Credit Misallocation During the Financial Crisis

Fabiano Schivardi[1] Enrico Sette[2] Guido Tabellini[3]

[1]Luiss and EIEF [2]Banca d'Italia [3]Bocconi

Madrid, November 16, 2017

The analysis and conclusions expressed in this paper are those of the authors and should not be interpreted as those of the Bank of Italy - Part of this project has been carried out while Enrico Sette was visiting the BIS as a Central Bank Research Fellow

Motivation

- Legacy of financial crisis is a weakened banking sector
- Undercapitalized banks can exacerbate the crisis by reallocating credit to weak firms, to avoid further losses in their balance sheets (“zombie lending")
- Zombie lending may contribute to delay the recovery
- Italy ideal testing ground: no injection of public capital or bad bank (in our sample period)
- Bad loans and low capitalization improving, but still an issue today

What we do

- We ask two main questions:

What we do

- We ask two main questions:
  1. Do we observe zombie lending (i.e. lending by weak banks to weak firms)?

What we do

- We ask two main questions:

  1. Do we observe zombie lending (i.e. lending by weak banks to weak firms)?
  2. What is the cost of zombie lending, in terms of performance of healthy firms and misallocation of real resources?

What we do

- We ask two main questions:
    1. Do we observe zombie lending (i.e. lending by weak banks to weak firms)?
    2. What is the cost of zombie lending, in terms of performance of healthy firms and misallocation of real resources?
- We improve on the previous literature both in terms of data quality and methodologically
- As a consequence, our assessment of the effects differ substantially

What we do

- We ask two main questions:
  1. Do we observe zombie lending (i.e. lending by weak banks to weak firms)?
  2. What is the cost of zombie lending, in terms of performance of healthy firms and misallocation of real resources?
- We improve on the previous literature both in terms of data quality and methodologically
- As a consequence, our assessment of the effects differ substantially
- We do find evidence that weak banks lend more to zombies, but this hardly hurts healthy firms

Related literature

- Seminal paper by Caballero, Hoshi, Kashyap (2008) for Japan. Main message: zombie lending hurts non zombies. Confirmed by Acharya, Eisert, Eufinger, Hirsch (2016) for Europe during the crisis
- Other work on Japan in the 90s, Peek and Rosengren (2005), Kwon et al (2014), Giannetti and Simonov (2013).
- Evidence on the 2007-2008 financial crisis (Albertazzi and Marchetti 2010, Barnett et al. 2014).
- Growing literature on credit frictions and misallocation (Hsieh and Klenow 2009, Midrigan and Xu 2014 etc.) and more generally on misallocation and TFP (Olley and Pakes 1996, Bartelsmann et al 2013).

Plan of the talk

1. Describe the data
2. What is a zombie firm? How can we identify it empirically?
3. Do weak banks lend more to zombie firms?
4. Aggregate consequences of zombie lending: impact on non zombies and productivity dispersion

Data sources

- We match 3 data sources:

1. Firm data: balance sheets from CERVED – all limited liabilities companies. Important: representative and reduces biases.
2. Bank balance sheet data: Supervisory reports
3. Loans data: Credit registry. All firm-bank relationships above 30,000 euros. Amount granted and drawn – we look at granted, better measure of credit supply.

Data sources

- We match 3 data sources:

  1. Firm data: balance sheets from CERVED – all limited liabilities companies. Important: representative and reduces biases.
  2. Bank balance sheet data: Supervisory reports
  3. Loans data: Credit registry. All firm-bank relationships above 30,000 euros. Amount granted and drawn – we look at granted, better measure of credit supply.

Data span 2004 to 2013 (use data back to 2002 to define zombie firms).

Definition of Zombie Firms

- Main idea: a zombie is a firm with expected marginal return on capital below the risk adjusted market cost of capital
- Economic interpretation: returns on capital allocated to zombies would be higher elsewhere – misallocation
- A combination of low ROA and high leverage (low return and high risk)
    - Preferred Definition: zombie=1 if 3-years moving average of Ebitda/Assets $<$ prime rate and Leverage $>$ 40% – median Leverage in the year 2005 for low returns firms (roa<prime) that exited the market between 2006-2007 because of default (2005 first year for which this info is available).

Definition of Zombie Firms

- Main idea: a zombie is a firm with expected marginal return on capital below the risk adjusted market cost of capital
- Economic interpretation: returns on capital allocated to zombies would be higher elsewhere – misallocation
- A combination of low ROA and high leverage (low return and high risk)
  - Preferred Definition: zombie=1 if 3-years moving average of Ebitda/Assets $<$ prime rate and Leverage $>$ 40% – median Leverage in the year 2005 for low returns firms (roa<prime) that exited the market between 2006-2007 because of default (2005 first year for which this info is available).
  - Alternative definition: zombie=1 if 3-year m.a. of EBITDA / interest expenses <1 + similar condition on leverage

Firms Characteristics

	Mean	Median	25pct	75pct	S.D.	N
	Panel B: Crisis					
Non-Zombie Firms						
Leverage	23.92	23.05	6.71	36.36	19.09	582,406
ROA	5.54	5.26	1.77	9.46	8.50	582,406
Cash Hold / Assets	6.96	2.71	0.62	8.85	10.27	551,970
Liquidity / Assets	13.18	6.07	2.33	14.14	62.10	582,265
Assets (000 Euros)	9,414	1,999	896	5,049	119,134	582,406
Zombie Firms						
Leverage	56.84	52.89	45.88	63.58	15.06	119,488
ROA	-1.34	1.09	-3.35	3.35	7.98	119,488
Cash Hold / Assets	3.18	0.94	0.23	3.30	6.15	109,909
Liquidity / Assets	9.11	3.20	1.05	8.62	65.19	119,463
Assets (000 Euros)	12,896	3,156	1,245	8,653	79,031	119,488

Bank Variables

- Bank strength: Regulatory Capital Ratio (CR): ratio of total capital (Tier 1 and Tier 2) to risk-weighted assets – Minimum level: 8%.
- We construct **LowCap** as a dummy=1 if below the median (11%) to capture non linearities

Bank Variables

- Bank strength: Regulatory Capital Ratio (CR): ratio of total capital (Tier 1 and Tier 2) to risk-weighted assets – Minimum level: 8%.
- We construct **LowCap** as a dummy=1 if below the median (11%) to capture non linearities
- Other bank controls: liquidity ratio (cash and government bonds to total assets), interbank funding (interbank deposits and repos with commercial banks and total assets), ROA, log of assets.
- exclude mutual banks (bcc): they have to lend a certain share of their portfolio locally and to their shareholders.

Identification of Credit Supply effects

- Test if low capital ratio conducive to zombie lending during the crisis
  - Weak banks particularly loss averse: hard to reconstruct the capital ratio
- Challenge: distinguish demand from supply of credit
  - Zombies may have a different demand for credit
  - Zombies may disproportionately borrow from weak banks - non random matching

Use Khwaja-Mian (2008) identification approach

- First, consider growth of *granted* credit: Δ log of total credit granted (credit lines, term loans, loans backed by receivables)

- Second, rely on multiple bank relations: compare credit growth of the same firm by banks with different capital levels and include Firm*year FE to capture all firm specific time-varying unobservables. Multiple relations common in Italy (Guiso et al. 2000, Degryse et al. 2009, Gobbi and Sette 2014).

- Estimating equation:

$$\Delta \text{log credit}_{ijt} = \beta_0 + \beta_1 (Z_{it} * \text{LowCap}_{jt} * \textit{DummyCrisis}_t) + \\ + \beta_2 \mathbf{X_{ijt}} + \textit{Dummies} + \eta_{ijt}$$

Use Khwaja-Mian (2008) identification approach

- In addition we include relationship-level ctrls: share of total credit to firm accounted by bank, share of credit granted through credit lines
- Additional concern: capital ratio and lending related to unobserved bank characteristics – include bank controls, and bank*time FE.
- Std errors double clustered at the bank and firm level

Important: we look at the change in outstanding credit, this is a stock not a flow variable as it corresponds to the outstanding debt of a firm towards each of its lenders.

Results: Baseline specifications

	(1)	(2)	(3)	(4)	(5)	(6)
LowCap*Z*crisis	1.906**	1.745**	1.957***	2.042***	1.982***	1.893***
	(0.790)	(0.703)	(0.694)	(0.704)	(0.680)	(0.671)
LowCap*Z	-1.150	-0.845	-0.857	-0.993*	-0.864	-0.830*
	(0.745)	(0.614)	(0.593)	(0.581)	(0.580)	(0.492)
LowCap*crisis	2.156	2.790	2.658	2.281	0.514	
	(1.911)	(1.715)	(2.007)	(1.672)	(1.866)	
LowCap	-1.766	-2.189	-2.300	-1.597	-0.817	
	(1.790)	(1.598)	(1.664)	(1.606)	(1.960)	
Z*crisis	-4.578***					
	(0.637)					
Z	-3.088***					
	(0.468)					
Firm-bank cntrs	N	N	Y	Y	Y	Y
Bank Controls	N	N	N	Y	Y	N
Firm FE	Y	N	N	N	N	N
Time FE	Y	N	N	N	N	N
Firm*year FE	N	Y	Y	Y	Y	Y
Bank FE	N	N	N	N	Y	N
Bank*year FE	N	N	N	N	N	Y
Obs	3,656,203	3,656,203	3,656,203	3,654,795	3,654,794	3,656,184
Rsq	0.112	0.358	0.377	0.379	0.382	0.390

Main results

- Growth rate of credit to Zombies was 2% higher for banks with CR below the median- compared to an average growth of -8%
- Capital ratio does not matter before the crisis: evidence of zombie lending only during the crisis
    - Consistent with the view that capital requirements binding only during the crisis

Robustness and Extensions

- Robust to different definitions of zombie firms
- Robust to different definitions of weak banks
  - Only regulatory ratios matter: not leverage or ROA.

Robustness and Extensions

- Robust to different definitions of zombie firms
- Robust to different definitions of weak banks
  - Only regulatory ratios matter: not leverage or ROA.
- Other policies: weak banks less likely to:
  - severe a relationship with a zombie

Robustness and Extensions

- Robust to different definitions of zombie firms
- Robust to different definitions of weak banks
  - Only regulatory ratios matter: not leverage or ROA.
- Other policies: weak banks less likely to:
  - severe a relationship with a zombie
  - classify a loan to a zombie as bad - notice: at least in the short (medium?) term, zombie lending implies less not more NPLs.

Robustness and Extensions

- Robust to different definitions of zombie firms
- Robust to different definitions of weak banks
  - Only regulatory ratios matter: not leverage or ROA.
- Other policies: weak banks less likely to:
  - severe a relationship with a zombie
  - classify a loan to a zombie as bad - notice: at least in the short (medium?) term, zombie lending implies less not more NPLs.

Bottom line: significant evidence of zombie lending.

In progress: focus on crisis period (also include regressions of total credit at the firm-level) and results qualitatively unchanged.

Effects of zombie lending during the crisis

- Zombie lending can hurt healthy firms through two channels:
  1. Crowding out of bank credit
  2. Implicit subsidy and distorted competition for inputs and output
- Relevant market: sector-province-year *pt*

Effects of zombie lending during the crisis

- Zombie lending can hurt healthy firms through two channels:
  1. Crowding out of bank credit
  2. Implicit subsidy and distorted competition for inputs and output

- Relevant market: sector-province-year *pt*
- Caballero et al. 2008, Acharya et al. 2016:

$$\Delta\mu_{ipt} = \beta_0 + \beta_1 ShZ_{pt} + \beta_2(1 - Z_{ipt}) * ShZ_{pt} + \beta_3 Z_{ipt} + Dummies_{ipt} + \eta_{ipt}$$

Effects of zombie lending during the crisis

- Zombie lending can hurt healthy firms through two channels:
  1. Crowding out of bank credit
  2. Implicit subsidy and distorted competition for inputs and output

- Relevant market: sector-province-year *pt*
- Caballero et al. 2008, Acharya et al. 2016:

$$\Delta\mu_{ipt} = \beta_0 + \beta_1 ShZ_{pt} + \beta_2(1 - Z_{ipt}) * ShZ_{pt} + \beta_3 Z_{ipt} + Dummies_{ipt} + \eta_{ipt}$$

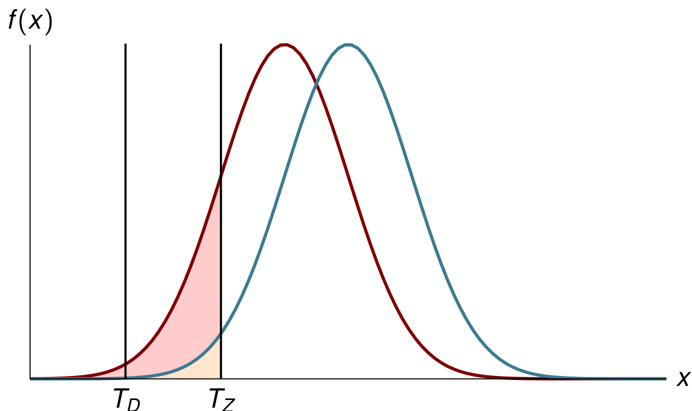
- A test of negative effects of Z on non Z is $\beta_2 < 0$.
- Identification challenge: *pt* shocks affect both ShZ_{pt} and firm performance
- Proposed solution: a full set of dummies at the *pt* level (β_1 drops out)

Problems in interpreting these regressions

$$\Delta\mu_{ipt} = \beta_0 + \beta_1 ShZ_{pt} + \beta_2(1 - Z_{ipt}) * ShZ_{pt} + \beta_3 Z_{ipt} + Dummies_{ipt} + \eta_{ipt}$$

- First, they can only identify the relative effects on non zombies
- Second, while they account for aggregate shocks, they face a more subtle identification issue
  - Define μ^Z as the mean performance of Z, and μ^{NZ} of non Z.
  - (Implicit) Identifying assumption: a shock at *pt* has the same effect on μ^{NZ} and μ^Z, absent negative spillovers
  - Necessary to attribute any relative change to spillovers
  - Unfortunately, this does not hold in general

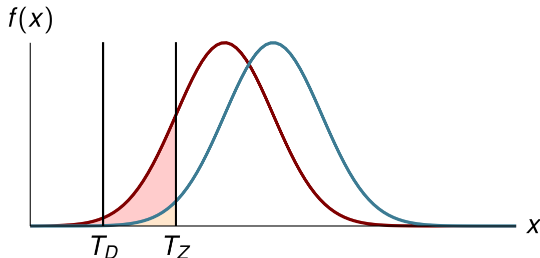
The effect of a common shock on zombies and non zombies



The figure plots two normal distributions with unit variance and mean $\mu_L = 4$ and $\mu_H = 5$, respectively. T_Z the zombie threshold and T_D is the exit threshold.

The effect of a common shock on zombies and non zombies

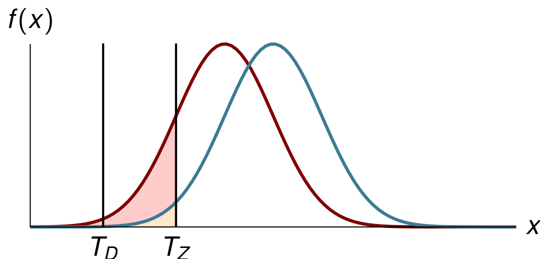
3 things happen



1. the share of zombies increases (the area to the left of Tz)

The effect of a common shock on zombies and non zombies

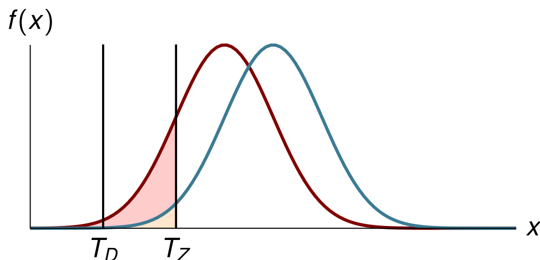
3 things happen



2. both conditional means μ_Z and μ_{NZ} change. Standard identification issue addressed in the literature

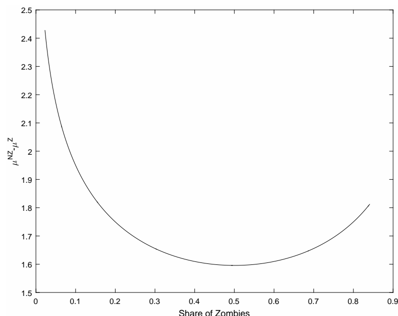
The effect of a common shock on zombies and non zombies

3 things happen



3. The difference in the conditional means $\mu_{NZ} - \mu_{Z}$ could be affected in a way which depends on the distribution.

Figure: Difference in non zombies vs. zombies average performance



Generate negative shocks which shifts the distribution to the left.
The graphs report the difference in the conditional mean of zombies and non zombies, $\mu_{NZ} - \mu_Z$ against the share of zombies.

- Negative correlation emerges just from firm heterogeneity, absent any spillovers!
- We find this correlation in the data, like the previous literature

Alternative identification scheme

- We propose a variable that moves the shares of zombies in a province-sector-year but that is orthogonal to local-sectoral shocks.

$$\overline{LowCap}_{pt} = \frac{\sum_j LowCap_{jt} * Credit_{jpt}}{\sum_j Credit_{jpt}}$$

- It captures the average degree of capitalization of banks lending in *pt*

Alternative identification scheme

- We propose a variable that moves the shares of zombies in a province-sector-year but that is orthogonal to local-sectoral shocks.

$$\overline{LowCap}_{pt} = \frac{\sum_j LowCap_{jt} * Credit_{jpt}}{\sum_j Credit_{jpt}}$$

- It captures the average degree of capitalization of banks lending in *pt*
- Likely to be exogenous with respect to local conditions prevailing in *pt*
  - Share of loans of each bank in a *pt* is on average 0.38%, median 0.03%
  - We have experimented excluding province-sectors that account for more than 5% of any bank loans, finding similar results
  - Remember we dropped mutual banks

Banks capital and firms performance

	(1)	(2)	(3)	(4)	(5)	(6)
	ΔLabour		ΔCapital		ΔSales	
$\overline{\text{LowCap}}$	0.027***		0.011		0.026***	
	(0.007)		(0.007)		(0.010)	
$\overline{\text{LowCap}}$*(1-Z)	-0.028***	-0.028***	-0.007	-0.001	-0.013**	-0.016***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)
Z	-0.060***	-0.060***	-0.015***	-0.012***	-0.053***	-0.055***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
$\beta_1 + \beta_2$	-0.001		0.004		0.013	
H_0: $\beta_1 + \beta_2 = 0$ (p-value)	0.878		0.4154		0.162	
Observations	966,968	966,968	916,559	916,559	965,755	965,755
R-squared	0.036	0.058	0.019	0.029	0.083	0.122
Province-Sector FE	YES	NO	YES	NO	YES	NO
Year FE	YES	NO	YES	NO	YES	NO
Prov-sect-year FE	NO	YES	NO	YES	NO	YES

Real Consequences - Evidence

- Labor: We do find a negative **relative** effect of $\overline{\text{LowCap}}$ on growth of healthy firms
- However, the **absolute** effect is zero
  - The negative relative effect comes from the fact that low capital banks help zombies, but do not hurt healthy firms
- Similar with capital and sales, and robust to modifications of the regression framework

Real Consequences - Evidence

- Labor: We do find a negative **relative** effect of $\overline{\text{LowCap}}$ on growth of healthy firms
- However, the **absolute** effect is zero
  - The negative relative effect comes from the fact that low capital banks help zombies, but do not hurt healthy firms
- Similar with capital and sales, and robust to modifications of the regression framework
- Something emerges when looking at the failure margin: low capitalization decreases failure of zombies and increase that of non zombies, even in absolute terms (Midrigan and Xu 2014).

Real Consequences - Evidence

- Labor: We do find a negative **relative** effect of $\overline{\text{LowCap}}$ on growth of healthy firms
- However, the **absolute** effect is zero
  - The negative relative effect comes from the fact that low capital banks help zombies, but do not hurt healthy firms
- Similar with capital and sales, and robust to modifications of the regression framework
- Something emerges when looking at the failure margin: low capitalization decreases failure of zombies and increase that of non zombies, even in absolute terms (Midrigan and Xu 2014).
- We also perform an analysis of TFP dispersion as a measure of misallocation (Hisieh-Klenow 2009). Some (weak) evidence that lower bank capitalization increases misallocation at the province-sector level

Evaluating the aggregate consequences of low capitalized banks

- Policy experiment: increase the capital ratio so that all banks are above the median so that $\overline{LowCap}_{pt}$ goes from an average of 0.45 to zero (4 billions required).
- effect between 0.18% and 0.35% per year.

Evaluating the aggregate consequences of low capitalized banks

- Policy experiment: increase the capital ratio so that all banks are above the median so that $\overline{LowCap}_{pt}$ goes from an average of 0.45 to zero (4 billions required).
- effect between 0.18% and 0.35% per year.
- Contrary to previous results, it suggests that contribution of zombie lending to GDP contraction (average -3.7%) has been at best modest
- Potentially a cost-effective policy as 4 billions are about 0.2% of GDP.

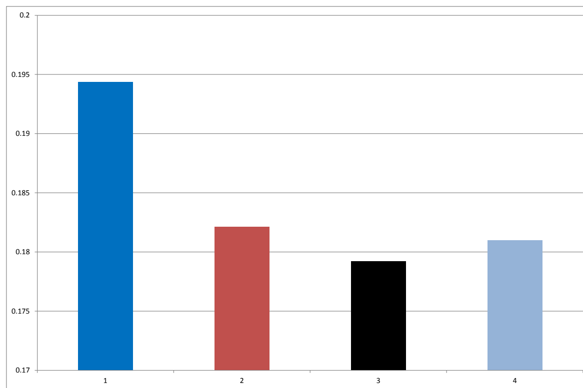
Conclusion

- We study the extent to which credit misallocation affects resources misallocation and, in this way, economic performance.
- Weak banks (low capital banks) are relatively more likely to lend to weak firms during the crisis.
- Real effects are however small: low capitalized banks sustain zombies but do not hurt healthy firms
    - Why? Local demand externalities, low competition for inputs, prevents disruptions of supply chains
- Suggests credit misallocation caused by zombie lending not first order explanation for depth (and length?) of the crisis.
- Does not mean that recapitalizing banks is not useful.
- Things might be different during the recovery phase (although survey evidence suggests healthy firms are obtaining desired amount of credit in Italy, possibly also thanks to ECB policies?).

Conclusion

THANK YOU FOR YOUR ATTENTION

Share of credit to zombies by quartile of the capital ratio



Back

Alternative definitions of zombie firms

	(1)	(2)	(3)	(4)	(5)	(6)
	Definition of zombie firm					
	Zombie 2		PC 1		PC 2	
LowCap*Z*crisis	1.746***	1.855***	1.437***	1.527***	1.567***	1.648***
	(0.564)	(0.601)	(0.394)	(0.413)	(0.387)	(0.412)
LowCap*Z	-0.112	-0.239*	-0.574*	-0.652***	-0.741**	-0.819***
	(0.348)	(0.127)	(0.330)	(0.106)	(0.325)	(0.068)
LowCap*crisis	0.690		0.787		0.669	
	(1.953)		(1.936)		(1.919)	
LowCap	-0.965		-0.947		-0.871	
	(2.044)		(2.031)		(2.019)	
Bank FE	Y	N	Y	N	Y	N
Bank*year FE	N	Y	N	Y	N	Y
Obs	3,569,638	3,570,983	3,654,794	3,656,184	3,569,638	3,570,983
Rsq	0.379	0.388	0.382	0.390	0.3780	0.388

Back

Alternative definitions of weak banks

	(1)	(2)	(3)	(4)	(5)
	Bank's strength definition				
	Capratio<median yby	Capratio<9	Capratio	T1 Ratio<5	T1 Ratio
BankCap*Zombie*Crisis	1.190*	2.452***	-0.398**	3.366***	-0.098
	(0.630)	(0.807)	(0.167)	(0.827)	(0.117)
BankCap*Zombie	0.252	0.160	0.123	-0.877	0.100
	(0.557)	(0.629)	(0.138)	(0.822)	(0.114)
BankCap*Crisis	-3.387***	-1.368	0.796**	5.835***	0.764***
	(1.090)	(1.257)	(0.382)	(2.164)	(0.247)
BankCap	2.187*	0.691	-0.440	-8.326***	-0.464
	(1.319)	(1.345)	(0.494)	(2.791)	(0.505)
Firm*year FE	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y
Obs	3654794	3654794	3654794	3654794	3654794
Rs	0.382	0.382	0.382	0.382	0.382

Back

Extensive Margin Regressions

Dependent variable: dummy=1 if the credit relationship is severed

	(1)	(1)	(3)	(4)	(5)
LowCap*Z*crisis	-0.831**	-0.661*	-0.703*	-0.726*	-0.760*
	(0.414)	(0.390)	(0.401)	(0.393)	(0.391)
LowCap*Z	-0.073	-0.134	-0.076	-0.107	-0.094
	(0.169)	(0.175)	(0.177)	(0.163)	(0.163)
LowCap*Crisis	-1.041**	-1.056***	-1.351***	-1.213***	
	(0.428)	(0.371)	(0.385)	(0.315)	
LowCap	0.611*	0.713**	0.475	1.051***	
	(0.319)	(0.302)	(0.329)	(0.289)	
Bank FE	N	N	N	Y	N
Bank*year FE	N	N	N	N	Y
Obs	4,331,355	4,331,355	4,329,493	4,329,493	4,331,341
Rsq	0.465	0.481	0.483	0.492	0.495

Back

Banks’ decision to classify a loan as non-performing

	(1) Bad Loan	(2) Sub-Standard	(3) Past due
LowCap*Z*crisis	-0.538**	-0.597***	0.535***
	(0.255)	(0.171)	(0.188)
LowCap*Z	-0.009	0.201**	-0.140
	(0.056)	(0.081)	(0.111)
LowCap*Crisis	0.139**	-0.218**	-0.085
	(0.067)	(0.108)	(0.151)
LowCap	-0.076	0.031	0.116
	(0.048)	(0.067)	(0.194)
Obs	4,099,406	4,099,406	4,099,406
Rsq	0.747	0.561	0.374

Back

Firm growth and Share of Zombie Firms

Dependent variable: ΔLabour

	(1)	(2)
ShZ	-0.042**	
	(0.018)	
ShZ*(1-Z)	-0.067***	-0.058***
	(0.013)	(0.013)
$\beta_1 + \beta_2$	-0.109	
Test $\beta_1 + \beta_2 = 0$ (p-val)	0.000	
Observations	966,968	966,968
R-squared	0.036	0.058
Province-Sector FE	YES	NO
Year FE	YES	NO
Prov-sect-year FE	NO	YES

Back

Firm failure and banks capital ratio

$$F_{ipt} = \gamma_0 + \gamma_1 \overline{LowCap}_{pt} + \gamma_2(1 - Z_{ipt}) * \overline{LowCap}_{pt} + \gamma_3 Z_{ipt} + Dummies_{ipt} + \nu_{ipt}$$

	(1)	(2)	(3)
	Linear probability		Probit
$\overline{\text{LowCap}}$	-0.877***		-0.620***
	(0.376)		(0.233)
$\overline{\text{LowCap}}$*(1-Z)	1.682***	1.732***	1.413***
	(0.374)	(0.383)	(0.210)
Z	6.079***	6.010***	4.686***
	(0.256)	(0.260)	(0.131)
$\gamma_1 + \gamma_2 = 0$	0.805***		0.792***
	(0.194)		(0.203)
Year FE	Y	N	Y
Prov*sect FE	Y	N	Y
Prov*sect*year FE	N	Y	N
Obs	1,150,661	1,150,661	1,150,661
Rsq	0.016	0.020	0.038

Back

Real Consequences - Productivity dispersion

- Further implication of credit misallocation: the dispersion of (revenue) productivity across firms should increase with zombie lending.
- Regression of the standard deviation of TFPR at the sector-province-year level on *LowCapitalRatio*
- Weak banks may misallocate credit only if a market is populated by zombies, hence also important to interact with the share of zombie firms.

Back

TFP dispersion and credit to zombies

$$SD(TFP)_{pt} = \lambda_0 + \lambda_1 \overline{LowCap}_{pt} + \lambda_2 \Delta TFP_{pt} + \lambda_3 \overline{LowCap}_{pt} * ShZ_{pt} + \\ + \lambda_4 ShZ_{pt} + Dummies_{pt} + \eta_{pt}$$

	(1)	(2)	(3)	(4)
$\overline{\text{LowCap}}$	-0.001	-0.001	-0.037***	-0.029***
	(0.008)	(0.006)	(0.010)	(0.008)
ShZ			-0.037	0.013
			(0.025)	(0.022)
$\overline{\text{LowCap}}$*ShZ			0.154***	0.139***
			(0.039)	(0.031)
Tfp growth	-0.054***	-0.076***	-0.053***	-0.073***
	(0.013)	(0.008)	(0.013)	(0.008)
Observations	9,191	10,868	9,191	10,868
R-squared	0.824	0.871	0.826	0.872

Back