Assessing the Permanent Income Hypothesis in Poor Areas:

The Case of Rural Pensions in Brazil

Bruno Kawaoka Komatsu
ORCID: 0000-0002-7731-3422
Insper, São Paulo, Brazil

Lucas Dias
University of São Paulo, São Paulo, Brazil.

Naercio Menezes-Filho
ORCID: 0000-0003-1241-6188
University of São Paulo, São Paulo, Brazil.
Insper, São Paulo, Brazil.
Corresponding author. E-mail: naercioamf@insper.edu.br

Abstract

In Brazil, poor women in family agriculture are entitled to a monthly unconditional pension from the government when they turn 55, a large predictable income increase for rural families. In this paper, we use a national family expenditure survey and a fuzzy regression discontinuity design strategy to estimate the impacts of that pension on consumption, finance and labor market indicators. We show that the pension increases income by 50%, but does not change the consumption of non-durables or food insecurity. Loans repayments rise upon receipt of the pension, which implies that access to credit allowed consumption smoothing. We also find heterogeneity of responses by socioeconomic status, with women with lower education levels driving the result, while those with higher education levels increased their non-durable spending. These findings lend support to the standard life-cycle consumption model, even in very poor environments.

Key-words: consumption excess sensitivity, RDD, pension eligibility, consumption smoothing

JEL codes: D91 (Intertemporal Consumer Choice; Life Cycle Models and Saving), E21 (Consumption; Saving; Wealth)

1. Introduction

The canonical life-cycle model predicts that life-time utility-maximizing agents anticipate predictable future income variations and smooth each period's marginal utility of consumption (Modigliani & Brumberg, 1954). Contrary to this theoretical prediction, previous research has found that consumption expenses display excess sensitivity in various contexts in developed countries. Studies have investigated excess sensitivity after retirement, stimulus packages, tax cuts, tax refunds and in the day of social security payments.[1] Another branch of the literature has examined the impact of old-age pensions on health indicators. Miglino et al (2023) finds that a pension program in Chile decreases deaths among the recipients by increasing food consumption, Salm (2011) finds that changes in pension laws of army veterans decreased their mortality and Duflo (2000) finds that extensions of a pension program in South Africa improved health and nutrition among children of affected families.

In this paper, we aim at reconciling these two branches of the literature. Our insight is that if the income stream brought about by a pension program is anticipated, it should not impact consumption indicators and, therefore, health and nutrition of the recipients and their families, according to the standard life-cycle model. We explore the rules of the Brazilian federal pension system for women in rural areas, which entitles them to a large unconditional permanent transfer when they turn 55, to examine whether there is a corresponding increase in expenditures on non-durables and a reduction of food insecurity among the households that start receiving the pension. We use detailed expenditure data from a nationally representative Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares*, ***POF*** hereafter) and exploit a strict eligibility criterion to estimate the causal effects of women's pensions on household consumption, food-security, financial and labor market indicators, using a Fuzzy Regression Discontinuity Design.

The rural pension system in Brazil presents a unique opportunity to investigate excess sensitivity for several reasons: pensioners are among the poorest groups in the country, likely facing challenges in

[1] See, among others, Li et al. (2015), Parker (2017), Gelman et al (2014), Gerard & Naritomi (2021), Souleles (2002), and Kueng (2018). See Havnarak & Sokolova (2020) for a survey and meta-analysis. Aguiar et al (forthcoming), Agarwal (2014), Colariete et al (2024) and Golosov et al (2024) examine the effects of unanticipated income gains.

consumption smoothing due to low savings; pensioners can continue their labor market activities after the transfer; the average pension value is high compared to family income; and the pension has a specific age eligibility criterion, enabling a clear identification of its impacts. Moreover, we use very detailed data on all categories of consumption, finance and labor market indicators, including loans repayment, which allows us to test whether households were liquidity constrained.

We do not find any evidence of increases in non-durable consumption after the receipt of the rural pension, despite large positive impacts on the household's *per capita* income and total *per capita* expenditures, and this result is robust across a variety of specifications. The absence of any impact is consistent with life-cycle models of consumption, reinforcing some of the previous research results, but it is inconsistent with the studies that have uncovered impacts of old-age pensions on food consumption and mortality.

We also find evidence that the families use the rural pension to pay back the loans they were granted before receiving the pension, which explains the null effects on non-durable consumption and food insecurity, showing that most households are not liquidity constrained even in this poor setting. Moreover, we show that the pension transfer leads self-employed women to switch to unpaid work, which typically involves tasks on one's own property for personal consumption. This shift occurs despite no change in food-related expenses (which include home production), suggesting that pensioners substitute some of the purchased food with home production, thus altering the composition of their actual food purchases.

However, we find heterogeneous results when we disaggregate the sample by education groups. When we examine the low-education group, who would be more likely to be resource constrained, we find no impact of rural pension on non-durable consumption. But among the high-education group, we find positive impacts on non-durable consumption and on its components. These results are consistent with recent research on excess sensitivity by socioeconomic groups. Kueng (2018) finds that a predictable annual lump-sum cash transfer from the Alaskan Permanent Fund, a sovereign wealth fund, increased the marginal propensity to consume of Alaska residents and that the larger response occurred among the high-income families. As the Brazilian rural pension, the lump-sum transfers in Alaska did not depend on income, so for low-income families it represented a larger share of their income. Because of that, it was costlier for them to deviate from consumption-smoothing than for high-income families.

Finally, we find that increase in expenses in durable goods and durable goods-related expenses, together with loans, explain all of the impact of rural pension on total expenses. Those effects on durable goods are not inconsistent with marginal utility smoothing, as consumers gain utility from the flux of services provided by durable goods, not by purchasing them. In this sense, consumers might still be smoothing marginal utility from those services and they adjust the timing of purchasing to coincide with the timing of rural pension. On the other hand, rural families might be credit constrained, as they leave the purchase of such lumpy and expensive items to be made just when they experience a permanent increase in their income with the rural pension, that they might use as collateral to larger loans.

The remainder of the paper is organized as follows: Section 2 describes the institutional context and the Brazilian pensions for the rural areas. Sections 3 and 4 describes the methodology and the identifying assumptions and the data. Section 5 presents the main results and Section 6 concludes with the final comments.

2. Institutional Context

The current rural pension scheme in Brazil was established in the late 1980s and early 1990s, expanding the coverage of the Brazilian social security benefits to informal rural workers who work in subsistence farming. The 1988 Federal Constitution established that rural workers were entitled to the same pension system of the urban workers and that the minimum value of the pension should be the current the federal minimum wage. It also reduced the minimum-age for rural workers start receiving pension to 55 years for women and 60 for men. Moreover, rural pension was transformed from a family-level to an individual-level benefit, which greatly expanded the number of beneficiaries (Rangel et al., 2009).

There are two main categories of rural pensions. The first one stipulates that rural workers can receive a pension at the minimum age of 55 for women and 60 for men, provided they have contributed to the Brazilian federal pension institute (INSS) for at least 15 years. The value of pension payments depends on the value of the contributions during the working period, but has a minimum value of one minimum wage. The second category is the special rural pension, which does not require contributions to the system during the working period. However, individuals need to prove they have worked for at least 180 months in family-based rural activity, they must live in small rural properties, and they also need to fulfill the minimum age requirements of 55 for women and 60 for men. In this case, the value

of the pension is equivalent to one minimum wage. Ninety percent of the rural pensions were based on the age criterion that does not require contributions to the system in 2018 and 99% of the recipients of rural pensions received the minimum value of one minimum wage (Ministry of Finance, 2019).

Therefore, most of the rural pensioners fall in the second category of rural pension, related to family agriculture, which represents 77% of the 5 million rural properties, representing 23% of the total area dedicated to agriculture, and 66.3% of the rural workers (IBGE, 2020). Workers that receive the non-contributory category of rural pension usually do not have their activities officially registered in government systems as formal workers. Because of that, the pension system accepts a variety of documents to prove work in rural activities, such as rural labor contracts, receipts of agricultural inputs purchase, proof of membership with the rural workers' union, farming association, or fisherman's association, etc. Importantly, households are allowed to work even after they start receiving pensions.

Among the Brazilian rural workers, the federal pension represents a large income increase as compared to their regular income flow. Moreover, in Brazil, private sector workers are allowed to continue their labor activities in the same job even after the receipt of the federal pension. Therefore, if they continue working, the pension would represent an unequivocal increase in their total income. Federal pensions, moreover, represent a stable and predictable income flow, in contrast with the uncertainty of the earnings from self-employment jobs, hold by 37% of rural workers in our sample. In this setup, according to the life-cycle model, workers should not save money to smooth transition to retirement. On the contrary, they should contract loans, anticipating the future flow of pension income.

3. Data and Methodology

Our empirical strategy focuses on estimating the impact of the age-based pension benefit for women because this is the benefit with the lowest minimum age requirement among all types of pensions in the Brazilian system and, therefore, it should be the one with the highest marginal impact on household income and consumption. We exploit the strict eligibility criterion in the Brazilian rural pension system to estimate the causal effects of pensions on household consumption and labor supply using a Fuzzy Regression Discontinuity Design. The estimated parameter measures the Local Average Treatment Effect (LATE) of the pension on the compliers, that is, 55-year-old women who receive the pension as soon as they are entitled to. In order to estimate this effect, we assume that consumption is a smooth function of age, that individuals cannot perfectly manipulate their age and that age increases the

probability of receiving pensions (Lee & Lemieux, 2010). We discuss the validity of these hypotheses below.

Formally, we assume that: T_i is a binary variable that equals one if the women i receives the pension transfer and zero otherwise; c^* represents the cutoff date for the rule that makes the individual eligible to receive pensions (55); A_i represents her age (the assignment variable), already normalized by the cut-off age. Let $Y_i(1)$ define the potential outcome of household i if the women received the pension and $Y_i(0)$ if she does not. We are interested in estimating the difference between these two potential outcomes, that is:

$$E[Y_i\ (1)\ -\ Y_i\ (0)|A_i\ =\ 0] \qquad (1)$$

In this model, the outcome variable is a continuous function of the assignment variable, and is defined as: $Y_i\ =\ T_iY_i(1)\ +\ (1\ -\ T_i)Y_i(0)$.

This object can be estimated as follows:

$$\tau_{RD} = E[Y_i(1) - Y_i(0) \mid A_i = 0] = \frac{\lim_{A_i \downarrow 0} Y_i - \lim_{A_i \uparrow 0} Y_i}{\lim_{A_i \downarrow 0} T_i - \lim_{A_i \uparrow 0} T_i} \quad (2)$$

The model is estimated non-parametrically by local linear regression following (Lee & Lemieux, 2010) and Calonico et al. (2014). Formally, the first and the second-stage regressions have the following form:

$$\begin{cases} T_i = \delta_0 + \delta_1 A_i + \delta_2 A_i \times 1(A_i > 0) + \delta_3 \mathbf{1}(A_i > 0) + u_i \\ Y_i = \beta_0 + \beta_1 A_i + \beta_2 A_i \times 1(A_i > 0) + \beta_3 \widehat{T}_i + \varepsilon_i \end{cases} \qquad (3)$$

Where Y_i denotes consumption, $1(\cdot)$ denotes the indicator function, and β_3 is our coefficient of interest that represents the causal effect of the rural pension on consumption. We adopt the optimal bandwidth that minimizes the mean square error as proposed by Calonico et al. (2014). Moreover, we express expenses variables in log or inverse hyperbolic sine (IHS) transformations of the household *per capita* expenses. Let us denote the household *per capita* expenses as y_i. Then y_i's log transformation (Y_i^l) and IHS transformation (Y_i^{IHS}) are, respectively:

$$Y_i^l = \log(1 + y_i) \text{ and } Y_i^{IHS} = \log\left(y_i + \left(y_i^2 + 1\right)^{\frac{1}{2}}\right) \quad (4)$$

3.1. Data

Our data come from the POF (the Brazilian official consumer household survey), conducted by the Brazilian Institute of Geography and Statistics (IBGE) in 2017–2018. The POF uses a nationally representative sample of roughly 58,000 households spread across 1,900 of the total of 5,570 municipalities throughout Brazil's territory (IBGE, 2019). It includes a wide range of income sources, such as earnings, government pensions and transfers, private pensions, rent, and financial services, as well as information on household and individual expenditures on a variety of products and services.[2] POF first used mainly as to establish weights of the Brazilian Consumer Price Index by IBGE, but that surveys detailed data on consumption allowed its use in previous research on consumption behavior (Gerard & Naritomi, 2021) and on prices (Carvalho Filho & Chamon, 2012).

POF includes expenses in goods obtained not only through monetary payments, but also through non-monetary ways, including donations, exchange of goods, business withdrawals, and self-production. In the case of non-monetary ways of acquisition, the value of those items is reported by the respondents, considering the local market prices. As a developing country, families in Brazil carry out an important part of their consumption through informal transactions that do not involve the use of money. In rural areas, the non-monetary consumption represented 22.5% of the total expenses in 2017-2018 (IBGE, 2019). POF also includes categories of income and expenses as specific as private donations to other families and to institutions, deposits and withdrawals of financial investments, and private loans. Additionally, the POF collects data on the inventory of durable goods, including the date of acquisition, individual and household characteristics, including measures of food security status.[3]

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[3] Food security status is measured using the Brazilian Food Insecurity Scale (EBIA), which is a version of an instrument developed by the United States Department of Agriculture to measure household food security (IBGE, 2021).

We use a subsample of 30 to 90-year-old women living in rural areas who are either the head or the spouse of the head of the household. We follow Battistin et al. (2009), Li et al. (2015), and use the age variable as an integer and exclude observations whose ages are equal to the cutoff (55 years), to avoid mixing the pre- and post- pension expenses. The main independent variable in this study is a dummy for pension, defined as receiving transfers from federal pensions. As discussed in section 2, individuals are allowed to continue working after receiving the federal pension (except if the pension is due to permanent inability to work). Moreover, in our data, we are not able to differentiate the specific type of rural pension that individuals earn, but more than 90% of the rural pensions in 2018 were based on the age criterion.

Our main outcomes are broad categories of expenditure. We focus mainly on the expenditure on non-durables, that includes food, clothing, hygiene and personal care, recreation and culture, tobacco, and personal services. To organize the exposition of results, we classify the remaining expenditure in broad categories that identify expenditures in health and education, and on other current expenses, which include expenses on loans, current expenses in housing and transport, expenses on the acquisition of real estate, home appliances and furniture, vehicles, and other investments, and expenses on taxes and donations. Additionally, we evaluate the impact of the rural pension on the possession of durable goods, using the household catalog of durable goods, focusing on those acquired in recent years (since 2015).

Our analysis also examines the pension impact on selected income variables available in the POF. The household total income variable includes monetary income and non-monetary income. Non-monetary income includes products obtained through donations, trade, or own production, and equity variation, net of taxes.

3.2. Descriptive Statistics

Table 1 displays descriptive statistics of the main variables included in the analysis. We note that, among the 35% of women in our sample that are in the age group that make them eligible to receive the rural pension, 27% are pensioners and 85% have a job in the one-year-period previous to data collection. However, only 36% of people in our sample are in paying jobs, while almost half of them are doing unpaid work (that does not included household work). These percentages vary with age. Among the

under 55-year-old women, 46% have a paying job and 35% have an unpaid work, while among those with more than 55 years of age, 17% have a paying job and 75% are in unpaid work.

Table 1 Summary statistics

	Mean	SD.	P50	Obs.
Age ≥ 55	0.35	0.48	0	9357
Working Situation				
Pensioner	0.27	0.45	0	9357
Working	0.85	0.36	1	9206
Paid work	0.36	0.48	0	9206
Unpaid work	0.49	0.5	0	9206
Weekly working hours	9.08	16.36	0	9206
Income and Poverty				
Poverty	0.13	0.33	0	9357
Poverty with no federal pension	0.34	0.47	0	9357
Household p.c. income	1,162	3,509	773	9,357
Household p.c. income with no federal pension	893	3,484	478	9,357
Individual labor inc.	360	1,073	0	9,357
Individual non-labor inc.	515	805	192	9,357
Individual non-labor inc. with no federal pension	156	580	0	9,357
Federal pensions	359	602	0	9,357
Other public pensions	26	246	0	9,357
Private pensions	4	164	0	9,357
Social transfers	98	219	0	9,357
Other sources	28	433	0	9,357
	927	1,326	611	9,357
Expenditure				
Total expenditure				
Non-Durables	268	268	190	9,357
Education/Healthcare	87	170	35	9,357
Other curr. exp.	572	1139	324	9,357

Note - Table shows descriptive statistics of the variables used in this study, using the sample of adult women living in rural areas and that are the head of the household or partner of the head of the household.

The household average *per capita* monthly income is R$1,162 (approximately US$360)[4]. Individual non-labor earnings are higher than labor earnings (equivalent to US$161 and US$113, respectively), and come mainly from federal pensions and social transfers (respectively, US$112 and US$31). The importance of the federal pension to rural households' income is made clear when we exclude it from the income variables in Table 1. Excluding the federal pension, the average individual non-labor income is reduced by 70% and the average household *per capita* income decreases 23%. In this scenario, the monetary poverty rate increases almost three times, from 13% to 34%. The poverty status is assessed

[4] Conversion using the Brazilian Central Bank's official Exchange rate for January 15, 2018, the POF date of reference. The value is R$ 3.20 for each US$ 1.

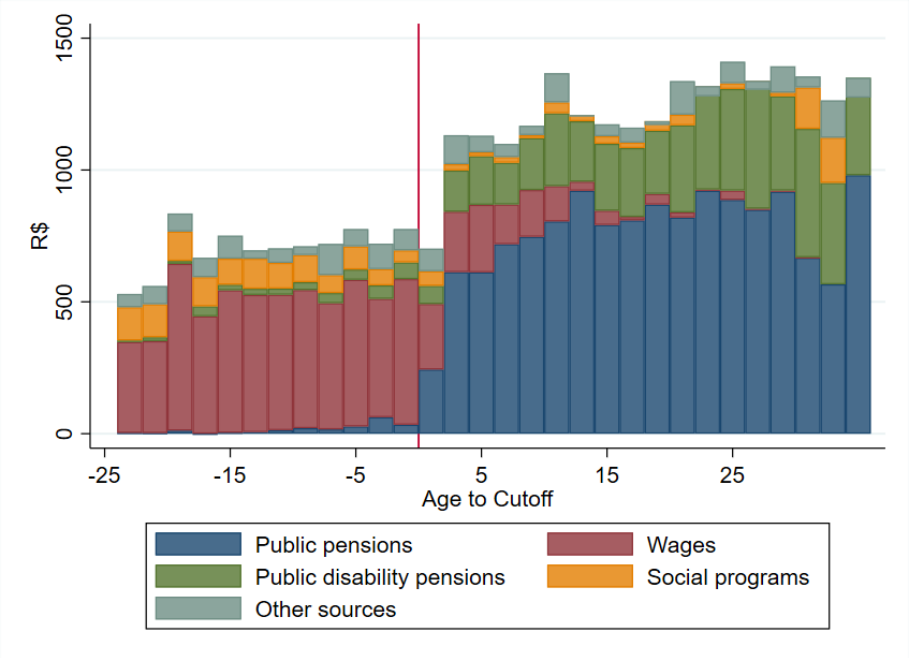
for each household, based on their *per capita* monetary income and regional poverty lines, developed for the Brazilian household surveys.[5]

Total expenditures are on average R$927 (approximately US$290) and expenses on nondurable goods and services amounts to R$268 (US$84), with food expenses being the most important category (R$178 or US$56). Other relevant expenses are housing current expenses (R$190 or US$59), education and healthcare (R$87 or US$27), vehicle acquisition and maintenance (R$81 or US$25), and transport current expenses (R$70 or US$22).

Figure 1 describe the behavior of individual income sources over the lifecycle. We observe that public pensions show a discrete increase from 54 to 55, and another sharp upsurge from 55 to 56, probably because there is a delay between pension requirement and concession. These increases represent permanent changes in income and remain at similar levels at older ages. We also observe that average wages show an important reduction from 54 to 55 year of age. Moreover, averages of public pensions for disabilities gradually increase with age. Among rural workers, the Brazilian pension system is relatively generous, as its minimum pension (one minimum wage) is a high value compared to the average individual income, so that income does not drop around the minimum-age of the rural pension (see Figure A.2 in the online appendix). We will examine these patterns using our empirical strategy in section 4

[5] Poverty lines developed by the researchers Sonia Rocha and Samuel Franco. Data retrieved from https://www.iets.org.br/spip.php?article406.

Fig. 1 Individual Income by Age and Source

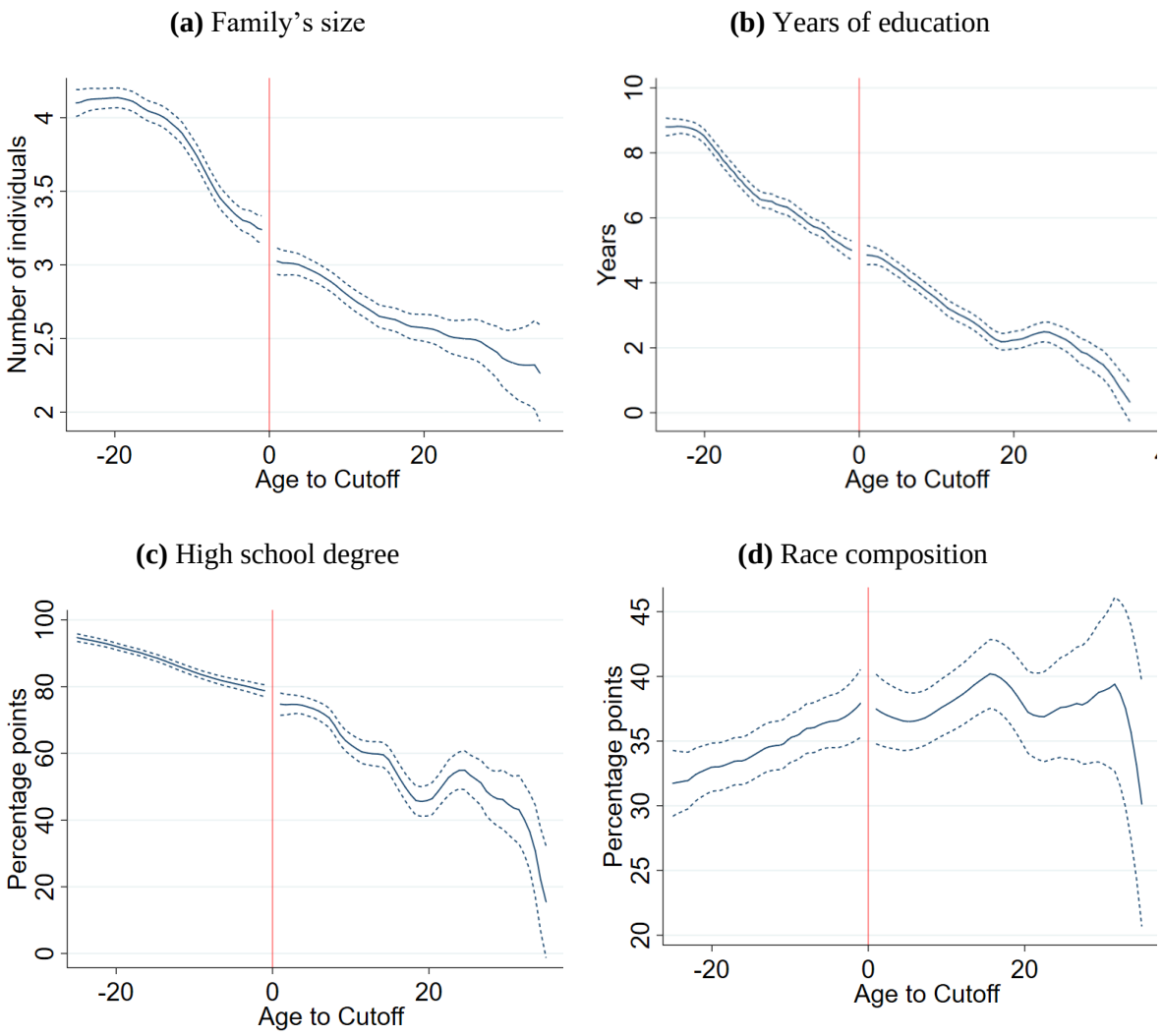


Note - Figure shows the average individual income by 2-years age bin. Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household.

3.3. Validity Checks

We first examine the continuity of covariates over the age cutoff and find no evidence of changes in the composition of the population around that threshold. Figure 3 displays local average density estimates of socioeconomic characteristics, such as household size, education, literacy and a dummy for afro-Brazilians or native-Brazilians, showing no clear discontinuities around the cut-off. Table 2 shows the results of estimating equation 3 using these characteristics as dependent variables, with the results indicating that the characteristics are smooth functions of the running variable.

Fig. 3 Continuity of explanatory variables



Note - figure shows graphs of control variables smoothing using kernel-weighted local polynomial regressions. Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Dashed lines represent 95% confidence intervals.

Moreover, we find no evidence of manipulation in the age variable, which supports our identification strategy. Since we construct this variable based on the declared age in the family expenditure surveys and there is no incentive to manipulate this variable in this context, we do not expect any kind of misinformation. To be sure, we test this assumption using the manipulation test proposed by Frandsen (2017), based on McCrary (2008), that is consistent when the running variable is discrete. Figure A.1 shows that the tests do not reject the null of no manipulation in the running variable, even allowing for non-linearity around the threshold ($k > 0$, following Frandsen (2017),

Table 2 Balancing Tests

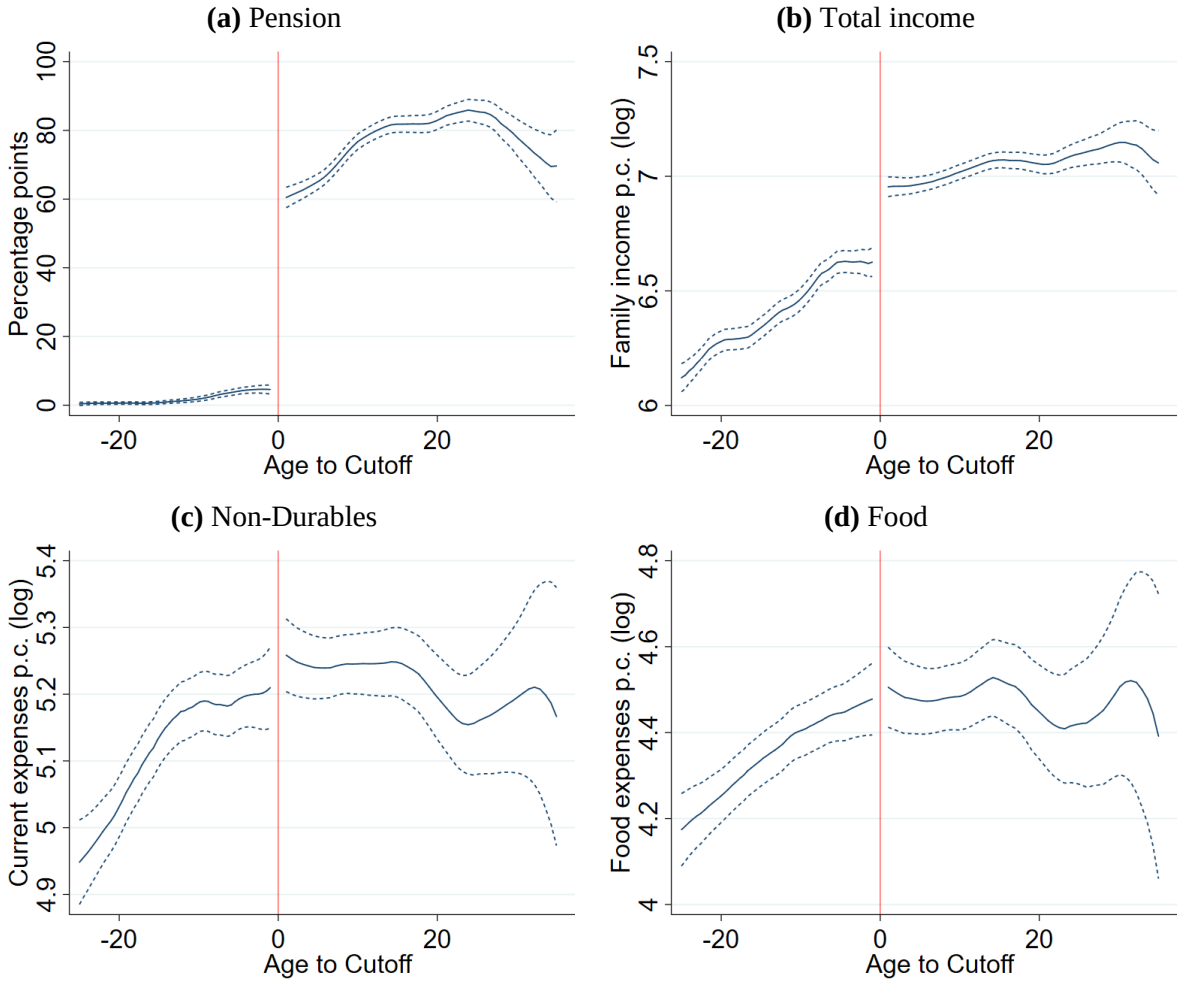
	Family's size (1)	Years of education (2)	White (3)	Literacy (4)
Pensions	-0.009	1.029	-0.035	-0.007
	(0.292)	(1.086)	(0.127)	(0.112)
Bandwidth	9.24	6.43	8.36	9.23
Mean (age < 55)	3.38	5.29	0.36	0.80
Mean (age > 55)	2.99	4.62	0.36	0.73
Observations	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of the rural pension on control variables. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4. Results

Figure 4 illustrates the first-stage relationship between age and pension receipt (Panel 4a) and the reduced-form relationships between age and household *per capita* income and also some specific consumption expenditures (Panels 4b to 4f). We observe a clear jump in the probability of receiving a pension between age 54 and 56 in Panel 4a, from less than 10% to 60%. There are similar discrete changes in household *per capita* income (Panel 4b), total *per capita* expenditure (Panel 4c), and expenses on property (Panel 4f). However, we do not observe clear discontinuities in expenses on non-durables and on food (Panels 4d and 4e), which already advances the main results of this paper.

Fig. 4 First Stage and Reduced Form Estimates on Main Outcomes



Note - Figure shows graphs of pension, total income, and consumption variables smoothing using kernel-weighted local polynomial regressions. Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Dashed lines represent 95% confidence intervals.

Table 3 shows the results of estimating the first-stage regression of the first column of Table 4, confirming that the discontinuity on the eligibility criterion for female rural pensions is strongly associated with receiving the benefits. These results indicate that the eligibility criterion in fact induces around 50% of women to receive the pension. Results for the other columns are similar.

Table 3 First-Stage Regressions

	Total Income (Log) (1)	Total Income (IHS) (2)
Pensions	0.496***	0.496***
	(0.039)	(0.039)
Bandwidth	10.15	10.14
Mean (age < 55)	6.59	7.28
Mean (age > 55)	6.97	7.66
Observations	9,357	9,357

Note - First stage RDD estimates of the impact of the rural pension on log transformation ($log\ (1 + y)$) and IHS of total income in Table 3. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4 displays the results of the fuzzy RDD regressions using *per capita* income, *per capita* values of total expenditures, expenditures on non-durables, education and health, and other expenses as dependent variables, with the log (top panel) and IHS (bottom panel) transformations. In the upper panel, which show results of log transformation, we observe in Column 1 that the pension has a positive and significant impact on the household *per capita* income, with the point estimate indicating a 54% discontinuous increase. Column 2 shows that the increase in income translates into a increase of lower magnitude in total expenses, of around 37%. Results are similar with the IHS transformation in the lower panel.

We now examine the components of consumption that are most affected by the pension in Columns 3 to 5 of Table 4. The results show that the pension does not significantly affect non-durable consumption (column 3). This result contrast with the literature on the effect of pensions (Salm, 2011; Duflo, 2000; Miglino et al, 2023). Our results are consistent with the life-cycle model, where individuals smooth the marginal utility of consumption over time, in the presence of predictable income variations.

Health and education expenses are not affected either (column 4), which does not come as a surprise, as the majority of rural and poor population are not able to afford a private health insurance in Brazil, so that health consultations and exams rely on the public health system that has a universal coverage. The rural pension significantly increases other expenses (column 5), however. This category includes investments in real estate and on durable consumption and will be detailed in Tables 11, 12, and A2.

Table 4 Rural Pension, Income, and Expenditure

	Total Income	Total Expenses	Components of Expenses		
			Non-Durables	Educ. and Health	Other Expenses
	(1)	(2)	(3)	(4)	(5)
Log Transformation					
Pensions	0.541***	0.369**	0.155	0.165	0.580***
	(0.210)	(0.203)	(0.251)	(0.369)	(0.241)
Bandwidth	10.15	10.12	9.41	9.77	8.76
Mean (age < 55)	6.59	6.46	5.20	3.44	5.87
Mean (age > 55)	6.97	6.65	5.23	3.76	6.09
Observations	9,357	9,357	9,357	9,357	9,357
IHS					
Pensions	0.543***	0.370**	0.154	0.174	0.582***
	(0.210)	(0.203)	(0.254)	(0.401)	(0.242)
Bandwidth	10.14	10.11	9.36	9.80	8.77
Mean (age < 55)	7.28	7.15	5.88	4.03	6.56
Mean (age > 55)	7.66	7.34	5.92	4.38	6.78
Observations	9,357	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of the rural pension on log transformation ($log\ (1 + y)$) and IHS of income, expenditures, consumption of non-durable goods and services, and other components of total expenditures. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

We verify important differences when we disaggregate the consumption of non-durables by educational degree, on Table 5. We obtain a non-significant impact among the low-education group, while in the high-education group, the impact is positive and marginally significant. This disparity by socioeconomic level is consistent with the findings of Kueng (2018), that families in the higher end of the income distribution exhibit a higher excess sensitivity in consumption to a predictable cash transfer.

Table 5 Rural Pension and Expenses on Non-Durable Goods

	Low Schooling (1)	High Schooling (2)
Log Transformation		
Pensions	-0.137	0.820*
	(0.266)	(0.515)
Bandwidth	9.57	8.59
Mean (age < 55)	5.08	5.42
Mean (age > 55)	5.11	5.60
Observations	5,182	4,175
IHS		
Pensions	-0.144	0.858*
	(0.271)	(0.524)
Bandwidth	9.48	8.92
Mean (age < 55)	5.76	6.10
Mean (age > 55)	5.79	6.29
Observations	5,182	4,175

Note - RDD estimates of the impact of the rural pension on non-durable expenses, by education groups. Low education includes up to those that concluded primary school and high education includes those who completed more years of study. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 6 examines the impact of the rural pension on subcategories of non-durable consumption and shows that there is no effect on most of them, including food expenses, which reinforces our conclusion. However, rural pension has a positive overall impact on the expenses on recreation and culture, and on personal services that are marginally significant.

When we disaggregate the sample in education groups, in the two lower panels of Table 6, we again observe important differences. While in the low-education group, rural pension reduces the hygiene and personal care expenditure (in about 43%), in the high-education group, rural pension increases the expenses in most of the non-durable categories, except for clothing and tobacco. The results of the high-education group are large and drive the overall positive impacts on recreation and culture, and on personal services.

Table 6 Rural Pension and Components of Non-Durable Goods

	Food	Clothing	Hygiene/ personal care	Recreation/ culture	Tobacco	Personal services
	(1)	(2)	(3)	(4)	(5)	(6)
Total						
Pensions	0.127	-0.024	0.047	0.559*	0.391	0.387*
	(0.387)	(0.369)	(0.302)	(0.407)	(0.326)	(0.276)
Bandwidth	9.78	10.11	10.03	8.47	7.97	9.44
Mean (age < 55)	4.45	2.74	2.92	1.18	0.49	1.48
Mean (age > 55)	4.47	2.66	2.96	1.03	0.50	1.47
Observations	9,357	9,357	9,357	9,357	9,357	9,357
Low Schooling						
Pensions	-0.237	-0.162	-0.426*	0.060	0.378	0.080
	(0.427)	(0.362)	(0.304)	(0.357)	(0.314)	(0.257)
Bandwidth	9.72	11.43	10.51	10.24	9.39	10.83
Mean (age < 55)	4.38	2.56	2.77	0.97	0.50	1.29
Mean (age > 55)	4.34	2.51	2.83	0.85	0.51	1.33
Observations	5,182	5,182	5,182	5,182	5,182	5,182
High Schooling						
Pensions	1.040*	-0.076	1.563**	1.938**	0.430	1.037**
	(0.738)	(0.857)	(0.743)	(0.982)	(0.744)	(0.652)
Bandwidth	8.18	7.54	9.06	9.30	6.74	9.92
Mean (age < 55)	4.59	3.05	3.18	1.58	0.47	1.81
Mean (age > 55)	4.86	3.18	3.32	1.46	0.44	1.88
Observations	4,175	4,175	4,175	4,175	4,175	4,175

Note - RDD estimates of the impact of the rural pension on components of non-durable goods. Low education includes up to those that concluded primary school and high education includes those who completed more years of study. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Food expenses do not change upon the receipt of rural pension, even when we disaggregate by type of acquisition (monetary or non-monetary).[6] The results of Table 7 show that although the impacts area negative for monetary expenses and positive for non-monetary expenses, which would be consistent with substitution of food purchasing for home production, they are not statistically significant at the 10% level.

[6] Monetary acquisitions include those using money or credit cards, while non-monetary acquisitions include donations, business draws, exchange of goods, and own production.

Table 7 Rural Pension and Expenses on Food by Type of Acquisition

	Monetary Acquisition	Non-monetary Acquisition
	(1)	(2)
Pensions	-0.277	0.332
	(0.522)	(0.523)
Bandwidth	8.03	10.26
Mean (age < 55)	3.94	1.93
Mean (age > 55)	3.93	1.77
Observations	9,357	9,357

Note - RDD estimates of the impact of the rural pension on food expenses, by type of acquisition. Monetary acquisitions include those using money or credit cards, while non-monetary acquisitions include donations, business draws, exchange of goods, and own production. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

As food expenses are not affected by the rural pension, we also examine whether the family's subjective nutritional necessities are impacted by that pension, using measures of food security in Table 8. The food security measure evaluates the availability, access, and stability of food in households and is based on individuals' perception of those dimensions. The food security indicators are not affected by the rural pension.

Table 8 Rural Pension and Food Security

	Food security	Low food insecurity	Medium food insecurity	High food insecurity
	(1)	(2)	(3)	(4)
Pensions	0.017	-0.027	0.014	0.018
	(0.127)	(0.109)	(0.095)	(0.078)
Bandwidth	9.37	9.67	8.68	7.92
Mean (age < 55)	0.51	0.27	0.14	0.08
Mean (age > 55)	0.58	0.26	0.11	0.06
Observations	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of the rural pension on dummy variables for food security levels. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

As a robustness exercise, online appendix Figure A.3 shows estimates of the coefficient in column 3 of Table 3 using various specifications, including a second-degree polynomial, alternative optimal bandwidths, a specification further controlling for individual characteristics. All estimates are

close to zero and do not show statistical significance, thus reinforcing our main result that non-durable consumption is not affected by the anticipated income from the rural federal pension. We perform additional robustness checks in Figure A.4 in the online appendix, by repeating the estimation of the coefficient in column 3 of Table 3 using multiples of that specification's optimal bandwidth. Point estimates are close to zero, are not statistically significant at the 10% level, and indicate that our main result holds as the bandwidth varies.

4.1. Mechanisms

We now examine the mechanisms that explain the lack of impact of the rural pension on non-durable expenses by further investigating the workers' borrowing behaviors. Loans seem to be the central mechanism by which workers smooth non-durable consumption. Table 9 details the impact of the rural pension on loans. While column 1 shows that the value or probability of receiving money from loans do not increase with rural pensions, the top panel of column 2 (log specification) shows that expenses related to loans (interests or amortizations) increase as workers start receiving the rural pension. moreover, the result in the bottom panel of column 2 (proportion of positive expenses) indicates that more individuals have expenses related to loans after receiving the rural pension. Point estimates indicate that expenses on loans increase in general 1.6 times with the benefit, and the proportion of female rural workers with any expenses with loans increase 33.8 pp.

These results suggest that workers can access credit before they start receiving pension, even in this context of low-income rural households. Workers anticipate current expenses before the receipt of the rural pension and smooth their consumption over time. This behavior may also explain the big differences of the averages between individuals in both sides of the cut-off in income from loans and in expenses on loans (also displayed in Table 9): while the difference in income from loans is only 7%, for the case of expenses related to loans (interests or amortization) it reaches 76%. Workers start paying their loans only after they receive the pension, as federal pensions consist of a stable and almost certain income flow, so that may be used as collateral for borrowing.

Table 9 Rural Pension and Loans

	Income from loans (1)	Expenses on loans (2)
Log Transformation		
Pensions	-0.013	1.633***
	(0.382)	(0.523)
Bandwidth	7.27	8.73
Mean (age < 55)	0.30	0.93
Mean (age > 55)	0.37	1.69
Observations	9,357	9,357
Prop. Positive Values		
Pensions	-0.002	0.338***
	(0.074)	(0.126)
Bandwidth	7.17	8.04
Mean (age < 55)	0.06	0.22
Mean (age > 55)	0.07	0.38
Observations	9,357	9,357

Note - RDD estimates of the impact of the rural pension on income from loans and expenses on loans. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4.2. Individual Income

Table 10 Rural Pension and Labor Market Outcomes

	Any work	Types of work				
		Unpaid work	Paid work			
			Total	Employee	Employer	Self-employed
	(1)	(2)	(3)	(4)	(5)	(6)
Working Dummy						
Pensions	0.126	0.402***	-0.226**	-0.075	-0.004	-0.160**
	(0.097)	(0.122)	(0.108)	(0.087)	(0.010)	(0.085)
Bandwidth	7.44	7.52	9.90	10.27	9.31	9.53
Mean (age < 55)	0.77	0.36	0.42	0.27	0.01	0.17
Mean (age > 55)	0.88	0.63	0.24	0.14	0.00	0.11
Observations	9,206	9,206	9,206	9,206	9,206	9,206
Weekly working hours						
Pensions	-	-	-9.432**	-2.063	-0.087	-6.563**
			(4.061)	(2.656)	(0.579)	(3.415)
Bandwidth	-	-	8.41	9.59	7.25	8.15
Mean (age < 55)	-	-	11.52	6.94	0.25	4.63
Mean (age > 55)	-	-	5.12	2.41	0.08	2.51
Observations	-	-	9,206	9,206	9,206	9,206

Note - RDD estimates of the impact of the rural pension on dummy variables of work and on weekly working hours. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

As highlighted in section 2, in Brazil, rural workers are allowed to continue their jobs even after they start receiving pension income. How do pensions affect their income and labor market decisions? Table 10 shows the impact of rural pensions on occupation and working hours, while Table 11 display the estimated coefficients of the effect of pensions on labor-income. The results in Table 10 indicate that the positive income shock generated by rural pensions leads to a reduction in the supply of paid work, even though women are allowed to continue working after receiving the pension. Column 1 in the upper panel shows that pensions do not impact the overall work probability, but columns 2 and 3 show that they increase the probability of unpaid work by 40 pp. and reduces paid work by 23 pp. Unpaid work include subsistence farming, housework and work at the rural property, so that this result is consistent with previous research that finds effects of retirement on home production (for example, Been & Goudswaard (2023) and Hurd & Rohwedder (2008)). Columns 4 to 6 show that the result on paid work is mainly driven by self-employment, the most flexible and often informal category of work

in Brazil. The lower panel shows results of weekly working hours that confirms those results, by showing the pensions reduce total payed working hours and working hours as self-employed.

Table 11 Rural Pension and Components of Individual Labor Income

	Total labor income	Components of Labor Income		
		Employee	Employer	Self-Employed
	(1)	(2)	(3)	(4)
Log Transformation				
Pensions	-1.419**	-0.545	-0.029	-0.872**
	(0.674)	(0.538)	(0.068)	(0.499)
Bandwidth	9.28	9.87	9.01	9.47
Mean (age < 55)	2.57	1.64	0.05	0.96
Mean (age > 55)	1.35	0.77	0.02	0.61
Observations	9,357	9,357	9,357	9,357
Prop. Positive Values				
Pensions	-0.221**	-0.072	-0.004	-0.158**
	(0.109)	(0.088)	(0.010)	(0.086)
Bandwidth	9.71	10.09	9.32	9.30
Mean (age < 55)	0.41	0.26	0.01	0.17
Mean (age > 55)	0.24	0.13	0.00	0.11
Observations	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of rural pension on log transformation ($log\ (1 + y)$) of components of individual labor income and on a dummy variable for positive values of those components. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 11 displays estimates of the impact of rural federal pensions on labor income, showing a negative effect on the women´s total labor income, which is mainly explained by the reduction of income from self-employment. These results mirror those in Table 10 and shows that the reduction in self-employed work also led to a drop in individual labor earnings. Table A1 in the online appendix shows that, rural pensions do not impact other non-labor income sources other than federal pensions, as expected.

4.3. Other Expenses

We now examine what explains the positive impact of the rural pension on other expenses. Table 12 shows the impact of the rural pension on the other expenses that were lumped together in column 5 of Table 3, besides the payment of loans. The housing and transport current expenses are not affected by the extra income from pension (columns 1 and 2), but other current expenses significantly increase with the additional income (column 3). Those other current expenses can be are classified into two groups of expenditures: the acquisition or maintenance of durable goods and investments, and taxes and donations. We further investigate the rural pension impacts on durable goods and investments in Table 13 and the effects on taxes and donations are presented in the online appendix Table A2.

Results of Table 13 provide evidence that the rural pension increases expenditure on the acquisition or maintenance of home appliances and furniture, and of vehicles. In column 2 of the log specification, point estimate indicates that expenses in home appliances and furniture increase by 80% when workers start receiving the rural pension. Column 3 of the bottom panel indicates that the proportion of workers with expenses with vehicles rises 25 pp. with the rural pension. It should be noted that in the case of acquisition of durable goods, individuals generally pay the purchases in installments, so that the credit is not reported as a loan income in the consumer expenditure survey. Additional evidence of positive impact on acquisition of durable goods are presented in the online appendix Tables A3 to A5. Results show that rural pensions have a positive impact on vehicle-related taxes, on recent acquisitions of refrigerators and automobiles, and on the stock of automobiles. These results indicate that once workers start receiving the rural pension, they use the money to acquire or invest in durable goods that might increase their health and wellbeing, in contrast with predictions of reductions of durable consumption from recent life cycle models that include expenses in durable (Fernández-Villaverde & Krueger, 2011; Alessie & De Ree, 2009).

We understand that the positive impact of the rural pension on durable goods does not violate the traditional lifecycle model. As consumers gain utility from the flow of services provided by durable goods over time, and not by purchasing the durable good, the increased spending on such lumpy and expensive items does not indicate a deviation from marginal utility smoothing. The timing of purchasing those items, however, might be adjusted to coincide with the predicted increase in the income flow. Moreover, our findings might indicate the existence of credit restrictions for larger sums of money that are necessary to acquire durable goods.

Table 12 Rural Pension and Components of Current Expenses (column 5 of Table 3)

	Housing current expenses (1)	Transport current expenses (2)	Other current expenses (3)
Log Transformation			
Pensions	0.164	0.561	0.859**
	(0.213)	(0.479)	(0.489)
Bandwidth	8.36	9.52	10.37
Mean (age < 55)	4.98	3.00	2.61
Mean (age > 55)	5.11	3.07	2.68
Observations	9,357	9,357	9,357
Prop. Positive Values			
Pensions	-0.000	0.013	0.030
	(0.000)	(0.122)	(0.141)
Bandwidth	11.22	6.41	5.66
Mean (age < 55)	1.00	0.76	0.75
Mean (age > 55)	1.00	0.77	0.79
Observations	9,357	9,357	9,357

Note - RDD estimates of the impact of rural pension on log transformation ($log\ (1 + y)$) of components of current expenses and on dummy variables for positive expenses on those components. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 13 Rural Pension and Components of Investment (column 3 of Table 12)

	Property aquisition and reform	Home Appl., furniture and maint.	Vehicle acquisition and maint.	Expenses on other investments
	(1)	(2)	(3)	(4)
Log Transformation				
Pensions	0.648	0.805***	0.976	0.018
	(0.470)	(0.375)	(0.632)	(0.017)
Bandwidth	7.34	9.43	6.42	9.81
Mean (age < 55)	0.68	3.03	1.91	0.00
Mean (age > 55)	0.87	3.28	1.99	0.00
Observations	9,357	9,357	9,357	9,357
Prop. Positive Values				
Pensions	0.105	0.068	0.249**	0.005
	(0.110)	(0.071)	(0.133)	(0.005)
Bandwidth	7.56	7.78	7.34	7.08
Mean (age < 55)	0.19	0.91	0.53	0.00
Mean (age > 55)	0.22	0.91	0.51	0.00
Observations	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of the rural pension on log transformation ($log\ (1 + y)$) of components of investment and on dummy variables for positive expenses on those components. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

5. Conclusion

This paper examines the excess sensitivity of consumption behavior to predictable income increases and the impact of those increases on food-security measures, using the unique case of the rural pension in Brazil. We investigate the effects of women's rural pension on the consumption of rural families using a detailed expenditure survey and exploiting a strict eligibility age criterion to identify that causal relationship. The Brazilian rural pension represents an interesting case to investigate the variations in consumption, as the beneficiaries of the federal pension in rural areas are usually poor populations with low savings capacity and the average value of the pension is high relative to the household's income. Moreover, workers are allowed to continue working in the same job after start receiving the transfer, so that rural pensions do not have a mechanic effect on leisure and it allows us to isolate the impact of an anticipated increase in income.

Our results bring insights into the recent debate around the validity of life-cycle models. We first find that in rural Brazil, a context of low income and low savings capacity, the agents' behavior is consistent with life-cycle models. We show that while the rural pension positively affects total *per*

capita income and expenditure, by respectively 54% and 37%, it does not significantly affect the non-durable consumption. These results are driven by women with lower levels of education, while among women with higher levels of education, non-durable expenses increase upon the rural pension receipt. None of the non-durable components is affected among the low-education group, including food expenditures, while among the high-education group, almost all of the non-durable components is positively affected. The absence of impact on consumption is consistent with models that predict that anticipated changes in income are incorporated in agent's intertemporal utility maximization, so that the marginal utility of non-durable consumption is smoothed over time. The heterogeneity of our results by socioeconomic groups are also rationalized by recent research that also find larger excess sensitivity of predictable lump-sum cash transfers on the marginal propensity to consume (Kueng, 2018).

Second, we find evidence of access to credit in this low income setting, which explains our main result. We find that rural pension increases loan payments by 1.6 times and the probability of having loan expenses by 34 pp., but the impact of the rural pension on income from loans is not significant. These results suggest that workers smooth their non-durable consumption by having access to credit before the receipt of pension and they start paying for it only after they receive the pension transfers. The relatively high-valued, certain and stable flux of income from the rural pension might represent a collateral that allows rural workers get credit for their current expenses.

Moreover, we find that rural pension increases the household *per capita* income and households anticipate that by not saving before the age threshold to start receiving the pension. The rural pension also positively impacts expenses in acquisition and maintenance of home appliances, furniture, and vehicles, and in vehicle-related taxes, and these expenses, along with loans, explain all the increase in the total expenditure. These effects are not inconsistent with marginal utility smoothing, but might indicate that rural families might be credit constrained.

Finally, we find changes in behavior that suggest a positive impact on home production. Rural pension reduces the probability of paid work (by 22 pp.), mainly driven by a drop in self-employment work (by 16 pp.), and increases unpaid work (by 41 pp.). Moreover, the rural pension further reduces total worked hours (by 9.6 hours a week) and total individual labor income, which is also explained by the impact on self-employed workers (self-employed working hours decreases by 6.6 hours a week). The result on unpaid work is consistent with a rise in home production, described in previous research,[7]

[7] See for example, Hurd & Rohwedder (2008) and Atalay et al. (2020).

despite the lack of impact on non-durable expenditure. It is possible that pension changes the composition of food expenditure and actual consumption remains unaltered.

References

Agarwal, S., & Qian, W. (2014). Consumption and Debt Response to Unanticipated Income Shocks: Evidence from a Natural Experiment in Singapore. *The American Economic Review*, 104(12): 4205-4230. https://doi.org/10.1257/aer.104.12.4205

Aguiar, M., Bils, M., & Boar, C. (forthcoming). Who Are the Hand-to-Mouth? *Review of Economic Studies*.

Alessie, R. & De Ree, J. (2009). Explaining the hump in life cycle consumption profiles. *De Economist*, 157(1), 107–120. https://doi.org/10.1007/s10645-009-9119-4

Atalay, K., Barrett, G. F., & Staneva, A. (2020). The effect of retirement on home production: evidence from Australia. *Review of Economics of the Household*, 18(1), 117–139. https://doi.org/10.1007/s11150-019-09444-3

Battistin, E., Brugiavini, A., Rettore, E., & Weber, G. (2009). The retirement consumption puzzle: Evidence from a regression discontinuity Approach. *American Economic Review*, 99(5), 2209–2226. https://doi.org/10.1257/aer.99.5.2209

Been, J. & Goudswaard, K. (2023). Intertemporal and intratemporal consumption smoothing at retirement: micro evidence from detailed spending and time use data. *Journal of Pension Economics and Finance*, 22(1), 1–22. https://doi.org/10.1017/S1474747221000330

Calonico, S., Cattaneo, M. D., & Titiunik, R. (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica*, 82(6), 2295–2326. https://doi.org/10.3982/ECTA11757

Carvalho Filho, I., & Chamon, M. (2012). The myth of post-modern income stagnation: evidence from Brazil and Mexico. Journal of Development Economics, 97: 368–386. https://doi.org/10.1016/j.jdeveco.2011.06.009

Duflo, E. (2000). Child Health and Household Resources in South Africa: Evidence from the Old Age Pension Program. *American Economic Review*, 90(2): 393–98. https://doi.org/*10.1257/aer.90.2.393*

Fernández-Villaverde, J. & Krueger, D. (2011). Consumption and saving over the life cycle: How important are consumer durables? *Macroeconomic Dynamics*, 15(5), 725–770. https://doi.org/10.1017/S1365100510000180

Frandsen, B. R. (2017). Party bias in union representation elections: Testing for manipulation in the regression discontinuity design when the running variable is discrete. In M. D. Cattaneo, & J. C. Escanciano (Eds.), *Advances in Econometrics* (volume 38, pp. 281–315). Emerald Publishing Limited.

Gelman, M., Kariv, S., Shapiro, M. D., Silverman, D., & Tadelis, S. (2014). Harnessing Naturally Occurring Data to Measure the Response of Spending to Income. *Science*, 345(212). https://doi.org/10.1126/science.1247727

Gerard, F., & Naritomi, J. (2021). Job displacement insurance and (the lack of) consumption-smoothing. American Economic Review, 111(3): 899–942. https://doi.org/10.1257/aer.20190388

Golosov, M., Graber, M., Mogstad, M., & Novgorodsky, D. (2023). How Americans Respond to Idiosyncratic and Exogenous Changes in Household Wealth and Unearned Income. *The Quarterly Journal of Economics*, qjad05. https://doi.org/10.1093/qje/qjad053

Hurd, M. D. and Rohwedder, S. (2008). *The retirement consumption puzzle: Actual spending change in panel data*. NBER Working Paper 13929. National Bureau of Economic Research, Inc. https://doi.org/10.3386/w13929

IBGE (2019). *Pesquisa de Orçamentos Familiares – POF 2017-2018: Primeiros resultados*. Rio de Janeiro, RJ, Brazil: IBGE.

IBGE (2020). Agricultura familiar. In IBGE, *Atlas do espaço rural brasileiro* (chapter 11, pp. 292–295). Rio de Janeiro, RJ, Brazil: IBGE.

IBGE (2021). *Pesquisa de Orçamentos Familiares – POF 2017-2018: Análise da segurança alimentar no Brasil: Mensuração da segurança alimentar e nutricional*. Rio de Janeiro, RJ, Brazil: IBGE.

Kueng, L. (2018). Excess Sensitivity of High-Income Consumers. *The Quarterly Journal of Economics*, 133(4), 1693-1751. https://doi.org/10.1093/qje/qjy014

Lee, D. S. & Lemieux, T. (2010). Regression discontinuity designs in economics. *Journal of Economic Literature*, 48(2), 281–355. https://doi.org/10.1257/jel.48.2.281

Li, H., Shi, X., & Wu, B. (2015). The retirement consumption puzzle in China. *American Economic Review*, 105(5), 437–441. https://doi.org/10.1257/aer.p20151007

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of econometrics*, 142(2), 698–714. https://doi.org/10.1016/j.jeconom.2007.05.005

Ministry of Finance (2019). *Anuário estatístico da previdência social: AEPS 2018*. Brasília.

Modigliani, F. & Brumberg, R. H. (1954). Utility analysis and the consumption function: an interpretation of cross-section data. In K. K. Kurihara (Ed.), *Post-Keynesian Economics* (pp. 388–436). New Brunswick, NJ, Rutgers University Press.

Miglino, E., Navarrete H., N. Navarrete H., G., & Navarrete H., P. (2023). Health Effects of Increasing Income for the Elderly: Evidence from a Chilean Pension Program. *American Economic Journal: Economic Policy*, 15(1): 370-393. https://doi.org/10.1257/pol.20200076

Parker, J. A. (2017). Why Don't Households Smooth Consumption? Evidence from a $25 Million Experiment. *American Economic Journal: Macroeconomics*, 9(4): 153–183. https://doi.org/10.1257/mac.20150331

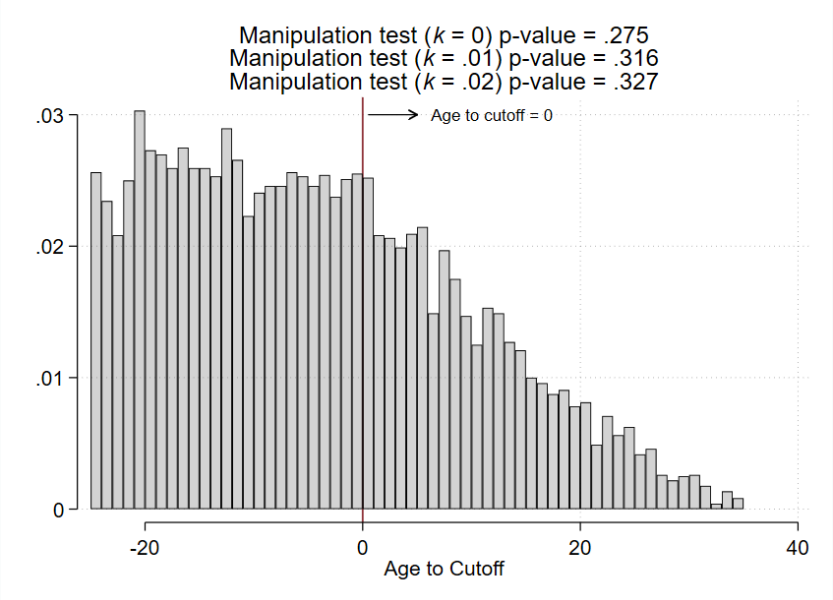
Rangel, L. A., Pasinato, M. T. d. M., Silveira, F. G., Lopez, F. G., & Mendonça, J. L. d. O. (2009). Conquistas, desafios e perspectivas da previdência social no brasil vinte anos após a promulgação da constituição federal de 1988. In Instituto de Pesquisa Econômica Aplicada, *Políticas Sociais: acompanhamento e análise*, (2nd edition, pp. 41–96). IPEA.

Salm, M. (2011). The Effect of Pensions on Longevity: Evidence from Union Army Veterans. *Economic Journal*, 121(552): 595–619. https://doi.org/10.1111/j.1468-0297.2011.02427.x

Souleles, N. S. (1999). The Response of Household Consumption to Income Tax Refunds. *The American Economic Review*, 89(4): 947- 958. https://doi.org/10.1257/aer.89.4.947

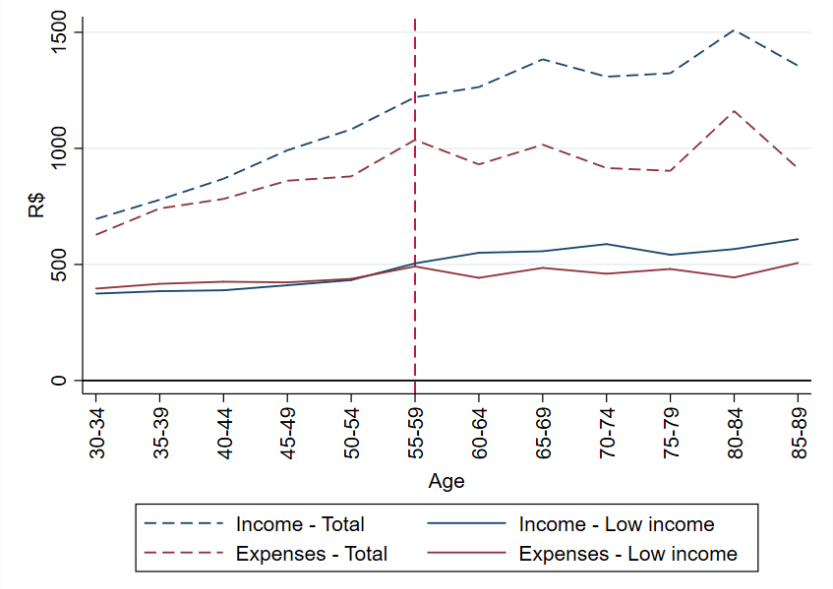
Supplementary Tables

Fig. A.1 Manipulation Test



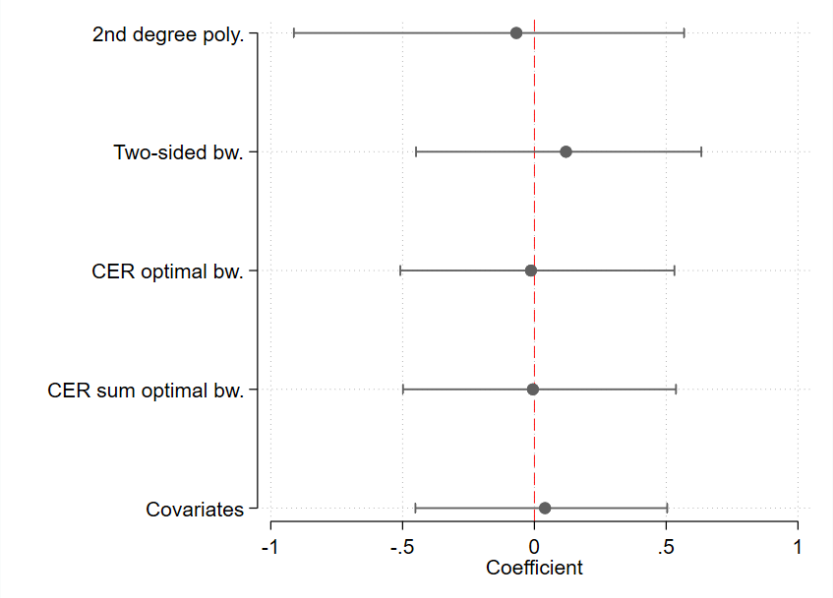
Note - Figure shows the histogram for the running variable age and the p-values of the tests proposed by Frandsen (2017).

Fig. A.2 Average *per capita* Income and *per capita* Expenses by Age Group



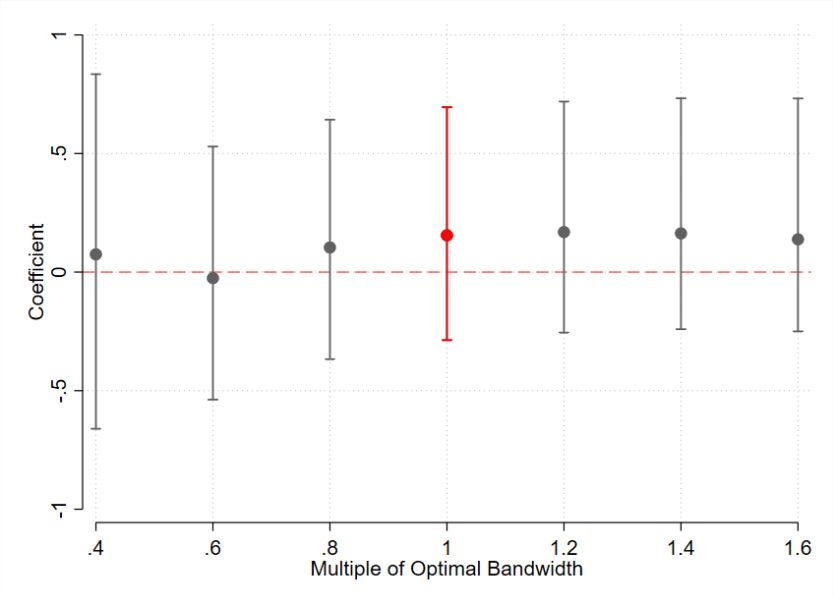
Note - Figure shows the average *per capita* income and *per capita* expenses by 5-years age bin. Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household and a sub-sample of such women in the lower half of per capita income. For each sample, we excluded the 1% most extreme values.

Fig. A.3 Robustness Check on the Impact of Rural Pension on Expenses in Non-Durable Goods and Services



Note - Figure shows RDD estimates of the impact of the rural pension on the expenditure on the log transformation ($log\ (1 + y)$) of non-durable goods and services, using a second degree polynomial on age, separate optimal MSE bandwidths for each side of the discontinuity, CER optimal bandwidth, CER optimal bandwidth for the sum of coefficients, and the inclusion of covariates in the model. Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Horizontal bars are 95% confidence intervals.

Fig. A.4 Bandwidth Robustness Test for the Impact of Rural Pension on Expenses on Non-Durables



Note - Figure shows fuzzy RDD estimates of the impact of the rural pension on non-durable expenses, varying the bandwidth from 0.4 to 1.6 times the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Vertical bars are the 95% robust confidence intervals.

Table A1 Rural Pension and Components of Individual Non-Labor Income

	Total non-labor income	Components of Non-Labor Income				
		Federal pensions	Other public pensions	Private pensions	Social transf.	Other sources
	(1)	(2)	(3)	(4)	(5)	(6)
Working Dummy						
Pensions	4.286***	6.457***	0.300	0.234	-1.137	-0.443*
	(0.665)	(0.323)	(0.311)	(0.233)	(0.741)	(0.321)
Bandwidth	6.82	10.20	8.29	9.54	6.20	6.49
Mean (age < 55)	2.58	0.53	0.08	0.00	1.82	0.15
Mean (age > 55)	5.19	4.90	0.32	0.04	0.60	0.19
Observations	9,357	9,357	9,357	9,357	9,357	9,357
Weekly working hours						
Pensions	0.464***	0.949***	0.068	0.035	-0.251	-0.073
	(0.119)	(0.045)	(0.053)	(0.026)	(0.139)	(0.056)
Bandwidth	6.03	10.07	9.60	7.08	5.84	6.76
Mean (age < 55)	0.45	0.08	0.01	0.00	0.31	0.03
Mean (age > 55)	0.76	0.71	0.05	0.01	0.12	0.03
Observations	9,357	9,357	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of the rural pension on log transformation ($log\ (1 + y)$) of components of non-labor income and on a dummy variable for positive values of those components. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A2 Rural Pension, Taxes and Donations (column 3 of Table 12)

	Property-related Taxes	Vehicle-related Taxes	Labor-related taxes	Child support and personal donations	Donations to third parties
	(1)	(2)	(3)	(4)	(5)
Working Dummy					
Pensions	0.170	0.799**	-0.002	0.371*	0.309
	(0.200)	(0.379)	(0.209)	(0.245)	(0.236)
Bandwidth	10.15	9.14	10.35	9.19	9.87
Mean (age < 55)	0.34	1.03	0.27	0.22	0.39
Mean (age > 55)	0.41	1.05	0.13	0.29	0.55
Observations	9,357	9,357	9,357	9,357	9,357
Weekly working hours					
Pensions	-0.030	0.224*	0.012	0.094*	0.017
	(0.109)	(0.124)	(0.049)	(0.066)	(0.127)
Bandwidth	9.73	8.39	9.84	9.80	6.84
Mean (age < 55)	0.27	0.33	0.06	0.06	0.21
Mean (age > 55)	0.32	0.35	0.03	0.09	0.26
Observations	9,357	9,357	9,357	9,357	9,357

Note - RDD estimates of the impact of the rural pension on log transformation ($log\ (1 + y)$) of components of other current expenditure. All columns use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A3 Rural Pension and Acquisition of Durable Goods from 2015 On

Item	Estimate	SE	Obs.
Refrigerator	0.285*	-0.127	9,349
Automobile	0.196*	-0.11	9,349
Kitchen table	0.418	-0.533	9,349
Wardrobe/cabinet	0.247	-0.252	9,349
Couch	0.211	-0.392	9,349
Fan	0.144	-0.215	9,349
Stove	0.125	-0.133	9,349
Microwave oven	0.075	-0.078	9,349
Sound-system	0.065	-0.124	9,349
Shower	0.049	-0.125	9,349
Dish-washer	0.04	-0.027	9,349
Electric oven	-0.001	-0.059	9,349
Motorcycle	-0.023	-0.092	9,349
Washing machine	-0.031	-0.083	9,349
Other	-0.047	-0.116	9,349
Water filter	-0.047	-0.082	9,349
Iron	-0.061	-0.107	9,349
TV	-0.072	-0.16	9,349
PC	-0.077	-0.06	9,349
Bicycle	-0.132	-0.089	9,349
Bed	-0.222	-0.28	9,349

Note - RDD estimates of the impact of the rural pension on the number of durable goods acquired from 2015 onward. All regressions use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A4 Rural Pension and Total Stock of Durable Goods

Item	Estimate	SE	Obs.
Automobile	0.272**	-0.128	9,349
Bed	-0.607**	-0.275	9,349
Couch	-1.280***	-0.45	9,349
Sound-system	0.163	-0.159	9,349
Electric oven	0.083	-0.091	9,349
Dish-washer	0.063	-0.039	9,349
Shower	0.041	-0.145	9,349
Refrigerator	0.031	-0.143	9,349
PC	0.016	-0.112	9,349
Microwave oven	-0.006	-0.101	9,349
Washing machine	-0.017	-0.113	9,349
Stove	-0.02	-0.078	9,349
TV	-0.036	-0.153	9,349
Motorcycle	-0.04	-0.118	9,349
Fan	-0.073	-0.229	9,349
Water filter	-0.108	-0.103	9,349
Iron	-0.156	-0.108	9,349
Bicycle	-0.19	-0.125	9,349
Other	-0.247	-0.185	9,349
Wardrobe/cabinet	-0.258	-0.27	9,349
Kitchen table	-0.317	-0.916	9,349

Note - RDD estimates of the impact of the rural pension on the total stock of durable goods. All regressions use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A5 Rural Pension and Probability of Having a Positive Number of Durable Goods

Item	Estimate	SE	Obs.
Automobile	0.210**	-0.094	9,349
Sound-system	0.129	-0.117	9,349
Dish-washer	0.063	-0.039	9,349
Electric oven	0.045	-0.083	9,349
TV	0.021	-0.087	9,349
Fan	0.007	-0.098	9,349
Shower	0.001	-0.104	9,349
Stove	-0.003	-0.026	9,349
PC	-0.011	-0.07	9,349
Motorcycle	-0.017	-0.099	9,349
Washing machine	-0.034	-0.106	9,349
Microwave oven	-0.04	-0.092	9,349
Kitchen table	-0.061	-0.068	9,349
Refrigerator	-0.071	-0.1	9,349
Iron	-0.079	-0.099	9,349
Water filter	-0.081	-0.097	9,349
Bed	-0.09	-0.125	9,349
Wardrobe/cabinet	-0.097	-0.127	9,349
Bicycle	-0.14	-0.1	9,349
Other	-0.167	-0.156	9,349
Couch	-0.241	-0.142	9,349

Note - RDD estimates of the impact of the rural pension on the probability of having durable goods. All regressions use the optimal bandwidth proposed by Calonico et al. (2014). Sample of adult women living in rural areas and that are the head of the household or partner of the head of the household. Robust standard errors in parenthesis. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.