Made
centro de
pesquisa em
macroeconomia
das desigualdades

Working Paper 08.09.2022 nº 010

Marginal Propensity to Consume Heterogeneity and Redistribuive Policies: The Brazilian Case

Theo Ribas Palomo[*]
Laura Carvalho[ǂ]
Rodrigo Toneto[‡]

Abstract

08.09.2022 nº 010

In this study, we document, to the best of our knowledge, the first estimates of marginal propensity to consume (MPC) for Brazil. The MPC is considered the main variable used in macroeconomic models to capture the heterogeneity of families' spending behavior. Due to data limitations in the country, the MPCs were obtained by estimating the income elasticities of consumption for each income group from the Consumer Expenditure Survey (POF) 2017/18. On the one hand, the MPC found for the Bottom 50%, 0.609, and for the Middle 40%, 0.620, are relatively high and do not differ statistically. However, these values fall significantly for the top of the pyramid, 0.483 for the Next 9% and 0.035 for the Top 1%, with the latter not being statistically different from zero. Finally, fiscal multipliers that consider the heterogeneity of MPCs were estimated to assess the impact's direction of balanced-budget redistributive policies on the economy. In the three scenarios evaluated, with the redistribution of income from the richest to the Bottom 50%, the main result was an increase in the economy's aggregate product.

Keywords: Marginal propensity to consume (MPC), income inequality, consumption, fiscal multiplier.

JEL Codes: D12, D31, E21.

Palomo, Theo Ribas; Carvalho, Laura; Toneto, Rodrigo. Marginal Propensity to Consume Heterogeneity and Redistribuive Policies: The Brazilian Case. (Working Paper nº 010). Made/USP.

[*]Department of Economics, University of São Paulo - FEA/USP.
Email: theo.palomo@hotmail.com
[†]Department of Economics, University
of São Paulo - FEA/USP.
Email: lcarvalho@usp.br
[‡]Department of Economics, Queen Mary University of London.
Email: r.toneto@hss21.qmul.ac.uk

made.feausp@gmail.com

1 Introduction

With the economic crisis induced by the COVID-19 pandemic, fiscal policy gained centrality in the economic discussion. In response to this shock, several governments implemented monetary transfer policies to maintain the income of families and companies affected by the period of social distancing. As a consequence of the general increase in government spending, the public debate has raised the question about progressive tax reforms, which seek to allocate the crisis' costs to the richest.

However, consumption response to changes in household income, such as the monetary transfers and tax reforms mentioned above, can have different intensities depending on the groups affected and the nature of these shocks. This heterogeneity directly affects the effectiveness of fiscal policy, and for this reason, it proves to be crucial for the evaluation of different public policies' designs, especially in the post-pandemic recovery context.

In this sense, the main variable used to capture this heterogeneity in macroeconomic models is the marginal propensity to consume (MPC), which measures the variation in family consumption resulting from an income shock. As recently pointed out:

> "Marginal propensities to consume (MPCs) are the most important feature of household spending behavior for macroeconomics. They play an essential role in determining the effects of changes in aggregate demand, the strength of the fiscal multiplier, the transmission mechanism of monetary policy and the portfolio share of wealth held in risky assets." (Kaplan and Violante, 2022, p. 33).

Despite the importance of this variable and the numerous published articles that aim to estimate it in different contexts and countries (which are discussed later), as far as we know, there are still no estimates for the Brazilian case. Situated in the top 20 unequal countries in the world (Alvaredo and Gasparini 2015), one of Brazil's main characteristics is its extreme inequality. Thus, considering the heterogeneity of MPCs in Brazilian population is even more fundamental to insert the redistribution side in the analysis.

The present study is divided into six main sections, including this introduction. In the second section, a literature review on consumption and MPC is presented, focusing on theoretical formulations and recent empirical evidence. Data and methodology used in the study are discussed in the third part. In the fourth, the MPCs are estimated, capturing the heterogeneity of the response for each selected income stratum. Finally, in the fifth section, following the international literature, simple fiscal multipliers that capture the heterogeneity of MPCs are estimated, which allows to assess the direction of the impact of redistributive policies in the Brazilian context.

2 Literature Review

Concerning the economic literature on aggregate demand function and, particularly, aggregate consumption, the contribution of Keynes (1936) was fundamental for the understanding of this variable, as well as its determining factors. Keynes (1936) considers the explanatory variables of consumption: income – the main factor for consumption's fluctuations in the short run –; other objective circumstances that permeate the economy, such as the interest rate and the fiscal policy; and other subjective factors which, in turn, are linked to human psychological characteristics, customs, and social institutions at a given historical moment.

Thus, the functional relationship that connects aggregate consumption with its main explanatory variable, aggregate income, will be called propensity to consume by the author. From this definition, Keynes postulates his fundamental psychological law, which can be summarized as: "(...) men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in their income" (Keynes, 1936, p. 52). In other words, changes in consumption have the same sign as changes in income, but to a smaller extent, resulting in a positive and less than one first derivative of income with respect to consumption. The intuition behind this law is linked to the fact that, once the primary needs of individuals are satisfied by consumption, a greater share of income will be allocated to savings as their income rises.

After Keynes' pioneering contribution, the literature on consumption has greatly advanced in economics, with outstanding academics focusing on this topic. Among them, we can highlight the work of Modigliani and Brumberg, who sought to understand consumption behavior and savings throughout the life cycle (e.g. Modigliani and Brumberg 1954). For these authors, individuals seek to smooth their consumption throughout life, considering their average income along the cycle. Thus, in periods of higher temporary income, the individual's consumption is expected to be lower than income and, in this way, wealth increases via greater savings. On the other hand, with retirement and, consequently, lower temporary incomes, individuals would spend their assets accumulated so far, allowing a level of consumption greater than income, i.e., negative savings or dissavings.

With another theoretical apparatus, Michal Kalecki inserted an important qualification to this literature through the functional income distribution. Following the Marxian tradition, Kalecki postulates that one of the main distinctions between the working class and the capitalist class refers to their behavior in terms of consumption, particularly in terms of their propensities to consume. While the latter saves a substantial part of their income, and present a lower propensity to consume, the former can save little and, therefore, have a high propensity to consume.

In many of his works, this fact leads the author to consider that workers spend their entire wages on consumer goods and, therefore, do not save anything (e.g. Kalecki 1968). Therefore, Kalecki was one of the first to suggest a heterogeneous behavior of the propensities to consume, in distinction to the use of a representative agent with a constant propensity as done for a long time by most of the literature.

Following the hypothesis that different classes or groups may have different propensities to consume, implications also arose in the way of analyzing fiscal policy. Conrad (1955) states the Haavelmo (1945) type of prediction that in an economy with a balanced budget – that is, government expenditure equals the amount of taxes collected – the fiscal policy's impact on the income level is equal to the number of goods and services purchased by the government proves to be erroneous in some cases. According to the author, the income redistribution caused by the fiscal policy also affects the final income level, increasing or dampening the initial impact depending on the different propensities to consume of the affected groups and their respective participations in aggregate income.

Over the decades, the importance of evaluating the response of household consumption to income shocks, such as monetary transfers or changes in the tax structure, has given rise to great advances in the literature. Through these new findings, the classic models that tried to explain the behavior of consumption, such as the life cycle theory and the permanent income hypothesis, underwent modifications, and the importance of considering the heterogeneity of agents in the models became increasingly evident.

In this direction, McCarthy (1995) uses a panel database for the USA, containing information about household consumption, income, and wealth over time, and finds evidence that the marginal propensity to consume (MPC) differs between the groups with greater wealth for those with less, being greater in the last ones. The explanation given in the study for this observation is based on two factors: liquidity constraints, especially among the poorest strata, and precautionary savings behavior, guided by uncertainties and risks regarding the future. In particular, as the poorest households have less access to the credit market, they are also more unprotected against possible income shocks and, therefore, will be unable to act to smooth their consumption.

In turn, Dynan, Skinner, and Zeldes (2004) find that, for households whose head was between 30 and 49 years old, the richest save a significantly greater portion of their income than the poorest. Contrary to the implications based on the life cycle theory, the authors find no evidence of dissaving at the end of life among the elderly and in any other income groups. The authors' conclusion is summarized at the end as "(...) The rich do, indeed, save more" (Dynan, Skinner, and Zeldes, 2004, p. 438). This result can be explained in the light of the richest's behavior, especially from precautionary savings, in response to possible health expenditures at the end of life, and the construction of a legacy to their heirs, via the formation of inheritances; justifying the non-existence of

dissavings. Finally, the study also points to differences between the MPC of the different strata.

Jappelli and Pistaferri (2014) use a survey carried out in Italy which, in its questionnaire, asked households about how much they would consume if they received a transfer in the amount of their average monthly income. With the respondents' answers, it was possible to calculate the MPC value for each household and to determine the heterogeneity of this sample with greater precision. Among their findings, the authors found a strong negative correlation between MPC and cash-on-hand[1]; a relatively constant impact of age on MPC until the time of retirement; a positive relationship between the MPC for the unemployment variable and a negative one for the variable that captures whether the individual had his credit rejected[2]. Finally, they found no evidence that greater financial knowledge would affect the value of the household's propensity to consume.

Furthermore, Johnson, Parker, and Souleles (2006) investigate the US income tax rebates of 2001. The authors found that households spent between 20% and 40% of this additional income on non-durable goods during the first three months of receipts. Notably, an even greater response was found in consumption spending in households with lower-wealth or lower-income households. Fisher et al. (2020) finds similar results, where the MPC of households with the same income but different levels of wealth is higher for those with lower wealth levels. Thus, they conclude that the growing wealth inequality observed in most countries negatively affects aggregate consumption, which may constrain economic growth.

A common point in most of these studies is the use of liquidity constraints to explain why the propensity to consume of the poorest households is lower than that of the richest. Filer and Fisher (2007) checked this hypothesis further by analyzing a database that contained information on whether the household declared bankruptcy in the last ten years. As this statement directly influences an individual's credit score, it also affects their access to credit. The results found by the study confirmed that those households that went bankrupt encountered greater credit restrictions later and, in turn, their consumption became more sensitive to variations in income, reinforcing the hypothesis raised by the literature.

Another explanatory factor for lower MPC among the poorest groups is the lower access to an institutional apparatus that allows for the abstention of a greater share of present consumption and relatively higher savings rates. Aportela (1999) finds that the growth in financial access achieved in Mexico, via the exogenous expansion of the savings institute

1. This variable was defined as the sum of household disposable income and financial wealth, less consumer debt (Jappelli and Pistaferri 2014)

2. As this variable is correlated with greater probabilities of liquidity restrictions in the future, this result is consistent with precautionary savings and the fear of these possible future restrictions (Jappelli and Pistaferri 2014)

to some cities in the country, raised the average savings rate of households between 3p.p. and 5p.p. This result was caused exclusively by the increase in this rate between 5.7p.p. and 8p.p. for the poorest, having no significant effect on other households, following the observation that the latter already had this institutional access.

Finally, Jappelli and Pistaferri (2010) emphasize the importance of distinguishing shocks that affect income between positive and negative, expected and unexpected, as well as transitory and permanent. The authors gather vast literature on MPC estimations and show possible conclusions from these findings. Among them, contrary to what is predicted by traditional consumption smoothing models, this variable seems to react to anticipated shocks that increase income. A possible explanation for this theoretical flaw, as suggested above, is liquidity constraints. In this sense, as anticipated shocks that negatively affect income, such as retirement, do not significantly affect consumption, the last hypothesis seems to be reinforced since these restrictions do not have much influence in this case.

Furthermore, the authors also find evidence that the reaction of consumption to permanent income shocks is significantly greater than transitory ones. Moreover, for the US, some studies show that consumption is not fully revised after permanent income shocks. Such results align with the hypothesis that precautionary savings and insurances – e.g., government welfare programs and self-insurance - affect consumption (Jappelli and Pistaferri 2010).

3 Data and Methods

3.1 Data

As this study aims to capture the heterogeneity of the propensities to consume in the different families, we chose to use household microdata instead of aggregated data, in line with the most recent literature. In Brazil, the survey responsible for providing information regarding consumption and other family budget variables is the Consumer Expenditure Survey (POF)[3]. The present study used the most recent survey, the POF 2017/18.

The POF's main scope is to provide information about the composition of the domestic budget of Brazilian families and, thus, to draw a profile of their living conditions. For that, information is collected from a sample of households over 12 months, capturing expenses and income and classifying them according to the frequency of their realization: weekly, monthly, quarterly, or annually. As for the sampling of surveys, since the 2002/03 edition, the POF covers the entire national territory. In this sense, the sample design allows inferences about Brazil and Major Regions (North, Northeast, Southeast, South,

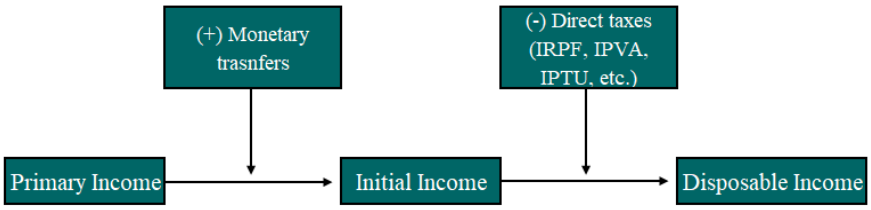
3. *Pesquisa de Orçamentos Familiares* (POF), in portuguese.

and Midwest) in rural and urban locations.

For the MPC estimates, the study uses the household disposable income per capita as the explanatory variable related to income. Figure 1 explains the income stages and the necessary adjustments to arrive at this variable. In the first place, there is the so-called primary income, constituted mostly by the monetary income obtained in the labor market and the equity variation. This last item, in turn, comprises property sales, inheritances, and the balance of financial transactions. Then, by adding government monetary transfers and mixed aid to primary income, we arrive at the initial income, also called total monetary income. Finally, with the incidence of direct taxes on the initial income, the stage of disposable income is reached.

The calculation of direct taxes and monetary transfers for the POF 2017/18 was carried out according to the methodology described in Silveira et al. (2020). As a result, direct taxes were separated into seven large groups: Social Security Contributions (INSS), Personal Income Tax (IRPF), Vehicle Tax (IPVA), Real State Tax (IPTU), other labor income deductions, other non-labor income deductions, and other direct taxes.

Figure 1: Income Stages



Source: own elaboration based on Silveira et al. (2020)

On the other hand, monetary transfers were grouped into eight categories: private sector's public pensions (RGPS), public sector's public pensions (RPPS), public aid, mixed aid, *Benefício de Prestação Continuada* (BPC) – aimed at the elderly and the disabled with low income – *Bolsa Família* and other cash transfer programs, scholarships and unemployment insurance. Except for mixed aid, which can be both public and private, the others constitute public transfers.

3.2 Methods

As Jappelli and Pistaferri (2014) point out, MPC estimations involve identifying the type of change in consumers' income, whether it was a predicted or unexpected shock, whether transitory or permanent, as well as the direction of this change. The authors summarize the most common strategies for identifying unexpected and exogenous shocks used by researchers in three categories: quasi-experimental approaches, where income variations arise from exogenous and unexpected shocks; the utilization of long panel

data to capture the behavior of income and consumption using statistical and theoretical tools; and, finally, the use of surveys that question households regarding their response in consumption to variations in income.

As for the Brazilian case, there are no surveys with data in panels that assess household consumption. As the interval between the most recent POF and its penultimate edition is almost a decade, the estimation strategy used an equation similar to that of Baker (2018) and Fisher et al. (2020)[4]. Following the literature mentioned above, the model sought to capture the effects of liquidity restrictions through a variable that captures the availability of credit to the family, as well as controlling for the level of wealth. Assuming homogeneity of preferences within each income stratum, the elasticity of consumption can be estimated from the model:

$$\ln c_i = \alpha + \beta ln(y_i) + \gamma w_i + \delta k_i + \theta g_i + \lambda g_i ln(y_i) + \xi z_i + \epsilon \tag{1}$$

where c is the household monetary consumption per capita; y household disposable monetary income per capita; w is a proxy for family wealth, and can be either the rent value imputed for families who own their own home - Estimated rent - or a dummie about whether or not the property is owned - Home ownership -; k is a proxy for credit availability, in this case a dummy for the existence of at least one credit card in the family; g is a vector of dummies for each income group, that is, Bottom 50%, Middle 40%, Next 9%, and Top 1%; and z is a vector of control variables for family characteristics – number of children (under 14 years old), states (UF) and a dummie for the household location, whether rural or urban – and for characteristics of the head of the household – years of education, dummies variables for ages (groups made every ten years), sex, race/color and if they had any income from work in the last 12 months -; finally, ϵ is the robust standard error.

The interaction term between the dummies of income groups and disposable income was included to capture the heterogeneity of elasticities between families of each income stratum to analyze whether and how this behavior varies along the distribution, assuming homogeneity within the groups. On the other hand, the choice of disposable income as the explanatory variable is linked to the fact that this stage represents the truly available income to the individual when deciding to allocate between consumption and savings.

With this, MPCs can be calculated as Fisher et al. (2020) from the following equation:

$$\varepsilon_i = \frac{MPC_i}{APC_i} \tag{2}$$

4. However, while these studies estimate a Euler equation, it was not possible to capture this temporal difference due to limited data for Brazil.

4 MPC heterogeneity: the Brazilian case

Table A1 in the Appendix presents the descriptive statistics of the main variables used in the econometric model specified above, divided by income groups. On the one hand, when comparing the consumption variables – monetary consumption per capita and monetary consumption minus rent expenses per capita – with disposable income per capita, it is possible to infer that the proportion of consumption expenditures over disposable income falls when income grows. For the Bottom 50% this proportion is 73.45% for consumption and 70.53% for consumption deducted from rent, while for the Top 1% these values are, respectively, 38.83% and 38.07%.

As for the credit card variable, which indicates whether the family has at least one card, its value grows significantly for the upper-income groups. In other words, the proportion of rich families with a credit card is much higher in comparison to the poorest – by 62.5 percentage points (p.p.) when comparing the lowest and highest strata – characterizing the credit restrictions faced most by the poor, as described by the consumption literature.

On the other hand, for the proxy variables for wealth, while Home ownership remains relatively constant across income strata, the Estimated rent increases significantly, by 1325% between the Bottom 50% and the Top 1%. As the imputed rent increases as higher the property value, this variable indicates that the richest families also have a higher level of wealth, here considering real state assets as a proxy for total wealth.

Further in the analysis, Table 1 shows the results of the regressions using monetary consumption per capita as the dependent variable. In regression (1), the income elasticity of consumption is 0.180 for this economy. However, the introduction of variables that consider the heterogeneity of agents, credit restrictions, possession of wealth, and other controls significantly modify these results, as observed in (2) and (3). Thus, in possession of the elasticities and APCs, calculated according to Table 1, it is possible to estimate the MPC of each group.

Firstly, it is observed that the estimated MPC for the Bottom 50% is 0.640, in the case of regression (2), and 0.638, for regression (3). Both values are significant and considerably higher than the previously observed. This is largely because the poorest families can barely meet their consumption needs from their income, needing to consume most of a possible additional income shock. On the other hand, the credit restrictions faced by this part of the population also contribute to this behavior, making it impossible for them to smooth consumption over time.

For the Middle 40%, the MPC values are, respectively, 0.630 and 0.634. Their elasticity of consumption is obtained using Table 2 by adding the coefficient of the income variable, which indicates the elasticity for the poorest stratum, with the interaction between this

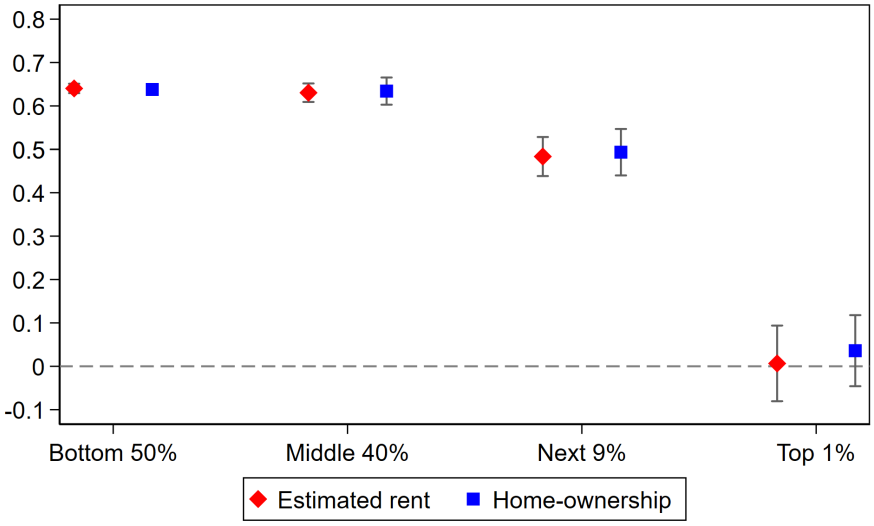
Table 1: Elasticities of household monetary consumption per capita

Dep. Var.: Ln total cons. pc		(1)	(2)	(3)
Constant		0.180***	0.041	0.124***
		(0.025)	(0.056)	(0.057)
Ln disposable income pc		0.909***	0.872***	0.869***
		(0.004)	(0.008)	(0.008)
Credit Card			0.061***	0.065***
			(0.007)	(0.007)
Home-ownership			Omitted	-0.058***
				(0.007)
Estimated rent			0.0001***	Omitted
			(0.0000)	
Bottom 50%			Omitted	Omitted
Middle 40%			-0.337***	-0.396***
			(0.112)	(0.111)
Next 9%			0.786***	0.645***
			(0.305)	(0.300)
Top 1%			7.902***	7.202***
			(1.033)	(0.966)
Ln disposable income pc	x Bottom 50%		Omitted	Omitted
Ln disposable income pc	x Middle 40%		0.044***	0.053***
			(0.016)	(0.016)
Ln disposable income pc	x Next 9%		0.100***	-0.081***
			(0.037)	(0.036)
Ln disposable income pc	x Top 1%		-0.855***	-0.776***
			(0.107)	(0.100)
Controls		No	Yes	Yes
Observations		58,008	58,008	58,008
R-squared		0.756	0.772	0.773

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: own elaboration based on POF 2017/18 microdata – IBGE

variable and the dummy Middle 40%. To simplify the visualization, Graph 2 shows the MPC of each group, obtained from the multiplication of the elasticities by the APCs, and their confidence intervals. As indicated, the propensities of the Middle 40% are not statistically different from the values obtained for the Bottom 50%, showing a very similar behavioral pattern between these groups.

Figure 2: MPC based on household monetary consumption per capita



Source: own elaboration based on POF 2017/18 microdata – IBGE

One of the reasons for the similarity between the first two groups is the extremely high concentration of income in Brazil, in which there is a relative level of homogeneity within the bottom 90% and greater differentiation within the top 10%. Thus, in the next 9%, the MPCs are already significantly smaller than the Bottom 50%, with a value of 0.483 for the first regression and 0.493 for the second.

Finally, for the Top 1%, the MPC drop is significant, with values of 0.007 and 0.036, respectively. Furthermore, it is not possible to state that these values are statistically different from zero. Despite such a large drop, this result is not surprising. As pointed out, the top of the Brazilian pyramid has income patterns very similar to those of rich countries and, as this part of the population has already met most of their consumption needs, it is expected that they will save almost all of a possible positive income shock. Additionally, as pointed out by the evidence presented in the literature, the richest also make precautionary savings to create a cushion against possible health expenses related to aging and medical emergencies, as well as save to build an inheritance for their descendants, justifying very low propensity values.

With these estimates, it is possible to compute the average MPC for the Brazilian case. The values of both regression (2) and (3) are very similar, 0.616 and 0.617, respectively.

Drescher, Fessler, and Lindner (2020) find average MPCs for European countries ranging from 0.329 for the Netherlands to 0.573 for Lithuania. In their sample of 17 European countries, the authors find an average MPC of 0.469. Thus, the values found for Brazil are far from the European average but close to those observed for countries with higher propensities, such as Lithuania (0.573), Greece (0.568), and Croatia (0.557).

Regarding the other control variables, it is possible to observe that possessing a credit card is related to higher consumption levels. This behavior can suggest that access to credit represents an expansion of the households' budget constraint, enabling higher spending levels. On the other hand, the coefficients of the wealth proxy variables indicate a dubious effect. While the Home Ownership coefficient is negative and significant, indicating that, ceteris paribus, families with greater wealth have lower average consumption levels, the Estimated rent coefficient points to the opposite.

However, from economic theory and anecdotal evidence, it was expected that, ceteris paribus, families with higher levels of wealth would be able to consume more than those less wealthy. One of the possible explanatory hypotheses for the result obtained is that the IBGE classifies rental expenses within POF consumption. Therefore, this negative effect could be explained by the fact that families who own their homes do not have consumption expenses with rent.

To assess this hypothesis, Table 2 uses the same previous regressions but uses the consumption deducted from rent expenses as the explained variable. The new estimates found reinforce the hypothesis outlined earlier: both coefficients of the wealth proxy variables are now positive and significant. On the other hand, the other variables continue with signs and significance close to the previous specification.

The behavior of MPCs also remains very close to the previous, with a small drop in the propensities for most groups, as indicated in Graph 3. In summary, for the Bottom 50% these values become 0.610 in regression (2) and 0.609 in regression (3), a reduction compared to the previous values of 4.78% and 4.47%, respectively. Of the same nature, for the Middle 40% this drop for regressions (2) and (3) was 3.17% and 2.25% and, in the Next 9%, 5.13% and 2.01%. However, in contrast to the other groups, in the Top 1% the propensity for regression with Estimated rent becomes negative and, for Home-ownership, drops to 3.28%, with both remaining statistically not different from zero.

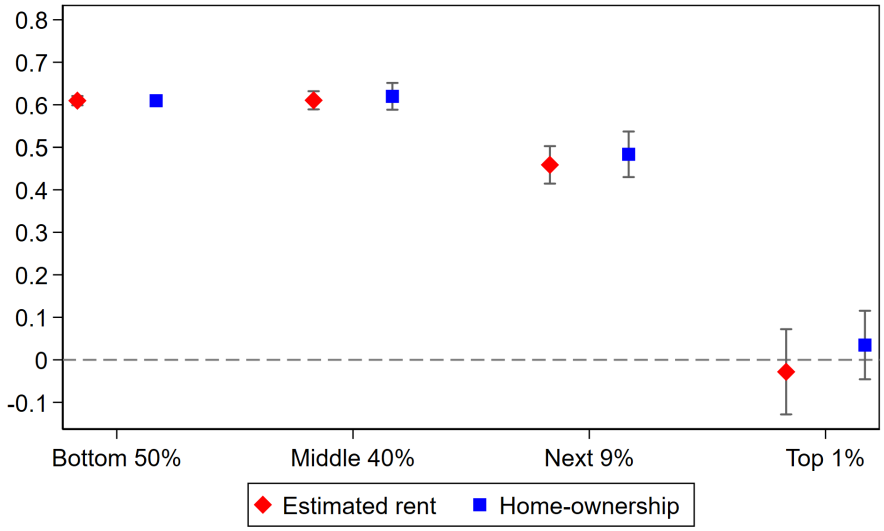
Consequently, the new estimated average MPC values also dropped, albeit by a small amount, i.e., 0.590 from regression (2) and 0.597 through (3). In the international comparison, these new values are even closer to the European countries with higher propensities estimated by Drescher, Fessler and Lindner (2020), as specified above.

Table 2: Elasticities of household monetary consumption per capita without rent expenses

Dep. Var.: Ln total cons. pc. rent	(1)	(2)	(3)
Constant	0.125***	0.056	0.033
	(0.026)	(0.059)	(0.059)
Ln disposable income pc	0.911***	0.865***	0.864***
	(0.004)	(0.008)	(0.008)
Credit Card		0.080***	0.078***
		(0.007)	(0.007)
Home-ownership		Omitted	0.058***
			(0.007)
Estimated rent		0.0001***	Omitted
		(0.0000)	
Bottom 50%		Omitted	Omitted
Middle 40%		-0.404*	-0.502***
		(0.116)	(0.116)
Next 9%		0.896***	0.587*
		(0.307)	(0.308)
Top 1%		8.695***	7.215***
		(1.221)	(0.967)
Ln disposable income pc x Bottom 50%		Omitted	Omitted
Ln disposable income pc x Middle 40%		0.054***	0.069***
		(0.016)	(0.016)
Ln disposable income pc x Next 9%		-0.112***	-0.071*
		(0.037)	(0.037)
Ln disposable income pc x Top 1%		-0.939***	-0.773***
		(0.127)	(0.100)
Controls	No	Yes	Yes
Observations	58,008	58,008	58,008
R-squared	0.750	0.766	0.765

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: own elaboration based on POF 2017/18 microdata – IBGE

Figure 3: MPC from household monetary consumption per capita without rent expenses



Source: own elaboration based on POF 2017/18 microdata – IBGE

5 Fiscal Multipliers and Redistributive Policies

In this section, estimates of the multiplier effect for the Brazilian economy were calculated considering the heterogeneity of marginal propensities to consume, and based on that, redistributive policies were simulated. Initially, the multiplier effects for income transfers proportional to the strata were obtained in the models of Fisher et al. (2020). The results are shown in Table 3. As explained by the authors, this exercise is not intended to estimate the values of the multipliers accurately but rather to show the effects that the insertion of MPC heterogeneity can have on the analysis.

The following table presents the correspondent multiplier estimation using the second model from the previous section, the one where the dependent variable is monetary consumption without rent expenses. As both specifications (2) and (3) do not have statistically different MPC values, (3) was chosen for this analysis because the MPC of the Top 1% is positive in this specification. Thus, the estimated multiplier effects are, as in Fisher et al. (2020), the so-called textbook multipliers, equal to 1/(1-mpc).

According to Table 4, the multiplier of a proportional income transfer to the groups that consider the heterogeneity of MPCs is 2.48. On the other hand, the traditional multiplier, which assumes a constant MPC along the distribution, is lower by 11.62%, with a value of 2.19. In other words, this simple exercise shows that by not taking into account the heterogeneity of agents in the model, there is a risk of underestimating the final effect of fiscal policy on the economy.

Table 3: Fiscal multipliers

Income groups	**Income elasticity (Table 3, column 3)**	**Average Propensity to Consume**	**Marginal Propensity to Consume = (1) * (2)**	**Multiplier**
	(1)	(2)	(3)	(4)
Bottom 50%	0.864	0.705	0.609	-
Middle 40%	0.933	0.664	0.620	-
Next 9%	0.793	0.610	0.483	-
Top 1%	0.091	0.381	0.035	-
Average[a]	0.878	0.620	0.544	2.191
Using different MPCs			0.597	2.479

Notes: [a]The Average APC is equal to the average total consumption without rents divided by the average disposable income in the population
Source: own elaboration based on Fisher et al. (2020) and POF 2017/18 microdata – IBGE

In order to assess the impact of redistributive policies, we develop a method capable of apprehending variations in the appropriation of income by the strata. Once again, it is important to emphasize that the findings here are intended to capture the direction of the impact of redistributive policies, as done in Jappelli and Pistaferri (2014) and Fisher et al. (2020), and not its exact value. With this in mind, household consumption was defined as specified below:

$$C = \sum_{i=1}^{n} c_i^0 + \sum_{i=1}^{n} \varphi_i (Y_i + B_i - T_i) \tag{3}$$

where c^0 is a constant that represents the autonomous consumption, φ is the marginal propensity to consume, B the monetary transfers and T the direct taxes; for each income group i. Furthermore, it is possible to substitute $\sum_{i=1}^{n} \varphi_i Y_i$ for $\sum_{i=1}^{n} \varphi_i \delta_i Y$, where δ_i is the share of agreggate income appropriated by each stratum. Therefore, a symplified version of the multiplier effect is obtained, considering the other componenets of aggregate demand as exogenous, given by the following equation:[5]

$$mult = \left[\frac{1}{1 - \sum_{i=1}^{n} \varphi_i \delta_i} \right] \tag{4}$$

Initially, the appropriations of disposable income by the strata estimated from the POF 2017/18 are: an appropriation of 16.31% of disposable income by the Bottom 50%, of 41.38% by the Middle 40%, 29.88% by the Next 9%, and finally, 12.45% for the Top 1%. With these values combined with MPC estimates, it is possible to obtain an initial multiplier of 2.02 for the Brazilian economy.

Thus, based on these estimates and on the relation established by equation (4), it is possible to evaluate the effects of balanced-budget redistributive policies on the Brazilian economy. In this section, three different scenarios will be evaluated: i) the transfer of R$1 billion from the Top 1% to the Bottom 50%; ii) the transfer of R$10 billion from the Top 1% to the Bottom 50%; iii) the transfer of R$10 billion to the Bottom 50%, with R$9 billion from the Next 9% and R$1 billion from the Top 1%.

In the first scenario, the multiplier effect for the policy in question is 2.03, a value very close to the one initially estimated - since the appropriations of income by the strata changed little, and the final effect of this policy on the economy is R$1.16 billion. In other words, a fiscal neutral transfer from the richest to the poorest by R$1 billion increases the economy's output by R$1.16 billion. This result can be explained by the high Bottom 50%'s MPC, implying the consumption of almost all the income shock, and, at the same

5. Thus, the aggregate demand equation for this economy is given by $Y = \left[\frac{1}{1-\sum_{i=1}^{n} \varphi_i \delta_i}\right] [\sum_{i=1}^{n} c_i^0 + \sum_{i=1}^{n} \varphi_i (B_i - T_i) + A]$, where A correspond to the autonomous components of aggregate demand.

time, an elasticity of consumption very close to zero for the Top 1%, so their consumption variation in response of this shock is negligible.

Regarding the second scenario, the appropriations of income by the groups change with greater intensity: a reduction of 3.47p.p. for the Top 1% combined with an increment of the same proportion for the Bottom 50%. It is for this reason that the estimated multiplier effect is also higher, with a value of 2.10. In view of this, the final effect of the transfer of R$10 billion from the richest to the poorest is an increase in aggregate income of R$12.07 billion.

Finally, the last scenario differs from the others because it also transfers income from the Next 9% group. As this stratum has a significantly higher MPC than the richest 1%, the effects on the economy output will be reduced. Firstly, the appropriation of income by the Bottom 50% continues to increase by 3.47p.p. However, this value for the Top 1% falls by 0.63% and, for the Next 9%, by 2.84%. The multiplier found is also smaller compared to scenario ii), with a value of 2.05. Thus, the final effect of this new transfer of R$10 billion to the poorest is R$3.50 billion, a 71% smaller effect than the previous case, where only the Top 1% were taxed.

6 Conclusion

The present study constitutes, to the best of our knowledge, the first effort to estimate the marginal propensities to consume (MPCs) for the Brazilian case. The economic literature considers the MPC as the main variable to capture the heterogeneity of families' expending behavior in macroeconomic models, making it possible to identify with a greater degree of sophistication the impact of fiscal policies on the output of the economy, which can vary depending on the groups affected. In the Brazilian context, characterized by high levels of income inequality, capturing this heterogeneity in the analysis is even more important.

We estimate an MPC value of 0.609 for the Bottom 50% based on the results of the last model. As the families in this group are in a situation of great economic vulnerability and face credit restrictions – making it impossible to smooth out intertemporal consumption – it is expected that, in the face of an additional income shock, they will react by consuming the largest share of it. On the other hand, for the Middle 40%, despite the MPC value estimated at 0.620, it does not differ statistically from the previous group. Thus, the Bottom 90% is relatively similar, largely resulting from the country's extreme inequality levels.

However, these estimates drop significantly towards the top of the pyramid. In the Next 9%, the estimated MPC is 0.483 and, in the Top 1%, 0.035. Furthermore, it is not possible to say that this last value found is statistically different from zero. In other words, for

the richest, an income shock would have a much smaller effect on consumption, or even zero, if the latter group is considered.

These results can be understood in the light of the literature presented above. On the one hand, the richest families have already met most of their consumption needs, and it is expected that most of the positive variation in income will be converted into savings. On the other, some economic behaviors are observed in these groups, such as precautionary savings aimed at protecting against eventual unexpected expenses at the end of life, as well as the formation of inheritances for their descendants. Therefore, justifying low MPC values are observed here.

With these estimates, it is possible to calculate the average MPC for Brazil: with a value of 0.597. In terms of international comparison, this estimation is close to some European countries, such as Lithuania (0.573), Greece (0.568), and Croatia (0.557), as estimated by Drescher, Fessler, and Lindner (2020).

In the last section, fiscal multipliers were estimated, as in Fisher et al. (2020), to assess the effect that the insertion of MPC's heterogeneity has on the analysis. Initially, the traditional multiplier effect, which assumes a constant MPC in the different groups, has a lower estimated value of 11.62% compared to the one considering different MPC values. This simple exercise shows that by not taking into account the heterogeneity of families' expending behavior in the Brazilian case, there is a risk of underestimating the final effect of fiscal policy on the economy.

Finally, to assess the impact of balanced-budget redistributive policies on the Brazilian economy, we implement a new method capable of capturing both the different MPC and the variations in the appropriation of aggregate income by each group. Thus, the economic impacts of three different scenarios were estimated: i) the transfer of R$1 billion from the Top 1% to the Bottom 50%; ii) the transfer of R$10 billion from the Top 1% to the Bottom 50%; iii) the transfer of R$10 billion to the Bottom 50%, with R$9 billion from the Next 9% and R$1 billion from the Top 1%.

In all these scenarios, significant effects on the economy were observed from these fiscal-neutral redistributive policies. In other words, the redistribution of income from the richest to the poorest families increased the economy's output. Finally, it is important to emphasize again that, as in the work of Jappelli and Pistaferri (2014) and Fisher et al. (2020), these findings do not seek to estimate the final impact of these redistributive policies accurately but rather to grasp their direction.

References

Alvaredo, Facundo, and Leonardo Gasparini. 2015. "Recent trends in inequality and poverty in developing countries." *Handbook of income distribution,* 697–805.

Aportela, Fernando. 1999. *Effects of financial access on savings by low-income people.*

Baker, Scott R. 2018. "Debt and the response to household income shocks: Validation and application of linked financial account data." *Journal of Political Economy* 126 (4): 1504–1557.

Conrad, Alfred H. 1955. "The multiplier effects of redistributive public budgets." *The Review of Economics and Statistics,* 160–173.

Drescher, Katharina, Pirmin Fessler, and Peter Lindner. 2020. "Helicopter money in Europe: New evidence on the marginal propensity to consume across European households." *Economics Letters* 195:109416.

Dynan, Karen E, Jonathan Skinner, and Stephen P Zeldes. 2004. "Do the rich save more?" *Journal of political economy* 112 (2): 397–444.

Filer, Larry, and Jonathan D Fisher. 2007. "Do liquidity constraints generate excess sensitivity in consumption? New evidence from a sample of post-bankruptcy households." *Journal of Macroeconomics* 29 (4): 790–805.

Fisher, Jonathan D, David S Johnson, Timothy M Smeeding, and Jeffrey P Thompson. 2020. "Estimating the marginal propensity to consume using the distributions of income, consumption, and wealth." *Journal of Macroeconomics* 65:103218.

Haavelmo, Trygve. 1945. "Multiplier effects of a balanced budget." *Econometrica: Journal of the Econometric Society,* 311–318.

Jappelli, Tullio, and Luigi Pistaferri. 2010. *The consumption response to income changes.* Technical report. National Bureau of Economic Research.

———. 2014. "Fiscal policy and MPC heterogeneity." *American Economic Journal: Macroeconomics* 6 (4): 107–36.

Johnson, David S, Jonathan A Parker, and Nicholas S Souleles. 2006. "Household expenditure and the income tax rebates of 2001." *American Economic Review* 96 (5): 1589–1610.

Kalecki, Michal. 1968. "The Marxian equations of reproduction and modern economics." *Social Science Information* 7 (6): 73–79.

Kaplan, Greg, and Giovanni L Violante. 2022. "The Marginal Propensity to Consume in Heterogeneous Agent Models." *National Bureau of Economic Research.*

Keynes, J. M. 1936. "The General Theory of Employment, Interest and Money." *London: Palgrave Macmillan.*

McCarthy, Jonathan. 1995. "Imperfect insurance and differing propensities to consume across households." *Journal of Monetary Economics* 36 (2): 301–327.

Modigliani, Franco, and Richard Brumberg. 1954. "Utility analysis and the consumption function: An interpretation of cross-section data." *Franco Modigliani* 1 (1): 388–436.

Silveira, Fernando Gaiger, Luana Passos, Eduardo Gil da Silva, and Theo Ribas Palomo. 2020. "Impactos redistributivos das transferências públicas monetárias e da tributação direta: evidências com a POF 2017-2018." *NT 89, Instituto de Pesquisa Econômica Aplicada (Ipea).*

Appendix A

Table A1: Descriptive statistics

Groups	**Monetary Disposable Income pc**	**Monetary Consumption pc**	**Monetary Consumption pc w/o Rent**	**Credit Card**	**Home-ownership**	**Estimated Rent**	**Observations**
Bottom 50%	499.275 (227.634)	366.725 (213.986)	352.123 (208.329)	0.300 (0.458)	0.664 (0.472)	78.801 (106.823)	27,208
Middle 40%	1583.492 (553.673)	1089.829 (593.980)	1052.073 (584.291)	0.564 (0.496)	0.656 (0.475)	182.912 (235.191)	25,026
Next 9%	5079.821 (1879.673)	3182.214 (1799.239)	3097.934 (1769.232)	0.836 (0.371)	0.662 (0.473)	447.020 (574.238)	5,245
Top 1%	19098.160 (16476.000)	7415.562 (4678.098)	7270.180 (4557.375)	0.925 (0.264)	0.664 (0.473)	1122.975 (1457.533)	560

Source: own elaboration based on POF 2017/18 microdata – IBGE