_H, R) > 0$. In particular, $\kappa_2(\cdot)$ increases linearly in m_1. Hence,

$$\frac{\partial}{\partial m_1}\Big[u(\kappa_2) - u(\kappa_2 - \kappa_3)\Big] = u'(\kappa_2)\frac{\partial \kappa_2}{\partial m_1} - u'(\kappa_2 - \kappa_3)\frac{\partial \kappa_2}{\partial m_1}. \quad \text{(C.11)}$$

Given the Assumption 1, the right-hand side of equation (C.11) is negative. Note that a function f is concave if and only if

$$f(y) - f(x) \leq f'(x)(y - x)$$

[Theorem 21.2 in Simon and Blume (1994)]. Therefore, in our case

$$\begin{aligned} u(\kappa_2) - u(\kappa_2 - \kappa_3) &\leq u'(\kappa_2 - \kappa_3)\Big[\kappa_2 - (\kappa_2 - \kappa_3)\Big] \\ &= u'(\kappa_2 - \kappa_3)\kappa_3 \end{aligned} \tag{C.12}$$

Therefore, the right-hand side of all inequalities (C.6)-(C.9) converges monotonically to zero as m_1 goes to infinity. The left-hand side of the inequalities (C.6)-(C.9) is positive given the Assumption 2. For all four cases, there exist a $m_1^{(i)}$, for $i = 1, \ldots, 4$, such that for any $m^* \geq \max\left\{m_1^{(1)}, m_1^{(2)}, m_1^{(3)}, m_1^{(4)}\right\}$, the conditions (C.6)-(C.9) are satisfied. Therefore, there is a level of income for which the household choose $z_1 = z_H$ instead of $z_1 = z_L$ (Proposition 1).

C.3 Healthcare and Education Average Expenditures

Table C.2 – Healthcare and Education Expenditures: Averages by Income Groups

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Healthcare	15.42	36.77	58.82	113.61	409.84
	(0.736)	(1.583)	(2.149)	(3.515)	(14.498)
Health Insurance	2.93	10.89	22.93	58.35	268.71
	(0.371)	(0.983)	(1.420)	(2.707)	(10.814)
Health Treatment	12.49	25.91	35.89	55.26	141.13
	(0.640)	(1.206)	(1.571)	(2.206)	(7.177)
Education	21.22	45.79	75.92	147.51	460.69
	(1.054)	(1.906)	(2.623)	(4.828)	(17.927)
Formal Education	18.74	41.31	66.07	130.77	411.29
	(0.999)	(1.872)	(2.623)	(4.828)	(17.927)
Professional Training	2.48	4.47	9.84	16.74	49.40
	(0.349)	(0.412)	(0.836)	(1.728)	(4.049)

Note: Average values are computed within quintiles of disposable income using sample weights, and the respective standard errors are in parenthesis. Monetary values are expressed in Brazilian Real (BRL) at prices of January 15, 2018.

C.4 Household Permanent Income Prediction

Table C.3 – Estimates of Different Specifications for Household Permanent Income

	$\ln y_i = \mathbf{z}_i\alpha + \mathbf{w}_i^{'}\boldsymbol{\gamma} + \varepsilon_i$			
	(01)	(02)	(03)	(04)
Intercept	6.2929***	6.3617***	6.8523***	6.8294***
	(.0564)	(.0689)	(.0513)	(.0548)
Schooling	0.0431***	0.0473***		
	(.0009)	(.0011)		
Consumption			0.0001***	0.0003***
			(.0000)	(.0000)
Capital Income	0.2637***	0.2796***	0.1354***	0.2297***
	(.0168)	(.0206)	(.0017)	(.0169)
Wealth	0.7227***	0.6942***	0.5580***	0.8098***
	(.00075)	(.0088)	(.0018)	(.0066)
Head's Age	0.0032	0.0075***	-0.0053*	-0.0045*
	(.0023)	(.0029)	(.0021)	(.0023)
Age Squared	-0.0001***	-0.0001	-0.0001***	-0.0001***
	(.0000)	(.0000)	(.0000)	(.0000)
Household Size	0.1655***	0.1285***	0.1164***	0.1287***
	(.0029)	(.0039)	(.0032)	(.0028)
Children	-0.1622***	-0.1315***	-0.1377***	-0.1516***
	(.0045)	(.0055)	(.0043)	(.0044)
Adjusted R^2	0.507	0.503	0.579	0.518
Sample Size	42,337	27,770	42,337	42,337

Note: OLS estimates with robust standard errors in parenthesis. At the top of the table are 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, and in column (02) is the years of formal schooling of the spouse. In column (03), the predictor is the household expenditure on non-durables, and in column (4) is the household expenditure on food. All estimates consider the full sample, except in column (02) which considers the couples sample. Although not reported, all the specifications include dummies for States.