Panel discussion on *"Policy and crisis transmission"*

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Outline

- General comments on “policy and crisis transmissions”, e.g. which areas of research are important and are under-research

- Comments on both papers (I guess no need to summarize the papers in detail)

- Work in progress very related to the conference and this topic with a large team of Spaniards

General comments on "policy & crisis transmissions"

- Large literature that contractionary monetary policy, or tightening of prudential policy, **reduce (aggregate) demand**
  - For example, lower (bank) credit availability, thereby lowering consumption and investment, lowering output and employment (also in other channels of policy transmission)

- **But not** on the **supply side on the economy**: e.g. productivity, cleansing effects, market power, R&D …
  - E.g. a change in policy that affects credit, thereby affecting R+D, productivity…

- **Not either** on **compositional changes related to credit**. There are some papers as my paper with Jimenez et al. (*Econometrica* 2014) & Sebnem's et al in *QJE* (2018)
  - But most papers are more on overall credit supply rather than compositional changes (more vs. less productive firms, excessive vs. more positive productive bank risk-taking)

General comments on both papers

- Instead, the two papers of this session tackle these under-research but crucial questions, they tackle them in a convincing way, and hence my overall comments are very positive!

- **Meier-Reinelt** studies a novel transmission mechanism of monetary policy, which explains why contractionary monetary policy shocks lower aggregate productivity (a quantitatively important channel)
  - Contractionary monetary policy shocks increase the relative markup of firms, and the increase in markup dispersion lowers aggregate productivity (explaining GDP losses)

- **Gropp-Ongena-Rocholl-Saadi** test the cleansing effects of banking crises: in the U.S. regions with higher levels of regulatory forbearance on distressed banks during the recent crisis, there was less restructuring in the real sector (fewer establishments, firms, and jobs were lost if more distressed banks remained in business)
  - Consistent with the cleansing hypothesis, regions with less regulatory forbearance during the crisis experienced a better productivity growth path after the crisis (with more establishment entries, job creation, and employment, wages, patents, and output growth)

Discussion:

MONETARY POLICY, MARKUP DISPERSION, AND AGGREGATE TFP

(Matthias Meier and Timo Reinelt)

Research questions

1. Do firms facing higher price-stickiness adjust markups differently after a MP shock?

2. Are there implications for aggregate TFP?

3. Is this transmission channel of MP important from a quantitative perspective?

Findings

1. After a contractionary MP shock “stickier” firms increase their markup relatively more
   - Stickier firms have a higher initial markup → dispersion in markups across firms goes up

2. Higher dispersion in markups across firms *lowers* aggregate TFP
   - A 1sd (contractionary) MP shock lowers aggregate TFP by 0.4-0.6% 2 years after the shock

3. Estimates suggest this transmission channel accounts for nearly 50-80% of GDP losses
   - Models with homogenous price-stickiness across firms neglect the relation between MP and TFP
   - GDP losses are comparable, though recovery is slower with heterogenous price-stickiness

Empirical strategy: Time-series analysis

- Standard measurement of MP shocks

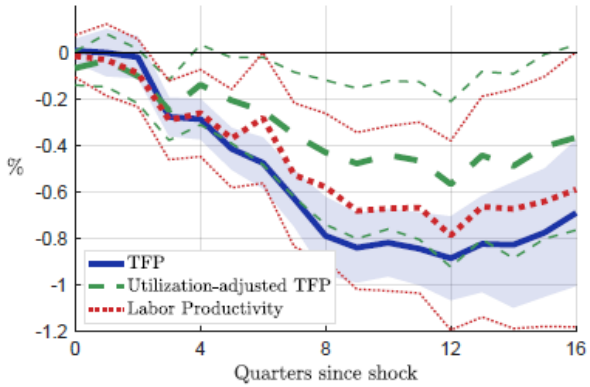
- Reaction of FED Funds Futures in a 30-minute interval around announcement
  - Results robust to many other popular definitions

- Main dependent variables: aggregate TFP and GDP
  - TFP = Solow residuals of real business output against (15 types of) capital and (hours of) labor
  - Applies several adjustments in robustness checks

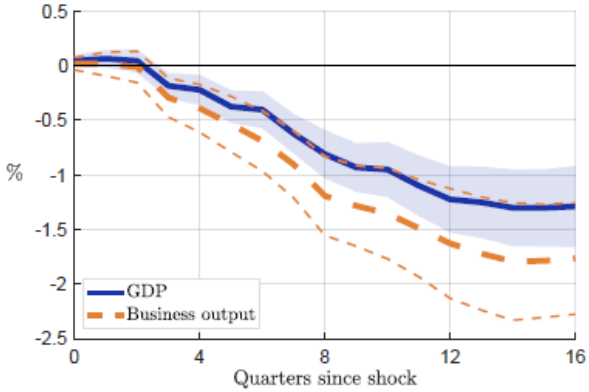
- Regressions are based on local projections (Jordá (2005))
  - Quarterly data: 1995Q2 to 2018Q3 (excluding apex of Financial Crisis from 2008q3 to 2009q2)

$$y_{t+h} - y_{t-1} = \alpha_h + \beta_h \varepsilon_t^{MP} + \gamma_h \, \varepsilon_{t-1}^{MP} + \gamma_1 (y_{t-1} - y_{t-2}) + u_t^h, \qquad h = \{0, \ldots, 16\}$$

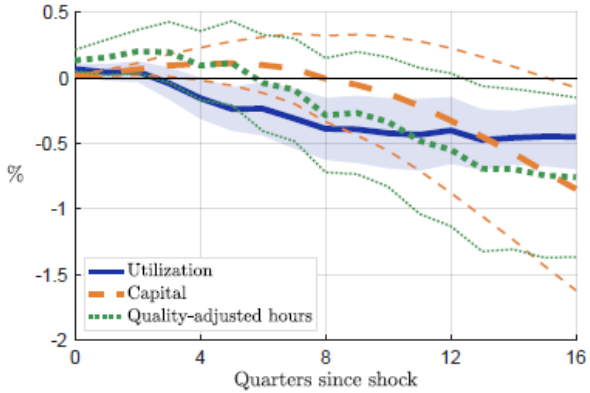
(a) Aggregate productivity



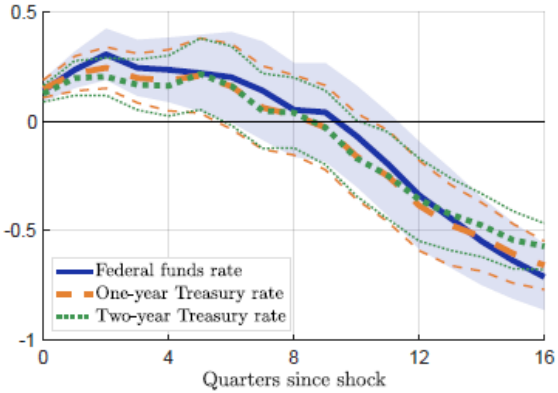
(b) Aggregate output



(c) Aggregate inputs



(d) Interest rates



Empirical strategy: uncovering the mechanism

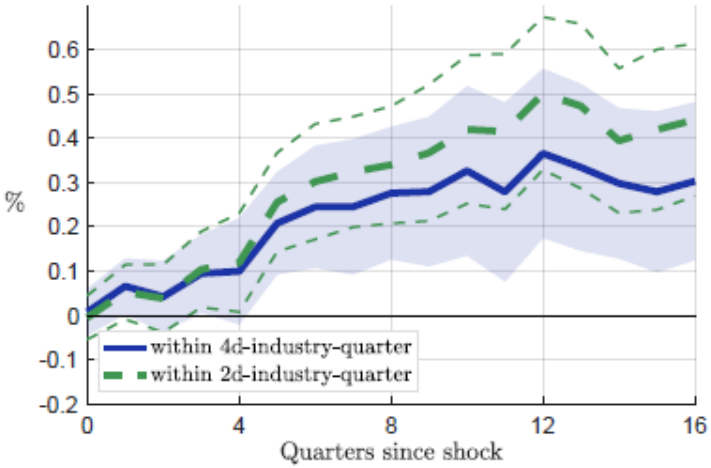
- Firm-level analysis:
  - Based on quarterly data from Compustat (US listed companies)
  - Markups measured as in De Loecker and Warzynski (2012)
  - $\tilde{\mu}_{i,t} = \log\left(\frac{sales}{cost\ of\ good\ sold}\right)_{i,t} - \overline{\log\left(\frac{sales}{cost\ of\ good\ sold}\right)_{s,t}}$
  - Regressions are based on local projections (Jordá (2005))

$$\tilde{\mu}_{i,t+h} - \tilde{\mu}_{i,t-1} = \alpha_{t,h} + \beta_h \varepsilon_t^{MP} \tilde{\mu}_{i,t-1} + \gamma_h\, \varepsilon_{t-1}^{MP} X_{i,t-1} + u_t^h, \qquad h = \{0, \dots, 16\}$$

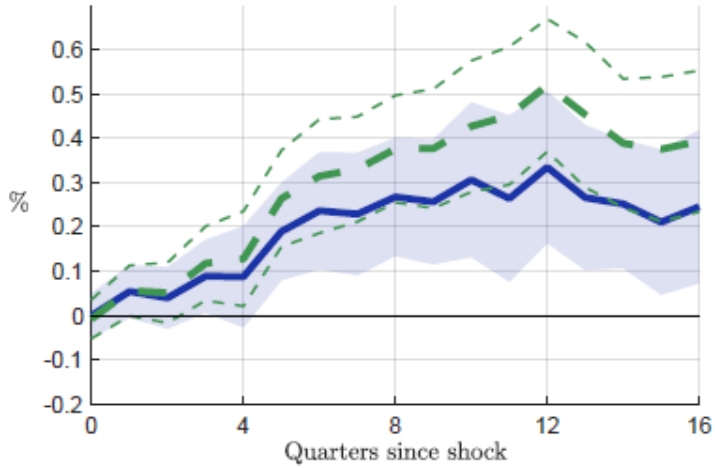
- Finally, verify impact on dispersion in aggregate TFP
  - Dispersion measured as $V_t = Variance(\tilde{\mu}_{i,t})$
  - Apply again local projections to check how the growth rate of V_t reacts after a contractionary MP shock

Figure 3: Firm-level heterogeneity in the markup response to monetary policy shocks

(a) Baseline specification



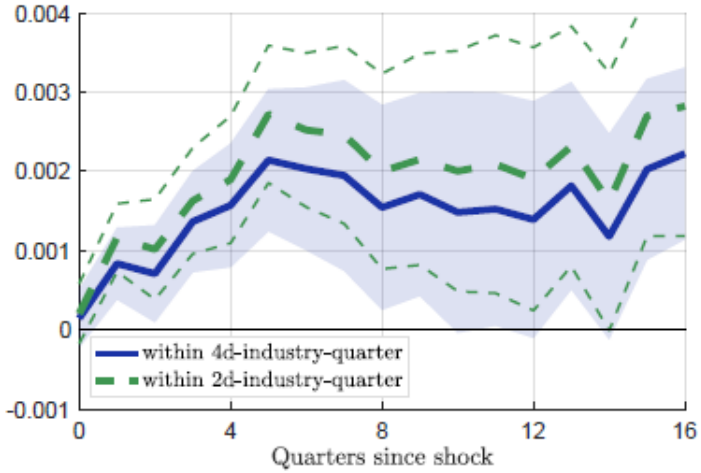
(b) Including controls



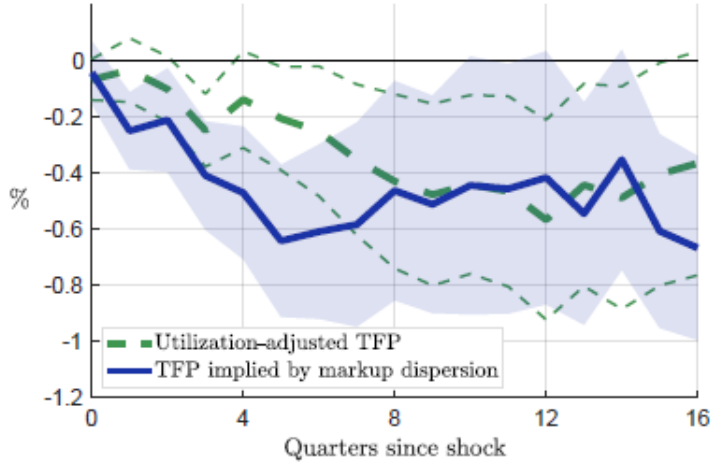
Notes: Response of firm-level markup to a monetary policy shock interacted with pre-shock firm-level markup. Inference is based on two-way clustered standard errors by firms and quarters. The shaded area is a one-standard error band.

Figure 2: Responses of markup dispersion to a monetary policy shock

(a) Markup dispersion



(b) Implied TFP response



Notes: The plots show the responses of markup dispersion to a one-standard deviation contractionary monetary policy shock. Panel (a) shows markup dispersion within two-digit and four-digit industry-quarters, respectively. Panel (b) shows the imputed response of TFP, implied by the response of markup disperesion within four-digit industry-quarters, according to Equation (2.4). For comparison, Panel (b) also shows the empirical response of utilization-adjusted TFP as shown in Figure 1. Inference is as in Figure 1.

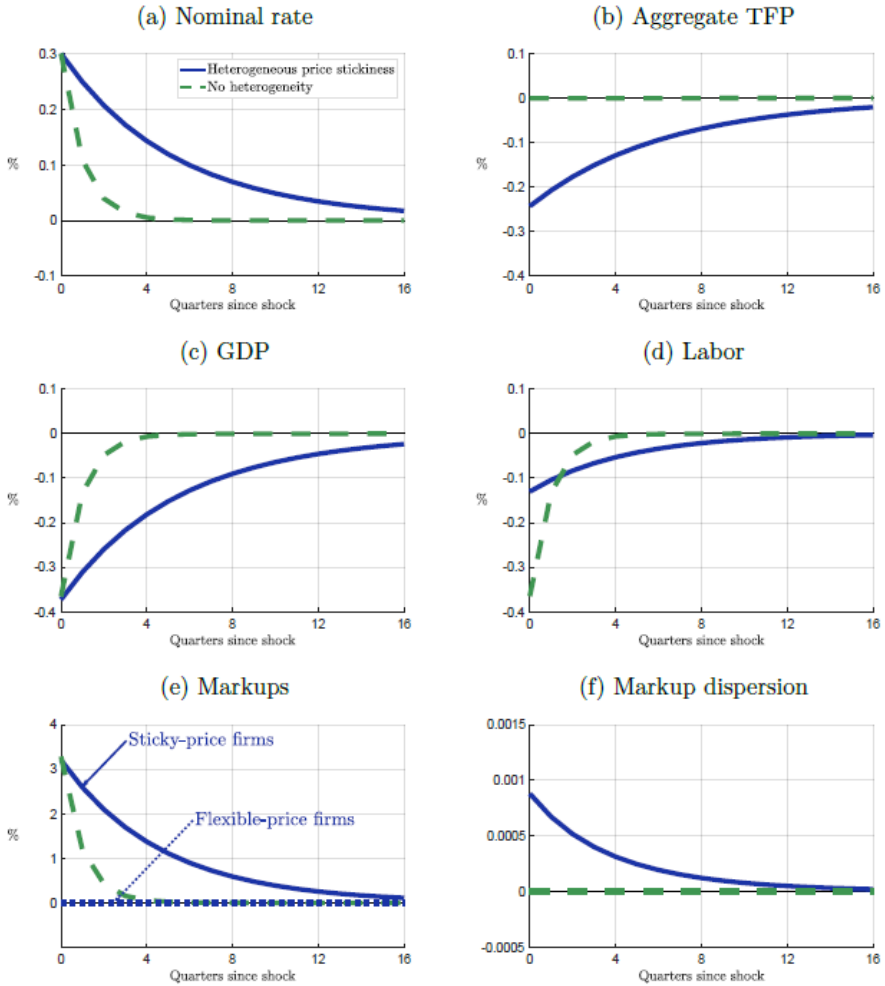
Theory: building a consistent NK model

Two main departures from standard NK workhorse model:

1. *Ex-ante* heterogeneity in degree of price-stickiness across firms
   - In standard NK models, Calvo pricing takes the form: $\theta_i = \theta \ \ \forall i$
   - Here this assumption is removed (for simplicity, assume that a group of firms never adjust)

2. Following Fernandez Villaverde et al. (2015), "asymmetric" profit function:
   - $profit_{i,t} = \left(\frac{P_{i,t}}{P} - W_t\right)\left(\frac{P_{i,t}}{P}\right)^{\eta} Y_t$
   - Profits fall more rapidly below the optimal price than above it
   - With uncertainty, this model generates upward bias in price setting
   - The bias is stronger among firms subject to greater price-stickiness

Figure 4: Model responses to a monetary policy shock



Notes: This figure shows impulse responses to a one standard deviation monetary policy shock.

Contribution

- Innovative framework: impact of MP shocks on TFP traditionally ignored
  - Large *literature on price-stickiness* heterogeneity and its influence on effectiveness of MP
    - Bils and Klenow (2004); Carvalho (2006); Nakamura and Steinsson (2008, 2013)…
  - Following Hsieh and Klenow (2009), focus on *markups dispersion as a drag on TFP growth*
    - Baqaee and Fahri (2017) show that contractionary shocks MP reduce TFP by increasing dispersion in markups
  - ***This paper builds a bridge* between these two strands of literature, and shows longer-term effects of monetary policy**
    - Does heterogenous price-stickiness matter for TFP response to MP shocks?

- New channel for the transmission of monetary policy to the real economy
  - Firm heterogeneity is relevant for macro responses to MP
    - Recent focus on financial heterogeneity (Cloyne et al. (2018), Jeenas (2018), Ottonello and Winberry (2018))
  - Reduction in TFP explains large portion of GDP response MP shocks

Comments

- Huge debate on how to measure markups, how firms nowadays choose some fixed vs. marginal costs, and assumptions on the production function…

- Dig more into mechanism
  - Empirically, the paper shows that firms with higher markups adjust markups more
  - But definition of markup correlates with firm profitability (and arguably with firm TFP as well)
  - How can we better dissect empirically the contribution of firm-level price stickiness to markups?
    - Empirically, impossible to build price-stickiness measure at firm level with Compustat (no data on prices)
    - However, you might control for pre-determined proxies of firm TFP. In the model, introduce heterogeneity across firms in terms of productivity
    - Recent related paper by Chanwoo (2019) proposes a different mechanism: Large firms increase their markup less after a contractionary MP shock

- IRFs based on local projections suggest a very persistent effect of MP shocks
  - After 4 years, no mean reversion to zero effect. Over same horizon, shocks are absorbed in model
  - Potential adjustments in the empirical models
    - *Time series regressions*: include more lags of the dependent and/or of the shock itself; and in *Firm level regressions*: interact markups (with more lags) and controls with GDP and inflation + firm fixed effects
  - Relation between MP (or demand) shocks and long-run growth?
    - Estimates predict a large and persistent effect of MP on TFP growth. Does the effect of MP shocks extend beyond business cycle fluctuations?

Discussion:

THE CLEANSING EFFECT OF BANKING CRISES

(Reint Gropp, Steven Ongena, Jörg Rocholl and Vahid Saadi)

Research questions

Analysis of the real economy impact of bank restructuring during a Crisis:

1. Destruction of economy activity during the Crisis
   - Firm exit
   - Job destruction

2. Post-Crisis recovery
   - Firm entry
   - Job creation
   - Growth of productivity, employment and GDP

3. Optimal policy design

Findings

1. Greater levels of bank restructuring are associated to higher destruction in real sector
   - Firms exit rate and job destruction rate increase substantially

2. However, bank restructuring grants a much faster post-Crisis recovery
   - Firms entry and job creation take place at much faster rates
   - Higher growth in productivity, showing the “cleansing effects” of banking crises

3. Trade-off between short-run pain and long-run → fine-tuning of bank restructuring
   - With too much bank restructuring, post-Crisis recovery does not take off

Empirical setting

- Data
  - Yearly bank-level data for US data from SNL Financial and FDIC
    - failure (=restructuring) dates
    - headquarter MSA
    - distribution of deposits across branches
  - Several indicators of economic performance at the MSA level from various US Agencies
  - Periods of analysis: 2007-2010 (Crisis) and 2011-2014 (Post-Crisis)

- Baseline regression model

$$y_i^{crisis} = \gamma_0 + \gamma_1 x_i^{crisis} + \Gamma X_i + \epsilon_i$$

  - y_i^{crisis} is the average of a given outcome y in MSA i during the Crisis period
  - x_i^{crisis} proxies MSA-level exposure to bank forbearance

Empirical Strategy: Challenge 1

How to estimate MSI-level forbearance?

- Run yearly bank-level pooled OLS regression during the Crisis period:

$$failed_{b,t} = \alpha_0 + \mathrm{B}_0 CAMELS_{b,t-1} + \Gamma \mathrm{X}_{\mathrm{b,t-1}} + \mathrm{u}_{\mathrm{b,t}}$$

  - Intuition: from a regulatory perspective, a bank failure should be based on CAMEL
  - Hence, a lower estimated residual $\hat{\mathrm{u}}_{\mathrm{b,t}}$ denotes a looser regulator
  - Ultimately, $\mathrm{x}_{\mathrm{b,t}} = -\hat{\mathrm{u}}_{\mathrm{b,t}}$ is an increasing proxy for bank forbearance

- Next, compute the MSA weighted average of $\mathrm{x}_{\mathrm{b,t}}$ across banks during the Crisis
  - Take average among banks headquartered in a given MSA
  - Weights are given by the deposits share account for by bank b at time t in a given MSA

Empirical Strategy: Challenge 2

- Economic outcomes y_i^{crisis} and forbearance x_i^{crisis} are endogenously related
  - Supervisors may be less willing to forbear banks with bad future growth perspecti
- IV strategy: gton are restructure
  - Banks clc r ties with supervisc

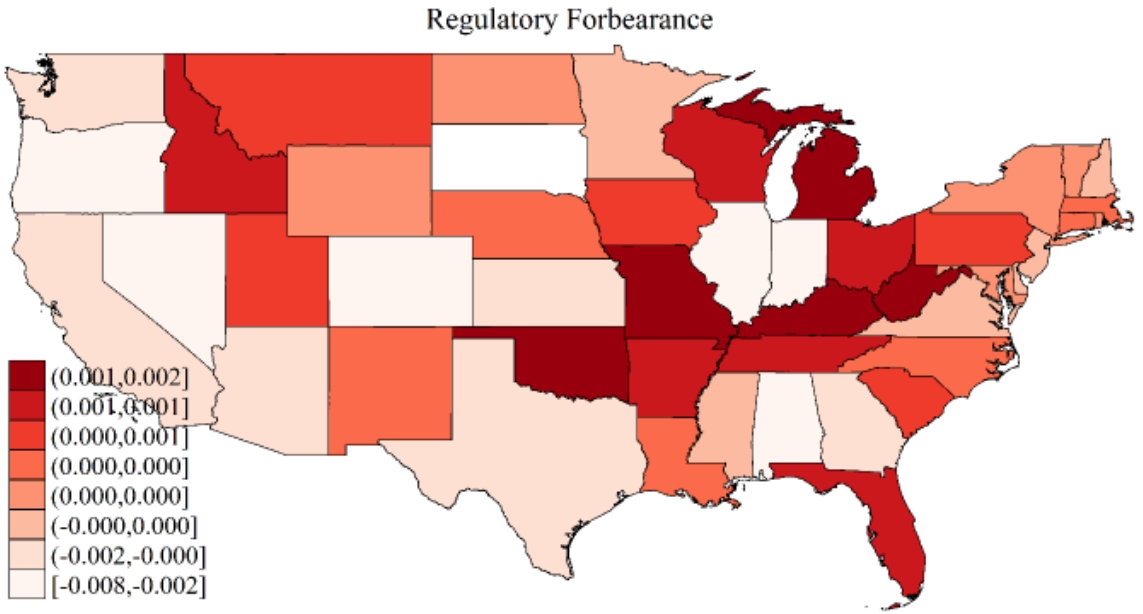


Table 5- Regulatory Forbearance and Real Outcomes during the Crisis

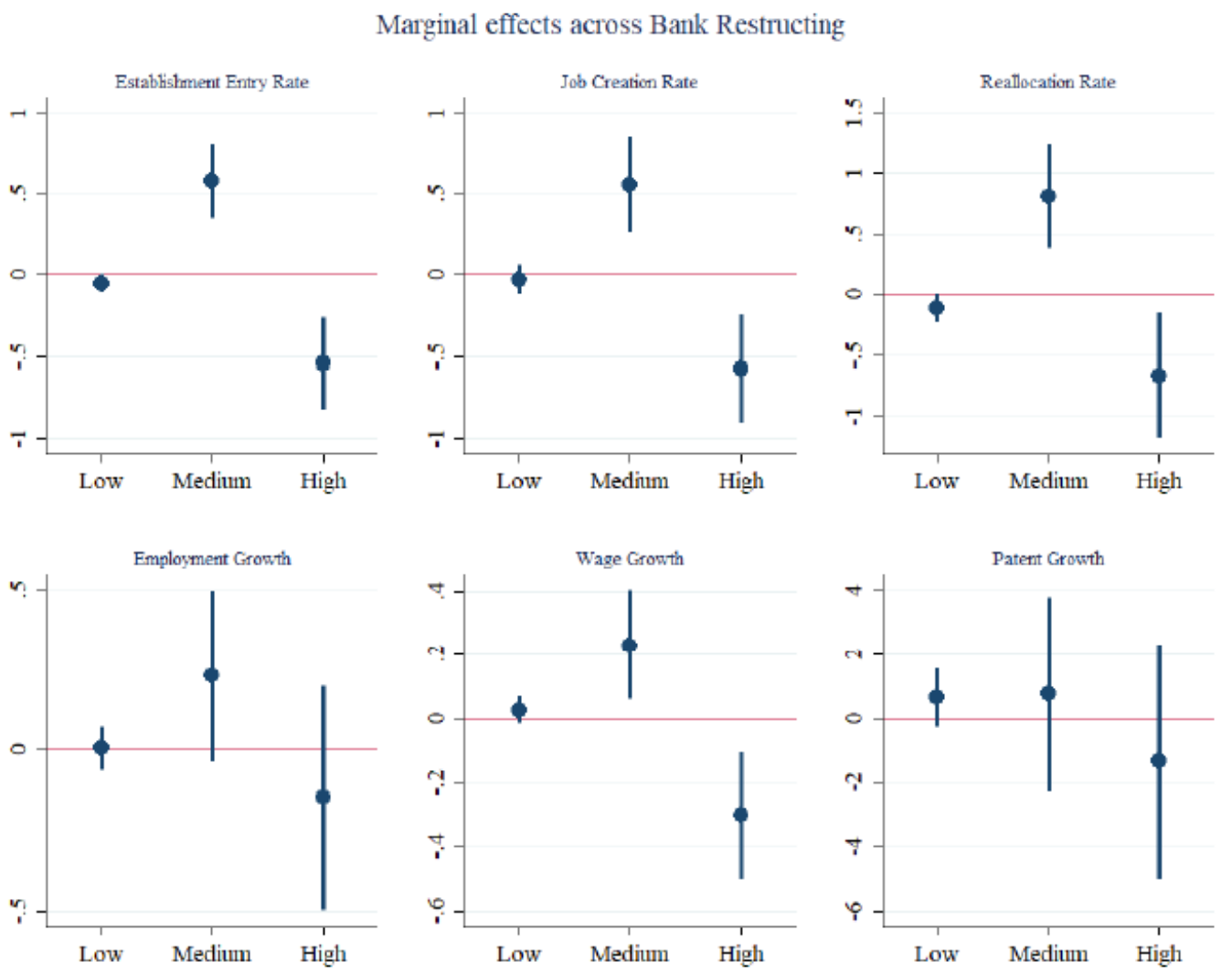
This table presents the results of the regression model presented in equation (1) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Forbearance	-0.9952**	-0.7370**	-1.0323**	-0.5119**	-0.5233*
	(0.461)	(0.353)	(0.506)	(0.246)	(0.284)
House Price Growth during Crisis	-0.0009*	-0.0008**	-0.0011**	-0.0004*	-0.0007**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.0043	0.0036*	0.0042	0.0022	0.0021
	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)
Pre-crisis GDP Growth	0.2128***	0.2074***	0.2701***	0.0991**	0.1712***
	(0.081)	(0.064)	(0.093)	(0.046)	(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

Table 7- Regulatory Forbearance and Real Outcomes after the Crisis

This table presents the results of the regression model presented in equation (2) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	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**	-1.094**	-1.243*	-0.610*	-0.631*	-1.620*	-0.953**	-0.789**	-8.481*	-0.731**
	(0.612)	(0.549)	(0.670)	(0.312)	(0.378)	(0.977)	(0.459)	(0.354)	(4.598)	(0.358)
House Price Growth during Crisis	-0.001**	-0.001***	-0.001**	-0.000**	-0.000**	-0.001**	0.000	0.000	-0.002	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.007**	0.007**	0.007*	0.003*	0.004**	0.009*	0.005	0.004	0.044*	0.004*
	(0.004)	(0.003)	(0.004)	(0.002)	(0.002)	(0.006)	(0.003)	(0.002)	(0.025)	(0.002)
Pre-crisis GDP Growth	0.275***	0.279***	0.273***	0.175***	0.098	0.365***	0.093	0.016	-0.331	-0.237***
	(0.089)	(0.083)	(0.101)	(0.047)	(0.068)	(0.123)	(0.075)	(0.059)	(0.630)	(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


Marginal effects across Bank Restructing
Establishment Entry Rate
Job Creation Rate
Reallocation Rate
Employment Growth
Wage Growth
Patent Growth
Low
Medium
High

Contribution

- After Great Financial Crisis, research has focused on *ex-ante policies*
  - *(Macro) Prudential policy*: how can we reduce the likelihood of (systemic) crises?
  - *Bail-in* (as opposed to bail-out) as a device to mitigate risk-taking incentives
    - *Theory:* Lorenzoni (2008); Bianchi (2011); Tirole (2011); Farhi and Tirole (2012); Gertler, Kiyotaki and Queralto (2012)…
    - *Empirical studies:* Cerutti, Claessens and Laeven (2017); Jiménez et al. (2017); Akinci and Olmstead-Rumsey (2018)…

- **Little empirical guidance on how to deal with bank-level distress when it materializes, and what are the short-term costs vs. the medium-term benefits**

Comments (1)

- Dig more into the *mechanism*: what drives post-Crisis recovery?
  - Greater and more efficient lending by "healthier" restructured banks?
  - Or pure cleansing (i.e. substitution of unproductive incumbents with more efficient new entrants)?
  - If data contain MSA-level lending, check evolution after the Crisis (if not, use deposits growth)
    - If credit *does not grow faster* in more restructured MSAs, then *pure cleansing* drives results
    - Otherwise, both factors may be at play and other tests are needed
      - E.g. is the relation between productivity and forbearance stronger in high/low lending-growth MSA?
- IV strategy
  - Identification assumption: distance from DC affects MSA economic outcomes only through forbearance
  - Fundamentally, the model boils down to a diff-in-diff of MSA-level outcomes against distance from DC
  - Check pre-crisis parallel trends: does distance from DC predict higher growth in outcomes before the Crisis? What does it mean the exclusion restriction: no other lobbying different than banking e.g.? …
- Computation of standard errors (s.e.): how do you account for noise in forbearance measure?
  - This noise is not accounted for by 2SLS-corrected s.e.
  - Check robustness of results to bootstrapped s.e.

Comments (2): Extensions

- *Which MSAs benefit the most from bank restructuring?*
  - If **restructuring addresses weakness in bank capitalization** → *highly levered MSAs* benefit more
  - If **restructuring addresses zombie lending** dynamics → *MSAs with higher share of NPLs* benefit more
    - Typically, evergreening associate to low capital and high levels of NPLs (Caballero, Hoshi and Kashyap (2008))
  - **Pre-crisis imbalances concentrated in real estate** → *MSAs more exposed to housing benefit more*
    - In the US, growth of real estate crowded-out commercial lending (Chakraborty, Goldstein and MacKinlay (2018))
    - Is economic destruction in real estate special for favoring subsequent higher TFP growth?

Firm Innovation, Productivity and Banking Crises

Mikel Bedayo **Christian Fons-Rosen**

Gabriel Jiménez **José-Luis Peydró** **Joan Torrent**

Question and identification

- **Research question:**
  - Do credit supply crunches reduce innovation?
  - Which type of innovation and which type of R+D expenses?
  - Are the effects stronger on tangible capital (investment) or on intangibles? What are the medium-/long-term effects?

- **We exploit:**
  - The 2008 global financial crisis
  - Matched supervisory credit register (not only with admin firm-level balance-sheet data but also) with the most important survey to firms in Spain (SEPI), with very detailed questions on e.g. innovation

Data, shock and context

- SEPI: Unique data with information on:
  - intangible vs. tangible assets
  - process vs. product innovation
  - national vs. international patents
  - R&D coming from external vs. internal funds

- For the first time, we match this firm-level dataset with the credit register. We analyze the data at loan level (for credit supply) but also at firm level (for R&D)

- Allows us to explore the effects of credit supply on R&D

- Focus since 2006 in Spain to exploit the banking crisis, exploiting bank credit supply shocks a la Amity-Weinstein (JPE 2018)

Preview of results

1. We show that the crisis leads to a reduction of firms' credit availability via reduction of credit supply

2. We show that credit supply crunch implies firms' reduction in innovation
   - Only the **R&D funded by external expenses** goes down. And it is not substituted by an increase in R&D from internal sources
   - **Only European patenting goes down, not Spanish one** (a firm only has incentives to incur the higher cost of patent protection at the European level when the idea is worth it; that Spanish patenting goes up and international patenting goes down **implies lower quality innovations**, not worth it to deal with extra European-level bureaucracy)
   - While **working capital** is unaffected, and **physical investment** is somewhat reduced, there is a **much stronger reduction in intangible fixed assets**
   - This shows that our result is not driven by a general reduction in all outcomes
   - We are now checking the **medium- and long-term effect on output, productivity, investment**

First Stage (firm-bank data):

Firms exposed to banks who cut credit supply *more* during the crisis experience *greater* reductions in bank credit availability

DepVar: chdavis. FE: 5. Vble dummy p50_ef5_dtb_2012. Firm-Bank cross-section WITH Firm FE and WITHOUT controls.

VARIABLES	(1) 2006	(2) 2007	(3) 2008	(4) 2009	(5) 2010	(6) 2011	(7) 2012
p50_ef5_dtb_2006_1	-0.026						
	(0.051)						
p50_ef5_dtb_2007_1		-0.071					
		(0.044)					
p50_ef5_dtb_2008_1			-0.107*				
			(0.063)				
p50_ef5_dtb_2009_1				-0.230***			
				(0.060)			
p50_ef5_dtb_2010_1					-0.113***		
					(0.036)		
p50_ef5_dtb_2011_1						-0.164***	
						(0.059)	
p50_ef5_dtb_2012_1							-0.030
							(0.067)
Observations	9,035	8,989	8,927	8,834	8,632	8,498	8,188
R-squared	0.336	0.378	0.397	0.408	0.413	0.430	0.428
Firm FE	YES	YES	YES	YES	YES	YES	YES
cod postal 3 digits FE	No	No	No	No	No	No	No
cnae FE	No	No	No	No	No	No	No
cod entidad cluster	YES	YES	YES	YES	YES	YES	YES
CNAE cluster	No	No	No	No	No	No	No
cod provincia 3 di cluster	No	No	No	No	No	No	No
N of firms	2128	2114	2100	2078	2029	1990	1925

Second Stage (firm panel data):

Firms exposed to banks who cut *more* credit supply during the crisis make *greater* reductions in R&D funded with external (vs. internal) sources

VARIABLES	(1) GEID_w2	(2) GEID_w2	(3) GTID_w5	(4) GTID_w5	(5) GIID_w5	(6) GIID_w5
p50_ef5_1	0.121	0.138	0.061	0.063	0.061	0.060
	(0.087)	(0.093)	(0.047)	(0.052)	(0.059)	(0.063)
p50_ef5_1_2008		-0.131		-0.061		-0.039
		(0.107)		(0.080)		(0.096)
p50_ef5_1_2009		-0.277*		-0.116*		-0.026
		(0.162)		(0.068)		(0.088)
p50_ef5_1_2010		-0.230		-0.120		-0.111
		(0.161)		(0.121)		(0.120)
p50_ef5_1_2011		-0.359**		-0.088		-0.035
		(0.173)		(0.133)		(0.144)
inter_post_8_11	-0.225*		-0.094		-0.054	
	(0.120)		(0.081)		(0.093)	
Observations	2,000	2,000	2,808	2,808	2,421	2,421
R-squared						
Year FE	YES	YES	YES	YES	YES	YES
cod_entidad_main FE	YES	YES	YES	YES	YES	YES
id_e FE	YES	YES	YES	YES	YES	YES
cod_entidad_main cluster	YES	YES	YES	YES	YES	YES

Second Stage (firm panel data):

Firms exposed to banks who cut credit supply *more* during the crisis reduce the quality of their patenting (less international vs. more national)

VARIABLES	(1) PATESP	(2) PATESP	(3) PATEXT	(4) PATEXT	(5) pat_totales	(6) pat_totales
p50_ef5_1	-0.154	-0.152	0.523*	0.483	0.160	0.092
	(0.537)	(0.523)	(0.309)	(0.388)	(0.182)	(0.216)
p50_ef5_1_2008		0.522		-0.745**		-0.335
		(0.458)		(0.347)		(0.313)
p50_ef5_1_2009		1.413*		-0.354		0.401
		(0.799)		(0.660)		(0.473)
p50_ef5_1_2010		0.462		-2.064**		-0.892
		(0.539)		(0.973)		(0.641)
p50_ef5_1_2011		0.610**		-0.291		0.223
		(0.279)		(0.949)		(0.716)
inter_post_8_11	0.745**		-0.748*		-0.197	
	(0.374)		(0.421)		(0.329)	
Observations	678	678	447	447	788	788
R-squared						
Year FE	YES	YES	YES	YES	YES	YES
cod_entidad_main FE	YES	YES	YES	YES	YES	YES
id_e FE	YES	YES	YES	YES	YES	YES
cod_entidad_main cluster	YES	YES	YES	YES	YES	YES

Second Stage (firm panel data):
Firms exposed to banks who cut credit supply *more* during the crisis reduce their intangible capital, more than their tangible one

VARIABLES	(1) FPIDTO_w5	(2) FPIDTO_w5	(3) chINM_t1	(4) chINM_t1	(5) chRIMVA	(6) chRIMVA	(7) chCOVA	(8) chCOVA	(9) chTEVA	(10) chTEVA
p50_ef5_1	0.090	0.095	0.118**	0.129**	0.002	0.001	0.065	0.068	0.008	0.019
	(0.203)	(0.201)	(0.046)	(0.047)	(0.023)	(0.022)	(0.057)	(0.060)	(0.037)	(0.040)
p50_ef5_1_2008		-0.119		-0.133**		-0.005		-0.057		0.043
		(0.234)		(0.059)		(0.036)		(0.047)		(0.040)
p50_ef5_1_2009		-0.335		-0.241**		0.008		-0.122*		-0.068*
		(0.228)		(0.088)		(0.028)		(0.062)		(0.037)
p50_ef5_1_2010		-0.238		-0.244**		0.010		-0.066		-0.065
		(0.251)		(0.104)		(0.028)		(0.070)		(0.050)
p50_ef5_1_2011		-0.166		-0.252***		-0.003		-0.068		-0.067
		(0.227)		(0.075)		(0.027)		(0.080)		(0.055)
inter_post_8_11	-0.213		-0.203***		0.002		-0.076		-0.025	
	(0.221)		(0.067)		(0.027)		(0.057)		(0.034)	
Observations	1,378	1,378	2,649	2,649	3,400	3,400	2,563	2,563	2,087	2,087
R-squared			0.738	0.739	0.769	0.769	0.816	0.816	0.841	0.841
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
cod_entidad_main FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
id_e FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
cod_entidad_main cluster	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Contributions of the paper

1. Exploiting the global financial crisis, bank credit supply shocks, bank-firm ex-ante lending relationships, and matched credit register with a

2. Unique dataset on Spanish Innovation Survey, providing much more info on changes in innovation strategy and results

3. Exogenous reductions in bank credit supply lead a firm to reduce and lower the quality of their innovation efforts

4. *Work in progress:* a reason for why it takes so long to recover from financial crisis, reducing medium-term productivity, investment…?