Does Loan Portability Promote Bank Competition?*

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Very Preliminary and Incomplete

Abstract

Credit portability has been advocated as an important instrument to promote competition in the banking industry. In 2014, the Brazilian Central Bank (BCB) implemented a regulatory norm to facilitate consumers' credit portability. We explore the spatial local banking concentration in Brazil to investigate how this institutional change affected local credit markets. We show robust evidence that credit portability reduced interest rates and increased the volume of credit for the types of loans most benefited by the law.

Keywords: bank competition, loan portability, household consumption

JEL codes: G21, E44, E58, G53

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1 Introduction

Consumer credit penetration has increased steadily over recent decades. There are currently more than $\$41$ trillion U.S. dollars in household debt globally, equivalent to around 40% of GDP across countries[1]. In Brazil, banking credit has increased from around 30% of GDP in 2007 to 48% in 2019, with household credit currently accounting for almost 60% of total credit. The country experienced a significant economic expansion from 2005 to 2014. Loans to households were boosted by several legal reforms of the financial system and government programs targeted to increase credit availability to a significant fraction of the Brazilian population[2].

The banking sector plays a central role in the functioning of the economy (e.g., Bernanke (1983)) by matching up creditors and borrowers. Through financial intermediaries, companies can invest in technology, infrastructure, machinery and equipment, expand operations, and meet their payrolls; families can buy durable goods (such as houses and cars) over time and smooth consumption in case adverse shocks arise. Thus, banks create money by transforming an illiquid asset (i.e., the borrower's future ability to repay a loan) into a liquid one (bank deposits).

Given the inherent risk of financial intermediation and the added value created in this process, banks charge a price for their services, reflected in the banking spread, which is the wedge between interest rates on loans and deposits. One natural factor in explaining the high banking spread in the country is that the enforcement of guarantees in Brazil is inefficient by international standards[3]. With low legal protection, banks tend to ration credit, and when they decide to lend, they take into account the low rate of recovery of defaulted loans and charge a higher interest rate.

Another fundamental factor in explaining the high banking spreads in Brazil

[1]Calculations based on data from the Global Debt Database by the International Monetary Fund for 82 developed and developing countries with available data for 2016.

[2]Brazil introduced legal changes to facilitate the repossession of collateral by financial institutions ("Lei de Alienação Fiduciária"), a new bankruptcy law, and a new law on payroll lending.

[3]According to the "Strength of legal rights index" from the World Bank, Brazil has ranked 2 since 2013. The strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12, with higher scores indicating that these laws are better designed to expand access to credit.

is the banks' market power. Although highly developed and well-regulated with high-level technology, Brazil's banking industry is highly concentrated. Figure 1 shows the distribution of the Herfindahl-Hirschman index (HHI)[4], which measures bank concentration in each Brazilian municipality for 2012, 2014, and 2016. In the years considered, the distribution of the HHI moved to the right, implying that the level of bank concentration increased between 2012 and 2016. Figure 2 shows that, over this period, approximately 80% of the outstanding volume of credit to firms and households originated in just eight banks in the country.

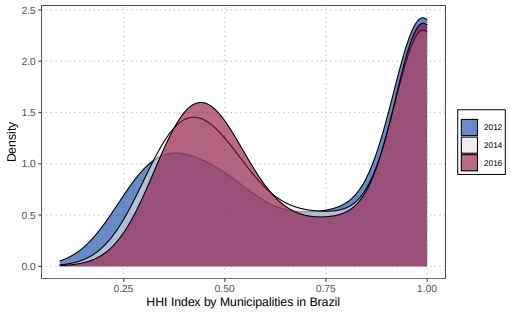

Figure 1: Distribution of the HHI index by Municipalities

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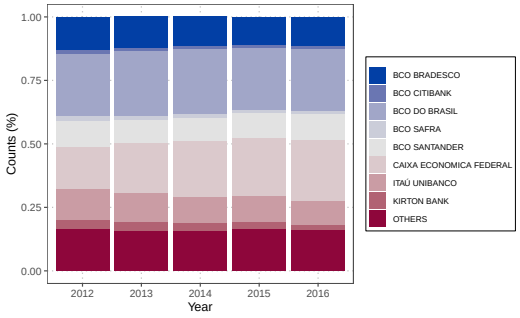

Figure 2: Total New Loans by Banks

Estban-BCB.

Promoting competition in the banking industry is particularly relevant in this outlook. In this direction, one vital intervention to foster competition in the banking industry implemented by the Brazilian Central Bank (BCB) was the enactment of Resolution nº 4,292, from December 20, 2013. This resolution came into force in May 2014. It implemented a regulatory norm to facilitate consumers' credit portability, establishing that a borrower can liquidate a credit transaction with a financial institution by creating a new one with a competitor. This BCB Resolution introduced essential changes in the portability process, which had been initiated in 2006[5], but without being broadly effective. The new rules established more transparent and standardized procedures with

[4]The Herfindahl-Hirschman index (HHI) is a common measure of market concentration. The HHI is calculated by squaring the market share of each bank in each municipality and then summing the resulting numbers. The index ranges from 0 to 10,000. The higher the HHI value, the higher the level of concentration and the less competition. The maximum value is 10,000, which corresponds to the case where only one bank operates in a given municipality.

[5]Resolution nº 3,402, from September 6, 2006.

the mandatory use of an electronic platform developed by the BCB to exchange information about credit transactions between the two financial institutions. Besides, the new resolution imposed deadlines and penalties for financial institutions that do not provide timely credit information. It established that consumers should not be charged for any costs related to credit portability[6].

Analyzing only ported loans from the effectiveness of Resolution nº 4,292 in May 2014 to December 2016, we observe more than 99.9% of the requests made and 97.9% of the balance, on average, refer to payroll loans. The payroll loan is a type of credit whose payment is deducted directly, in fixed monthly installments, from the payroll (formal employees or civil servants) or the retiree's social security benefit. In this way, the risk of default in this modality is reduced, which is also reflected in lower interest rates[7]. In addition, among the requests made for the portability of payroll loans, approximately 75% refer to retirees from the National Institute of Social Security (INSS), and the rest come from civil servants.

This institutional change offers a quasi-experimental design to assess the causal effects of greater bank competition on interest rates and the volume of loans in the country. We focus only on payroll loans, as it is the most representative type of credit among portability requests made. To isolate portability's effect on the country's local credit market, we employ an empirical differences-in-differences strategy that compares changes in outcomes in markets affected and unaffected by portability. We say that a municipality is affected by portability (i.e., treated) in case it had at least two different banks when the resolution was announced (in December 2013) so that the customer would have the opportunity to "search" for better prices (that is, interest rates) for the loan. We assume that portability did not affect local bank competition in markets with only one bank. Our estimates' identifying assumption is that of parallel trends: absent this regulation, treatment, and control would have parallel outcomes (conditional on the market's characteristics) over time.

Our empirical results show a reduction of approximately 0.8 percentage points in municipalities with more than one bank in operation (i.e., treated group) compared to those with only one bank (i.e., control group). This reduc-

[6]XXX detail costs better here

[7]The average interest rate on payroll loans between May 2014 and December 2016 was 27.9%, while the average interest rate for personal loans in the same period was 117.3%.

tion is statistically significant and economically relevant. Given that the average spread was around 16 percentage points[8] in this period for payroll loans, this implies that this institutional change alone generated a drop of about 5% in this average spread. The results are robust to different specifications and subsamples - for example, excluding municipalities with more than 200,000 inhabitants.

We also document that some groups "benefited" more than others. Ported payroll loans carried by retirees had virtually no interest rate reduction in the period (i.e., several borrowers changed banks to obtain a slight decrease in interest on the loan). However, the decline in interest rates on loans to civil servants was more significant and more visible[9].

Indeed, in our empirical study, we found robust and economically relevant support that credit portability reduced interest rates and increased volume[10] for the credit types most benefited by the law in the analyzed period. We also show that portability gains were not homogeneous for all borrowers. It seems to us that there is a relevant potential not yet realized in the portability since it is little known to the general public and can be leveraged with Open Banking[11], reducing the informational advantages of the original institutions and facilitating, for the borrower, the search for a better offer.

Related Literature As the new portability resolution facilitates the transfer of consumer credit across financial institutions, the opportunity cost of switching banks is expected to decrease, increasing competition in this market and reducing interest rates and spreads. Policies promoting rivalry in the banking industry are expected to help expand the credit market and economic activity. In this sense, there are few studies on the role of portability in the telecom industry, investigating several policy measures in different countries (Lee et al. (2006); Shi et al. (2006); Viard (2007)), all of them concluding that portability increased competition and reduced prices in telecom markets. To the best of our

[8]The average interest rate on payroll loans between January 2012 and December 2016 was 26.7%. The average Selic rate for the same period was 11.1%. Thus, the average spread (the difference between the payroll interest rate and the Selic rate) was 15.6% in the period.

[9]It is worth mentioning that there was (and still is) a ceiling for the interest on payroll loans for retirees during the period, but there was no similar ceiling for payroll loans for civil servants.

[10]We find causal evidence that the portability led to an increase in the volume of credit per capita (around 3%) in treated municipalities compared to control municipalities.

[11]Joint Resolution 1, of May 4, 2020. Defined as standardized sharing of data and services through openness and integration of systems. Open Banking will allow customers to share their data to get better products and services.

knowledge, the only paper that evaluated the credit portability for the Brazilian banking industry is Azevedo et al. (2019), and the authors find that credit spreads for types of credit susceptible to portability become significantly lower than credit spreads for other types of credit that were not benefited by the new law.

Our research is directly related to Joaquim and van Doornik (2019). The authors find that (i) a reduction in bank competition increases lending spreads (the difference between lending and deposit rates) and decreases credit volume, all considered in relative terms. The decrease in volume occurs entirely through the extensive margin, i.e., fewer loans in equilibrium and not smaller loans; (ii) the authors show that these effects on credit markets feed through to the real economy by providing evidence that M&A impact firms' outputs of both tradable and non-tradable sectors, indicating that firm financing is relevant to real outcomes in some contexts.

Section 2 describes the data and shows the characteristics of banking markets in Brazil. Section 3 discusses our empirical framework. Section 4 presents the results on individuals XXX. Section 5 concludes.

2 Data and Banking Markets

In this paper, using a comprehensive consumer-level credit registry, we intend to examine the quantitative importance of loan portability, bank concentration, and the household credit channel. Brazil is the subject of our investigation since it offers very detailed data, as we show below.

2.1 Data Sources

Credit Registry. The credit registry (Sistema de Informação de Crédito - SCR) of the Brazilian Central Bank serves as our primary data source. It includes details about specific loans, including interest rates, loan amounts, maturities, credit risks, etc. Banks must report information on each loan monthly and the database has information on loan-level for households and firms. The reporting threshold has changed over time: 5,000 BRL in the period between January 2003 and December 2011, 1,000 BRL in the period between January

2011 and May 2016, 200 BRL in the period starting in June 2016. In this paper, we focus on loans to households.

ESTBAN. Another source of banking information is the Monthly Bank Statistics by municipality (Estatística Bancária Mensal por município - ESTBAN). It contains the balance sheet of each banking conglomerate, the number of branches per municipality, and information on loans per branch. From the balance sheet data, we have the outstanding volume of credit to households and firms for each bank in a given municipality (i.e., the stock of credit). Using this information, we can calculate market shares and concentration measures for each market.

RAIS. We additionally use the Brazilian matched employer-employee data collection (Relação Anual de Informações Sociais - RAIS). This is a dataset by the Brazilian Ministry of Labor and Employment and it contains labor market data for the universe of firms and workers in the formal sector. In this dataset, we have several information about workers' characteristics such as hires/fires, wages, tenure, education, and occupation.

IBGE. We use information from The Brazilian Institute of Labor and Geography (IBGE) about population, GDP, GDP per capita, and so on at the municipality level.

For further information on the data, see Appendix A. From SCR, we extracted a representative sample of 12.8% of all borrowers (Garber et al. (2019)), more details in Appendix A.

2.2 Banking Markets

We consider a municipality in Brazil to be our benchmark definition of a local banking market.

Table 1 brings some descriptive statistics for municipalities with at least one bank in Dec/2014 and Dec/2018. Measures of concentration, such as the Herfindahl-Hirschman Index (HHI) or the number of different bank branches confirm that banking markets in Brazil are very concentrated and somewhat heterogeneous in their degree of concentration due to the high standard deviation.

Table 1: Descriptive Statistics (ESTBAN)

	2014	2018
Loan to Household Volume (R$ 1,000,000)		
Mean	122	148
Median	19	23
Stand. Dev.	2,249	2,853
# Branches (different banks)		
Mean	20	19
Median	7	6
Stand. Dev.	28	27
HHI		
Mean	0.40	0.42
Median	0.35	0.39
Stand. Dev.	0.23	0.23

2.2.1 Loan Portability

Loan portability has been advocated as an important intervention to foster competition in the banking industry. It is the process of transferring a loan from one bank to a different bank in order to take advantage of lower interest rates. The BCB Resolution nº 4,292 introduced important changes in the portability process, which had been initiated in 2006, but without being broadly effective. The new rules established more transparent and standardized procedures with the mandatory use of an electronic platform, developed by the BCB, to exchange information about the credit transaction between the two financial institutions. Besides, the new resolution imposed deadlines and penalties for the financial institutions that do not provide timely credit information.

Analyzing only the types of credit that were ported in the analysis period (from the effectiveness of Resolution 4,292 in May 2014 to December 2016), we observe that more than 99.9% of the requests made and 97.9% of the balance, on average[12], refer to payroll loans.

[12] xxx

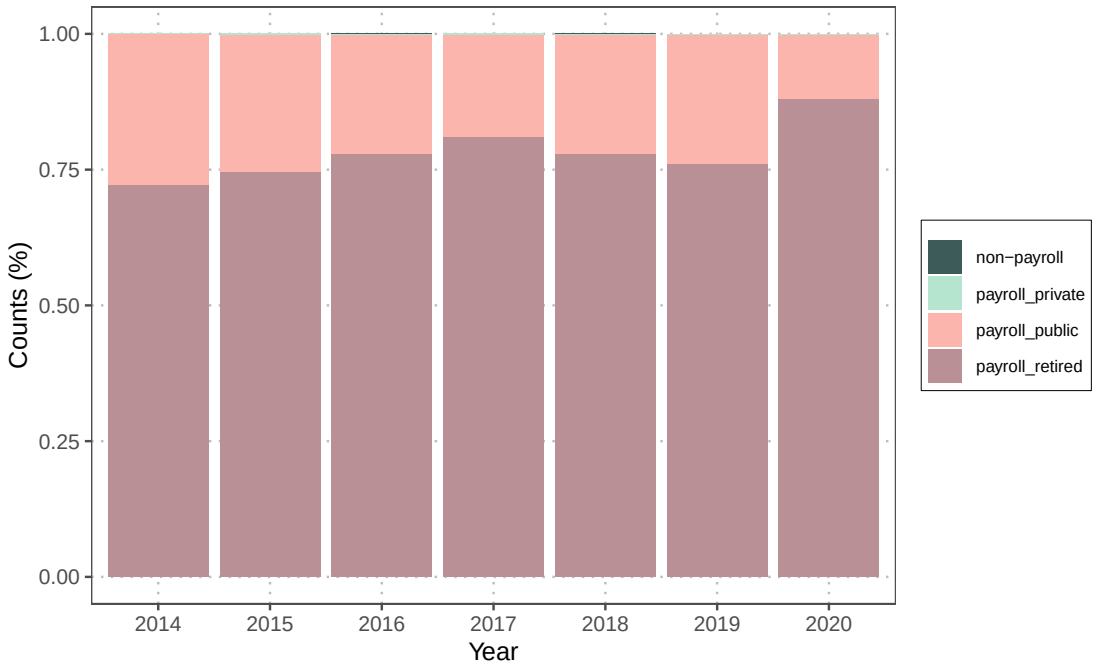

Figure 3: Ported Loans - Payroll vs. Non-Payroll Loans

SCR-BCB.

2.2.2 Payroll Loans

Payroll loans are a type of loan that allows banks to deduct payments directly from borrowers' paycheck[13] in fixed monthly installments, from the payroll (formal employee or civil servants) or from the retiree's social security benefit.

Thus, the delinquency risk of this type of loan is greatly reduced and it is reflected in lower interest rates. The average interest rate on payroll loans between May 2014 and December 2016 was 27.9%, while for personal loans, in the same period, the average interest rate was 117.3%.

Also, the payroll loan is almost exclusive to public employees and retired individuals (Figure 5). From all payroll loans (2012-2020), public employees accounted for 59%, retired (INSS), 34%, and private sector employees, 7%.

[13] Law 10.820/2003

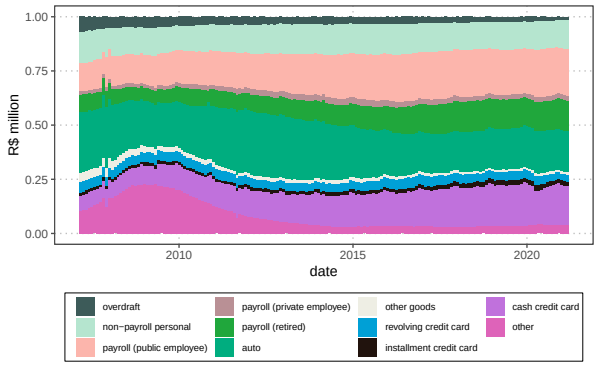

Figure 4: Non-earmarked Household Credit

Estatísticas monetárias e de crédito-BCB.

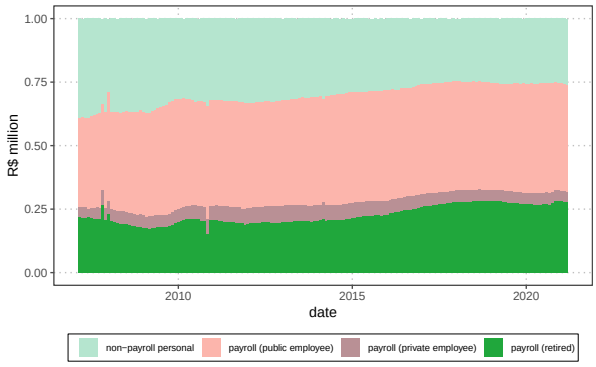

Figure 5: Non-earmarked Household Credit - Payroll vs. Non-Payroll Personal

Estatísticas monetárias e de crédito-BCB.

Table 2: Summary Statistics on Payroll Loans: interest rates (% p.a.), loan size (R$) and maturity (days)

	N	mean	sd	p10	p50	p90
Loan (payroll)	333992	5171619.69	41028341.98	258956.68	974687.44	6598863.57
Payroll loan per capita	333992	104.57	51.02	49.15	95.66	171.02
Rate (payroll)	333992	28.46	1.78	26.70	28.41	30.13
Maturity (payroll)	333992	1826.94	153.84	1642.39	1812.20	2031.15
Selic	333992	11.23	2.51	7.50	11.00	14.25
Bank branch	333992	4.05	40.50	0.00	1.00	5.00
Diff. bank branch	333992	1.94	2.74	0.00	1.00	5.00
Total new loans	333992	4.59e+08	1.35e+10	0.00	12526830.00	2.65e+08
HHI Index	333992	4671.30	4057.25	0.00	4362.44	10000.00
Observations	333992					

Therefore, in this study, we focused only on payroll-deductible personal credit, as it is the most representative modality among portability requests made.

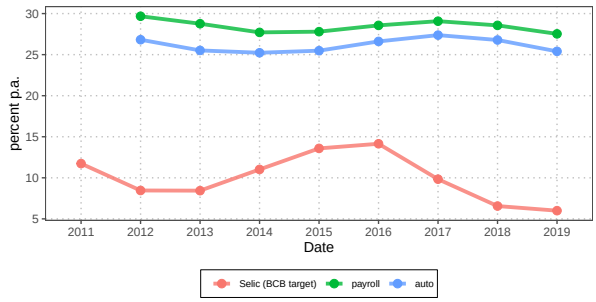

Figure 6: Effective Interest Rates (average)

SCR-BCB.

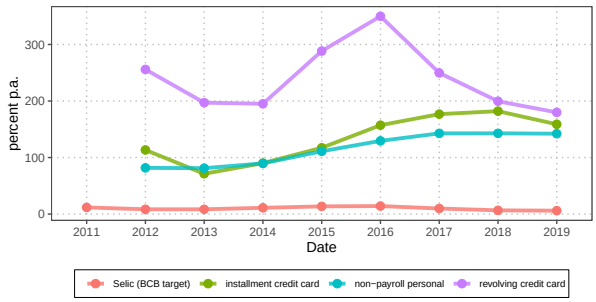

Figure 7: Effective Interest Rates (average)

SCR-BCB.

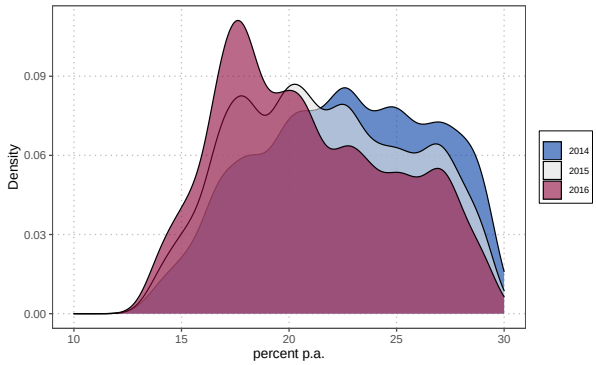

Figure 8: Effective Interest Rate for Ported Payroll Loans for Civil Servants

SCR-BCB.

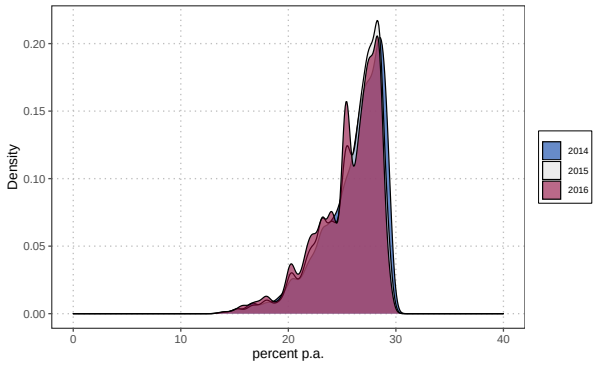

Figure 9: Effective Interest Rate for Ported Payroll Loans for Retirees

SCR-BCB.

3 Empirical Framework

3.1 Empirical Framework

This project aims to understand the effects of banking competition. In order to do so, we investigate how the quantity and price of credit changed in light of this institutional innovation. This effect is hard to identify because bank competition is not exogenous to these outcomes. For example, suppose a market receives a positive productivity shock. This shock will increase the total demand for lending and make the market more attractive to potential entrants, which changes incumbents' behavior and affects competition. We intend to overcome

this identification challenge by using the enactment of Resolution nº 4,292 as a source of exogenous variation in local competition and explore heterogeneous exposition to this episode across municipalities.

Initially, we use a difference-in-difference (DiD) research design similar to the one used by Joaquim and van Doornik (2019) to estimate the effect of bank competition on these outcomes. We compare outcomes for treated markets (markets exposed to the episode) with outcomes in the control group (not exposed) before and after the credit portability resolution. We say that a market is treated if it has at least two different bank branches at the enactment of this resolution. Figure 10 illustrates this heterogeneous exposure across municipalities for treated and control groups.

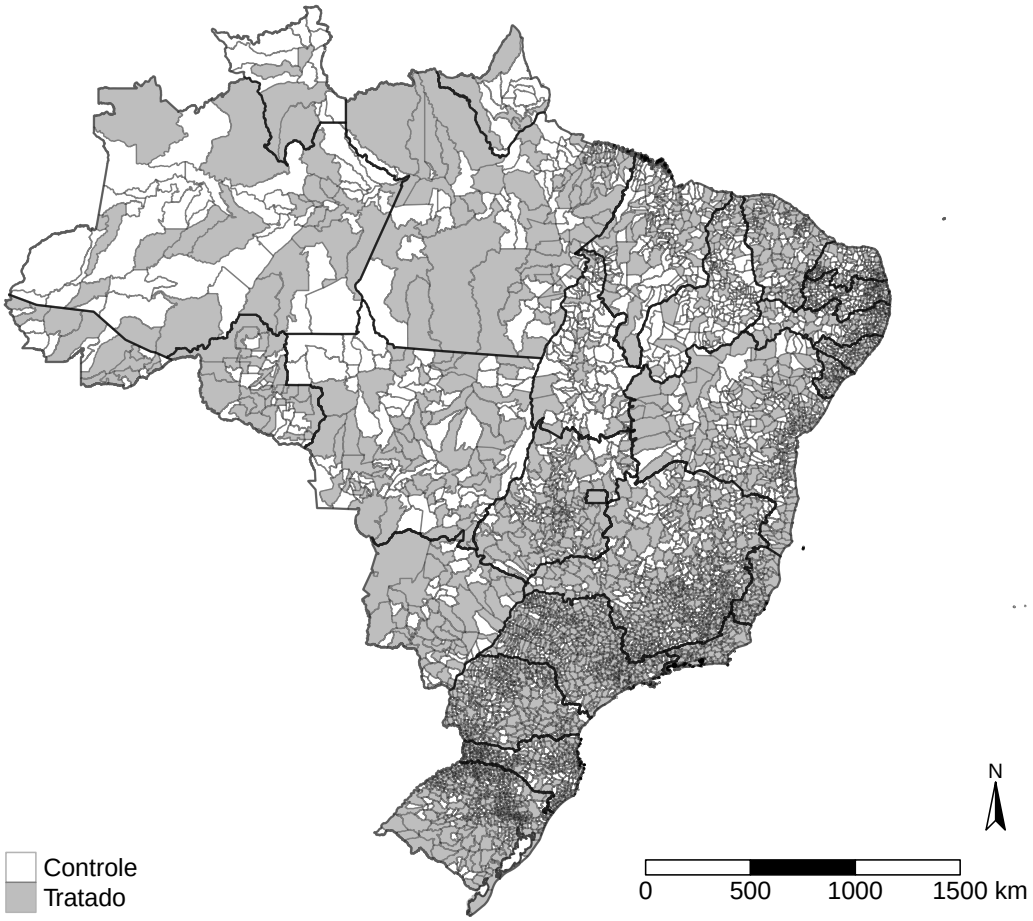

Figure 10: Treated and Control Municipalities in Dec 2013

Estban-BCB.

Our estimates' identifying assumption is that of parallel trends: absent this regulation, treatment, and control would have parallel outcomes (conditional on the market's characteristics) over time.

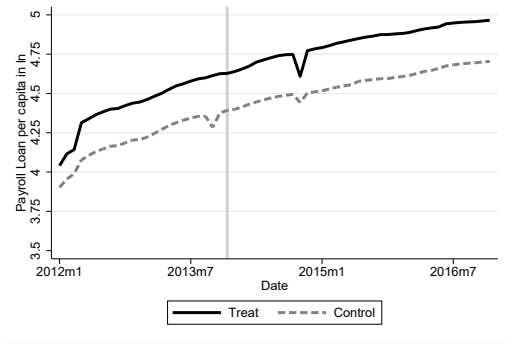

Figure 11: Payroll loans (per capita, in ln)

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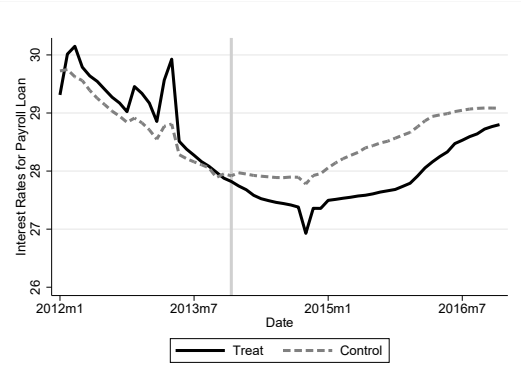

Figure 12: Interest rate (% p.a.)

SCR-BCB.

We focus on loan and household data aggregated at the municipality level. Our baseline specification consists of the following DiD model:

$$y_{m,t} = \gamma_m + \gamma_t + \beta X_{m,t} + \delta TREAT_{m,t} \times POST_t + \varepsilon_{m,t} \tag{1}$$

where $y_{m,t}$ is consumer loans per capita or interest rate for municipality m in month/year t; γ_m and γ_t are municipality and time fixed-effects; $X_{m,t}$ is a vector of control variables that is allowed to have a varying effect over time β_t; $T_{m,t}$ is a dummy that is equal to one if a municipality has more than two different bank branches in time t; $TREAT_{m,t} \times POST_t$: interaction of the dummy with Loan Portability Resolution (Dec 2013).

4 The Effects of Loan Portability

Summarize here XXX

4.1 Interest Rates

We report in Table 3 the estimates of Equation (1) on the interest rate of payroll loans. The rows of Table 3 represent the dependent variables. Each column

in Table 3 represents a different regression (with different dependent variables). The coefficient δ in Equation (1) is the DiD causal effect we expect to estimate. The regressions below show that the loan portability law helped decrease interest rates for this type of loan in the period analyzed.

Table 3: Fixed effect estimate of the impact of the loan portability on the effective annual interest rate by municipalities (sample: 201201 - 201612, all municipalities)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-0.867***	-0.869***	-0.591***	-0.855***	-0.642***	-0.876***
	(0.0288)	(0.0288)	(0.0310)	(0.0288)	(0.0337)	(0.0290)
HHI Index		2.31e-05***	9.35e-05***	0.000194***		
		(7.12e-06)	(7.44e-06)	(4.20e-05)		
HHI x Post			-0.000113***			
			(4.16e-06)			
HHI Index sqrt				-0.0189***		
				(0.00450)		
GDPpc 2011 x Post					-5.38e-07	
					(8.09e-07)	
Loan (payroll)						2.71e-09***
						(9.65e-10)
Constant	28.68***	28.58***	28.55***	28.80***	29.08***	28.67***
	(0.00757)	(0.0338)	(0.0379)	(0.0590)	(0.0159)	(0.00865)
Observations	333,992	333,992	333,992	333,992	333,692	333,992
R-squared	0.498	0.498	0.515	0.499	0.502	0.498
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.2 Volume of Credit per capita

We report in Table 4 the estimates of Equation (1) on the volume of payroll loans per capita (in log). The regressions confirm that the enactment of the loan portability resolution had a positive and significant effect in increasing the volume of payroll loans for the municipalities that had more than two different bank branches (i.e., for consumers that lived in a municipality that had the opportunity to switch credit to another bank in the same locality).

Thus, these results confirm that loan portability was important in boosting competitiveness in the credit market by increasing the volume of loans in the economy and decreasing their price.

Table 4: Fixed effect estimate of the impact of the loan portability on payroll loans (per capita) by municipalities (sample: 201201 - 201612, all municipalities, in ln)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	0.0330***	0.0333***	0.0347***	0.0307***	0.0398***	0.0406***
	(0.00359)	(0.00359)	(0.00381)	(0.00359)	(0.00396)	(0.00402)
HHI Index		-2.90e-06***	-8.30e-06***	-3.32e-05***		
		(9.31e-07)	(9.74e-07)	(4.20e-06)		
HHI x Post			8.90e-06***			
			(5.54e-07)			
HHI Index sqrt				0.00336***		
				(0.000473)		
GDP in 2011 = o,					-	
GDP 2011 x Post					-5.45e-10*	
					(2.99e-10)	
GDPpc 2011 x Post						-2.52e-07**
						(1.08e-07)
Constant	4.524***	4.538***	4.581***	4.498***	4.536***	4.536***
	(0.000942)	(0.00438)	(0.00466)	(0.00753)	(0.00192)	(0.00192)
Observations	333,992	333,992	333,992	333,992	333,692	333,692
R-squared	0.951	0.951	0.952	0.952	0.951	0.951
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.3 Extensions

4.3.1 Retirees

Table 5: Fixed effect estimate of the impact of the loan portability on interest rates for payroll loans by municipalities (sample: 201201 - 201612, all municipalities, retirees)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-0.688***	-0.255	0.517	-0.207	-0.599***	-0.662***
	(0.200)	(0.289)	(0.378)	(0.289)	(0.204)	(0.200)
HHI Index		8.84e-06	-8.37e-05	0.00172***		
		(0.000117)	(0.000127)	(0.000559)		
Post = o,			-		-	
HHI x Post			0.000181***			
			(4.79e-05)			
HHI Index sqrt				-0.277***		
				(0.0860)		
GDP per capita in 2011 = o,					-	
GDPpc 2011 x Post					-1.13e-05**	
					(5.26e-06)	
Loan (payroll)						-8.25e-08**
						(3.31e-08)
Constant	29.58***	29.37***	28.64***	40.08***	29.67***	29.59***
	(0.0735)	(0.813)	(0.779)	(3.318)	(0.0848)	(0.0733)
Observations	239,247	165,319	165,319	165,319	239,095	239,247
R-squared	0.108	0.128	0.129	0.128	0.108	0.108
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.3.2 Civil Servants

Table 6: Fixed effect estimate of the impact of the loan portability on interest rates for payroll loans by municipalities (sample: 201201 - 201612, all municipalities, civil servants)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-2.089**	-2.450*	-3.314*	-2.684*	-2.479**	-2.038*
	(1.039)	(1.373)	(1.945)	(1.380)	(1.058)	(1.043)
HHI Index		0.000274	0.000341	-0.00549**		
		(0.000364)	(0.000387)	(0.00247)		
Post = o,			-		-	
HHI x Post			-0.000183			
			(0.000266)			
HHI Index sqrt				0.913**		
				(0.393)		
GDP per capita in 2011 = o,					-	
GDPpc 2011 x Post					5.76e-05***	
					(1.69e-05)	
Loan (payroll)						-1.96e-07*
						(1.08e-07)
Constant	29.65***	28.51***	29.48***	-5.890	29.12***	29.66***
	(0.541)	(2.338)	(2.642)	(15.17)	(0.549)	(0.540)
Observations	97,408	81,491	81,491	81,491	97,327	97,408
R-squared	0.118	0.122	0.122	0.122	0.118	0.118
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.3.3 Federal Civil Servants

Table 7: Fixed effect estimate of the impact of the loan portability on interest rates for payroll loans by municipalities (sample: 201201 - 201612, all municipalities, federal civil servants)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-3.823**	-4.875**	-7.254**	-4.980**	-4.227**	-3.842**
	(1.736)	(1.967)	(3.141)	(1.969)	(1.736)	(1.742)
HHI Index		0.000793	0.000885	-0.00126		
		(0.000784)	(0.000815)	(0.00445)		
Post = o,			-		-	
HHI x Post			-0.000453			
			(0.000437)			
HHI Index sqrt				0.313		
				(0.662)		
GDP per capita in 2011 = o,					-	
GDPpc 2011 x Post					4.51e-05*	
					(2.58e-05)	
Loan (payroll)						8.48e-08
						(1.45e-07)
Constant	30.92***	27.78***	30.71***	16.46	30.55***	30.91***
	(1.081)	(4.223)	(4.374)	(24.18)	(1.111)	(1.079)
Observations	43,794	40,060	40,060	40,060	43,794	43,794
R-squared	0.125	0.130	0.130	0.130	0.125	0.125
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.4 Robustness

4.4.1 Revolving Credit Card

Revolving credit card was not affected by the portability:

Table 8: Revolving loans - summary statistics

	N	mean	sd	p10	p50	p90
Revolving loan	331686	265781.23	2966446.84	2846.65	23140.29	253491.48
Revolving loan per capita	331686	3.25	3.12	0.45	2.37	7.13
Rate (revolving)	331686	256.54	96.63	136.09	250.04	387.14
Maturity (revolving)	331672	2423.52	1913.10	707.25	1931.54	4852.07
Selic	331686	11.24	2.51	7.50	11.00	14.25
Bank branch	331686	4.08	40.64	0.00	1.00	5.00
Diff. bank branch	331686	1.95	2.75	0.00	1.00	5.00
Total new loans	331686	4.62e+08	1.35e+10	0.00	12827495.00	2.67e+08
HHI Index	331686	4691.99	4051.79	0.00	4387.14	10000.00
Observations	331686					

Table 9: Fixed effect estimate of the impact of the loan portability on interest rates for revolving loans by municipalities (sample: 201201 - 201612, all municipalities)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-28.68***	-28.80***	-34.44***	-27.62***	-36.79***	-29.42***
	(1.295)	(1.296)	(1.348)	(1.300)	(1.472)	(1.316)
HHI Index		0.00144***	0.00468***	0.0156***		
		(0.000403)	(0.000393)	(0.00172)		
HHI x Post			-0.00537***			
			(0.000192)			
HHI Index sqrt				-1.569***		
				(0.196)		
GDP per capita in 2011 = o,					-	
GDPpc 2011 x Post					1.62e-05	
					(2.89e-05)	
Loan (payroll)						2.28e-07***
						(8.52e-08)
Constant	264.1***	257.4***	223.3***	275.8***	249.7***	263.1***
	(0.342)	(1.900)	(1.871)	(3.308)	(0.794)	(0.513)
Observations	331,686	331,686	331,686	331,686	331,386	331,686
R-squared	0.487	0.488	0.498	0.488	0.489	0.488
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Fixed effect estimate of the impact of the loan portability on revolving loans per capita by municipalities (sample: 201201 - 201612, all municipalities, in ln)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-0.213***	-0.212***	-0.161***	-0.214***	-0.154***	-0.162***
	(0.0149)	(0.0149)	(0.0157)	(0.0150)	(0.0159)	(0.0164)
HHI Index		-1.08e-05***	-1.58e-05***	-3.62e-05**		
		(3.71e-06)	(3.98e-06)	(1.61e-05)		
HHI x Post			8.65e-06***			
			(2.36e-06)			
HHI Index sqrt				0.00281		
				(0.00186)		
GDP in 2011 = o,					-	
GDP 2011 x Post					-2.58e-09**	
					(1.16e-09)	
GDP per capita in 2011 = o,						-
GDPpc 2011 x Post						5.03e-07
						(3.74e-07)
Constant	0.727***	0.777***	0.905***	0.744***	0.825***	0.825***
	(0.00393)	(0.0176)	(0.0197)	(0.0315)	(0.00994)	(0.00994)
Observations	331,686	331,686	331,686	331,686	331,386	331,386
R-squared	0.726	0.726	0.727	0.726	0.727	0.727
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.5 Municipalities with less than 200 thousand inhabitants

Table 11: Sub-sample: municipalities with less than 200 thousand inhabitants - Payroll loans - summary statistics

	N	mean	sd	p10	p50	p90
Loan (payroll)	325832	2276281.64	4046945.95	255610.42	937126.88	5268811.86
Payroll loan per capita	325832	102.84	49.20	48.71	94.55	167.27
Rate (payroll)	325832	28.47	1.79	26.71	28.42	30.15
Maturity (payroll)	325832	1828.13	153.70	1644.21	1813.30	2031.97
Selic	325832	11.24	2.51	7.50	11.00	14.25
Bank branch	325832	1.98	2.80	0.00	1.00	5.00
Diff. bank branch	325832	1.73	1.90	0.00	1.00	5.00
Total new loans	325832	77230547.76	1.97e+08	0.00	11152432.00	2.13e+08
HHI Index	325832	4702.20	4100.01	0.00	4462.40	10000.00
Observations	325832					

Table 12: Sub-sample: municipalities with less than 200 thousand inhabitants - Fixed effect estimate of the impact of the loan portability on interest rates for payroll loans by municipalities (sample: 201112 - 201312, all municipalities)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-0.884***	-0.885***	-0.594***	-0.870***	-0.660***	-0.907***
	(0.0293)	(0.0293)	(0.0316)	(0.0293)	(0.0341)	(0.0307)
HHI Index		2.09e-05***	9.32e-05***	0.000188***		
		(7.13e-06)	(7.50e-06)	(4.21e-05)		
HHI x Post			-0.000114***			
			(4.21e-06)			
HHI Index sqrt				-0.0185***		
				(0.00451)		
GDP per capita in 2011 = 0,					-	
GDPpc 2011 x Post					-8.66e-07	
					(8.32e-07)	
Loan (payroll)						1.73e-08**
						(7.23e-09)
Constant	28.69***	28.59***	28.54***	28.80***	29.08***	28.66***
	(0.00745)	(0.0341)	(0.0387)	(0.0577)	(0.0162)	(0.0159)
Observations	325,832	325,832	325,832	325,832	325,532	325,832
R-squared	0.496	0.496	0.512	0.496	0.499	0.496
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Sub-sample: municipalities with less than 200 thousand inhabitants - Fixed effect estimate of the impact of the loan portability on payroll loans per capita by municipalities (sample: 201112 - 201312, all municipalities, in ln)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	0.0360***	0.0361***	0.0368***	0.0335***	0.0464***	0.0435***
	(0.00364)	(0.00364)	(0.00387)	(0.00365)	(0.00420)	(0.00406)
HHI Index		-2.60e-06***	-8.03e-06***	-3.23e-05***		
		(9.31e-07)	(9.81e-07)	(4.21e-06)		
HHI x Post			8.81e-06***			
			(5.60e-07)			
HHI Index sqrt				0.00329***		
				(0.000473)		
GDP in 2011 = o,					-	
GDP 2011 x Post					-7.11e-09***	
					(1.70e-09)	
GDP per capita in 2011 = o,						-
GDPpc 2011 x Post						-2.13e-07**
						(1.04e-07)
Constant	4.510***	4.522***	4.567***	4.485***	4.522***	4.522***
	(0.000925)	(0.00442)	(0.00474)	(0.00740)	(0.00194)	(0.00194)
Observations	325,832	325,832	325,832	325,832	325,532	325,532
R-squared	0.949	0.949	0.950	0.950	0.949	0.949
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.6 Placebo

In order to confirm that the results estimated in Tables 4 and 3 are truly caused by the portability law, we estimated the placebo regressions below.

Table 14: PLACEBO: Fixed effect estimate of the impact of the loan portability on interest rates for payroll loans by municipalities (sample: 201112 - 201312, all municipalities)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	FE	FE	FE
Treat in Dec 2013 x Post	-0.562	-0.562	-0.442	-0.562	-0.559	-0.560
	(0.640)	(0.640)	(0.660)	(0.640)	(0.641)	(0.640)
HHI Index		7.45e-06	1.26e-05	7.56e-05		
		(1.61e-05)	(1.61e-05)	(6.01e-05)		
HHI x Post			-1.66e-05			
			(1.02e-05)			
HHI Index sqrt				-0.00861		
				(0.00805)		
GDP per capita in 2011 = o,					-	
GDPpc 2011 x Post					1.77e-06	
					(1.77e-06)	
Loan (payroll)						3.37e-09**
						(1.63e-09)
Constant	28.88***	28.85***	28.82***	28.99***	28.89***	28.87***
	(0.00114)	(0.0766)	(0.0765)	(0.178)	(0.00635)	(0.00689)
Observations	133,580	133,580	133,580	133,580	133,460	133,580
R-squared	0.456	0.456	0.456	0.456	0.455	0.456
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 15: PLACEBO: Fixed effect estimate of the impact of the loan portability on payroll loans per capita by municipalities (sample: 201112 - 201312, all municipalities, in ln)

VARIABLES	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Treat in Dec 2013 x Post	-0.0344**	-0.0343**	-0.00743	-0.0344**	0.00474	0.00849
	(0.0159)	(0.0157)	(0.0169)	(0.0159)	(0.0164)	(0.0162)
HHI Index		-1.22e-05***	-1.02e-05***	-2.67e-05***		
		(1.38e-06)	(1.33e-06)	(5.51e-06)		
HHI x Post			2.11e-06**			
			(8.60e-07)			
HHI Index sqrt				0.00183***		
				(0.000687)		
GDP in 2011 = o,					-	
GDP 2011 x Post					2.97e-08	
					(3.34e-08)	
GDP per capita in 2011 = o,						-
GDPpc 2011 x Post						5.42e-08
						(2.15e-07)
Constant	4.310***	4.368***	4.369***	4.336***	4.322***	4.322***
	(2.85e-05)	(0.00659)	(0.00638)	(0.0138)	(0.000645)	(0.000645)
Observations	133,580	133,580	133,580	133,580	133,460	133,460
R-squared	0.959	0.959	0.960	0.959	0.960	0.960
Mun FE	YES	YES	YES	YES	YES	YES
Date FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5 Conclusion

The banking sector plays a central role in the functioning of the economy and is incredibly concentrated. Although highly developed and well regulated with high-level technology, Brazil's banking industry is highly concentrated, a factor enabling inefficiencies to emerge. Brazil's five most prominent institutions hold 85% of its financial assets, which makes Brazil one of the world's most concentrated markets. In 2014, Brazil's banking market concentration was already high, averaging 0.40, as measured by the HHI index, and it increased even more in the last couple of years (averaging 0.42 in 2018). The Central Bank

of Brazil (BCB) has been implementing several measures to encourage competition, such as interest rate regulation and caps (on credit card, payroll lending, overdraft lending, etc.) and the aforementioned regulation on credit portability.

Thus, this papers analyzes the causal evidence of banking competition's effects on household consumption and economic activity in Brazil. To that end, we rely on the institutional setting that enacted the credit portability regulation (Resolution nº 4,292) as a source of exogenous variation in local competition and explore heterogeneous exposition across municipalities. Our results show that this law was effective to increase competition in this market by increasing the volume of loans and reducing its price at least for the loan types more susceptible by the law. However, we still see several inefficiencies/ misallocation in the process. As shown, ported loan by public employees showed the highest decrease in interest rates, whereas interest rates charged in payroll loans for retirees changed very little. Therefore, there is room to improve this setting by advertising (some people do not know they can switch banks without costs and in a simple process, similar to a cell phone portability process). Also, it seems that some legal improvement in the payroll law (Law 10.820/2013) could boost payroll loans to private employees too and open up the possibility to port these loans in case faced with better credit conditions.

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Appendix

A Data Appendix

A.1 Description of Data Sets

- ESTBAN: contains the balance sheet of each banking conglomerate as well as the number of branches per municipality. To determine the amount of credit, we will use the following account entry: *verbete 160 operacoes de credito*, which translates to "credit operations" in each bank's asset. Additionally, from this dataset, we use the number of agencies in each municipality.

- Credit Information System (SCR): this dataset records detailed information on credit relationships between individuals and Brazilian banks. The data is transmitted monthly from financial institutions to the Central Bank of Brazil and covers all credit relationships of individuals that have a total exposure with a financial institution above a given reporting threshold[14]. This dataset is a confidential one at the individual level, and we already have a co-author at the BCB to access this information. The data contains detailed information on each transaction, including the type of debt, name of the lender, outstanding balance, interest rate, and maturity. For this project's scope, we focus on credit (and debit, in another database) card consumption as a proxy for consumption. This dataset uniquely identifies the borrower in each credit relationship using fiscal code. This allows us to match credit relationships of each borrower with data on individual characteristics from the Annual Social Information System (RAIS) and Unique Registry for Social Programs (Cadastro Único), in case this project evolves to analyzing individuals instead of municipalities.

- Annual Social Information System (RAIS): This is a formal labor market dataset, and it is available publicly (without worker or firm identifiers).

[14]The reporting threshold has changed over time: 5,000 BRL in the period between January 2003 and December 2011, 1,000 BRL in the period between January 2011 and May 2016, 200 BRL in the period starting in June 2016.

We will drop firms that are not operating or have zero registered employees and workers that have wages equal to zero. For this project's scope, and since the credit registry has limited information on income, we use RAIS to extract information on individual annual labor income, labor condition, and education.

- Unique Registry for Social Programs (Cadastro Único): This is Federal Government's instrument that identifies and characterizes low-income families, allowing the government to understand this population's socioeconomic reality better. It contains information such as the residence characteristics, identification of each person, education, work situation, and income, among others. Since 2003, the Cadastro Único has become the main instrument of the Brazilian State for the selection and inclusion of low-income families in federal programs, being mandatorily used to grant the benefits of the Bolsa Família Program, of the Social Electricity Tariff, of the Programa Minha Casa Minha Vida, from Bolsa Verde, among others.

- IBGE: Municipality level output and population are available at IBGE's Sidra system.

A.2 Sample

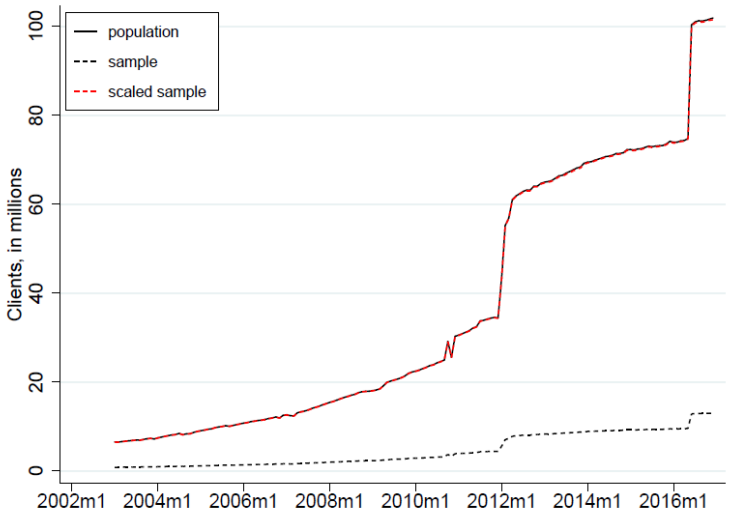

Figure A1: Number of Individuals in Credit Information System (SCR)

Note: Data from SCR-BCB. The sample series shows total number of individuals clients by month in the 12.8% random sample of individuals extracted from SCR. The scaled sample series is obtained by multiplying total clients by month in the extracted sample by 117/15. Garber et al. (2019)