

# The Cleansing Effect of Banking Crises

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# Motivation

- We know a lot about the **short term real effects** of financial crises
  - In the short run less investment, employment and growth (**Ivashina and Scharfstein, 2010; Chodorow-Reich, 2014**, among others)
- But: We know little about the **long-term implications** of financial crises:
  - Do financial crises have persistent or even permanent effects?
- This paper: Does **long-term productivity** depend on the government intervention in the crisis?
  - *Forbearance* versus *Restructuring* in the banking sector

# This paper

- How do financial disruptions affect **long-term productivity**?
  - Recessions are times of low opportunity cost of time and resources and hence, are times of more productivity-enhancing reallocations (**Foster, Grim, and Haltiwanger, 2016**)
  - Recessions may slow down productivity growth by intensifying credit frictions.
    - For example, legacy assets in the banking sector (**Caballero, Hoshi, and Kashyap, 2008**).
- Does it matter how the authorities deal with the credit disruption?
  - Is there a trade-off between the short run and the long run effects of financial crises?

# Cleansing effect

- Marginal banks (close to the minimum capital requirement) are hesitant to realize losses.
  - *Sunk costs* (Dewatripont and Maskin, 1995)
  - *Soft budget constraints* (Caballero et al., 2008)
    - may encourage banks to maintain lending to inefficient borrowers
  - Hence, unproductive firms stay in the market
- This distorts competition:
  - Loans to such firms are effectively a subsidy to an inefficient firm,
  - Efficient firms have a harder time entering the market or increasing market share.
  - This channel further reduces productivity.
- A financial crisis, by forcing marginal banks out of business, may “clean” the economy of inefficient banks and firms.

# Empirical challenge

- We test our hypotheses using data on the US metropolitan statistical areas (MSA)
  - Unit of observation: MSA
- Identify **exogenous variation** in the degree of forbearance in a local market
  - IV approach to instrument for estimated forbearance
- Measure **ex-post productivity**
  - Follow productivity literature: wage growth, patents, per capita growth, firm entry and exit...
- Regress regulatory forbearance during 2007/2010 financial crisis on post crisis (2011/2015) outcomes.

# Cleansing effect: results

- Higher regulatory forbearance to close banks during the crisis is associated with **lower output losses during the crisis**
- But: Higher regulatory forbearance is associated **negatively with post-crisis output and productivity growth**
- Tough policy during the crisis yields higher job creation rates, higher wages, higher patent growth, higher new entry of firms years later

# Literature

- Short-term disruptions in:
  - lending (Ivashina and Scharfstein (2010), Puri, Rocholl and Steffen (2011))
  - investments (Campello, Garaham, and Harvey (2010))
  - consumption (Damar, Gropp and Mordel (2014))
  - employment (Chodorow-Reich (2014))
- Bank recapitalization
  - Homar and van Wijnbergen (2016): recapitalization eliminates the problem of zombie banks.
  - Acharya, Eisert, Eufinger, and Hirsch (2017): (exogenously) recapitalized banks continue lending to zombie firms.
  - Schivardi, Sette, and Tabellini (2017): undercapitalized Italian banks engaged in zombie lending, but the aggregate effects on productivity are small.
- Reallocations
  - Mukherjee and Proebsting (2016): crises are cleaning in the market for corporate control by intensify productivity-enhancing M&A activity.

# Data

- Census Bureau's Business Dynamics Statistics
  - Number of firms, establishments, entries and exits, job creation and destruction, ... for all US MSAs
- Quarterly Census of Employment and Wages
  - average annual wage growth for all US MSAs
- U.S. Patent and Trademark Office
  - Number of patents granted for all US MSAs
- Bureau of Economic Analysis
  - GDP and GDP per capita growth for all US MSAs
- The universe of US FDIC-insured commercial banks from 2000-2015 from the SNL
- FDIC's list of failed banks
- FDIC's Branch Office Deposits



# Regulatory forbearance

- We follow [Wheelock and Wilson \(2000\)](#) and estimate the following bank failure model emulating supervisory CAMEL ratings:

$$\begin{aligned} failed_{i,t} = & \alpha_0 + \alpha_1 \text{equiry ratio}_{it-1} + \alpha_2 \text{loan ratio}_{it-1} + \alpha_3 \text{real estate}_{it-1} + \\ & \alpha_4 \text{C\&I}_{it-1} + \alpha_5 \text{other real estate}_{it-1} + \alpha_6 \text{NPA}_{it-1} + \alpha_7 \text{ROA}_{it-1} + \alpha_8 \text{liquidity}_{it-1} + \\ & \alpha_9 \text{efficiency}_{it-1} + \alpha_{10} \log(\text{assets})_{it-1} + \alpha_{11} \log(\text{age})_{it-1} + \sum_{j=1}^2 \alpha_{11+j} \text{GDPG}_{t-j}^{MSA_i} + \\ & \sum_{k=1}^{11} \alpha_{13+k} \text{Industry}_{ik} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

- *failed* = significant restructuring/closure

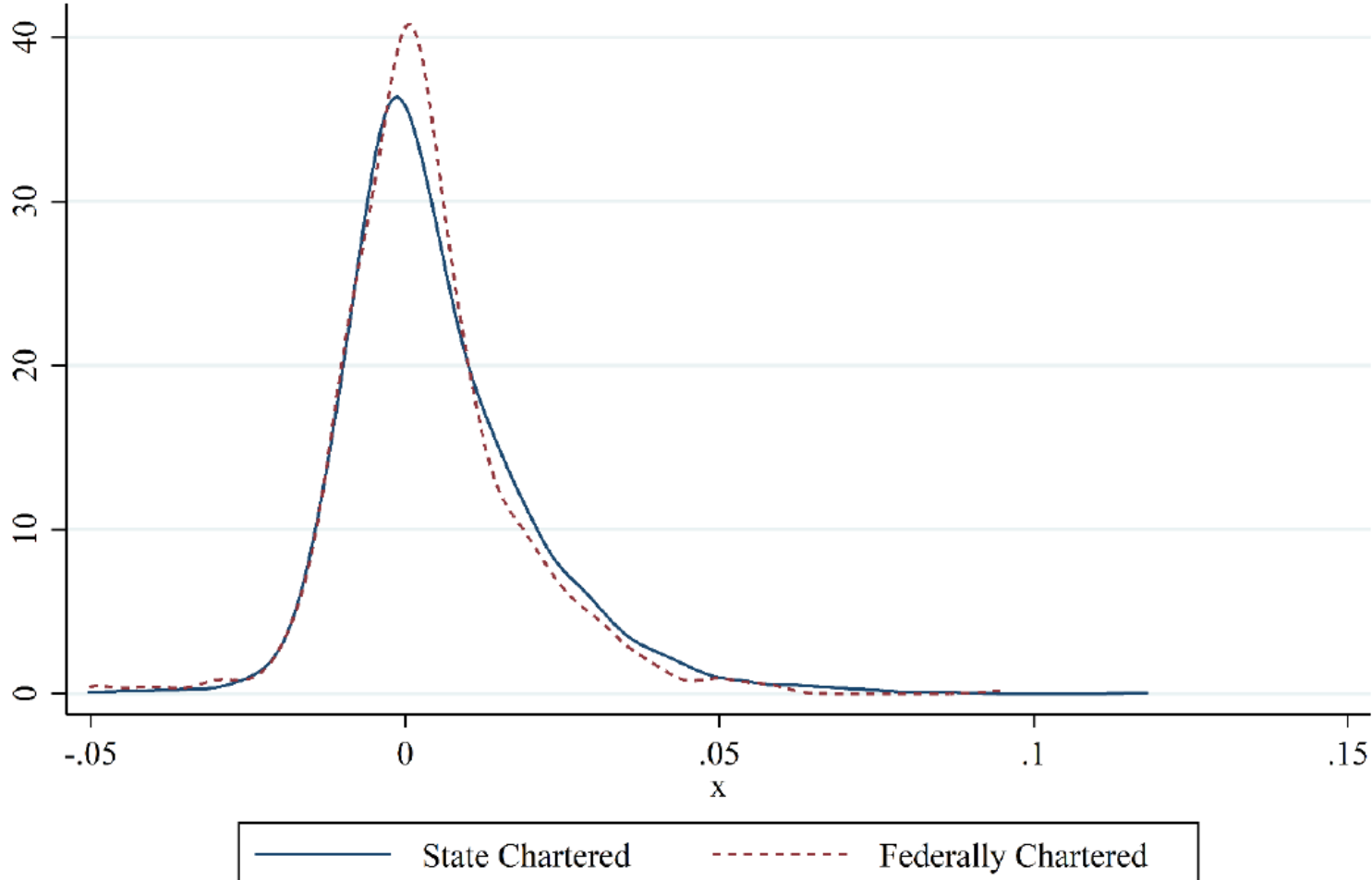
# Regulatory forbearance

- We use the bank-level residuals of equation (3) and aggregate as follows
  - For each year we calculate the bank-size weighted average in each MSA
  - We then average over 2007-2010 to obtain a cross-sectional measure of forbearance for each MSA

# Regulatory forbearance

- Does the measure make sense?
  - State-chartered banks benefit more from regulatory forbearance than federally chartered banks. ([Agarwal, Luca, Seru, and Trebbi \(2014\)](#))
  - Higher competition in the local banking market reduces regulatory forbearance ([Kang, Lowery, and Wardlaw \(2014\)](#)).
  - Cross-guarantee provisions facilitate restructuring of subsidiaries relative to independent banks ([Ashcraft, 2005](#)).
  - We observe state-level persistence in the measure of forbearance.

# Regulatory forbearance: state- versus federally-chartered banks



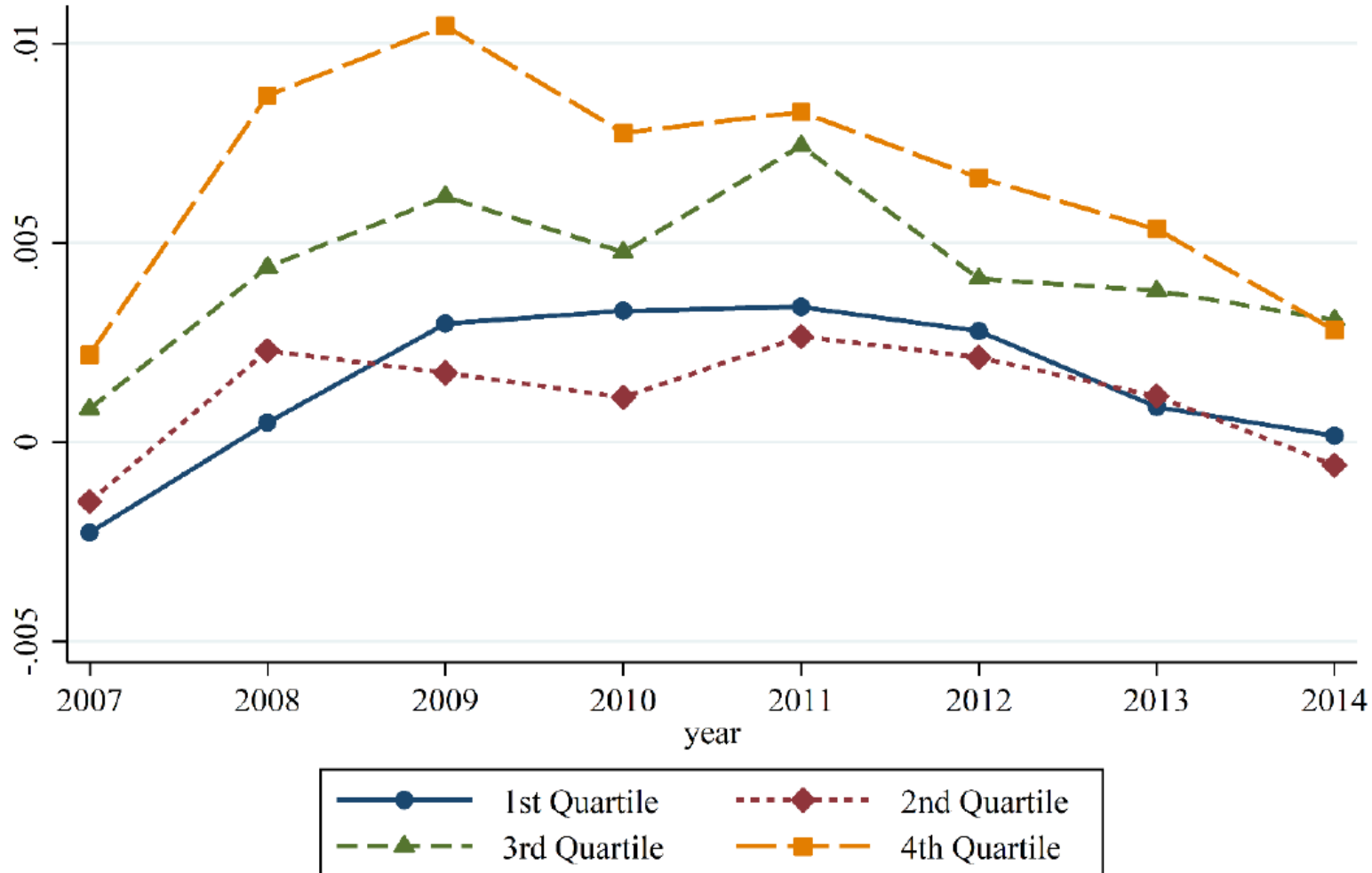
# Regulatory forbearance: banking competition

	Forbearance	
	Linear	Logistic
Bank per tsd.	-0.0454*** (0.003)	-0.0033*** (0.001)
Log(Assets)	0.0003*** (0.000)	0.0001** (0.000)
Year Fixed Effects	Yes	Yes
Adj. R-squared	0.055	0.003
Observations	40317	40317

# Regulatory forbearance: cross-guarantee provision

	Forbearance	
	Linear	Logistic
Subsidiary share in MSA	-0.0256** (0.013)	-0.0042* (0.002)
House Price Growth during Crisis	0.0002 (0.000)	0.0000 (0.000)
Pre-crisis Bank-to-GDP Ratio	0.0030* (0.002)	0.0000 (0.000)
Pre-crisis GDP Growth	-0.0448 (0.062)	-0.007 (0.017)
Constant	0.0063 (0.005)	0.0008 (0.001)
Adj. R-squared	0.055	0.006
Observations	262	262

# Regulatory forbearance: state-level persistence



# Identification: IV

- Bank closures and regulatory forbearance may be endogenous to expectations of future growth.
  - Supervisors may be laxer on distressed banks if local growth expectations are already gloomy ([Agarwal, Luca, Seru, and Trebbi, 2014](#))
- Therefore, we need an instrument that
  - correlates with regulatory forbearance,
  - but does not directly drive growth/productivity.
- Distance to Washington D.C.
  - affects banks' access to lobbying firms, and politicians,
  - intensifies banker-supervisor personal ties,
  - matters for revolving door motives.
  - This affects banks' regulatory treatment in case of distress. ([Lambert, 2017](#), [Dam and Koetter, 2012](#)).
- Exclusion restriction: Distance to Washington D.C. is not a driver of productivity, except through regulatory forbearance.



# Results: first-stage IV

	Forbearance
Log(Distance + 1)	-0.0031*** (0.001)
House Price Growth during Crisis	0.0002 (0.000)
Pre-crisis Bank-to-GDP Ratio	0.0035** (0.002)
Pre-crisis GDP Growth	-0.0073 (0.060)
Constant	0.0194** (0.008)
Observations	262
F-test of excluded instruments	7.00
Prob > F	0.008

# Approach

- With a measure of forbearance in hand
  - We check whether forbearance has an effect **during the crisis**
    - Expect fewer firm closures, less layoffs etc.
  - We check whether given an effect during the crisis, it has **long term consequences** for proxies of productivity

# Real outcomes during the crisis

- We run the following regression:

$$\bar{y}_i^{\{2007 \leq t \leq 2010\}} = \beta_0 + \beta_1 \bar{x}_i^{\{2007 \leq t \leq 2010\}} + B\bar{X}_i + \epsilon_i$$

- $y$  represents average MSA-level:
  - establishment and firm exit rate
  - job destruction rate
- $x$  represents average MSA-level
  - regulatory forbearance
- We instrument  $\bar{x}$  with  $\log(\text{distance} + 1)$

# Forbearance and real outcomes during the crisis

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Forbearance	-0.9952** (0.461)	-0.7370** (0.353)	-1.0323** (0.506)	-0.5119** (0.246)	-0.5233* (0.284)
House Price Growth during Crisis	-0.0009* (0.000)	-0.0008** (0.000)	-0.0011** (0.000)	-0.0004* (0.000)	-0.0007** (0.000)
Pre-crisis Bank-to-GDP Ratio	0.0043 (0.003)	0.0036* (0.002)	0.0042 (0.003)	0.0022 (0.001)	0.0021 (0.001)
Pre-crisis GDP Growth	0.2128*** (0.081)	0.2074*** (0.064)	0.2701*** (0.093)	0.0991** (0.046)	0.1712*** (0.052)
Anderson-Rubin P-values	0.000	0.000	0.001	0.000	0.009
Weak-IV Robust 95% Confidence interval	(-0.98,-0.34)	(-1.0,-0.23)	(-1.0,-0.28)	(-1.0,-0.15)	(-1.0,-0.07)
Observations	262	262	262	262	262

# Forbearance and post-crisis bank quality

	Equity ratio	NPA	ROA
Highly Forbearing	-0.5032** (0.207)	0.7511*** (0.070)	-0.0631 (0.040)
ln(Assets)	-1.8815*** (0.117)	-0.0853*** (0.017)	0.0589*** (0.015)
Year Fixed Effects	Yes	Yes	Yes
Adj. R-squared	0.057	0.045	0.015
Observations	13939	13950	13935

# Results: post-crisis outcome

- To ascertain the long run real effects of forbearance, we run the following regression:

$$\bar{y}_i^{\{t \geq 2011\}} = \gamma_0 + \gamma_1 \bar{x}_i^{\{2007 \leq t \leq 2010\}} + \Gamma \bar{X}_i + \varepsilon_i$$

- $y$  represents average MSA-level:
  - establishment and firm entry rate, job creation rate, reallocation rate, employment growth, wage growth, patent growth, and gdp per capita growth
- $x$  represents average MSA-level regulatory forbearance
- We instrument  $x$  with  $\log(\text{distance} + 1)$

# Forbearance and real outcomes after the crisis

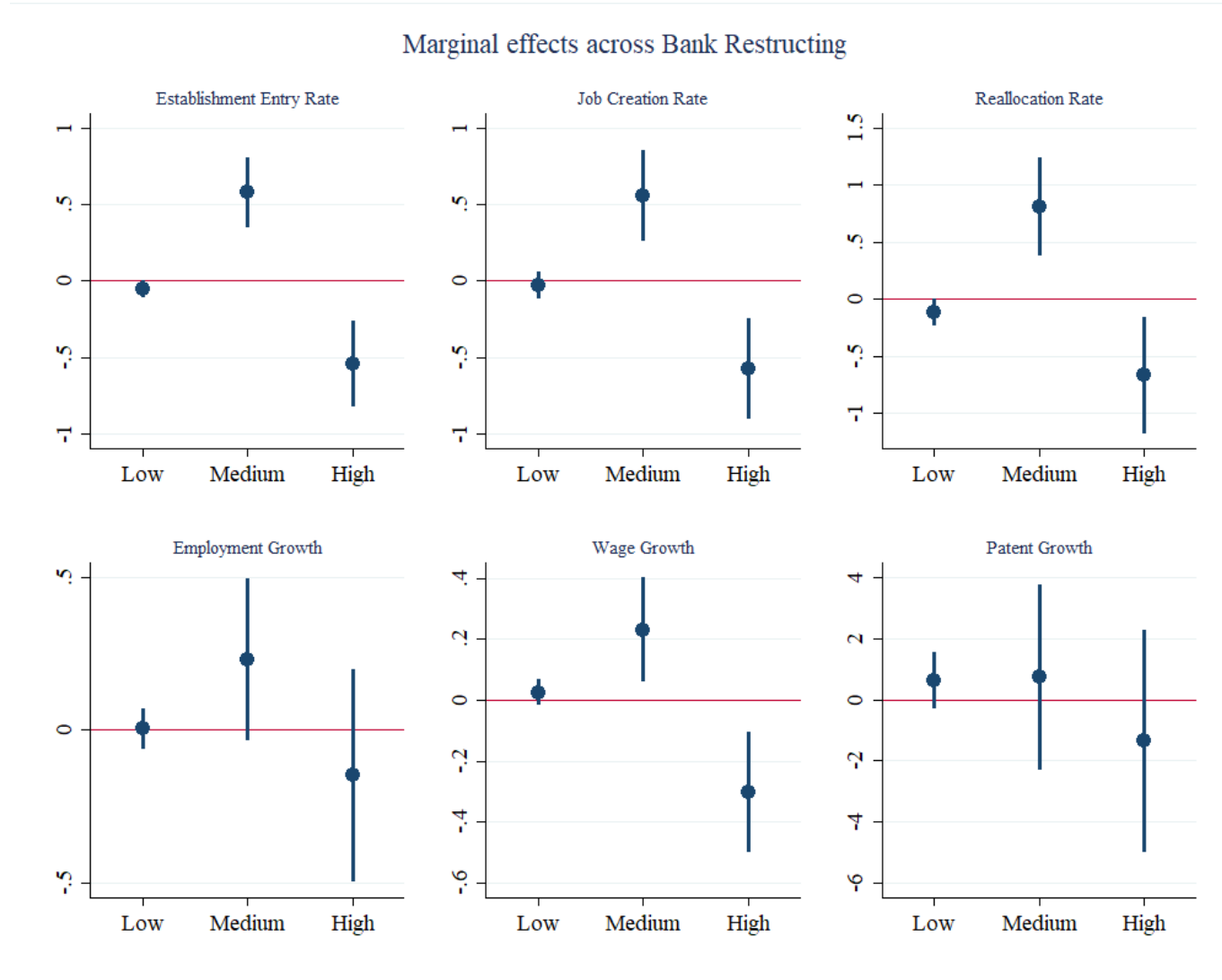
	Establishment Entry Rate	Firm Entry Rate	Job Creation Rate	Job Creation Rate by Births	Job Creation Rate by Continuers	Reallocation Rate	Employment Growth	Wage Growth	Patent Growth	GDP per capita Growth
Forbearance	-1.243** (0.612)	-1.094** (0.549)	-1.243* (0.670)	-0.610* (0.312)	-0.631* (0.378)	-1.620* (0.977)	-0.953** (0.459)	-0.789** (0.354)	-8.481* (4.598)	-0.731** (0.358)
House Price Growth during Crisis	-0.001** (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	-0.002 (0.002)	-0.001** (0.000)
Pre-crisis Bank-to-GDP Ratio	0.007** (0.004)	0.007** (0.003)	0.007* (0.004)	0.003* (0.002)	0.004** (0.002)	0.009* (0.006)	0.005 (0.003)	0.004 (0.002)	0.044* (0.025)	0.004* (0.002)
Pre-crisis GDP Growth	0.275*** (0.089)	0.279*** (0.083)	0.273*** (0.101)	0.175*** (0.047)	0.098 (0.068)	0.365*** (0.123)	0.093 (0.075)	0.016 (0.059)	-0.331 (0.630)	-0.237*** (0.058)
Anderson-Rubin P-values	0.007	0.006	0.023	0.012	0.054	0.053	0.005	0.001	0.019	0.006
Weak-IV Robust 95% Confidence interval	(-1.0,-0.23)	(-1.0,-.20)	(-1.0,-0.03)	(-1.0,-0.07)	(-1.0,0.12)	(-1.0,0.28)	(-1.0,-0.20)	(-1.0,-0.24)	(-1.0,-0.42)	(-1.0, -0.14)
Observations	245	245	245	245	245	245	245	239	244	246

# Robustness

1. Bank restructuring as an alternative measure of forbearance
2. Non-linear effects?
3. Recapitalization (TARP)
4. Mean reversion: low growth simply reverts to higher growth after the crisis



# Bank restructuring: Non-linear marginal effects



# TARP

- Recapitalization of distressed banks may allow them to realize losses and cut funding to their unprofitable borrowers ([Giannetti and Simonov, 2014](#) and [Homar and Van Wijnbergen, 2015](#))
- Are our results explained by differences in recapitalization of banks across MSAs?
- We check whether:
  - TARP receiving states experienced more establishment and job losses during the crisis,
  - And whether they experienced higher productivity growth after the crisis.

# Recapitalization: In-crisis effects

	Establishment Exit Rate (OLS)	Establishment Exit Rate (2SLS)	Job Destruction Rate (OLS)	Job Destruction Rate (2SLS)
TARP	-0.0002** (0.000)	-0.0028** (0.001)	-0.0004** (0.000)	-0.0029** (0.001)
House Price Growth during Crisis	-0.0011*** (0.000)	-0.0013*** (0.000)	-0.0013*** (0.000)	-0.0015*** (0.000)
Pre-crisis Bank-to-GDP Ratio	0.0007** (0.000)	0.0021 (0.002)	0.0006 (0.000)	0.002 (0.002)
Pre-crisis GDP Growth	0.2531*** (0.055)	0.1177 (0.083)	0.3031*** (0.066)	0.1715* (0.102)
Adj. R-squared	0.400	-0.700	0.355	-0.262
Observations	262	262	262	262

# Recapitalization: Long-run effects

	Establishment Entry Rate (OLS)	Establishment Entry Rate (2SLS)	Job Creation Rate (OLS)	Job Creation Rate (2SLS)	Employment Growth (OLS)	Employment Growth (2SLS)	Wage Growth (OLS)	Wage Growth (2SLS)
TARP	0.000 (0.000)	-0.003** (0.001)	-0.000** (0.000)	-0.003** (0.001)	-0.000** (0.000)	-0.003** (0.001)	0.000 (0.000)	-0.002** (0.001)
House Price Growth during Crisis	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000* (0.000)	-0.000* (0.000)	0.000** (0.000)	0.000 (0.000)
Pre-crisis Bank-to-GDP Ratio	0.001*** (0.000)	0.003 (0.002)	0.002*** (0.000)	0.003** (0.002)	0.001 (0.001)	0.002** (0.001)	0.000 (0.000)	0.001 (0.001)
Pre-crisis GDP Growth	0.334*** (0.053)	0.183** (0.089)	0.308*** (0.059)	0.165 (0.107)	0.140*** (0.049)	0.012 (0.090)	0.041 (0.031)	-0.055 (0.063)
Adj. R-squared	0.305		0.24		0.062		0.016	
Observations	262	262	262	262	262	262	255	255

# Conclusion

- Resolving banks' impaired assets can reduce the problem of zombie lending.
- Keeping distressed banks alive, despite being less destructive for the crisis period, seems to be detrimental for the longer term productivity.
- The US financial crisis has not been productivity improving perhaps due to extensive government support of banks during the crisis.

# Conclusion

- Should we consider **long-run implications** for productivity when **designing crisis intervention tools**?
  - Banking union
  - Deposit insurance
  - Regulation and supervision
- The political economy is negative: **short-run loss for a long-term gain**
  - Tie policy makers hands? Time inconsistency problem in financial crisis: in the short run it is always better to bail out.
- Gropp, Güttler and Saadi (2017) show that expectations of a bank bailout may reduce allocative efficiency outside of a crisis.
  - Inefficient firms are more likely to obtain credit when bail-out expectations of Banks are high.