BANCO CENTRAL DE RESERVA DEL PERÚ

Lending Rate Caps and Credit Reallocation

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DT. N°. 2022-012
Serie de Documentos de Trabajo
Working Paper series
Diciembre 2022

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November 24, 2022

Abstract

We estimate the effects of lending rate caps by studying a regulation that prohibited interest rates above 83.4% in Peru, affecting 27% of loans to small firms. We find that this policy generated substantial credit reallocation with implications for financial stability. At the loan-level, banks reduce small-size loans and expand medium-size credit, favoring incumbent firms at the expense of new borrowers. At the city level, we define treatment as the percent decline in interest payments necessary to bring interest rates down to the lending rate cap in the pre-reform period. Using a difference-in-differences approach, we estimate that one standard deviation higher treatment leads to a 5 percentage points decline in interest rates with null effects on credit because banks reallocate loans away from risky borrowers towards safer clients in highly concentrated bank credit markets. The decline in interest payments and the reallocation of credit cause a reduction in the share of non-performing loans, suggesting a minor role for risk-taking incentives associated with the deterioration of banks charter value when interest rates are regulated.

*We are extremely grateful to Adrien Matray and Eduardo Morales for continued guidance and support, and Atif Mian, Richard Rogerson, Nobuhiro Kiyotaki, and seminar participants at Princeton, the XL Economist Meeting at the Central Bank of Peru, the Vietnam Symposium in Banking and Finance, and the LACEA-LAMES annual meeting for helpful discussions and comments. The views expressed herein are those of the authors and do not necessarily reflect those of the Central Bank of Peru.

1 Introduction

Many small firms in emerging markets borrow at high interest rates that cannot be explained by default risk. As a result, the regulation of interest rates is often floated in the political debate. Indeed, most developing countries have introduced or strengthened price regulations in bank credit markets over the last decade (Ferrari et al. (2018)). Besides the response of credit, a key concern among policy makers is that such policies might increase the vulnerability of the financial sector by deteriorating bank charter value. In this paper, we estimate the effects of lending rate caps on credit and financial stability in Peru, where this regulation was introduced in 2021.

The effects of lending rate caps on credit are a priori unclear. They can increase credit supply by restraining bank market power, or reduce it by excluding risky borrowers from bank credit markets. Developing economies are characterized by highly concentrated banking sectors and strong informational frictions such that both, bank market power and firm risk, play an important role in credit markets. Thus, whether lending rate caps can reduce credit or not is an empirical question. The response of financial stability is also theoretically ambiguous. Lending rate caps can reduce bank risk-taking incentives by limiting the ability of banks to properly price risk through interest rates. However, the decline in banks charter value associated with the regulation of interest rates can actually increase risk-taking incentives.

To understand how lending rate caps affect credit and financial stability, we study a large reform implemented by the Central Bank of Peru that prohibited annualized interest rates above 83.4%. This policy was introduced in July 2021 and affected 27% of loans to small firms and 6% of the value of these loans. Moreover, if we bring interest rates on every loan granted in the pre-reform period down to the lending rate cap, the annualized interest payments faced by small firms would have declined by 10%.

We combine two datasets provided by the Central Bank of Peru covering the universe of loans to small firms. The first dataset includes information on new granted loans in a monthly basis over 2022. We observe the value, interest rate, and maturity of every loan granted by all banks established in Peru to every firm. The second dataset includes information of the outstanding debt, also at the bank-firm level, for the period 2019-2022. We observe the balance of loans and the number of days of repayment delay. Both datasets contain information of the city where loans are originated, the industry where firms operate, and a unique bank and client identifier used for bank regulation purposes that allows us to merge both datasets.

The first part of the paper studies the loan-level effects of the policy. We leverage the joint distribution of loan size and interest rates to construct a measure of treatment. We split loans in 40 bins based on loan-size. The top 10 bins were not affected by the policy because all interest rates were below the cap in the pre-reform period. Thus, we define loans in the bottom 30 bins as treated and those in the top 10 bins as part of the control group. We find a persistent decline in interest rates of 15 percentage points and a short-term contraction in the number and value of treated loans which disappears by the end of our sample period. We then split the treated group into small-size loans (highly treated) and medium-size loans. We find a persistent decline in small-size credit which is totally offset by an expansion in medium-size loans by the end of 2021. Our findings indicate that lending rate caps can effectively reduce interest rates with substantial reallocation effects on credit, and focusing solely on average effects might be misleading. The persistent contraction of small-size loans highlights the trade-off between borrower protection and credit access.

We then aggregate our data at the firm level and explore the implications of credit reallocation on incumbent firms. First, we document that the reallocation of credit is also present among these firms. However, they do not experience any short-term reduction in credit, which indicates that the whole lending reduction is accounted for by new clients. Second, we rank incumbent firms according to the interest rate at which they borrowers before the reform. We find that firms borrowing at interest rates above the lending rate cap experience an expansion in credit. Moreover, firms borrowing right below the cap also receive more credit and pay lower interest rates. Our findings indicate that lending rate caps can generate substantial reallocation effects on credit. Banks move away from small-size loans towards medium-size credit, favoring incumbent firms at the expense of new borrowers.

The second part of the paper explores the city level effects of lending rate caps. We use a difference-in-differences strategy that leverages variation in the exposure to the reform across cities. Our benchmark definition of treatment is equal to the city-level percent decline in interest payments necessary to bring interest rates of every loan granted in the pre-reform period down to the lending rate cap. We quantify the effects of the policy by comparing multiple outcomes in more treated cities relative to less treated cities before and after the reform. Our identification exploits variation in the distribution of interest rates across cities and requires that, absent the reform, more and less treated locations should follow similar trends, i.e. treatment should have null effects in the absence of the reform.

We provide evidence supporting our identifying assumption in three ways. First, we provide clean event-study graphs showing that treatment has null effects before the reform. Second, even though our identification does not require cities to be similar in *levels*, we include high dimensionality fixed effects in our benchmark specification to control for various unobserved time-varying shocks at the region and city-size level. Third, we perform placebo tests estimating the response of large firms, a segment of the credit market that was not affected by the policy.

We estimate that lending rate caps were effective in reducing interest rates without affecting the balance of loans to small firms. One standard deviation higher treatment is associated with a 5 percentage points decline in the weighted average interest rate of new loans after the reform. Despite this substantial reduction in interest rates, the response of total loans is statistically insignificant, consistent with the credit reallocation discussed above. Our city-level analysis allows us to explore alternative dimensions of *general equilibrium effects* taking place at the local level. In particular, we test the role of firm risk and bank market power. We define risky firms as those experiencing more than 30 days of repayment delay at least once in 2020. Otherwise, firms with active loans in 2020 are classified as safe firms. Firms receiving a loan for the first time in 2021 are classified as new firms. We find that the null response of total loans hides an important reallocation of credit across borrowers. Risky firms experience a 0.6% decline in total loans in cities with one standard deviation higher treatment. This effect is offset by an expansion of 1.6% in credit to new borrowers. The ability of banks to reallocate credit away from risky borrowers towards safer clients determines the null effect of the policy on the balance of loans.

We explore the role of bank market power leveraging variation in the degree of concentration of local credit markets. We compute the Herfindahl Hirschman Index (HHI) of the banking sector at the city-level. Then, we split cities in two groups, each of them accounting for one half of the population. We find that the reallocation of credit takes place in cities with high levels of concentration. One standard deviation higher treatment leads to a 0.8% contraction in credit to risky borrowers and a 1.9% increase in loans to new clients. These effects are small and statistically insignificant in less concentrated cities. Our results suggest that bank market power plays a crucial role in shaping the reallocation of credit. We interpret this finding as evidence of banks providing credit to safe and risky borrowers in segmented markets. Once lending rate caps are introduced, banks can not longer attend some of the risky borrowers, and then reallocate funds towards marginal safe borrowers that were not previously attended because banks preferred to exert market power in this segment absent the regulation.

In the third part of the paper, we study the implications of credit reallocation for financial stability. We estimate the response of non-performing loans, defined as the balance of credit with more than 30 days of repayment delay. We find that one standard deviation higher treatment is associated with a 5.5% decline in non-performing loans, which is offset by an increase of 1.7% in the balance of normal loans with less than 30 days of repayment delay. These effects generate a contraction of 0.9 percentage points in the share of non-performing loans, which represents 8% of the pre-policy average share across cities. Our results indicate that the reduction in interest payments and the reallocation of credit strengthen financial stability, suggesting that the risk-taking channel associated with a reduction of banks charter value when interest rates are regulated plays a minor role in our setting.

Overall, our paper shows that lending rate caps can reduce interest rates without affecting total loans because banks can reallocate credit away from risky firms towards safer clients in highly concentrated markets. The decline in interest payments and the reallocation of credit strengthens financial stability.

Literature Review. Our paper contributes to two main strands of literature. First, we contribute to the literature studying the effects of lending rate caps (Bodenhorn (2007), Temin and Voth (2008), Benmelech and Moskowitz (2010), Zinman (2010), Rigbi (2013), Melzer and Schroeder (2017), Fekrazad (2020), Joaquim and Sandri (2020), Cuesta and Sepúlveda (2021)). Our contribution to this literature is threefold. First, we study the response of small firms in an emerging market. This is an interesting setting because small firms face particularly high interest rates in developing economies, a feature that can not be explained by default rates (Banerjee (2003)), suggesting the presence of capital misallocation which can partially explain under-development. Second, we provide empirical evidence of a novel channel through which bank credit markets adjust after interest rates are regulated, named the reallocation of credit. We find that banks reduce small-size loans but increase the supply of medium-size loans. This leads to a reallocation of credit away from risky borrowers towards safer clients in highly concentrated markets. Third, we study how lending rate caps affect financial stability which is a crucial outcome in the bank regulation debate.

Our paper also relates to the broader literature that studies the effects of price regulations in credit markets (Jambulapati and Stavins (2014), Agarwal et al. (2014), Debbaut et al. (2016), Keys and Wang (2019), Nelson (2022)). We contribute to this literature by studying the effects of lending rate caps, which is a commonly used policy in developing economies. We also relate to the literature that studies regulations in markets with imperfect competition and asymmetric information (Mahoney and Weyl (2017), Einav et al. (2012), Crawford et al. (2018)). Our main contribution is to disentangle the role of firm risk and bank market power.

Second, we contribute to the literature that studies how financial frictions affect economic development. On the empirical side, we contribute to the literature studying how financial policy can promote economic development by alleviating credit constraints (Burgess and Pande (2005), Banerjee and Duflo (2014), Bruhn and Love (2014), Ponticelli and Alencar (2016), Garber et al. (2021), Bau and Matray (2020), Fonseca and Van Doornik (2022), Fonseca and Matray (2022)). We contribute to this literature in three ways. First, we study the effects of lending rate caps, a policy that is widely used in emerging markets. The effect of this policy is a priori ambiguous given the high levels of concentration and informational frictions in bank credit markets of developing economies. Second, we use administrative data to disentangle the role of firm risk and bank market power. Third, we explore the effects on financial stability, which is a key concern when policy makers introduce bank regulations to promote economic growth (Corbae and Levine (2022), Carlson et al. (2022)).

On the theoretical side, most of the literature models financial frictions in the form of collateral constraints (Banerjee and Moll (2010), Buera and Shin (2013), Midrigan and Xu (2014), Moll (2014), Itskhoki and Moll (2019)). Such constraints are motivated by informational frictions in bank credit markets and lead to policy recommendations aimed at helping firms to accumulate capital to ease collateral constraints (Itskhoki and Moll (2019)). However, this literature is silent about price regulations despite of growing evidence that low bank competition might reduce credit access and economic development in emerging markets (Joaquim et al. (2020), Burga and Céspedes (2021)). A salient exception in the theoretical literature is a recent paper by Joaquim and Sandri (2020) studying the role of firm risk and bank market power in shaping economic growth in a calibrated model. Our paper contributes to this literature by documenting that lending rate caps can lead to substantial reductions in interest payments without affecting the total volume of loans, highlighting the role of credit reallocation.

The rest of the paper is organized as follows. Section 2 provides a description of the data and policy. Section 3 presents our empirical approach. Section 4 shows the response of interest rates and credit at the loan level, and section 5 studies the local credit market effects. Section 5 discusses the implications for financial stability and section 6 concludes.

2 Data and Institutional Background

We combine two main administrative datasets covering the universe of loans to small firms. The first one includes information of interest rates on new loans, and the second one contains information of the outstanding bank debt.

2.1 Interest rates

We use loan-level data from the *Reporte de Tasas de Interés* provided by the Central Bank of Peru. This is a monthly panel data including the value, annualized interest rate, and maturity of every loan to small firms granted between March and December 2021 by every bank established in Peru. We also observe the city where loans are originated, the industry where firms operate, and a unique client identifier used for regulation purposes. We use this dataset to construct our measure of treatment and to estimate the response of interest rates.

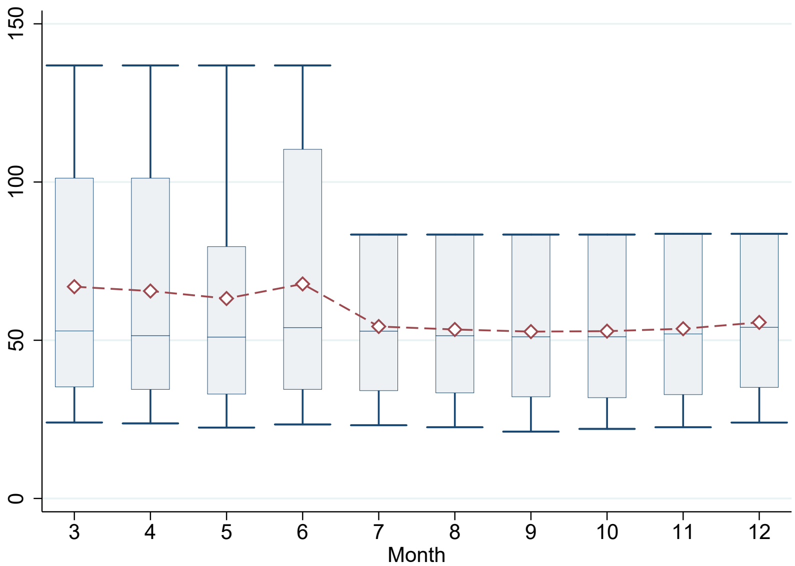
2.2 Balance of loans

We use bank-firm level data from the *Reporte Crediticio Consolidado* provided by the Central Bank of Peru to estimate the effect of lending rate caps on total loans and financial stability. Our dataset includes the outstanding debt that firms have with each bank established in Peru. We observe loans to small and large firms, and we can distinguish loans with more than 30 days of repayment delay.

2.3 Institutional background

Lending rate caps were introduced in Peru in two stages. First, it prohibited interest rates above 83.4% for all consumer loans since May 2021. In the second stage, since July 2021, it also prohibited interest rates above the same cap for small firms. Figure 1 provides information of interest rates for the universe of loans to small firms originated between March and December 2021.

Figure 1: Distribution of Interest Rates



This figure shows the distribution of annualized interest rates in 2021.

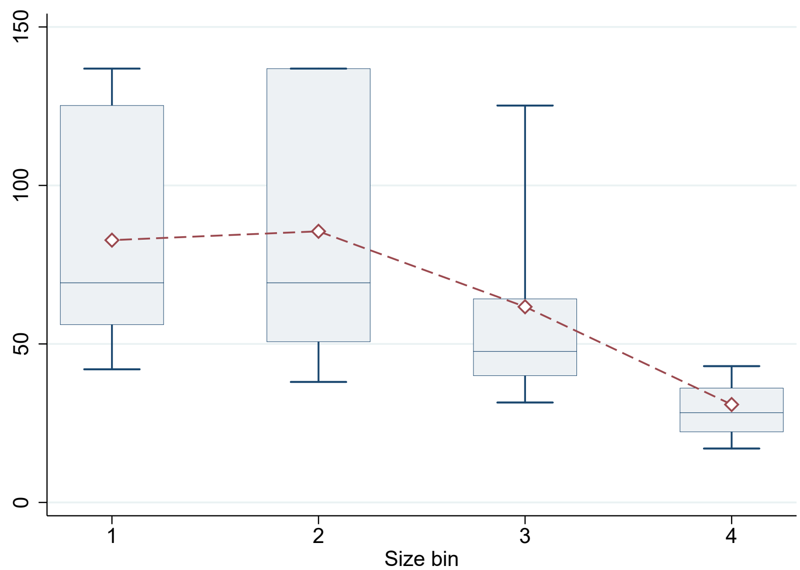
We observe a large dispersion in interest rates before the reform, with 27% of loans showing interest rates above the lending rate cap. These loans represented 6% of the total value of credit granted to small firms in the pre-reform period. The average interest rate declined from 65 to 53%, while the median interest rate was not affected. Moreover, if we bring interest rates of every loan originated in the pre-reform period down to the lending rate cap, the total annualized interest payments would have declined by 10%. We plot the distribution of loan-size and maturity in Figure A1 in the Appendix. The average loan-size exhibits a minor increase from USD 2.8 to 3 thousand. The average maturity is one year and we do not observe any important change after the policy implementation.

3 Empirical approach

3.1 Loan-level analysis

The reform prohibits interest rates above 83.4% for loans granted to small firms since July 2021. We leverage the joint distribution of interest rates and loan size to build a treatment measure at the loan level. Figure 2 plots the distribution of interest rates for different quartiles of the loan-size distribution in the pre-reform period. We can see that the top quartile is not affected by the regulation since every loan was granted below the cap, while all other quartiles are affected to some extent.

Figure 2: Distribution of Interest Rates by Loan-Size Quartile



This figure plots the distribution of annualized interest rates by loan-size quartile in the pre-reform period.

We split loans in 40 bins based on the loan-size distribution in the pre-reform period[1]. We define the control group as those loans in the top 10 bins (top quartile), and the treated group as those in the bottom 30 bins. We estimate the effects of the policy by comparing different outcomes in treated bins relative to control ones before and after the policy. We estimate the following equation:

$$Y_{kt} = \sum_{\substack{\tau=2021m3 \\ \tau\neq 2021m6}}^{2021m12} \beta_\tau \times \text{Treatment}_k \times \mathbb{1}[t=\tau] + \delta_k + \delta_t + u_{kt} \tag{1}$$

Where Y_{kt} is an outcome variable computed at size-bin k and time t, Treatment$_k$ equals one for the first 30 bins, and δ_k and δ_t denote size-bin and fixed effects. Standard errors are clustered at the size-bin level. Our parameter of interest β_τ measures the monthly treatment effect.

[1] We use the whole set of loans granted in the pre-reform period, rank them by size, and split them in 40 bins. Each bin accounts for (approximately) the same number of observations.

3.2 Local credit market analysis

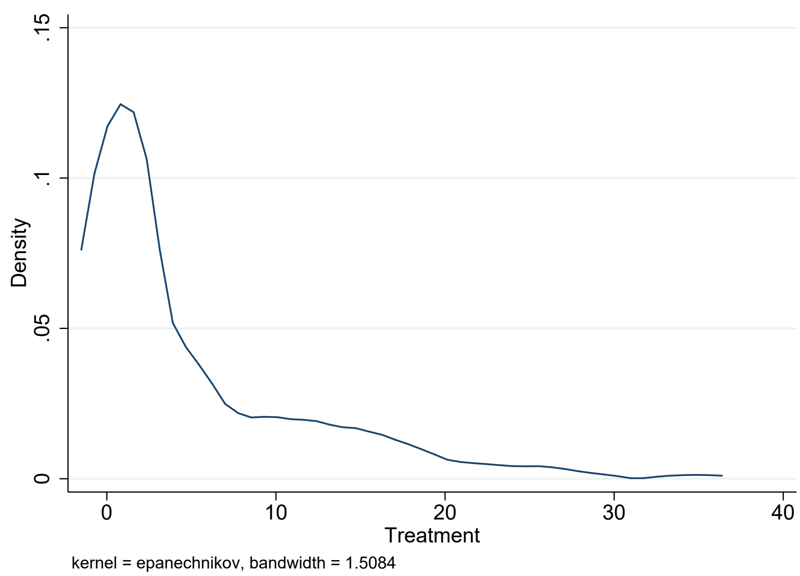
We define a local credit market at the city level and estimate the effects of lending rate caps by comparing the evolution of multiple outcomes in cities that were differently treated by the policy, before and after its implementation, using a difference-in-differences approach. We define treatment in city c and month t as follows[2]:

$$\text{Treatment}_{ct} = \frac{\sum_{i \in c} \ell_{it} \times \max\{r_{it} - \overline{r}, 0\}}{\sum_{i \in c} \ell_{it} \times r_{it}} \times 100 \tag{2}$$

Where ℓ_{it} denotes the value of loans granted to firm i in month t, r_{it} is the interest rate charged on those loans, and $\overline{r}$ is the lending rate cap. This measure captures how binding the policy was in a given city. It indicates the percent decline in interest payments necessary to bring interest rates on all loans granted in city c and month t down to the lending rate cap. We take the average from March to June 2021 to define our city-level treatment:

$$\text{Treatment}_{c} = \frac{1}{4} \sum_{k=2021m3}^{2021m6} \text{Treatment}_{ct} \tag{3}$$

Figure 3: Density Distribution of Treatment across Cities



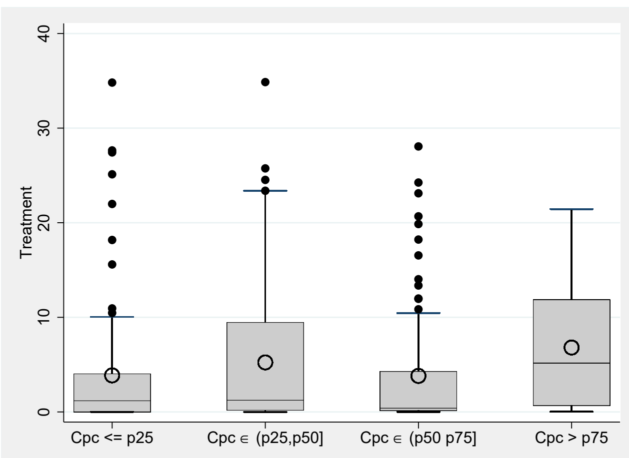
Note: This figure shows the distribution of treatment as defined in equations (2) and (3).

[2]This measure follows the minimum wage literature. See for example Card and Krueger (1994), Draca, Machin, and Van Reenen (2011), and Dustmann et al. (2021)

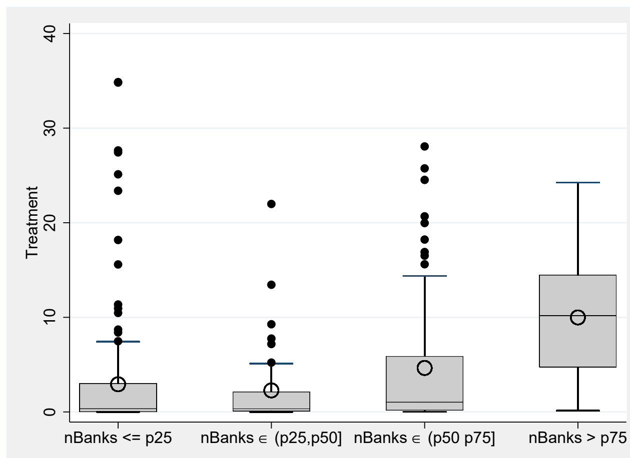
Figure 3 shows the distribution of treatment across cities. The average treatment is 6% and the standard deviation is 7%. The distribution is highly skewed to the right, with half of cities exhibiting treatment below 3% and one quarter of them above 8%.

Our identifying assumption is that absent the policy, more treated cities would have evolved in parallel trends with less treated cities. Our identification does not require cities to be similar in levels. However, a potential concern is that small locations might grow at different rates than large cities. Then, our estimates would be biased if city size is correlated with our treatment measure. Figure 4 shows the distribution of treatment for each quartile of the city size distribution defined by credit percapita and number of banks. This figure shows that large cities are on average more treated, but we have enough variation within quartiles to estimate the effects of lending rate caps by comparing cities of similar size. Our benchmark specification includes time-varying fixed effects for each quartile of the city size distribution.

Figure 4: Distribution of Treatment across Cities by Size



(a) Credit per capita



(b) Number of banks

Note: This figure shows the distribution of treatment as defined in equations (2) and (3) across different quartiles of the city size distribution defined by credit percapita and number of banks in 2019. The circles denote the average value of treatment.

We use a discrete measure of treatment to explore non-linearities in the effects of lending rate caps. We split cities in three groups according to our benchmark treatment, each group accounts for one third of the population. Then, we define cities in the top tercile as strongly treated and cities in the bottom tercile as non-treated. We report summary statistics in Table 1. We have 289 cities in our data. The average city is highly concentrated (average HHI equals .42), has

USD 7 thousand of loans percapita and 8 banks. We have 65 strongly treated locations where the continuum measure of treatment is 17% on average, and 182 non-treated cities where this measure is 2% on average. Strongly treated locations are bigger and less concentrated than non-treated locations.

Table 1: Characteristics of Cities

	All Cities		Strongly Treated		Non-Treated	
	Mean (1)	Median (2)	Mean (3)	Median (4)	Mean (5)	Median (6)
Treatment	6	3	19	17	2	1
HHI	.42	.32	.29	.17	.49	.39
Loans percapita	7	3	12	3	4	3
Num. banks	8	5	13	14	5	3
Distinct cities	289		65		182	

Notes. HHI, loans percapita, and number of banks in 2019. Loans per capita in USD thousand.

We quantify the effects of lending rate caps on financial outcomes by estimating the following difference-in-differences equation:

$$Y_{crt} = \sum_{\substack{k=2021m1 \\ k\neq 2021m6}}^{2021m12} \gamma_K \times \text{Treatment}_c \times \mathbb{1}[t=k] + +\delta_{q(c),t} + \delta_c + \delta_{rt} + u_{ct} \tag{4}$$

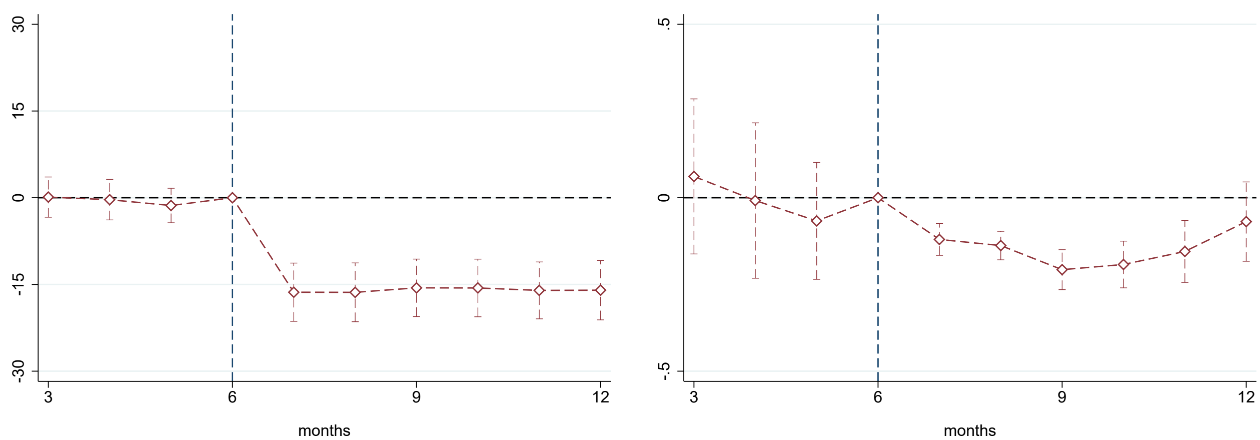
Where Y_{crt} denotes an outcome variable in city c, region r, and time t. $\delta_{q(c)t}$ represents time-varying fixed effects for each quartile of the city size distribution defined by credit percapita and number of banks in 2019. We include city fixed effects δ_c to control for any time-invariant unobserved heterogeneity at the city-level, and time-varying region fixed effects δ_{rt} to control for any shock affecting cities in the same region. Standard errors are clustered at the city level.

The coefficient of interest is γ_k, which captures the monthly effect of being one standard deviation more treated. By including the set of fixed effects described above, we identify this parameter comparing cities within region and city-size bins. We provide evidence supporting our identifying assumption in three ways. First, we provide clean, graphical event studies showing that treatment has null effects before the regulation. Second, we include high-dimensionality time-varying fixed effects to account for multiple shocks at the region and city-size levels. Third, we perform placebo tests using the segment of large firms.

4 Loan Level Effects

We start by estimating the response of interest rates and total loans after the regulation using equation (1). We plot our results in Figure 5. Panel (a) shows a sharp and persistent decline in interest rates, of around 15 percentage points on average, with null effects before the reform which is consistent with our parallel trends assumption. We also find a large reduction of total loans, of around 20% at the peak, as we can observe in Panel (b). We can observe that the reduction in total loans is short-term, and the effect of the policy is not statistically significant by the end of our sample period.

Figure 5: Event Study Graphs for the Loan-Level Average Effect of Lending Rate Caps



(a) Interest rates (b) Total Loans

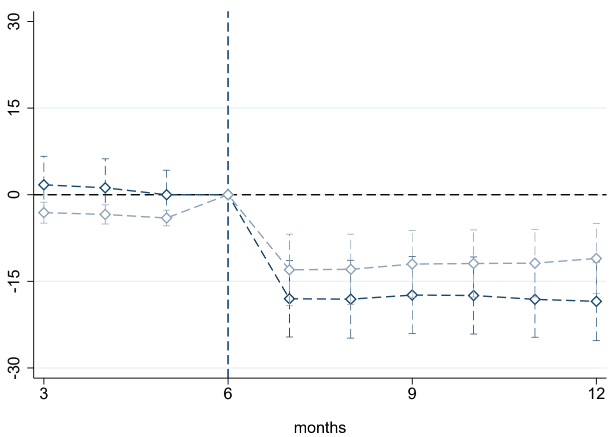
Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans at the loan-level. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

The reduction in total loans is consistent with the trade-off between borrowers protection and access to credit. We further explore this by splitting our treatment group into two blocks. We define the bottom 20 bins as highly treated and the bins 21-30 as the *spillover group*. We then estimate the following specification:

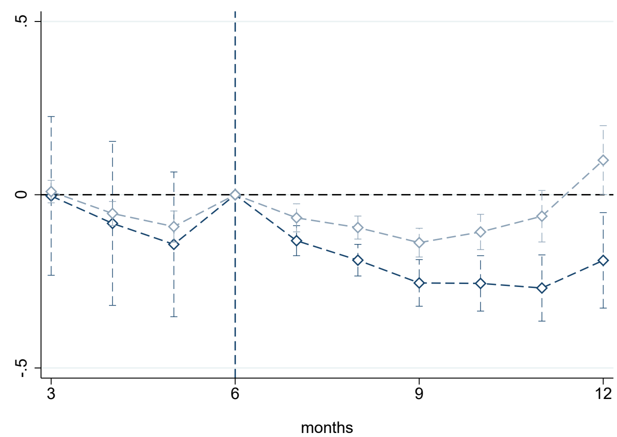
$$Y_{kt} = \sum_{\substack{\tau=2021m3 \\ \tau\neq 2021m6}}^{2021m12} (\alpha_\tau \times \text{Highly Treated}_k + \rho_\tau \times \text{Spillover}_k) \times \mathbb{1}[t=\tau] + \delta_k + \delta_t + u_{kt}$$

We plot our results in Figure 6. The top panel considers all firms. We observe a large and persistent decline in interest rates for the highly treated group (dark-blue line) and the spillover group (white-blue line). We find a large and persistent reduction of loans only in the highly treated group. However, this reduction in credit is totally offset by an expansion of credit in the spillover group. Our findings indicate that lending rate caps effectively reduced interest rates and that the response of credit crucially depends on the loan-size. We show that banks reduce smaller loans by around 20%, but at the same time, they reallocate funds towards medium-size loans which totally offset the reduction of credit by the end of our sample period.

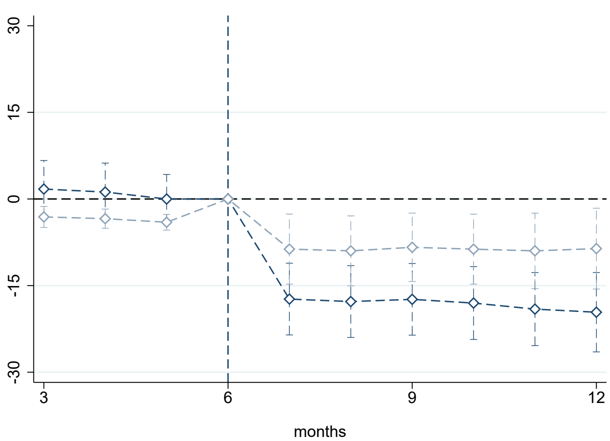
Figure 6: Event Study Graphs for Loan-Level Heterogeneous Effects of Lending Rate Caps



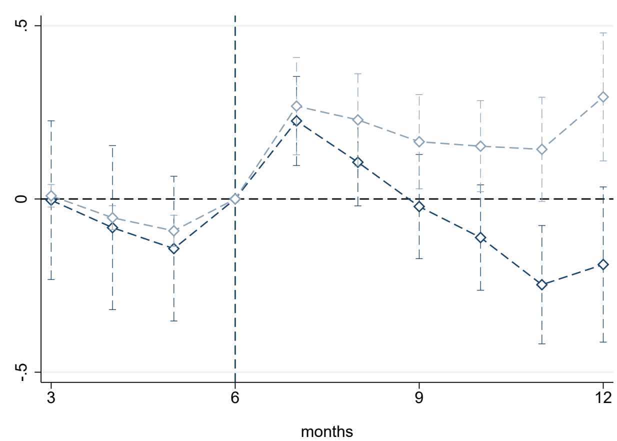
(a) Interest rates - All firms



(b) Total Loans - All firms



(a) Interest rates - Incumbent



(b) Total Loans - Incumbent

Notes. This figure reports the event study graph for the heterogeneous effect of lending rate caps on interest rates and total loans at the loan-level for all firms and incumbent borrowers. The dark-blue line refers to the response of highly treated loans and the white-blue line refers to the spillover group. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

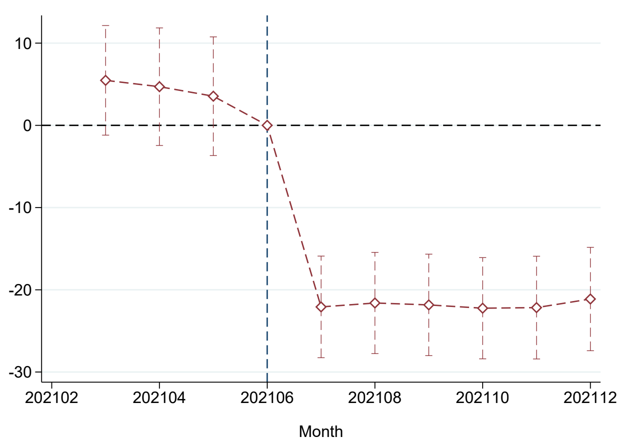
The bottom panel considers only incumbent firms. We also find a decline in interest rates for both types of loans and a reallocation of credit from small-size towards medium-size loans. However, we find an expansion of credit on impact which indicates that banks also reallocate credit across clients in the short-run, reducing credit to new borrowers and increasing loans to incumbent firms. The number of loans follows the same pattern.

We finally ask how these effects aggregate up to the firm level. We rank firms based on the interest rate at which they borrow before the reform. We then split firms in 40 bins, 20 of equal size for firms borrowing at interest rates below 40%, and 20 bins for the rest.[3] Then we aggregate our data at the bin level and estimate the following specification:

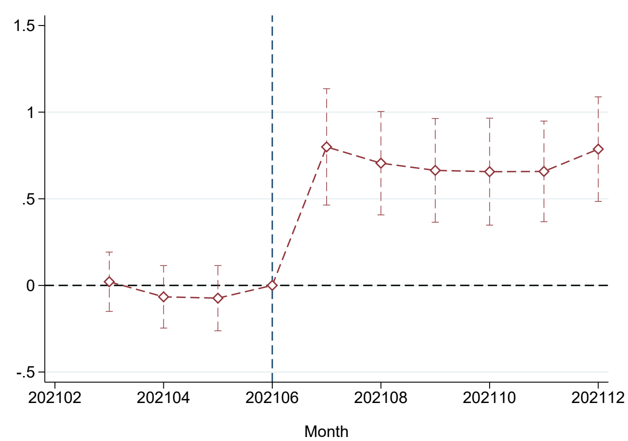
$$Y_{kt} = \sum_{\substack{\tau=2021m3 \\ \tau\neq 2021m6}}^{2021m12} \left(\gamma_\tau \times \mathbb{1}_{\{k\,:\,i_0(k)>40\%\}}\right) \times \mathbb{1}[t=\tau] + \delta_k + \delta_t + u_{kt}$$

Notice that this estimation considers only incumbent firms, thus, our results do not consider the response of new borrowers.

Figure 7: Event Study Graphs for the Firm-Level Effects of Lending Rate Caps



(a) Interest rates



(b) Total Loans

Notes. This figure reports the event study graph for the effect of lending rate caps on interest rates and total loans for incumbent firms. The dark-blue line refers to the response of highly treated loans and the white-blue line refers to the spillover group. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

[3]We use this threshold instead of the lending rate cap motivated by the spillover effects of this policy across loans of different size. In unpublished results we show that spillover effects also take place at the firm-level as firms borrowing between 40 and 83.4% receive more credit after the reform.

Our results are reported in Figure 7. We find a large decline of interest rates of around 20 percentage points after the reform. Despite this substantial reduction in interest payments, incumbent firms also experience a 75% expansion of credit, mainly among firms borrowing below the lending rate cap, which indicates that spillover effects play a crucial role in our setting.

Our results indicate that lending rate caps can generate substantial reallocation effects both at the loan- and firm-level. Banks reallocate credit away from small-size towards medium-size loans. Incumbent firms obtain more credit at the expense of new borrowers, mainly in the short-run. In the next section, we explore the local credit market implications of this credit reallocation and the role of firm risk and bank market power in shaping the effects of lending rate caps.

5 Local Credit Market Effects

We start by estimating how interest rates and credit changed following the implementation of lending rate caps. Table 2 reports our results. Columns 1 to 3 show the response of the weighted average interest rate on loans to small firms and columns 4 to 6 report the response of the balance of loans to small firms. In our benchmark specification reported in column 3, interest rates decline by 5.3 percentage points on average in cities with one standard deviation higher treatment after the implementation of lending rate caps. Our results are robust to excluding fixed effects as we report in columns 1 and 2. Despite the large decline in interest rates, column 6 reports null effects on the balance of loans.

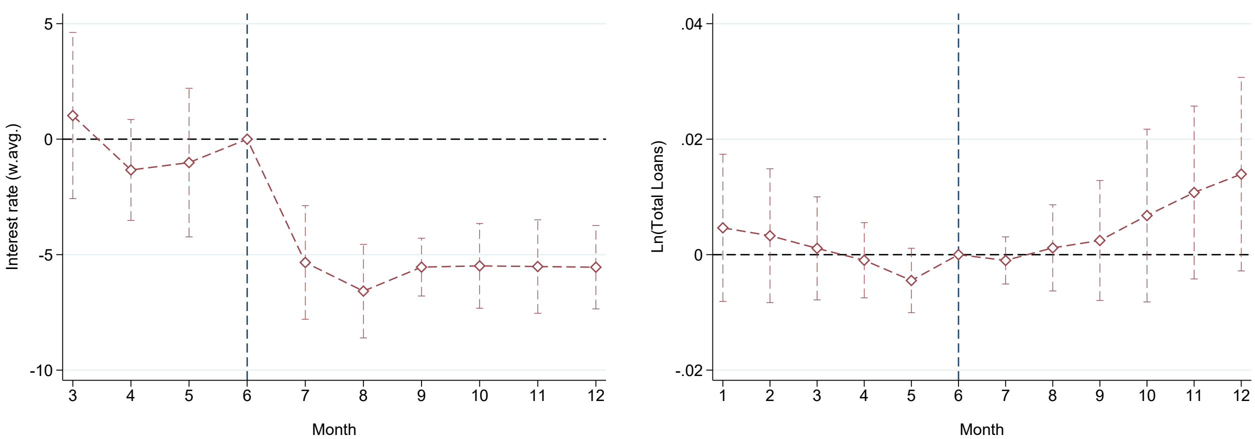
Figure 8 plots the event study graphs for the response of interest rates and outstanding debt. We show the estimated monthly treatment effect before and after the policy implementation, including the same fixed effects used in our benchmark specification. We normalize the month before the policy was implemented to zero. The plots show null effects of being treated before the policy, which is consistent with our identifying assumption. Interest rates on new loans experience a significant and persistent decline after June 2021. We observe that the balance of loans to small firms increases steadily over time after the reform, although the point estimates are not statistically significant. Figure A3 in the Appendix plots event-study graphs for the other specifications reported in Table 2 showing similar patterns.

Table 2: Average Effect of Lending Rate Caps on Interest Rates and Loans

	Interest Rates			Total Loans		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Treatment}_c \times \text{Post}_t$	-4.261***	-4.921***	-5.335***	0.003	0.005	0.005
	(0.442)	(0.462)	(0.537)	(0.005)	(0.006)	(0.007)
Fixed Effects						
City	✓	✓	✓	✓	✓	✓
Month	✓	✗	✗	✓	✗	✗
City size-Month	✗	✓	✓	✗	✓	✓
Region-Month	✗	✗	✓	✗	✗	✓
Observations	2,890	2,890	2,880	3,468	3,468	3,456

Notes. Interest rates is a weighted average with weights equal to the share of firms' new loans relative to total new loans in the city. Total loans is the city-level balance of loans in logs. Treatment_c is the standardized percent decline in interest payments necessary to bring all loans originated between March and June 2021 to the lending rate cap. Post_t is an indicator variable equal to one after June 2021. We include a vector of fixed effects for each quartile of the distribution of total loans percapita and number of banks across cities in 2019 interacted with month fixed effects. Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

Figure 8: Event Study Graphs for the Average Effect of Lending Rate Caps



(a) Interest rates (b) Total Loans

Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

We conduct several robustness checks. One potential concern is that the definition of local credit market might be too narrow. We aggregate our data at the province level and estimate equation (4). Our results, reported in Table A1, are qualitatively similar. Interest rates exhibit a significant decline while total loans are not affected by the policy. Figure A4 display the event study graphs with no evidence of pre-trends. Another concern is that our results could be driven by small cities with minor implications for the aggregate economy. We weight our regressions using the level of population according to the 2017 Peruvian Census. Our results are reported in Table A2 and Figure A5. We observe a reduction in interest rates with null effects on total loans and no evidence of pre-trends. Our results are also robust to excluding Lima from our analysis as we observe in Table A3 and Figure A6. Finally, we compare cities in the top and bottom terciles of treatment. Our results are shown in Table A4 in the Appendix. Strongly treated cities experience a decline of 12 percentage points in interest rates after the reform, while total loans exhibit a small and insignificant increase of 2%. Figure A7 show a clear lack of pre-trends in both regressions and exhibit a significant increase of 5% in total loans by the end of the sample period.

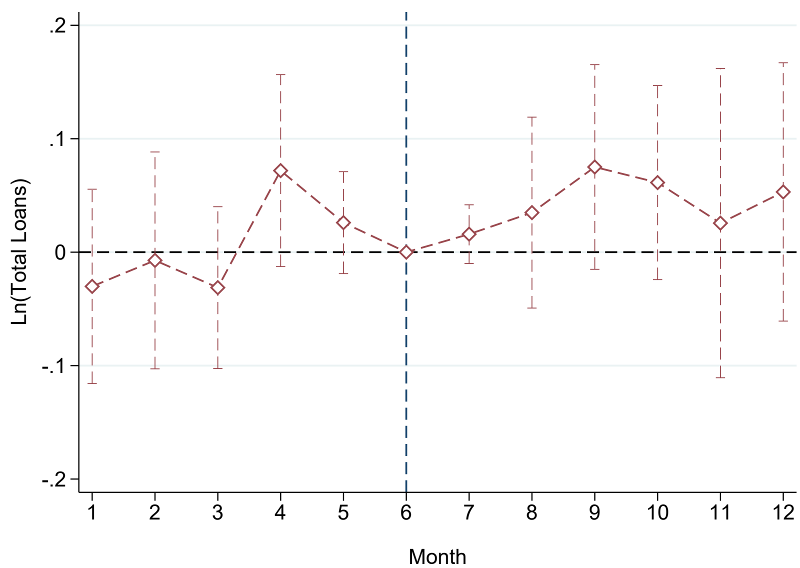
Table 3: Average Effect of Lending Rate Caps on Loans to Large Firms

	Placebo	Small firms	
	Total Loans	Total Loans	Interest rates
	(1)	(2)	(3)
$\text{Treatment}_c \times \text{Post}_t$	0.038	0.010*	-3.875***
	(0.045)	(0.006)	(0.778)
Fixed Effects			
City	✓	✓	✓
City size-Month	✓	✓	✓
Region-Month	✓	✓	✓
Observations	925	996	830

Notes. Interest rates is a weighted average with weights equal to the share of firms' new loans relative to total new loans in the city. Total loans is the city-level balance of loans in logs. Treatment_c is the standardized percent decline in interest payments necessary to bring all loans originated between March and June 2021 to the lending rate cap. Post_t is an indicator variable equal to one after June 2021. Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

Finally, we conduct placebo tests using the outstanding debt of large firms as our dependent variable. We report our results in Column 1 of Table 3. The balance of loans to large firms is not affected by our treatment. Figure 9 shows the monthly treatment effects where we can notice that, different from small firms, credit to large firms does not show any increase after the regulation. Notice that loans to large firms are granted in a fewer number of cities. Columns 2 and 3 of Table 3 show the response of interest rates and total loans in the segment of small firms considering cities where banks also provide credit to large firms. Our results are qualitatively similar as those reported in Table 2. Overall, our results show that the policy was effective in reducing interest rates without affecting total credit. The next subsections explore the role of firm risk and bank market power

Figure 9: Event Study Graphs for the Average Effect of Lending Rate Caps on Large Firms

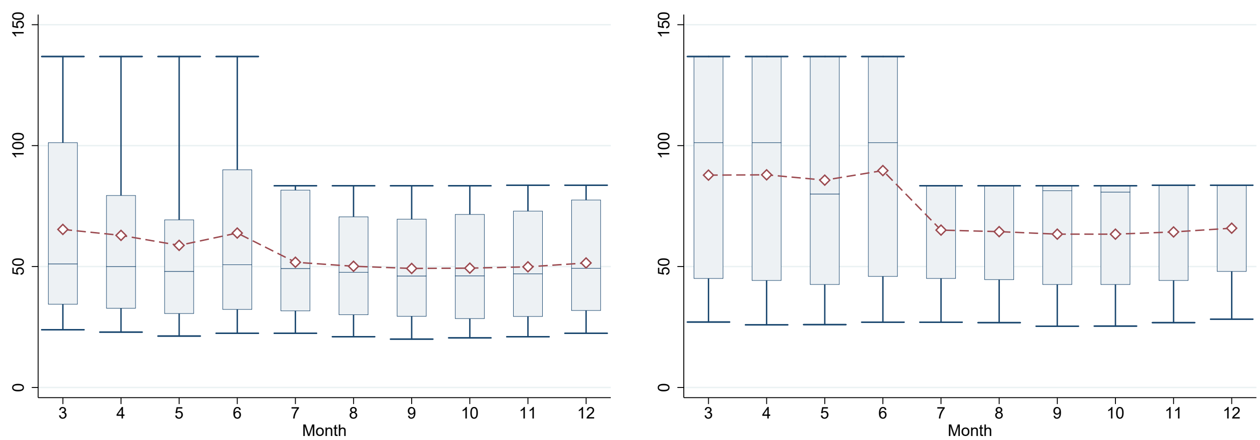


Notes. This figure reports the event study graph for the average effect of lending rate caps on total loans to large firms. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

5.1 Risky loans

Lending rate caps might reduce credit by not allowing banks to properly price risky borrowers. We exploit our detailed administrative data to quantify the role of firm risk. For each lending relationship, we observe whether firms have more than 30 days of repayment delay or not by the end of each month. We classify firms as risky if they have experienced more than 30 days of repayment delay at least once in 2020. Otherwise, firms with bank credit lines in 2020 are classified as safe clients. Finally, we consider firms without bank debt in 2020 as new firms. Figure 10 plots the distribution of interest rates of loans granted to existing borrowers, both safe and risky, from March to December 2021. We observe important differences across these two groups. The median interest rate at which risky firms borrow in the pre-reform period is 100%, while the median rate for safe firms is 50%. In the post-reform period the median interest rate for risky borrowers is equal to the lending rate cap, while it remains at 50% for safe borrowers. Figure A2 in the appendix plots the distribution of interest rates on loans to new clients. In the pre-reform period, 52% of loans granted to risky borrowers were above the cap. This share is 25% for safe borrowers and 20% for new clients.

Figure 10: Distribution of Interest Rates among Existing Borrowers



(a) Safe borrowers (b) Risky borrowers

Note: This figure shows the distribution of annualized interest rates in 2021.

We decompose the growth rate of total loans into the contribution of safe, risky, and new borrowers as follows:

$$\frac{\mathrm{L}_{\mathrm{post}} - \mathrm{L}_{\mathrm{pre}}}{\mathrm{L}_{\mathrm{pre}}} = \frac{\mathrm{L}^{\mathrm{Safe}}_{\mathrm{post}} - \mathrm{L}^{\mathrm{Safe}}_{\mathrm{pre}}}{\mathrm{L}_{\mathrm{pre}}} + \frac{\mathrm{L}^{\mathrm{Risky}}_{\mathrm{post}} - \mathrm{L}^{\mathrm{Risky}}_{\mathrm{pre}}}{\mathrm{L}_{\mathrm{pre}}} + \frac{\mathrm{L}^{\mathrm{New}}_{\mathrm{post}} - \mathrm{L}^{\mathrm{New}}_{\mathrm{pre}}}{\mathrm{L}_{\mathrm{pre}}} \tag{5}$$

Where "pre" and "post" denote average values in the first and second semester of 2021, respectively. The three terms in the right hand side represent the contribution of loans to safe, risky, and new borrowers, respectively. We estimate the following regression using each term of equation (5) as a dependent variable.

$$Y_{cr} = \gamma \text{Treatment}_c + \delta_{q(c)} + \delta_r + u_{cr} \tag{6}$$

Where $\delta_{q(c)}$ and δ_r denote city-size quartile and region fixed effects, respectively. City size is measured by credit percapita and number of banks in 2019. This specification is consistent with our difference-in-differences equation (4) and allows us to decompose the response of total loans into the response of each component of equation (5).

Table 4 reports our results. Column 1 shows that total loans exhibit a small and insignificant increase after the reform, consistent with our previous estimation. This effect hides an important reallocation of credit. Loans to risky borrowers experience a significant decline of 0.6% that is offset by an expansion of 1.7% in credit to new borrowers. Our results indicate that lending rate caps can generate substantial reductions in interest rates without affecting total loans because banks can reallocate credit away from risky borrowers towards new clients. We interpret this reallocation as evidence of bank market power, and discuss in more detail this channel in the next subsection.

Table 4: Decomposition of Loans Growth Rate by Type of Borrower

	Total Loans	Existing Borrowers			New Borrowers
		All	Safe	Risky	
	(1)	(2)	(3)	(4)	(5)
Treatment$_c$	0.007	-0.009*	-0.003	-0.006**	0.016***
	(0.007)	(0.005)	(0.003)	(0.003)	(0.005)
Fixed effects					
City size	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓
Observations	289	289	289	289	289

Notes. This table reports the effect of lending rate caps on each component of equation (5). Data are collapsed as an average "pre" (January-June 2021) and "post" (July-December 2021). Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

5.2 Banks market power

We explore the role of bank market power by estimating the effects of lending rate caps in cities with different levels of bank concentration. We rank cities according to the Herfindahl Hirschman Index (HHI) and split them in two groups, each of them accounting for half of the population. We then estimate the following regression for the same outcome variables defined in equation (5):

$$
\begin{aligned}
Y_{cr} = \gamma \text{Treatment}_c + \beta \text{Treatment}_c \times \text{High HHI}_c + \delta_{q(c)} + \delta_r + \\
\delta_{q(c)} \times \text{High HHI}_c + \delta_r \times \text{High HHI}_c + u_{cr}
\end{aligned}
\tag{7}
$$

Table 5 reports our results. We find that the reallocation of credit takes place in highly concentrated locations. One standard deviation higher treatment leads to a 0.8% contraction in credit to risky borrowers and 1.9% increase in loans to new clients in more concentrated cities. The effects are statistically insignificant in less concentrated locations. Our results indicate that bank market power plays a relevant role in shaping the response of total credit as it determines the ability of banks to reallocate of credit towards new small borrowers. We interpret this finding as evidence of banks competing for safe and risky borrowers in two segmented markets. Once lending rate caps are implemented, banks find it less profitable to serve risky borrowers, reallocating funds towards marginal safe borrowers that are not attended because banks prefer to exert market power in this segment absent the regulation.

Table 5: Decomposition of Loans Growth Rate by Type of Borrower and Bank Concentration

	Total Loans	Existing Borrowers			New Borrowers
		All	Safe	Risky	
	(1)	(2)	(3)	(4)	(5)
Treatment_c	-0.001	-0.003	-0.002	-0.001	0.001
	(0.007)	(0.005)	(0.004)	(0.002)	(0.002)
$\text{Treatment}_c \times$ High HHI	0.008	-0.012	-0.004	-0.008*	0.019**
	(0.013)	(0.009)	(0.006)	(0.004)	(0.008)
Fixed effects					
City size	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓
Observations	289	289	289	289	289

Notes. This table reports the effect of lending rate caps on each component of equation (5) in cities that are below and above the median of the HHI distribution. Data are collapsed as an average “pre” (January-June 2021) and “post” (July-December 2021). Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

6 Effects on Financial Stability

Our results indicate that lending rate caps can generate substantial reductions in interest rates without affecting total loans because banks can reallocate credit away from risky borrowers towards new firms. The implications of credit reallocation for financial stability depend on the characteristics of new borrowers. If the deterioration of bank charter value is large enough to increase bank risk-taking incentives, new clients will be riskier, increasing the vulnerability of the financial sector. Otherwise, if new clients are safer, both the reallocation of credit and the reduction of interest payments will strength financial stability.

We quantify the response of financial stability at the local level by estimating equation (4) using non-performing loans (NPL) as the outcome variable[4]. We also estimate the response of normal loans (less than 30 days of repayment delay) and the share of NPL. Table 6 reports the average effects. One standard deviation higher treatment is associated with a 5.5% decline in NPL, while normal loans increase by 1.7%. As a result, the share of NPL declines by 0.9 percentage points.

Table 6: Average Effect of Lending Rate Caps on Financial Stability

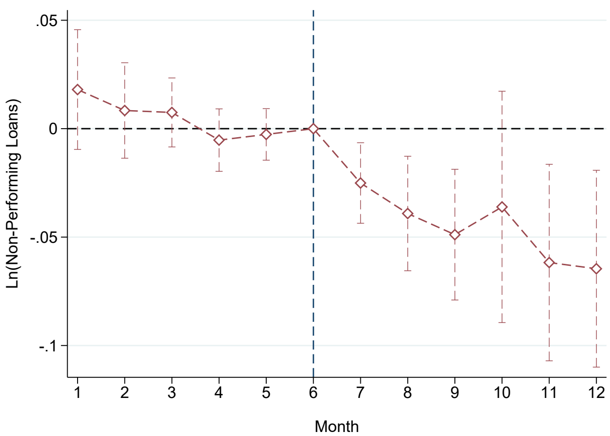
	NPL (1)	Normal Loans (2)	Share of NPL (3)
$\text{Treatment}_c \times \text{Post}_t$	-0.050*** (0.015)	0.017** (0.008)	-0.934*** (0.288)
Fixed effects			
City	✓	✓	✓
City size-Month	✓	✓	✓
Region-Month	✓	✓	✓
Observations	3,455	3,456	3,456

Notes. Normal loans is the balance of loans with no delays in repayment, NPL is the balance of loans with more than 30 days of delay in repayment, and the share of NPL is the ratio of NPL to total loans (normal loans + NPL). Treatment_c is the standardized percent decline in interest payments necessary to bring all loans originated between March and June 2021 to the lending rate cap. Post_t is an indicator variable equal to one after June 2021. We include a vector of fixed effects for each quartile of the distribution of total loans percapita and number of banks across cities in 2019, interacted with month fixed effects. Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

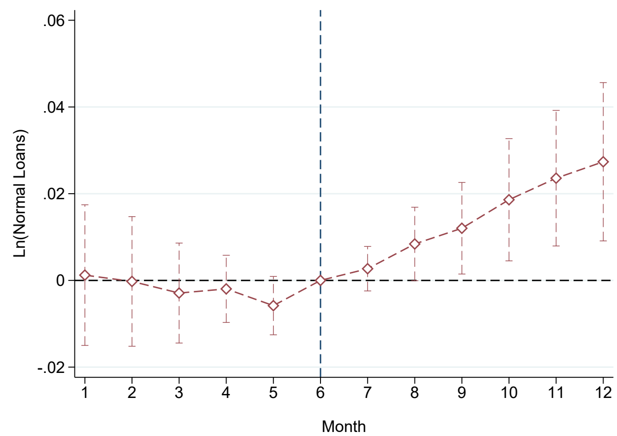
[4]Non-performing loans have more than 30 days of repayment delay

Figure 11 shows the evolution of these variables before and after the policy implementation. None of these variables exhibit pre-trends. The response of financial stability is meaningful, one standard deviation higher treatment leads to a 1 percentage point decline in the share of NPL by December 2021, which represents 8% of the pre-policy average share across cities. Our results indicate that lending rate caps strengthen financial stability in our setting, suggesting a minor role for increasing bank risk-raking incentives associated with the deterioration of banks charter value when interest rates are regulated.

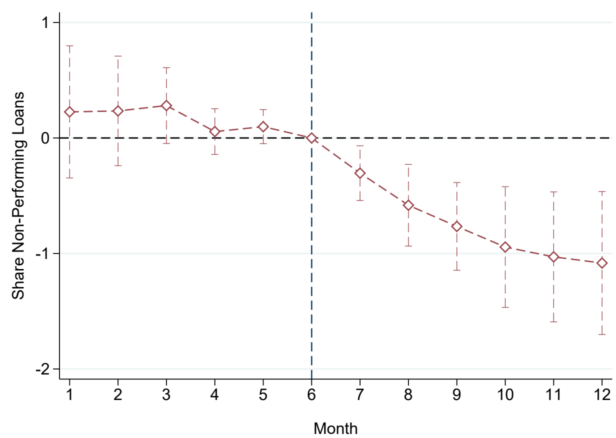
Figure 11: Event Study Graphs for the Average Effect of Lending Rate Caps on Financial Stability



(a) Non-performing loans



(b) Normal loans



(c) Share NPL

Notes. This figure reports event study graphs for the average effect of lending rate caps on normal loans, NPL, and the share of NPL. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

7 Conclusions

Many small firms in developing countries borrow at high interest rates which makes price regulations in bank credit markets to be often floated in the political debate. Indeed, most emerging markets have introduced or strengthen existing regulations on interest rates in the past decade. However, there is little evidence on the effects of these policies on small firms in developing economies.

In this paper we quantify the effects of lending rate caps on credit and financial stability. We study a policy introduced by the Central Bank of Peru in 2021 that prohibited interest rates above 83.4%. We provide empirical evidence that lending rate caps can reduce interest rates with substantial reallocation effects on credit. We find that banks reduce small-size loans and expand medium-size credit, favoring incumbent borrowers at the expense of new small clients. Moreover, banks substitute credit away from risky borrowers towards safer clients in cities with high levels of bank concentration. The reduction in interest payments and the reallocation of credit strengthen financial stability, suggesting a minor role for risk-taking incentives associated with the deterioration of banks charter value when interest rates are regulated.

In ongoing work, we are exploiting our detailed administrative data to study potential heterogeneous patterns across industries and banks. We also expect to combine our credit registry data with tax reports to estimate the real effects of lending rate caps. Finally, we intend to build a model where banks compete over safe and risky borrowers in segmented markets such that lending rate caps can generate a reallocation of credit as documented in this paper. The model will be useful to discuss optimal policy.

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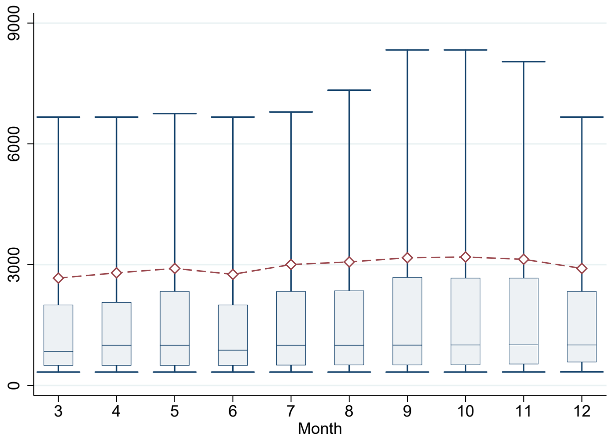
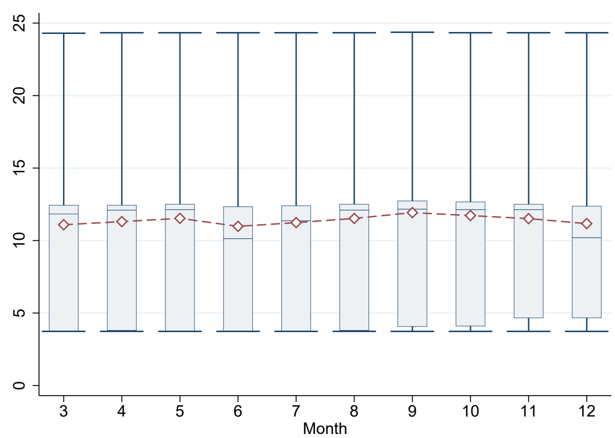
Appendix

Figure A1: Distribution of Loan-size and Maturity



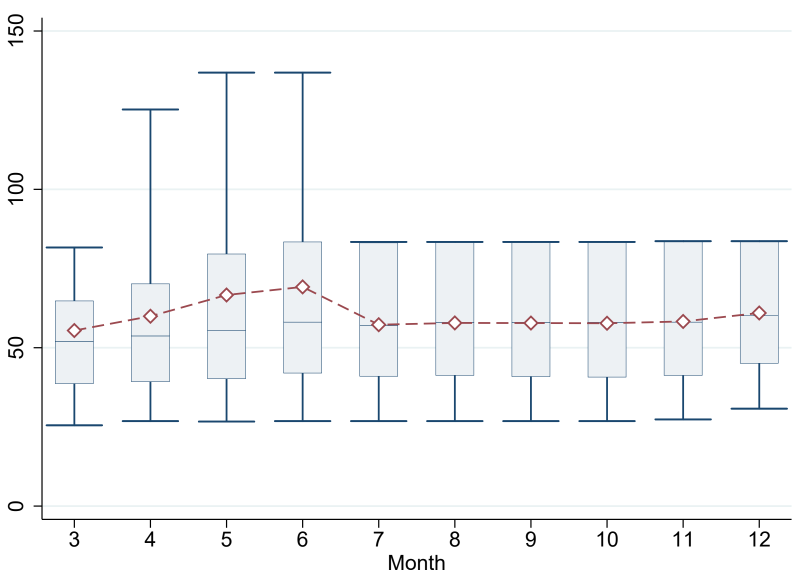
(a) Loan-size



(b) Maturity

Note: This figure shows the distribution of loan-size and maturity in months in 2021.

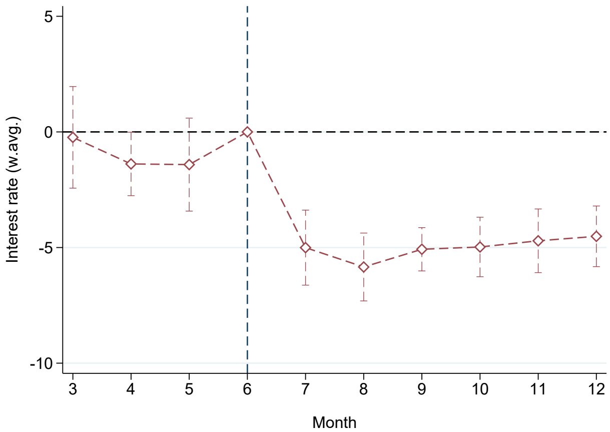
Figure A2: Distribution of Interest Rates on Loans to New Borrowers

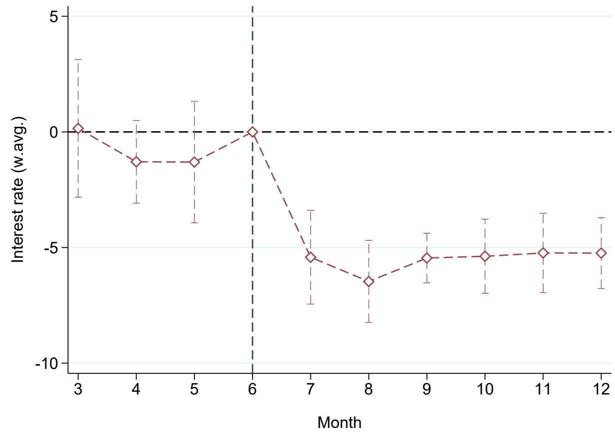


Note: This figure shows the distribution of annualized interest rates in 2021.

Different set of fixed effects

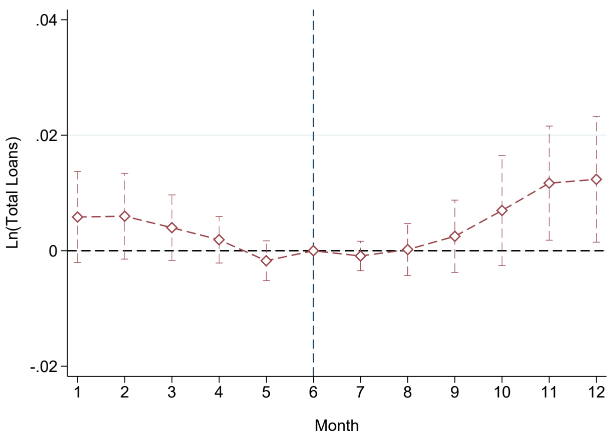
Figure A3: Event Study Graphs for the Average Effect of Lending Rate Caps on Interest Rates and Loans with Different Fixed Effects

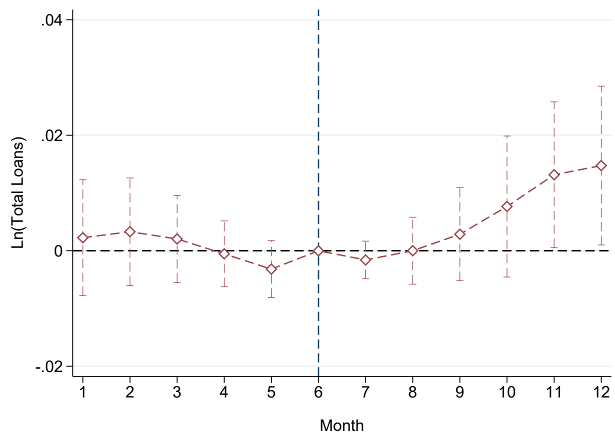




(a) Interest rates (City and Year FE)

(b) Interest rates (City and City size-Year FE)





(a) Total Loans (City and Year FE)

(b) Total Loans (City and City size-Year FE)

Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

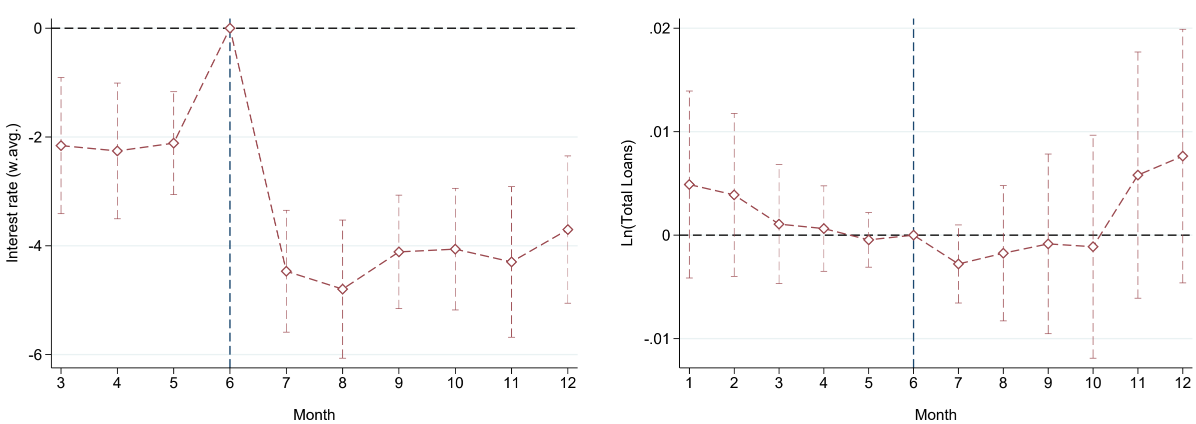
Province-level results

Table A1: Average Effect of Lending Rate Caps on Interest Rates and Loans

	Interest Rates (1)	Total Loans (2)
Treated$_c$ × Post$_t$	-2.608***	-0.001
	(0.292)	(0.005)
Fixed Effects		
Province	✓	✓
Month	✓	✓
Province size-Month	✓	✓
Region-Month	✓	✓
Observations	1,530	1,836

Notes. Interest rates is a weighted average with weights equal to the share of firms' new loans relative to total new loans in the province. Total loans is the province-level balance of loans in logs. Treatment$_p$ is the standardized percent decline in interest payments necessary to bring all loans issued between March and June 2021 to the lending rate cap. Post$_t$ is an indicator variable equal to one after June 2021. We include a vector of fixed effects for each quartile of the distribution of total loans percapita and number of banks across provinces in 2019 interacted with month fixed effects. Standard errors are clustered at the province level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

Figure A4: Event Study Graphs for the Average Effect of Lending Rate Caps on Interest Rates and Loans



(a) Interest rates

(b) Total Loans

Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans at the province level. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

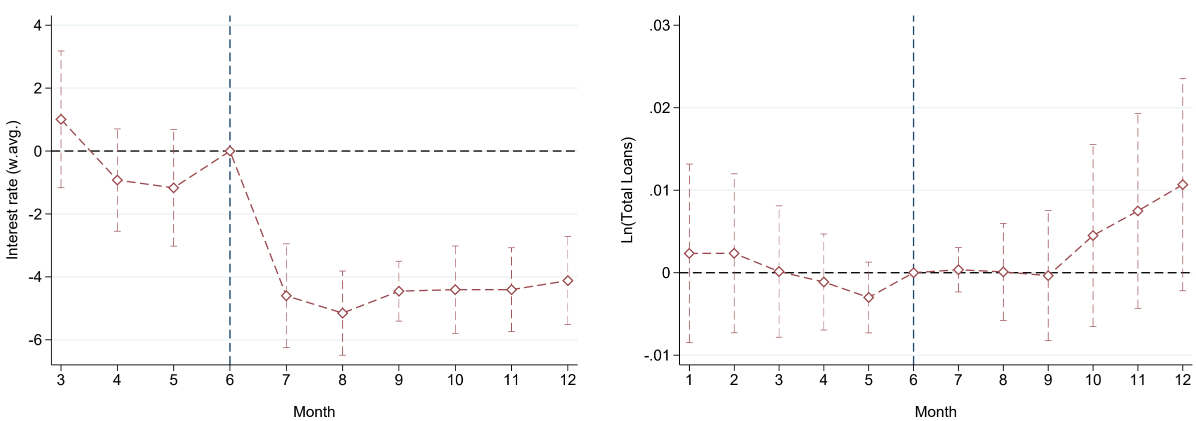
Weighted regressions

Table A2: Average Effect of Lending Rate Caps on Interest Rates and Loans

	Interest Rates	Total Loans
	(1)	(2)
Strongly Treated$_c$ × Post$_t$	-4.251***	0.004
	(0.404)	(0.006)
Fixed Effects		
City	✓	✓
Month	✓	✓
City size-Month	✓	✓
Region-Month	✓	✓
Observations	3,508	4,212

Notes. Interest rates is a weighted average with weights equal to the share of firms' new loans relative to total new loans in the city. Total loans is the city-level balance of loans in logs. Treatment$_c$ is the standardized percent decline in interest payments necessary to bring all loans issued between March and June 2021 to the lending rate cap. Post$_t$ is an indicator variable equal to one after June 2021. We include a vector of fixed effects for each quartile of the distribution of total loans percapita and number of banks across cities in 2019 interacted with month fixed effects. Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

Figure A5: Event Study Graphs for the Average Effect of Lending Rate Caps on Interest Rates and Loans



(a) Interest rates

(b) Total Loans

Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans at the city level. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

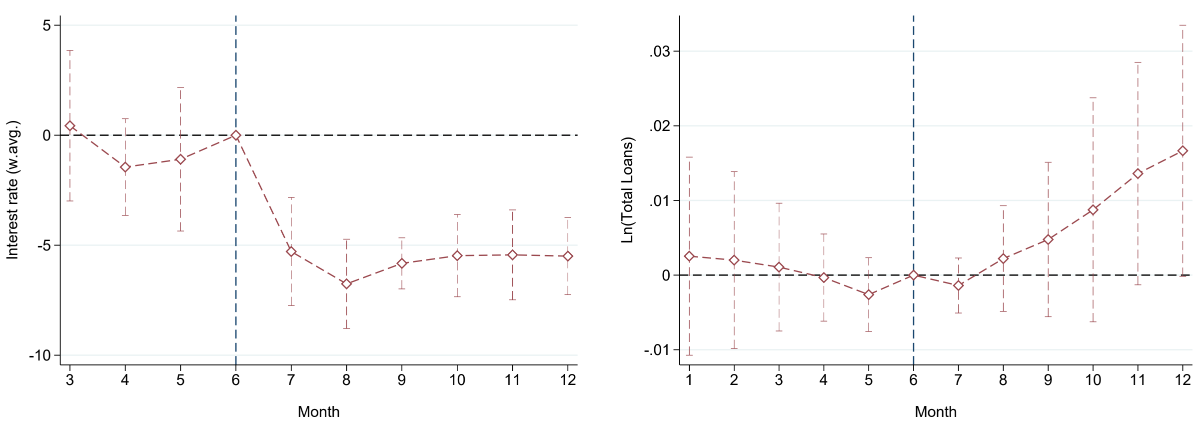
Excluding Lima

Table A3: Average Effect of Lending Rate Caps on Interest Rates and Loans

	Interest Rates (1)	Total Loans (2)
Strongly Treated$_c$ × Post$_t$	-5.185*** (0.546)	0.007 (0.008)
Fixed Effects		
City	✓	✓
Month	✓	✓
City size-Month	✓	✓
Region-Month	✓	✓
Observations	2,998	3,600

Notes. Interest rates is a weighted average with weights equal to the share of firms' new loans relative to total new loans in the city. Total loans is the city-level balance of loans in logs. Treatment$_c$ is the standardized percent decline in interest payments necessary to bring all loans issued between March and June 2021 to the lending rate cap. Post$_t$ is an indicator variable equal to one after June 2021. We include a vector of fixed effects for each quartile of the distribution of total loans percapita and number of banks across cities in 2019 interacted with month fixed effects. Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

Figure A6: Event Study Graphs for the Average Effect of Lending Rate Caps on Interest Rates and Loans



(a) Interest rates (b) Total Loans

Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans at the city level. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.

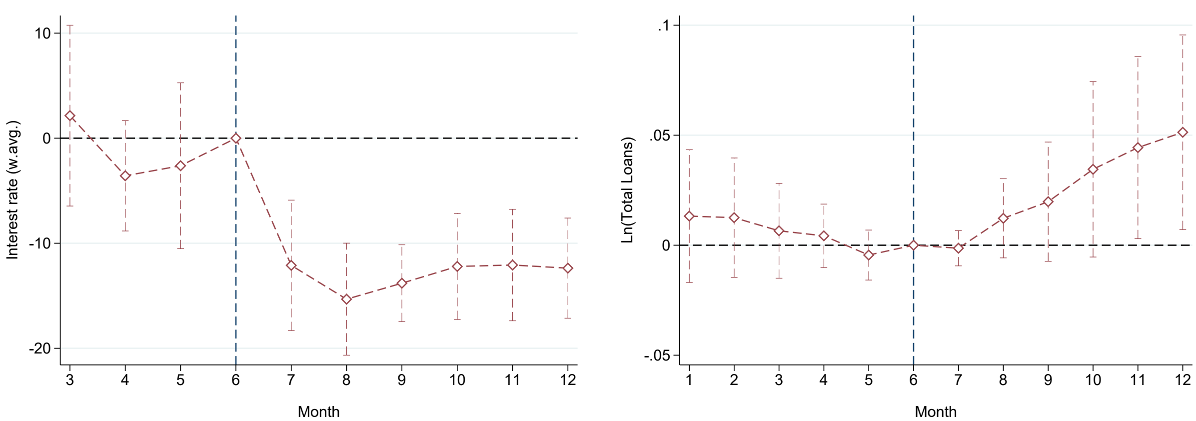
Discrete treatment

Table A4: Average Effect of LRC on Interest Rates and Loans

	Interest Rates (1)	Total Loans (2)
Strongly Treated$_c$ × Post$_t$	-11.967***	0.021
	(1.728)	(0.018)
Fixed Effects		
City	✓	✓
Month	✓	✓
City size-Month	✓	✓
Region-Month	✓	✓
Observations	2,878	3,456

Notes. Interest rates is a weighted average with weights equal to the share of firms' new loans relative to total new loans in the city. Total loans is the city-level balance of loans in logs. Strongly Treated$_c$ equals one for the top tercile (and zero for the bottom tercile) of treatment defined as the percent decline in interest payments necessary to bring all loans issued between March and June 2021 to the lending rate cap. Post$_t$ is an indicator variable equal to one after June 2021. We include a vector of fixed effects for each quartile of the distribution of total loans percapita and number of banks across cities in 2019 interacted with month fixed effects. Standard errors are clustered at the city level. *, **, and *** denote 10, 5, and 1% statistical significance respectively.

Figure A7: Event Study Graphs for the Average Effect of Lending Rate Caps on Interest Rates and Loans



(a) Interest rates (b) Total Loans

Notes. This figure reports the event study graph for the average effect of lending rate caps on interest rates and total loans at the city level. The policy was implemented in June 2021. Each dot is the coefficient on the interaction between being treated and month fixed effects. The confidence interval is at the 95% level.