The Economic Effects of a Borrower Bailout: Evidence from an Emerging Market

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Motivation

What do economic stimulus programs do?

1. Economic stimulus programs have a long history
   - → Great Depression and New Deal Era in the United States
     - → Direct subsidies to stimulate demand
     - → Debt moratoria and restructuring programs
   - → Examples from the recent financial crisis:
     - → Direct subsidies for investment or consumption
     - → Credit market interventions
     - → Tax policy

2. But effects on economic activity remain poorly understood
   - → Effects on real economic activity
   - → Time pattern of effects
   - → Externalities

Motivation

Stimulus programs through the credit market

1. The case for interventions into debt contracts
   - → address credit constraints; stimulate investment and consumption directly
   - → Insurance against otherwise uninsurable aggregate shocks (Bolton and Rosenthal, 2002)
   - → mitigate deadweight losses from large scale default and foreclosure (Guiso, Sapienza and Zingales, 2009; Breza 2013; Giné et al 2013)
2. The case against interventions into debt contracts
   - → Distort incentives for banks (Diamond and Rajan 2000; Gianetti and Simonov, 2009; Phillipon and Schnabl 2013)
   - → Distort contracting environment and incentives for borrowers
   - → may lead to ex-post credit rationing

Contribution

Use natural experiment to trace the effects of large stimulus program

- Stimulus enacted through an ex-post intervention in the credit market
  - → Provide causally identified evidence
  - → Quantify credit market *and* real effects

Moral hazard consequences

- Political interventions into debt contracts and moral hazard (Guiso, Sapienza and Zingales, 2009; Breza, 2013; Giné et al 2013)
  - → Estimate moral hazard costs directly
  - → Distinguish between impact on bank and borrower risk-taking

Interaction with the political cycle

- Political cycles in lending and loan performance (Dinç 2005, Cole 2009)
  - → Identify mechanisms perpetuating moral hazard

Main findings

1. Post-program credit supply: Indian districts with greater exposure to the bailout experienced a significant post-program slowdown in new lending.
2. Ex-post moral hazard: Districts with a greater exposure to the bailout saw significantly faster growth in non-performing loans after the program.
3. Bank versus borrower moral hazard: The results suggest that deterioration in loan performance is due to borrower- not bank moral hazard.
4. Real effects: Our estimates on agricultural productivity identify a precise zero.
5. Mechanism – moral hazard and the electoral cycle: The program magnified default cycles around election years, suggesting the anticipation of politically motivated credit market interventions as a key mechanism that reinforces moral hazard in loan repayment.

India's Bailout for Rural Households

The program

India's bailout for rural households

Why is this an interesting program to study?

- Possibly the largest household level bailout program in history
- Economically significant
  - → US$ 16 - 17 billion
  - → 1.7 - 2% of India's GDP
  - → Benefit to approximately 50 million rural hoouseholds
- Representative of a common class of stimulus programs
  - → Ex-post restructuring of debt contracts
  - → Examples from the United States
    - → Debt moratoria in the 1930s
    - → Mortgage restructuring
  - → Examples from developing economies
    - → Thailand: US$ 2.9 billion bailout for rural households
    - → Brazil: restructuring of more than US$ 10 billion farm debt

The program

India's bailout for rural households

The Agricultural Debt Waiver and Debt Relief Scheme (ADWDRS)

- Partial or full bailout of **all** agricultural loans outstanding and overdue
  - → Covers all ag loans originated Dec 31, 1997 – Dec 31, 2007
  - → Loan must be 90+ DPD on February 28, 2008
  - → Loans at private, public sector, cooperative and regional rural banks
  - → Eligibility depends on land pledged as collateral
  - → Banks refinanced by the Reserve Bank of India
- What was the policymaker's motivation?
  - → Stimulate demand and investment
  - → Transfer to rural voters ahead of national elections
  - → Resolve accumulated bad loans in the books of state banks

The natural experiment

India's bailout for rural households

Identification challenge: endogeneity of program exposure

- Land-based eligibility rules generate exogenous variation in bailout exposure
- Benefit depends on land pledged as collateral several years prior to program
- Program rules were unanticipated, applied retrospectively
  - $\rightarrow$ no prior debt relief program based on landholding

Natural experiment

Land $\leq$ 2 hectares $\longrightarrow$ 100% unconditional bailout

Land $>$ 2 hectares $\longrightarrow$ 25% conditional bailout

The natural experiment

India's bailout for rural households

Exogenous variation in program exposure

- Two sources of exogenous variation at the district level are key to our identification strategy:

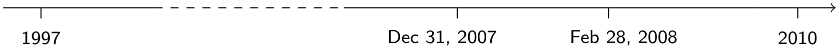
A. Share of credit that is below collateral threshold and could have qualified is determined by a district's historical land distribution

B. Time series of weather shocks determines credit share actually in default

The natural experiment

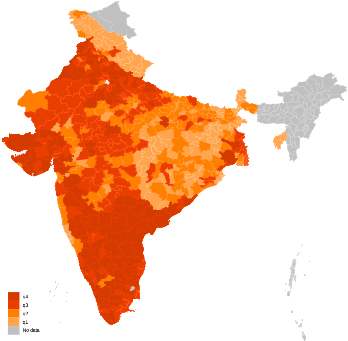
Timeline

- December 1997 to December 2007

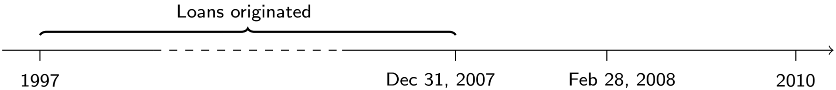


The natural experiment

Timeline

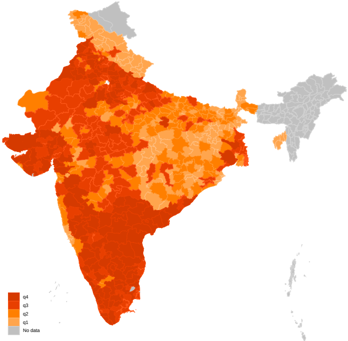


- December 1997 to December 2007
  - → Households take up loans
  - → Pledge land as collateral



The natural experiment

Timeline



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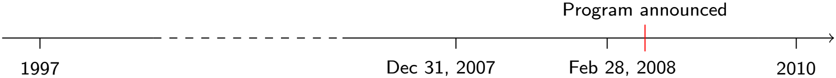
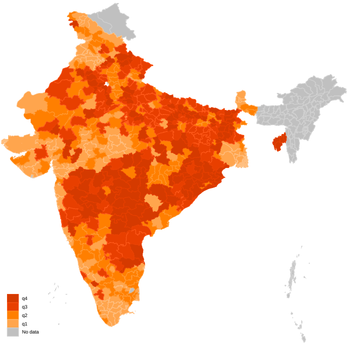
  - → Households take up loans
  - → Pledge land as collateral
- March 28, 2008
  - → Debt relief program is announced



The natural experiment

Timeline



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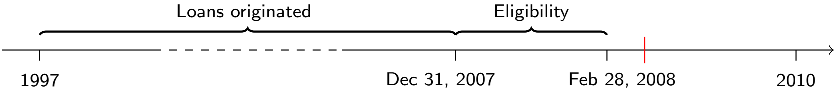
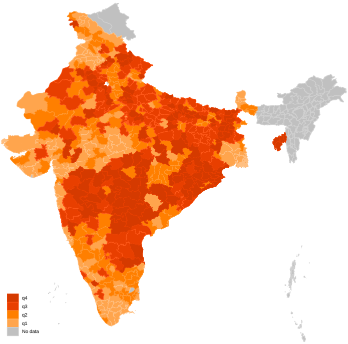
- March 28, 2008
  - → Debt relief program is announced
  - → Loan has to be in default as of December 31, 2007, and until February 28, 2008
  - → Eligibility is based on collateral

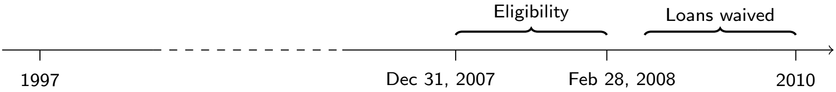


The natural experiment

Timeline



- December 1997 to December 2007
  - → Households take up loans
  - → Pledge land as collateral
- March 28, 2008
  - → Debt relief program is announced
  - → Loan has to be in default as of December 31, 2007, and until February 28, 2008
  - → Eligibility is based on collateral
- June 2008: program implemented
  - → Borrowers with collateral $\leq$ 2 ha get 100%, borrowers $>$ 2 ha get 25% conditional relief
- December 2010: program ends



Dataset

Dataset

Overview

- **Panel of 491 (of 593) Indian districts 2001-2012**
  - → Data at the level of India's 2001 census districts [District map]
  - → Districts in the data account for
    - → 94% of the Indian population
    - → 89% of total bank credit in the base year
- Program exposure
  - → Amount of credit qualifying for the program
  - → Amount of debt relief claimed under the program
- Data on credit
- Data on loan performance
- Additional controls
  - → Rain, monsoon precipitation as percentage of long-run mean
  - → Electoral cycle

Dataset

District-level credit

- **Panel of bank lending at the district level**
  - → The Reserve Bank of India BSR dataset
  - → Data by district and type of credit
    - → Total credit,
    - → ag credit
    - → consumer credit
  - → Covers all commercial bank lending in India
  - → Based on census of loans at branch level
  - → Reported annually
- **Panel of loan performance**
  - → Based on proprietary data from India's largest four public sector banks
    - → agricultural credit and NPLs
    - → 27,678 branches in base year
    - → approximately 62% of rural credit

Dataset

Additional controls

- **Rainfall, deviation from normal**
  - → Monsoon rainfall (variation in credit demand)
    - → as percentage of 50 year district average
    - → Indian meteorological department data
    - → District level gauge data for coverage to 2011
  - ⇒ control for variation in credit demand
- **Electoral cycle**
  - → state elections are staggered in time
    - → 5 year election cycle
    - → state governments can call early elections
    - → full set of election dummies $\sum_{t=0}^{4} e_t$ Program exposure
    - → years until next scheduled state election
  - ⇒ control for political cycles in credit

Empirical Strategy

Empirical strategy

Reduced form difference-in-differences

Estimating equation: credit growth

$$y_{dt} = \alpha + \gamma\big(Bailout\_share \cdot post\big) + \delta_d + \vartheta_t + \mathbf{X}'\psi_{dt} + \epsilon_{dt}$$

- Difference-in-Differences (DD) around program date
- Three specifications
  1. District fixed effects and year dummies
  2. Regional credit cycles $\Rightarrow \delta_d * region_k$
  3. Unit time trends
- Additional controls: rain, electoral cycle dummies

Empirical strategy

Identification

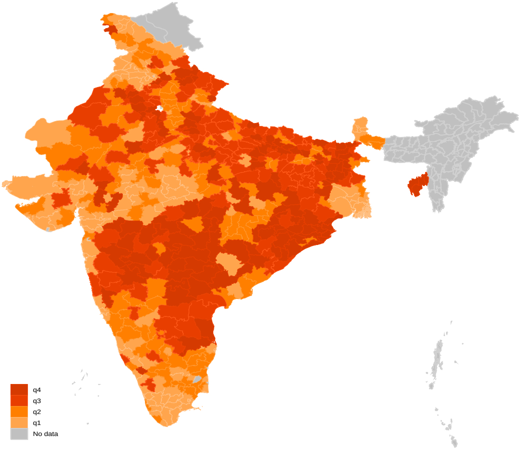
Program exposure

$$Bailout\_share = \frac{(1-\eta)\left[credit^S_{d\bar{t}} + .25\bar{\kappa}credit^L_{d\bar{t}}\right]}{Total\_credit_{d\bar{t}}}$$

- where $1-\eta$ is the share of non-performing loans
- $credit^S$ is the amount of credit below the collateral threshold
- $credit^L$ is the amout of credit above the collateral threshold
- Let $\kappa = 1$, estimate ITT effect

Empirical strategy

Identification



Empirical strategy

Identification

Summary statistics

	Bailout share [N=489]
Mean	.326
Median	.284
StDev	.224
Min	.002
Max	.991

Bailout share by state

Effects of the Bailout

T1 Effect on credit supply

Intensive and extensive margin

	Log(credit$_{dt}$)					
	Δ Amount			Δ Accounts		
	(1)	(2)	(3)	(4)	(5)	(6)
Bailout_share*post	-0.025**	-0.024*	-0.102***	-0.018	-0.025**	-0.037*
	[0.013]	[0.014]	[0.021]	[0.012]	[0.013]	[0.022]
# observations	4,941	4,941	4,941	4,941	4,941	4,941
# clusters	489	489	489	489	489	489
R-squared	0.909	0.912	0.921	0.700	0.717	0.716
Year fixed effects	Yes	No	No	Yes	No	No
Year*region effects	No	Yes	No	No	Yes	No
District time trends	No	No	Yes	No	No	Yes

- Persistently lower credit in high-bailout districts
- Bank lending slows down in districts with high program exposure
- Consistent with "evergreening" in pre-bailout period [Peek and Rosengren, 2005]

Placebo – program timing | Placebo – type of credit | Incentives for evergreening

T1 Effect on credit supply

Intensive and extensive margin

	$credit_t/credit_{2001}$					
	Δ Amount			Δ Accounts		
	(1)	(2)	(3)	(4)	(5)	(6)
Bailout_share*post	-0.138***	-0.138***	-0.251**	-0.055*	-0.066**	-0.097
	[0.027]	[0.030]	[0.123]	[0.031]	[0.032]	[0.091]
# observations	4,918	4,918	4,918	4,918	4,918	4,918
# clusters	489	489	489	489	489	489
R-squared	0.182	0.285	0.107	0.107	0.141	0.081
Year fixed effects	Yes	No	No	Yes	No	No
Year*region effects	No	Yes	No	No	Yes	No
District time trends	No	No	Yes	No	No	Yes

- Persistently slower credit growth in districts with high program exposure
- Consistent with "evergreening" in pre-bailout period [Peek and Rosengren, 2005]

Placebo – program timing | Placebo – type of credit | Incentives for evergreening

T2 Effect on credit supply

Is there active reallocation?

	$\text{credit}_t - \text{credit}_{t-1}$					
	Low-bailout districts			High-bailout districts		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible_amount*post	0.677***	0.465***	1.280***	0.097*	0.061*	0.161
	[0.120]	[0.134]	[0.137]	[0.057]	[0.034]	[0.099]
# observations	2,478	2478	2,478	2,451	2,451	2,451
# clusters (districts)	224	224	224	224	224	224
R-squared	0.288	0.344	0.438	0.263	0.414	0.344
Year fixed effects	Yes	No	No	Yes	No	No
Year*region effects	No	Yes	No	No	Yes	No
District time trends	No	No	Yes	No	No	Yes

- Significant reallocation of credit in the post-program period
- $ 1.3 of new lending for every $ 1 of debt relief in low-bailout districts
- $ .16 of new lending for every $ 1 of debt relief in high-bailout districts
- Post-program bank lending goes to observably less risky districts

T3 Effect on loan performance

	1 if Δ NPA > 0					
	All districts			High bank competition		
	(1)	(2)	(3)	(4)	(5)	(6)
Bailout_share*post	0.074***	0.088***	0.080*	0.092***	0.075**	0.240***
	[0.021]	[0.022]	[0.048]	[0.033]	[0.033]	[0.072]
# observations	2,676	2,676	2,676	1,402	1,402	1,402
# clusters	489	489	489	237	237	237
R-squared	0.243	0.276	0.297	0.214	0.253	0.305
Year fixed effects	Yes	No	No	Yes	No	No
Year*region effects	No	Yes	No	No	Yes	No
District time trends	No	No	Yes	No	No	Yes

- What is the impact on moral hazard in loan repayment?
- Bank lending becomes more conservative, new credit goes to lower risk borrowers
- But: unambiguous post program decline in loan performance in high-bailout districts

T4 Real effects: productivity

Revenue per hectare

- Key motivation of bailout programs
  - → stimulate demand and investment directly
  - → resolve debt overhang, disincentives for productive investment
  - → limited evidence that stimulus programs achieve this (Mian and Sufi, 2012)
- Test using district panel of agricultural productivity
  - → Crop yields for 20 most common crops in India (yield r, area a)
  - → Wholesale prices of agricultural commodities in base year 2001 $\bar{p}$
  - → Panel 2001-2011

Measuring productivity

$$\pi_{dt} = \frac{\sum_{dt}^{C} \{ r_{dt}^{c} \cdot \bar{p}_{d,2001}^{c} \}}{\sum_{dt}^{C} a_{dt}^{c}}$$

T4 Real effects: productivity

Revenue per hectare

	Log revenue per hectare					
	(1)	(2)	(3)	(4)	(5)	(6)
Bailout_share*post	0.004	0.004	0.001	0.003	0.004*	0.001
	[0.002]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]
# observations	4,241	4,241	4,241	4,182	4,182	4,182
# clusters	488	488	488	488	488	488
R-squared	0.098	0.181	0.411	0.105	0.187	0.396
Year fixed effects	Yes	No	No	Yes	No	No
Year*region effects	No	Yes	No	No	Yes	No
District time trends	No	No	Yes	No	No	Yes

- No significant effect of bailout on agricultural productivity
- Debt relief does not resolve debt overhang; increase productivity
- Consistent with micro-evidence

Mechanism: Moral Hazard and the Electoral Cycle

Mechanism

Moral hazard and the electoral cycle

- **State elections in India**
- Electoral cycle affects incentives for default

  → Promises of lenient enforcement (Examples: Haryana, Uttar Pradesh)
  → Political interventions into the credit market (Andhra Pradesh)

- Political cycles in credit and default
- Was this mechanism magnified by the program?

T5 Mechanism

Moral hazard and the electoral cycle

	1 if Δ NPA > 0					
	All districts			High bank competition		
	(1)	(2)	(3)	(4)	(5)	(6)
Years_to_election*post	-0.011	-0.035**	-0.154***	-0.023	-0.051**	-0.120***
	[0.014]	[0.017]	[0.012]	[0.021]	[0.026]	[0.017]
#observations	2,913	2,913	2,913	1,506	1,506	1,506
R-squared	0.234	0.273	0.344	0.208	0.257	0.324
	Log loan size					
Years_to_election*post	-0.004	-0.004	-0.009	-0.003	-0.005	-0.008
	[0.006]	[0.009]	[0.006]	[0.008]	[0.012]	[0.007]
# observations	2205	2205	2205	1155	1155	1155
R-squared	0.467	0.490	0.748	0.516	0.549	0.767
Year fixed effects	Yes	No	No	Yes	No	No
Year*region effects	No	Yes	No	No	Yes	No
District time trends	No	No	Yes	No	No	Yes

- Significant negative effect on loan performance
- Effect due to borrower moral hazard; no change in loan size around elections
- Time pattern: effect persistent over time. Do borrowers "learn" to expect renegotiation?

T5 Mechanism

Moral hazard and the electoral cycle

	1 if Δ NPA > 0		
Model 1	(1)	(2)	(3)
Years_to_election*post	-0.011	-0.035**	-0.154***
	[0.014]	[0.017]	[0.012]
# observations	2,913	2,913	2,913
R-squared	0.234	0.273	0.344
Model 2			
Post*Years_to_election	-0.006	-0.008	-0.010
*Bailout_share	[0.011]	[0.012]	[0.014]
# observations	2,205	2,205	2,205
R-squared	0.255	0.284	0.370
Model 3			
Post*Years_to_election	0.271	-0.296	0.638
*Bailout_per_capita	[1.082]	[1.127]	[1.213]
# observations	2,205	2,205	2,205
R-squared	0.261	0.283	0.377
Year fixed effects	Yes	No	No
Year*region effects	No	Yes	No
District time trends	No	No	Yes

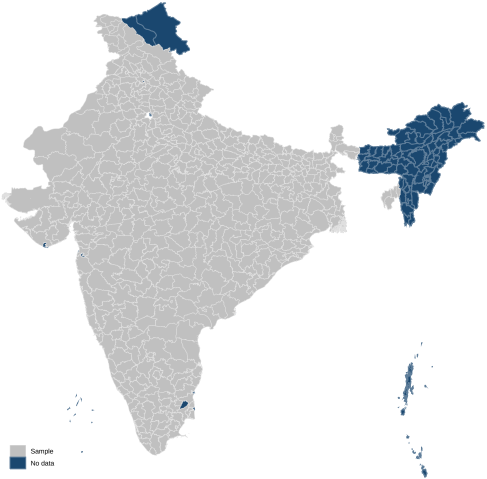
Conclusion

Summary

1. Bailout has significant impact on the allocation of credit and post-program moral hazard
2. We distinguish bank from borrower moral hazard. Bank lending after the bailout becomes more conservative: no extensive margin lending to high-bailout districts
3. Strong negative effect on loan performance. One standard deviation increase in bailout leads to 7-10% faster growth in non-performing loans. Effect persists
4. Estimates on productivity identify a zero effect
5. Mechanisms: bailout amplifies default-cycles around elections, reinforcing and the effect of the bailout on borrower moral hazard

Thank you!

Indian census districts



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