"Inspect what you expect to get respect" Can bank supervisors kill zombie lending?

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Issue: Zombie lending

- What
  - Caballero et al. (2008 AER) "continuing to lend to otherwise insolvent firms"
- Where
  - In most high-income countries
    - Adalet McGowan et al. (forth EconPolicy)
- When
  - Typically following financial and economic crises
    - Japan in the 1990s; European countries in the 2010s
- Why
  - Banks avoid costs of reporting losses on their portfolios; gambling for resurrection

Why do we care

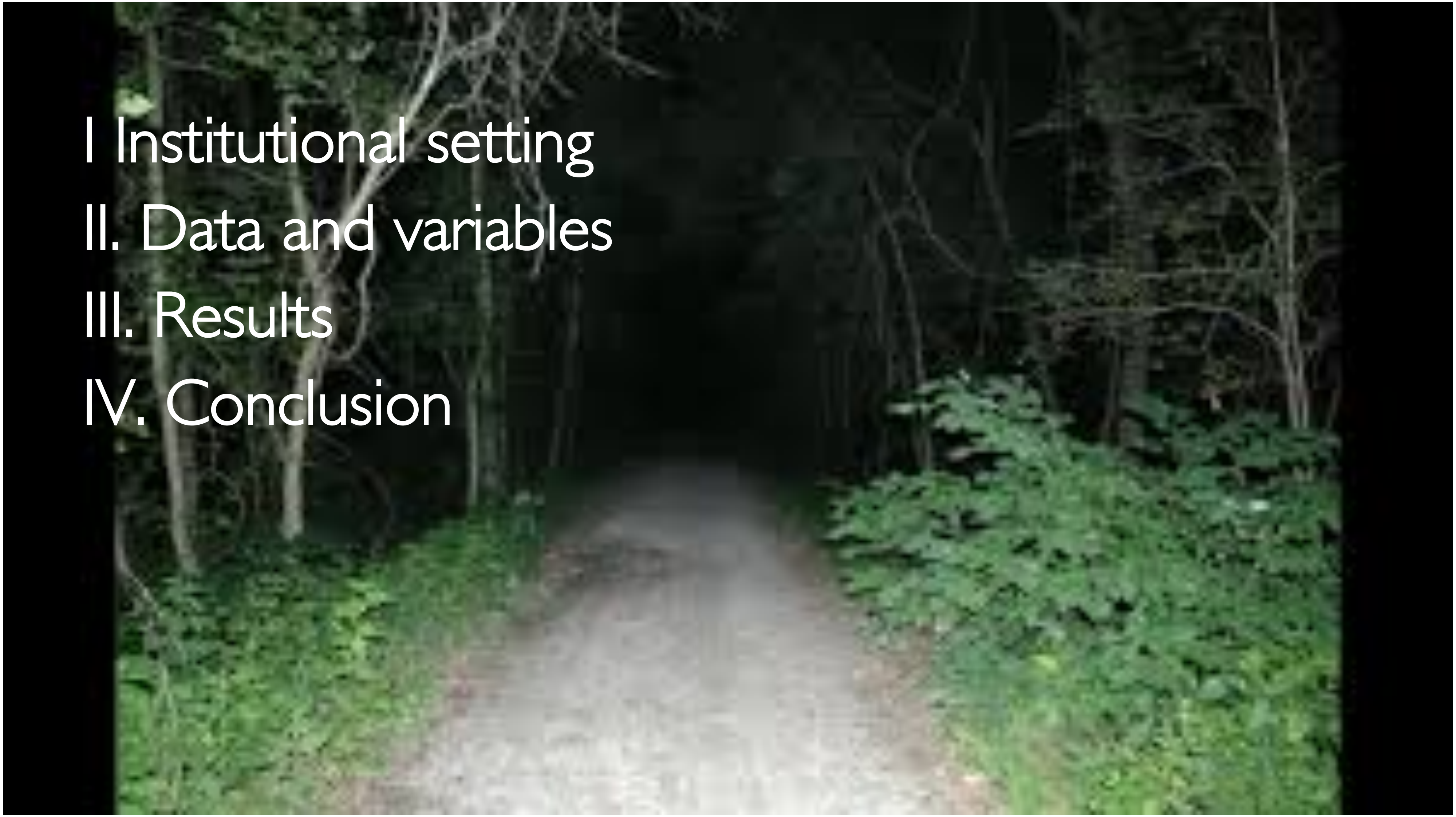
- Credit misallocation can contribute to low aggregate productivity and economic growth
  - Caballero et al. (2008 AER); Schivardi et al. (2017); Storz et al. (2017); Acharya et al. (forth. RFS)
  - Zombie firms can negatively affect more productive firms through both product and credit markets
- Zombie lending can prolong periods of crisis
  - Laeven and Valencia (2018): more than half of the banking crises lasted at least 5 years and generated a median cumulative output loss of 35% of GDP
- But it might be hard to draw the line between evergreening and relationship banking in a crisis
  - Bolton et al. (2016 RFS)

This paper

- We analyze the effectiveness of supervision in mitigating zombie lending:
  - Special on-site inspections of the banks' credit portfolios
    - Largest Portuguese banks subject to the inspections
    - Much more intrusive and granular assessment
    - We analyze how the inspections affect banks' refinancing behavior of zombie firms

What we find

- We start by providing evidence that zombie lending is also prevalent in Portugal
  - 22% of the firms that are refinanced have equity<0
- An inspected bank becomes on average 4 pp less likely to refinance a zombie firm
  - Average refinancing rate is around 20%
- Banks appear to change their lending behavior after the imposed recognition of losses


I Institutional setting
II. Data and variables
III. Results
IV. Conclusion

I. INSTITUTIONAL SETTING

Background information

- Portugal under a financial assistance program between 2011 and 2014
  - *Troika*: IMF, EC, and ECB
- Concerns about the quality of the credit portfolios of the banking sector motivated a program of special on-site inspections, which involved:
  - Steering committee
    - Troika, Bank of Portugal, and experts from three other central banks (Spain, Belgium, and France)
  - External auditors
    - Ernst and Young and PricewaterhouseCoopers
- This setup allows us to investigate the impact of supervisory bank inspections

The on-site inspections

- Coverage
  - Only 8 largest national banking groups (80% of total)
- Objectives
  - Assess the quality of credit portfolios
- Execution
  - Sample of exposures extracted from portfolios (56% of total)
  - Auditors analyze selected exposures one-by-one
- Intrusive assessment
  - On-site inspections facilitate information flow
  - Inspectors could seek additional information from borrowers

Sectoral inspection

- Sectors eligible
  - Construction and real estate
    - Some firms in sectors with close links (suppliers, tourism)
- Timeline
  - Carried out from July to November of 2012
  - Final report in December of 2012
- Outcome
  - Inspected banks had to reinforce impairments by €861 million (2.2% of the overall amount of exposures assessed)

II. DATA AND VARIABLES

Data

- Period of analysis: 2005-2015 (quarterly data)
- Loan-level
  - Credit register contains all loans of at least €50
  - Reporting is mandatory for all financial institutions
- Firm-level information
  - All firms operating in Portugal
  - Balance sheet and income statement information
- Bank-level information
  - Accounting data

Main variables

Variable	Mean	Standard Deviation
Dependent variables		
New loan	0.208	0.348
Loan growth	0.108	0.243
Zombie firm		
Negative equity	0.223	0.416
Low interest coverage	0.358	0.475
Weak bank		
Low ROA	0.423	0.422
Relationship characteristics		
Duration of relationship (months)	60.300	43.500
Main bank	0.606	0.435
On default with current bank	0.077	0.240

Variables and descriptives (cont.)

Variable	Mean	Standard Deviation
Other firm characteristics		
Micro firm	0.817	0.385
Financial leverage	0.762	0.653
Firm ROA	-0.067	0.269
Other bank characteristics		
Bank ROA	0.071	0.839
Capital ratio	0.123	0.033
Credit overdue	0.055	0.042
Bank size	9.600	1.740

III. RESULTS

Methodology

- Loan-level regressions (firm-bank-time)
- Most saturated specification:

$$NewLoan_{fbt} = \delta\left(Zombie_{ft} \times Inspected_b \times Post_t\right) + \alpha_{ft} + \alpha_{bt} + \alpha_{fb} + \varepsilon_{fbt}$$

- Controls for matching between firms and banks
- Period: 4 quarters before/after the inspection
  - Inspection period dropped

How inspections affect lending behavior?

Inspected Sectors: Construction and Real Estate				
Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.051***	-0.035***	-0.038***	-0.044***
	[-5.569]	[-2.894]	[-3.098]	[-3.351]
Inspected bank × Zombie firm	0.005	-0.018**	-0.017**	
	[0.845]	[-2.189]	[-2.036]	
Inspected bank × Post	0.003	0.001		
	[0.667]	[0.189]		
Zombie firm × Post	0.025***			
	[3.660]			
Year-quarter FE	Yes	-	-	-
Firm FE	Yes	-	-	-
Firm×Year-quarter FE	-	Yes	Yes	Yes
Bank FE	Yes	Yes	-	-
Bank×Year-quarter FE	-	-	Yes	Yes
Firm×Bank FE	-	-	-	Yes
Number of observations	207,423	207,423	207,423	207,423
R-squared	0.209	0.447	0.454	0.622

Inspections mitigate zombie lending

Inspected Sectors: Construction and Real Estate

Dependent variable:	New loan from existing lender			
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Inspected banks prior to inspections

Inspected Sectors: Construction and Real Estate				
Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.051***	-0.035***	-0.038***	-0.044***
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Inspected banks vis-à-vis healthy firms

Inspected Sectors: Construction and Real Estate

Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.051***	-0.035***	-0.038***	-0.044***
	[-5.569]	[-2.894]	[-3.098]	[-3.351]
Inspected bank × Zombie firm	0.005	-0.018**	-0.017**	
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Year-quarter FE	Yes	-	-	-
Firm FE	Yes	-	-	-
Firm×Year-quarter FE	-	Yes	Yes	Yes
Bank FE	Yes	Yes	-	-
Bank×Year-quarter FE	-	-	Yes	Yes
Firm×Bank FE	-	-	-	Yes
Number of observations	207,423	207,423	207,423	207,423
R-squared	0.209	0.447	0.454	0.622

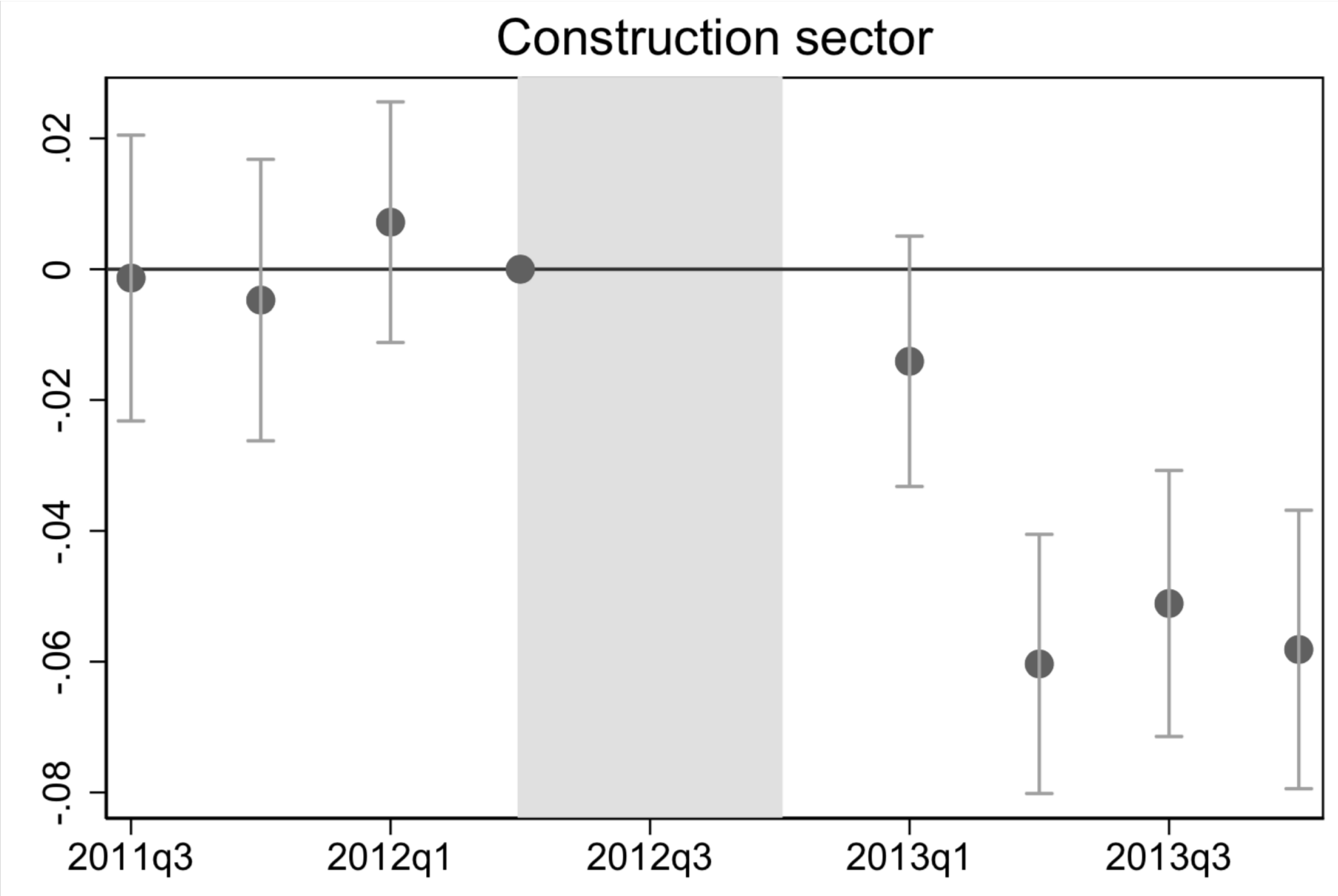
Non-inspected banks: their problem now?

Inspected Sectors: Construction and Real Estate				
Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.051***	-0.035***	-0.038***	-0.044***
	[-5.569]	[-2.894]	[-3.098]	[-3.351]
Inspected bank × Zombie firm	0.005	-0.018**	-0.017**	
	[0.845]	[-2.189]	[-2.036]	
Inspected bank × Post	0.003	0.001		
	[0.667]	[0.189]		
Zombie firm × Post	0.025***			
	[3.660]			
Year-quarter FE	Yes	-	-	-
Firm FE	Yes	-	-	-
Firm×Year-quarter FE	-	Yes	Yes	Yes
Bank FE	Yes	Yes	-	-
Bank×Year-quarter FE	-	-	Yes	Yes
Firm×Bank FE	-	-	-	Yes
Number of observations	207,423	207,423	207,423	207,423
R-squared	0.209	0.447	0.454	0.622

Important checks

- Parallel trends
  - Inspected and non-inspected banks were reducing exposure to zombies at the same rate
  - Plot period-by-period coefficients
- Inspected and non-inspected banks comparable
  - Inspected banks are larger
  - Compare smaller inspected banks with larger non-inspected banks

Period-by-period coefficients



Smallest inspected vs. largest non-inspected

Inspected Sectors: Construction and Real Estate

Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.065***	-0.073*	-0.076**	-0.092**
	[-3.584]	[-1.927]	[-2.002]	[-2.362]
Inspected bank × Zombie firm	0.046***	0.052*	0.056*	
	[3.150]	[1.799]	[1.934]	
Inspected bank × Post	0.008	-0.023		
	[1.031]	[-1.622]		
Zombie firm × Post	0.025**			
	[2.387]			
Year-quarter FE	Yes	-	-	-
Firm FE	Yes	-	-	-
Firm×Year-quarter FE	-	Yes	Yes	Yes
Bank FE	Yes	Yes	-	-
Bank×Year-quarter FE	-	-	Yes	Yes
Firm×Bank FE	-	-	-	Yes
Number of observations	57,008	57,008	57,008	57,008
R-squared	0.351	0.540	0.544	0.701

Effect becomes 2x larger

Inspected Sectors: Construction and Real Estate				
Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.065***	-0.073*	-0.076**	-0.092**
	[-3.584]	[-1.927]	[-2.002]	[-2.362]
Inspected bank × Zombie firm	0.046***	0.052*	0.056*	
	[3.150]	[1.799]	[1.934]	
Inspected bank × Post	0.008	-0.023		
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Zombie firm × Post	0.025**			
	[2.387]			
Year-quarter FE	Yes	-	-	-
Firm FE	Yes	-	-	-
Firm×Year-quarter FE	-	Yes	Yes	Yes
Bank FE	Yes	Yes	-	-
Bank×Year-quarter FE	-	-	Yes	Yes
Firm×Bank FE	-	-	-	Yes
Number of observations	57,008	57,008	57,008	57,008
R-squared	0.351	0.540	0.544	0.701

Mechanisms

1) Recognition of losses
   – Banks forced to reinforce impairments, reducing the cost of "pulling the plug" on zombie firms

2) Inspections can have a disciplining role
   – Banks internalize costs of future inspections and reduce zombie lending across the board

Testing for the mechanism

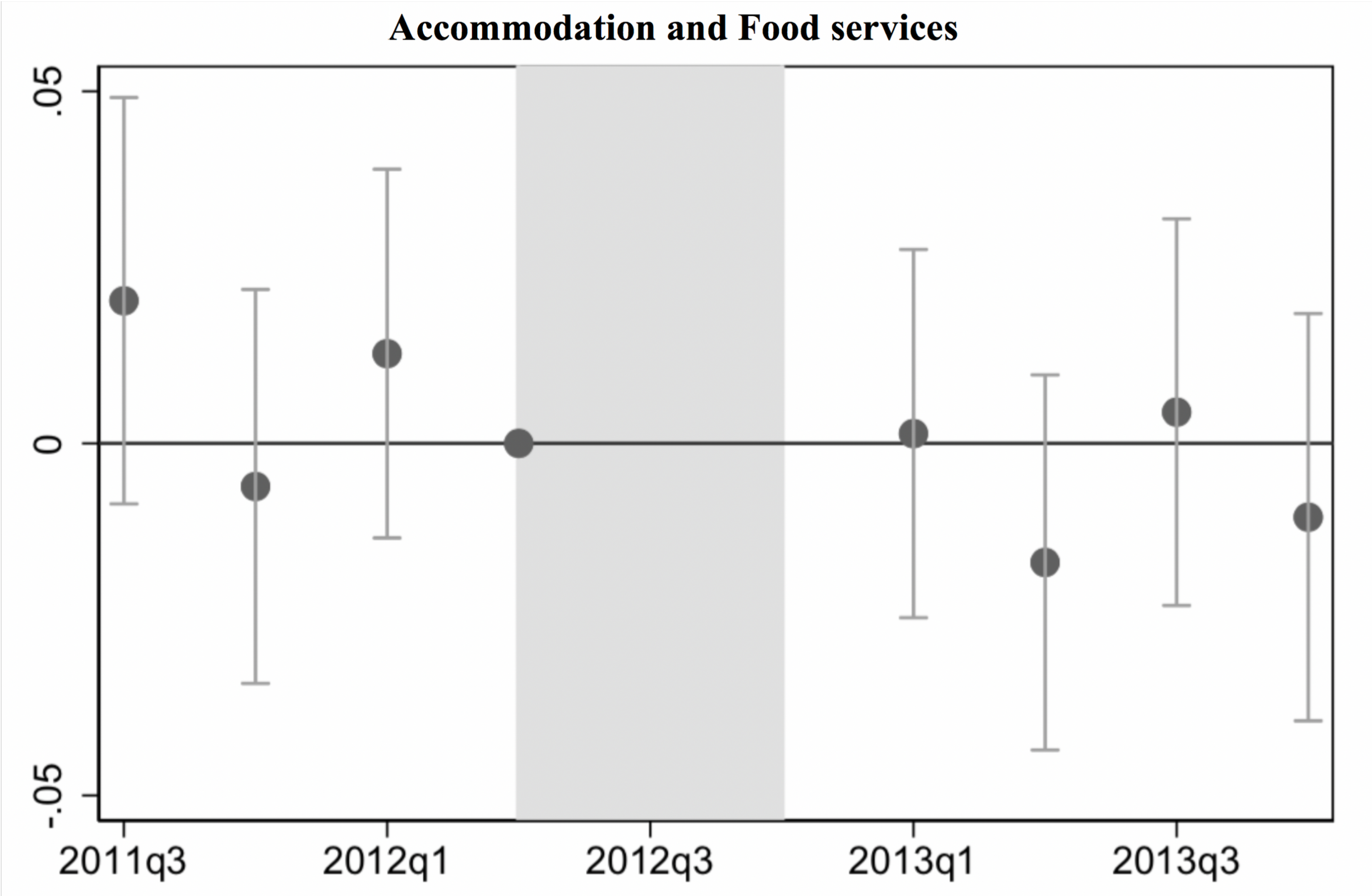
- Check whether zombie lending changed in comparable and uninspected sectors!
- Accommodation and food services
  - Uninspected sector
  - Similar economic fundamentals make it a good counterfactual

No change in zombie lending behavior…

Non-inspected sectors: Accommodation and Food Services

Dependent variable:	New loan from existing lender			
	(1)	(2)	(3)	(4)
Inspected bank × Zombie firm × Post	-0.000	-0.005	-0.008	-0.008
	[-0.038]	[-0.330]	[-0.469]	[-0.462]
Inspected bank × Zombie firm	-0.006	-0.008	-0.008	
	[-0.851]	[-0.698]	[-0.714]	
Inspected bank × Post	0.001	0.011		
	[0.174]	[1.187]		
Zombie firm × Post	-0.003			
	[-0.361]			
Year-quarter FE	Yes	-	-	-
Firm FE	Yes	-	-	-
Firm×Year-quarter FE	-	Yes	Yes	Yes
Bank FE	Yes	Yes	-	-
Bank×Year-quarter FE	-	-	Yes	Yes
Firm×Bank FE	-	-	-	Yes
Number of observations	68,227	68,227	68,227	68,227
R-squared	0.202	0.458	0.471	0.647

Period-by-period coefficients



Mechanism

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IV. Conclusion

- We analyze how a series of special and large-scale on-site inspections made on the credit portfolios of several Portuguese banks affect their future lending decisions.
- Inspected banks become 4 pp less likely to refinance a firm with negative equity following an inspection.
- Our results indicate that making banks take a “big bath” is what drives their new lending behavior.

Thanks!
Comments welcome!

1. WHO REFINANCES ZOMBIE FIRMS

Methodology

- Which bank and relationship characteristics make a lender more likely to refinance a zombie firm?
- Methodology
  - Select all zombie firms with outstanding loans from at least two lenders
    - Firm×Year fixed effects (Khwaja and Mian, 2008)

Results

Dependent variable:	New loan from existing lender
Bank characteristics	
Bank ROA	-0.010***
	[-11.711]
Credit overdue	-0.004***
	[-19.543]
Log(Bank Assets)	0.030***
	[62.485]
Relationship characteristics	
Duration of relationship	0.000***
	[8.571]
Main bank	0.128***
	[57.440]
In default with current bank	0.188***
	[72.419]
Firm-year-quarter FE	Yes
Number of observations	427,587
R-squared	0.417

Bank profitability matters

	Dependent variable: New loan from existing lender
Bank characteristics	
Bank ROA	-0.010***
	[-11.711]
Credit overdue	-0.004***
	[-19.543]
Log(Bank Assets)	0.030***
	[62.485]
Relationship characteristics	
Duration of relationship	0.000***
	[8.571]
Main bank	0.128***
	[57.440]
In default with current bank	0.188***
	[72.419]
Firm-year-quarter FE	Yes
Number of observations	427,587
R-squared	0.417

5.5% of the average zombie refinancing rate