

Debt Moratorium and Macroeconomics

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Motivation, why is it important?

- **Debt moratorium:** payment suspension of a debt instrument.
- One of the **oldest policy recommendations**, references in Abrahamic religions.
 - *“If it is difficult for someone to repay a debt, postpone it until a time of ease.”* –Qur’an 2:280
- A world of **record-high** debt levels, both public and private
 - Navigating such world record of debt levels is now at the **forefront of macroeconomic debates**.
 - Debt moratorium plays a central role in these discussions.

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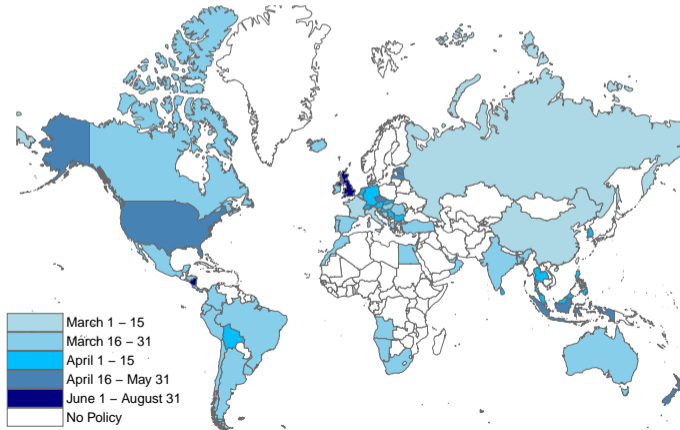
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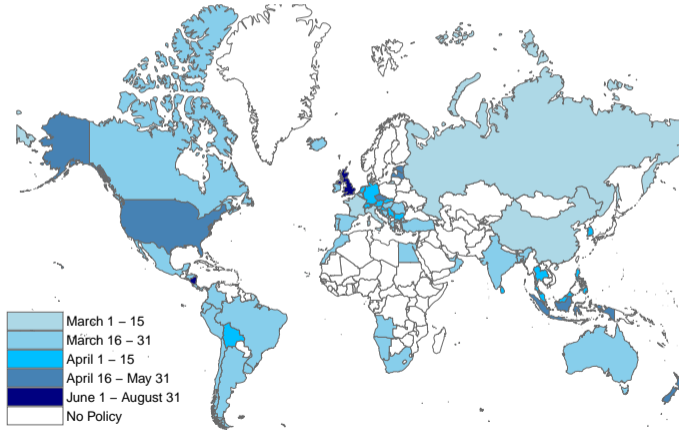
Moratorium policies (Covid-19)

- Moratorium policies **gained prominence** in the wake of the **2020 pandemic**.
- Following the success the policy, **EU banks offer payment holidays** to clients in trouble.



Moratorium policies (Covid-19)

- **DEBT MORATORIA** remains **largely unexplored** in both empirical and theoretical contexts.



TWO MAIN CONTRIBUTIONS:

1. **(Empirical)** Establish the causal link of moratorium on firms.
 - Focus on Colombian moratorium of 2020. Use credit registry data and balance-sheet information firms.
 - Estimate the causal impact of moratoria on new loans and real outcomes.
 - **stressed**: **Regression discontinuity** exploiting eligibility conditions to get moratoria.
 - **non-stressed**: **Difference-in-Difference**.
2. **(Quantitative)** Study the aggregate long-term implications of moratorium policy.
 - General equilibrium default model (Mendoza and Yue, 2012) with **moratorium loans** for firms (Hatchondo et al., 2022).

What we find?

1. Moratoria improve economic conditions for stressed firms.
 - **new loans**: ↑ loan amount (**extensive and margin**), ↓ interest rate, and ↓ default probability.
 - **real outcomes**: ↑ employment, ↑ operating revenues, and ↑ investment.
2. Moratoria mitigates the negative response of the economy caused by liquidity shocks.
 - **Welfare improving**: ↓ number of firms that default, but ↑ default risk (moratoria debt).
 - **Welfare gains increase**: policy combining payment suspension with interest not accruing.

Empirical Strategy

Empirical Strategy

The Colombian Case

Data

- Colombian credit registry from Q1-2018 to Q4-2021.
 - **Quarterly** loan level data.
 - Information on loans (bank-firm pairs): issuance date, outstanding balance, interest rate, maturity, delinquency days, credit rating, collateral.
 - We can identify **corporate loans treated by moratoria** in 2020.
- We employ 50,152 **existent-loans** (i.e. originated by 2019Q4) at the end of 2020:Q1
⇒ 37 private banks & 23,932 stressed firms.
- Match treatment information to **new corporate loans** and **firms balance sheet** during 2020Q2-2021Q4.

The Debt Moratorium Policy

- Enacted in **March 2020** \implies mitigate the effects of the COVID-19 Pandemic
- **Treatment**
 1. Duration \leq 120 days
 2. Grace periods on principal and interest payments
 3. Interest rate accrues
 4. Delinquency days reset
 5. Credit rating remain frozen
- **Eligibility:** any loan with \leq 60 days past due as of 29/02/2020
 - First covid case: March 6th **NO ANTICIPATION!!!**

Empirical Strategy

Identification Stressed Firms

Identification Stressed Firms

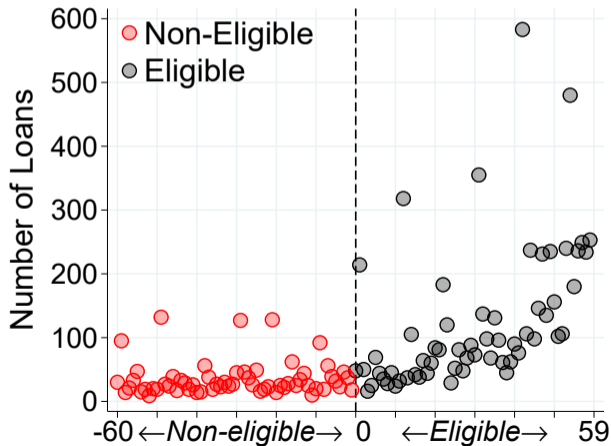
NElig-Elig.Distrib

Pre-Treat.Distrib.

manipulation

- Existent loan of firm "i" with bank "j" (i.e. originated by 2019Q4)

$$\Rightarrow \text{run}_{ij} = 60 \text{ days} - \text{delinquency days}_{ij}$$



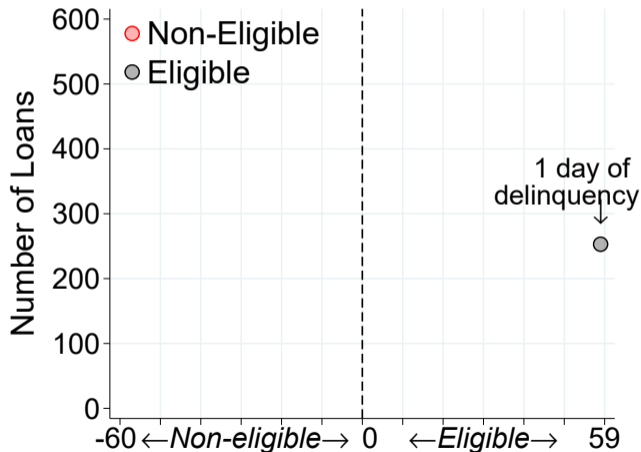
Identification Stressed Firms

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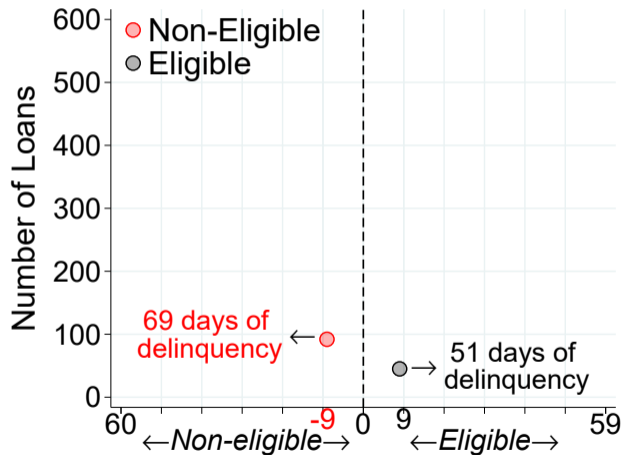
Pre-Treat.Distrib.

manipulation

- **Stressed firms** \implies at least one day of delinquency on existent mortgage



- Eligible and Ineligible firms within 9 days of the threshold.



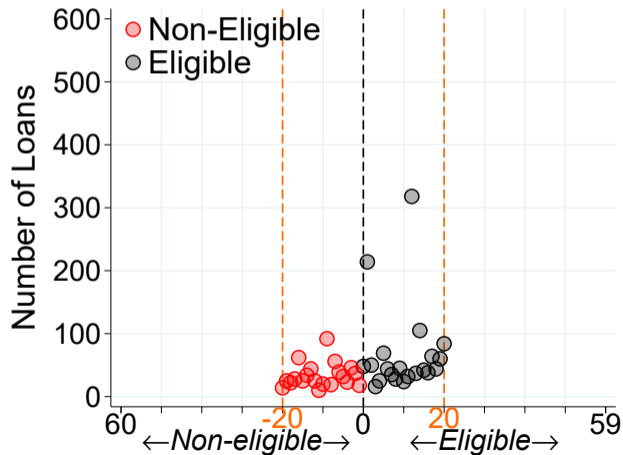
Identification Stressed Firms

NElig-Elig.Distrib

Pre-Treat.Distrib.

manipulation

- **IDENTIFICATION** \implies compare barely eligible and non-eligible firms
 \implies Non-parametric Local Polynomial Approach (Calonico et al. (2014))



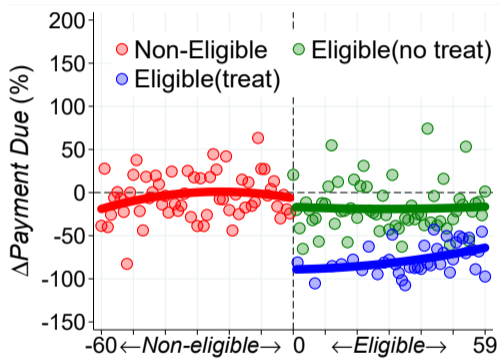
Empirical Strategy

Effect of Moratoria on Existent Loans

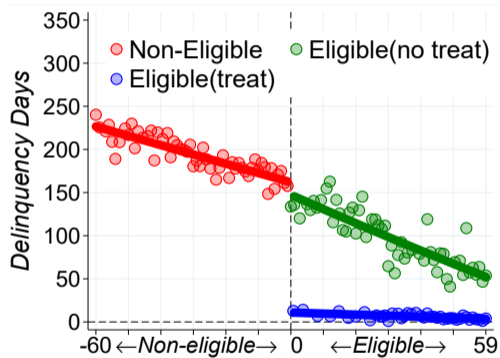
About moratoria treatment

RD estimates

- What happen with **stressed firms** receiving a moratoria on *existent* loan?



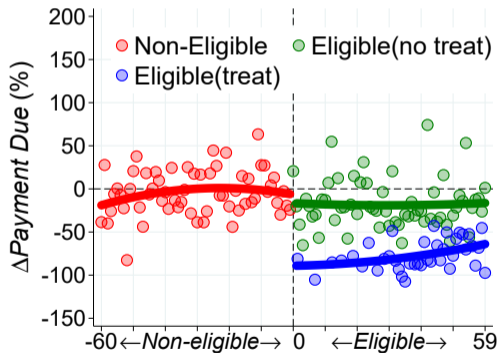
(a) Change in Payment Due



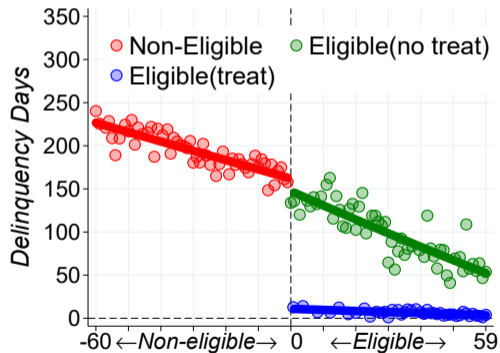
(b) Delinquency days

About moratoria treatment RD estimates

- Our data confirms that policy worked as intended.
 - Payment suspension: loan payments reduced 90%.
 - Delinquency days reset: delinquency reduce by 108 days.



(a) Change in Payment Due



(b) Delinquency days

Empirical Strategy

Stressed Firms and Moratoria: New Loan Conditions

Moratoria and Loans Conditions: RD plots

- New loans after receiving moratoria and up to a year policy ended.

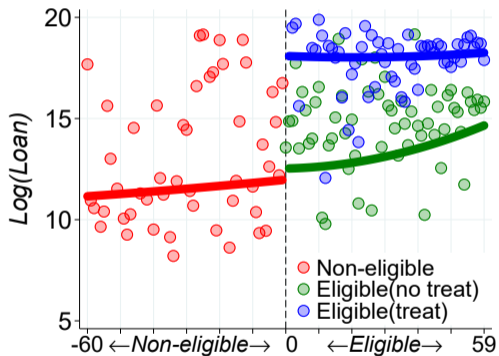
⇒ Future access to credit

- Loan amount and interest rate.
- Ex-ante default (bank assigned at origination), ex-post default (payment delayed ≤ 30 days).
- Other credit conditions: maturity, collateral, credit rating.

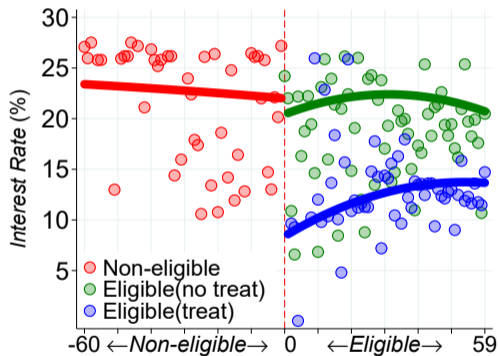
Moratoria and Loans Conditions: RD plots

- New loans after receiving moratoria and up to a year policy ended:

⇒ Loan amount and interest rate.



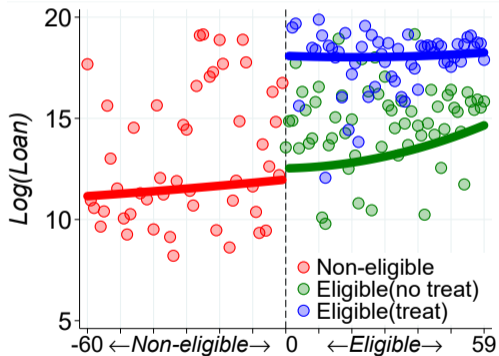
(a) Loan Amount



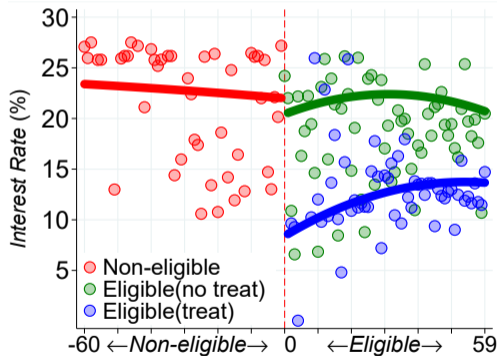
(b) Interest rate

Moratoria and Loans Conditions: RD plots

- Improve credit access for stressed firms after receiving moratoria
 - loan amount increase 16%.
 - interest rate reduce 35 basis points.



(a) Loan Amount



(b) Interest rate

Moratoria and Loans Conditions: RD Estimates

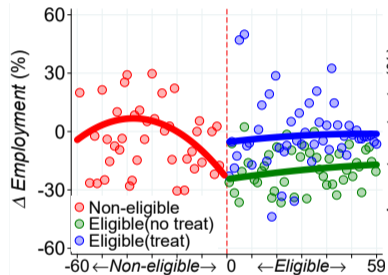
- Conditions on new credits change in other dimensions.
 - Higher probability of getting new loan (**extensive margin**).
 - Reduce default risk of firms.

	Intensive	Extensive	Interest	Maturity	Collateral	Rating	Default Prob.	
	Log(Loan)	$\mathbb{1}\{\text{loan}\}$					Ex-ante	Ex-post
Fuzzy-RD	16.44*** (4.8)	1.04* (0.6)	-0.35*** (0.1)	5.59* (2.9)	1.10*** (0.6)	4.07* (2.2)	-1.17* (0.7)	-2.32*** (0.8)
First Stage								
D_{ij}	0.19*** (0.0)	0.15* (0.1)	0.34*** (0.1)	0.15*** (0.0)	0.20*** (0.0)	0.16*** (0.0)	0.16*** (0.0)	0.14*** (0.0)
Observations	35,072	70,764	35,072	35,072	35,072	35,072	35,072	68,901
BW (in days)	15.3	13.0	7.5	11.9	13.3	19.9	20.5	17.8

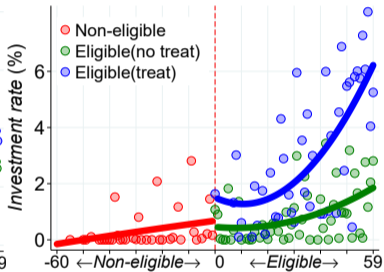
Empirical Strategy

Stressed Firms and Moratoria: Real Outcomes

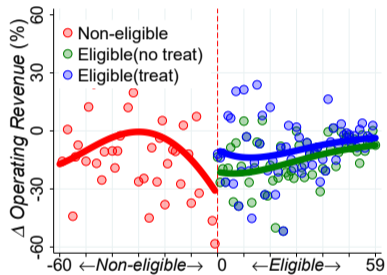
Moratoria and Real Outcomes: RD Plots



(a) Employment



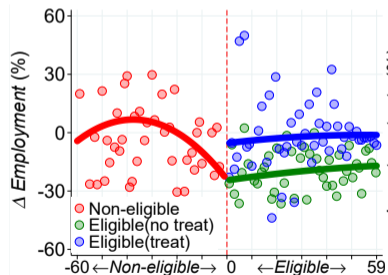
(b) Investment



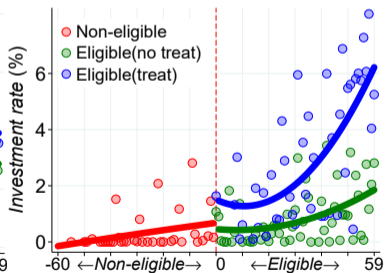
(c) Operating Revenue

Moratoria and Real Outcomes: RD Plots

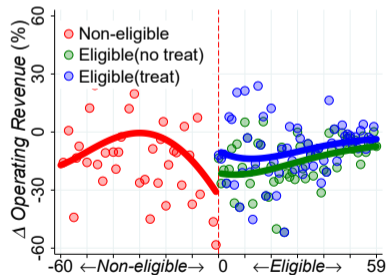
- Better economic performance for stressed firms after receiving moratoria
 - higher employment growth increase by 1.8 percentage points (pp.)
 - investment rate increase by 0.05 pp.
 - operating revenues growth increase by 3.8 pp.



(a) Employment



(b) Investment



(c) Operating Revenue

Moratoria and Real Outcomes: RD Estimates

- Firms financial performance improve in other dimensions: [assets](#), [profits](#), [equity](#).
- Firms are [accumulating debt](#), consistent with results on new credits.

	Δ Emp.	Inv.rate	Δ Op. Rev.	Δ Assets	Δ Liab.	Δ Profit	Δ Equity
Fuzzy-RD	1.83*** (0.7)	0.05** (0.0)	3.87*** (0.8)	1.70** (0.8)	1.95*** (0.7)	2.54*** (0.8)	0.85* (0.5)
First Stage							
D_{ij}	0.21*** (0.0)	0.22*** (0.0)	0.35*** (0.0)	0.16*** (0.0)	0.19*** (0.0)	0.19*** (0.1)	0.15*** (0.0)
Observations	15,379	11,386	31,786	30,887	30,660	29,762	30,887
BW (in days)	28.9	9.7	7.0	12.8	9.0	9.4	14.8

Testing RD design validity

- Our identification strategy relies on continuity assumption around the cutoff
- Empirical evidence supports the validity of the RD design.
 - (1) No abrupt changes in density around the cutoff [DETAILS](#)
 - (2) Balance across eligible/non-eligible groups [Real Outcomes](#) [Credit conditions](#)
 - (3) Robustness of RD estimates
 - Placebo cutoffs: [DETAILS](#)
 - Excluding variation close to cutoff [DETAILS](#)

Empirical Strategy

Non-Stressed Firms and Moratoria

Difference-in-Difference Specification

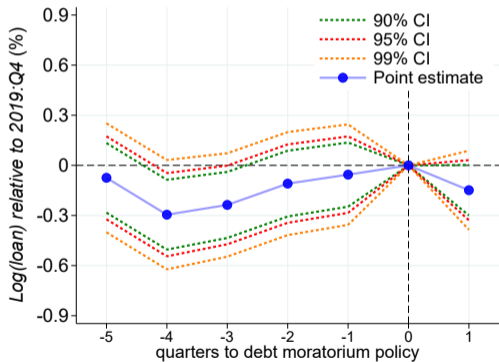
- Non-Stressed firms \implies past due days_{ij} = 0
- Use TWFE (Roth et al. 2022)

$$Loan_{ij,t+1} = \alpha_{j,it} + \gamma D_{ij} + \underbrace{\beta D_{ij} \times T_t}_{\substack{\text{new loans originated} \\ \text{on or after 2020Q1}}} + \underbrace{\sum_{\tau=1}^q \phi_{-\tau} D_{ij} \times T_{t+\tau}}_{\substack{\text{new loans originated} \\ \text{on or before 2019Q4}}} + \epsilon_{ij,t}$$

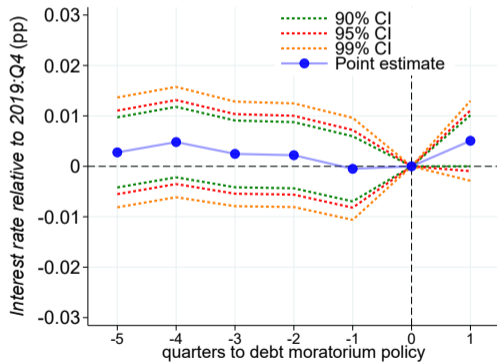
- Acknowledge that the causal link is not as clean as the RDD.
- It is confounded by selection
- We aim to bring theory (and later on the model) closer to the data.

Moratoria and Loans Conditions: DID Estimates

- Tighter loan conditions for non-stressed firms.
 - loan amount reduce 0.15%
 - interest rate increase by 0.5 bp.



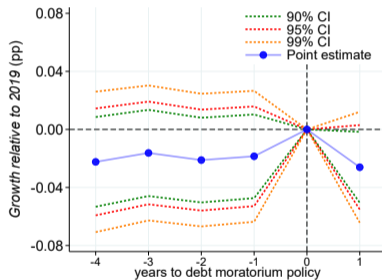
(a) Loan Amount



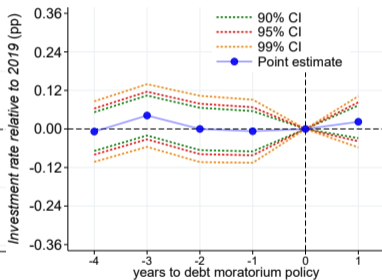
(b) Interest rate

Moratoria and Real Outcomes: DID Estimates

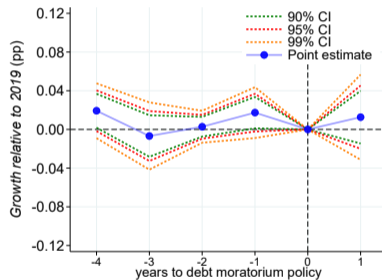
- No significant effect on real outcomes for non-stressed firms.



(a) Employment



(b) Investment



(c) Operating Revenue

CONCLUSIONS

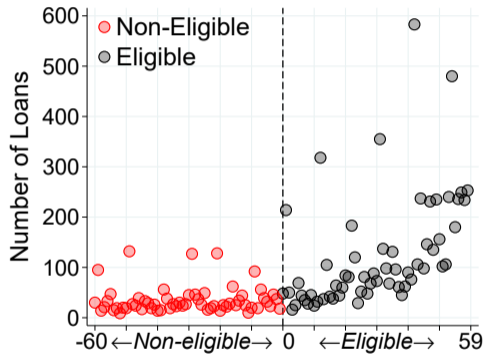
Conclusions

- This paper study implications of temporary payment debt suspension for firms.
- **Empirical strategy** We combine RD and DID strategies
 - Debt moratorium has different effects depending if firm is stressed or not
 - For stressed firms moratoria seems to improve future credit conditions and economic and financial performance.
 - Non-stressed firms are less vulnerable to liquidity shocks, so moratoria not relevant.
- **Quantative model** Introduce non-contingent moratorium loans on default model.
 - Moratoria mitigates the negative response of the economy to liquidity shock.
 - Larger welfare gains if policy stipulate debt forgiveness or moratoria with interest rate not accruing.

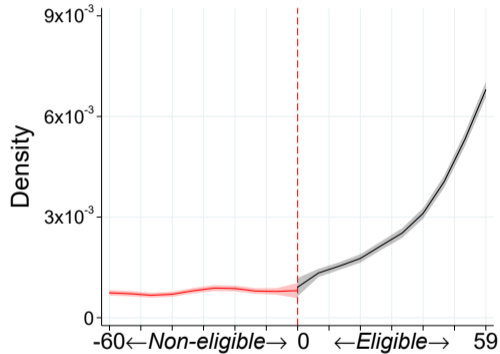
- **Effectiveness of debt forbearance measures**
 - Mian, Rao and Sufi (2013), Mian and Sufi (2011), and Ganong and Noel (2020) (**consumer debt**), Dinerstein, Yannelis and Chen (2024) (**student loan moratoria**).
- **Quantitative models with long-term debt and default**
 - Hatchondo et al. (2022) (**contingent convertible bonds and sovereign default**), Önder et al. (2024) (**consumer debt moratoria**)

Testing Manipulation back

- Reject manipulation of the running variable (p -value=0.8195)

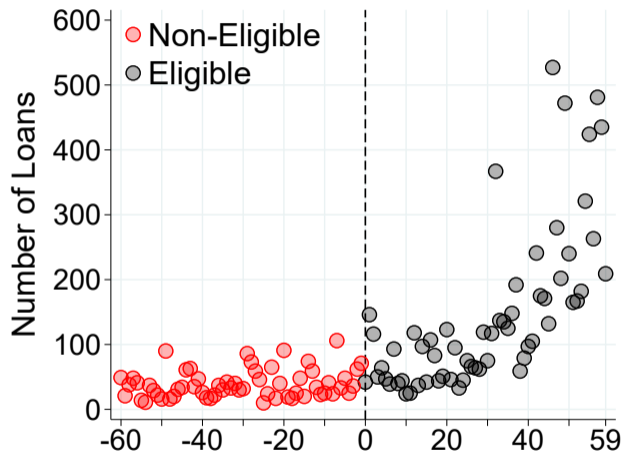


(a) Treatment Distribution



(b) McCrary's Test

Pre-treatment distribution of loans [back](#)



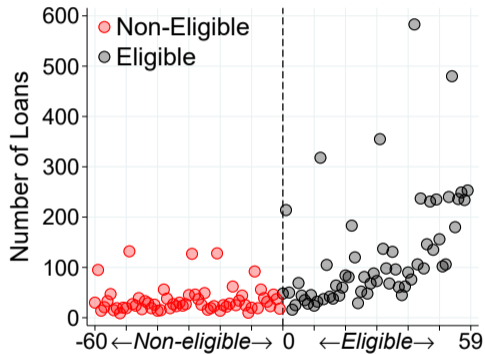
Policy enforcement on existing loans [back](#)

Repayment and delinquency days: Existent Loans

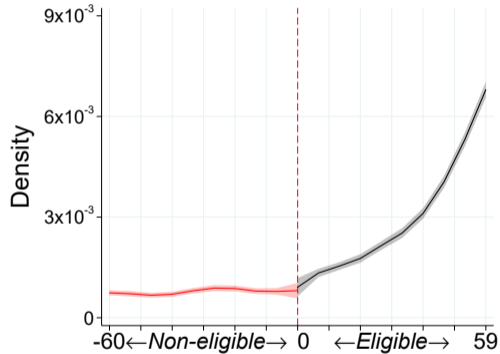
	During quarter of treatment			After quarter of treatment		
	Delinquency days	Δ Payment due	Δ Loan	Delinquency days	Δ Payment due	Δ Loan
Sharp-RD	-107.77*** (8.7)	-0.90*** (0.10)	0.076** (0.037)	-174.19*** (0.09)	0.52*** (16.9)	-0.056* (0.034)
Observations	34,369	30,997	20,809	53,771	54,511	38,691
BW (in days)	47.7	34.7	25.6	40.0	10.9	27.0

Testing Manipulation back

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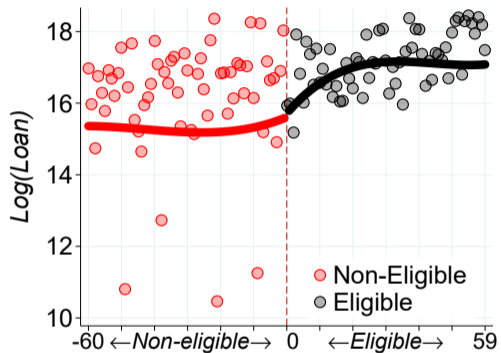


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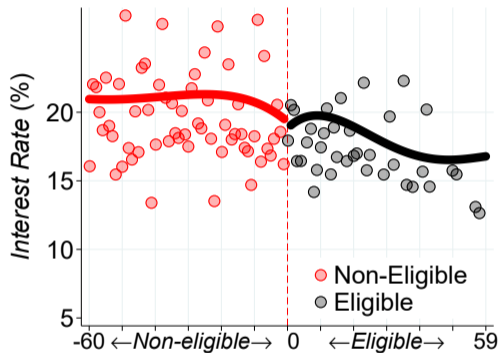


(b) McCrary's Test

Pre-Existing Differences: Existent Loans [back](#)



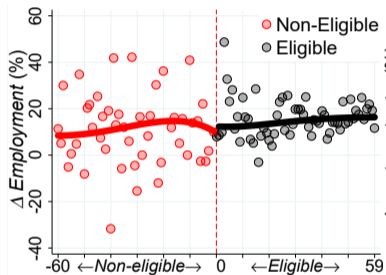
(a) Loan Amount



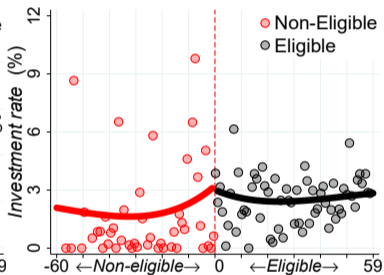
(b) Interest rate

Pre-Existing Differences: Real Outcomes

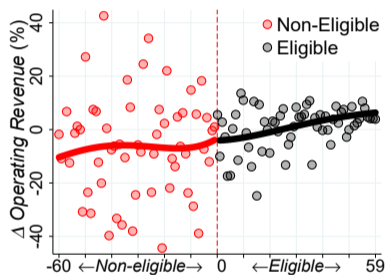
[back](#)



(a) Employment

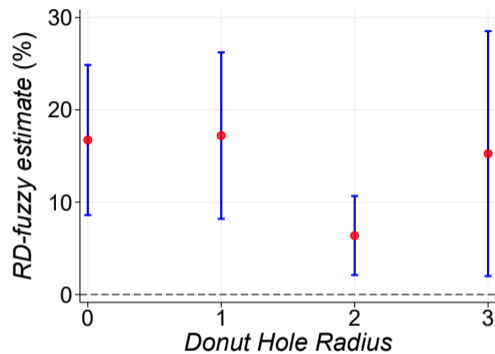


(b) Investment

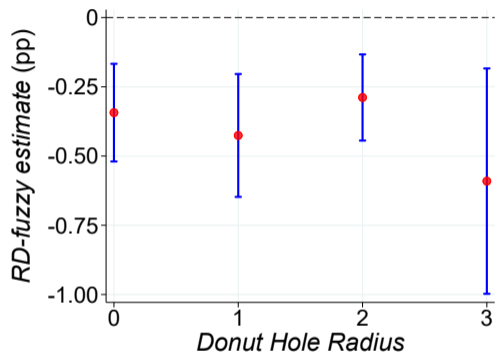


(c) Operating Revenue

Donut-Hole Test [back](#)

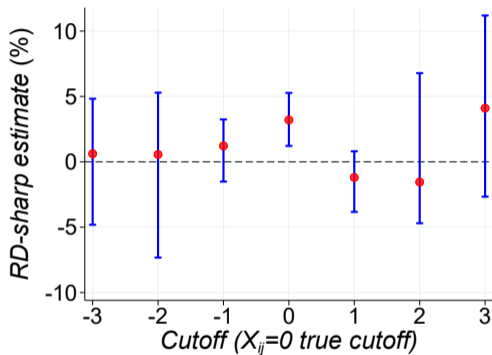


(a) Log(Loan)

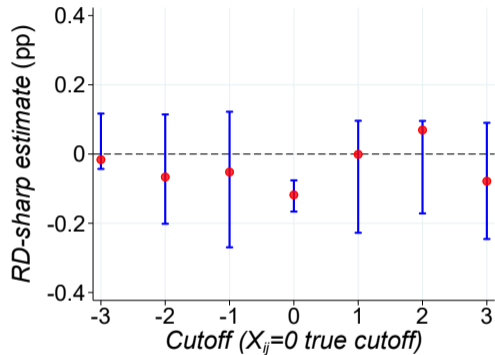


(b) Interest Rate

Placebo Cutoffs [back](#)



(a) Log(Loan)



(b) Interest Rate

Quantitative Model

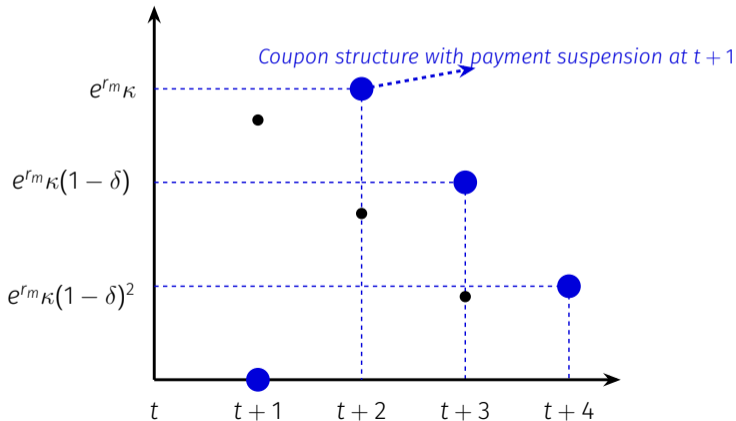
Model

Model outline

- Benchmark model: Eaton and Gersovitz (1981); Aguiar and Gopinath (2006), Arellano (2008), Hatcondo, Martinez, Onder and Roch (2022)
- Add **liquidity shocks** in the form of lenders' increased risk aversion - trigger.
- Introduce production economy as in Mendoza and Yue (2012)
- Nash-bargaining between borrowers and lenders after default
- Households own firms and borrow on behalf of them.
- Each period, the household
 1. observes **aggregate income** and **liquidity shock**,
 2. chooses whether to default,
 3. borrows using **non-contingent bonds and contingent debt**

Non-contingent Moratoria Loans

- Perpetuities with geometrical decreasing coupons.
 - Automatic payment suspension with adverse “liquidity” shock.
 - Payment suspension at $t + 1$, unpaid coupon is paid (with interest) after liquidity shock.



Quantitative Model

Model Results

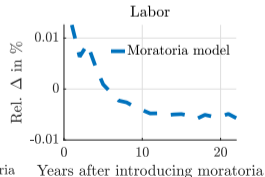
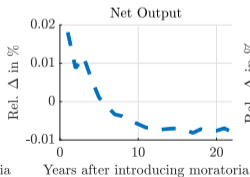
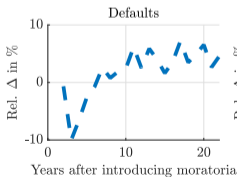
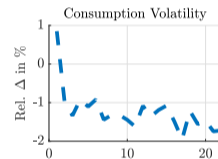
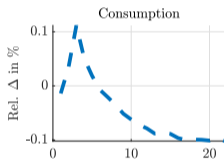
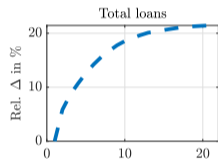
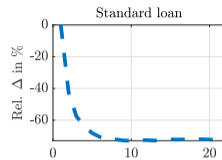
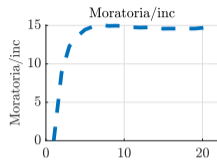
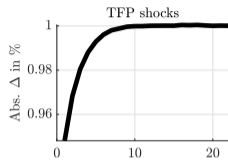
Parameterization

- Resort to administrative data whenever possible.
- Three 1.25-year p_H episodes every 20 years, o.w. $p_L = 0$
- Spread is on average 300 basis points higher with p_H
- With negative correlation between shocks to global risk premia and TFP

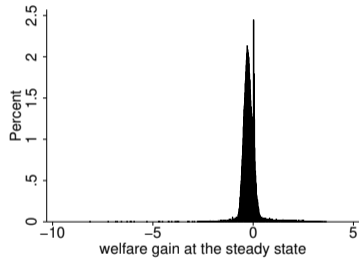
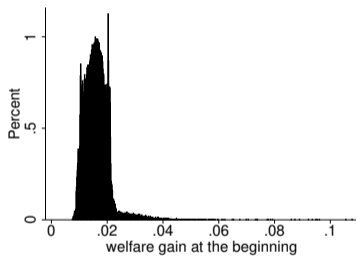
Long-run Simulation results

	Data	Benchmark	Moratoria
Mean standard loan/income (%)	15.7	15.5	4.0
Mean moratorium loan/income (%)	<i>n.a.</i>	<i>n.a.</i>	14.2
Mean r_s (%)	5.7	5.7	6.5
Mean moratorium r_s (%)	<i>n.a.</i>	<i>n.a.</i>	7.6
Share of NPL	3.5	3.7	3.9
Recovery rate (%)	33	31.2	29.2
Duration	5.0	5.0	4.8
Duration moratorium	<i>n.a.</i>	<i>n.a.</i>	5.2
σ_{r_s}	2.2	2.4	2.8
σ_{r_s} moratorium	<i>n.a.</i>	<i>n.a.</i>	2.9
Labor decline during defaults (%)	18.1	14.4	14.3
Labor decline during high-risk-premium (%)	3.6	2.8	3.2
Probability high-risk-premium starts (%)	15.0	15.0	15.0
Lower income during high-risk-premium (%)	4.0	4	4.5
Δr_s with high-risk-premium shock	3	3	3.8
Fraction of defaults triggered by liquidity (%)	<i>n.a.</i>	10.1	0.8
$\sigma(c)/\sigma(y)$	0.87	0.95	0.93
$\rho(c, y)$	0.92	0.99	0.99

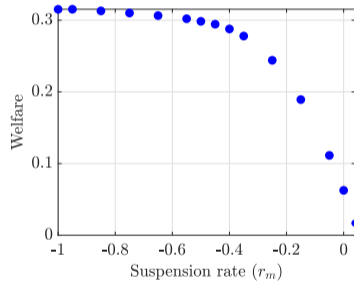
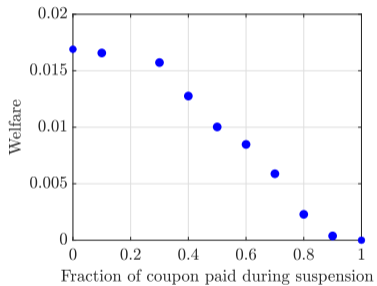
IRFs with Moratoria Loans: Liquidity Shock



Ways to improve the contract design: Welfare gains



Optimal moratorium debt relief



Debt-forgiveness with moratoria loans

	Bmark	$r_m = r$	$r_m = 0.0$	$r_m = -0.35$	$r_m = -1$
Mean standard loan/income (%)	15.5	4.0	3.9	3.1	5.1
Mean morator. loan/income (%)	<i>n.a.</i>	14.2	15.7	20.7	19.8
Mean r_s (%)	5.7	6.5	6.4	4.9	3.9
Mean moratorium r_s (%)	<i>n.a.</i>	7.6	8.3	12.9	19.0
Share of NPL	3.7	3.9	3.9	3.3	2.9
Recovery rate (%)	31.2	29.2	29.5	34.1	36.9
$\sigma(c)/\sigma(y)$	0.99	0.97	0.92	0.93	0.93
$\sigma(r_s)$	2.4	2.8	1.22	1.16	1.13
Δr_s with shock	3.0	3.8	3.6	1.9	1.0
Δr_s moratorium with shock	<i>n.a.</i>	3.7	3.6	2.7	2.0

IRFs with Moratoria and optimal haircut.

