

Alleviating Constraints or Targeting the Unsophisticated? The Government-led Household Credit Expansion in Brazil

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Abstract

From 2011 to 2014, the Brazilian government conducted a heavily advertised major credit expansion program through government-owned banks. Using administrative data on individual-level borrowing and spending, we find that the program led to a substantial rise in borrowing by public sector employees, especially those that were less financially sophisticated. Real interest rates on the debt were high, and they did not fall materially during the expansion. As a result of the borrowing done in the expansion, less financially sophisticated public sector workers experienced higher consumption volatility and lower average consumption through the 2011 to 2016 business cycle. Individuals more likely to face a borrowing constraint did not increase borrowing during the credit expansion.

Keywords: credit booms, payroll loans, credit card expenditure

JEL Classification: D12, D14, E21, E32, G21, G28

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I INTRODUCTION

In the last two decades, household debt in emerging economies has increased substantially. This trend has become more pronounced after the Global Financial Crisis, with levels of household debt-to-GDP ratios approaching those observed in the United States (see Figure I). Governments have played a crucial role in encouraging this increase in credit to households. For example, they have launched large-scale policies to promote access to housing credit in Malaysia, Pakistan, and China, and access to payroll loans in Brazil.

Why would governments promote household credit? Answering this question requires an understanding of the precise mechanisms through which such government-led household credit expansions affect individuals. It may be that such programs affect households by facilitating access to credit in otherwise imperfect markets. In this case, the programs may allow individuals to overcome borrowing constraints and smooth consumption over time. However, governments may use policies to boost consumption, at least temporarily, when the economy declines. If such policies target individuals who are less financially sophisticated, then they may boost consumption in the short run. However, the longer-run consequences of programs that target less sophisticated individuals are less clear.

In this paper we address this question by bringing micro-level evidence from Brazil. Brazil offers a promising laboratory for two main reasons. First, it experienced a large push in credit from government-owned banks from 2011 to 2014. Second, Brazil offers the advantage of an individual-level credit registry covering the universe of formal household debt, from which a representative sample of 12.8% of all borrowers has recently become available at the Central Bank of Brazil (Garber et al. 2019). This data set contains bank debt composition and credit card expenditures at the individual level, and allows us to follow each individual between 2003 and 2016. In addition, using borrowers' unique fiscal codes, we match credit and consumption information with individual characteristics from a large employer-employee data set covering the universe of formal workers.

We start by documenting the household credit expansion efforts of government-owned banks. Government-owned banks – which represent around half of the bank lending market in Brazil – are traditionally instrumental for the implementation of government policies. In 2011, the federal government intervened in the Brazilian banking sector with the objective of boosting borrowing. The intervention included large capital injections into the two largest government banks (Banco do Brasil and Caixa Economica Federal), and policies that facilitated the origination of specific categories of loans – such as payroll loans – to households. The policies were associated with a large rise in advertising by government banks. The effect of these policies is clearly visible in the aggregate data: in the years after 2011 retail credit from private banks stagnated, while government-owned banks started lending more aggressively. While the quantity of credit provided

by government banks increased substantially, the loans were made at high interest rates that did not fall materially during the expansion. As an example, the real interest rate on payroll loans, which were an important driver of the rise in debt, averaged 20% throughout the credit expansion period.

We propose an identification strategy to quantify the effect of the change in government banks' credit policies on individuals' borrowing. These effects are traditionally difficult to estimate because changes in the credit policy on the lender side might be correlated with contemporaneous changes in credit demand by individuals. Building on the empirical literature on the effects of bank liquidity shocks on firm borrowing, we estimate the effect of the change in credit policy by focusing on individuals that borrow from both government banks and private banks, and then studying the relative change in lending from these two types of banks once individual-level credit demand shocks are absorbed. The Brazilian setting is conducive to this approach, as about 20% of individuals in our sample – representing almost 50% of household debt – had credit relationships with both types of banks during the period under study. We find that, during the 2011 to 2014 period of rising credit, government banks increased their lending more than private banks to the same individual, and that this result also holds within different loan categories.

What was the impact of this credit expansion on individual-level outcomes? Answering this question requires us to shift our analysis from the loan-level to the individual-level. To identify the effect of the government-bank credit expansion on individuals, we exploit the fact that the credit expansion was concentrated in certain categories of loans, which traditionally target specific categories of workers. In particular, starting in 2011, the Central Bank of Brazil favored the expansion of payroll loans.¹ Payroll loans are a type of loan that allows banks to deduct payments directly from borrowers' paycheck. As such, individuals with government jobs tend to be the primary target of lenders offering such loans. Thus, we exploit variation in the employer of each borrower as a proxy of her exposure to the increase in payroll lending, and compare public sector with private sector workers around the introduction of the 2011 government credit expansion policies.

Public and private sector workers differ along many observable characteristics, which we document in the data. In addition, public workers are likely to differ also in terms of unobservable characteristics, such as job security or risk aversion. There are three features of our setting that make this a plausible identification strategy. First, the richness of the data allows us to condition on a large set of initial individual characteristics via fixed effects, comparing borrowers with similar initial income, age, education, leverage, pre-existing relationship with government banks, location and occupation. Second, we show that public and private sector workers within these categories display parallel trends in debt-to-income ratio before the introduction of the government credit expansion. Third,

¹This was done by keeping low the risk weights of payroll loans relative to other categories of loans in the computation of reserve requirements of Brazilian banks.

and more importantly, individuals in public sector jobs display lower volatility in their labor income. Data from RAIS for the period 2008 to 2017 shows that public sector workers have, on average, annual labor income that is 7 percent higher with an 11 percent lower standard deviation than private sector workers.² As such, any unobservable impact of job stability should generate a downward bias of our estimates of credit access on consumption volatility.

The results show that public sector workers experienced a significantly larger rise in debt to income ratios as a result of the government credit push of 2011 to 2014. This relative increase was almost exclusively driven by loans originated by government-owned banks, and it was concentrated in the payroll lending segment. Consistent the argument that this relative rise was due to the push by government banks, public sector workers relative to private sector workers actually decreased substantially their borrowing from private banks. However, the relative rise in borrowing from government banks more than offset the decline in borrowing from private banks.

What was the mechanism explaining the rise in borrowing by public sector workers? The traditional channel emphasized in the literature to explain large borrowing responses to a rise in credit availability is borrowing constraints (e.g., Gross and Souleles (2002)). However, in this setting, borrowing constraints were unlikely to be a primary factor. The government bank credit expansion did not explicitly target any specific constraint on borrowing. Furthermore, payroll loans for public sector employees were not difficult to obtain prior to 2011, and observed borrowing on payroll loans prior to 2011 does not bunch against credit limits.

Instead, following the influential work of Lusardi and Mitchell (2014), we focus on financial sophistication. Such a focus is warranted by a number of factors surrounding the government bank credit expansion that began in 2011. As already mentioned, the programs instituted by government banks were associated with large advertising campaigns, which previous research has suggested may be particularly effective in generating a take-up response among less financially sophisticated individuals (e.g., Gurun et al. (2016)). Furthermore, the interest rates on loans were high in Brazil, and they did not materially fall during the period of the changes in government bank credit policy. As mentioned above, the real interest rate on payroll loans averaged 20% during this period. It is difficult to understand why a financially sophisticated individual would suddenly increase highly collateralized borrowing at a high real interest rate in order to boost spending, especially when there is little evidence that the individual was constrained from doing so prior to 2011.

To measure financial sophistication at the individual level, we focus on two individual-level characteristics that are available in the data set: years of education and occupation. Following the methodology in Bustos et al. (2018) and Lagaras (2017), we construct a

²Statistics based on all individuals aged 25 to 55 in the formal labor market between 2008 and 2017

numerical index of occupations based on keywords in the description of the occupation that capture familiarity with finance, statistics, accounting, mathematics and economics. We interact this numerical index of occupational knowledge of financial concepts with years of education to obtain the final measure of financial sophistication at the individual level.

The rise in borrowing by public sector workers was significantly larger among those workers in the lowest quintile of the financial sophistication distribution. While the average increase in the debt to income ratio for all public sector workers from 2011 to 2014 was 2.0 percentage points, it was closer to 5 percentage points for the least financially sophisticated. More sophisticated public sector workers borrowed more from government banks from 2011 to 2014, but they mostly offset the higher borrowing with reduced borrowing from private banks. In contrast, less sophisticated public sector workers did not offset the higher borrowing from government banks. The larger borrowing by less financially sophisticated public sector workers corresponded exactly to the 2011 change in policies by government banks; there is no evidence of a pre-trend.

We also examine whether public sector workers that were more likely to face a binding borrowing constraint borrowed more in response to the government bank credit expansion. To do so, we use a proxy for expected income growth of an individual based on the age and occupation of that individual at the beginning of the credit expansion. The idea behind this strategy is that individuals with a high ratio of future income to present income are more likely to face a binding borrowing constraint. The proxy of expected income growth we construct predicts actual income growth accurately. Using this proxy, we find that public sector workers more likely to face a borrowing constraint in 2011 did not increase borrowing more from 2011 to 2014. In sum, while less financially sophisticated public sector workers boosted borrowing substantially in response to the government bank credit expansion, financially constrained public sector workers did not. This is consistent with the features of the program itself, which did not target a specific borrowing constraint.

A unique advantage of the data set used in this study is the ability to measure consumer spending. Using credit card expenditures as a proxy for spending, we find that less financially sophisticated public sector workers experienced a significantly sharper drop in spending during the recession of 2014 to 2016. The reason for the sharp decline in consumption appears to be linked to the large relative drop in after-debt-service income, which is driven in part to the high real interest rates on the debt. Consistent with the fact that payroll loans were highly collateralized, less financially sophisticated public sector workers did not see larger delinquencies on debt during the recession. Overall, the evidence suggests that this group of the population borrowed aggressively from government banks at high real interest rates from 2011 to 2014, which then led to a sharper drop in consumption during the recession.

Were less sophisticated public sector workers made better off from the additional

borrowing from 2011 to 2014? This is a difficult question to answer, but the overall consumption patterns from 2011 to 2016 suggest that the answer is no. In particular, these individuals experienced a lower level of consumption and higher volatility of consumption over the entire business cycle of 2011 to 2016. This, of course, is partially due to the fact that a recession occurred from 2014 to 2016. Nonetheless, from an ex post perspective, it is difficult to argue that these workers experienced better outcomes, at least in terms of consumption.

Related Literature

Our paper is related to the large literature studying the role of household debt expansions on future economic growth (see Mian and Sufi (2018) for a review). This relationship has been studied at least since the Great Depression in the United States. For example, Olney (1999) shows that the drop in consumption during the early 1930s in the United States was at least in part driven by the large increase in consumer debt of the late 1920s. In particular, in the 1920s the United States experienced a widespread increase in the use of consumer credit, mostly in the form of installment plans to buy durable and semi-durable goods such as automobiles, which is very similar to what occurred in Brazil from the mid-2000s (Garber et al., 2019). Olney (1999) argues that it was the combination of increased debt-to-income ratios and the punitive consequences of default to push households towards the only available alternative: reduce consumption. Similarly, Brazil introduced a set of reforms in the mid-2000s that facilitated the repossession of collateral and made default more costly for individuals.³ There are other parallels between the two experiences suggesting that the channel at work might be similar. In particular, both Brazil in 2015-16 and the US during the Great Depression did not experience a significant surge in consumer credit defaults when the crisis hit, making lower spending the only alternative available to households.⁴ We contribute to this literature by presenting – to the best of our knowledge – the first individual-level evidence on the relationship between household debt booms and future consumption from a developing country.

The paper is also related to the micro literature on the real effects of access to credit for individuals. A large literature has emphasized the benefits of increasing access to credit, which can allow individuals to better smooth consumption and income shocks (Townsend, 1994), or to start entrepreneurial projects if credit-constrained (Banerjee and Duflo, 2010).

³See, for example, the 2004 reform that facilitated the repossession of cars on defaulting borrowers studied in Assunção et al. (2013) and the 2004 new Fiduciary Law, which facilitated the repossession of houses from borrowers that stop making mortgage payments. In addition, the diffusion of payroll lending implied that interest and principal payments were deducted directly from monthly salary payments.

⁴Another interesting parallel is the large use of consumer credit among public sector employees in both cases. As reported in Olney (1999): “41 percent of the 506 families of federal employees whom the BLS surveyed in 1928 bought a good on installments” (US Bureau of Labor Statistics 1929). This share was about 25 percent among the families surveyed by the BLS in a nationwide survey in 1935-36. Similarly, in this paper we will show that payroll lending by Brazilian banks targeted public sector employees in particular.

However, increased access to credit can also have negative effects on individuals' welfare. For example, in models with time-inconsistent preferences and hyperbolic discounting, individuals might borrow to increase current consumption even when this is not a welfare-improving decision in the long run (Laibson 1997, Ausubel 1991). Consistent with this idea, the literature on payday lending has shown how access to (high-interest) credit can actually exacerbate economic hardship, and it argues that a potential mechanism is individuals' overconfidence in their ability to generate future income and to repay their debt (Melzer 2011). Another stream of the literature on payday lending has noted that low-income individuals might also have low financial literacy, and thus might be less likely to fully understand how interest rates and fee structures will affect their disposable income (Bertrand and Morse 2011). Similar to the setting studied by the payday lending literature, individuals in our sample operate in a high interest rate environment, in which low financial sophistication can have important real effects.

Finally, our paper sheds new light on the role of government in amplifying and prolonging household debt booms, a role that has become prominent in several emerging economies following the global financial crisis. In this sense, our paper is also related to the literature on the role of government – and state-owned banks in particular – in credit markets (La Porta et al., 2002). This literature has documented that lending decisions by government controlled banks often respond to political influence (Sapienza, 2004) and that their credit allocation decisions can have real effects in the local economy (Carvalho, 2014).⁵ Consistent with the results presented in this paper, the role of government banks tends to become more prominent in periods before competitive elections (Cole, 2009). We contribute to this literature by documenting the role of government banks in amplifying household debt boom cycles and their effect on future economic growth.

The rest of the paper is organized as follows. Section II describes the matched credit registry and employer-employee data set used in the analysis. Section III explains the government intervention in household credit markets in 2011, and it also presents the individual fixed effects specifications to show the effect on borrowing. Section IV presents the results on the rise in debt, Section V discusses and test empirically potential mechanisms – namely financial sophistication and borrowing constraints, and Section VI studies the real effects of exposure to the government credit expansion on after-debt-service income, default and consumption. Section VII provides concluding remarks.

II DATA

The main data sources for this paper are the Credit Information System of the Central Bank of Brazil (SCR) and the Annual Social Information System of the Ministry of Labor (RAIS). The Credit Information System was launched in 2003 by the Banco Central do

⁵On the role of government-owned banks in Brazil see also Coelho et al. (2013) and Lundberg (2011).

Brasil (BCB) and records information on all credit relationships between individuals and Brazilian banks.⁶ The data are transmitted monthly from financial institutions to the BCB, and cover all credit relationships of those individuals that have a total exposure with a financial institution above a given reporting threshold.⁷ In the period between 2003 and 2016, this credit registry contained information on about 117 million unique individuals. In an effort led by the Research Department of the BCB, we extracted a random sample of 15 million individuals – 12.8% of all those ever to appear in the Credit Information System in this period – along with all their transactions recorded in the dataset.⁸

Figure II, panel (a), reports the number of individual borrowers in the credit registry as a whole (solid black line) and in our sample (dashed black line).⁹ As shown, there are two breaks in the time series of number of borrowers, corresponding to the reductions in the reporting threshold that occurred in 2012 and 2016. As threshold reductions can affect client composition, we impose a constant 5,000 Brazilian Real (BRL) reporting threshold throughout the 2003 to 2016 period. Figure II, panel (b), reports the number of individual borrowers in the threshold-adjusted sample, scaled by the sampling weights. An individual is included in this sample if at least one of their banking relationships has a balance of at least 5,000 BRL in a given year. As shown, our sample represents a population of about 7 million borrowers in 2003, which grew to almost 40 million borrowers by 2016. We also report this number as a share of the adult population in Brazil, intended as individuals 20 years old and above.¹⁰ As shown, access to formal credit for Brazilian households has increased substantially in the last two decades. By the end of the period under study in this paper, around a quarter of all adults in Brazil were borrowing from banks a balance of at least 5,000 BRL.

The credit registry also reports information on the types of loans. The loan categories covered in the credit registry include: mortgages, car loans, payroll loans, non-payroll personal loans, current account overdrafts, credit card debt, rural loans and a residual category which we label “other loans”. During the 2011-2016 period, the key period studied in our empirical analysis, the three main loan categories in terms of share of household debt in Brazil were: mortgage loans – representing on average 32% of total

⁶The Credit Information System is a confidential dataset of the BCB. The collection and manipulation of individual loan-level data were conducted exclusively by the staff of the BCB.

⁷The reporting threshold has changed over time: 5,000 BRL (around 1500 USD) in the period between January 2003 and December 2011, 1,000 BRL (about 500 USD) in the period between January 2012 and May 2016, 200 BRL (60 USD) in the period starting in June 2016.

⁸In particular, we acknowledge the participation of Sergio Mikio Koyama and Toni dos Santos in this process. The extraction of this sample – initially done for Garber et al. (2019) – is intended to facilitate the use of the Credit Information System in future research.

⁹In the same Figure we also report the number of clients in the sample scaled by a factor of 117/15 for comparability with population totals (dashed red line). The scaling number is population size divided by sample size, both expressed in number of individual clients across all periods.

¹⁰The number of adults is sourced from the 2000 and 2010 Brazilian Population Censi. We use a linear interpolation for years between the 2000 and the 2010 Census, and a linear projection for years post 2010.

household debt – followed by payroll loans and car loans, each representing about 18% of total household debt. Rural loans are another important category – with about 15% of total household debt – although they are issued in a highly regulated market mostly in the rural areas of the country and almost exclusively originated by government banks. The remaining categories, including non-payroll consumer loans, credit card debt, overdraft, and other loans together account for the remaining 17% of total household debt.

The Credit Information System uniquely identifies the borrower in each credit relationship using the fiscal code. This allows us to match credit relationships of each borrower with data on individual characteristics from the Annual Social Information System (RAIS). RAIS is an employer-employee dataset covering all formal workers employed in Brazil.¹¹ We use RAIS to extract information on individual annual labor income (SCR has limited information on income) as well as gender, age, education, sector and occupation of each borrower.

III HOUSEHOLD CREDIT EXPANSION BY GOVERNMENT-OWNED BANKS

III.A THE CREDIT EXPANSION POLICY

Government-owned banks represent around half of the bank lending market in Brazil (Coelho et al., 2011). The two largest ones are Banco do Brasil and Caixa Economica Federal, which are controlled by the federal government. Traditionally, these two banks are responsive to government influence and play an important role in the implementation of its policies.

Figure III shows the evolution of total household debt in Brazil between 2003 and 2016, in billions of inflation-adjusted Brazilian reais (panel a) and as a share of the country GDP (panel b). Overall, Brazil experienced a substantial increase in household debt since the early 2000s, which increased from 5% to more than 20% of the country GDP at the end of the sample. We split total household debt between debt originated by government vs private banks.¹² As Figure III shows, in the last phase of the boom period – between 2011 and 2014 – government-owned banks expanded credit to households, while private banks lending as a share of GDP slowed down or even contracted.

The timing of this differential increase in bank lending between government and private banks coincides with the introduction of a set of interventions by the federal government in

¹¹Employers are required by law to provide detailed worker information to the Ministry of Labor. See Decree n. 76.900, December 23rd 1975. Failure to report can result in fines. RAIS is used by the Brazilian Ministry of Labor to identify workers entitled to unemployment benefits (*Seguro Desemprego*) and federal wage supplement program (*Abono Salarial*).

¹²We classify banks as government controlled or private based on the the BCB database of financial institutions characteristics (Unicad). Government controlled banks include those controlled by the federal government (e.g. Banco do Brasil, Caixa Economica Federal) and those controlled by states (e.g. Banrisul). Privately controlled banks include private domestic banks, private foreign banks, private banks with mixed control (domestic/foreign) (e.g. ITAU, Bradesco, Santander).

the Brazilian banking sector aimed at increasing the flow of credit in a sluggish economy. These interventions were carried out by the Treasury Department and the Central Bank.

Between 2011 and 2012, the Treasury Department made a set of large capital injections into government-owned banks Caixa and Banco do Brazil.¹³ It also promoted a campaign – led by the same government-owned banks – to reduce bank spreads following the reduction of the reference interest rate by the Central Bank.¹⁴

In the same period, while the Central Bank started increasing risk weights of long-term loans to households (loans with maturity above 60 months) due to concerns about their increase, it also maintained relatively low capital requirements for specific categories of such loans.¹⁵ In particular, exceptions were made for rural loans, car loans, mortgages, and payroll loans. In November of 2011, the Central Bank decreased the risk weights for payroll loans with maturity between 36 and 60 months, a category that encompasses about a third of payroll loans observable in our data, which likely increased the banks’ ability to originate this type of loans.¹⁶

Corresponding to these interventions, in April of 2012, government banks launched two flagship programs to market new credit availability to Brazilian households: “Bom-pratodos” (“Good for everyone”) by the Banco do Brasil and “Caixa Melhor Credito” (“Better Credit”) by the Caixa Economica Federal. The programs targeted both Brazilian households and firms, claiming to offer credit at lower interest rates, longer maturities, and higher credit limits than those available in the market at the time.

The new credit availability was publicized via widespread advertising campaigns. Data from the annual reports of the two banks show that advertising and marketing expenses increased sharply after 2011. As shown in Figure IV, advertising and marketing expenses were about 300 million BRL for both Banco do Brasil and Caixa Economic Federal in 2010. These expenses increased to 500 million and 800 million BRL respectively in the following 3 years.

In addition, there was an increase in the use of individuals working as bank correspondents – called *pastinhas* in Portuguese – that promoted and sold loans to households. Bank correspondents were particularly active in the generation of payroll loans, and they received an origination fee from the lender for every new loan that they generated. This raised concerns – which were explicitly stated by the Brazilian Financial Stability Committee – about predatory practices pushing customers to take on too much debt, especially

¹³More specifically, the Brazilian government injected about 6.7Bn R\$ (approximately 3.7Bn USD) into Caixa and BNDES (the government development bank) between 2011 and 2012, while Banco do Brasil received a 8.1Bn R\$ (approximately 4Bn USD) injection in 2012.

¹⁴The pressure by the federal government on major state-owned banks to lower bank spreads in an attempt to push private banks to follow was largely covered in Brazilian media at the time. See, for example, Silva Júnior (2012) and O Globo (2012).

¹⁵Regulation on capital requirements in Brazil establishes that banks should hold equity capital equal or higher than 11% of their risk weighted assets. See *Circular* 3360, 2007, Central Bank of Brazil.

¹⁶See *Circular* 3563, 2011, Central Bank of Brazil.

low-income customers with low financial education.¹⁷

These government interventions in credit markets occurred at the beginning of the presidency of Dilma Rousseff in 2011, and lasted until the following presidential election in 2014. The role of government-owned banks in expanding credit in Brazil became an important topic in the debates between the two main presidential candidates during the 2014 electoral campaign. The incumbent president Dilma Rousseff defended the government initiatives of the previous three years, while her opponent – Aécio Neves – argued in favor of a smaller government role in Brazilian financial markets (Màximo, 2014).

It is importance to recognize that the government bank credit push was not implemented through a lifting of borrowing constraints. For example, there was no increase in credit limits, and no loosening of restrictions on debt-to-income or loan-to-value ratios. In the language of Justiniano et al. (2019), the program was not a loosening of borrowing constraints but instead was a loosening of lending constraints. This feature is important when discussing the mechanisms responsible for the rise in household borrowing, which is done in Section V below.

III.B IDENTIFYING THE EFFECT OF GOVERNMENT-BANK CREDIT EXPANSION

What was the effect of the government-owned bank credit expansion on household borrowing? This sub-section proposes an identification strategy to quantify the effect of the credit push by government banks on individuals' credit take up. These effects are traditionally difficult to estimate because changes in bank credit origination policy might be correlated with contemporaneous changes in credit demand by individuals. To overcome this challenge, we build on the empirical literature studying the effects of bank liquidity shocks on firm borrowing (e.g. Khwaja and Mian 2008), which identifies such effects by focusing on firms borrowing from multiple banks that are heterogeneously exposed to a liquidity shock. Similarly, in our setting, we focus on individuals that borrow from multiple banks that are heterogeneously exposed to a change in credit expansion policies.¹⁸

The aggregate data reported in section III.A shows that, during the 2011-2014 period, government banks experienced faster growth in credit to households than private banks. The timing of this differential expansion in credit between bank types is consistent with government banks responding more promptly to the set of policies launched by the

¹⁷References to the risks associated with the bank correspondent model, especially when it comes to the origination of payroll loans, can be found in the minutes of several meetings of the COMEF (the Financial Stability Committee) starting in 2011 and up to 2013. For some relevant examples, see the minutes of the COMEF meetings from September 2011 up to May 2013.

¹⁸Our empirical approach in this section is similar to that in Jensen and Johannesen (2017), which study the effect of the 2007-08 financial crisis on credit supply to households using data on multi-lender individuals from Denmark. See also Chava et al. (2018), which focus on individuals with credit cards from multiple banks to study the effect of bank funding shocks on credit limits.

Brazilian government in 2011. However, this pattern would also be consistent with a differential increase in credit demand from clients of government banks relative to clients of private banks. To make progress on this front, we focus on individuals borrowing from both private and government-owned banks, and estimate the following specification:

$$\left(\frac{debt}{income}\right)_{ibt} = \alpha_{it} + \alpha_b + \sum_{k \neq 2003} \beta_k 1_{t=k} Gov_b + u_{ibt} \quad (1)$$

The outcome variable in equation (1) is the debt balance of individual i with bank b in year t , divided by the annual labor income of individual i . To estimate this specification we first collapse the data at the bank-individual level. Thus, each observation is a bank-individual relationship, which we hereafter refer to as a loan. The variable Gov_b is a dummy equal to one for government controlled banks, and zero for private banks. This dummy is interacted with calendar year dummies. Our coefficients of interest are the β_k , which capture the difference in borrowing from government vs private banks in a given year, normalized by an individual's labor income. The specification includes individual fixed effects interacted with calendar year fixed effects, so that the identifying variation of the coefficients of interest comes from within-individual differences in borrowing between bank types. We exclude the interaction between the dummy Gov_b and the dummy capturing the year 2003, effectively using that year as the reference year for the estimated β_k . We include bank fixed effects to absorb any time invariant characteristics of loans originated by a specific banks. Standard errors in this specification are clustered at the lender level, and we have about 1500 lenders in our data.

The results of estimating equation (1) are reported in Figure V. The figure shows that the estimated β_k is small in magnitude and not statistically different from zero at standard levels of significance until 2011. This implies that in the early years of our sample, government banks did not differentially expand credit relative to private banks. In the period between 2011 and 2014, the estimated β_k increase in magnitude from about 0.05 to about 0.15, and then stabilize at this level. The magnitude of the coefficients imply that, after 2011, government controlled banks increase their lending by about 10 percentage points more than privately controlled banks to the same individual, where the estimated coefficient should be read as a share of the income of the borrower. The results reported in Figure V indicate that government banks significantly accelerated credit originations to Brazilian borrowers in the post-2011 period, which is consistent with the timing of the government policies described in section III.A. Although not statistically significant, a positive increase in credit from government banks is already visible starting from the global financial crisis years (2009-2010). This early change in the trend could be explained by the different government support (actual or perceived) that these two types of banks received during the crisis.

Next, we quantify the differential increase in government lending between 2011 and

2014 with the following specification:

$$\Delta \left(\frac{debt}{income} \right)_{ib,2011-2014} = \alpha_i + \beta Gov_b + u_{ib} \quad (2)$$

The outcome variable in equation (2) is the change in lending from bank b to individual i between 2011 and 2014, as a share of labor income of individual i , α_i captures individual fixed effects and Gov_b is a dummy equal to 1 if the lender is a government controlled bank.

The results are reported in Table I. We start in column (1) by estimating equation (1) without individual fixed effects. The estimated coefficient indicates that loans from government controlled banks relative to income experienced an 11.6 percentage points larger change in the 2011-2014 period relative to loans from privately controlled banks. Next, in column (2), we add individual fixed effects to our specification, effectively absorbing any individual level shocks to credit demand. The magnitude of the estimated coefficient in column (2) is similar to the one observed in column (1), indicating that, for this sample of individuals, credit demand shocks of borrowers are uncorrelated with government ownership of lenders. The R^2 of the regression increases by a factor of nine. Individual fixed effects add statistical power, but their inclusion does not affect the coefficient of interest. This suggests that omitted unobservable selection is not responsible for the positive coefficient on Gov_b (e.g., Altonji et al. (2005), Oster (2019)).

Notice that the estimate in column (2) includes individuals that started new credit relationships during the 2011-2014 period. That is, the estimated coefficient in column (2) captures both the intensive and the extensive margin variation in debt-to-income. To avoid potential concerns related to endogenous opening of credit relationships with new lender types, in columns (3) and (4) we restrict our sample to individuals with active credit relationships with both government and private banks in the baseline year 2011. As shown, the estimated coefficient on government banks remains positive and statistically significant. In terms of magnitude, the estimate in column (4) is around one-third of the estimate in column (2). This implies a lower impact of government credit expansion on the debt-to-income ratio of individuals that were already borrowing from different types of banks in 2011, potentially because these individuals were likely to already have higher initial leverage.

Finally, in column (5) of Table I, we collapse the data at the individual-bank type level, effectively creating two observations for each individual. This specification can be thought of as a weighted version of the specification in column (4), in which each bank relationship is weighted by the monetary value of the balance between bank b and individual i . This is the appropriate weighting in our view given that the interventions were designed to increase lending by government banks. The magnitude of the estimated coefficient β in this specification increases to 0.14.

In the analysis so far, we aggregated all loan types from a given bank to a given indi-

vidual in a single outcome variable. However, the credit registry data includes information on the type of each loan. The loan categories covered in the credit registry include: car loans, payroll, non-payroll personal loans, mortgages, current account overdrafts, credit card debt, rural loans and a residual category which we label "other loans". Information on loan types allows us to compare the differential increase in lending between government and private banks to the same individual and within the same loan category.

The results of this analysis are reported in Table II and Figure VI. Column (1) reports the estimated coefficient on the government bank dummy when the outcome variable is the change in total debt to income, replicating column (4) of the previous table. Then, in columns (2) to (7) we report the estimated coefficients on the government bank dummy when the outcome variables are the changes in each specific type of loan over income in the 2011-2014 period. The results show that the differential increase in credit supply from government banks to the same individual is present also when comparing credit relationships of the same type. The results are particularly strong for payroll loans, which account for around 60 percent of the differential variation in debt-to-income growth between government and private banks, and car loans. Notice that the relevant variation in this analysis relies on individuals that took two loans of the same type from two types of banks during the 2011-2014 period. As variation across bank types is limited when we focus on mortgages and rural loans, we lack power to estimate the effects for these two categories.¹⁹

Our analysis in this section relies on multi-lender borrowers. Thus, it is important to provide descriptive statistics on this selected sample and how it evolved over time. Figure VII, panel (a), reports the number of borrowers in our sample in three categories: borrowers of private banks only, borrowers of government banks only, and multi-bank type borrowers, which we define as those with positive balance from at least one government bank and one private bank. As shown, the number of multi-bank type borrowers has been increasing over time during the period under study, from 12 percent of borrowers in 2003 to about 20 percent in the last years of our sample. The figure also shows how the number of individuals borrowing only from private banks stagnated in the post 2011 period. This number increased from 4 to 19.5 million individuals between 2003 and 2011, and then increased only from 19.5 to 21 million individuals between 2011 and 2014. On the other hand, the number of individuals borrowing from government banks (either exclusively or in combination with private banks) increased from 10 million individuals in 2011 to about 17 million in 2014. Figure VII, panel (b), reports the total balance of each of the three groups of borrowers. In terms of balances, multi-bank type borrowers are the largest category, representing between 40 and 50 percent of all household debt in Brazil during the period under study.

¹⁹The vast majority of mortgage loans and rural loans in Brazil are originated by government banks.

IV THE RISE IN HOUSEHOLD DEBT

IV.A IDENTIFICATION STRATEGY FOR INDIVIDUAL-LEVEL BORROWING

What was the impact of the government-driven expansion in credit availability on individual-level debt levels? Addressing this question requires a shift from loan-level to individual-level data. The results presented in section III.B use loan-level data to show that, in the 2011-2014 period, government controlled banks started lending more than private banks to the same individual. However, these results are not informative of the effect of credit expansion by government banks on the aggregate indebtedness of an individual. This is because a relative expansion of credit from government banks could have happened at the expense of credit from private banks, leaving individual indebtedness unchanged.

To make progress on this front, we propose an individual-level measure of exposure to the credit expansion by government-owned banks in the post-2011 period. To construct this measure, we exploit the fact that the credit expansion was concentrated in certain categories of loans, which traditionally target specific categories of workers. As discussed in section III.A, starting in 2011, the Central Bank of Brazil favored the expansion of payroll loans by reducing their risk weights relative to other categories of loans in the computation of reserve requirements of Brazilian banks. This is consistent with the estimates presented in Table II, which show that the relative credit expansion of government banks was particularly strong within payroll loans. Payroll lending allows banks to deduct payments directly from the borrower’s paycheck. Due to this feature, payroll lending traditionally tends to target public sector workers. This is because these workers are considered to have higher job security, and therefore lower default risk for the financial institutions that collect debt service payments directly from their paycheck.²⁰

We argue that the expansion of credit in the payroll lending segment affected public sector workers relatively more than private sector workers. To test this argument empirically, we extract information on the sector of employment for each borrower from the employer-employee data set RAIS. We classify as public sector workers those individuals employed by public administration, which includes personnel of local and federal government administrative bodies, judicial system, defense and law enforcement.²¹ Dur-

²⁰Retirees from the public pension system are also targeted since their pension income is considered stable by lenders. In December 2003 Brazil passed a new law regulating the use of payroll loans also for private sector employees and private sector social security beneficiaries. Lenders authorized by the social security administration of the Brazilian government were able to collateralize loans using the wages of workers paying into the social security system, as long as the total payments were no more than 30% of the borrower’s income. Coelho et al. (2012) show that the introduction of this law led to a large increase in payroll lending and a substantial decline in interest rates.

²¹More specifically, we define this variable using the legal classification (“*natureza jurídica*”) of the employer of each borrower. We classify as public sector workers those employed by firms whose legal classification is “public administration”.

ing the period under study, public sector workers represent, on average, 21 percent of formal workers registered in our data. The most represented occupations among public sector workers include administrative assistants, secretaries, teachers, cleaning services providers, and building management and maintenance personnel.

Public and private sector workers differ along many observable characteristics, which we document in the data. Table III reports unconditional averages of gender, years of education, age, exposure to government banks, labor income and debt-to-income ratios for private sector and public sector workers in the baseline year 2011. As shown, we find significant differences at baseline. In particular, public sector workers are 21 percent more likely to be female, have on average 0.89 more years of education, are around 5 years older and have a 19.3 percentage point higher share of borrowing from government-owned banks at baseline. The average monthly wage of public sector workers is around 688 BRL higher (18%) than the average monthly wage of formal private sector workers, while their average debt-to-income ratio is significantly lower. Of course, public workers are also likely to differ from private sector workers in terms of unobservable characteristics, such as job security or risk aversion.

By construction, employment in the public sector is not randomly assigned in our sample of borrowers. However, there are three features of our setting that make this a plausible identification strategy to answer our research question. First, the richness of the data allows us to condition on a large set of initial individual characteristics via fixed effects. In our empirical analysis we control for all the individual observable characteristics reported in Table III. In addition, we augment the estimating equation with fixed effects for the micro-region and the occupation of the worker. The information on occupations reported in RAIS is extremely detailed, covering 2,163 occupational categories. This allows us to compare workers operating in the public sector with workers operating in the private sector that are effectively performing the same job within their firms. For example, this allows us to compare a secretary employed in a local administrative body with another secretary employed in a local private company. Second, we show that public and private sector workers within these categories display parallel trends in debt-to-income ratios before the introduction of the government credit expansion. Third, and most importantly, individuals selecting into public sector jobs are likely to display lower volatility in their labor income and, thus, in their consumption. As such, it is plausible that any unobservable impact of job stability should generate a downward bias of our estimates of credit access on consumption volatility.

IV.B EXPOSURE TO CREDIT AVAILABILITY AND INDIVIDUAL INDEBTEDNESS

To measure the degree to which public sector workers boosted borrowing in response to the rise in government bank credit availability, we estimate the following equation at

the individual-level:

$$\Delta \left(\frac{\text{debt}}{\text{income}} \right)_{i,2011-2014} = \alpha + \gamma 1(\text{Public})_{i,2011} + \Gamma X_{i,2011} + u_i \quad (3)$$

where the outcome variable is the change in the ratio of total balance across all banking relationships over labor income between 2011 and 2014 for individual i , and $1(\text{Public})_{i,2011}$ is an indicator function that takes value 1 if individual i was a public sector worker in 2011, and 0 otherwise. When estimating equation (3) we include fixed effects for age and income quintiles, education level, gender, micro-region and occupation. We also include the individual-level controls reported in Table III: initial debt-to-income ratio and share of initial borrowing from government banks. Standard errors are clustered at micro-region level (there are 558 micro-regions in Brazil).

The results are reported in Table IV. Column (1) shows that public sector workers experienced a 2 percentage points higher increase in their debt-to-income ratio relative to private sector workers between 2011 and 2014. This corresponds to 17 percent of the average increase in debt-to-income ratio between 2011 and 2014 across all individuals in our sample (11.8 percentage points). As shown in columns (2) and (3), this effect is driven by an increase in debt from government-owned banks. The magnitude of the coefficients indicates that larger borrowing from government banks partly crowds out borrowing from private banks, but it also generates a net increase in total borrowing as a share of income at individual level. In columns (4) to (6), we show that these results are even larger when normalizing the change in individual borrowing with 2011 income. This indicates the effect is largely driven by differential changes in borrowing rather than differential changes in income.

Next, in Table V, we study the effect of being employed in the public sector on individual indebtedness by loan category. The results show that a differential increase in payroll loans is the main driver of the differences in the change in debt-to-income ratios across different types of workers. Payroll loans to public sector workers increased by 3.6 percentage points more than for private sector workers, as a share of individual income. For other loan categories we find either non-significant or very small effect of public employment on credit take up.

V BORROWING CONSTRAINTS OR FINANCIAL SOPHISTICATION?

V.A EXPLORING MECHANISMS

What explains the borrowing response of Brazilian public sector workers to the government bank credit expansion of 2011 to 2014? What was the mechanism that led to a large response? Recall that the effects are largest among payroll loans to public sector

workers, a feature that we take into account in the analysis below.

A typical explanation for a large response in borrowing during a credit expansion is that households faced borrowing constraints that were loosened by the expansion itself (e.g., Gross and Souleles (2002)). However, as already mentioned in Section III.A, the set of interventions by the government did not change any explicit limits on borrowing. Furthermore, a closer look at the nature of the expansion by government-owned banks in Brazil casts doubt on this borrowing constraint view.

For example, the grand majority of public sector workers do not appear to have been constrained from borrowing more via payroll loans prior to the expansion of 2011. Among individuals that had a payroll loan prior to 2011, very few were up against the constraint imposed by government policy. Recall from above that lenders were able to collateralize loans using the wages of workers paying into the social security system, as long as the total payments were no more than 30% of the borrower's income. But as Figure VIII shows, very few individuals were near this constraint. Among the borrowers in our sample, only 5% of those with a positive balance in their payroll loan were close or at the 30% limit.²² Furthermore, while the government bank credit expansion involved a major advertising push and a large relative increase in lending by government owned banks, there was no change to the limit on payroll loans as a fraction of borrower income. In short, the policy did not explicitly loosen a borrowing constraint that was prevalent in the payroll loan market.

In addition, it should be taken into account that interest rates on payroll loans remained high during the entire period of the credit expansion. Figure IX reports the average annual interest rate and maturity on existing loans originated by government banks and private banks between 2008 and 2016. We present these statistics separately for the four main categories of loans in our sample: payroll, car loans, mortgages and non payroll personal loans. To partially account for borrower quality, all panels in this figure are constructed conditioning on multi-bank type borrowers: that is, individuals who in a given year have a positive balance with both a government and a private bank. As the figure shows, after accounting for inflation (about 6% per year in this period) average interest rates for certain loan categories are extremely high in Brazil by international standards. For example, real interest rates on payroll loans were on average around 20% between 2011 and 2016. Furthermore, the data indicates that government banks did not sharply reduce interest rates relative to private banks during the 2011 to 2014 period as they expanded credit.

Why did public sector workers borrow substantially in response to the expansion of credit by government owned banks, despite the fact that the borrowing was expensive and no explicit borrowing constraint was removed? We are motivated by a number of reasons to focus on financial sophistication as an important mechanism. First, the importance of

²²We consider as close to the limit a balance of 25% or more of the borrower's monthly income.

financial sophistication in consumer credit settings is highlighted by the survey article of Lusardi and Mitchell (2014), who conclude that: “despite the spread of such financially complex products to the retail marketplace, including student loans, mortgages, credit cards, pension accounts, and annuities, many of these have proven to be difficult for financially unsophisticated investors to master.” Over the past decade, low financial sophistication has emerged as a leading explanation for the response of individuals to a rise in credit availability.

Second, as already mentioned above, the credit push by government banks was associated with a large and sustained increase in advertising. The link between advertising and financial sophistication has been studied in Gurun et al. (2016), who find that lenders that advertise more sell more expensive mortgages, and that this effect is particularly strong among less sophisticated consumers. In a survey article on financial literacy, Hastings et al. (2013) cite a number of research studies showing how advertising is often used to persuade consumers into expensive products instead of trying to inform them about the best deal.

Third, there is evidence that the Central Bank itself was concerned with excessive credit expansion among less financially sophisticated households. In 2012, the Financial Stability Committee of the Central Bank of Brazil (COMEF) recognized that the rapid increase in the share of income devoted to debt service payments among Brazilian households signaled the need for higher investments in financial education, especially for the low-income section of the Brazilian population.²³ The issue of credit expansion among less sophisticated households was also linked to the large increase in the number of bank correspondents, or *pastinhas*, described in section III.A. Based on these concerns, in the same year, the Central Bank created a specific department dedicated to promoting financial education among the Brazilian population.

V.B MEASUREMENT

To test for the underlying mechanism responsible for the rise in household borrowing, we explore cross-sectional heterogeneity across public sector workers in their borrowing response. We construct a measure of financial sophistication and a measure of the likelihood of an individual facing a borrowing constraint.

The proxy for financial sophistication starts from two individual-level characteristics that are observable in the employer-employee dataset RAIS: years of education and occupation. In particular, we use textual analysis of the description of the tasks associated with the more than 2,500 occupations contained in the RAIS data to construct an occupation-level proxy of basic knowledge of financial concepts. Following the methodology in Bustos et al. (2018) and Lagaras (2017), we proceed in three steps. First, we digitize the text

²³See on this the conclusions of the September 2012 COMEF meeting.

containing the official description of the tasks associated with each occupation as provided by the Ministry of Labor. Second, we define a set of keywords or combination of keywords that aim at capturing the familiarity required by each occupation with basic concepts in five areas: finance, statistics, accounting, mathematics and economics.²⁴ Lastly, we run a text analysis that counts the occurrence of such keywords in the description of each occupation.

Using this methodology we generate an index of familiarity with financial concepts that ranges from 1 to 6. The index is equal to 1 if no keyword is found in the description of an individual occupation. The index increases by one unit if we find at least one keyword related to one of the five areas described above. For example, if the occupational description includes keywords related to the finance and accounting areas, the index will increase by two units. Finally, to construct the individual-level proxy of financial sophistication we interact the number of years of education with the index of familiarity with financial concepts. Since we do not observe the field of study of each individual in our data, the rationale of this interaction is to give a higher “weight” to years of education of individuals whose occupations tend to require some knowledge of basic financial concepts.

In order to measure borrowing constraints, the existing literature has used several potential proxies including credit scores and available credit from credit cards and home equity lines (Mian and Sufi, 2011; Baker, 2018). These proxies are either not readily available in our setting or potentially problematic to interpret. In particular, the Brazilian credit registry does not contain detailed credit scores, the use of home equity lines in Brazil is extremely limited, and the previous literature has shown that credit card utilization correlates with higher frequency of financial mistakes (Jørring, 2020).

As a result, we propose a different measure of individuals likely to face a binding borrowing constraint based on individual-level proxies of future income growth. The permanent income hypothesis states that individuals will attempt to smooth consumption by borrowing when they are young and their future expected income is high. However, if lenders impose a constraint on individuals based on their current available resources, then individuals with a high ratio of future income relative to current income are more likely to face a binding constraint relative to individuals with a low ratio. All else equal, an individual with more of their total income coming in the future is more likely to face a binding borrowing constraint. If the government bank credit expansion in Brazil lifted borrowing constraints through some channel unobserved to us, we would expect individuals with higher expected income growth to see a relative rise in borrowing, after controlling for measures of current income and current consumption.²⁵

²⁴The list of keywords include the following groups of Portuguese words: “financeir*”, “estatistic*”, “conta*”, “matemática*”, “economi*”, which are supposed to capture familiarity with tasks related to finance, statistics, accounting, mathematics and economics. The “*” indicates that we include the masculine/feminine and singular/plural versions of the same word in Portuguese.

²⁵The logic of this test is closest to the discussion in Zeldes (1989) and Deaton (1991). There are,

We define this expected increase in future income as the *income slope* of each individual. We construct a proxy of the income slope for the individuals in our sample in three steps. First, we use data on all full-time workers employed in Brazil in the baseline year 2011. Next, for each of the 2,500 occupations recorded in RAIS, we estimate a set of linear regressions of wages on years of age. In particular, we estimate separate regressions of log average wages on years of age in which we progressively restrict our sample to older and individuals based on age ventiles. To illustrate this procedure, let us take an example based on a specific occupation: administrative assistants. To estimate the income slope of individuals employed as administrative assistants that are in the first ventile of age (i.e. those aged between 18 and 20), we estimate a regression of log wage on years of age using all administrative assistants in the data. Next, when estimating the income slope of administrative assistants in the second ventile of age (i.e. those aged between 21 and 22), we estimate the same regression but restricting the sample to administrative assistants aged 21 and older. We repeat this procedure for each ventile, progressively focusing on older and older workers in the data. We include in all these regressions state fixed effects, to account for differential income slopes for the same occupation in different regions of the country. In the third and last step, we loop this procedure across all 2,500 occupations recorded in RAIS, and save the estimated slopes for each occupation and age ventile. This procedure generates occupation-age ventile specific slopes that we then merge with our sample of borrowers.

Figure X summarizes the outcome of the procedure described above. In this figure, we plot the average income slope across all occupations for each age ventile, along with the 25th and 75th percentile of the income slope distribution. As shown, labor income slopes are the highest for younger individuals, they tend to decline over time with age as individuals reach the maximum attainable wage in their profession, and then become close to zero (on average) when workers are in their late forties. We also perform an external validity test in which we study whether the estimated income slopes indeed predict future income growth for formal workers – including both public and private sector ones – in Brazil. Notice that we estimate income slopes using variation across workers of different ages in 2011. Thus, testing how this measure predicts income growth after 2011 is an out of sample validation of the measure. The results are reported in Table VI. In Panel A we estimate to what extent income slopes computed in 2011 predict annual average income growth between 2011 and 2014, while in Panel B we look at annual average income growth between 2011 and 2017. If income slopes are a good predictor of future income growth, we expect a coefficient close to 1 in these regressions, which is indeed what we find. Notice also how the income slope measure tends to be a better predictor of future income growth

of course, reasons other than liquidity constraints that would explain the dynamics of consumption, the most prominent of which is idiosyncratic income process uncertainty (e.g., Gourinchas and Parker (2002), Carroll (1997)).

for younger workers relative to older ones. We expect the income slope measure to be less informative for older individuals, as most of their income has already been accumulated before the moment in which we observe them for the first time.

V.C HETEROGENEITY IN BORROWING RESPONSE

Less financially sophisticated public sector workers show the largest borrowing response to the government bank credit expansion. Figure XI plots the average increase in credit take up during the 2011-2014 period across quintiles of financial sophistication measured as of 2011. Within each quintile, we report the average increase in debt-to-income separately for public sector and private sector workers after controlling for other individual characteristics, such as age, income, gender and micro-region fixed effects. As shown, the difference in debt-to-income growth between public and private sector workers during the 2011-2014 period is concentrated among borrowers in the bottom 40% of the financial sophistication distribution. It is especially large in the bottom quintile.

The timing of the effect of being a financially unsophisticated public sector worker on individual indebtedness is also consistent with the view that such individuals responded most aggressively to the government bank credit expansion. More specifically, we use a dynamic specification similar to equation (1), and we estimate a separate annual coefficient for the interaction between the low financial sophistication dummy (lowest quintile) and public sector worker dummy as follows:

$$\begin{aligned} \left(\frac{debt}{income}\right)_{it} &= \alpha_i + \alpha_t + \sum_{\substack{k=2007 \\ k \neq 2011}}^{2016} \gamma_k 1_{t=k} (PubSec_i \times LowFinSophi_i) \\ &+ \sum_{\substack{k=2007 \\ k \neq 2011}}^{2016} \lambda_k 1_{t=k} PubSec_i + \sum_{\substack{k=2007 \\ k \neq 2011}}^{2016} \theta_k 1_{t=k} LowFinSophi_i + u_{it} \end{aligned} \quad (4)$$

The estimated γ_k coefficients along with their confidence intervals are reported in Figure XII. The figure shows that the timing of the relative increase in credit take up by financially unsophisticated public sector workers matches the timing of the 2011 credit expansion policies. There is no pre-trend in the triple-difference coefficient, consistent with the view that it was the government bank credit push that explains the relative increase in borrowing by less financially sophisticated public sector workers after 2011.

We test more formally for heterogeneous effects across individuals in Table VII. In this table we estimate a version of equation (2) in which we interact the dummy identifying public sector workers with a dummy identifying the first quintile of the initial distribution of financial sophistication. The specification includes the main effects of public sector employment and financial sophistication, as well as the full set of fixed effects used in Table

III. We also include an interaction term for public sector workers in the top quintile of the income slope distribution. As mentioned above, this interaction term should capture whether individuals more likely to face a binding borrowing constraint responded differentially to the government bank credit expansion of 2011 to 2014.

Column (1) shows that the effect of being a public sector employee on debt-to-income growth during the 2011-2014 period is significantly stronger among workers in the first quintile of the financial sophistication distribution. The marginal effect is large, a 4.1 percentage point rise in the debt to income ratio.

In contrast, the marginal effect for public sector workers with a high income slope is negative. To the degree to which the high income slope captures individuals more likely to face a borrowing constraint, this result does not support the view that the credit expansion lifted borrowing constraints.²⁶

A financially unsophisticated public sector worker experienced a larger increase in debt-to-income relative to private sector workers, and the quantitative effect can be calculated by adding the coefficient on the public sector indicator and the interaction term. Such a calculation implies a relative increase in the debt to income ratio of 5 percentage points. Columns (2) and (3) show two important findings. First, the unsophisticated public sector workers' increase in indebtedness is almost entirely driven by loans originated by government banks. This is consistent with the view that the credit push by government banks was responsible for the rise in borrowing by unsophisticated public sector workers. Second, more sophisticated public sector workers experienced a significantly smaller change in their overall level of indebtedness as a share of their income. They did increase their borrowing from government banks, but much of this increase was offset by a reduction in borrowing from private banks.

Columns (4) through (6) investigate the effect scaling by initial income. This ensures that the patterns are driven by changes in debt from 2011 to 2014 instead of spurious changes in income. The effects are even larger quantitatively: financially unsophisticated public sector workers boosted borrowing by $(5.0+9.2=)$ 14.2 percentage points more of initial income relative to their counterparts in the private sector.

VI REAL EFFECTS

Less financially sophisticated public sector workers experienced a significantly larger increase in borrowing during the 2011 to 2014 period. This increase was driven by borrowing from government banks. The timing of the effect is consistent with the credit origination policies introduced by the government in 2011. In this section we study the

²⁶Table A.1 in the appendix replicates Table VII including a control variable for the level of credit card expenditure in 2011, and also focuses only on the sample of individuals that are younger than 50 years old as of 2011. When comparing two young public sector workers with the same level of consumption 2011, we do not find that the one with higher expected income growth increases borrowing by more.

effects of the government bank credit origination policy on consumption patterns. We structure our discussion in three steps. First, we describe our measure of individual-level consumption. Second, we study the effect of higher credit availability during the credit expansion period on individual consumption decisions during the 2014-2016 recession that followed it. Third, we study the effect of higher credit availability on the level and volatility of consumption over the entire period 2011-2016, which encompasses both the credit expansion phase and the subsequent recession.

Our main measure of individual consumption is credit card expenditure. Credit card expenditure is the monetary value of accumulated credit card expenditure over a year, sourced from the SCR. This measure captures expenditure on all credit cards issued by banks to an individual. However, our data does not contain information on the items or services purchased via credit cards, and thus it does not allow us to separate between durable vs non-durable consumption. In terms of credit card diffusion among the Brazilian population, the SCR data indicates that, in the post 2011 period, about 14 percent of adults and 53 percent of borrowers had a credit card.²⁷ Of course, credit card penetration is increasing in the period under study, but our results are robust to conditioning on the balanced panel of individuals that used credit cards throughout. We also perform a set of robustness tests to check how well credit card expenditure maps into other aggregate measures of household consumption available for Brazil.²⁸

Table VIII presents results exploring outcomes during the 2014 to 2016 recession that followed the credit expansion. Less sophisticated public sector workers borrowed the most during the boom. Column (1) shows that their after-debt-service income fell the most during the recession years. If we compare less sophisticated public sector workers with private sector workers, the total derivative implies a relative reduction in after-debt-service income of $(2.0+1.9=)$ 3.9 percent. This is primarily due to the fact that the interest rates on the debt were quite high. As column 4 shows, the same derivative with income as the left hand side variable is only slightly negative $(0.005-0.008=-0.003)$. Less sophisticated public sector workers experienced a large decline in their available resources for consumption due to the borrowing they did during the credit expansion years.

Column (2) reports a specification with the change in the share of debt in default from 2014 to 2016 as the outcome variable. Default is measured as the share of an individual debt balance that is more than 90 days late. As shown, less sophisticated public sector workers had a similar share of their balance in default relative to private sector ones. This is consistent with the high degree of collateral that the lender had for payroll loans in particular, where wage garnishment is written into the contract. The

²⁷These statistics refer to the threshold adjusted sample described in section II.

²⁸As shown in Figure A.1, quarter-to-quarter changes in aggregate credit card expenditure of borrowers in SCR captures well the macro trend in aggregate consumption reported by the national household consumption index produced by the Brazilian Institute of Statistics. The measure is also highly correlated with changes in non-tradable employment at finer levels of geographical aggregation (e.g. micro-regions).

margin of adjustment for less sophisticated public sector workers during the recession was not delinquency.

Less sophisticated public sector workers witnessed a larger decline in their after-debt-service income, and they were not more likely to discharge their debt. As column (3) shows, cutting consumption was the main margin of adjustment. The decline in consumption was substantial relative to private sector workers, with a total derivative of $(0.013+0.039=)$ 5.2 percent.

Figure XIII shows the consumption decline across the main groups of the analysis. The figure plots the average change in credit card expenditure between 2014 and 2016 across the five quintiles of financial sophistication, separating public and private sector workers within each bin, and controlling for the same set of fixed effects and individual characteristics used in Table VIII. As shown, less financially sophisticated public sector workers cut their spending to a significantly larger extent than private sector workers within the same bin. In contrast, public and private sector worker with higher financial sophistication experienced similar spending cuts during the crisis.

One advantage of our setting is that it allows us to study the impact of credit expansion at the individual level on a period that encompasses both an expansion and a recession. In this last part of the analysis, we focus on the whole period 2011 to 2016. We focus on the impact of the credit expansion on individual average consumption and consumption volatility, as well as average disposable income over the entire business cycle.

The results are reported in Table IX. We find that, at the individual level, the credit expansion ultimately resulted in lower mean and higher variance of consumption over the 2011 to 2016 period. Column (1) shows that less financial sophisticated public sector employees experienced 0.28 log points lower credit card spending per year during the 2011-2016 period, which corresponds to 3.6% of the mean in our sample. This result is robust to normalizing individual spending by its average level in the pre-2011 period, as shown in column (2). Column (3) shows that, over the 2011-2016 period, less financially sophisticated public sector workers experienced 12.7% higher volatility in annual credit card expenditure.²⁹ Finally, in columns (4) and (5), we focus on after-debt-service income. We find that less financially sophisticated public sector employees had, on average, less after-debt-service income over the 2011-2016 period. The magnitudes of the estimated coefficients indicate that their after-debt-service income was about 5% lower than the mean in our sample.

The overall results in Tables VIII and IX show that less financially sophisticated public sector workers experienced a larger decline in their after-debt-service income and a larger drop in spending during the recession. Any increase in consumption during the 2011 to 2014 period was not enough to offset this subsequent decline. As a result,

²⁹We measure volatility with the coefficient of variation in credit card expenditure, i.e. standard deviation divided by the mean.

they experienced lower average consumption and higher consumption volatility relative to private sector workers over the entire business cycle. These results suggest that, from an ex-post perspective, this category of workers was made worse off by the government-led credit expansion policies. It is important to emphasize, however, that this is an ex-post statement; in the absence of the recession, the borrowing from 2011 to 2014 may not have led to lower average consumption and higher consumption volatility over the 2011 to 2016 period.

VII CONCLUDING REMARKS

Since 2000, emerging economies have experienced a significant rise in household debt-to-GDP ratios. In many circumstances, the rise in household credit availability is an explicit goal of the government. There are many reasons why policy-makers may want to facilitate the expansion of credit availability to households. However, there is little research on the effects of government policies in emerging economies that boost credit availability.

In this paper we use individual-level data from Brazil to provide evidence on an important household credit push by the government from 2011 to 2014. The evidence supports the view that actions by government-owned banks represented a large rise in borrowing, and that less financially sophisticated public sector workers boosted borrowing significantly in response. At the individual level, it is difficult to find evidence ex post that these same workers benefited from the program. Less financially sophisticated public sector workers borrowed more from 2011 to 2014, cut consumption by significantly more from 2014 to 2016, and experienced overall lower consumption levels and higher consumption volatility from 2011 to 2016. While it is difficult to make strong statements about the ex ante optimality of the household credit push by government banks, the evidence suggests that ex post the most exposed individuals experienced worse outcomes with regard to consumption.

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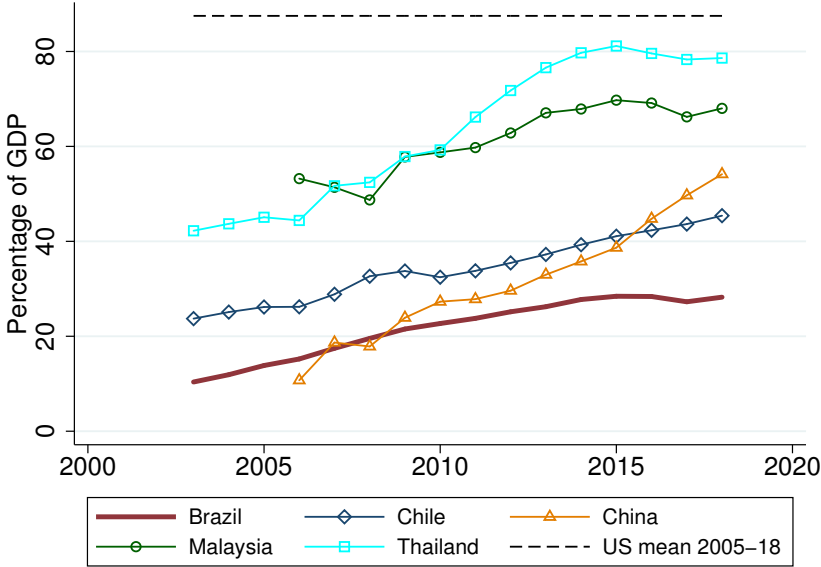
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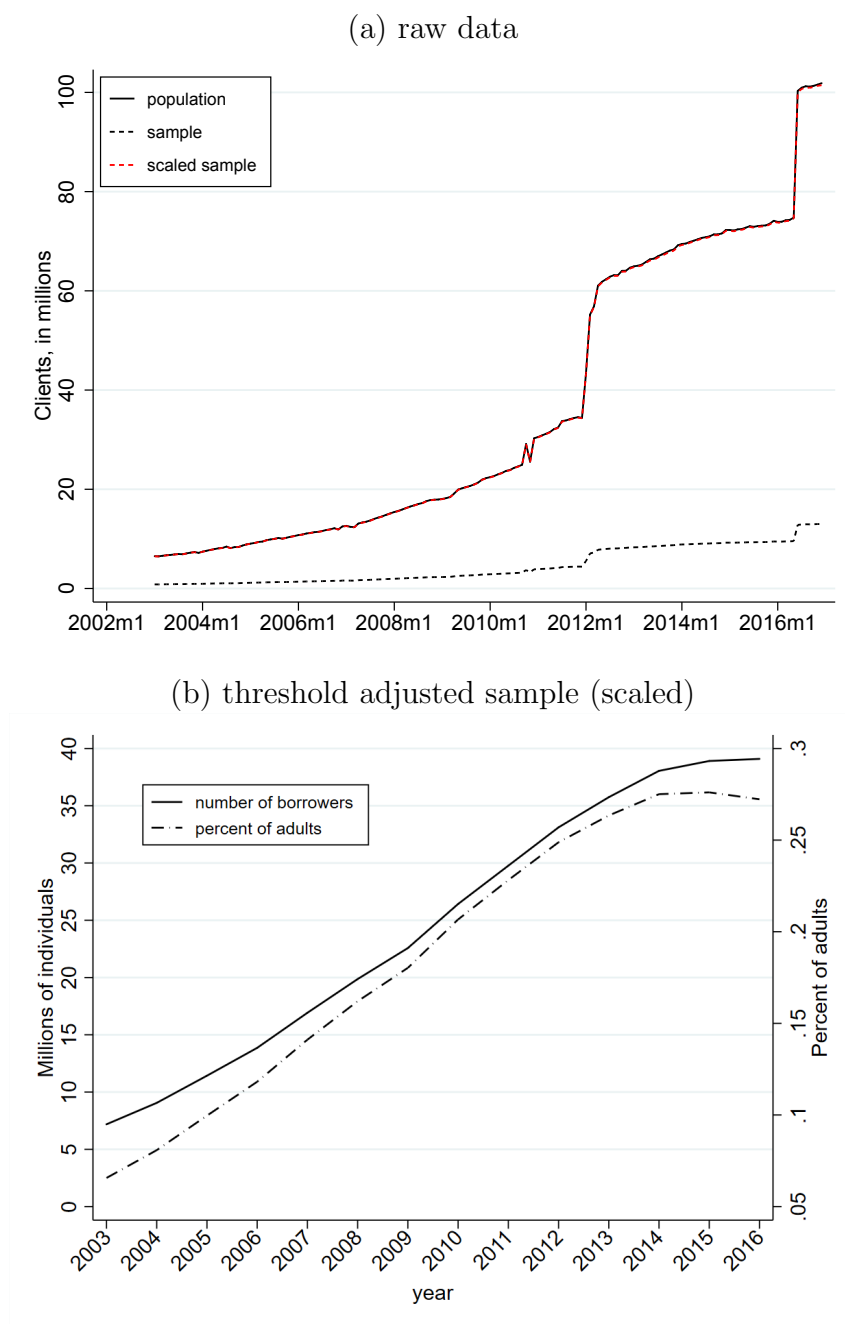
FIGURES AND TABLES

FIGURE I: RISE IN HOUSEHOLD DEBT IN EMERGING MARKETS



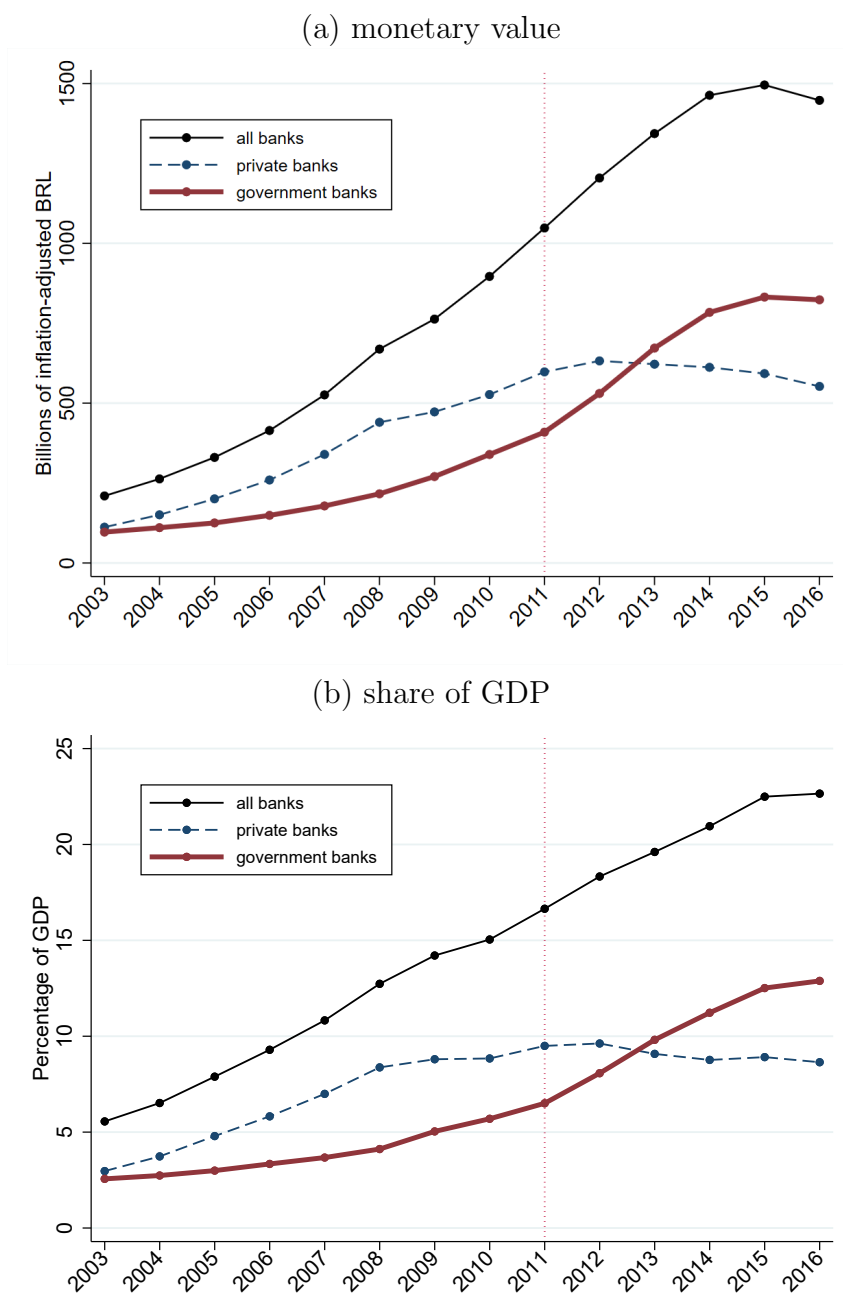
Notes: Data from IMF, International Financial Statistics (IFS).

FIGURE II: CREDIT INFORMATION SYSTEM: SAMPLE AND POPULATION, 2003-2016



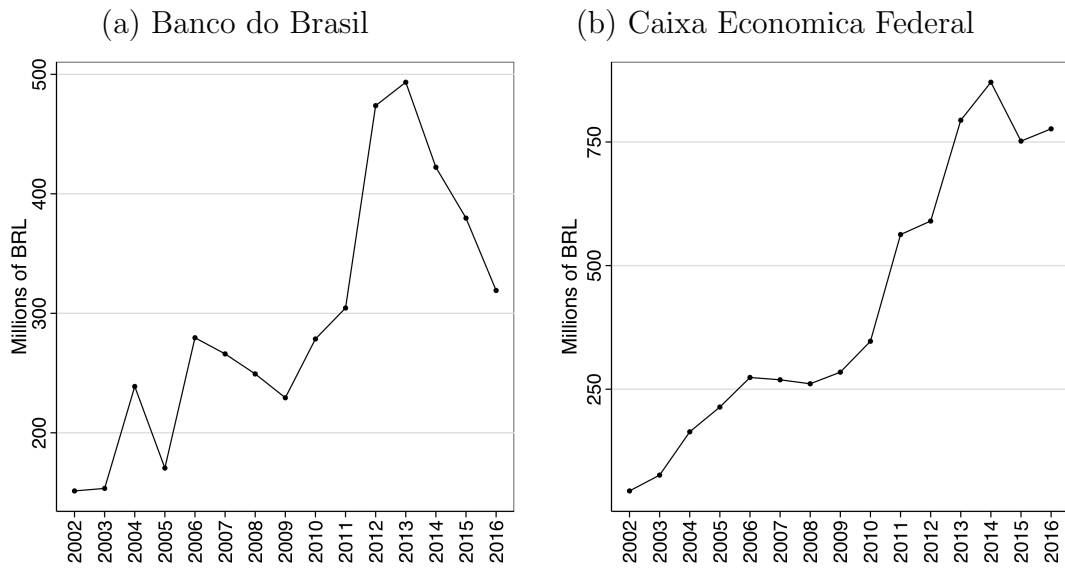
Notes: Data from the Credit Information System (SCR), Central Bank of Brazil, and Population Censi of 2000 and 2010 (IBGE).

FIGURE III: GOVERNMENT BANKS AND HOUSEHOLD DEBT IN BRAZIL: 2003-2016



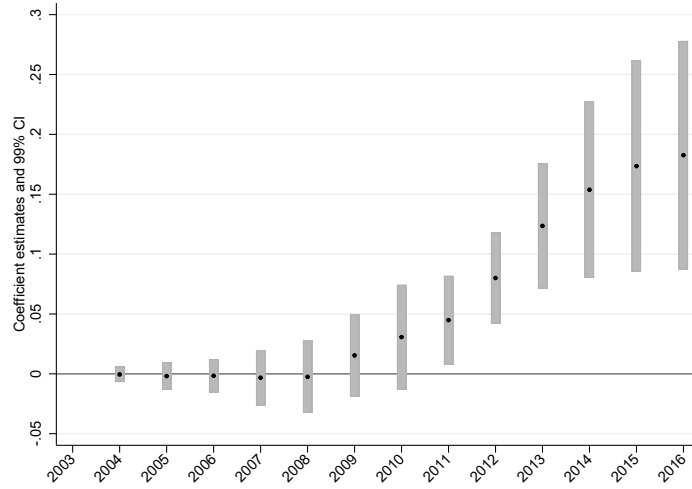
Notes: Data from the Credit Information System (SCR), Central Bank of Brazil, adjusted for changes in reporting thresholds in 2012 and 2016.

FIGURE IV: GOVERNMENT BANKS: ADVERTISING EXPENDITURE



Notes: Data from annual reports of Banco do Brasil and Caixa Economic Federal.

FIGURE V: WITHIN-INDIVIDUAL EFFECTS - DYNAMIC SPECIFICATION

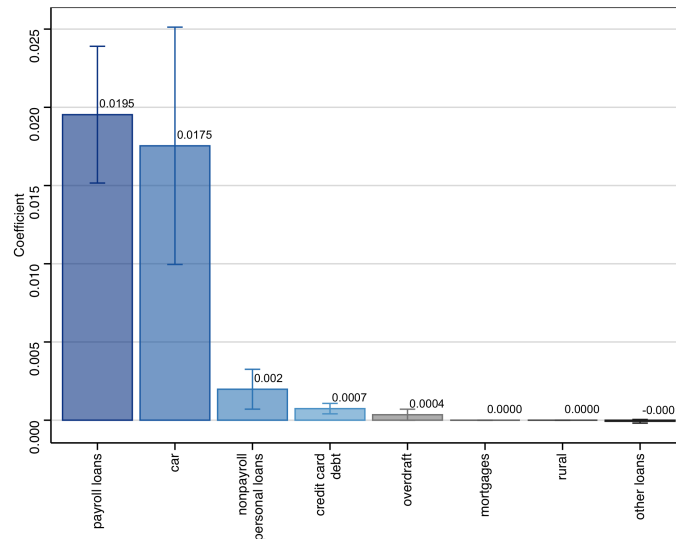


Notes: The graph reports point estimates and 95 percent confidence intervals for the coefficients β s in the following equation (equation (1) in the paper):

$$\left(\frac{debt}{income}\right)_{ibt} = \alpha_{it} + \alpha_b + \sum_{k \neq 2003} \beta_k 1_{t=k} Gov_b + u_{ibt}$$

These are the coefficients on a government bank dummy interacted with year fixed effects in a bank-individual level specification with individual-year fixed effects. They capture the difference in borrowing from government vs private banks in a given year, normalized by an individual's labor income.

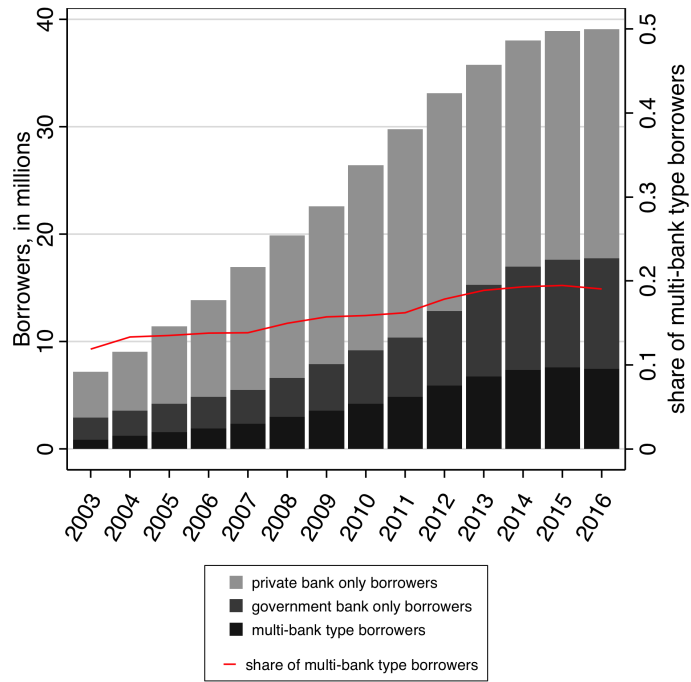
FIGURE VI: WITHIN-INDIVIDUAL EFFECTS - BY LOAN TYPE



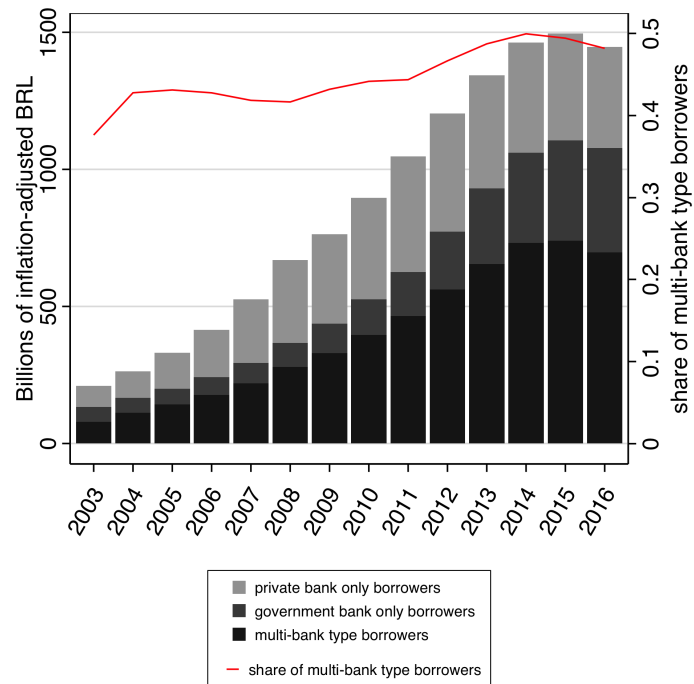
Notes: The graph reports point estimates and 95 percent confidence intervals for the coefficient β in equation (2) in the paper. We estimate a separate specification for each loan category.

FIGURE VII: MULTI BANK TYPE BORROWERS

(a) Number of borrowers

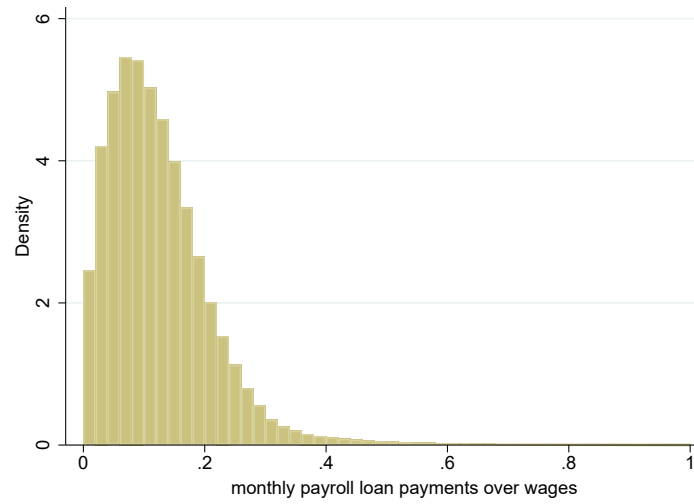


(b) Balance



Notes: Data from the Credit Information System (SCR), Central Bank of Brazil, adjusted for changes in reporting thresholds in 2012 and 2016.

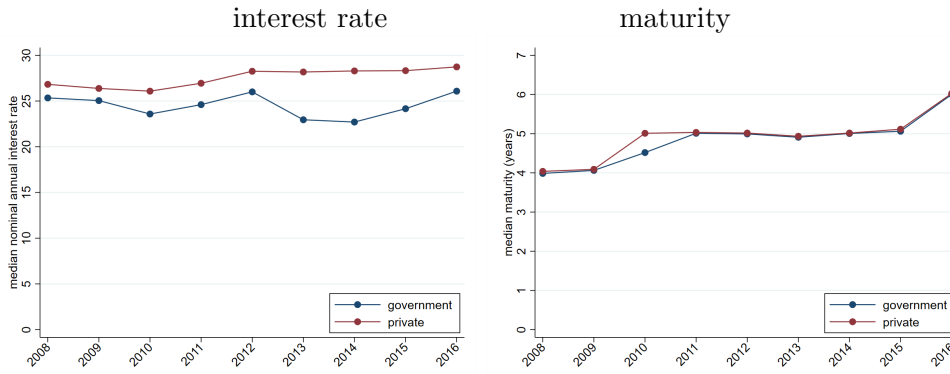
FIGURE VIII: PAYROLL LENDING PAYMENTS OVER MONTHLY LABOR INCOME



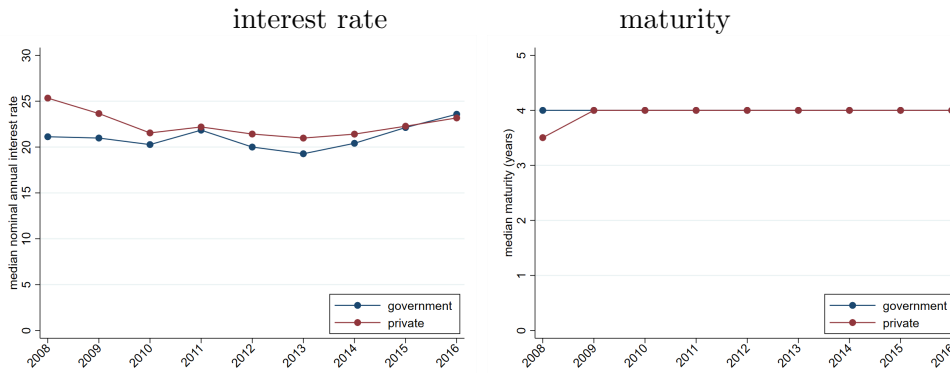
Notes: Figure shows the distribution of the ratio of debt servicing payments for payroll loans over wages. Payroll loans payments are sourced from SCR, wage are sourced from RAIS. Data refers to the year 2011.

FIGURE IX: LOAN TERMS BY CATEGORY OF DEBT AND TYPE OF BANK

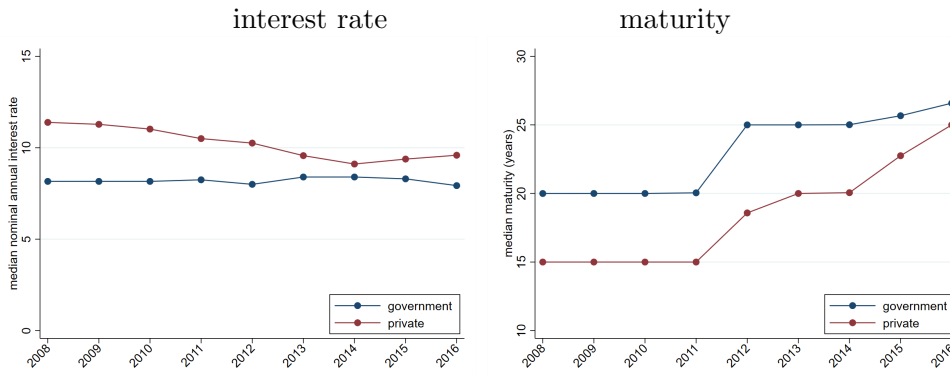
(a) payroll loans



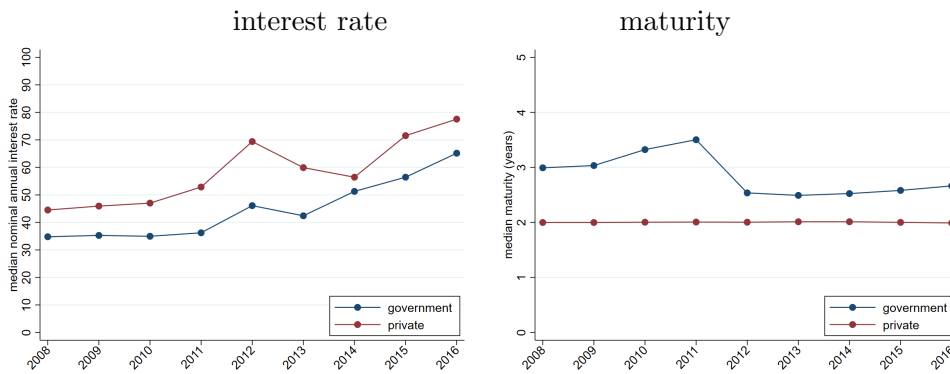
(b) auto loans



(c) mortgages

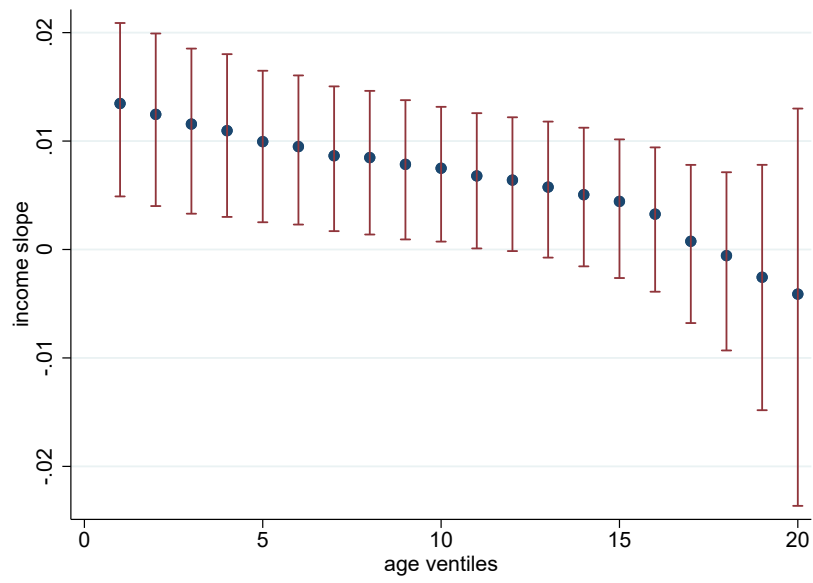


(d) non-payroll loans



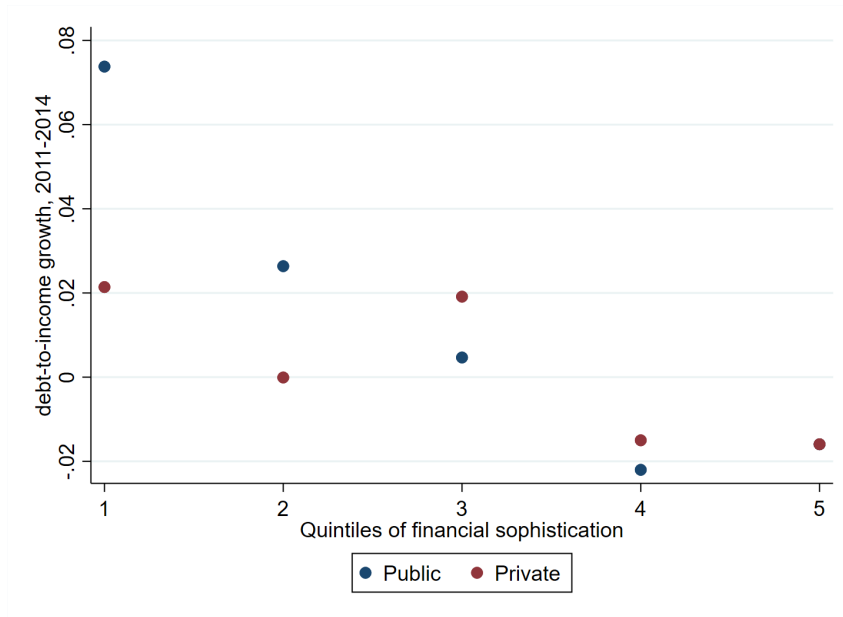
Notes: The figure reports the average interest rate (in percentage points) and maturity (in years) for loans outstanding in each year. The sample restricted to multi-bank borrowers. 37

FIGURE X: LABOR INCOME SLOPE BY WORKERS' AGE VENTILES



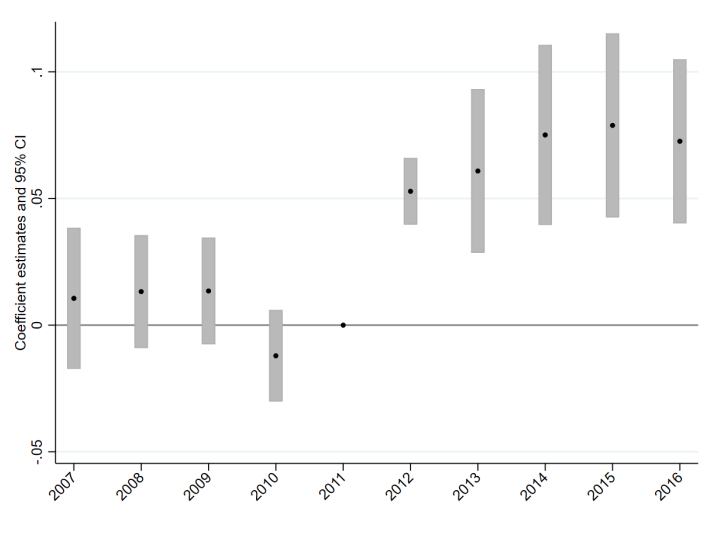
Notes: The Figure reports the average income slope across occupations for each age ventile (blue dots), along with the 25th and 75th percentile of the income slope distribution (red cap lines).

FIGURE XI: DEBT TO INCOME GROWTH BY INITIAL FINANCIAL SOPHISTICATION RESIDUALIZED. PUBLIC VS PRIVATE SECTOR WORKERS



Notes: Employment in public vs private sector and financial sophistication defined in baseline year 2011. Dots represent average residualized debt to income growth across borrowers in each quintile of financial sophistication and employment category.

FIGURE XII: DYNAMIC EFFECTS OF PUBLIC SECTOR EMPLOYMENT WITH LOW FINANCIAL SOPHISTICATION ON BORROWING

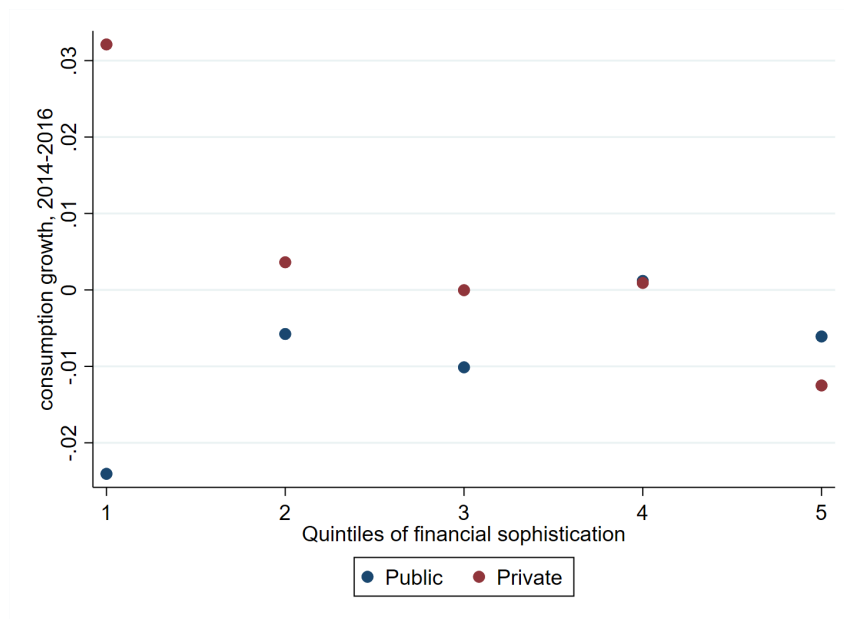


Notes: The graph reports point estimates and 95 percent confidence intervals for the coefficients γ_s in the following equation (equation (4) in the paper):

$$\left(\frac{debt}{income}\right)_{it} = \alpha_i + \alpha_t + \sum_{\substack{k=2007 \\ k \neq 2011}}^{2016} \gamma_k 1_{t=k} (PubSec_i \times LowFinSophi_i) + \sum_{\substack{k=2007 \\ k \neq 2011}}^{2016} \lambda_k 1_{t=k} PubSec_i + \sum_{\substack{k=2007 \\ k \neq 2011}}^{2016} \theta_k 1_{t=k} LowFinSophi_i + u_{it}$$

These coefficients capture the dynamic effect of public sector workers with low financial sophistication on borrowing by year, in the period between 2007 and 2016. The effects are computed relative to the excluded year 2011.

FIGURE XIII: CONSUMPTION GROWTH BY INITIAL FINANCIAL SOPHISTICATION RESIDUALIZED. PUBLIC VS PRIVATE SECTOR WORKERS



Notes: Employment in public vs private sector and financial sophistication defined in baseline year 2011. Dots represent average residualized consumption growth across borrowers in each quintile of financial sophistication and employment category.

TABLE I: WITHIN-INDIVIDUAL EFFECTS

outcome	Δ (debt to income) _{2011–2014}				
	initial gov/non-gov				
sample	(1)	(2)	(3)	(4)	collapsed (5)
1(gov)	0.11651 [0.03151]***	0.11418 [0.02437]***	0.02630 [0.01159]**	0.03957 [0.01243]***	0.13913 [0.02235]***
individual fe	no	y	no	y	y
Observations	5,096,649	5,096,649	1,872,540	1,872,540	642,254
N individuals	1,178,811	1,178,811	321,127	321,127	321,127
R-squared	0.03307	0.30433	0.00168	0.22139	0.57347
Cluster	bank	bank	bank	bank	main-bank
N clusters	1697	1697	1567	1567	1191

Notes: The unit of observation is a bank-individual lending relationship. The sample in columns (3) to (5) includes all individuals in our SCR-RAIS matched sample with a positive balance with both government controlled and private banks in 2011. The variable $1(gov)$ is a dummy equal to 1 if the lender is a government controlled bank. Standard errors are clustered at bank-level in columns (1) to (4), and at the main lender level in column (5). Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE II: WITHIN-INDIVIDUAL EFFECTS
BY CATEGORY OF DEBT

outcome	Δ (debt to income) ₂₀₁₁₋₂₀₁₄									
loan category:	total	payroll loans	non payroll personal loans	car	mortgages	overdraft	credit card debt	other loans	rural	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
1(gov)	0.03957 [0.01243]***	0.01953 [0.00223]***	0.00198 [0.00065]***	0.01754 [0.00387]***	0.00000 [0.00000]	0.00035 [0.00018]*	0.00074 [0.00017]***	-0.00007 [0.00006]	0.00000 [0.00000]	
individual fe	y	y	y	y	y	y	y	y	y	
Observations	1,872,540	1,872,540	1,872,540	1,872,540	1,872,540	1,872,540	1,872,540	1,872,540	1,872,540	
N individuals	321127	321127	321127	321127	321127	321127	321127	321127	321127	
R-squared	0.22139	0.17752	0.22973	0.18514		0.22535	0.24053	0.19558		
Cluster	bank	bank	bank	bank	bank	bank	bank	bank	bank	
N clusters	1567	1567	1567	1567	1567	1567	1567	1567	1567	

Notes: The unit of observation is a bank-individual lending relationship. The sample includes all individuals in our SCR-RAIS matched sample with a positive balance with both government controlled and private banks in 2011. The variable 1(*gov*) is a dummy equal to 1 if the lender is a government controlled bank. Standard errors clustered at bank-level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE III: COMPARING PRIVATE VS PUBLIC SECTOR WORKERS IN 2011

Baseline characteristics	Private	Public	Difference	St.err.	N
Unconditional					
1(female)	0.346	0.561	0.214	[0.01335]***	981,797
years of education	12.763	13.652	0.889	[0.10638]***	981,797
age	37.777	42.849	5.072	[0.22736]***	981,797
annual labor income	45,648	53,842	8,194	[2,973.57]***	981,797
debt to income ratio	0.880	0.734	-0.145	[0.03102]***	981,797
share of gov borrowing	0.224	0.417	0.193	[0.01985]***	981,797
Conditional on gender, years of education, sector, occupation and quintiles of age and income:					
age			0.842	[0.04403]***	981,797
annual labor income			-688.5	[659.7]	981,797
debt to income ratio			-0.086	[0.02709]***	981,797
share of gov borrowing			0.161	[0.01461]***	981,797

Notes: The sample includes all formal workers with a positive debt balance in both 2011 and 2014, and an active credit card in both 2014 and 2016 that appear in the Credit Information System-RAIS matched dataset. Data on individual characteristics refers to year 2011. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

TABLE IV: INDIVIDUAL-LEVEL EFFECTS: DEBT-TO-INCOME DURING BOOM YEARS 2011-2014

outcome	Δ (total debt to income) ₂₀₁₁₋₂₀₁₄			Δ (total debt) ₂₀₁₁₋₂₀₁₄ /income ₂₀₁₁		
	total	government banks	private banks	total	government banks	private banks
	(1)	(2)	(3)	(4)	(5)	(6)
I(public sector employee) ₂₀₁₁	0.02012 [0.00280]***	0.07168 [0.00673]***	-0.05314 [0.00649]***	0.09015 [0.00419]***	0.12098 [0.01074]***	-0.02687 [0.00919]***
individual controls	y	y	y	y	y	y
fixed effects:						
micro-region	y	y	y	y	y	y
income quintiles	y	y	y	y	y	y
age quintiles	y	y	y	y	y	y
education	y	y	y	y	y	y
gender	y	y	y	y	y	y
occupation	y	y	y	y	y	y
Observations	981,797	981,797	981,797	981,797	981,797	981,797
R-squared	0.18778	0.06494	0.23966	0.06259	0.04751	0.09184
N clusters	558	558	558	558	558	558

Notes: The table reports the results obtained estimating equation (3) in the paper. Total debt includes all categories of debt recorded in the Credit Information System. Income is the total annual labor income for each individual observed in RAIS. Individual controls include: share of borrowing from government banks in 2011 and debt-to-income ratio in 2011. Standard errors clustered at micro-region level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE V: INDIVIDUAL-LEVEL EFFECTS: DEBT-TO-INCOME DURING BOOM YEARS 2011-2014
BY CATEGORY OF DEBT

outcome debt category	Δ (debt to income) ₂₀₁₁₋₂₀₁₄							
	total	payroll loans	non payroll per- sonal loans	car	mortgages	overdraft	credit card debt	other loans
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I(public sector employee) ₂₀₁₁	0.02012 [0.00280]***	0.03600 [0.00324]***	-0.00065 [0.00045]	-0.00794 [0.00231]***	0.00259 [0.00328]	-0.0012 [0.00015]***	0.00073 [0.00039]*	-0.00071 [0.00080]
individual controls	y	y	y	y	y	y	y	y
fixed effects:								
micro-region	y	y	y	y	y	y	y	y
income quintiles	y	y	y	y	y	y	y	y
age quintiles	y	y	y	y	y	y	y	y
education	y	y	y	y	y	y	y	y
gender	y	y	y	y	y	y	y	y
occupation	y	y	y	y	y	y	y	y
Observations	981,797	981,797	981,797	981,797	981,797	981,797	981,797	981,797
R-squared	0.18778	0.05224	0.02130	0.11449	0.06228	0.01889	0.05461	0.08769
N clusters	558	558	558	558	558	558	558	558

Notes: The table reports the results obtained estimating equation (3) in the paper. Total debt includes all categories of debt recorded in the Credit Information System. Income is the total annual labor income for each individual observed in RAIS. Individual controls include: share of borrowing from government banks in 2011 and debt-to-income ratio in 2011. Standard errors clustered at micro-region level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE VI: DO INCOME SLOPES PREDICT FUTURE LABOR INCOME GROWTH?

	(1)	(2)	(3)	(4)
	Yearly Avg Labor Income Growth, 2011-2014			
			age \leq 50	age $>$ 50
Labor income slope using 2011 data	1.415*** (0.050)	1.435*** (0.041)	1.306*** (0.067)	0.235*** (0.020)
Observations	30,479,542	30,479,541	23,779,698	6,699,836
R-squared	0.004	0.009	0.007	0.008
Municipality f.e.	×	✓	✓	✓
	(1)	(2)	(3)	(4)
	Yearly Avg Labor Income Growth, 2011-2017			
			age \leq 50	age $>$ 50
Labor income slope using 2011 data	1.098*** (0.036)	1.102*** (0.037)	1.013*** (0.052)	0.248*** (0.016)
Observations	25,407,737	25,407,737	18,811,619	6,596,112
R-squared	0.009	0.016	0.012	0.014
Municipality f.e.	×	✓	✓	✓

Notes: Standard errors clustered at municipality level reported in brackets. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE VII: INDIVIDUAL-LEVEL EFFECTS: DEBT-TO-INCOME DURING BOOM YEARS 2011-2014
HETEROGENEITY BY INITIAL FINANCIAL SOPHISTICATION VS BORROWING CONSTRAINTS

outcome	Δ (total debt to income) ₂₀₁₁₋₂₀₁₄			Δ (total debt) ₂₀₁₁₋₂₀₁₄ /income ₂₀₁₁		
	total	government banks	private banks	total	government banks	private banks
	(1)	(2)	(3)	(4)	(5)	(6)
I(public sector employee) ₂₀₁₁ × <i>LowFinSophi</i> ₂₀₁₁	0.04127 [0.00539]***	0.03523 [0.00531]***	0.00669 [0.00382]*	0.06201 [0.00756]***	0.05003 [0.00770]***	0.01547 [0.00771]**
I(public sector employee) ₂₀₁₁ × <i>HighSlope</i> ₂₀₁₁	-0.01413 [0.00417]***	-0.00798 [0.00373]**	-0.00284 [0.00198]	0.01245 [0.00724]*	0.00452 [0.00474]	0.00577 [0.00395]
I(public sector employee) ₂₀₁₁	0.00738 [0.00343]**	0.05701 [0.00676]***	-0.05078 [0.00705]***	0.05659 [0.00424]***	0.09170 [0.01058]***	-0.02752 [0.00928]***
<i>LowFinSophi</i> ₂₀₁₁	-0.03119 [0.00935]***	-0.02395 [0.00542]***	-0.00747 [0.00555]	0.00334 [0.01136]	-0.01070 [0.00710]	0.01210 [0.00715]*
<i>HighSlope</i> ₂₀₁₁	0.01881 [0.00290]***	0.01919 [0.00258]***	-0.00383 [0.00133]***	0.03053 [0.00381]***	0.02956 [0.00358]***	-0.00346 [0.00206]*
individual controls	y	y	y	y	y	y
fixed effects:						
micro-region	y	y	y	y	y	y
income quintiles	y	y	y	y	y	y
age quintiles	y	y	y	y	y	y
education	y	y	y	y	y	y
gender	y	y	y	y	y	y
occupation	y	y	y	y	y	y
Observations	981,797	981,797	981,797	981,797	981,797	981,797
R-squared	0.18642	0.06083	0.23905	0.05925	0.04107	0.09153
N clusters	558	558	558	558	558	558

Notes: Individual controls include: share of borrowing from government banks in 2011 and debt-to-income ratio in 2011. Standard errors clustered at micro-region level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE VIII: INDIVIDUAL-LEVEL REAL EFFECTS DURING RECESSION YEARS 2014-2016

outcomes	Δ after-debt-service income (1)	Δ (share balance in default) (2)	$\Delta \log$ (credit card exp) (3)	$\Delta \log$ (income) (4)
$I(\text{public sector employee})_{2011} \times LowFinSophi_{2011}$	-0.01876 [0.00557]***	0.00022 [0.00020]	-0.03940 [0.00873]***	-0.00845 [0.00434]*
$I(\text{public sector employee})_{2011}$	-0.02015 [0.00296]***	-0.00082 [0.00011]***	-0.01320 [0.00693]*	0.00486 [0.00313]
$LowLowFinSophi_{2011}$	-0.00757 [0.00780]	-0.00104 [0.00031]***	0.01143 [0.01349]	0.00576 [0.00386]
baseline controls	y	y	y	y
fixed effects:				
micro-region	y	y	y	y
income quintiles	y	y	y	y
age quintiles	y	y	y	y
education	y	y	y	y
gender	y	y	y	y
occupation	y	y	y	y
Observations	878,028	981,797	981,797	878,276
R-squared	0.01718	0.02387	0.01208	0.03648
N clusters	558	558	558	558

Notes: Individual controls include: share of borrowing from government banks in 2011 and debt-to-income ratio in 2011. We also control in all specifications for the *HighSlope* dummy – which captures individuals in the top quintile of the labor income slope measure described in section V.B – and its interaction with a dummy for public sector employees. Standard errors clustered at micro-region level reported in brackets. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

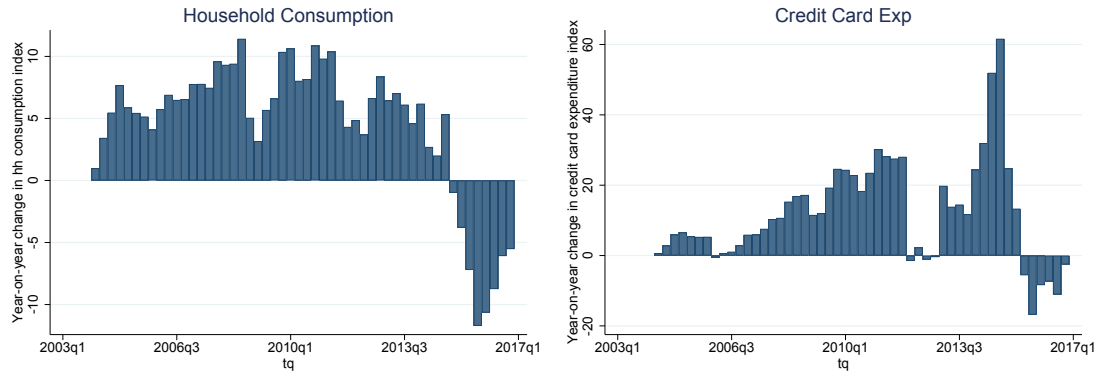
TABLE IX: CONSUMPTION MEAN, CONSUMPTION VOLATILITY, AND AFTER-DEBT-SERVICE INCOME
BOOM AND RECESSION YEARS 2011-2016

outcomes	credit card expenditure			after-debt-service income	
	average	avg normalized by pre-2011	coeff of variation	average	avg normalized by pre-2011
	(1)	(2)	(3)	(4)	(5)
$I(\text{public sector employee})_{2011} \times LowFinSophi_{2011}$	-0.28339 [0.01796]***	-0.01651 [0.00451]***	0.01647 [0.00115]***	-0.03192 [0.00656]***	-0.03758 [0.01232]***
$I(\text{public sector employee})_{2011}$	-0.09247 [0.02726]***	0.01139 [0.00274]***	0.00717 [0.00150]***	-0.01569 [0.00846]*	-0.01479 [0.01471]
$LowFinSophi_{2011}$	0.06363 [0.01646]***	-0.00306 [0.00549]	-0.00205 [0.00113]*	0.02211 [0.00956]**	0.02238 [0.02029]
baseline controls	y	y	y	y	y
fixed effects:					
micro-region	y	y	y	y	y
income quintiles	y	y	y	y	y
age quintiles	y	y	y	y	y
education	y	y	y	y	y
gender	y	y	y	y	y
occupation	y	y	y	y	y
Observations	981,797	463,286	981,797	981,595	768,537
R-squared	0.28693	0.02002	0.07105	0.27083	0.03896
N clusters	558	557	558	558	558
Mean Outcome	7.94	1.21	0.13	0.57	0.75
beta \times mean outcome	-3.6%	-1.4%	12.7%	-5.6%	-5.0%

Notes: Individual controls include: share of borrowing from government banks in 2011 and debt-to-income ratio in 2011. We also control in all specifications for the *HighSlope* dummy – which captures individuals in the top quintile of the labor income slope measure described in section V.B – and its interaction with a dummy for public sector employees. Standard errors clustered at micro-region level reported in brackets. Standard errors clustered at micro-region level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

A APPENDIX: FIGURES AND TABLES

FIGURE A.1: HOUSEHOLD CONSUMPTION INDEX AND CREDIT CARD EXPENDITURE



Notes: Household consumption index is recorded at quarterly frequency from the Brazilian Institute of Statistics under "Sistema de Contas Nacionais Trimestrais - SCNT". The credit card expenditure index is constructed aggregating individual credit card expenditure data from the Credit Information System at quarterly frequency.

TABLE A.1: INDIVIDUAL-LEVEL EFFECTS: DEBT-TO-INCOME DURING BOOM
HETEROGENEITY BY FINANCIAL SOPHISTICATION VS BORROWING CONSTRAINTS
ROBUSTNESS TO CONTROLLING FOR INITIAL CONSUMPTION AND SAMPLE OF YOUNG BORROWERS

outcome	Δ (total debt to income) _{2011–2014}					
	total		government banks		private banks	
sample	all	age \leq 50	all	age \leq 50	all	age \leq 50
	(1)	(2)	(3)	(4)	(5)	(6)
I(public sector employee) ₂₀₁₁ \times <i>LowFinSophi</i> ₂₀₁₁	0.01830 [0.00913]**	0.02992 [0.01109]***	0.02255 [0.00679]***	0.02877 [0.00790]***	-0.00352 [0.00478]	-0.00093 [0.00627]
I(public sector employee) ₂₀₁₁ \times <i>HighSlope</i> ₂₀₁₁	-0.01547 [0.00540]***	-0.00678 [0.00567]	-0.00637 [0.00412]	-0.00358 [0.00397]	-0.00490 [0.00256]*	0.00052 [0.00263]
I(public sector employee) ₂₀₁₁	0.00220 [0.00383]	-0.00334 [0.00411]	0.05677 [0.00694]***	0.06059 [0.00760]***	-0.05602 [0.00614]***	-0.06693 [0.00624]***
<i>LowFinSophi</i> ₂₀₁₁	-0.04134 [0.01080]***	-0.06142 [0.01371]***	-0.02772 [0.00728]***	-0.04122 [0.00930]***	-0.00874 [0.00683]	-0.00984 [0.00849]
<i>HighSlope</i> ₂₀₁₁	0.02430 [0.00416]***	0.01498 [0.00422]***	0.01801 [0.00313]***	0.01305 [0.00308]***	0.00149 [0.00185]	-0.00238 [0.00182]
Log card expenditure ₂₀₁₁	0.00510 [0.00042]***	0.00608 [0.00049]***	-0.00083 [0.00032]***	-0.00088 [0.00031]***	0.00310 [0.00029]***	0.00390 [0.00032]***
individual controls	y	y	y	y	y	y
fixed effects:						
micro-region	y	y	y	y	y	y
income quintiles	y	y	y	y	y	y
age quintiles	y	y	y	y	y	y
education	y	y	y	y	y	y
gender	y	y	y	y	y	y
occupation	y	y	y	y	y	y
Observations	545,202	437,316	545,202	437,316	545,202	437,316
R-squared	0.16890	0.18364	0.05772	0.06754	0.22452	0.23185
N clusters	557	557	557	557	557	557

Notes: Individual controls include: share of borrowing from government banks in 2011 and debt-to-income ratio in 2011. Standard errors clustered at micro-region level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .