

Kicking the Can Down the Road: Government interventions in the European banking sector

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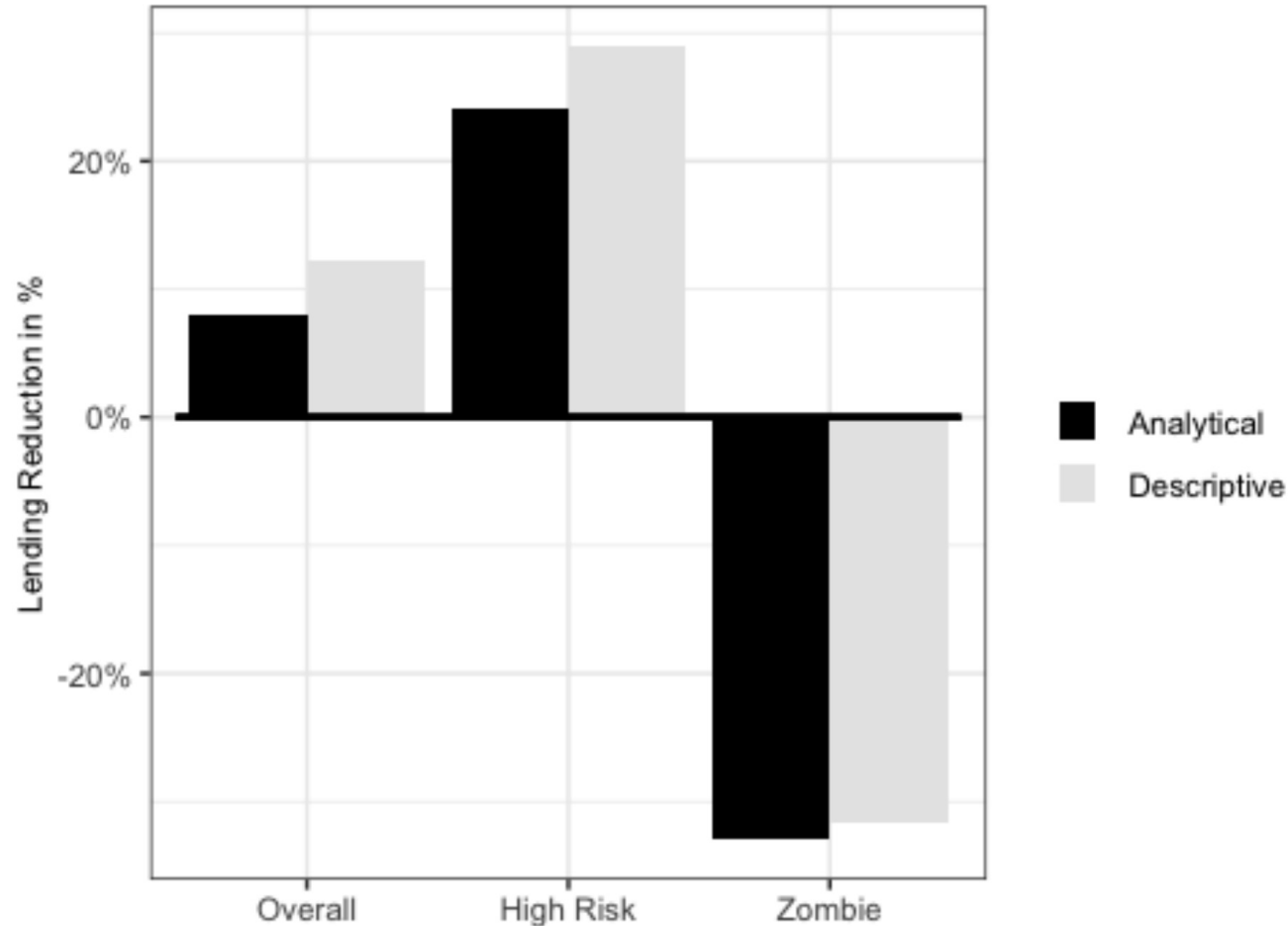
Federal Deposit Insurance Corporation

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Motivation

- Eurozone sovereign debt crisis characterized by deteriorating banking sector health
 - NPLs/loans increase from 5.2% (2009) to 8.1% (2012)
 - Emergence of sovereign-bank doom-loop
- Problems mainly concentrated in GIIPS countries
 - DE: NPLs (% Loans) decrease from 3.3% (2009) to 2.9% (2012)
 - GIIPS: NPLs (% Loans) **increase** from 6.5% (2009) to **11.2%** (2012)
- Why did GIIPS banks perform so much worse than non-GIIPS banks?
- This paper: Deterioration of banks performance as result of insufficient government support during the financial crisis

Key result: Undercapitalization distorts lending incentives



“Excess reduction” in lending by undercapitalized banks relative to better capitalized banks

Key idea

- Sovereign fiscal capacity affects intervention decision
- Bailout decision: Gvt's trade off fin. stability vs. fiscal costs
 - High debt levels: Debt issuances threaten debt sustainability
- Sovereign debt overhang -> regulatory forbearance (may seem) optimal
 - Postponing costly capital interventions as a gamble for resurrection
 - But: Debt overhang on bank balance may distort lending decision

This paper

- Did fiscally constrained eurozone governments delay necessary recapitalizations of distressed banks?
- Are some banks still undercapitalized after the 2008-2009 global financial crisis (GFC)?
- How do undercapitalized banks act differently compared to better capitalized banks?
- What are the consequences? Real, bank balance sheet, etc.?

Data

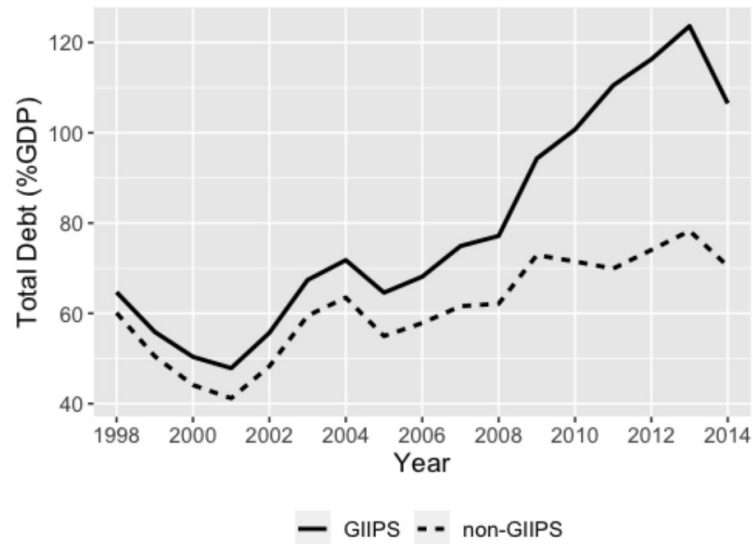
- All government interventions for eurozone banks 2007-12
 - Detailed information: (1) Recap's, (2) guarantees, (3) other liquidity support, (4) troubled asset relief (Laeven and Valencia, 2008)
- Matched with bank-level financial data: Bankscope
 - 830 banks: 134 obtain at least one support measure 2007-12
- Syndicated loan data: Dealscan
 - Loans hand-matched with firm-level data from Amadeus
- Macro-level data: Eurostat

Measuring fiscal constraints

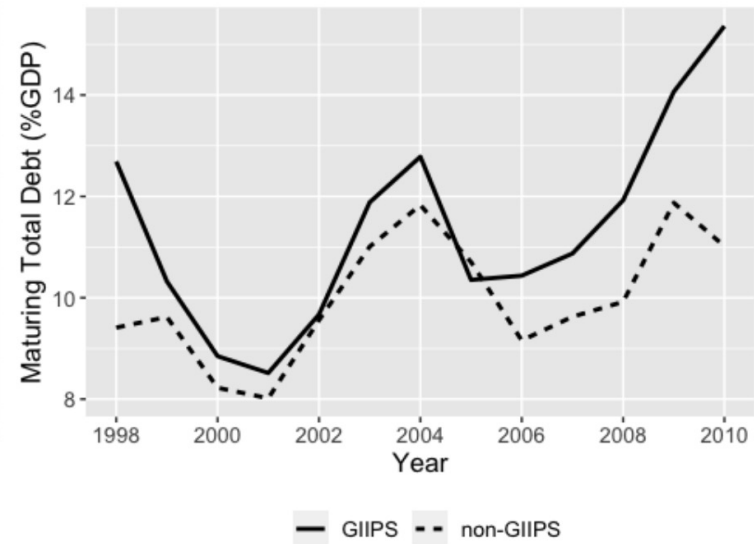
Our key measure for fiscal constraints:

- Government Revenue / GDP.
- Debt / GDP
- Maturing Debt / GDP
- CA Balance

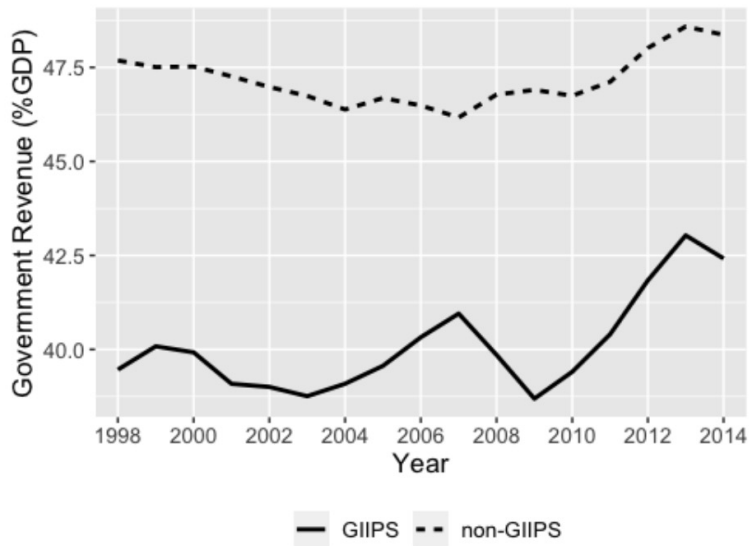
Figure 1: Developments of fiscal capacity: GIIPS vs non-GIIPS countries



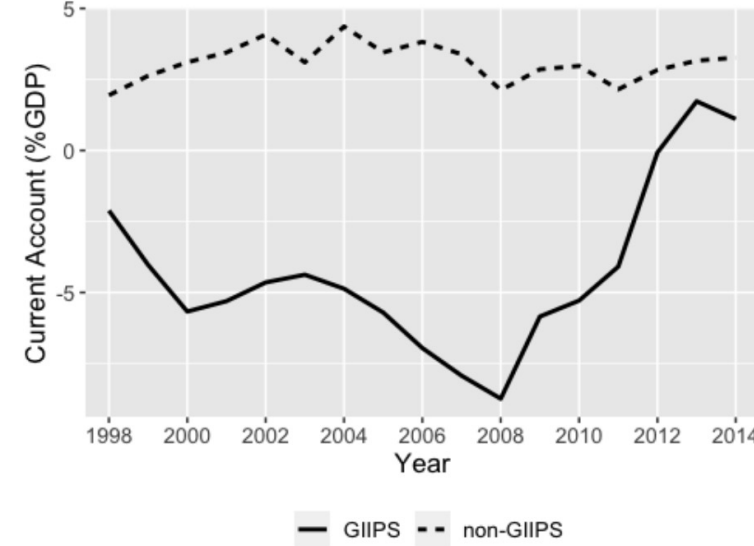
(a) Total Debt



(b) Maturing Debt



(c) Government Revenues



(d) Current Account

Other determinants of bailouts

- Banking sector
 - Avg. equity ratio , Number of previous bailouts
- Bank factors
 - Total assets / GDP, Equity / Asset, Short-term funding / Assets, Profitability (ROAA)
- Elections
 - Year before election, new government, Pro EU

Table 2: Baseline Cox Regression for Government Interventions

The table presents the results of Cox regressions for government interventions between September 15, 2008 and December 31, 2009. Banks exit the sample if they receive a government intervention of any type (*any*) or a recapitalization (*recap*). Hazard rates h_{AID} , $AID \in \{any, recap\}$ take the exponential form:

$$h_{AID,i}(t) = h_{AID,0}(t) \cdot \exp(\beta_0 \times X_{i,t-1} + \beta_1 \times b_{c,t-1} + \beta_2 \times m_{c,t-1}).$$

Panel A - Recapitalization

VARIABLES	(1)	(2)	(3)	(4)
Government Revenue (%GDP)	0.23*** (0.00)	0.27*** (0.00)	0.22*** (0.00)	0.25*** (0.00)
Debt/GDP	-0.02 (0.47)			0.05** (0.04)
Maturing Debt (%GDP)		-0.23*** (0.00)		-0.43*** (0.00)
CA Balance			0.03 (0.68)	0.11** (0.02)
Observations	18,826	18,826	18,826	18,826
N fail	32	32	32	32
Pseudo-R2	0.39	0.40	0.39	0.40

What are the implications of “being undercapitalized” at the end of 2009...

-on bank-level outcomes? On lending incentives?
- Key identification challenge: being undercapitalized is endogenous
 - Depends on pre-crisis bank characteristics -> predisposition to being bailed-out
 - Depends on ability of a country (i.e. fiscal capacity) and willingness to bail out its banking sector

Identification—“Inverse Probability Weighting”

- To address this challenge, we use a method developed in Hirano et al. (2003) and used in e.g. Jorda and Taylor (2016) called “inverse probability weighting”
- Undercapitalization is an input in the model
 1. the Tier 1 capital ratio is below 8% (a threshold defined by the FDIC) or
 2. the equity-to-assets ratio is below 3% (a threshold defined by the BCBS) or
 3. the non-performing loans (NPL) to loans ratio is in the top 5% of all banks in our sample at the end of 2009.

Panel A - Any aid vs. recapitalization vs. no aid

	Undercapitalized banks	Better-capitalized banks	Total
Received aid	13	71	84
Received recap.	8	27	35
Received no aid	68	678	746
Total	81	749	830

Panel B - Capitalization status of banking sector by country

Country	Number of undercapitalized banks	Number of better-capitalized banks	Number of banks (total)	Share of undercapitalized banks
NL	0	19	19	0.00%
FR	1	25	26	3.85%
DE	18	437	455	3.96%
BE	1	13	14	7.14%
PT	1	9	10	10.00%
ES	10	69	79	12.66%
AT	6	35	41	14.63%
FI	1	5	6	16.67%
GR	2	10	12	16.67%
LU	1	4	5	20.00%
IT	35	110	145	24.14%
SI	2	6	8	25.00%
IE	3	7	10	30.00%

Identification—“Inverse Probability Weighting”

- Logit model

$$\text{Undercap}_i = \frac{\exp(\beta X_i)}{1 + (\exp(\beta X_i))'}$$

where $\beta X_i = \beta_0 \times X_{i,2007} + \beta_1 \times b_{c,2007} + \beta_2 \times m_{c,2007} + \beta_3 \times b_{c,2007} * m_{c,2007}$.

- Weights

$$IPW_i = \frac{1}{\widehat{Prob}_i} \quad \text{for treated,}$$

$$IPW_i = \frac{1}{1 - \widehat{Prob}_i} \quad \text{for non-treated.}$$

Identification—“Inverse Probability Weighting”

- If a bank has a weight of 1 -> perfectly predict that it is undercapitalized (endogenous)
- The larger the weight, the better are we able to remove a bias due to endogeneity of being undercapitalized from the model
- Weights are used to re-weight the sample in all subsequent treatment effects models to reduce (or even eliminate) the bias from endogenous treatment.

Example – 2 treated banks

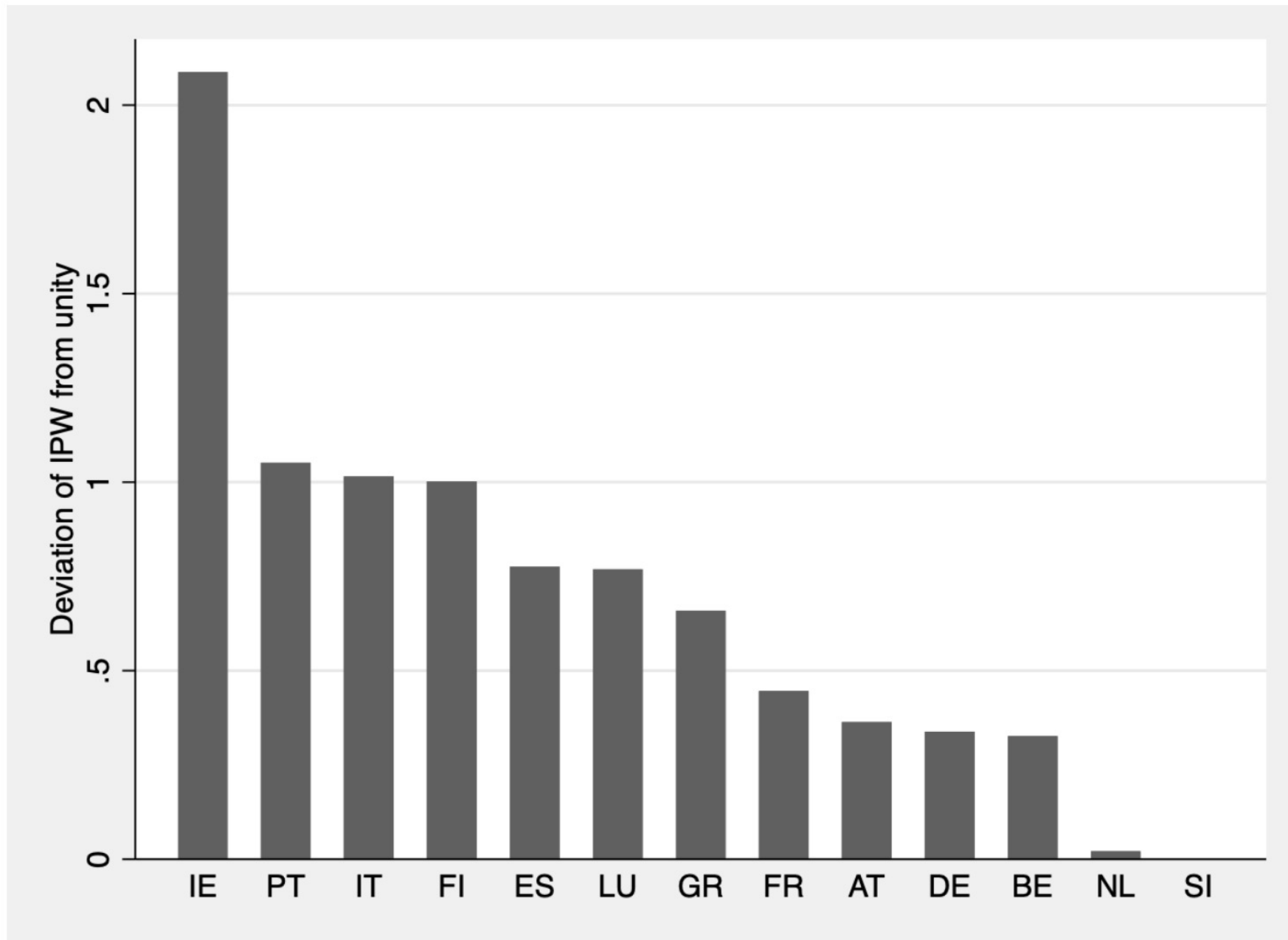
- **Bankinter (ES)** has a weight of 2.3
 - That is, based on bank and government characteristics propensity to recapitalize was high
 - Equity / Asset ratio was 3.52 %
- **Postbank** bzw. **Apobank** both have a weight of 10
 - Equity / Asset ratio was 4.89 %
- Classifying Apobank as undercapitalized is therefore 4x as surprising (based on observable characteristics) compared to Bankinter

Table 5: Likelihood of being undercapitalized

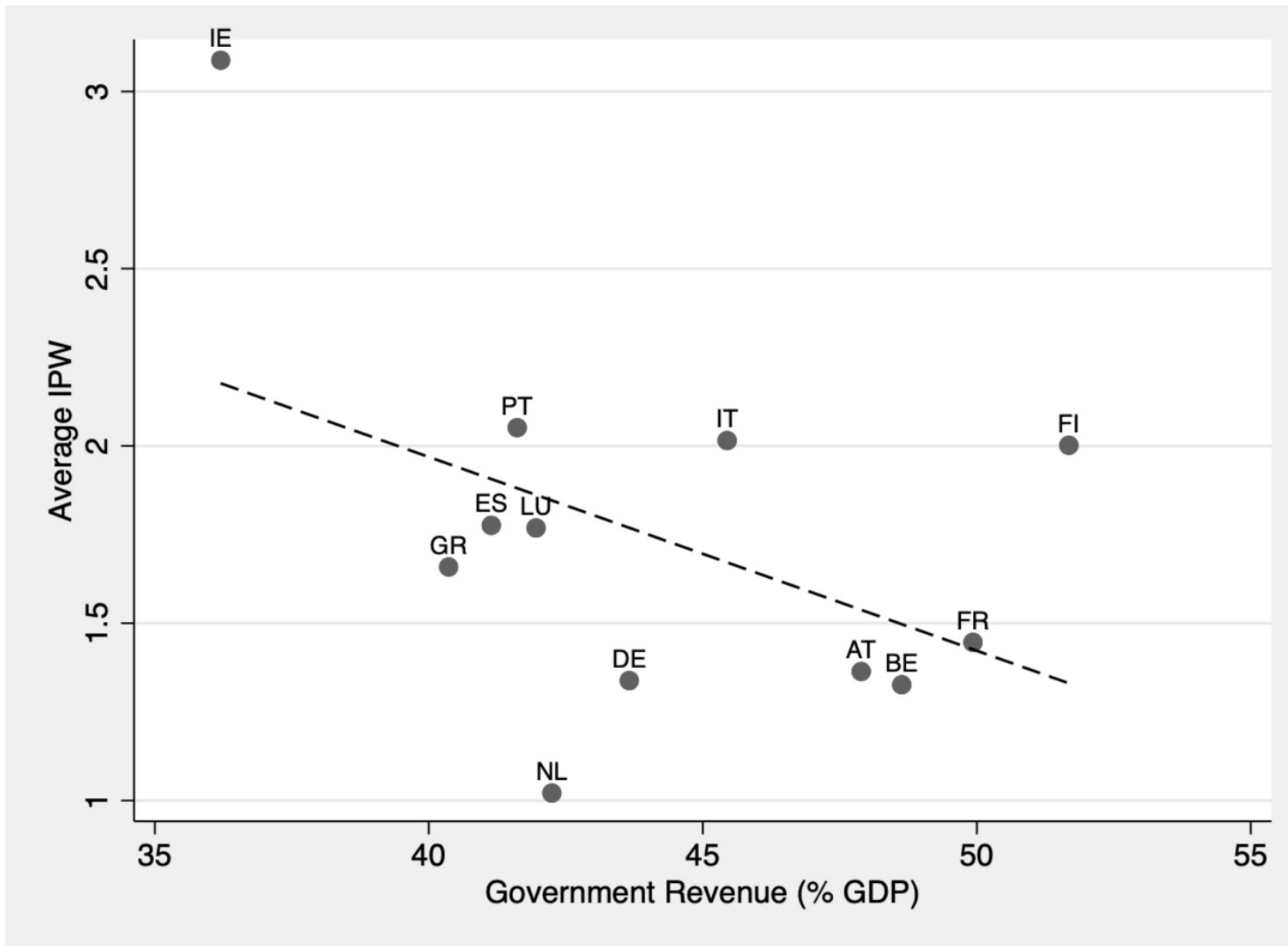
The table presents the results of a Logit regression with the following specification

$$Undercap_i = \frac{\exp(\beta X_i)}{1 + (\exp(\beta X_i))} \text{ where } \beta X_i = \beta_0 \times X_{i,2007} + \beta_1 \times b_{c,2007} + \beta_2 \times m_{c,2007}.$$

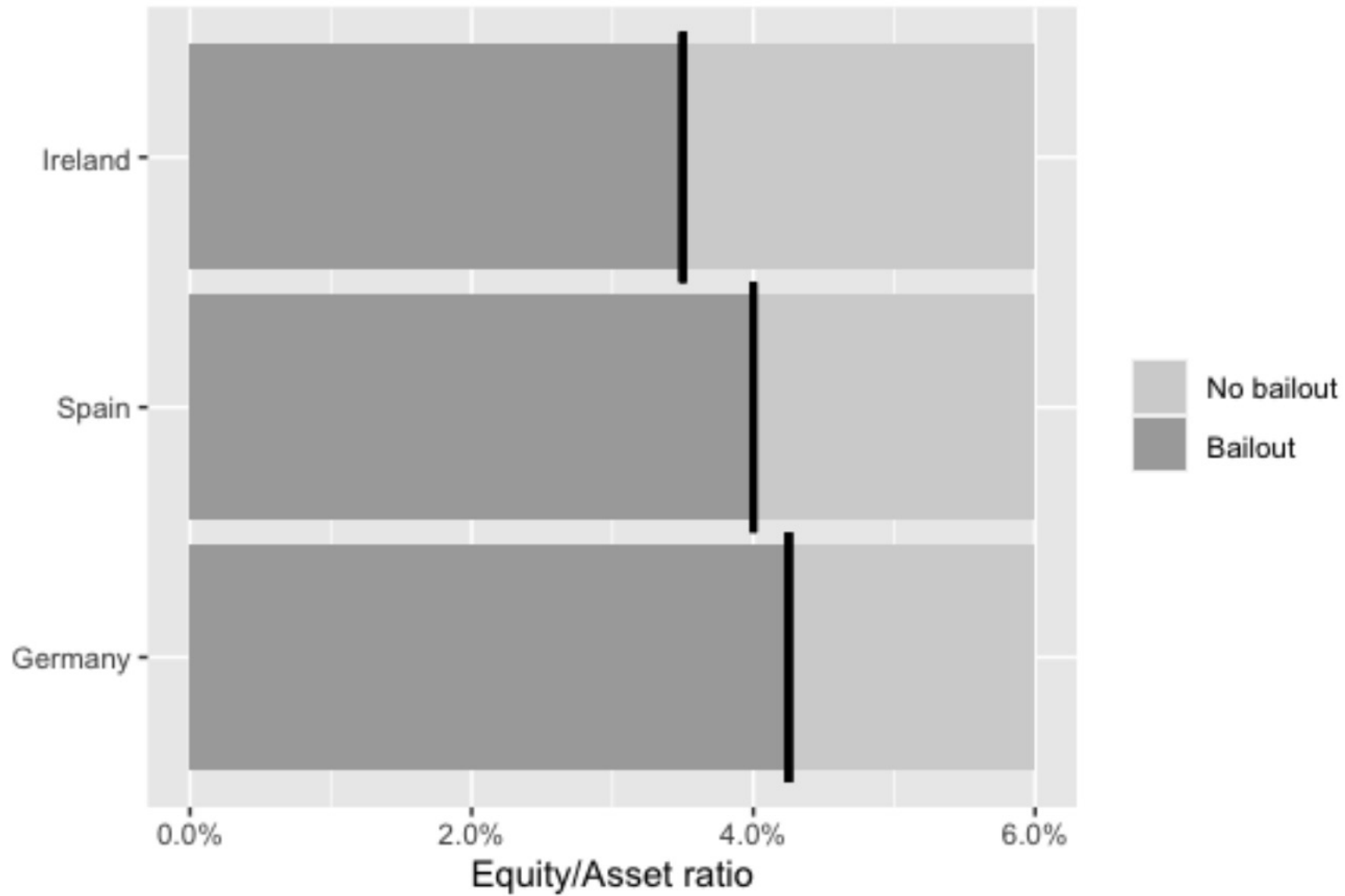
The variable *Undercap* takes the value 1 if a bank is classified as undercapitalized as defined in the text. Bank-level variables $X_{i,2007}$ comprise total assets to domestic GDP (*Total Assets/GDP*), the equity-to-assets ratio (*Equity/TA*), the short-term funding ratio (*ST funding/TA*) and return on average assets (*ROAA*), as of end-2007. Banking sector variables $b_{c,t-1}$ comprise the average equity ratio in the domestic banking sector (*Average Equity Ratio*) and the number of banks which already received recapitalization (*Banks with recaps*). Macroeconomic variables $m_{c,t-1}$ comprise the government revenues to GDP (*Government Revenue*), the maturing government debt to GDP (*Maturing Debt*), the current account balance (*CA Balance*), the total government debt to GDP (*Debt/GDP*), the budget balance to GDP (*Budget Balance*), real GDP growth (*GDP growth*), GDP per capita (*GDP*), and the inflation rate (*Inflation*) in the respective country as well as a dummy variable for whether the current year is the year of a governmental election (*Year before election*) or a year in which a new government was elected (*New government*). Lastly, we add a control for the pro, respectively anti, EU sentiment in the current government (*Pro EU*). All non-binary variables are demeaned. Standard errors are robust and adjusted for clustering at the country-level. The table reports coefficient estimates. Parentheses contain p-values. *, **, *** denote statistical significance at the 10%, 5%, and 1%-levels, respectively.



(a) Deviation of IPW from unity per country ("randomness")



(b) Scatterplot of average IPW vs. government revenue at the country level



(b) Stylized depiction of endogeneity in bailouts

VARIABLES	(1) Recap 2010–13	(2) Survival until 2012	(3) LTRO Uptake/TA
Constant	-11.03*** (0.00)	3.70*** (0.00)	48.24** (0.02)
Log Total Assets	0.71*** (0.00)	-0.25** (0.03)	-1.83** (0.03)
Equity/Total Assets	0.08 (0.25)	0.06 (0.40)	-2.67** (0.05)
ROAA	-0.43*** (0.00)	0.63*** (0.01)	9.32*** (0.00)
Loans/Deposits	0.00 (0.19)	0.00 (0.69)	-0.02 (0.53)
Undercap	0.08 (0.92)	-0.18 (0.64)	12.06** (0.01)
Observations	736	736	57
(Pseudo) R-squared	0.35	0.26	0.37
Cluster	bank	bank	bank

Undercap banks have higher
LTRO uptake 2011/2012
...ECB funding likely reduces
their likelihood to default

Brief summary – bank-level outcomes


- Equity further deteriorates with high LLP and low ROAA → indication of a bad lending portfolio
- Tier 1 ratio goes up → indication for de-leveraging and risk reduction in lending portfolio
- High LTRO uptake → banks were not able to deal with a further shock (sovereign crisis)
- Governments had to finance LTRO now instead of recap in 2008/09

Loan-lending regressions

Panel A of the table presents the results of cross-sectional Khwaja and Mian (2008)-type bank lending regressions based on syndicated loan data and estimated with weighted-least squares (WLS),

$$\Delta y_{2009-12,i,c,j} = \beta \times \text{Undercap}_i + \gamma' X_{i,2009} + \eta_j + \eta_c + u_{ijc}.$$

Panels B and C of the table present the results of cross-sectional Khwaja and Mian (2008)-type bank lending regressions based on syndicated loan data estimated with weighted-least squares (WLS),

$$\begin{aligned} \Delta y_{2009-12,i,c,j} = & \beta \times \text{Undercap}_i + \beta_2 \times \text{Undercap}_i * \text{RiskIndicator}_j \\ & + \gamma' X_{i,2009} + \eta_j + \eta_c + u_{ijc}. \end{aligned}$$


- Khwaja and Mian (2008): some firms have more than one bank, thus use within-firm estimator (firm fixed effect in first-difference regression)

Zombie-lending hypothesis

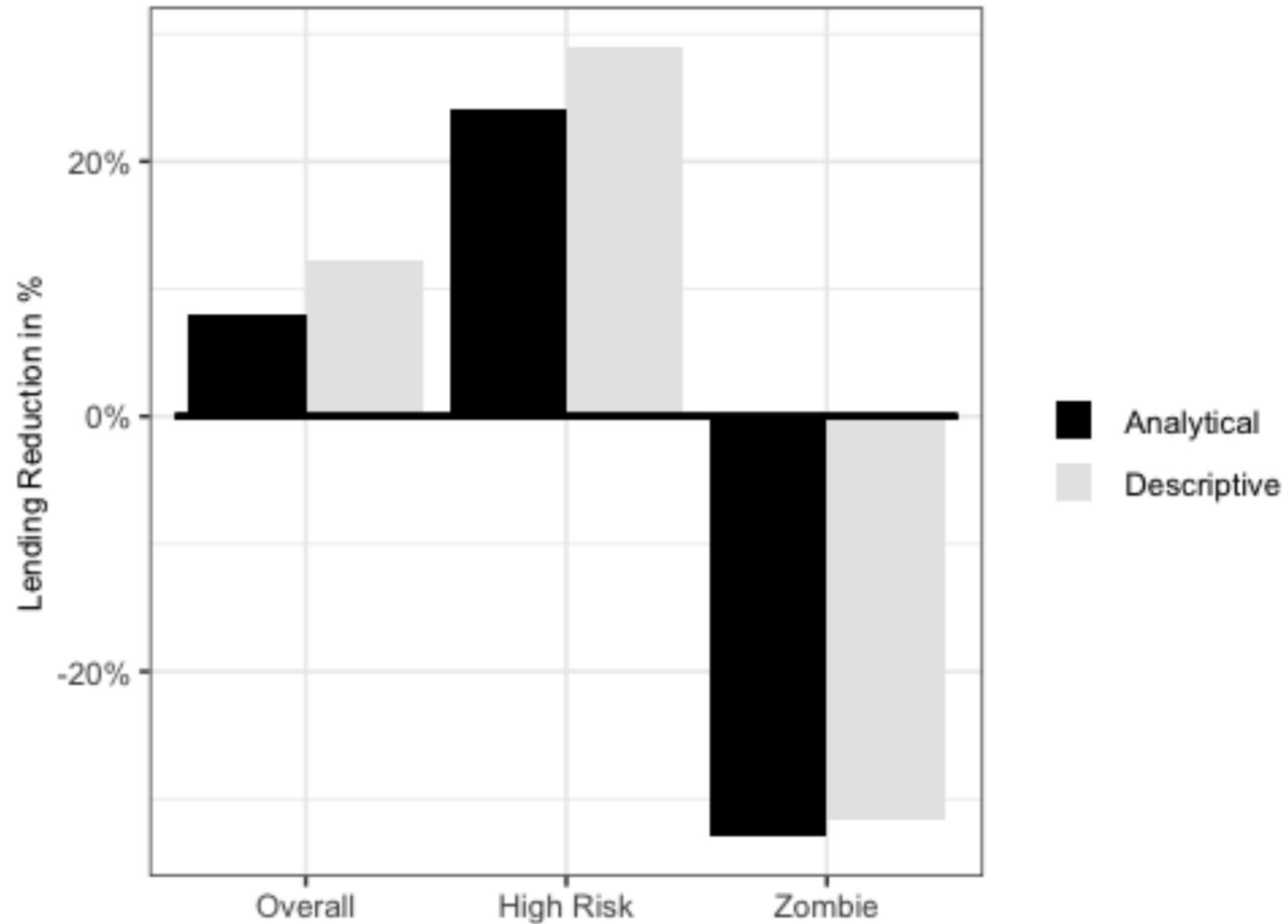
- Earlier result: undercapitalized banks reduce lending to risky borrowers..
 - ... But not to relationship borrowers
- Hypothesis: undercapitalized evergreen loans, i.e.
 - they avoid writing-down non-performing loans by extending loans to distressed firms,
 - at subsidized costs

Identifying zombie firms (Acharya et al., 2018 RFS)

- A firm is a zombie firm if
 - Its rating is BB or lower AND
 - Pays interest on its loans below the benchmark interest rate of loans to very safe publicly traded firms.
- We obtain total interest paid for firm j in industry s year t from Amadeus.
 - $r_{j,s,2009}$ = total interest payment / total debt outstanding
- Benchmark interest rate
 - $R_{s,2009}$ median interest rate paid by publicly traded firms in 2009 (non-GIIPS countries, same industry s as firm)
- *Zombie* firm: $r_{j,s,2009} < R_{s,2009}$
 - Separately for firms with high/low reliance on short-term debt

Figure 4: Excess Reduction in Lending by Undercapitalized Banks relative to Better-capitalized Ones

This graph shows the difference between the reduction in lending between undercapitalized and better-capitalized banks ("excess reduction"). Positive values refer to negative loan growth, and vice versa. "Analytical" refers to the coefficient estimates from the regression models in Section 7. "Descriptive" refers to the purely descriptive difference between the lending reductions in the sample. "Overall", "High Risk", and "Zombie" are all as defined in Section 7.



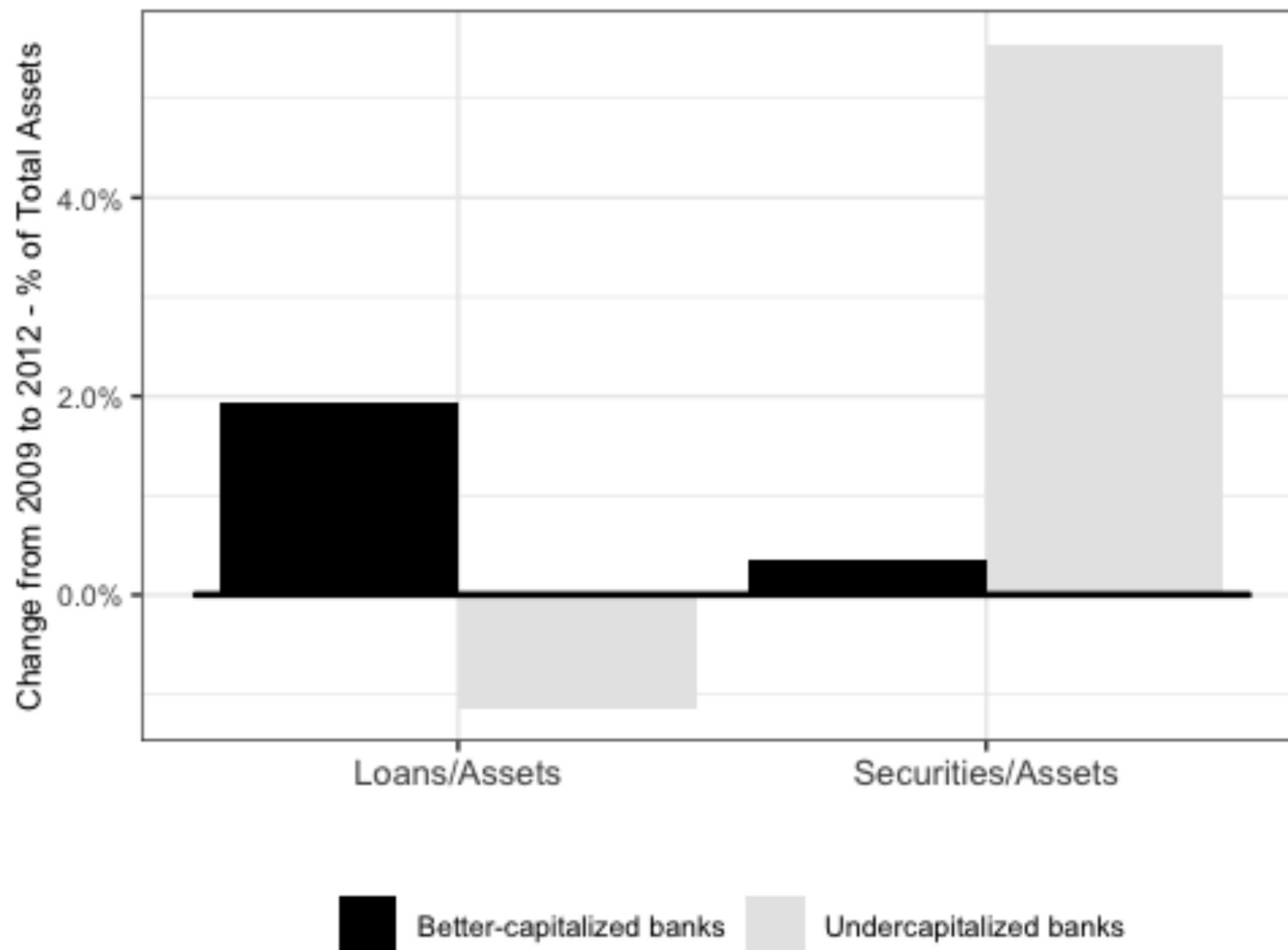
Zombie firms borrowing from undercap banks perform much worse (2009-2012)

Panel A: as of 2009			
VARIABLES	Borrowing from undercapitalized banks	Borrowing from better-capitalized banks	p-value of t-test
Interest Coverage Ratio	-2.78	1.94	0.07
EBITDA/Total Assets	0.03	0.03	0.80
ROA	-1.01	0.63	0.25
Cash Flow/Total Assets	0.02	0.03	0.47
Sales/Assets	0.14	0.62	0.00
Tangible Assets/Total Assets	0.98	0.92	0.00
Cash/Total Assets	0.07	0.05	0.53
Liabilities/Total Assets	0.70	0.80	0.02
Log Total Assets	18.96	19.32	0.38

Panel B: as of 2013–2016			
VARIABLES	Borrowing from undercapitalized banks	Borrowing from better-capitalized banks	p-value of t-test
Interest Coverage Ratio	-1.87	14.06	0.00
EBITDA/Total Assets	0.03	0.05	0.05
ROA	-1.16	1.51	0.00
Cash Flow/Total Assets	0.02	0.06	0.00
Sales/Assets	0.30	0.72	0.00
Tangible Assets/Total Assets	0.72	0.88	0.00
Cash/Total Assets	0.04	0.06	0.00
Liabilities/Total Assets	0.81	0.69	0.00
Log Total Assets	19.47	19.68	0.22

Figure 5: Evolution of Loans-to-Assets and Securities-to-Assets Ratio for Undercapitalized Banks relative to Better-capitalized Ones

This graph shows the descriptive differences between the gross loans-to-assets ratio and the debt securities-to-assets ratio at the end of 2012 compared to the end of 2009 on banks' balance sheets.



Pairwise Comparison of Government Bond Yield Spreads: Italy versus Germany

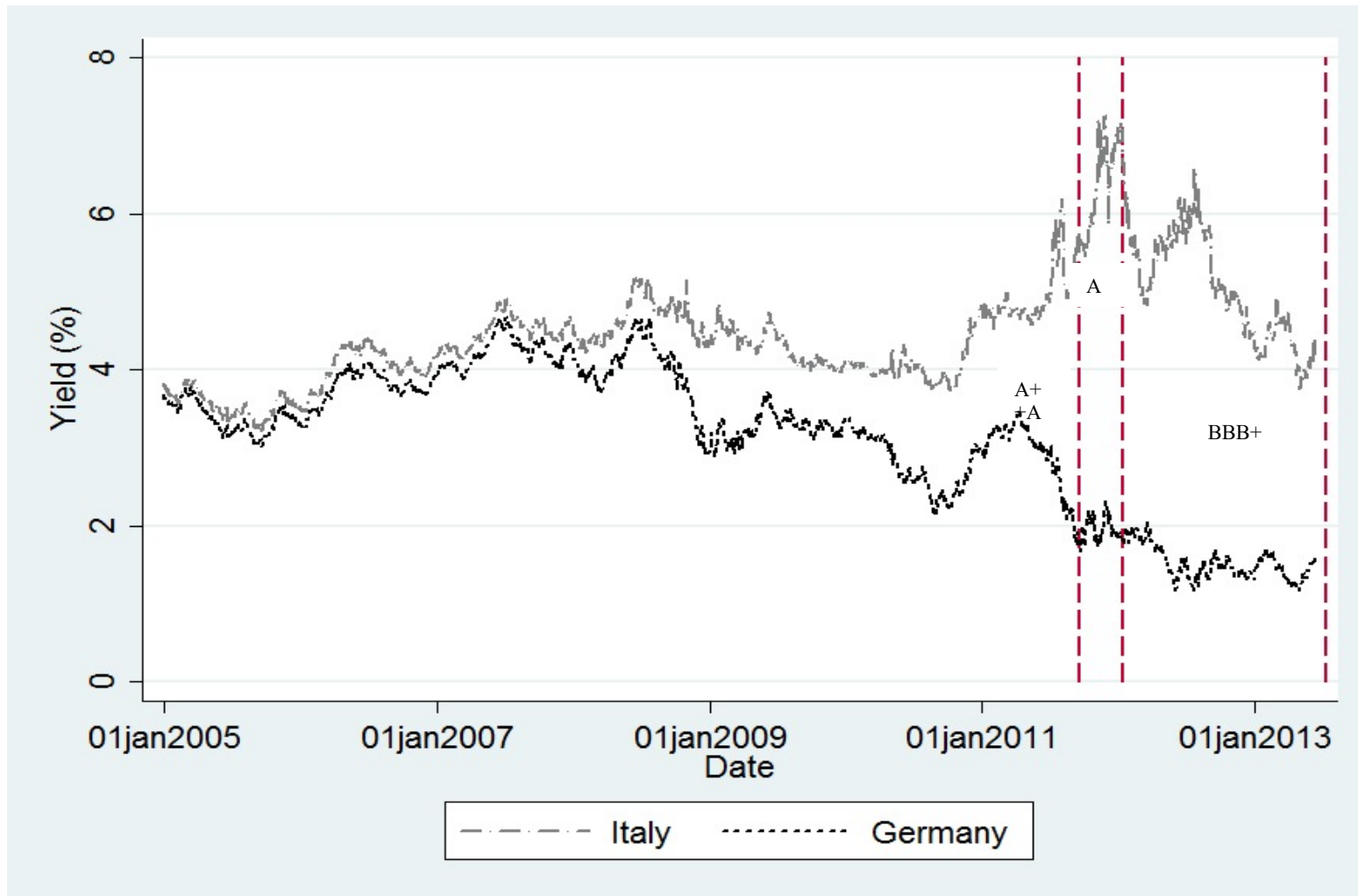
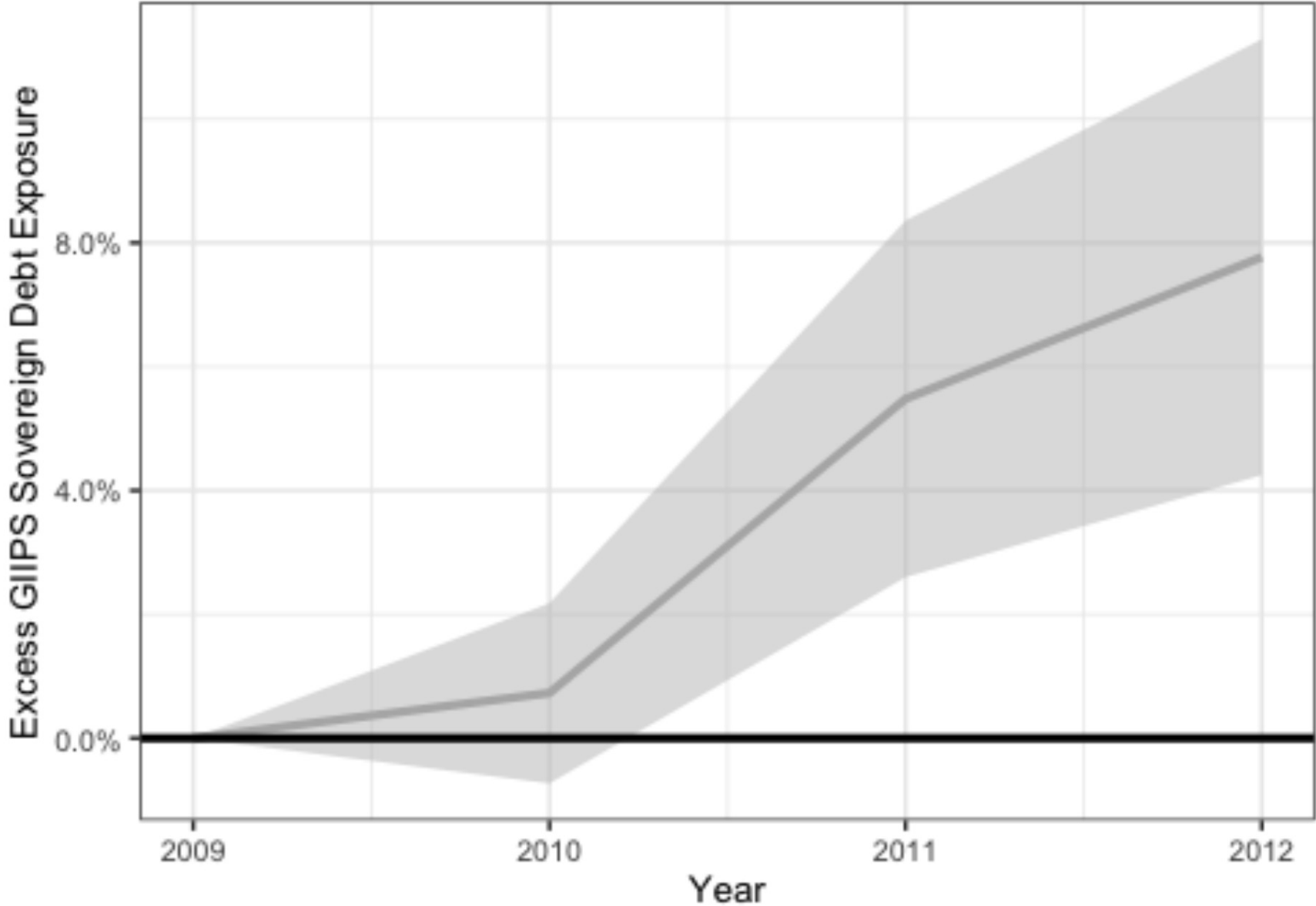


Figure 6: Development of government debt exposures for undercapitalized banks relative to better-capitalized banks



Conclusion

- Fiscally constrained governments -> regulatory forbearance
- Banks that left the crisis undercapitalized performed worse along three dimensions:
 - aggregate lending (real effect)
 - more zombie lending (financial stability effect)
 - more LTRO uptake (kicking the can effect)
- Forbearance: trading-off less government debt today against worse outcomes down the road