

Consumption Smoothing or Consumption Binging?

The effects of government-led consumer credit expansion in Brazil

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Abstract

Brazil initiated a major credit expansion program through government banks in 2011. The program primarily targeted public sector workers with offers of payroll-backed loans. Using individual-level administrative data we find that the program led to a 15 percentage point rise in debt to initial income for public sector workers. We develop a new method for estimating workers' expected income growth, and show that "consumption smoothing" cannot explain the rise in consumer borrowing. Instead, the evidence supports "consumption binging": less financially sophisticated workers borrowed more at high real interest rates, and experienced both higher consumption volatility and lower average consumption.

Keywords: credit booms, payroll loans, credit card expenditure.

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

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I INTRODUCTION

Household debt has increased substantially in recent decades, first in advanced economies and more recently in emerging markets. For example, the household credit to GDP ratio rose by an average of 1.4 percentage points annually between 1990 and 2006 in the United States leading up to the Great Recession. Since then, the annual rise in the household credit to GDP ratio has been 1.9 percentage points in emerging markets with an incredible 3.6 percentage point annual increase in China.¹ While there has been substantial empirical work on the macroeconomic implications of the rise in household debt, much less has been done on the microeconomic foundations of why household borrowing has increased.

Why do households borrow when more credit is made available? The “consumption smoothing” hypothesis views household borrowing as an effort to smooth consumption by those who anticipate stronger income growth going forward. This is the standard permanent income hypothesis with traditional exponential discounting consumers. If such households face a borrowing constraint that is suddenly relaxed, then they may optimally increase borrowing substantially.

However, there is an alternative “consumption binging” hypothesis that holds that households display certain characteristics that may lead to “over-borrowing” in response to a credit expansion. For example, they may suffer from myopia, present bias, or financial unsophistication. Whatever the underlying reason, the common prediction of this class of theories is that consumers can consumption binge; that is, they may borrow “too much” in response to a borrowing opportunity with the result that their future consumption becomes more volatile rather than smoother. The survey study by Garz et al. (2021) focuses on low- and middle-income countries and highlights that one major potential problem as credit grows is consumer “overindebtedness” which they define as “consumers taking on more debt than they should reasonably expect to pay back without undue hardship”.

Whether actual household behavior follows the consumption smoothing versus consumption binging hypothesis is important from a policy and welfare perspective. For example, there is robust evidence that strong growth in household credit tends to be followed by a slowdown in GDP growth (see Mian and Sufi 2018 for a review). To what extent are these patterns driven by consumption smoothing motives that fail to internalize externalities such as aggregate demand externalities? Alternatively, to what extent are these patterns driven by behavioral biases that result in consumption binging and hence a boom-bust pattern in consumption and output? The policy implications depend on the relative strength of these two hypotheses.

¹Source: IMF global debt database. The emerging market average is weighted by GDP in PPP dollars in the base year.

It is generally difficult to separate the consumption smoothing and consumption binging hypotheses in response to a credit expansion wave. The main reason is that data requirements are quite demanding as one would need to observe borrowing, income, and spending outcomes at the individual level, and then sort individuals along potential consumption smoothing and consumption binging tendencies. This paper makes progress on this question by analyzing the consequences of a major government credit expansion program in Brazil. An analysis of government credit expansions is also important given that governments around the world have encouraged household credit growth with the goal of boosting short-term aggregate demand.²

The Brazilian government initiated a major consumer credit expansion effort in 2011 through the injection of new capital into the two largest government banks (Banco do Brasil and Caixa Economica Federal). In response, government banks started a large marketing campaign to promote the take up of payroll loans. These are installment loans that allow banks to deduct payments directly from borrowers' paychecks. As such, individuals with government jobs tend to be the primary target of such loan offers as they have the most dependable payroll stream.

Public sector workers were therefore naturally more "exposed" to the government's credit expansion program. We incorporate these features of the program in a difference-in-differences framework to study the consequences of the credit expansion program with data covering the period from 2007 to 2016. The analysis is facilitated by a new individual-level administrative data set at the Central Bank of Brazil that combines borrowing records from the credit registry, matched employer-employee worker payroll data, and credit card spending data (see Garber et al. 2019).

The effect of government policies is easily visible in aggregate data: in the years after 2011, 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.

In order to estimate the impact of this government-led credit expansion, we compare public sector workers with private sector workers conditioning on a rich set of individual characteristics, including income, age, education, location, occupation, leverage, and pre-existing relationships with banks. In a difference-in-differences framework, we then compare outcomes before and after the introduction of the government-led program across public and private sector workers.

²For example, governments have launched large-scale policies to promote access to housing credit in Malaysia, Pakistan, and China, and access to payroll loans in Brazil. These policies have been often implemented with the support of government-controlled banks.

Despite conditioning on a rich set of individual attributes, public and private sector workers may differ along unobservable characteristics. Two facts help alleviate this concern. First, private and public sector workers have similar borrowing and leverage trajectories before the introduction of the credit expansion program once we condition on the rich set of attributes mentioned above. Second, and perhaps more importantly, unconditionally public sector workers have better and more stable jobs on average. For example, in the full sample of formal workers recorded in Brazil in our baseline year 2010, public sector workers earn wages that are 68% higher and have 35% lower volatility in their annual labor income than private sector workers. The likelihood of falling out of formal labor market over the 2007-2016 period is 15% for private sector workers, but only 5% for public sector workers. As such, *ceteris paribus*, any unobservable impact of job stability should generate a downward bias of our estimates of credit access on consumption volatility.

Finally, we also estimate a within-individual impact of the change in government credit policy by focusing on individuals that initially borrow from both government banks and private banks, and then comparing the relative change in borrowing from these two types of banks. The within-individual estimate has the advantage of absorbing credit demand changes at the individual level. We find a strong within-individual effect, as the same individual starts to borrow more from government banks relative to private banks after the introduction of government program in 2011. These effects are twice as large for public sector workers than for private sector ones.

Overall, the results show that public sector workers experienced a 15 percentage point increase in debt relative to their 2010 income from 2010 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.

Why did public sector workers respond so aggressively to the credit expansion initiative? Was credit growth driven primarily by a consumption smoothing motive in the face of relaxed borrowing constraints as the traditional permanent income hypothesis postulates? Or was credit growth driven more by consumption binging motives?

From the outset, the institutional features of the Brazilian government bank credit expansion cast doubt on the relaxed borrowing constraint view. There was no explicit restriction on borrowing that was lifted or removed, and interest rates remained high. Furthermore, as we show in a simple model calibrated to features of the Brazilian economy, it is difficult to rationalize the rise in borrowing with a model featuring households with standard preferences facing a relaxed borrowing constraint; the real interest rate on borrowing remained far too high to justify the strong borrowing response witnessed in the data.

From an empirical perspective, if consumption smoothing were a strong motive for public sector workers borrowing, then we should naturally observe same-age workers with

stronger expected income growth borrowing more aggressively. We test for this implication by constructing a new measure for expected income growth using income data on all formal sector employees in Brazil. The basic idea is that for someone in a particular age and occupation bin, their expected income growth going forward should be reflected in the *cross-sectional income slope* by age for workers in the same occupation, who are older than the age-bin under consideration. For example, consider an administrative assistant in the age bracket of 27-29 years old in 2010. Their expected income growth should be correlated with the estimated slope of log wage on age for all administrative assistants that are at least 27 years old in 2010.

We estimate the cross-section income slope for each age-bin, and each of the 2,500 occupations recorded in the Brazilian employer-employee data set. We find that this measure of expected income growth is indeed strongly correlated with *actual* income growth at the individual level. A regression of average annual labor income growth between 2010 and 2014 on the cross-sectional income slope for age-occupation bin in 2010 estimates a coefficient of 1.5 with a standard error of 0.05 for the more than 27 million formal workers in our data base. There is strong external validity support for our measure of expected income growth.

Is it the case that public sector workers with higher expected income growth are the ones who take on more payroll-backed loans? Since loans are explicitly based on payroll, and are for general consumption purposes, one would expect the consumption smoothing hypothesis to be most relevant. However, there is no support in the data that public sector workers with stronger expected income growth are more likely to increase their borrowing. In fact, the estimated coefficient even has the opposite sign with a tight standard error. The consumption smoothing hypothesis is clearly rejected in the data.

So what explains the large rise in borrowing? Following the influential work of Lusardi and Mitchell (2014), the specific consumption binging framework we focus on is financial sophistication. Such a focus is warranted by a number of factors surrounding the government bank credit expansion that began in 2011. First, the programs instituted by government banks were associated with large advertising campaigns, which previous research suggests may be particularly effective in generating a take-up response among less financially sophisticated individuals (e.g., Gurun et al. 2016). Second, there was an increase in the use of bank correspondents, which raised the concerns of the regulator for their predatory practices targeting low-income, low-financially sophisticated consumers.

To measure financial sophistication at the individual level, we focus on two characteristics that are available in our data: years of education and occupation. We construct a numerical index based on keywords in the description of the occupation that capture familiarity with finance, statistics, accounting, mathematics and economics.³ We interact this numerical index of occupational knowledge of financial concepts with years of

³See also Carrell and Zinman (2014) for an occupation-based measure of financial sophistication.

education to obtain the final measure of financial sophistication at the individual level.

We validate this measure of financial sophistication by matching individuals in the administrative data set to a smaller survey data set in which individuals are asked a number of questions related to their financial affairs. In particular, the survey asks individuals to assess their understanding of financial concepts (“financial literacy”), and asks questions designed to capture individuals’ self-control in expenditure decisions and discipline in saving decisions (“present bias”). The merged data show that our administrative measure of financial sophistication is positively correlated with survey-based measures of financial literacy and negatively correlated with survey-based measures of present bias at the individual level.

Using this measure, the results show that the rise in borrowing by public sector workers was significantly larger among workers with lower financial sophistication. The increase in the debt to income ratio from 2010 to 2014 was 5 percentage points larger for borrowers in the lowest quintile of the financial sophistication distribution. The timing of the relative rise in borrowing by less financially sophisticated public sector workers also corresponded to the 2011 change in policies by government banks, and there is no evidence of a pre-trend. We also document that the effect of financial sophistication on credit growth is particularly strong on the extensive margin, i.e. for individuals that did not have payroll loans to start with, indicating that familiarity with this type of financial product matters. Overall, these results suggest that consumption binging was a significant factor behind the rise in household debt to income ratio for public sector workers.

We have already mentioned that public sector workers were taking out payroll loans at a real interest rates of around 20%. Yet, workers’ wage data shows that the typical real income growth of these workers was only 1%. These statistics suggest that borrowing by public sector workers should have led to lower average consumption since borrowers would be paying a very high interest rate relative to their average income growth. Since we are able to merge credit card spending data to the administrative data set, we can test if this was indeed the case.

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 are highly collateralized, less financially sophisticated public sector workers did not see larger delinquencies on debt during the recession.

Overall, the evidence suggests that financially unsophisticated public sector workers borrowed aggressively from government banks at high real interest rates from 2010 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

2010 to 2014? This is a difficult question to answer, but consumption patterns from 2010 to 2016 suggest that the answer is no. In particular, these individuals experienced a lower level and higher volatility of consumption over the entire business cycle of 2010 to 2016.

We conclude the paper by presenting a set of additional results and robustness tests. We show that the main results are robust to potential violation of the parallel trends assumption using the methods proposed by the recent literature on difference-in-differences and event study designs (Rambachan and Roth (2022), Freyaldenhoven et al. (2021)). We explore the role of both intensive and extensive margin in the growth of the payroll lending market, documenting that financial sophistication plays an important role in the extensive margin, i.e. for individuals that did not have payroll loans to start with. Finally, we explore the role of changes in contract terms offered by government banks, documenting that the modest changes in interest rates and maturity observed in the data are unlikely to be a major driving force of the increase in indebtedness of public sector employees.

Related Literature

This paper is broadly related to three strands of literature. First, the paper is most closely related to the literature on understanding why consumers borrow. The consumption-saving decision is one of the most consequential economic decisions that consumers make. When should consumers borrow from external markets?

Friedman’s seminal permanent income hypothesis (PIH) framework implies that if the borrowing rate is favorable enough relative to expected income growth, then consumers would want to borrow in order to smooth future consumption. A relaxation of borrowing constraints could therefore lead to a sizable increase in borrowing. This is the “consumption smoothing” motive for borrowing. More generally, 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; Bruhn and Love, 2014), or to start entrepreneurial projects if credit-constrained (Banerjee and Duflo, 2010). Even in environments where consumer loans are expensive, studies have found that access to such loans can help borrowers mitigate financial distress (Morse, 2011), increase job retention (Karlan and Zinman, 2010), and better manage their financial situation (Zinman, 2010).

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. Melzer (2011) shows that one potential mechanism is individuals’ overestimation of their ability to pay. Bertrand and Morse (2011) highlight the importance of low financial literacy in not fully understanding how interest rates and fee structures affect disposable income. Carrell and Zinman (2014) show that restricting access to payday lending improves job performance.

The literature has also documented how marketing and advertising of financial products can lead less financially sophisticated consumers into using expensive products (see Hastings et al. (2013) for a review). Evidence on upselling of high-fee financial products by agents targeting individuals with lower financial sophistication has been documented in the markets for fund managers in Mexico (Hastings et al., 2017), subprime mortgages in the US (Gurun et al., 2016) or credit and savings products in Ghana, Mexico and Peru (Giné and Mazer, 2022). Similar to the settings studied in the payday loan literature and the literature on marketing of financial products, individuals in our sample operate in a high interest rates environment and were targeted by marketing campaigns and bank sales agents.

The findings of this study are also consistent with those in Gerard and Naritomi (2021). They find that laid off workers in Brazil tend to immediately consume their lump-sum severance payment instead of smoothing consumption over time. In general, our paper is among the first to show how a large-scale national level credit expansion program largely results in increasing consumption volatility as opposed to smoothing consumption, and even at the cost of lowering average consumption. Moreover, we can directly test for the consumption smoothing motive using the expected income growth estimate from the matched employer-employee data set.

A closely related study is Aydin (2022), which evaluates consumption patterns after a randomized experiment in which credit limits were lifted for a set of borrowers in the Turkish economy. The study finds that the consumption response of those randomly selected for an increase in the credit limit monotonically increases with ex-ante proximity to the limit, but even those quite far from the limit show some spending response. The setting here is distinct from the one evaluated in Aydin (2022), in that the Brazilian natural experiment, as we argue below, is not an increase in a credit limit. Furthermore, this study emphasizes financial sophistication as an important driver of the cross-sectional heterogeneity in the response to a credit supply expansion; this is important given that previous research suggests that proximity to a credit limit is correlated with the tendency to make financial mistakes (e.g., Jørring (2020)).

The second strand of the literature related to our paper is the work in macro-finance that connects run up in household debt to business cycle downturns (see Mian and Sufi 2018 for a review). Consistent with historical evidence from other countries, the large rise in household debt in Brazil from 2003 to 2014 was followed by one of the most severe recessions in Brazilian history. A prominent discussion in this literature is whether debt cycles reflect changes in borrowing constraints facing rational households in the presence of aggregate demand externalities (e.g., Korinek and Simsek 2016) or behavioral factors (e.g., Bordalo et al. 2018). Our paper suggests that in the case of Brazil, borrowing and consumption patterns in response to government-led credit expansion was more due to behavioral factors than a loosening of borrowing constraints for consumption smoothing

households. To the best of our knowledge, this is the first study using individual-level data to test the relationship between household debt expansion and future consumption over a credit cycle.

The third strand of the literature related to this paper is the work on government policy in amplifying credit cycles (see e.g. La Porta et al. 2002). Governments in emerging markets have increasingly become active in promoting credit expansion since the global financial crisis, with China being the most prominent example (Cong et al., 2019). Earlier work has documented how 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).⁴ 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). This study is the first to our knowledge to evaluate the effect of the government bank credit push in Brazil on household debt.

The rest of the paper is organized as follows. Section II explains the government intervention in household credit markets and describes the data used in the empirical analysis. Section III presents the identification strategy and documents the effect of exposure to higher credit availability on individual borrowing. Section IV discusses potential mechanisms behind the increase in credit take up and tests them in the data. Section V presents results on real outcomes.

II INSTITUTIONAL BACKGROUND AND DATA

II.A CREDIT EXPANSION BY GOVERNMENT BANKS

Figure I shows the evolution of total household debt in Brazil between 2007 and 2016, in billions of inflation-adjusted Brazilian reals. We split total household debt between debt originated by government and private banks. 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.⁵ Traditionally, these two banks are responsive to government influence and play an important role in the implementation of its policies. As Figure I shows, starting in 2011 credit to households originated by private banks slowed down or even contracted, while government banks' lending expanded substantially.

The timing of this differential increase in bank lending between government and private

⁴On the role of government-owned banks in Brazil see also Fonseca and Matray (2022), Coelho et al. (2013) and Lundberg (2011).

⁵We 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).

banks coincides with the introduction of a set of interventions by the federal government in the Brazilian banking sector aimed at increasing the flow of credit in a sluggish economy, and the launch of a heavily advertised campaign by government banks to publicize this increase in credit availability. In particular, between 2011 and 2012, the Treasury Department made a set of large capital injections into government-owned banks Caixa and Banco do Brazil.⁶ 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.⁷ In particular, exceptions were made for car loans, mortgages, and payroll loans (which we describe in detail in section II.B). 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.⁸

Following these interventions, the two largest government banks launched flagship programs to market new credit availability to Brazilian households: “Bom pra todos” (“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 better conditions than those available in the market at the time (lower interest rates, longer maturities, and higher credit limits) as well as better customer support to prospective clients. The new credit availability was publicized via widespread advertising campaigns. As shown in Figure II, data from the annual reports of the two banks show that advertising and marketing expenses doubled between 2010 and 2013, while there was not significant increase in such expenses for the three largest private banks (Itau Unibanco, Bradesco, and Santander Brazil).

In addition, there was an increase in the use of individuals working as bank correspondents – called *pastinhas* in Portuguese – that promoted and made 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 low-income customers with low financial education.⁹

⁶More 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.

⁷Regulation 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.

⁸See *Circular 3563*, 2011, Central Bank of Brazil.

⁹References 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 example, during the September 2011 meeting of COMEF, one of the members advocated for the need to regulate the payment of commissions to originators of payroll credit to remove the incentive to “predatory” practices (<https://www.bcb.gov.br/>

The timing of these government interventions in credit markets correspond to the beginning of the presidency of Dilma Rousseff, the candidate of the Workers’ Party (PT) that succeeded Luiz Inácio Lula da Silva in the 2010 presidential elections. In 2011, the Brazilian economy started experiencing substantial declines in industrial production and GDP growth. In this sense, the credit expansion programs of 2011 are consistent with a politically-motivated effort by the government to stimulate a slowing economy, an effort that lasted until the 2014 presidential election. Indeed, the use of government banks to expand credit in Brazil during the 2011-2014 period became an important topic in the debates between the two main presidential candidates during the 2014 electoral campaign. In particular, the incumbent president Dilma Rousseff defended the initiatives of the previous three years, while her opponent – Aécio Neves – criticized them and argued in favor of a smaller government role in Brazilian financial markets (Màximo, 2014).

It is important to recognize that the government bank credit push was not implemented through a lifting of borrowing constraints. For example, to the best of our knowledge, 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 IV.

II.B 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 and records information on all credit relationships between individuals and Brazilian financial institutions.¹⁰ Data is transmitted monthly from financial institutions to the Central Bank, and covers all credit relationships of those individuals that have a total exposure with a financial institution above a certain reporting threshold.¹¹ We rely on the 12.8% random sample of Brazilian borrowers along with all their transactions created by Garber et al. (2019), to which we refer for a detailed description of the sampling procedure. Figure B.1 reports the number of individual borrowers in our sample between 2007 and 2016, scaled by sampling weights. As shown, our sample represents a population of about 17 million borrowers in

content/publicacoes/atascomef/201109/Ata_2_Comef.pdf, page 7 of the minutes). Although there is no universal definition of “predatory lending”, the term is generally used to characterize practices that a financial intermediary may use to “make a loan with terms that are disadvantageous to the borrower” (US General Accounting Office, 2004), often through aggressive sales tactics.

¹⁰The 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.

¹¹The 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.

2007, which grew to almost 40 million borrowers by 2016. The Figure also reports the number of borrowers as a share of the adult population in Brazil, intended as individuals 20 years old and above.¹² 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 had access to formal credit.

There are 1,661 financial institutions in our sample. About 80% of them are credit unions, which however account for a small fraction of the outstanding balance of loans to individuals: 3% in the baseline year 2010. Financial institutions are categorized as private vs government controlled based on the majority of their ownership reported in the Unicad dataset of the Central Bank of Brazil. There are 34 financial institutions in the category of government controlled banks, including Caixa Economica Federal and Banco do Brasil – the two largest banks controlled by the Federal government – and 32 banks controlled by state governments. Overall, government-controlled banks represent 39% of outstanding balance of loans to households in our sample in the baseline year 2010. Excluding credit unions, there are 290 private banks in our data.

The loan categories covered in SCR 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 period under study, the three main loan categories in terms of share of household debt in Brazil were: mortgage loans – representing on average 32% of total 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. 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.

Because of the importance of payroll loans in our setting, we provide more detailed information on these contracts in what follows. Payroll loans are installment loans for which the principal and interest payments are deducted by the bank directly from the borrowers’ paycheck or pension. They have a pre-determined maturity – 5 years for the median contract in our data – and fixed monthly payments during the amortization period of the loan.¹³ The Brazilian law establishes that interest and principal payments on payroll loans cannot amount to more than a certain share of the borrowers’ labor income after mandatory deductions (such as pension contributions and taxes). During the period studied in this paper, this share (called “margem consignável”) has been fixed at 30%

¹²The 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 liner projection for years post 2010.

¹³Brazilian banks also offer payroll cards – “cartão de crédito consignado” – a more flexible instrument which operates similarly to a normal credit card, but with payments deducted directly from the borrower’s wage. Payroll cards have a low credit limit of 5% of the borrower’s monthly income, and allow borrowers to pay their balance in up to 72 months. Payroll cards were only introduced at the end of 2015 and are not included in our dataset. Thus, hereafter, the term “payroll loans” is used to define the standard installment payroll loans and not payroll cards.

as established in the law regulating payroll lending (law 8,213 of 1991). Payroll loans have been available to public sector employees and retirees – whose stable income stream constitute good collateral – since 1991. In 2003, a new law made available payroll loans also for private sector employees and private sector social security beneficiaries, leading to a large expansion of personal credit (Coelho et al., 2012).¹⁴

Although government and private banks have a similar share of the total household lending market in Brazil, they tend to specialize in different loan segments. In the baseline year 2010, private banks have in their books almost the entirety of outstanding auto loans (96%) and credit card debt (97%) as well as the majority of non-payroll loans (63%) recorded in our sample. Government banks, on the other hand, have the majority of household mortgage balance (81%) and rural lending (64%). The market for payroll loans, instead, is split in relatively equal terms between the two types of banks, with private banks reporting 54% and government banks the remaining 47% of payroll balance of Brazilian households in the baseline year 2010.

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.¹⁵ 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.

To construct the sample of individuals used in the empirical analysis, we start from all individuals with positive borrowing as of 2010 in the 12.8% random sample extracted from the Credit Information System. This corresponds to 3,305,067 individuals. Notice that, when appropriately scaled, this number corresponds to the around 25 million borrowers observed in Brazil in the year 2010 as reported in Figure B.1. Next, we match borrowers with formal workers recorded in RAIS using their fiscal codes. We are able to match 1,888,005 individuals, or 57% of our sample of borrowers in 2010. There are two main reasons why borrowers might not appear in RAIS. First, many borrowers are retirees that do not pay into the social security system. Second, RAIS only covers formal employees, thus leaving out entrepreneurs, self-employed, informally employed or unemployed individuals. We define the 1,888,005 individuals observed both in RAIS and in the Credit Information System as our full sample of borrowers with formal jobs in 2010. Finally,

¹⁴Notice that borrowers do not have the ability to delay payment for a fee or penalty for a payroll loan, as is common in revolving credit and credit card lending. As a result, there is no scope for lenders to exploit present-bias using variation in when payments are made as in Heidhues and Kőszegi (2010) and Allcott et al. (2022)

¹⁵Employers 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*).

we focus on individuals recorded in RAIS in 2010 and 2014 – so that we can observe the evolution of their labor income – and with credit card data available during the recession years 2014 to 2016. Once we apply these restrictions, we obtain the 763,423 individuals used in the empirical analysis.

Panel A of Table I reports summary statistics for the full sample of borrowers recorded in RAIS in 2010, and for the regression sample used in the empirical analysis. As shown, 42 percent of borrowers in our regression sample are female, and 41 percent are public sector workers. They have on average 13.2 years of education – corresponding to completed high school in Brazil – and 40.5 years of age. Their monthly labor income is about 4,000 BRL, eight times higher than the federal minimum wage in 2010. Their average debt to labor income ratio is 0.64, and their average share of borrowing from government banks is 0.23. In section VI we show that our results are consistent between the two samples for the outcomes that are observable in both.

III THE RISE IN HOUSEHOLD DEBT

III.A IDENTIFICATION STRATEGY

What was the impact of the government-driven expansion in credit availability on individual-level debt levels? To address this question, we propose an individual-level measure of exposure to the credit expansion by government banks. In particular, we exploit the fact that the credit expansion was concentrated in certain categories of loans (payroll loans), which traditionally target specific categories of workers (public sector employees). As discussed in section II.A, payroll lending allows banks to deduct payments directly from the borrower’s paycheck. Due to this feature, it traditionally targets individuals with higher job security and more stable income, such as public sector workers and retirees.

We use public sector employment as a measure of exposure to the government banks credit expansion. We extract information on the sector of employment for each borrower in the baseline year 2010 from RAIS, and classify as public sector workers those individuals employed by the public administration, which includes personnel of local and federal government administrative bodies, judicial system, defense and law enforcement.¹⁶ As shown in Table I, public sector workers represent 41% of borrowers used in our regression sample. The most represented occupations include administrative assistants, secretaries, teachers, cleaning services providers, and building management and maintenance personnel.

¹⁶More specifically, we define public-sector employees based on the legal classification of the employer of each borrower (“*natureza jurídica*”). RAIS classifies employers into 77 categories based on their legal status. We define as public sector workers those employed by entities whose legal classification captures the Brazilian public administration. This corresponds to “*natureza jurídica*” codes between 1015 and 1210 (20 categories). These categories include each branch of the federal government, state governments, and municipal governments as well as other government owned types of legal entities.

Public and private sector workers in our regression sample differ along many observable characteristics, which we document in Panel B of Table I. Public sector workers are more likely to be female (22 percentage points), have on average 0.76 more years of education, are 5 years older, and have a 8 percentage point higher share of borrowing from government banks at baseline. The average monthly wage of public sector workers is around 500 BRL (14%) higher than the average monthly wage of formal private sector workers, while their average debt-to-income ratio (0.64) is similar to the one observed for private sector workers.

Although employment in the public sector is clearly not randomly assigned, there are several 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. In our empirical analysis, we control for the individual observable characteristics discussed above and augment the estimating equation with fixed effects for the micro-region and the occupation of each worker.¹⁷ The information on occupation reported in RAIS is extremely detailed, covering about 2,500 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, individuals selecting into public sector jobs display lower volatility in their labor income and, likely, in their consumption. As such, it is plausible that any unobservable impact of job stability should generate a downward bias on our estimates of credit access on consumption volatility. In section III.C we also propose an identification strategy exploiting within-individual variation across banks lending to the same worker. This strategy allows to absorb individual-level demand shocks, and thus document a relative increase in credit supply to public sector workers by government banks during this period.

III.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 dynamic specification at the individual-level:

$$\frac{debt_{it}}{income_{i,2010}} = \lambda_i + \delta_t + \sum_{\substack{k=2007 \\ k \neq 2010}}^{2016} \beta_k 1_{t=k} Public_{i,2010} + \Psi_t X_{i,2010} + u_{it} \quad (1)$$

¹⁷The Brazilian Institute of Geography and Statistics (IBGE) defines microregions by combining geographically contiguous and economically integrated municipalities. There are 558 micro-regions in Brazil.

where the outcome variable is the total balance of bank debt across all banking relationships of individual i in year t normalized by the labor income of individual i in the baseline year 2010. $Public_{i,2010}$ is an indicator function that takes value 1 if individual i was a public sector worker in 2010, and 0 otherwise, and $1_{t=k}$ is a dummy equal to 1 if year t is equal to k . Equation (1) includes individual fixed effects (λ_i), year fixed effects (δ_t), and baseline individual controls ($X_{i,2010}$) interacted with year fixed effects. Individual controls include age and income quintiles, education level, gender, micro-region and occupation. We also include initial debt-to-income ratio and share of initial borrowing from government banks. All controls are observed in the baseline year 2010 and interacted with year fixed effects to capture in a flexible way the effect of observable characteristics on borrowing during the period under study.

The unit of treatment in equation 1 is the legal classification of the employer of each worker. As described above, RAIS classifies employers into 77 categories based on their legal status, and 20 of such categories are associated with the Brazilian public administration. Although there are likely to be differences in the degree of reliability of the payroll stream offered by different employers in the public administration (e.g federal jobs are likely to be safer than municipal jobs), in our empirical analysis we assign treatment status equal to 1 (public sector employment) to all the 20 employer categories associated with the public administration. In all specifications estimating equation (1), we cluster standard errors at the employer category level. This corresponds to 62 clusters in the regression sample of borrowers.

The results of estimating equation (1) are reported in Figure III. We report separately the effect of public sector employment on individual debt balance with government banks versus private banks. As shown, we find a significant increase in borrowing from government banks for public sector workers relative to private sector workers starting in the period after 2011. On the other end, the estimated coefficients on public sector employment are close to zero and mostly not statistically significant when focusing on borrowing from private banks. These results are consistent with public sector workers being more exposed to the credit expansion program of government banks that started at the end of 2011.

As shown, we find no differential trends in borrowing of public sector workers from either government banks or private banks in the four years before the intervention.¹⁸

Table II reports the results of estimating a first-difference version of equation (1) as follows:

$$\frac{\Delta debt_{i,2010-2014}}{income_{i,2010}} = \alpha + \gamma Public_{i,2010} + \Gamma X_{i,2010} + u_i \quad (2)$$

The outcome variable is the change in bank debt balance between 2010 and 2014 nor-

¹⁸In section VI we provide a sensitivity analysis of our main results to potential violations of the parallel trends assumption.

malized by the 2010 labor income for individual i . We study the effect of public sector employment on total borrowing in column (1), and then we separate the effects on borrowing from government banks versus private banks in columns (2) and (3), respectively. The magnitude of the estimated coefficient in column (1) implies that public sector workers experienced a 15 percentage points higher increase in their debt-to-initial income ratio relative to private sector workers between 2010 and 2014. This corresponds to 23 percent of the average level of debt to income observed in our sample at baseline (0.65). As shown in columns (2) and (3), this effect is driven by an increase in debt from government banks.

Next, we study the effect of being employed in the public sector on individual indebtedness by loan category. The results are summarized in Figure IV and reported in detail in Table III. As shown in Figure IV, the main driver of the differences in the change in debt-to-income across workers is the differential increase in payroll lending. Public sector workers also experience significantly higher increases in non-payroll personal loans and credit card debt, and a relative decline in car loans and mortgages with respect to private workers. However, the differences in these other loan categories are small. The results in Table III show that the differential effect of public sector employment on payroll loans is mostly driven by lending from government banks.

The push to increase consumer lending in Brazil via government banks might stem from political motivations, given the timing of introduction of the policies discussed in section II.A. Previous literature has documented that government banks in Brazil have been used for political goals, including the expansion of economic activity in politically sensitive regions (Carvalho, 2014). Thus, we investigate whether the credit push studied in this paper was targeted towards regions with a larger constituency of voters of the Workers' Party (PT) – the incumbent party at the time of the program. We test this hypothesis by exploiting variation in the baseline vote share of the PT across regions of Brazil. More specifically, we estimate a version of equation (2) which includes an interaction between public sector employee and the share of votes for the PT in the 2010 presidential election at micro-region level. The results are reported in Appendix Table B.1. As shown, the differential effect of the program on public sector workers does not depend on the presence of a strong PT local constituency. We find small and non-significant effects of the interaction term with the local share of votes for the PT both when focusing on the change in lending by government banks and by private banks between 2010 and 2014. This indicates that – at least when it comes to credit expansion towards households – government banks did not specifically target regions that traditionally support the incumbent party.

III.C WITHIN-INDIVIDUAL EFFECTS

In this section we provide additional evidence using within-individual variation. One potential concern with the results presented in section III.B is that changes in the credit

origination policy of government banks might be correlated with contemporaneous changes in credit demand by public sector workers. To investigate this concern, we build on the empirical literature studying the effects of bank liquidity shocks on firm borrowing (e.g. Khwaja and Mian 2008), and focus on individuals that borrow from multiple banks that are heterogeneously exposed to a change in credit expansion policies.¹⁹

We estimate the following specification:

$$\frac{\Delta debt_{ib,2010-2014}}{income_{i,2010}} = \lambda_i + \eta_b + \gamma Gov_b + u_{ib} \quad (3)$$

The outcome variable in equation (3) is the change in debt balance of individual i with bank b between 2010 and 2014, divided by the annual labor income of individual i in the baseline year 2010. To estimate this specification we first collapse the data at the bank-individual level. Thus, each observation is a bank-individual relationship. The variable Gov_b is a dummy equal to 1 for government controlled banks, and 0 for private banks. Our coefficient of interest is γ , which captures the difference in borrowing from government versus private banks between 2010 and 2014 normalized by the individual’s labor income. The specification includes individual fixed effects, so that the identifying variation of the coefficient of interest comes from within-individual differences in borrowing between bank types. We also include bank fixed effects to absorb any bank-specific trends in loan origination in the 2010-2014 period.

In the within-individual specification described in equation 3, the unit of treatment is a bank. Some banks are owned by the government – and we consider them treated in this experiment because of the nature of the credit expansion policy – and others are privately owned – and we consider them as control. Thus, in all specifications using within-individual variation across banks, we cluster standard errors at the bank level.

Note that equation (3) can only be estimated for individuals borrowing from both private and government banks. Borrowing from multiple types of banks in Brazil is relatively common due to bank-level specialization in different types of loans. Around 40% of individuals in our regression sample have open balances with both government and private banks in the baseline year 2010. The results of estimating equation (3) are reported in Table IV. We start by estimating equation (3) without individual fixed effects in column (1), and then including individual fixed effects in column (2). The estimated γ is positive and statistically significant, and increases in magnitude from 0.132 to 0.139 when fully controlling for individual demand shocks. The magnitude of the coefficient in column (2) implies that, between 2010 and 2014, government controlled banks increase their lending by 13.9 percentage points more than privately controlled banks to the same

¹⁹Our empirical approach in this section is similar to that in Jensen and Johannesen (2017), which studies 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 focuses on individuals with credit cards from multiple banks to study the effect of bank funding shocks on credit limits.

individual, where the estimated coefficient should be read as a share of the initial labor income of the borrower. Finally, in column (3), we interact the government bank dummy with a dummy for public sector workers. As shown, the increase in lending by government banks relative to private banks was more than twice as large for public sector workers than for private sector workers.

Public sector workers might increase their borrowing from government banks relatively more because they expect more lenient enforcement by such banks in case of default. We think that this mechanism is unlikely to be at work in the Brazilian payroll lending market. The first reason is due to the nature of payroll loan contracts. In payroll loans, repayment happens automatically when wages are deposited in the worker’s bank account. Because public sector jobs are extremely safe – the Brazilian Constitution establishes that civil servants admitted via public context acquire tenure for life after three years of service (Art.41) – public sector employees can only default if they resign, if they die, or in cases in which the payment of government salaries is delayed for technical or political reasons. Among our sample of borrowers, the default rate on payroll loans of public sector workers is less than half of the one of private sector workers. In the baseline year 2010, public sector workers have 0.6 percent of their total balance with a delay in payments of 90 days or more, against the 1.6 percent of private-sector workers. To the best of our knowledge, there have been no official loan forgiveness programs specifically targeted to public sector workers during the period under study.

Second, we test more formally whether public sector employees default at the same rate when borrowing from government banks vs private banks. If they expect more leniency from government banks, we should expect higher default rates on contracts originated by such banks. Because public sector workers borrowing from government banks might differ from those borrowing from private sector banks, we focus on public sector workers borrowing from both private and government banks and estimate equation (3) using as outcome variable the change in the share of balance in default (90 days late or more) during the recession period 2014-2016 multiplied by 100. The results are reported in Appendix Table B.2. As shown, we find small (-0.4 percentage points) and non statistically significant differences between the default rate of public sector workers towards government banks and towards private banks during the recession period. Column (2) shows that this result holds when including individual fixed-effects.

Overall, the results presented in this section are consistent with an increase in credit supply from government banks during the 2010-2014 period. Recall that these results are not informative about the effect of the 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. However, taken together, the evidence in sections III.B and III.C point towards a credit supply increase by government banks that

led to an increase in overall indebtedness of more exposed individuals.

IV EXPLORING THE MECHANISM

IV.A RELAXATION OF BORROWING CONSTRAINTS

A typical explanation for a large response in borrowing during a credit expansion is that households face borrowing constraints that are loosened by the expansion itself (e.g., Gross and Souleles 2002). However, as already mentioned in Section II.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 were far from the borrowing limit on 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. Brazilian law establishes that lenders are able to collateralize loans using the wages of workers paying into the social security system, as long as the total payments are no more than 30% of the borrower’s income. But as Figure B.2 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 had payments of 25% or more of their monthly income. There is evidence that even borrowers far from a constraint show a positive borrowing response when credit limits are exogenously increased (e.g., Aydin (2022)), the borrowing effect is substantially smaller compared to the response of borrowers closer to the limit.

Furthermore, it should be taken into account that interest rates on payroll loans remained high during the entire period of the credit expansion. Figure B.3 reports the average annual interest rate and maturity on existing loans originated by government banks and private banks between 2007 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.²⁰ As the figure shows, after accounting for inflation (about 6% per year in this period), real interest rates on payroll loans were on average around 20% between 2011 and 2016.

The programs launched to market new credit availability to Brazilian households emphasized the better conditions offered by government banks relative to the average bank in Brazil. In practice, we observe modest evidence of improvements in loan conditions by government banks in this period. The top panels of Figure B.3 show how government banks offered lower interest rates than private banks on payroll loans both before and after the intervention. Between the baseline year 2010 and 2014, the median nominal

²⁰To 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. Using all borrowers in our sample shows similar patterns.

interest rate on payroll loans for multi-bank type borrowers declined from 23.6 to 22.7, a 0.9 percentage points decrease. Figure B.3 also shows that the median maturity increased from 4.5 to 5 years.²¹ In section VI.C we discuss this point in detail and test more formally the impact of government banks credit expansion policies on contract terms of targeted individuals.

IV.A.1 Modeling the borrowing constraint view

In Appendix section A we outline a simple model of consumer behavior based on Angeletos et al. (2001). We use the model to analyze how households that are patient and have typical preferences with exponential discounting would respond when “treated” by a loosening of a borrowing constraint. We then calibrate the model to actual wage dynamics, the interest rate on saving, and the interest rate on borrowing observed in Brazil. The key insight from the calibration exercise is that, given the average real wage growth, the standard deviation of wage growth across consumers, and the large spread between borrowing and saving interest rates, very few households should ever respond to a loosening of borrowing constraints by borrowing more. The Brazilian credit expansion did not appear to loosen any explicit borrowing constraint; the model shows that even if it did loosen a borrowing constraint in ways unobserved to us, it would be difficult to rationalize the observed borrowing response in a standard model.

Figure A.1 in the appendix plots the saving rate of consumers against current assets before and after the shock to their borrowing constraint. One takeaway from the saving rate schedules is that households with typical preferences most often have a positive saving rate while they are employed and thus would be reluctant to borrow. The reason is that the 20% real rate of borrowing in Brazil is too high relative to the 1% average real wage growth expected in Brazil. The borrowing rate is too high to justify foregoing future consumption for current consumption. Of course, for the small share of households who may be expecting much higher wage growth, or who may be currently unemployed, we may see some borrowing. But the basic insight remains that most of the households should choose not to borrow when given the opportunity. Another takeaway is that households with typical preferences do not respond to the loosening of the borrowing constraint. Again, the intuition is straight-forward. Given the features of the Brazilian economy, households with typical preferences do not borrow even if a borrowing constraint is lifted because the real interest rate remains high relative to income growth. Figure A.2 in the appendix plots the consumption (left panel) and borrowing (right panel) impulse

²¹The relatively small changes in loan conditions is consistent with a recent study that focuses on the credit expansion by government banks in Brazil towards SMEs that was part of the same wave of market interventions studied in our paper. Joaquim et al. (2022) uses micro-data from the credit registry of Brazil to document that, despite government banks had lower interest rates than private banks both before and after the intervention, the credit expansion to SMEs was not characterized by a significant decline in loan rates by government banks.

response functions for a household with exponential discounting in response to loosening of a borrowing constraint. Households with these typical preferences do not respond to the loosening of the borrowing constraint, and as such their consumption and net assets remain unchanged.

IV.A.2 Measuring borrowing constraints

Households with standard exponential preferences facing a binding borrowing constraint is a benchmark in many studies focused on the response of consumers to a rise in credit availability (e.g., Gross and Souleles 2002).²² 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. 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. 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.²³

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 2010. 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 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

²²In 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).

²³The logic of this test is closest to the discussion in Zeldes (1989) and Deaton (1991). There are, 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)).

older and older workers in the data. We include in all these regressions state fixed effects, to account for different labor income levels 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 V(a) summarizes the outcome of the procedure described above. In this figure, we plot the average income slope across all occupations for each age ventile, splitting workers between private sector and public sector workers. As shown, labor income slopes are the highest for younger individuals. An income slope of around 1 for individuals in their twenties implies that such individuals in Brazil can expect their annual labor income to increase by 1 percent per year in real terms for the rest of their working life. Average income slopes tend to decline over time with age as individuals reach the maximum attainable wage in their profession, and then become close to zero when workers are in their late forties and fifties. The Figure also shows how the evolution of this slope is different between public and private sector workers. Private sector workers tend to experience faster labor income growth when younger, but also a steeper decline in their slope as they get older. On the other hand, public sector workers have a lower slope when younger, which however remains relatively constant as they get older. In Figure V(b) we plot the average slope of public sector workers along with the 25th and 75th percentiles. There is large variation in income slopes across occupations within age groups. For example, expected real income growth for public sector workers in their twenties range from 0 to about 2 percentage points per year.

We also perform an external validity test in which we study whether the estimated income slopes indeed predict future income growth. Notice that we estimate income slopes using variation across workers of different ages in 2010. Thus, testing how this measure predicts income growth after 2010 is an out of sample validation of the measure. The results are reported in Table V. We estimate to what extent income slopes computed in 2010 predict annual average income growth between 2010 and 2014. If income slopes are a good predictor of future income growth, we expect a coefficient close to 1 in these regressions. As shown, we find that income slopes are very precise predictor of future income growth for public sector workers, which have a coefficient of 0.93. For private sector workers, we find a coefficient of 1.9, which indicates that income slopes tend to under-estimate their future income growth during this period.

Our measure of expected future income growth is related to the recent literature using detailed administrative data to study differences in income profiles across individuals. For example, Guvenen et al. (2017) use US social security administration data to reconstruct the evolution of lifetime income across age cohorts that entered the US labor market between 1957 and 2013. Closest to our approach is Hampole (2022), which studies how

financial frictions affect the choice of college majors that offer different patterns of life cycle earnings. Hampole (2022) uses data from the US Annual Community Survey to calculate the slope of individual wages with respect to age by college major, with the objective of studying the trade-off between initial earnings vs lifetime earnings when individuals choose their college major. Relative to Hampole (2022), our measure is based on the observed occupation of each individual as recorded in administrative data, and captures how expected labor income growth differs not only across occupations but also within-occupation across age groups.

IV.A.3 Borrowing response by income slope

In this section we test for heterogeneous effects in the borrowing response of public sector workers to the credit expansion program across individuals with different income slopes in the baseline year 2010. To this end, we estimate a dynamic specification similar to equation (1) in which we interact public sector employment with dummies capturing *high income slope* – our proxy for credit constraints. We define individuals with high income slope as those in the top quintile of the income slope distribution at baseline. Our estimating equation also includes interactions of the high income slope dummy with year fixed effects, as well as the same individual level controls interacted with year fixed effects as in Figure III.

The results of are reported in panel (a) of Figure VI. The main takeaway is that public sector workers more likely to be financially constrained did not take up more debt after the government-led credit expansion. If anything, the borrowing of high income slope public sector workers declined in the post 2010 period.

We also estimate a first-difference version of the specification reported in Figure VI, where the outcome variable is the change in bank debt balance between 2010 and 2014 normalized by the 2010 labor income for each individual. Panel (a) of Figure VII report the point estimates and confidence intervals for the coefficients on the interactions between the public sector worker dummy and dummies capturing quintiles of income slope at baseline. All coefficients are estimated relative to the excluded interaction with the third quintile. As shown, we do not find significant heterogeneous effects in borrowing, with the exception of the top quintile of workers that experienced a decline in borrowing during the 2010 to 2014 period.

Overall, there is no evidence that the Brazilian government bank credit expansion was associated with a loosening of a borrowing constraint. In addition, a simple model calibrated to the Brazilian data shows that even if there were a loosening of a borrowing constraint, we would not expect households with standard preferences to respond by borrowing significantly more. Finally, the empirical evidence is inconsistent with the view that households most likely to face a borrowing constraint increased borrowing by more in response to the government bank credit expansion.

IV.B FINANCIAL SOPHISTICATION

As an alternative to the benchmark borrowing constraint mechanism, we are motivated by a number of reasons to focus on financial sophistication. First, the importance of 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. Advertising has been shown to be a powerful determinant of credit demand in consumer credit markets (e.g., Bertrand et al. 2010). 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 (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.²⁴ 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 II.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.²⁵

IV.B.1 *Measuring financial sophistication*

We propose an empirical proxy for individuals who are less sophisticated in terms of financial matters. The specific measure of financial sophistication that we construct is based on two individual-level characteristics that are observable in the employer-employee dataset RAIS: years of education and occupation. In particular, we use textual analysis

²⁴See on this the conclusions of the September 2012 COMEF meeting.

²⁵On the benefit of financial literacy programs for less educated individuals see the findings in Hastings et al. (2017) which document the importance of increasing price sensitivity to financial products among the most price-inelastic individuals, which are often those with lower financial education.

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 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.²⁶ 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 for each of the five areas described above that has related key-words found in the job description. 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.

The advantage of this methodology is that it allows us to measure financial sophistication for the universe of employees in the RAIS data. The disadvantage is that it is a less precise measure of financial literacy or financial sophistication relative to survey based measures obtained by the existing literature (see, e.g., Hastings and Mitchell (2020), Stango and Zinman (2022)). However, we can cross-check our measure using a recent survey on the financial health of Brazilian households designed by the Brazilian Banks Federation (FEBRABAN) and the Central Bank. We focused on two main sections of the survey: the section evaluating financial “ability” and the section evaluating financial “behavior”. In the financial ability section, respondents are asked to assess their own ability to make financial decisions, including their ability to search for information needed for such decisions. We think of this as a proxy of financial literacy. In the financial behavior section, respondents are asked to assess their ability to exercise self-control in their expenditure decisions, and to meet their saving and financial goals. We think of this as a proxy of present bias. Table B.3 reports the three survey questions asked in each section along with their English translation. For each question, individuals assess their ability on a five-point scale ranging from “no ability” (“*Nada*”) to “full ability” (“*Totalmente*”).

²⁶The 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.

We convert the five-point scale in points from 0 to 4, and then sum the points obtained across the three questions of each section for each individual. Thus, the financial ability and the financial behavior scores range from a minimum of 0 to a maximum of 12 points.

We use data from the first two waves of the survey, which were carried out in 2020 and in 2022 on a nationally representative sample of about 5,000 individuals in each round. We were able to match 2,459 respondents which reported their fiscal code in their answers to the survey with RAIS for the years 2020 and 2022.²⁷ This allows us to test the correlation between our measure of financial sophistication based on administrative data and the scores obtained by respondents in the two sections of the survey. These correlations are reported in Table B.4 and visualized in Figure VIII. Panel (a) reports the average financial ability score and the average financial sophistication of individuals in each quintile of financial sophistication, along with the regression line estimated using the underlying micro data. The financial ability score is standardized so that a unit increase in the y-axis corresponds to a standard deviation increase in the score. This implies that individuals in the lowest quintile of financial sophistication also had the lowest average financial ability score, 0.35 standard deviations below the scores for the top 2 quintiles. Similarly, Panel (b) shows that individuals in the lowest quintile of financial sophistication also recorded a 0.4 standard deviations lower score in terms of financial behavior, which implies lower self-reported discipline and lower self-control when taking savings and consumption decisions. This latter result is consistent with the finding in survey data that less financially sophisticated individuals also display higher present bias (Hastings and Mitchell 2020, Stango and Zinman 2022).

IV.B.2 *Borrowing response by financial sophistication*

We test for heterogeneous effects in the borrowing response of public sector workers to the credit expansion program across individuals with different levels of initial financial sophistication. As in section IV.A, we estimate a dynamic specification similar to equation (1) in which we interact public sector employment with dummies capturing *low financial sophistication*. We define individuals with low financial sophistication as those in the bottom quintile of the financial sophistication distribution at baseline.

The results are reported in panel (b) of Figure VI. We find that public sector workers with lowest financial sophistication experienced a larger expansion in borrowing after the 2011 government credit expansion. There is no pre-trend in the coefficients, and the timing of the relative increase in credit take up by financially unsophisticated public sector workers matches the timing of the credit expansion policies. Panel (b) of Figure VII reports the relative increase in borrowing of public sector workers by quintile of

²⁷Unfortunately, there is only minimal overlap between the 2,459 respondents in the 2020 and 2022 surveys and the borrowers in our baseline sample defined in 2010 to estimate our main specifications using the survey based measure of financial sophistication.

financial sophistication between 2010 and 2014. As shown, the increase in borrowing is monotonically declining with financial sophistication.

We summarize our findings on potential mechanisms in column (1) of Table VI. The outcome variable in this table is the change in bank debt balance between 2010 and 2014 normalized by the 2010 labor income. The results show that the effect of being a public sector employee on debt growth as a share of initial income is significantly stronger among workers with low financial sophistication. The marginal effect is large, a 5.1 percentage point larger rise in the debt as a share of initial income. In contrast, the marginal effect for public sector workers with a high income slope is negative.

V REAL EFFECTS

In this section we study the effects of the government bank credit origination policy on consumption patterns. Our main measure of individual consumption is credit card expenditure, which 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.

There are two important limitations with this measure of individual consumption. First, the use of credit cards among the Brazilian population is limited. In the period under study, only about 14 percent of adults in Brazil have a credit card. However, the diffusion of credit cards is much higher among borrowers recorded in the credit registry, with 53 percent of individuals in SCR reporting expenditure via credit card.²⁸ In this sense, our results should be interpreted as capturing the impact of the government credit expansion policy on borrowers whose marginal spending is on their credit card.

A second and important limitation of our data is that it does not contain information on the items or services purchased via credit cards. Thus, we cannot observe whether changes in spending are on durable or non-durable goods and services. To make progress on this front, we provide stylized facts on the composition of credit card spending in Brazil using data from the clearing house of credit card transactions (NUCLEA). This data cannot be matched with individuals in the credit registry and only starts in 2018, after the end of the period studied in our paper. Still, it is useful to shed light on the composition of credit card spending between durables vs non-durables. To study this composition, we manually classify 5-digit sector codes of the Brazilian sectoral classification system (CNAE) into durables vs non-durables, and then compute the share of total credit card expenditure based on the sector of the vendor that processes the transaction.

Table B.5 reports the largest sectors by credit card sales that we classify as durables vs non-durables. For the year 2018 – the first year for which this data is available – we

²⁸Credit 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.

find that around 75% of total credit card sales were processed by firms in sectors that we classify as non-durable. The main sectors associated with spending in non-durables are grocery stores (16% of total credit card expenditures), restaurants (9.8%) and traveling and entertainment (8%). On the other hand, we find that 19% of total credit card sales were processed by firms in sectors that we associate with durable goods, including construction related expenses (3.9%), vehicles (3.6%), and electronics and home appliances (3.1%). We classify education related expenses in the durable sectors, including any expenses in the higher education sector, expenses for language schools or driving classes, or expenses in professional training programs. In total, educational expenses account for around 1% of total credit card expenses in 2018.

An important caveat in interpreting these stylized facts is that a fraction of non-durable credit card spending according to the classification reported in Table B.5 could have durable components. However, we are not able to differentiate these two components at the level of aggregation at which credit card transactions are observed in the NUCLEA data. In addition, although the NUCLEA data allows to shed light on the composition of the average Real spent via credit card in Brazil, it cannot be used to study the composition of the *marginal* spending induced by the government-led credit expansion program studied in this paper.

Columns (2) to (5) in Table VI present 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 (2) shows that their after-debt-service income fell the most during the recession years, although this coefficient is not precisely estimated at standard levels. If we compare less financially sophisticated public sector workers with private sector workers, the total derivative implies a relative reduction in after-debt-service income of $(3+1.2=)$ 4.2 percent. This is primarily due to the fact that the interest rates on the debt were quite high, as shown by the small effects on income documented in column (5).

Column (3) 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. For readability, the outcome variable is multiplied by 100, so that a coefficient of 1 should be interpreted as a 1 percentage point larger increase in the share of balance in default. The coefficient on the public sector employee dummy indicates that public sector workers outside of the bottom quintile of financial sophistication and outside of the top quintile of income slope experienced a 0.024 percentage points lower increase in the share of their balance in default relative to private sector workers between 2014 and 2016. The small difference in default between public and private sector workers 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. Importantly, we find no differential effects on default for public sector workers with low

financial sophistication. The margin of adjustment for less sophisticated public sector workers during the recession was not delinquency. Public sector workers with higher income slope experienced a larger decline in the share of their debt in default – though the magnitude is economically small (0.04 percentage points). This is consistent with their predicted income trajectory.

To summarize, public sector workers with low financial sophistication witnessed a larger decline in their after-debt-service income, and they were not more likely to discharge their debt. As column (4) shows, cutting consumption was the main margin of adjustment. The decline in consumption was substantial relative to private sector workers, with a 4.2 percentage points larger decline in credit card expenditure between 2014 and 2016.

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 2010 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 VII. We find that, at the individual level, the credit expansion ultimately resulted in lower mean and higher variance of consumption over the 2010 to 2016 period. Column (1) shows that less financial sophisticated public sector employees experienced 0.27 log points lower credit card spending per year during the 2010-2016 period, which corresponds to 3.4% of the mean in our sample. This result is robust to normalizing individual spending by its average level in the pre-2010 period, as shown in column (2). Column (3) shows that, over the 2010-2016 period, less financially sophisticated public sector workers experienced 12.3% higher volatility in annual credit card expenditure relative to the mean in our sample.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 2010-2016 period.

To sum up, we find that households with low financial sophistication experience lower mean consumption over the whole period, as well as higher consumption volatility. 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 2010 to 2014 may not have led to lower average consumption and higher consumption volatility over the whole period. In addition, it is difficult to use the ex-post consumption pattern evidence alone to prove that borrowers ex-ante made sub-optimal decisions (e.g., Heidhues and Strack (2021), Strack and Taubinsky (2022)). Finally, because we cannot separate expenditures on durable versus non-durable spending, some caution is warranted before concluding that the expenditure volatility pattern reflects sub-optimal decision-making.

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

The bottom line is that more research is needed to establish conclusive evidence that less financially sophisticated borrowers made sub-optimal borrowing and spending decisions.

VI ADDITIONAL RESULTS AND ROBUSTNESS

VI.A PRE-TRENDS ANALYSIS

In Figure B.4 we present a sensitivity analysis of our main results to potential violations of the parallel trends assumption. For this, we rely on the methodology developed by Rambachan and Roth (2022). The key intuition of this approach is that counterfactual post-treatment trends cannot be “too different” from pre-trends. Rambachan and Roth (2022) formalize this intuition by proposing a sensitivity analysis of post-treatment estimates in which the researcher first computes the maximum pre-treatment violation of parallel trends, and then studies how large should the post-treatment violation be in order to invalidate the conclusion of a (in our case) positive post-treatment effect.

Panel (a) of Figure B.4 reports this sensitivity analysis for the event-study in Figure III of the paper, which captures the timing of the effect of the 2011 credit expansion policies on public sector workers borrowing. The first confidence interval (shown in red) represents the 95% confidence interval for the average effect in the post-treatment period based on our original estimate, which is centered around 0.11. Next, we report confidence intervals computed following Rambachan and Roth (2022) for different values of $Mbar$, the ratio between the violation in the post-treatment period and the maximum violation of parallel trends in the pre-treatment period. As shown, the average effect in the post treatment period remains significant for values of $Mbar$ up to 2. This implies that the results presented in Figure III are robust to allowing for violations of parallel trends up to two times as large as the maximum violation in the pre-treatment period.

We also replicate this analysis for the event study in Figure VI.b, which captures the differential effect of the 2011 credit expansion policies on the borrowing of public sector workers with low financial sophistication. We first report the confidence interval on the average effect in the post-treatment period based on our original estimate, which is centered around 0.05. Notice that in this case, allowing for a violation of parallel trends as large as the maximum violation in the pre-treatment period would break down the significance of the average effect in the post-treatment period. However, it is important to notice that, as can be seen in Figure VI.b, the pre-policy trend is declining, i.e. it moves in the opposite direction relative to the documented effect after the policy. To clarify this point, we use one of the approaches in Freyaldenhoven et al. (2021), who propose to use the slope of the effects on the outcome in the pre-treatment period to extrapolate the trend in the confound in the post period.³⁰ The results are reported in Figure B.5. Panel

³⁰This is under the assumption that the confound follows a linear trend and that there are no anticipatory effects of the policy. See also Dobkin et al. (2018) for an application.

(a) report the original figures including the linear predictions from the pre-trend period, while Panel (b) reports the deviation from the extrapolated linear pre-trend. As shown, the estimates of the effect on the outcome in the post-period in Figure VI.b are positive and statistically significant after adjusting for the estimated linear pre-trends.

VI.B EXTENSIVE VS INTENSIVE MARGIN IN THE PAYROLL LOAN MARKET

Table III documents that the relative increase in indebtedness by public sector employees between 2010 and 2014 was largely driven by payroll loans. More than half of the individuals in our sample did not have payroll loans at baseline, and many of them started participating in the payroll lending market during this period. In Table B.6 we study the extensive vs intensive margin of growth in payroll lending.

We start by focusing on individuals in our sample that were not borrowing via payroll loans at baseline, and estimate equation 2 using as outcome variable a dummy equal to 1 if an individual has a positive payroll loan balance in 2014. Column (1) shows that, out of individuals without a payroll loans in 2010, public sector workers are about 19 percentage points more likely than private sector workers to get a payroll loan by 2014. Column (2) shows that the effect was significantly larger for public sector employees with low financial sophistication.

Next, we study the actual increase in borrowing via payroll loans as a share of an individual baseline income. Columns (3) and (4) focus on borrowers with no payroll loans at baseline, i.e. individuals for which payroll debt balance over income in 2010 is equal to 0. The results show that, by 2014, public sector workers experienced on average an 11 p.p. higher increase in payroll debt as a share of their initial income. This increase is of 16.6 p.p. for public sector workers in the lowest quintile of financial sophistication. In columns (5) and (6) we focus instead on the intensive margin. Among individuals that already had positive balance of payroll loans at baseline, public sector workers experienced a 15 p.p. larger increase in payroll debt over initial income.

Two main findings emerge from the results in B.6. First, the increase in payroll lending was driven by both intensive and extensive margin. Second, financial sophistication plays an important role especially in the extensive margin, i.e. for individuals that did not have payroll loans to start with. This suggests that familiarity with this type of financial product matters. Notice also that, when focusing on payroll lending and splitting the sample between extensive and intensive margin, we find that public sector workers with higher expected income growth indeed borrowed more during this period.

As we discuss in the description of the institutional setting, the Brazilian government credit expansion policies brought no relaxation of effective borrowing constraints. However, the marketing campaign initiated by government banks in 2011 could have affected credit take up by informing or reminding individuals about their ability to borrow against their future income via payroll loans. In this sense, government banks' marketing could

have acted as an informative “nudge” (Karlan et al., 2016).

To shed some light on the potential role of marketing as a shock to information frictions, we extend the analysis presented in Table B.6. If marketing provided useful information about ability to borrow, this is more likely to be the case for individuals that were initially less familiar with payroll loans. Thus, we study whether individuals with no payroll loans at baseline – which we assume to be less familiar with this product – experience different patterns in consumption mean and volatility relative to those documented in Table VII. The results are reported in Table B.7. As shown, we find that the main findings on consumption hold for the sub-sample of plausibly less-informed borrowers. Inexperienced borrowers with lower financial sophistication experience a decrease in average spending and an increase in spending variance in the period after the boom.

VI.C CHANGES IN PAYROLL LOANS CONTRACT TERMS

As discussed in section IV.A and documented in Figure B.3, the contract terms offered by government banks improved – though only modestly – between 2010 and 2014. To gauge the importance of these changes in the contract terms of payroll loans for the individuals in our regression sample we estimate a version of equation (2) in the paper using as outcome variables the change in interest rate and in log maturity on payroll loans at individual level between 2010 and 2014. This regression is estimated on the subsample of individuals with payroll loans in both 2010 and 2014 and non-missing data on these two outcomes in both periods.³¹ The results are reported in Table B.8. We find that public sector employees – the targeted group of the government banks credit expansion – experienced an average a 1.27 percentage points decline in interest rate paid on payroll loans between 2010 and 2014. This corresponds to about 5% of the sample mean of interest rate at baseline. As for maturity, we find a positive but more modest increase of about 1 percent, corresponding to a 0.6 months longer maturity.

The existing literature has documented that loan demand elasticities with respect to prices and maturity can be significant (Karlan and Zinman, 2019, 2008; Argyle et al., 2020). Our setting does not provide us with either randomized variation or discontinuities in contract terms that can be exploited to estimate such elasticities for individuals in our sample. However, we can use existing estimates from the literature to calculate the percentage change in borrowing in response to changes in interest rate and maturity such as the one documented for treated individuals in Table B.8. Using a randomized experiment with a for-profit lender in South Africa, Karlan and Zinman (2008) documents an elasticity of loan demand to prices of -0.32 (-0.18 in Argyle et al. (2020)). Based on this estimate, a 5% decline in rates for treated individuals in our sample would translate into 1.6% percent increase in loan demand, which is much lower than the 23% increase in

³¹Despite the reporting of information on interest rate and maturity has been improving over time, data on these variables is reported for only about 60% of individuals with positive payroll loans in 2010.

borrowing documented in the paper.

Both Karlan and Zinman (2008) and Argyle et al. (2020) document that loan demand elasticities with respect to maturity are larger than those with respect to interest rates by up to a factor of five. In particular, Argyle et al. (2020) estimate an implied elasticity for maturity of 0.85. However, as shown in Table B.8, we find a relatively modest increase in maturity of payroll loans in our setting. Thus, even a large elasticity of demand to maturity would imply only modest percentage increases in borrowing. More specifically, a 1.1 percent larger increase in payroll maturity documented in Table B.8 translates into a 1 percent larger increase in borrowing. Again, this is much lower than the 23% increase documented in the paper. Overall, we think that despite the documented importance of loan demand to changes in prices and maturity, changes in contract terms are unlikely to be a major driving force of the increase in indebtedness documented in this paper.

VI.D CONSUMER CREDIT AND SMALL BUSINESS CREDIT AND INVESTMENT

In this section we discuss the relationship between consumer credit and small business credit and investment. One possibility is that the consumer credit taken by public sector employees could be funneled into small business investment, either directly by the borrower or indirectly via informal loans to other family members. Our understanding of the setting suggests that intra-household transfers whereby an individual with more stable income borrows in formal credit markets and then lend informally to other family members are relatively common in Brazil, although mostly aimed at financing consumption rather than starting a business. Unfortunately, data limitations prevent us from exploring this hypothesis empirically: we do not observe family links between individuals, intra-households transfers themselves are unobservable, and any business started by a family member is likely to be, at least initially, informal and therefore also unobservable. Still, we think that within-family transfers aimed at business investment would, if anything, attenuate the negative effects on spending documented in the paper. If payroll loans to treated individuals with stable income were passed to relatives that have a business with high marginal returns, one would expect the treated individuals to benefit from such investment, at least to the extent that they receive compensation in exchange for providing the initial financing. In this sense, this channel should attenuate the negative impact of loan take-up during this credit expansion on future spending.

Another possibility is that individuals or households targeted by the consumer credit expansion are also targeted by the credit expansion to SMEs which happened during the same period (Joaquim et al., 2022). We think that this is unlikely to be the case, because the Brazilian law limits the ability of public sector employees to run a company.³²

³²Law 8,112 of 1990 states that federal employees are prohibited from "participating in the management or administration of a private company" (art. 117, title X), although they are allowed to be shareholders or partners in such companies. In addition, the federal civil service law establishes that public sector

Still, this channel could operate at the household level rather than at the individual level. We explore this possibility using data from the Brazilian Consumer Expenditure Survey (POF), a decadal household-level survey run by the Brazilian Statistical Institute (IBGE). We focus on the 2008-09 wave, the closest to our baseline year. The survey covers a representative sample of 55,970 Brazilian households and reports individual information on each household member, including information on their occupation. We use this unique feature of the data to investigate the relationship between public sector employment and entrepreneurship at the individual and household level.³³

The key stylized fact that emerge from the survey data is that entrepreneurship is more diffused among households *without* a public sector employee than in households *with* a public sector employee. More specifically, when we take into account both first and second occupation of each respondent, households where at least one member is a public sector employee are less likely to have a household member declaring to be an “employer” (2.95% vs 5%), and less likely to have a household member declaring to be “self-employed” (22% vs 39%). Of course, this fact in itself does not rule out a relationship between consumer and commercial credit in the period under study. A direct test of this relationship would require us to observe family links and entrepreneurship status in the credit registry data, which is unfortunately not available.

VI.E ADDITIONAL ROBUSTNESS TESTS

The current clustering procedure assumes that errors are correlated within each employer category but are uncorrelated across employer categories. However, model errors of employees of the federal administration might be correlated with those of employees of the municipal administration. Thus, a potential concern is that errors might be correlated also *across* employer categories that we classify as part of the public sector or the private sector. In addition, errors might also be correlated across individuals whose main lender is a government-owned vs a private banks. To allow for these additional levels of correlation in model errors, we present a robustness test in which we re-estimate all the main results of the paper allowing standard errors to be clustered within just 4 groups generated by interacting public vs private-sector employment with government vs non-government ownership of the main lender of each individual. The results of this robustness are reported in Table B9. As shown, all the main results of the paper remain statistically significant.³⁴

employees cannot be “individual micro-entrepreneurs” or MEI, which is the simplified registration option for small businesses in Brazil.

³³We categorize as public sector employees individuals that declare their main occupation to be “civil servant” in the POF survey. We categorize as entrepreneurs individuals that declare their main occupation to be “employer” (strict definition) or that declare to be either an “employer” or “self employed” (loose definition) in the POF survey. All percentages reported here are weighted by sampling weights.

³⁴Following Cameron and Miller (2015), we base inference on a T distribution with degrees of freedom equal to the number of clusters G minus 1. This implies using $G - 1 = 4 - 1 = 3$ degrees of freedom

A potential concern with our measure of borrowing constraints is that the income slope might become a worse predictor of future income growth for older individuals that have already accumulated most of their labor income in the past. In addition, we expect our measure of borrowing constraint to explain a higher increase in borrowing *conditional* on the initial level of consumption of each individual. To deal with these two concerns, in Table B.10 we replicate Table VI focusing only on the sample of individuals that are younger than 50 years old at baseline and including the initial level of credit card expenditure of each individual as a control variable. As shown, all the results are robust to this sample restriction and the inclusion of baseline consumption.

Finally, in Table B.11, we replicate the key results on credit take-up presented in Tables II and VI for the full sample of borrowers observed in RAIS in 2010. As described in section II.B, relative to our main regression sample, the full sample of borrowers recorded in RAIS in 2010 tends to capture lower-income, younger and less educated borrowers, with higher initial debt to income ratio and a lower probability of being public sector employees. As shown in Table B.11, we find qualitatively similar and quantitatively larger effects of exposure to the credit expansion program on debt to initial income growth in the full sample, consistent with the fact that it better captures lower income, lower educated workers.

VII CONCLUDING REMARKS

In the last two decades, 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, and in particular on which individuals respond the most to such policies.

In this paper, we use individual-level data from Brazil to provide evidence on an important household credit push by the government starting in 2011. We document that the credit expansion led to a large rise in household borrowing, especially among public sector employees. Which type of individuals borrowed more in response to the credit expansion? We find no evidence of the consumption smoothing hypothesis: public sector workers with higher expected income growth are not more likely to increase their borrowing. On the other hand, we find evidence consistent with the consumption binging hypothesis: the less financially sophisticated public sector workers boosted borrowing significantly in response, at the expense of lower future consumption. While it is difficult to make strong statements about the ex ante optimality of the household credit push

for all the t -tests in Table B9. This increases critical values substantially. For example, with number of clusters $G = 4$, the critical value in a two-sided test at the 95% confidence level is 3.18.

by government banks, the evidence suggests that ex post the most exposed individuals experienced worse outcomes with regard to consumption.

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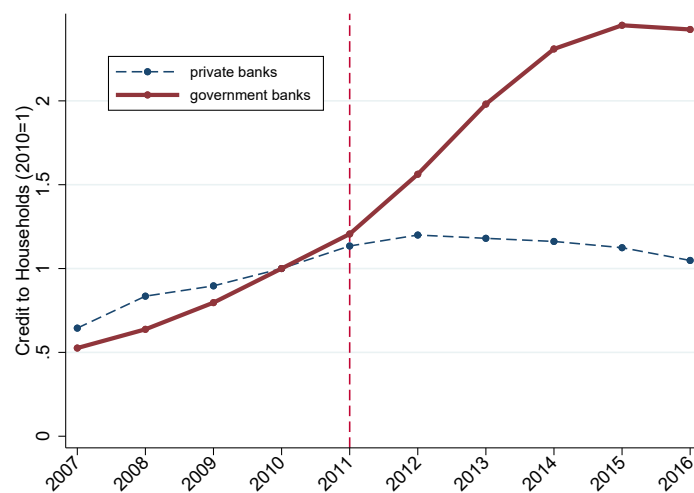
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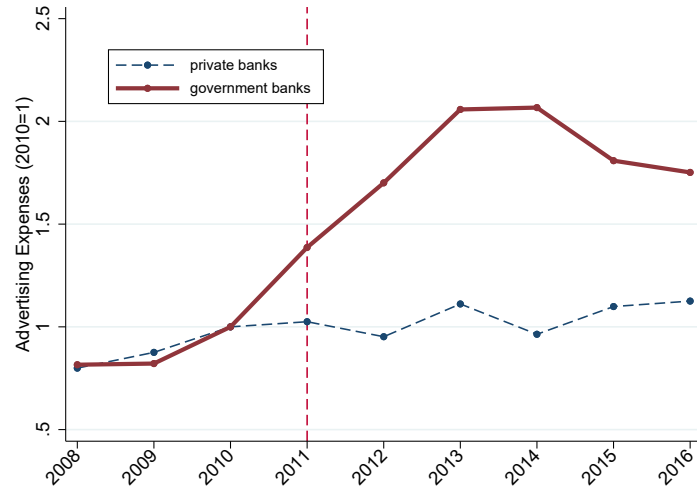
FIGURES AND TABLES

FIGURE I: BALANCE OF BANK DEBT OF BRAZILIAN HOUSEHOLDS: 2007-2016



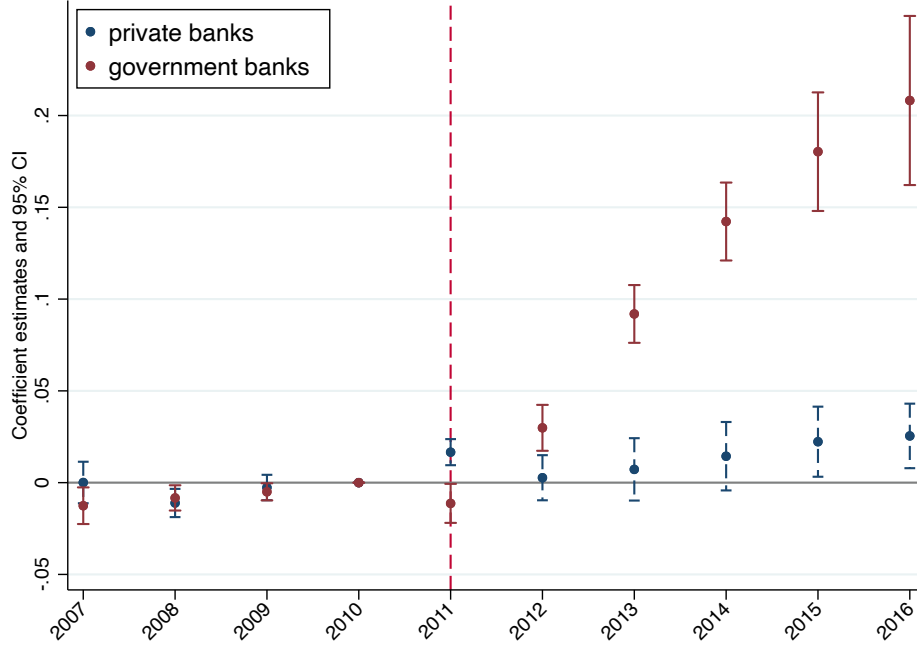
Notes: The figure reports the total outstanding balance of bank loans to households originated by government banks vs private banks. The data is sourced from the Credit Information System (SCR) of the Central Bank of Brazil and reported relative to the level in 2010 for each category. The red dashed vertical line indicates the introduction of consumer credit expansion policies via government banks.

FIGURE II: ADVERTISING EXPENDITURE OF 5 LARGEST BRAZILIAN BANKS



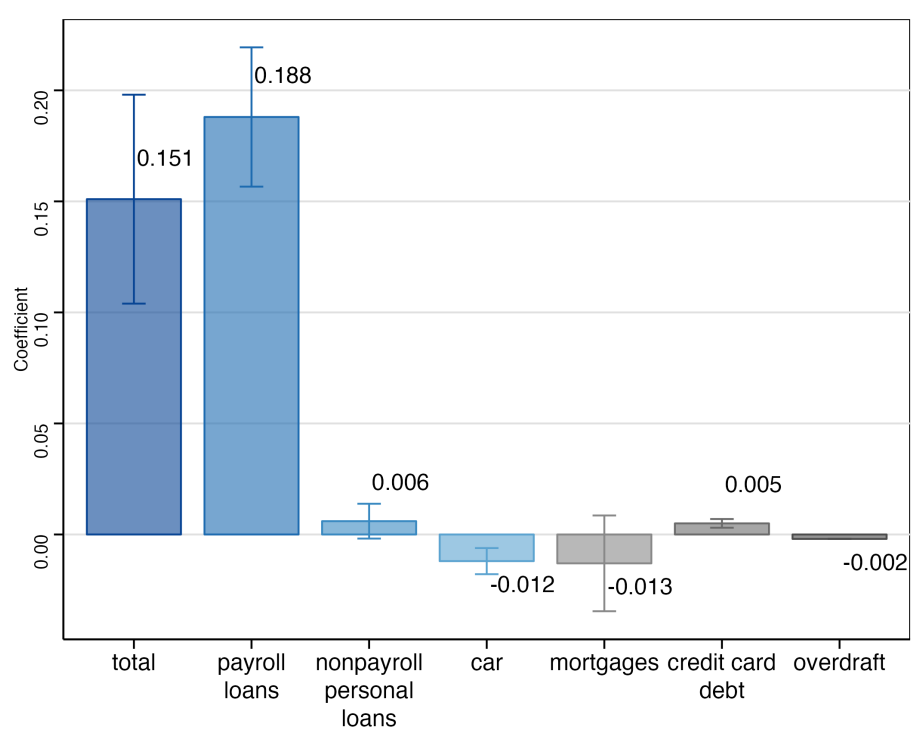
Notes: The figure reports the average annual expenditure in advertising for the 5 largest Brazilian banks by assets divided in two categories: government banks (Banco do Brasil and Caixa Economic Federal) and private banks (Itau Unibanco, Bradesco and Santander Brazil). The data is sourced from banks' annual reports and reported relative to the level in 2010 for each category. We focus on the years starting from 2008 because data on Itau Unibanco is only available starting from that year (due to the merger between Itau and Unibanco in 2008). The red dashed vertical line indicates the introduction of consumer credit expansion policies via government banks.

FIGURE III: DYNAMIC EFFECTS OF PUBLIC SECTOR EMPLOYMENT ON
DEBT-TO-2010 INCOME RATIO
GOVERNMENT BANKS VS PRIVATE BANKS



Notes: The graph reports point estimates and 95 percent confidence intervals for the coefficients β_k in equation (1). These coefficients capture the dynamic effect of public sector workers on debt divided by 2010 labor income by year, for the period between 2007 and 2016. The effects are computed relative to the excluded year 2010. The red dashed vertical line indicates the introduction of consumer credit expansion policies via government banks.

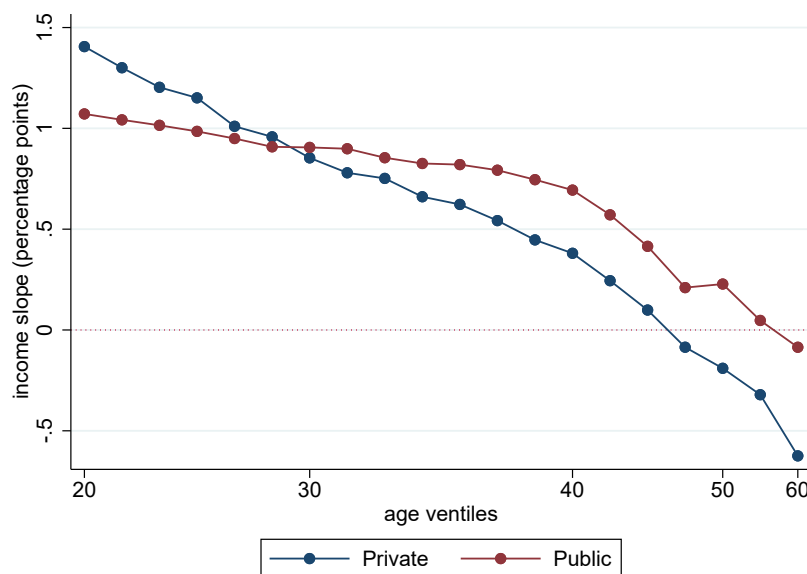
FIGURE IV: PUBLIC EMPLOYMENT AND BORROWING, BY BANK AND LOAN TYPE



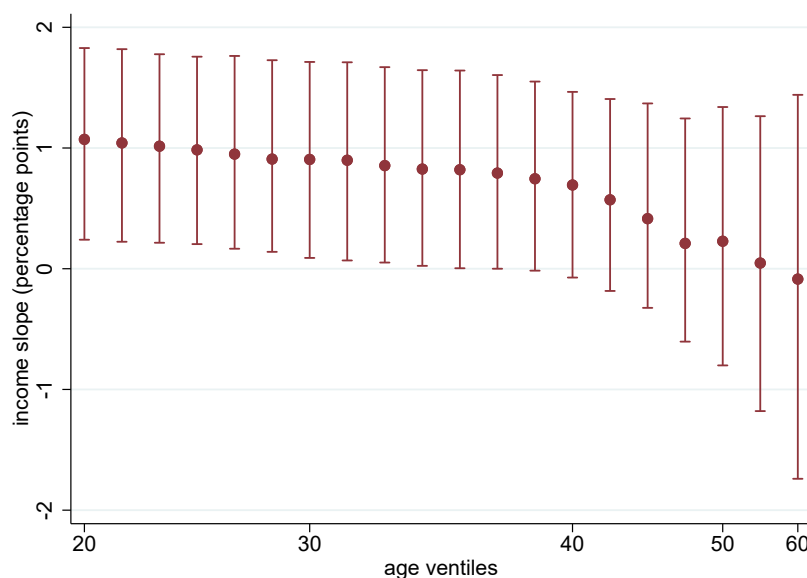
Notes: The graph reports point estimates and 95 percent confidence intervals for the estimated coefficients reported in Panel A of in Table III.

FIGURE V: LABOR INCOME SLOPE BY WORKERS' AGE

(a) Average slope by age ventiles for private vs public workers

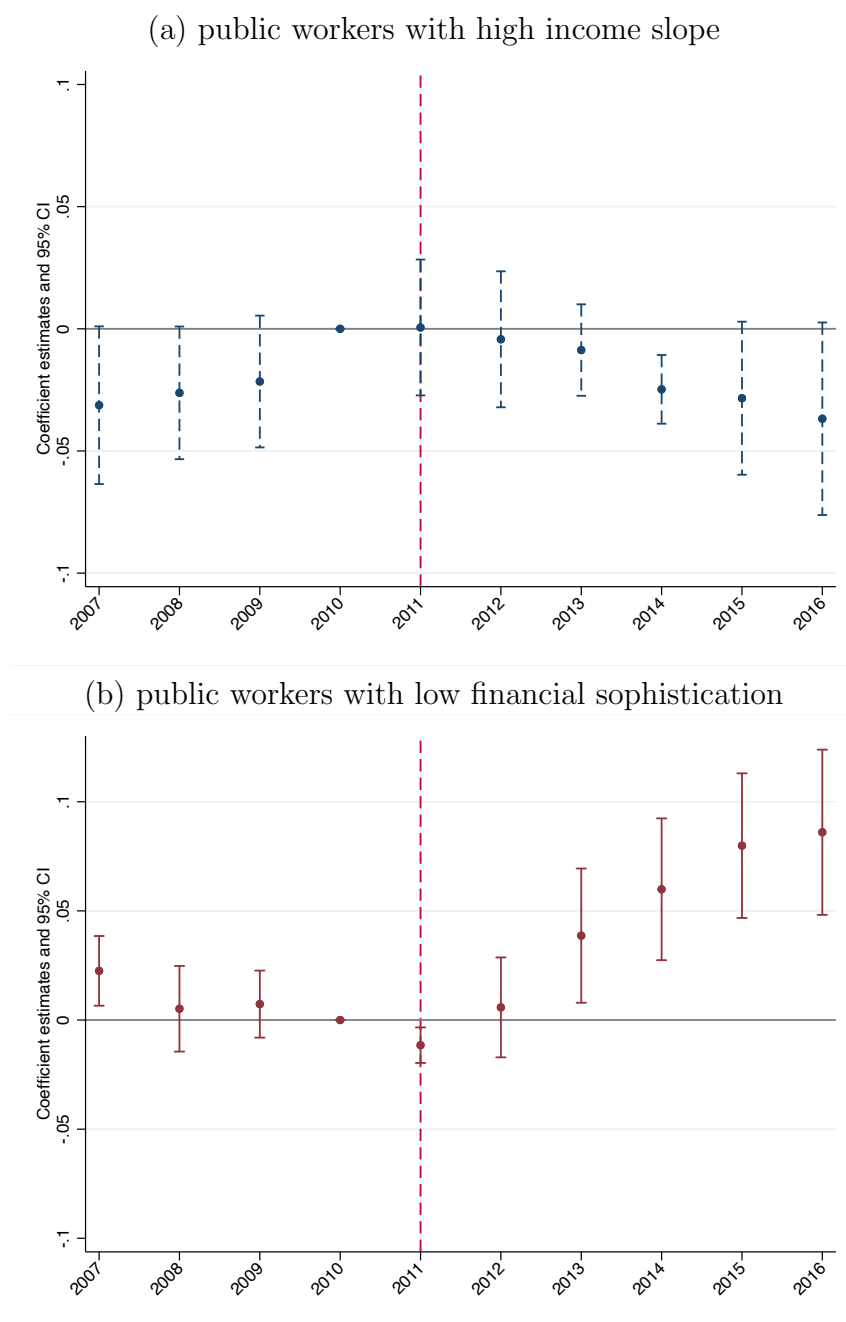


(b) Average, 25th and 75th percentile of slope by age ventiles of public workers



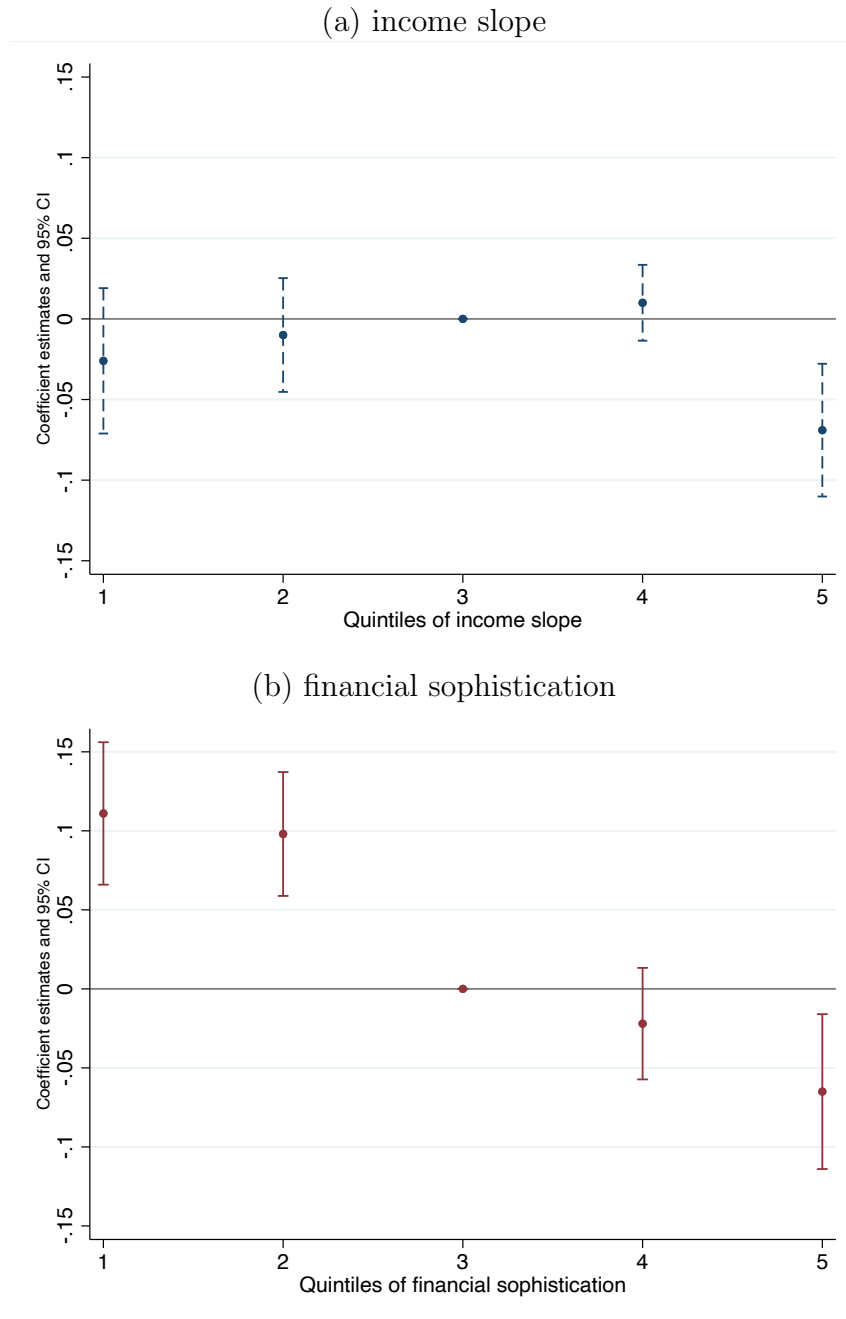
Notes: Panel (a) reports the average income slope across occupations for each age ventile for private sector workers (in blue) and public sector workers (in red). Panel (b) reports the average income slope across occupations by age ventile for public sector workers only, along with the 25th and 75th percentile of the income slope distribution.

FIGURE VI: DYNAMIC EFFECTS OF PUBLIC SECTOR EMPLOYMENT ON
DEBT-TO-2010 INCOME RATIO
HETEROGENEOUS EFFECTS BY INCOME SLOPE AND FINANCIAL SOPHISTICATION



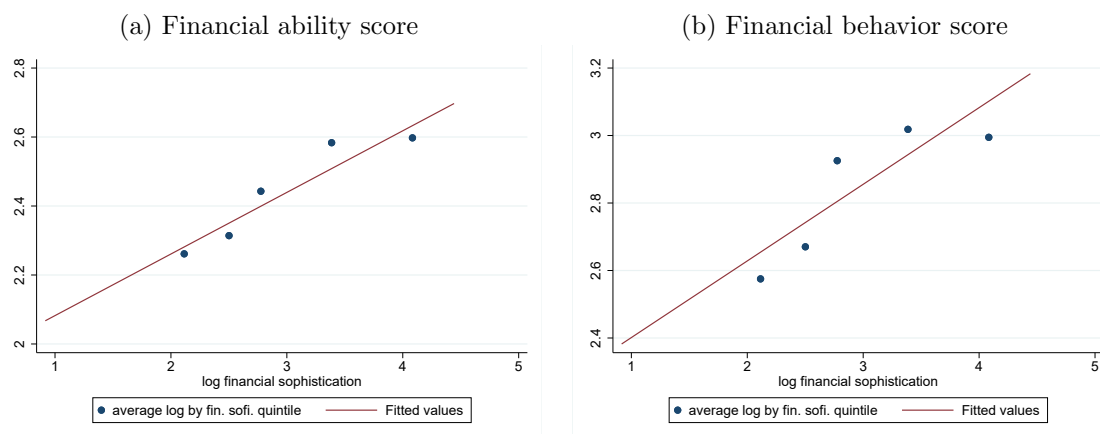
Notes: The graph reports point estimates and 95 percent confidence intervals for the coefficients on the interaction between public sector employment and dummies capturing high income slope and low financial sophistication. These coefficients capture the incremental effect on borrowing of low financial sophistication and high income slope for public sector workers in the period between 2007 and 2016. The effects are computed relative to the excluded year 2010. The red dashed vertical line indicates the introduction of consumer credit expansion policies via government banks.

FIGURE VII: EFFECTS OF PUBLIC SECTOR EMPLOYMENT ON DEBT-TO-2010 INCOME
RATIO
BY QUINTILES OF INCOME SLOPE AND FINANCIAL SOPHISTICATION



Notes: The graph reports point estimates and 95 percent confidence intervals for the coefficients on the interaction between public sector employment and dummies capturing quintiles of income slope and financial sophistication. The effects are computed relative to the excluded interaction with the third quintile.

FIGURE VIII: FINANCIAL SOPHISTICATION, FINANCIAL LITERACY, AND PRESENT BIAS



Notes: The figure reports the correlation between our measure of financial sophistication (in logs) and the financial ability score (panel a) and financial behavior score (panel b) at individual level captured by the 2020 and 2022 FEBRABAN surveys on financial health of Brazilian households. A higher financial ability score captures higher financial literacy. A higher financial behavior score captures lower present bias. We report the average financial ability and financial behavior scores for each quintile of financial sophistication, along with the regression line estimated using the underlying micro data. Both scores are standardized so that a unit increase in the y-axis corresponds to a standard deviation increase.

TABLE I: SUMMARY STATISTICS

Panel A: Summary statistics of regression sample vs full sample

Baseline characteristics	Regression sample (N=763,423)		Full sample (N=1,888,005)	
	Mean	St.dev	Mean	St.dev
Gender (=1 if female)	0.42	0.49	0.39	0.49
Education (years)	13.24	3.03	12.10	3.28
Age	40.55	10.30	38.52	11.08
Monthly Wage (BRL)	3,970	4,596	2,676	3,071
log (yearly labor income)	10.33	0.93	9.93	0.96
Public employment	0.41	0.49	0.32	0.47
Total debt to labor income	0.64	0.65	0.71	0.77
Share of borrowing from government banks	0.23	0.41	0.27	0.41
Δ (total debt) _{2010–2014} /income ₂₀₁₀				
all	0.66	1.18	0.36	1.18
government banks	0.42	0.87	0.30	0.75
private banks	0.20	0.60	0.05	0.66

Panel B: Comparing Private vs Public sector workers

Baseline characteristics	Regression sample (N=763,423)				Full sample (N=1,888,005)			
	Private (N=453,567)	Public (N=309,856)	Diff	St.err.	Private (N=1,274,479)	Public (N=613,526)	Diff	St.err.
Gender (=1 if female)	0.33	0.55	0.22	[0.01]***	0.31	0.55	0.24	[0.00]***
Education (years)	12.93	13.69	0.76	[0.11]***	11.77	12.79	1.02	[0.01]***
Age	38.52	43.52	5.00	[0.23]***	36.39	42.95	6.55	[0.02]***
Monthly Wage (BRL)	3,758	4,281	523	[252]**	2,453	3,140	687	[5.03]***
log (yearly labor income)	10.25	10.46	0.22	[0.05]***	9.80	10.21	0.41	[0.00]***
Total debt to labor income	0.64	0.63	-0.01	[0.02]	0.73	0.66	-0.06	[0.00]***
Share of borrowing from government banks	0.19	0.28	0.08	[0.01]***	0.20	0.42	0.23	[0.00]***

Notes: The full sample includes all borrowers in the 12.8% credit registry random sample that are also formally employed at the end of 2010 and thus recorded in RAIS. The regression sample restricts the full sample by focusing on individuals recorded in RAIS consistently between 2010 and 2014 and that have credit card data available during the recession years 2014 to 2016. Data on individual characteristics refers to the year 2010. Changes in total debt as a share of initial labor income are winsorized at the 5% in each tail. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

TABLE II: INDIVIDUAL-LEVEL EFFECTS: BORROWING DURING BOOM YEARS
2010-2014

outcome	Δ (total debt) ₂₀₁₀₋₂₀₁₄ /income ₂₀₁₀		
	total	government banks	private banks
	(1)	(2)	(3)
1(public sector employee) ₂₀₁₀	0.151 [0.024]***	0.177 [0.018]***	-0.020 [0.009]**
individual controls	y	y	y
fixed effects:			
micro-region	y	y	y
income quintiles	y	y	y
age quintiles	y	y	y
education	y	y	y
gender	y	y	y
occupation	y	y	y
Observations	763,423	763,423	763,423
R-squared	0.081	0.063	0.126
N clusters	62	62	62

Notes: The table reports the results obtained estimating equation (2) 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 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

TABLE III: INDIVIDUAL-LEVEL EFFECTS: BORROWING DURING BOOM YEARS 2010-2014
BY CATEGORY OF DEBT AND TYPE OF BANK

Panel A: All banks		$\Delta (\text{total debt})_{2010-2014} / \text{income}_{2010}$						
	total	payroll loans	non payroll sonal loans	per-	car loans	mortgages	credit card debt	overdraft
	(1)	(2)	(3)		(4)	(5)	(6)	(7)
1(public sector employee) ₂₀₁₀	0.151 [0.024]***	0.188 [0.016]***	0.006 [0.004]		-0.012 [0.003]***	-0.013 [0.011]	0.005 [0.001]***	-0.002 [0.000]***
R-squared	0.081	0.210	0.032		0.035	0.055	0.099	0.026
Panel B: Government banks		$\Delta (\text{debt from government banks})_{2010-2014} / \text{income}_{2010}$						
	total	payroll loans	non payroll sonal loans	per-	car loans	mortgages	credit card debt	overdraft
	(1)	(2)	(3)		(4)	(5)	(6)	(7)
1(public sector employee) ₂₀₁₀	0.177 [0.018]***	0.141 [0.011]***	0.009 [0.003]***			-0.007 [0.011]	0.002 [0.000]***	0.000 [0.000]
R-squared	0.063	0.195	0.063			0.050	0.071	0.024
Panel C: Private banks		$\Delta (\text{debt from private banks})_{2010-2014} / \text{income}_{2010}$						
	total	payroll loans	non payroll sonal loans	per-	car loans	mortgages	credit card debt	overdraft
	(1)	(2)	(3)		(4)	(5)	(6)	(7)
1(public sector employee) ₂₀₁₀	-0.020 [0.009]**	0.036 [0.004]***	-0.003 [0.000]***		-0.014 [0.002]***		0.003 [0.001]**	-0.002 [0.000]***
R-squared	0.126	0.096	0.020		0.038		0.100	0.031

Notes: Observations (in all specifications): 763,423. Number of clusters (in all specifications): 558. All specifications include the same individual controls and fixed effects as in Table II. The table reports the results obtained estimating equation (2) 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 2010 and debt-to-income ratio in 2010. Missing coefficients for car loans in Panel B and for mortgages in Panel C are due to bank specialization in these segments: car loans are mostly issued by private banks, mortgages are mostly issued by government banks. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE IV: WITHIN-INDIVIDUAL EFFECTS: BORROWING DURING BOOM YEARS
2010-2014

	$\Delta (\text{total debt})_{ib,2010-2014} / \text{income}_{i,2010}$		
	(1)	(2)	(3)
1(Gov)	0.132 [0.018]***	0.139 [0.015]***	0.075 [0.011]***
1(Gov) \times 1(public sector employee) ₂₀₁₀			0.109 [0.019]***
individual fe	no	y	y
Observations	2,747,174	2,747,174	2,747,174
R-squared	0.038	0.190	0.195
N individuals	356,778	356,778	356,778
N clusters	1,661	1,661	1,661

Notes: The unit of observation is a bank-individual lending relationship. The sample includes all multi-bank type individuals, i.e. individuals with a positive balance with both government controlled and private banks in the baseline year 2010. 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 reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

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

outcome sample	Yearly Avg Labor Income Growth 2010-2014		
	all workers (1)	public sector (2)	private sector (3)
Labor income slope using 2010 data	1.512*** (0.048)	0.929*** (0.050)	1.903*** (0.041)
Municipality fixed effects	y	y	y
Observations	27,365,472	6,079,528	21,285,928
R-squared	0.013	0.047	0.014

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

TABLE VI: HETEROGENEITY BY INITIAL FINANCIAL SOPHISTICATION AND INCOME SLOPE

outcome	Boom period 2010-14	Recession period 2014-16			
	Δ (total debt) _{2010–2014} /income ₂₀₁₀ (1)	Δ after-debt-service income (2)	Δ (Share Balance in default $\times 100$) (3)	Δ log (credit card expenditure) (4)	Δ log (income) (5)
1(public sector employee) ₂₀₁₀ \times <i>LowSophi</i> ₂₀₁₀	0.051 [0.020]**	-0.012 [0.008]	0.004 [0.028]	-0.042 [0.007]***	-0.007 [0.007]
1(public sector employee) ₂₀₁₀ \times <i>HighSlope</i> ₂₀₁₀	-0.056 [0.019]***	0.022 [0.005]***	-0.036 [0.016]**	-0.002 [0.011]	0.017 [0.006]***
1(public sector employee) ₂₀₁₀	0.170 [0.023]***	-0.030 [0.005]***	-0.024 [0.019]	-0.013 [0.013]	-0.001 [0.008]
<i>LowFinSophi</i> ₂₀₁₀	0.025 [0.012]*	-0.016 [0.005]***	-0.097 [0.023]***	0.008 [0.008]	0.004 [0.004]
<i>HighSlope</i> ₂₀₁₀	0.066 [0.010]***	-0.007 [0.002]***	-0.019 [0.013]	0.007 [0.008]	0.002 [0.002]
individual 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	763,423	684,884	763,423	763,423	685,052
R-squared	0.081	0.017	0.025	0.013	0.041
N clusters	62	62	62	62	62

Notes: Individual controls include: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE VII: CONSUMPTION MEAN, CONSUMPTION VOLATILITY, AND AFTER-DEBT-SERVICE INCOME
BOOM AND RECESSION YEARS 2010-2016

outcomes	credit card expenditure			after-debt-service income	
	average	avg normalized by pre-2010	coeff of variation	average	avg normalized by pre-2010
	(1)	(2)	(3)	(4)	(5)
$1(\text{public sector employee})_{2010} \times \text{LowFinSophi}_{2010}$	-0.271 [0.048]***	-0.018 [0.006]***	0.016 [0.003]***	-0.051 [0.024]**	-0.047 [0.022]**
$1(\text{public sector employee})_{2010} \times \text{HighSlope}_{2010}$	0.100 [0.022]***	-0.003 [0.005]	-0.003 [0.001]***	0.011 [0.011]	0.001 [0.014]
$1(\text{public sector employee})_{2010}$	-0.153 [0.048]***	0.015 [0.005]***	0.010 [0.003]***	0.001 [0.020]	0.010 [0.028]
$\text{LowFinSophi}_{2010}$	0.063 [0.025]**	-0.000 [0.006]	-0.003 [0.002]	0.026 [0.006]***	0.029 [0.011]**
HighSlope_{2010}	-0.031 [0.012]**	0.003 [0.004]	0.001 [0.001]	-0.007 [0.004]*	-0.004 [0.006]
individual 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	763,405	436,844	763,405	763,275	761,217
R-squared	0.301	0.023	0.080	0.202	0.023
N clusters	62	62	62	62	62
Mean Outcome	7.94	1.21	0.13	0.57	0.75
beta \times mean outcome	-3.4%	-1.5%	12.3%	-9.0%	-6.3%

Notes: Individual controls include: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

A A MODEL OF CONSUMER BEHAVIOR

In this section we outline a simple model of consumer behavior based on Angeletos et al. (2001). We use the model to analyze how households that are patient and have typical preferences with exponential discounting would respond when “treated” by a credit expansion program such as the government credit push in Brazil. Given their preferences, these households would want to borrow more today if doing so enables them to smooth their consumption profile over time as in the traditional permanent income hypothesis.

We then calibrate the model to actual wage dynamics, the interest rate on saving, and the interest rate on borrowing observed in Brazil. The key insight from the calibration exercise is that, given the average real wage growth, the standard deviation of wage growth across consumers, and the large spread between borrowing and saving interest rates, very few households with these preferences should ever respond to the credit expansion program by borrowing more. This implies that, under typical preferences with exponential discounting, it is hard to rationalize a large increase in household borrowing.

A.A BASIC SETUP

Consider an environment where households live for T working-age periods, and make a consumption versus saving decision each period. While working, they are employed with wage w_t that grows at an expected rate of g . Workers face labor-income risk in the form of unemployment. They receive a fraction $\chi < 1$ of their wage w_t when unemployed. Workers have a labor market state space, Z_t , that is a two state Markov process drawn from $\{\chi, 1\}$ with transition probability matrix P that represents the probability of workers transitioning in and out of employment.

Consumers have preferences given by:

$$U = \max_c \{u(c_t) + \mathbb{E} \left[\sum_{s=1}^T \delta^s u(c_{t+s}) \right] \} \quad (4)$$

where instantaneous utility is CRRA with $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$.

There is a borrowing-lending interest rate spread in credit markets. Consumers can borrow at a rate r_d subject to a borrowing limit $b < 0$, but can only save at a rate r_a with $r_a < r_d$. Consumers maximize (4) subject to the constraints:

$$a_{t+1} = R(a)(w_t Z_t + a_t - c_t) \quad (5)$$

$$a_t \geq b * w_t Z_t \quad (6)$$

$$R(a) = 1 + r(a) = \begin{cases} 1 + r_a & a_{t+1} > 0 \\ 1 + r_d & a_{t+1} < 0 \end{cases} \quad (7)$$

$$w_t = (1 + g)^t \quad (8)$$

where a_t are net assets. The timing is as follows. Consumers choose consumption and savings at the beginning of period, and receive or make payments on net asset income at the end of period. This means we can express the relevant interest rate for the Euler equation as depending on assets in $t + 1$. We assume consumers work for $T = 40$ years, starting at the age of 25 and condense retirement into a terminal period with no saving.³⁵

³⁵We solve the model by backwards induction, starting with the condition that $a_{T+1} = 0$. By the FOCs,

A.B CALIBRATING THE MODEL TO BRAZILIAN CONSUMERS

We simulate the behavior of households in response to a loosening of the borrowing constraint. For analytical simplicity, we model this as an increase in the borrowing limit from b to $b + \Delta b$, where $\Delta b < 0$. However, given the institutional details of the government credit expansion, it should be kept in mind that this formulation embeds, in reduced form, a range of possibilities in terms of how households perceive credit access. For example, one feature of the credit expansion program was increased expenditure on marketing and making people aware of the availability of borrowing choices or making the act of borrowing more salient. We can think of these examples as making people aware that they can borrow Δb if they wanted.

We calibrate the model to the Brazilian environment by setting parameter values to numbers shown in Table A.1.

TABLE A.1: MODEL PARAMETERS

Parameter	T	δ	γ	χ	$p_{1,1}$	$p_{2,1}$	g	r_a	r_d	b	Δb
Value	40	0.987	2	0.5	0.7	0.01	0.01	0.02	0.2	-0.2	-0.1

Notes: The table displays the value of the parameters used in the theoretical model. T is the total working life in years, while δ and γ is the degree of impatience and IES of consumers, respectively. χ is the share of usual income a household gets while unemployed. $p_{1,1}$ and $p_{2,1}$ are, respectively, the probability of remaining unemployed if unemployed last period, and the probability of becoming unemployed if employed last period. g , r_a , and r_b are the growth rate of wages, the interest rate on assets, and the interest rate on debt. b is the initial borrowing constraint (as share of current income), and Δb is the size of the borrowing constraint shock.

The calibration is for the average consumer in our regression sample who is fifteen years ($t = 15$) into her working life, i.e., a 40 year old consumer with meaningful working life (and income risk) ahead of them (see Table I). We consider households who are currently employed and stay employed for the next five years.³⁶ We set $\gamma = 2$ for an elasticity of intertemporal substitution of 0.5 that is the typical estimate in macro literature. The long run discount rate is $\delta = 0.987$ as in the literature (e.g. Laibson et al. 2007, and Angeletos et al. 2001). We set the average yearly real wage growth rate to 1% to match the average wage growth in Brazilian RAIS employer-employee matched data at baseline. The average cross-sectional standard deviation of real wage growth is 2.5%. We will also explore heterogeneity in wage growth and how that might effect behavior.

Real saving (r_a) and borrowing (r_d) rates of return are 2% and 20% respectively. These are the typical rates Brazilian consumers face when making their consumption versus saving decision.³⁷ We normalize the current annual wage to 1 and the borrowing

we know that the interior consumption will be defined by $u'(\tilde{c}_t) = \delta R \mathbb{E}[u'(\tilde{c}_{t+1})]$. Thus, the optimal level of consumption is $\tilde{c}_t^* = \min\{(\delta R \mathbb{E}[\tilde{c}_{t+1}^{-\gamma}])^{-1/\gamma}, a + w_t z - b_t/R\}$, considering that $\tilde{c}_t \leq Ra_t + y_t - b_t$ holds at all times. Using this policy function, we can iterate backwards to find optimal consumption at each period.

³⁶Conditioning on remaining employed is just for simplicity, and is not important for the results.

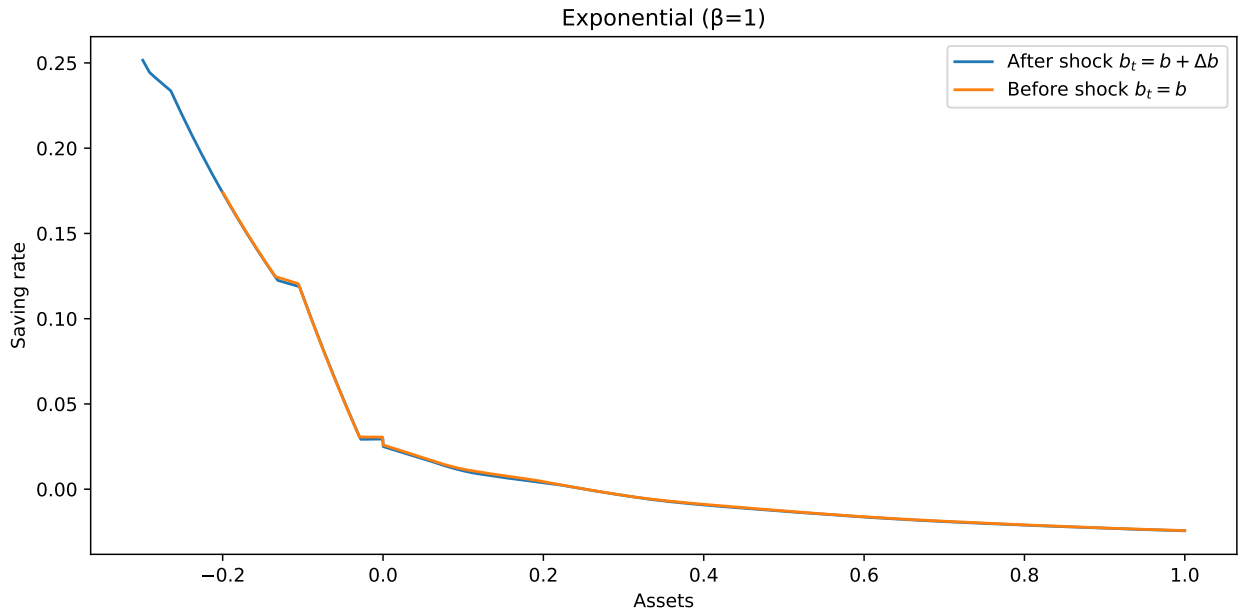
³⁷We calibrate the rate of return on savings using the average real rate on federal government bonds. Net of depository fees, the nominal rate on such bonds during the 2010-2014 period was 8.3%, and average inflation was 6.2%, for a real rate of about 2%. Note that this is an upper bound for the real saving rate in Brazil, because many households use savings accounts that pay rates very close to inflation, earning real rates of 0%. For the rate of return on borrowing, we use the average real interest rate on payroll loans, which in the period under study was about 20%.

limit to -0.2. The matrix P is set such that probability of remaining unemployed, if unemployed last period, $p_{1,1} = 0.7$, and probability of becoming unemployed if employed last period, $p_{2,1} = 0.01$. The risk of unemployment is low as treated individuals in our sample are government employees who are unlikely to be fired. Unemployment insurance χ is set at 0.5 times employed wage.

Figure A.1 in the appendix plots the saving rate of consumers against current assets a_t . We plot the saving rate with borrowing limit at b and then also at borrowing limit $(b + \Delta b)$. The main takeaway from saving rate schedules is that households typically have a positive saving rate while they are employed and thus would be reluctant to borrow. The reason is that the 20% real rate of borrowing in Brazil is too high relative to the 1% average real wage growth expected in Brazil. The borrowing rate is too high to justify foregoing future consumption for current consumption. Of course, for the small share of consumption smoothing households who may be expecting much higher wage growth, or who may be currently unemployed, we may see some borrowing. But the basic insight remains that most of the households should choose not to borrow when given the opportunity.

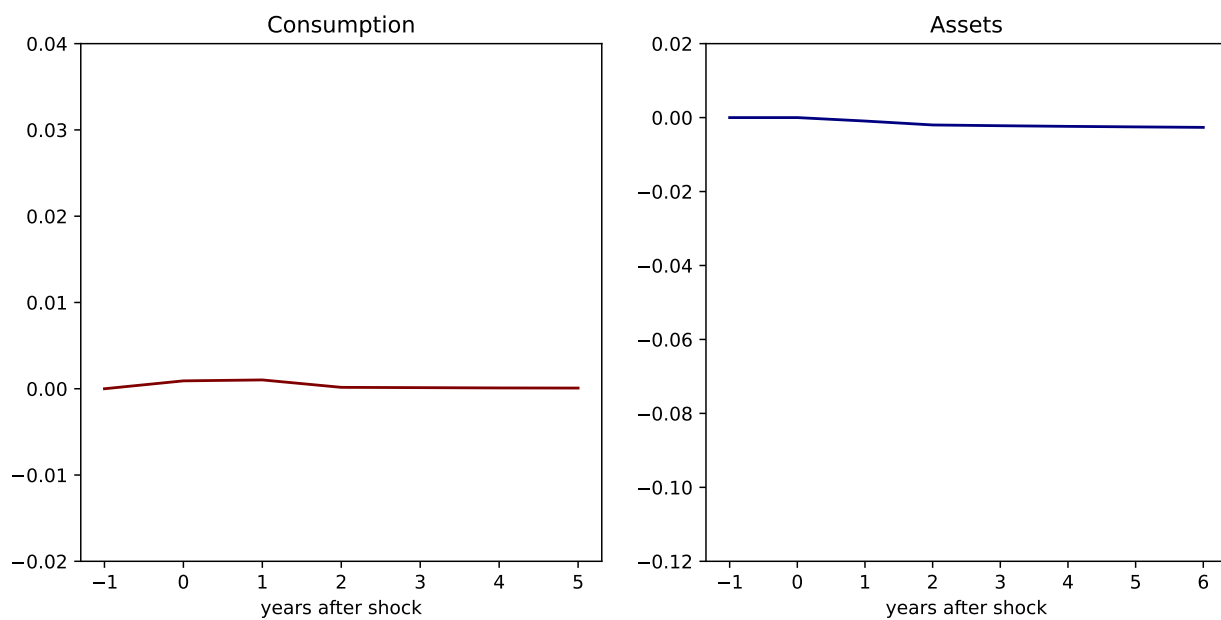
Figure A.2 plots the consumption (left panel) and borrowing (right panel) impulse response functions for households in response to a loosened borrowing constraint. We show these impulse response functions for households with relatively low level of net assets at the time of program expansion. As the figure shows, there is almost no response of the households in terms of their consumption or borrowing. Again, the key insight is that a loosened borrowing constraint does not spur additional borrowing for consumption given the high real interest rate compared to real income growth.

FIGURE A.1: SAVING POLICY FUNCTIONS FOR EXPONENTIAL DISCOUNTING HOUSEHOLDS



Notes: The panels compare the change in savings policy of households as a function of their assets after a borrowing constraint shock. The shock consists of the borrowing constraint going from 0.2 to 0.3 of current salary. We condition on the consumer being currently employed. At the time of the shock, the consumers are 15 years into their working life and their wages are normalized to 1.

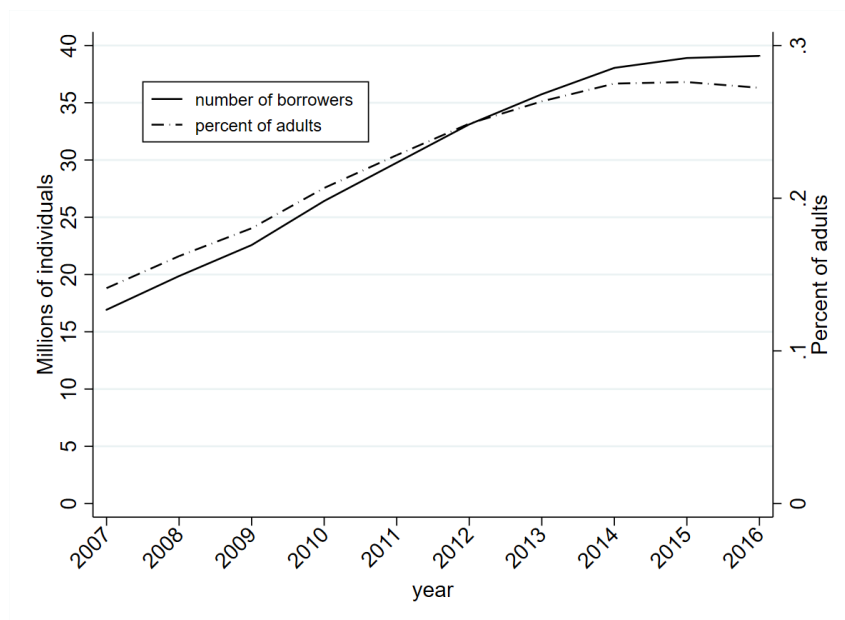
FIGURE A.2: RESPONSES OF CONSUMPTION AND ASSETS FOR EMPLOYED HOUSEHOLDS WITH $a_0 = 0$



Notes: The right panel compares the impulse response function after a shock that relaxes borrowing constraints; the left panel shows the respective evolution on assets. The borrowing constraint goes from 0.2 to 0.3 of current salary at $t = 0$. At the time of the shock, the consumers are 15 years into their working life, their assets are 0, and their wages are normalized to 1. We condition on the consumer being employed for the entire period.

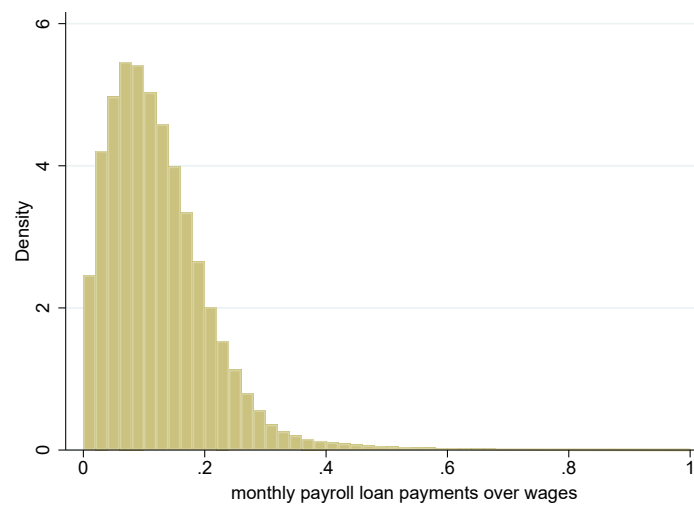
B APPENDIX: FIGURES AND TABLES

FIGURE B.1: NUMBER OF BORROWERS IN SCR, 2007-2016



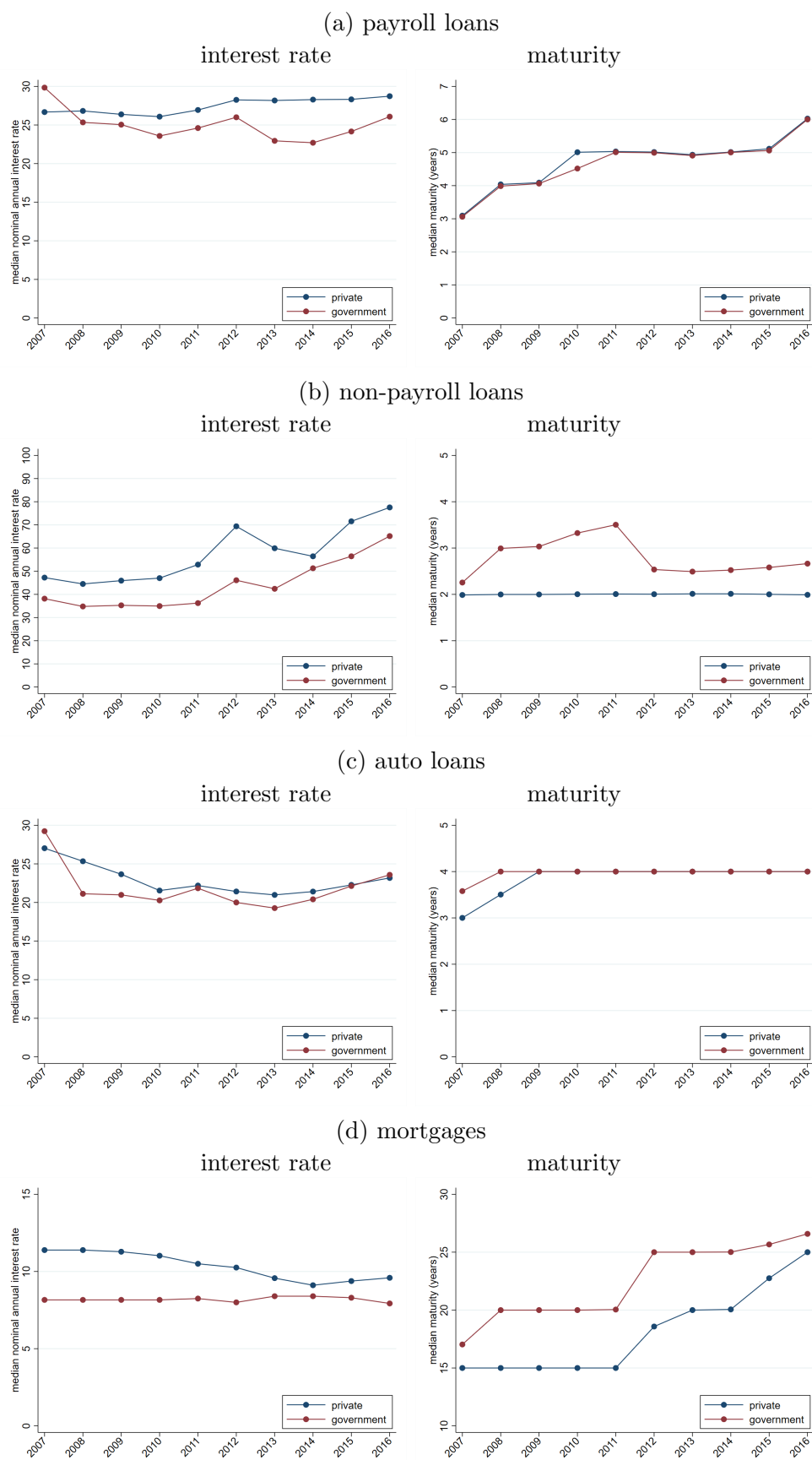
Notes: Data from the Credit Information System (SCR), Central Bank of Brazil, and Population Census.

FIGURE B.2: PAYROLL LENDING PAYMENTS OVER MONTHLY LABOR INCOME



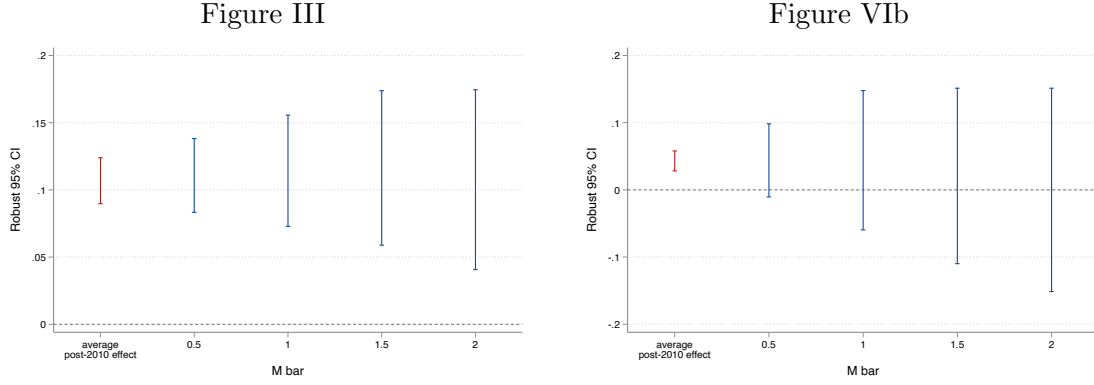
Notes: Figure shows the distribution of the ratio of debt servicing payments for payroll loans over wages at baseline. Payroll loans payments are sourced from SCR, wage are sourced from RAIS.

FIGURE B.3: LOAN TERMS BY CATEGORY OF DEBT AND TYPE OF BANK



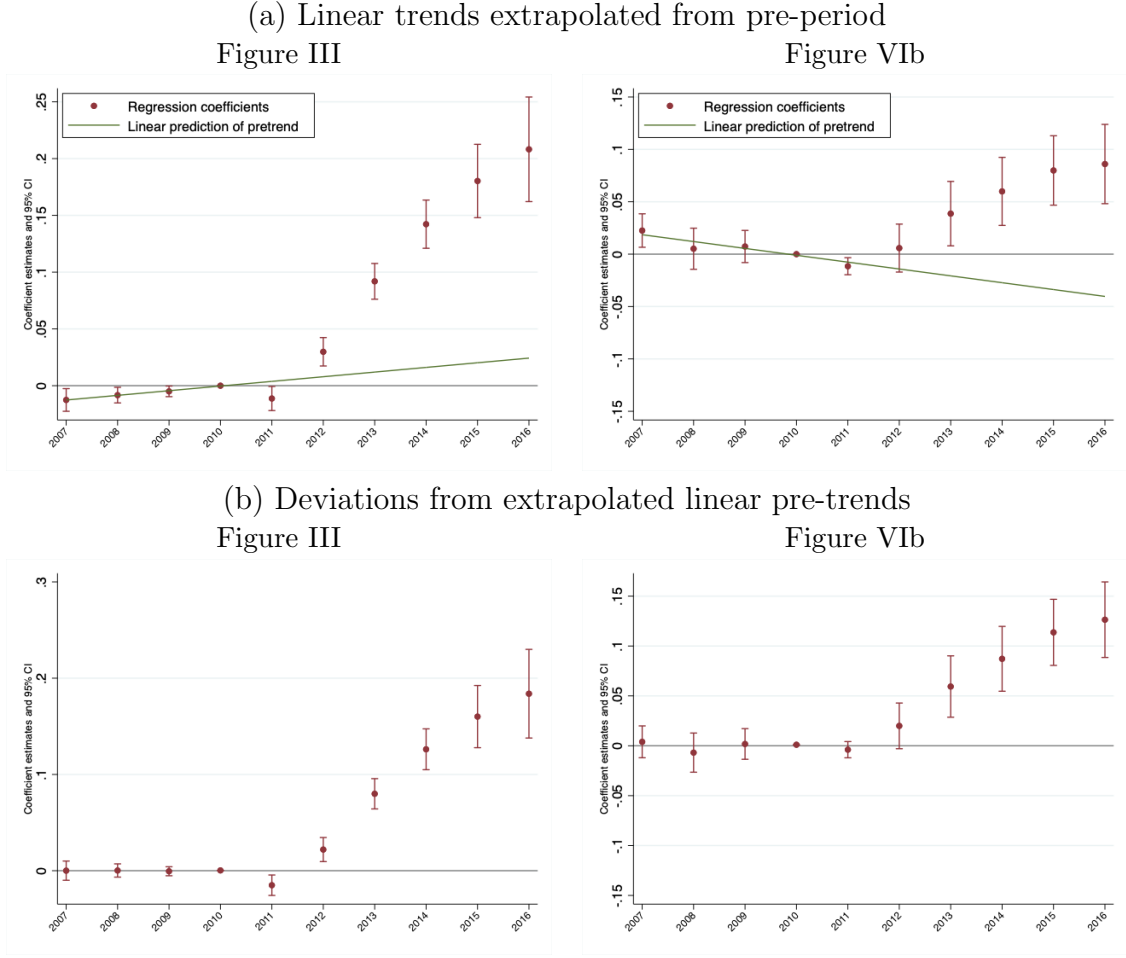
Notes: The figure reports the median interest rate (in percentage points) and maturity (in years) for loans outstanding in each year. The sample restricted to multi-bank borrowers. 7

FIGURE B.4: DIAGNOSTICS ON PRE-TRENDS BASED ON RAMBACHAN AND ROTH (2022)



Notes: The figure reports, for each outcome, the 95% confidence set for the average effect in the post-treatment period, as well as a series of (conditional least-favorable hybrid) confidence sets obtained using the methodology developed by Rambachan and Roth (2022) to diagnose the sensitivity of the effects to deviations from the parallel trends assumption. The values of $M\bar{bar}$ in the x-axis correspond to different magnitudes of the post-treatment violation of the parallel trends assumption, expressed as a share of the maximum violation of parallel trends in the pre-treatment period (e.g. $M\bar{bar} = 1$ imposes that post-treatment violation of parallel trends is no larger than the maximum pre-treatment violation of parallel trends). The estimates of β_k are based on the dynamic specification at individual-level reported in equation (1), which includes individual and year fixed effects, as well as baseline individual characteristics interacted with year fixed effects. Standard errors are clustered at employer-category level.

FIGURE B.5: ACCOUNTING FOR PRE-POLICY LINEAR TRENDS



Notes: Panel (a) reports a linear event-time trend extrapolated from the pre-policy periods, as in Freyaldenhoven et al. (2021) and Dobkin et al. (2018), for Figures III and VI.b in the paper. Panel (b) reports the deviations of the estimated coefficients in the original figures from the extrapolated linear pre-trend. The estimates of β_k in the original figures are based on the dynamic specification at individual-level reported in equation (1), which includes individual and year fixed effects, as well as baseline individual characteristics interacted with year fixed effects. Standard errors are clustered at employer-category level.

TABLE B.1: INDIVIDUAL-LEVEL BORROWING DURING BOOM YEARS (2010-2014):
HETEROGENEITY BY WORKERS' PARTY LOCAL VOTE SHARE

outcome	$\Delta (\text{total debt})_{2010-2014} / \text{income}_{2010}$					
	total		government banks		private banks	
	(1)	(2)	(3)	(4)	(5)	(6)
I(public sector employee) ₂₀₁₀	0.151 [0.024]***	0.131 [0.031]***	0.177 [0.018]***	0.183 [0.080]**	-0.020 [0.009]**	-0.053 [0.059]
I(public sector employee) ₂₀₁₀ \times PT vote share ₂₀₁₀		0.052 [0.054]		-0.015 [0.175]		0.085 [0.160]
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	763,423	763,423	763,423	763,423	763,423	763,423
R-squared	0.081	0.081	0.063	0.063	0.126	0.126
N clusters	62	62	62	62	62	62

Notes: Individual controls include: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE B.2: DIFFERENTIAL DEFAULT OF PUBLIC EMPLOYEES TO GOVERNMENT VS PRIVATE BANKS DURING RECESSION PERIOD

sample:	multi-bank type public sector workers	
outcome:	Δ (Share Balance in default \times 100)	
	(1)	(2)
1(government)	-0.375 [0.346]	-0.293 [0.303]
individual fe	no	y
Observations	236,079	236,079
R-squared	0.002	0.451
N individuals	86,524	86,524
N clusters	679	679

Notes: Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE B.3: SURVEY QUESTIONS USED TO DEFINE FINANCIAL ABILITY/BEHAVIOR
SCORES

Part A: financial ability (“habilidade financeira”)	
Survey question in Portuguese	English translation
Eu sei tomar decisões financeiras complicadas	I know how to make complicated financial decisions
Eu sou capaz de reconhecer um bom investimento	I am able to recognize a good investment
Eu sei me informar para tomar decisoes financeiras	I know how to inform myself to make financial decisions
Part B: financial behavior (“comportamento financeiro”)	
Survey question in Portuguese	English translation
Eu sei como me controlar para não gastar muito	I know how to control myself so I don’t spend too much
Eu sei como me obrigar a poupar	I know how to force myself to save
Eu sei como me obrigar a cumprir minhas metas financeiras	I know how to force myself to meet my financial goals

Notes: source: I-SFB/Febraban Index of Financial Health of the Brazilian Population, Methodology.

TABLE B.4: CORRELATION BETWEEN FINANCIAL SOPHISTICATION AND FINANCIAL ABILITY/BEHAVIOR SCORES

outcome:	Financial ability score		Financial behavior score	
	(1)	(2)	(3)	(4)
log financial sophistication	0.179 [0.040]***	0.178 [0.040]***	0.227 [0.039]***	0.226 [0.039]***
survey wave fe		y		y
Observations	2,442	2,442	2,449	2,449
R-squared	0.009	0.009	0.014	0.014

Notes: Robust standard errors reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE B.5: SHARE OF CREDIT CARD EXPENDITURE BY SECTOR OF MERCHANT

Non durables	share of total exp
Main sectors:	
Groceries	16.81%
Restaurants	9.81%
Traveling and entertainment	7.97%
Clothing and footwear	7.44%
Fuel and gas	5.99%
Drugstores and cosmetics	5.72%
Others	20.90%
Total	74.65%
Durables	share of total exp
Main sectors:	
Construction	3.91%
Vehicles, parts and accessories	3.56%
Electronics and home appliances	3.14%
Furniture	2.01%
Education	0.96%
Jewelry	0.83%
Books, magazines, CDs	0.42%
Others	4.18%
Total	19.01%
Not classified	share of total exp
Total	6.34%

Notes: Nuclea dataset, Central Bank of Brazil. All data refer to transactions cleared during 2018.

TABLE B.6: EXTENSIVE AND INTENSIVE MARGIN OF PAYROLL LOAN MARKET

outcomes sample:	Payroll Entry		Δ (payroll debt) _{2010–2014} /income ₂₀₁₀			
	no payroll loans in 2010 (1)	(2)	no payroll loans in 2010 (3)	(4)	with payroll loans in 2010 (5)	(6)
1(public sector employee) ₂₀₁₀	0.187 [0.010]***	0.144 [0.010]***	0.108 [0.006]***	0.074 [0.005]***	0.151 [0.006]***	0.135 [0.007]***
1(public sector employee) ₂₀₁₀ \times <i>LowSophi</i> ₂₀₁₀		0.140 [0.009]***		0.092 [0.006]***		-0.003 [0.006]
1(public sector employee) ₂₀₁₀ \times <i>HighSlope</i> ₂₀₁₀		0.052 [0.005]***		0.043 [0.003]***		0.035 [0.004]***
<i>LowFinSophi</i> ₂₀₁₀		0.005 [0.005]		0.004 [0.002]		0.007 [0.010]
<i>HighSlope</i> ₂₀₁₀		-0.002 [0.002]		-0.003 [0.001]**		-0.021 [0.004]***
baseline 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	461,030	461,030	461,030	461,030	302,093	302,093
R-squared	0.111	0.113	0.133	0.136	0.181	0.181
N clusters	556	556	556	556	558	558

Notes: Individual controls include: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE B.7: CONSUMPTION MEAN AND VOLATILITY FOR INDIVIDUALS WITHOUT
PAYROLL LOANS AT BASELINE

outcomes	credit card expenditure		
	average	avg normalized by pre-2010	coeff of variation
	(1)	(2)	(3)
$1(\text{public sector employee})_{2010} \times \text{LowFinSophi}_{2010}$	-0.116 [0.044]**	-0.008 [0.005]*	0.006 [0.002]***
$1(\text{public sector employee})_{2010} \times \text{HighSlope}_{2010}$	0.064 [0.016]***	-0.004 [0.005]	-0.002 [0.001]**
$1(\text{public sector employee})_{2010}$	0.076 [0.038]*	0.027 [0.006]***	-0.005 [0.002]**
$\text{LowFinSophi}_{2010}$	0.051 [0.015]***	-0.005 [0.006]	-0.003 [0.002]*
HighSlope_{2010}	-0.021 [0.008]***	0.002 [0.004]	0.001 [0.001]*
individual controls	y	y	y
fixed effects:			
micro-region	y	y	y
income quintiles	y	y	y
age quintiles	y	y	y
education	y	y	y
gender	y	y	y
occupation	y	y	y
Observations	461,018	237,994	461,018
R-squared	0.320	0.028	0.079
N clusters	62	62	62

Notes: Individual controls include: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE B.8: INTEREST RATE AND MATURITY ON PAYROLL LOANS

sample: outcomes:	payroll loan borrowers	
	Δ (interest rate) _{2010–2014}	Δ log (maturity) _{2010–2014}
	(1)	(2)
I(public sector employee) ₂₀₁₀	-1.277 [0.309]***	0.011 [0.008]
individual controls	y	y
fixed effects:		
micro-region	y	y
income quintiles	y	y
age quintiles	y	y
education	y	y
gender	y	y
occupation	y	y
Observations	171,280	174,346
R-squared	0.132	0.044
N clusters	53	53

Notes: Individual controls include: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE B.9: ROBUSTNESS TO ALTERNATIVE CLUSTERING

Panel a: Robustness of Table 2					
outcome	Δ (total debt) _{2010–2014} /income ₂₀₁₀				
	total	government banks	private banks		
	(1)	(2)	(3)		
1(public sector employee) ₂₀₁₀	0.151 [0.021]***	0.177 [0.036]***	-0.020 [0.023]		
Observations	763,423	763,423	763,423		
R-squared	0.081	0.063	0.126		
Panel b: Robustness of Table 6					
outcomes	Boom period 2010-14	Recession period 2014-16			
	Δ (total debt) _{2010–2014} /income ₂₀₁₀	Δ after-debt-service income	Δ (Share Balance in default \times 100)	Δ log (credit card expenditure)	Δ log (income)
	(1)	(2)	(3)	(4)	(5)
1(public sector employee) ₂₀₁₀ \times <i>LowSophi</i> ₂₀₁₀	0.051 [0.019]**	-0.012 [0.001]***	0.000 [0.000]	-0.042 [0.003]***	-0.007 [0.002]**
1(public sector employee) ₂₀₁₀ \times <i>HighSlope</i> ₂₀₁₀	-0.056 [0.005]***	0.022 [0.003]***	-0.000 [0.000]	-0.002 [0.006]	0.017 [0.002]***
1(public sector employee) ₂₀₁₀	0.170 [0.024]***	-0.030 [0.005]***	-0.000 [0.000]	-0.013 [0.016]	-0.001 [0.003]
<i>LowFinSophi</i> ₂₀₁₀	0.025 [0.014]	-0.016 [0.006]**	-0.001 [0.000]***	0.008 [0.010]	0.004 [0.002]
<i>HighSlope</i> ₂₀₁₀	0.066 [0.007]***	-0.007 [0.002]**	-0.000 [0.000]*	0.007 [0.007]	0.002 [0.001]
Observations	763,423	684,884	763,423	763,423	685,052
R-squared	0.081	0.017	0.025	0.013	0.041
Panel c: Robustness of Table 7					
outcomes	credit card expenditure			after-debt-service income	
	average	avg normalized by pre-2010	coeff of variation	average	avg normalized by pre-2010
	(1)	(2)	(3)	(4)	(5)
1(public sector employee) ₂₀₁₀ \times <i>LowFinSophi</i> ₂₀₁₀	-0.271 [0.069]**	-0.018 [0.008]*	0.016 [0.004]***	-0.051 [0.012]***	-0.047 [0.023]*
1I(public sector employee) ₂₀₁₀ \times <i>HighSlope</i> ₂₀₁₀	0.100 [0.014]***	-0.003 [0.001]	-0.003 [0.001]*	0.011 [0.007]	0.001 [0.007]
1(public sector employee) ₂₀₁₀	-0.153 [0.028]***	0.015 [0.007]*	0.010 [0.002]***	0.001 [0.010]	0.010 [0.017]
<i>LowFinSophi</i> ₂₀₁₀	0.063 [0.029]*	-0.000 [0.004]	-0.003 [0.001]**	0.026 [0.007]**	0.029 [0.012]*
<i>HighSlope</i> ₂₀₁₀	-0.031 [0.016]	0.003 [0.002]	0.001 [0.001]	-0.007 [0.004]	-0.004 [0.004]
Observations	763,405	436,844	763,405	763,275	761,217
R-squared	0.301	0.023	0.080	0.202	0.023
Mean Outcome	7.94	1.21	0.13	0.57	0.75
beta \times mean outcome	-3.4%	-1.5%	12.3%	-9.0%	-6.3%

Notes: All regressions include fixed effects for micro-region, income quintile, age quintile, education, gender and occupation of the borrower. We also include the following individual controls: share of borrowing from government banks in 2010 and debt-to-income ratio in 2010. Standard errors are adjusted for correlation within 4 clusters: public vs private-sector employment \times government vs non-government ownership of the main lender of each individual at baseline. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

TABLE B.10: INDIVIDUAL-LEVEL BORROWING DURING BOOM YEARS (2010-2014):
HETEROGENEITY BY FINANCIAL SOPHISTICATION VS BORROWING CONSTRAINTS
ROBUSTNESS TO CONTROLLING FOR INITIAL CONSUMPTION AND SAMPLE OF BORROWERS < 50 YEARS OF AGE

outcome	Boom period 2010-14	Recession period 2014-16			
	Δ (total debt) _{2010–2014} /income ₂₀₁₀ (1)	Δ after-debt-service income (2)	Δ (Share Balance in default) (3)	Δ log (credit card expenditure) (4)	Δ log (income) (5)
1(public sector employee) ₂₀₁₀ \times <i>LowFinSophi</i> ₂₀₁₀	0.051 [0.017]***	-0.020 [0.010]**	0.000 [0.000]	-0.042 [0.019]**	-0.007 [0.005]
1(public sector employee) ₂₀₁₀ \times <i>HighSlope</i> ₂₀₁₀	-0.075 [0.013]***	0.019 [0.006]***	0.000 [0.000]	0.009 [0.011]	0.009 [0.004]**
1(public sector employee) ₂₀₁₀	0.192 [0.018]***	-0.031 [0.006]***	-0.001 [0.000]***	-0.025 [0.010]**	0.002 [0.004]
<i>LowFinSophi</i> ₂₀₁₀	-0.020 [0.035]	-0.033 [0.016]**	-0.001 [0.001]**	0.022 [0.029]	-0.003 [0.008]
<i>HighSlope</i> ₂₀₁₀	0.070 [0.009]***	-0.002 [0.004]	-0.000 [0.000]	-0.002 [0.008]	0.006 [0.003]*
log credit card expenditure ₂₀₁₀	0.010 [0.001]***	0.004 [0.001]***	-0.000 [0.000]***	-0.022 [0.001]***	0.001 [0.000]**
individual 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	296,083	272,475	296,083	296,083	272,513
R-squared	0.075	0.027	0.028	0.018	0.048
N clusters	557	557	557	557	557

Notes: The sample is restricted to borrowers with less than 50 years of age and with data on credit card expenditure in the baseline year 2010. Individual controls include: share of borrowing from government banks and debt-to-income ratio, both observed in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .

TABLE B.11: INDIVIDUAL-LEVEL BORROWING DURING BOOM YEARS (2010-2014):
ROBUSTNESS TO USING FULL SAMPLE OF BORROWERS OBSERVED IN RAIS IN 2010

outcome	$\Delta (\text{total debt})_{2010-2014} / \text{income}_{2010}$			
	total (1)	government banks (2)	private banks (3)	total (4)
$I(\text{public sector employee})_{2010}$	0.208 [0.011]***	0.189 [0.013]***	0.012 [0.019]	0.207 [0.007]***
$I(\text{public sector employee})_{2010} \times \text{LowSophi}_{2010}$				0.074 [0.009]***
$I(\text{public sector employee})_{2010} \times \text{HighSlope}_{2010}$				-0.098 [0.027]***
$\text{LowFinSophi}_{2010}$				-0.002 [0.014]
HighSlope_{2010}				0.162 [0.010]***
individual 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	1,867,205	1,867,205	1,867,205	1,867,205
R-squared	0.073	0.043	0.128	0.074
N clusters	558	558	558	558

Notes: Individual controls include: share of borrowing from government banks and debt-to-income ratio, both observed in 2010. Standard errors clustered at employer-category level reported in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1 .