(Hierarchical) Regulatory Forbearance, Credit Evergreening and Zombie Lending: Evidence from an Emerging Economy

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Overview

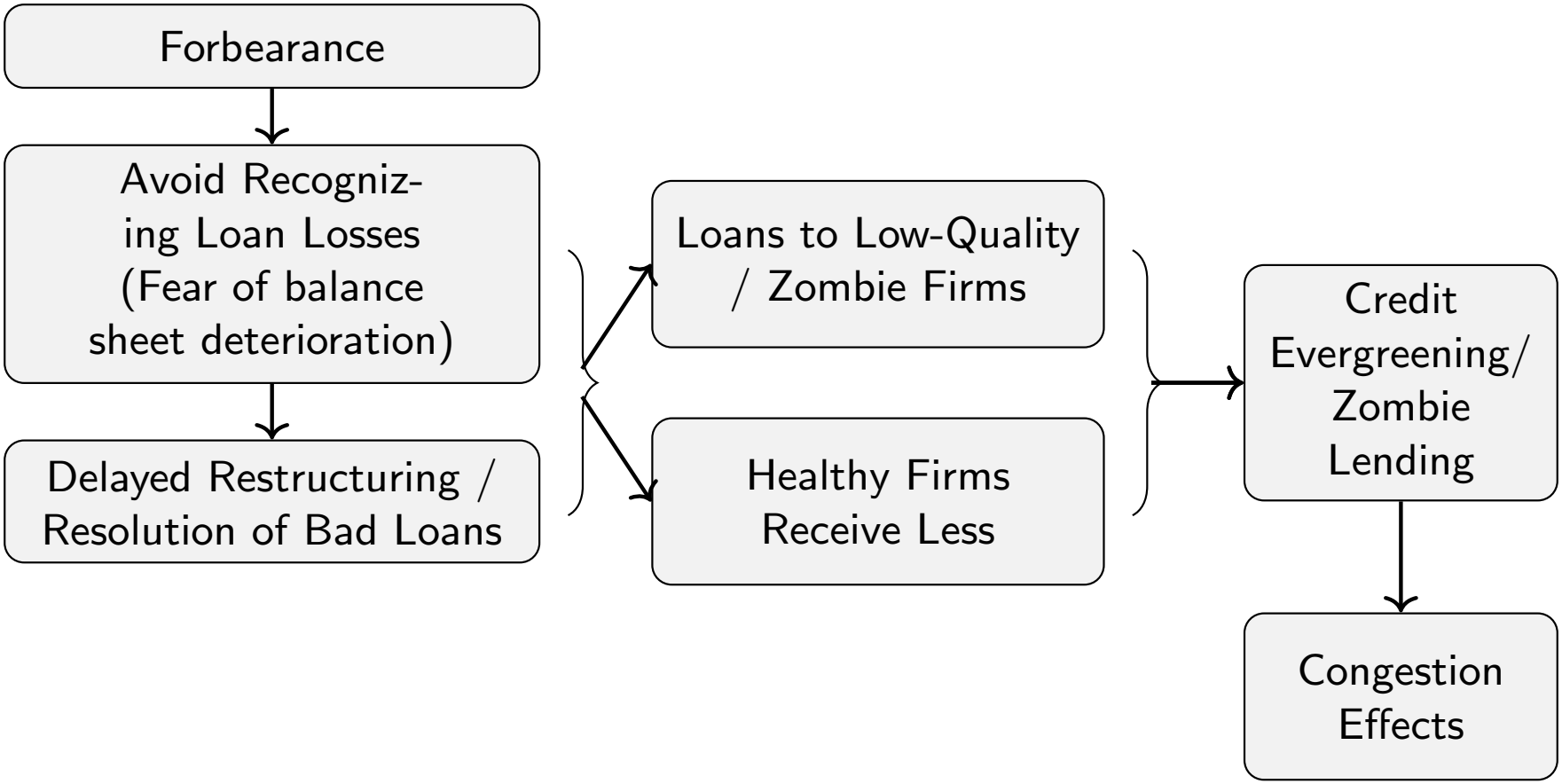
Motivation

- Supervision prevents banks from taking excessive risk (Beverly, Anna Kovner, and Matthew Plosser(2020), JF).
- Existing evidence on regulatory forbearance focuses on capital relief and recapitalizations, mostly in advanced economies.
- Much less is known about institutional forbearance: when supervision weakens because monitoring itself becomes bureaucratically constrained.
- We study a sharp and novel episode of hierarchical regulatory forbearance in Bangladesh.
- **We ask whether weakening supervision—without changing capital rules—induces zombie lending.**

2017 Regulatory Shock: What Changed?

- **Before 2017:**
  - Direct branch-level inspections
  - Independent supervisory audits
- **After 2017:**
  - Multi-layer approval (Director $\rightarrow$ Executive Director $\rightarrow$ Deputy Governor)
  - Delays in branch inspections and audit finalization
- **Why this matters:**
  - No change in capital or provisioning rules
  - Enforcement became weaker
  - **Lower expected cost of misclassification**
- **Identification:**
  - Timing of the policy is plausibly exogenous

How does forbearance affect banks, and subsequently, firms?



Sources:[Caballero et al. (2008), Peek and Rosengren (2005), and Acharya et al. (2019)]

Contribution to the Literature

- **Prior work:** bank recapitalization, relaxed capital requirements, and reduced provisioning rates—**primarily in advanced economies (Europe and North America).**
- **We study:** hierarchical institutional forbearance
- **Setting:** bank-dependent economy with limited outside finance

Research Questions

- Do downward shifts in regulatory monitoring increase stressed banks' incentives to engage in **credit evergreening?**
- Does credit evergreening distort **firms' real activity in an emerging economy?**

Our Hypotheses

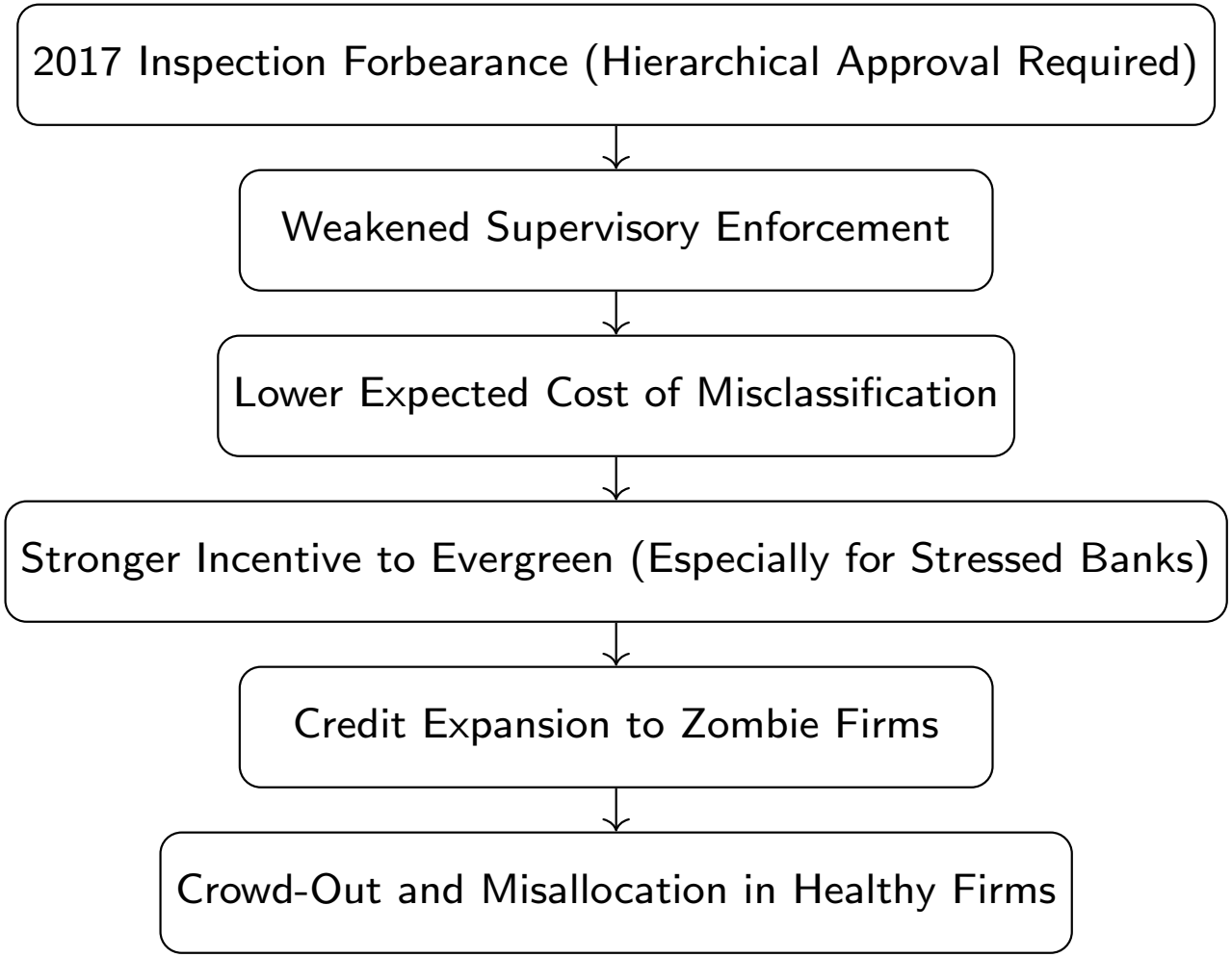


Figure: Mechanism of Hierarchical Regulatory Forbearance and Zombie Lending

Preview of Main Findings

- The troubled banks extended significantly more **credit zombie firms** relative to healthy borrowers.
- By crowding out credit to non-zombie borrowers, zombie lending significantly impaired productivity, sales, and investment of healthier firms.
- The results underscore the unintended consequences of regulatory forbearance, **especially when borrowers cannot substitute bank credit with alternate forms of debt**.

Data and Methodology

- Novel bank–firm matched lending data (2013–2020)
- Firm-level annual data from the Compustat Global database.
- Approximately 170 non-financial firms, approximately 4,000 observations

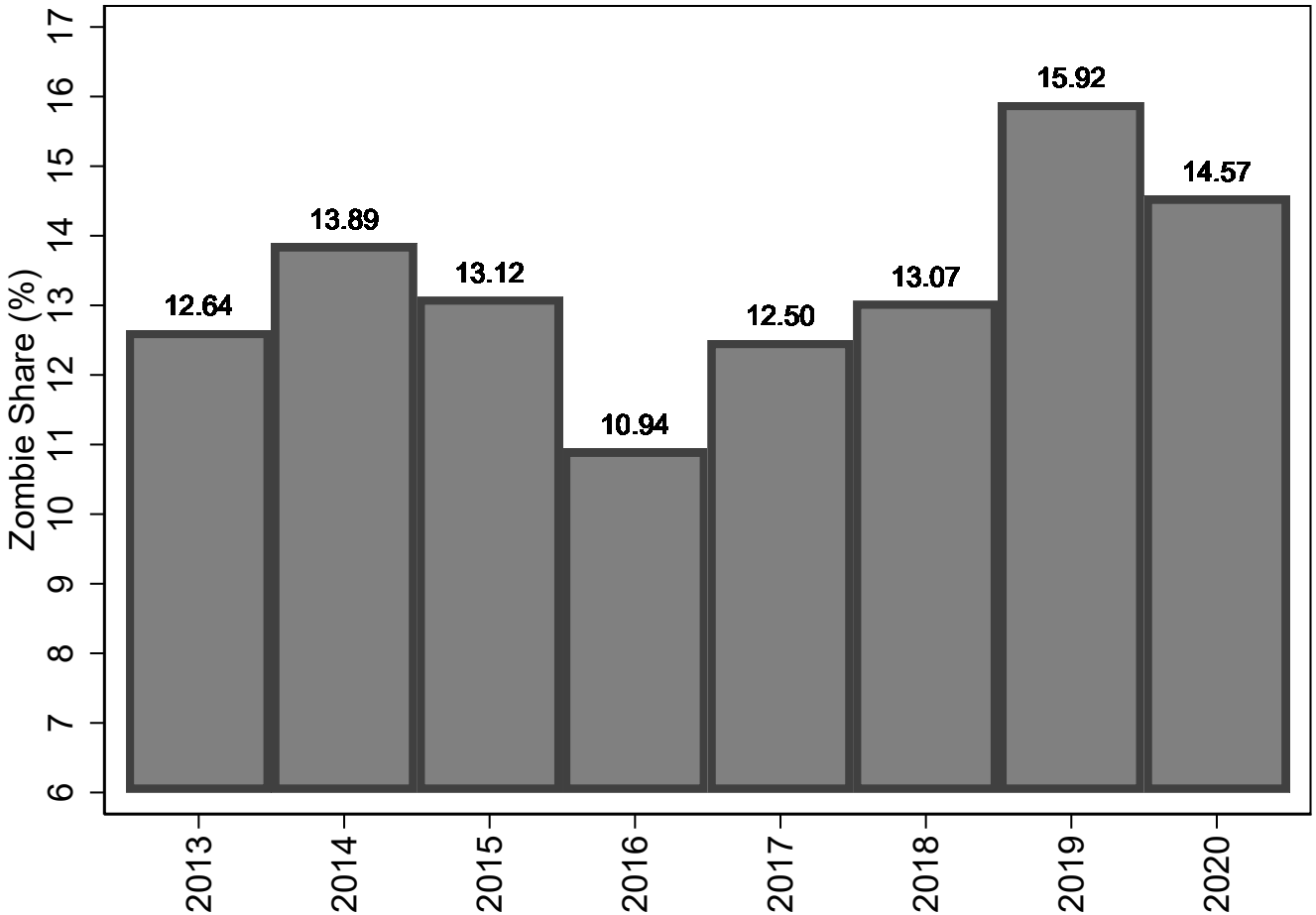
- Triple-Difference (DDD) estimation strategy

How to Identify Zombies and Troubled Banks

- **Caballero et al. (2008)**.
- We follow **Caballero et al. (2008) and Acharya et al. (2019, 2024) to classify firms as zombie.**
- A firm is classified as zombie if:
  - it receives credit at a subsidized rate (negative interest expenses gap),
  - it has a BB rating or lower based on its ICR
  - its two-year average ICR is below the industry-year median while its leverage ratio is above the industry-year median.
- Troubled banks are identified using the gross non-performing loan ratio and Tier-1 capital ratio.

Zombies in Bangladesh

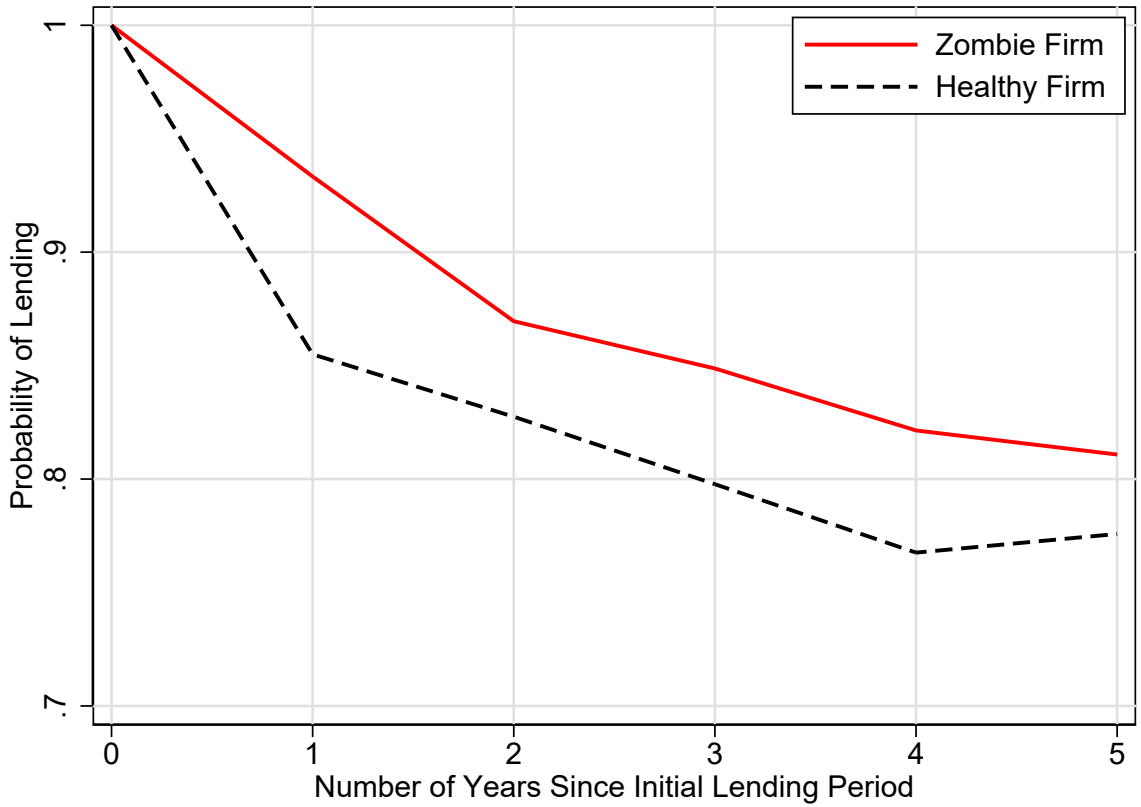
Figure: Share of Zombie Firms



Sources: Compustat, and authors' calculations.

Bank-borrowers Relationship

Figure: Persistent Bank-Borrower Relationship



Sources: Authors' calculations.

- Banks maintain longer lending relationships with zombie firms.

Bank Credit "Evergreening"

We estimate the following regression equation:

$$
\begin{aligned}
Log(Debt_{ibt}) = {} & \beta_1 StressedBank_b \times \text{Zombie}_i + \beta_2 StressedBank_b \times \text{Forbear}_t \\
& + \beta_3 Zombie_i \times \text{Forbear}_t \\
& + \beta_4 StressedBank_b \times \text{Zombie}_i \times \text{Forbear}_t \\
& + \gamma X_{it} + \theta_b + \eta_i + \phi_t + \epsilon_{ibt}, \qquad (1)
\end{aligned}
$$

- *Stressed bank*, *Zombie*, and *Forbear* are all dummy variables.
- Firm controls include log of assets, ICR, and the net liquid asset ratio.
- Bank, firm, and year fixed effects are included.

Bank Credit "Evergreening" (Time Invariant Zombie)

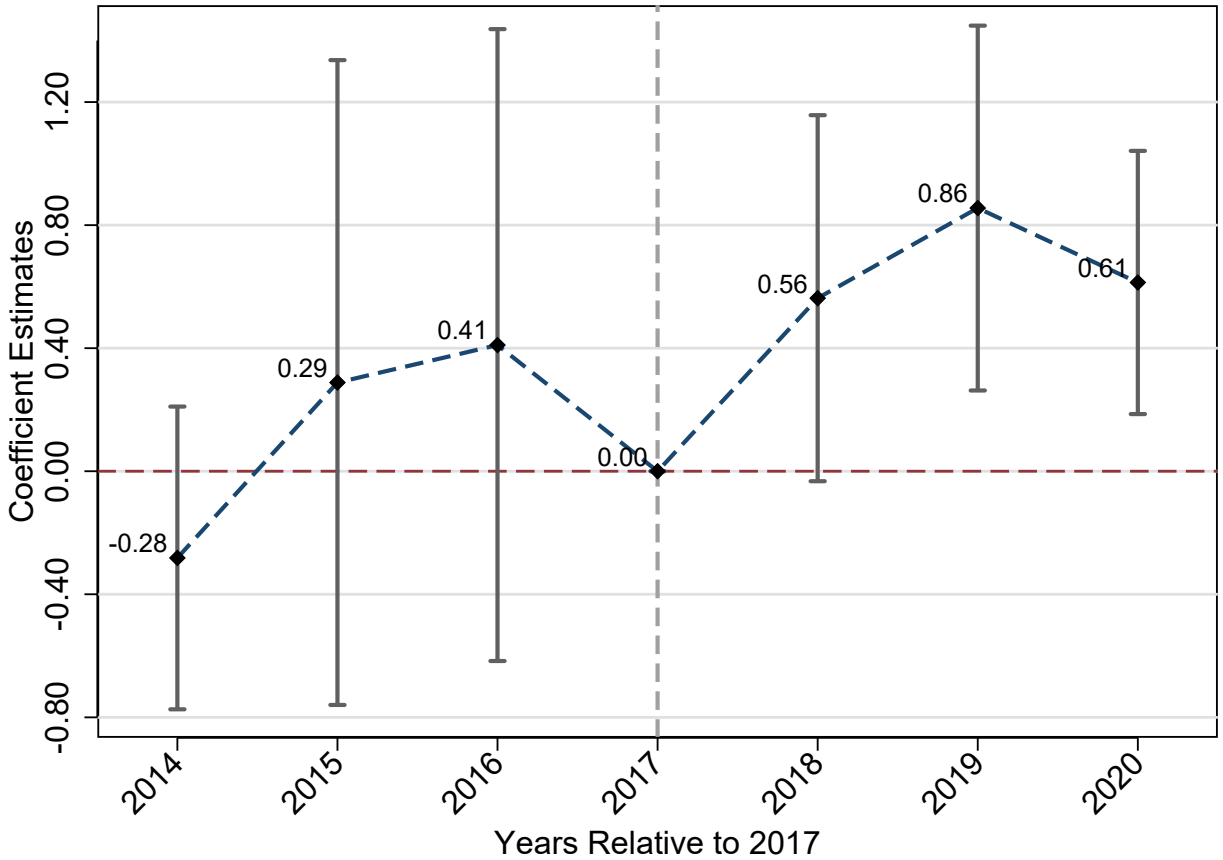
Table: Forbearance: Stressed Banks' Credit Supply to Zombie Firms

	Intensive Margin		Extensive Margin	
	Log(Debt$_t$) (1)	Log(Debt$_t$) (2)	New Loan (3)	New Loan (4)
Stressed bank×Zombie	-0.147	-0.277	-0.013	-0.010
	(0.222)	(0.233)	(0.014)	(0.008)
Stressed bank×Zombie ×Forbearance	0.582**	0.608*	-0.016	-0.013
	(0.288)	(0.316)	(0.034)	(0.031)
R^2	0.500	0.451	0.276	0.213
N	3,962	3,963	3,962	3,963
Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Firm Controls	Yes	Yes	Yes	Yes

Notes: This table reports the impact of forbearance on firm-level bank debt using a triple-interaction specification. Asterisks *, **, and ***, denote significance at the 10%, 5%, and 1% levels. The sample covers 2013–2020.

Bank Credit "Evergreening" (Time Invariant Zombie)

Figure: Event Study: Forbearance and Stressed Bank Lending to Zombie Firms



Notes: This figure presents event-study estimates of the impact of forbearance on stressed bank lending to zombie firms. Ninety-percent confidence intervals are reported.

Bank Credit "Evergreening" (Time Variant Zombie)

Table: Forbearance: Stressed Banks' Credit Supply to Zombie Firms

	Intensive Margin		Extensive Margin	
	Log(Debt$_t$) (1)	Log(Debt$_t$) (2)	New Loan (3)	New Loan (4)
Stressed bank × Zombie	-0.006	-0.065	-0.012	-0.007
	(0.207)	(0.220)	(0.016)	(0.009)
Stressed bank × Zombie × Forbearance	0.515**	0.670**	-0.017	-0.024
	(0.253)	(0.284)	(0.033)	(0.032)
R^2	0.500	0.452	0.276	0.214
N	3,962	3,963	3,962	3,963
Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Firm Controls	Yes	Yes	Yes	Yes

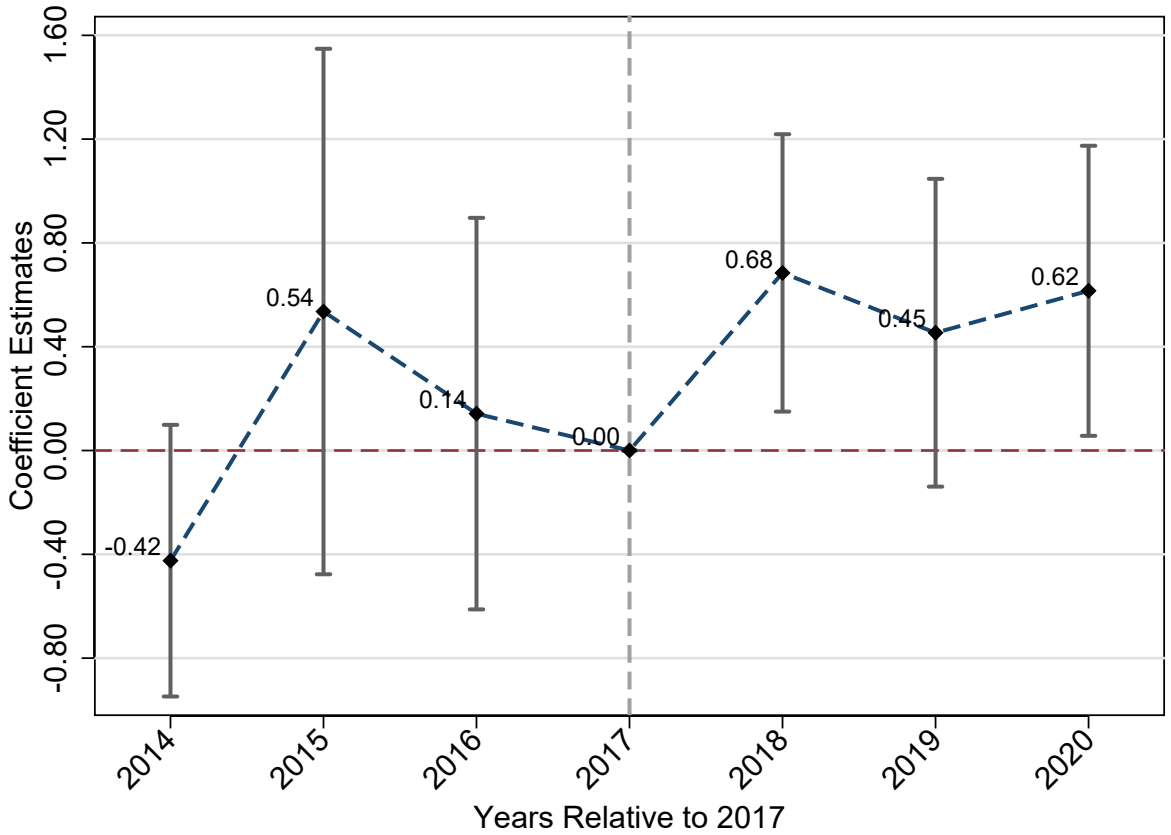
Notes: This table reports the impact of forbearance on firm-level bank debt using a triple-interaction specification. Asterisks *, **, and ***, denote significance at the 10%, 5%, and 1% levels. The sample covers 2013–2020.

- Approximately 51.5% more lending to zombie firms by the stressed banks
- **Heterogeneity Analysis:**

  (Credit-constrained Firms) and (Alternative Definition)

Bank Credit "Evergreening" (Time Variant Zombie)

Figure: Event Study: Forbearance and Stressed Bank Lending to Zombie Firms



Notes: This figure presents event-study estimates of the impact of forbearance on stressed bank lending to zombie firms. Ninety-percent confidence intervals are reported.

Forbearance and Bank Lending Rate

Table: Forbearance: Banks' Implicit Interest Rate on Loans to Zombie Firms

Variables	Interest Rate (1)	Interest Rate (2)	ΔInterest Rate (3)	ΔInterest Rate (4)
Stressed bank×Zombie×Forbearance	0.540	0.530	-0.567	-0.588
	(0.440)	(0.455)	(0.545)	(0.555)
R^2	0.709	0.702	0.153	0.142
N	3,958	3,958	3,772	3,772
Dependent Variable Mean (Healthy firms)	8.519	8.519	-0.319	-0.319
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Firm Controls	Yes	Yes	Yes	Yes

Notes: This table reports the impact of forbearance on the implicit interest rate using a triple-interaction specification. Asterisks *, **, and ***, denote significance at the 10%, 5%, and 1% levels. The sample covers 2013–2020.

Forbearance and Zombification

Table: Impact of Forbearance on Zombification

Variables	Zombie	Zombie	Zombie	Zombie
	(1)	(2)	(3)	(4)
Forbearance	0.168***	0.058***		0.043***
	(0.053)	(0.017)		(0.016)
Stressed bank				-0.013**
				(0.006)
Stressed bank×Forbearance			0.025***	0.024**
			(0.010)	(0.009)
R^2	0.815	0.809	0.816	0.809
N	3,962	3,963	3,962	3,963
Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Firm Controls	Yes	Yes	Yes	Yes

Notes: The dependent variable is a dummy variable that equals 1 if a firm becomes a zombie and 0 otherwise. Asterisks *, **, and ***, denote significance at the 10%, 5%, and 1% levels. The sample covers 2013–2020.

- The likelihood of a firm becoming zombie increased by about 16.8% during 2018-2020.

Stressed Bank Lending and Firms' Real Performance

Table: Impact of Forbearance on Firms' Real Outcomes

Variables	Sales Growth	Employment Growth	TFP Growth	$\frac{\text{Capital EXP.}}{\text{Total Asset}}$
	(1)	(2)	(3)	(4)
Panel A. Low-Quality Firm				
Stressed bank×Low-quality firm× Forbearance	-4.634**	0.735	-4.587*	0.347
	(2.301)	(2.830)	(2.557)	(0.571)
R^2	0.412	0.284	0.366	0.520
N	3,801	3,419	3,419	3,870
Panel B. Zombie Firm (Baseline Definition)				
Stressed bank×Zombie×Forbearance	-5.177*	0.577	-4.836*	-0.566
	(2.700)	(3.349)	(2.742)	(0.642)
R^2	0.417	0.284	0.369	0.520
N	3,794	3,413	3,413	3,860
Panel C. Alternative Zombie Definition-I				
Stressed bank×Zombie×Forbearance	-5.398*	-0.911	-4.167	-0.539
	(2.759)	(3.611)	(2.777)	(0.686)
R^2	0.425	0.284	0.374	0.518
N	3,794	3,413	3,413	3,860
Panel D. Alternative Zombie Definition-II				
Stressed bank×Zombie×Forbearance	-5.897**	-0.898	-3.891	-0.836
	(2.643)	(3.385)	(2.727)	(0.643)
R^2	0.416	0.284	0.368	0.520
N	3,794	3,413	3,413	3,860
Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes

Notes: This table reports the impact of forbearance on firms' real economic outcome using a triple-interaction specification. Asterisks *, **, and ***, denote significance at the 10%, 5%, and 1% levels. The sample covers 2013–2020.

Congestion Effects from Zombification

The following regression is estimated following the approach of **Caballero et al. (2008)**:

$$Y_{ist} = \beta_1 NZ\_dummy_{ist} + \beta_2 NZ\_dummy_{ist} \times ZShare_{st-1} + \gamma X_{ist-1} + \eta_i + \theta_{st} + \epsilon_{ist} \quad (2)$$

- NZ_dummy_{ist} equals 1 if a firm is non-zombie, and 0 otherwise.
- $ZShare_{st-1}$ represents the asset-weighted zombie share in each industry at time t-1.

Congestion Effects from Zombification

Table: Contagion Effects from Zombies to Non-zombies

Variables	Sales Growth	Employment Growth	TFP Growth	$\frac{\text{Capital EXP.}}{\text{Total Asset}}$
	(1)	(2)	(3)	(4)
Panel A. Full-Sample: Baseline Zombie Specification				
Non-Zombie × Zombie Share$_{t-1}$	-0.847***	0.018	-0.266***	-0.105***
	(0.234)	(0.104)	(0.070)	(0.016)
R^2	0.384	0.275	0.400	0.524
N	1,300	1,009	1,009	1,237
Dependent Variable Mean (Healthy firms)	3.263	2.829	-0.894	6.309
Panel B. Sub-Sample: Financially Constrained Firms				
Non-Zombie × Zombie Share$_{t-1}$	-1.148**	0.020	-0.222	-0.110***
	(0.419)	(0.140)	(0.179)	(0.007)
R^2	0.395	0.348	0.413	0.524
N	579	463	463	539
Dependent Variable Mean (Healthy firms)	0.668	2.586	-3.797	6.260
Firm FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Lagged Controls	Yes	Yes	Yes	Yes

Notes: Asterisks *, **, and ***, denote significance at the 10%, 5%, and 1% levels.

- Sales growth of healthy firms declined by 25.96%, TFP growth fell by 29.75%, and investment shrank by 1.66% due to the rise in the share of zombie firms.

Concluding Remarks

- We study a novel form of regulatory forbearance that operates not through capital relief, but through **institutional constraints on supervision**.
- We show that this led stressed banks to **evergreen loans to weak and zombie firms** relative to productive borrowers.
- These lending patterns did not improve zombie firm performance.
- Instead, they crowded out credit to healthy firms and generated large productivity and investment losses..
- The results underscore the unintended consequences of regulatory forbearance, **especially when borrowers cannot substitute bank credit with alternate forms of debt**.

Thank You

Zombie Lending

Forbearance: Stressed Banks' Credit Supply to Zombie Firms (bl).

	Intensive Margin		Extensive Margin	
Variables	$\text{Log}(\text{Debt}_t)$ (1)	$\text{Log}(\text{Debt}_t)$ (2)	New Loan (3)	New Loan (4)
Stressed bank×Zombie×Forbearance	1.000***	1.242***	-0.030	-0.027
	(0.346)	(0.353)	(0.079)	(0.068)
R^2	0.484	0.393	0.204	0.094
N	1,580	1,582	1,580	1,582
Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Firm Controls	Yes	Yes	Yes	Yes

Zombie Lending

Forbearance: Stressed Banks' Credit Supply to Zombie Firms (bl).

Variables	Intensive Margin		Extensive Margin	
	$\text{Log}(\text{Debt}_t)$ (1)	$\text{Log}(\text{Debt}_t)$ (2)	New Loan (3)	New Loan (4)
Panel A. Alternative Zombie Definition-I				
Stressed bank×Zombie× Forbearance	0.434*	0.553*	-0.021	-0.023
	(0.251)	(0.284)	(0.031)	(0.030)
R^2	0.500	0.451	0.277	0.213
N	3,962	3,963	3,962	3,963
Panel B. Alternative Zombie Definition-II				
Stressed bank ×Zombie× Forbearance	0.424*	0.556**	-0.020	-0.031
	(0.248)	(0.278)	(0.033)	(0.031)
R^2	0.500	0.451	0.277	0.214
N	3,962	3,963	3,962	3,963
Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Firm Controls	Yes	Yes	Yes	Yes