The Impact of Alternative Forms of Bank Consolidation on Credit Supply and Financial Stability[1]

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[1] The views expressed are of the authors and do not necessarily reflect those of the Banco de España.

Motivation

- In banking systems featuring many undiversified banks, fierce competition may induce these entities to take on too much risk.
- If bad risks then translate into problematic loans, public intervention drawing on government funds may become necessary.
- Bank consolidation as a structural policy often advanced by regulators to solve the problems of over-banked systems (Corbae and Levine, 2018).
- Conflicting views around bank mergers: financial v. antitrust.
  - Financial view: merged banks more capable to absorb losses.
  - Antitrust view:
    - − Market power reduces credit supply, especially to SME.
    - + Partially compensated by efficiencies (risk management, capacity reduction).

Motivation

- We study the impact of bank mergers and bank business groups on credit supply and performance.
- Alternative consolidation forms can differentially balance pros and cons of integration.
  - Bank business groups allow for investment in information technologies that would not be feasible absent the deal.
  - At the same time, they are less likely to give rise to market power than mergers, because group members remain legally independent.
- Empirical challenge: difficult to disentangle the separate effects of alternative integration modes.
  - Is there a differential impact of mergers and business groups on exercise of market power?
  - Are there differences in the efficiencies they generate?
  - What's their impact on welfare?

Overview

- Use Spanish savings banks' sector restructuring program as policy experiment: multiple M&A and business groups.
- Banks self-selecting into the two modes are comparable based on (predetermined) financial and economic characteristics.
  - Choice mainly driven by regional politics considerations.
- Quasi-experimental evidence: compared to business groups, M&A reduce volume of credit and non-performing loans (NPL), increase interest rates.
  - New beneficial effect of M&A: exercise of market power can cause a reduction in NPL.
- Structural evidence: in the short run (no cost efficiencies), total welfare roughly unchanged. Large welfare gains in the long run (due to cost efficiencies).

Literature

- Mergers in banking:
  - Redistributional effects.
  - Cost and informational efficiencies.
  - Shocks propagation.
  - We document "bright side" in NPL reduction by mergers compared to other consolidation forms.
- Mergers in IO: large literature, little considering alternatives to mergers. Exception: Gugler and Siebert (2007) on semiconductor industry.
- Structural banking models: quantify welfare effects of country-wide consolidation program.

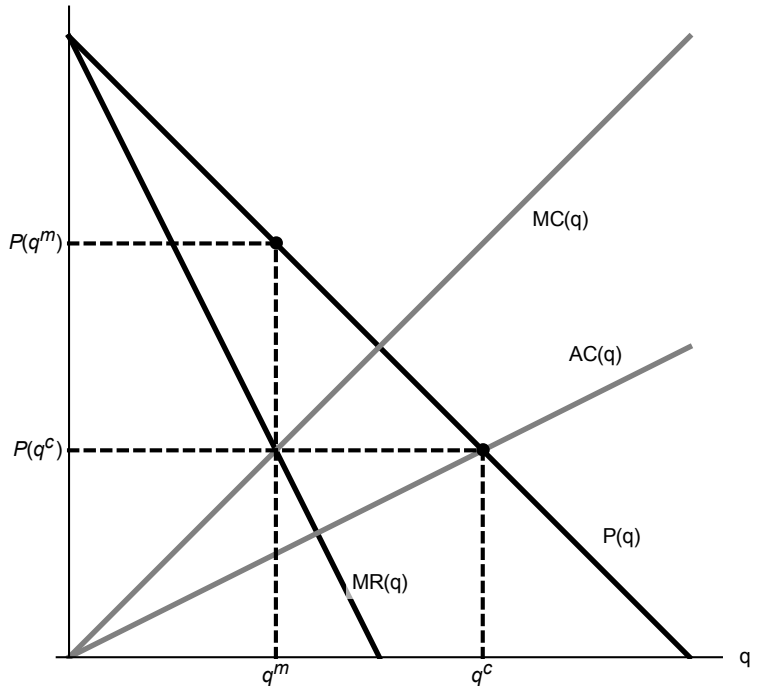
Stylized model

- Stylized setting building on Einav and Finkelstein (2011). Goal: illustrate how market power affects supply and selection of borrowers.
- Banks offer symmetric loans. Borrowers' binary choice: take loan or not.
- $q \in [0, 1]$: fraction of borrowers taking a loan.
- $P(q)$: cumulative distribution of borrowers' willingness to pay.
- $C(q)$: total cost, with $MC(q) = C'(q)$ and $AC(q) = C(q)/q$.

Stylized model

- Assume that expanding q implies lending to borrowers with higher prob. of default; thus, higher average cost and marginal cost for banks.
  - Increasing MC and AC schedules, $MC'(q), AC'(q) > 0$.
- Interpretation: credit supply expansion raises borrowing among firms with a greater probability of default.
- Compare two market outcomes: perfect competition ($P(q) = AC(q)$) and monopoly ($MR(q) = MC(q)$).

Effect of market power



- Perfect competition (q^c): high supply, but bad risk (high AC).
- Monopoly (q^m): reduction in supply, but better risk (lower AC).

$\Rightarrow$ Market power comes with reduction of risk.

- However, if consolidation produces efficiencies, lower AC for any given q.
- Challenge: identify impact of different integration modes on market power and efficiencies.

The Spanish banking sector restructuring program

- During 2009–2012, Spanish government pushed banks to consolidate, to improve solvency and profitability. Target: savings banks' sector.
  - Savings banks comparable to Thrift institutions in the United States, but also active on corporate loan market.
- By end of 2009, savings banks' assets represented 40% of total banking assets in Spain. Main issue:
  - Poor investment choices: 100BE out of 217BE of loans to construction sector problematic as of 2010.
  - Similar patterns in other European countries.
- Deal: consolidation in exchange of injection of public capital (FROB).
- Banks accounting for $\approx 90\%$ of total credit extended by savings banks participated in the program.

▸ More features

What happened

- Savings banks could choose between standard M&A and *sistema institucionales de protección* (SIP).
- SIP banks remained separate legal entities, but were compelled to set up new, common risk management unit and report consolidated results to regulator. SIP is a form of business group.

M&A	SIP
◦ Legal independence: no	◦ Legal independence: yes
◦ Risk management: coordinated	◦ Risk management: coordinated
◦ Results and regulatory duties: joint	◦ Results and regulatory duties: joint
◦ Solvency: joint	◦ Solvency: mutual pacts of assistance (100%)

▸ How it happened

Implications

- Credit policies. Risk management unit produces common information, yet SIP banks' legal independence may impair coordination of credit policies, due to possibly different use of that information.

  $\Rightarrow$ M&A produce stronger market power effect.

- Efficiencies. By regulatory guidelines:

  SIP must be stable and produce the same organizational improvements, cost efficiencies, diversification, quality and product value as a traditional M&A.

  $\Rightarrow$ M&A and SIP should generate the same level of efficiencies.

Quasi-experimental evidence

- Ideally, 3 groups of randomly selected banks: M&A, SIP and untreated. However, virtually all savings banks participated in the program.
- Empirical strategy:
  - Short "post" consolidation period to control for cost efficiencies.
  - Assume M&A and SIP produce similar informational efficiencies.
  - Testable prediction: market power effects stronger for M&A banks.
  - Estimate differential impact of M&A v. SIP on (i) lending conditions (P, q) and (ii) NPL (C).

Data

Bank of Spain credit register: matched bank-firm level observations.

- Information on stock of credit exposure, its characteristics, firm and bank balance sheets.
- Covers universe of monthly bank-firm relationships in Spain.
- Period: 11.2007 to 11.2011.

Final sample: 543,154 firm-bank relationships and 396,534 non-financial corporations.

- Restructuring program starts (with first merger) in 11.2009.
- Use M&A and SIP taking place between 11.2009 and 12.2010, compare outcomes between 11.2009 and 11.2011.

▸ Descriptive statistics

Empirical checks

- M&A and SIP banks are comparable wrt predetermined financial and economic characteristics (including capitalization, NPL, profitability and business model).
- Patterns of credit supply, interest rates and NPL of M&A and SIP banks satisfy common trend assumption.
- Ample geographic variation in M&A and SIP pre-treatment market shares at province level.

▸ Balance test ▸ Geographic variation ▸ Common trends ▸ Placebo

Specification (credit and NPL)

Consider bank j dealing with borrower i and time t:

$$\begin{aligned} y_{jit} \quad = \quad & \alpha(\text{M\&A}_j \times \text{Post}_t) \quad + \quad \beta X_{jt-1} + \gamma Z_{it-1} + \zeta \text{FROB}_{jt} \\ & + \quad \textit{Industry} \times \textit{Location} \times \textit{Size} \times \textit{Time FE} \\ & + \quad \textit{Bank FE} + \epsilon_{jit} \end{aligned}$$

- y: growth rate, average level of lending or NPL.
- Post: 0 between 11/2007–10/2009, 1 between 11/2009–11/2011.

  $\Rightarrow$ α: how M&A and SIP differentially affect y.
- Industry-Location-Time-Size FE: firms with same size within same year, SIC-3 industry, province.
- Bank FE control for bank-specific shocks.
- X: predetermined bank controls (e.g., capital ratio, credit/deposits, ROA).
- Z: predetermined firm controls (e.g., leverage, liquidity, ROA).
- FROB: injection of public capital.

Results on credit volume

	Delta			Quarterly Average	Delta			Quarterly Average
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	All	SME	Large	All	All	SME	Large	All
Post x M&A	-0.194***	-0.194***	-0.173	-0.041***	-0.259***	-0.263***	-0.192	-0.054***
	[0.024]	[0.024]	[0.169]	[0.008]	[0.035]	[0.035]	[0.159]	[0.012]
Observations	792,542	776,962	15,103	756,339	350,700	336,981	13,719	328,414
R-squared	0.118	0.119	0.221	0.477	0.493	0.496	0.445	0.720
Industry-Location-Size-Time FE	YES	YES	YES	YES	NO	NO	NO	NO
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm-Time FE	NO	NO	NO	NO	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES	NO	NO	NO	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Dependent variable: (log) total credit.
  - From col. (1): wrt SIP banks, during the restructuring program M&A banks reduced lending by 19.4% $\approx$ 45,000 euro per firm.

▸ Alternative FE ▸ Alternative clustering

Results on NPL

	Delta			Quarterly Average	Delta			Quarterly Average
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	All	SME	Large	All	All	SME	Large	All
M&A	-0.027***	-0.027***	-0.028	-0.018***	-0.028***	-0.029***	-0.028	-0.019***
	[0.004]	[0.004]	[0.020]	[0.003]	[0.005]	[0.005]	[0.019]	[0.004]
Observations	112,560	109,885	2,442	104,534	38,003	36,024	1,979	34,020
R-squared	0.221	0.222	0.409	0.237	0.725	0.726	0.699	0.803
Industry-Location-Size FE	YES	YES	YES	YES	NO	NO	NO	NO
Firm FE	NO	NO	NO	NO	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES	NO	NO	NO	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Dependent variable: proportion of NPL.
- Sample of bank-firm pairs with no credit exposures during the pre-consolidation period $\rightarrow$ no Post dummy.
  - Share of non-performing firm credit is $\approx$ 3 pp less for M&A banks.

▸ NPL and systemic risk – CoVar analysis ▸ Firms with credit ▸ Spillover ▸ Alternative clustering

Specification (interest rates)

Consider bank j at time t:

$$\begin{aligned} w_{jt} \quad = \quad & \alpha(\text{M\&A}_j \times \text{Post}_t) \quad + \quad \beta X_{jt-1} + \zeta \text{FROB}_{jt} \\ & + \quad \textit{Bank FE} + \textit{Time FE} + \iota_{jt} \end{aligned}$$

- w: spread between the nominal interest rate and the three-month Euribor.
- Post: 0 between 11/2007–10/2009, 1 between 11/2009–11/2011.
- X: pre-determined bank controls.
- FROB: injection of public capital.

Results on interest-rate spreads

	(1)	(2)	(3)	(4)
	OLS, weighted average IR		Weighted OLS, three maturity buckets	
VARIABLES	Loans < 1ME	Loans > 1ME	Loans < 1ME	Loans > 1ME
Post x M&A	0.178***	0.098*	0.253***	0.128
	[0.034]	[0.058]	[0.039]	[0.087]
Observations	586	586	1,751	1,387
R-squared	0.923	0.736	0.800	0.666
Bank FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Maturity FE	NO	NO	YES	YES
Bank Controls	YES	YES	YES	YES

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Information on rates reported at bank level, by maturity and loan size.
- Col. (1): loans granted to SME ($<$ 1ME) by M&A banks are 17.8 bp more expensive, $\approx$ 5.3% of the baseline spread (3.3%).

Mechanisms

1. Establish that our results are due to differences in consolidation mode (M&A v. SIP), not to banks' geographical presence. ▸ Go
2. Show that M&A and SIP produce comparable level of efficiencies absent market power. ▸ Go
3. Similar results when using commercial banks as control group to study the separate effects of M&A and SIP. ▸ Go
4. M&A reduce credit supply more relative to SIP mostly for ex-ante risky borrowers ▸ Go

Structural model - overview

- Develop and estimate equilibrium model of:
  - Borrower demand for credit from differentiated banks (Berry, 1994).
  - Banks' Bertrand-Nash interest rate competition.
- Use model estimates and equilibrium assumptions for counterfactuals to:
  - Simulate scenarios with M&A and SIP.
  - Compare welfare (borrowers' surplus, banks' profits) and stability (banks' default risk) across scenarios.
  - Counterfactuals without (short run) and with (long run) cost efficiencies.

Structural model - demand

- Borrower's i demand for credit in month t from bank j in province m is given by indirect utility

$$U_{ijmt} = \underbrace{X'_{jmt}\beta + \alpha P_{jt} + \xi_{jmt}}_{\equiv \delta_{jmt}} + \varepsilon_{ijmt}.$$

  - X bank controls (size, profitability, capital ratios, exposure to RE), bank FE, province-month FE.
  - P average loan interest rate.
  - ξ unobserved bank characteristics.
  - ε type-1 extreme value shocks.

- Each bank j can reject borrowers above a threshold of expected default $\overline{F}_{jt}$. Thus, following Sovinsky Goeree (2008), a bank's market share is:

$$S_{jmt} = \exp(\delta_{jmt}) \left[\frac{\Pr\left[F_{jt} \leq \overline{F}_{\underline{k}t}\right]}{1 + \sum_k \exp(\delta_{kmt})} + \sum_{\ell=\underline{k}+1}^{j} \frac{\Pr\left[\overline{F}_{\ell-1t} < F_{jt} \leq \overline{F}_{\ell t}\right]}{1 + \sum_{k>\ell-1} \exp(\delta_{kmt})} \right].$$

Structural model - pricing

- Independent banks simultaneously solve:

$$\max_{P_{jt}} \ \Pi_{jt} = \left[1 + P_{jt} - MC_{jt}\right] Q_{jt}. \tag{1}$$

  - $Q_{jt} = \sum_m^M S_{jmt} \mathcal{M}_{mt}$: volume of loans granted by bank j at time t.
  - $\mathcal{M}_{mt}$: total potential volume borrowable in province-month.
  - MC_{jt}: expected marginal costs.

- Specifically,

$$MC_{jt} = C_{0jt} + C_1 Q_{jt}. \tag{2}$$

- We will estimate C_1 using FOC from equation (1).
- C_1 captures selection: $C_1 > 0$ increasing marginal cost.

Structural model - M&A and SIP

- M&A banks set P_{jt} to maximize sum of expected profits.

$$\Pi_{jt} = \left[1 + P_{jt} - MC_{jt}\right] Q_{jt} + \sum_{k \neq j} \left[1 + P_{kt} - MC_{kt}\right] Q_{kt}.$$

  - Absent efficiencies generated by M&A, only market power effect.

- SIP banks simultaneously set P_{jt} to maximize individual profit (no coordinated decision on interest rate).
  - Absent SIP-related efficiencies, SIP members' profit function is the same as without consolidation.

Structural model - demand estimation

1. We compute the volume of credit extended by major banks (Q_{jmt}).
2. We group the total volume of credit granted by all other banks into a single outside option ($\mathcal{Q}_{0mt} = \mathcal{M}_{mt} - \sum_j \mathcal{Q}_{jmt}$).
3. Based on data from before the restructuring program started, we estimate the demand model with instrumental variables:

$$\ln(S_{jmt}) - \ln(S^j_{0mt}) = X'_{jt}\beta + \alpha P_{jt} + \xi_{jt}. \tag{3}$$

   - IV: lagged values of NPL (Egan, Hortaçsu, Matvos, 2017).

Results: Assuming a 5% bank's market share and a 5% loan rate (close to the average in the data), borrowers' demand elasticity ≈ -2.05.

Using demand and supply equilibrium conditions, we find that $\hat{C}_1 > 0$.

▸ Table

Structural model - counterfactuals

- Short-run: neither M&A nor SIP produce cost efficiencies.
- Long-run: M&A and SIP generate cost efficiencies. Their overall marginal costs drop by around half of a standard deviation.
- Borrower surplus,

$$E(CS_{mt}) = \frac{1}{\alpha} \log \left[\sum_{k} \exp\left(\delta_{kmt}\right) \Pr\left[F_{kt} \leq \overline{F}_{\underline{k}t}\right] \left(1 - D_{kt}\right) + \sum_{\ell=\underline{k}+1}^{k} \left[\sum_{k>\ell-1} \exp(\delta_{kmt}) \Pr\left[\overline{F}_{\ell-1t} < F_{kt} \leq \overline{F}_{\ell t}\right] \left(1 - D_{kt}\right) \right] \right] + C.$$

- Note: borrower surplus depends on banks' survival probability $(1 - D_{kt})$.

Structural model - results

Panel A			
	Short run	Long run	
	M&A Banks	M&A Banks	SIP Banks
% Change Interest Rate	3.00	-8.05	-8.74
% Change Loan Volume	-5.10	2.00	6.96
% Change Marginal Costs	0.00	-0.64	-0.51
% Change Banks Profit	0.76	10.47	8.42

Panel B			
	Baseline	M&A & SIP Short run	M&A & SIP Long run
Interest Rate (p.p.)	5.45	5.48	5.20
Loan Volume (ME)	143.31	142.79	152.77
Total Loan Volume (ME)	9,745.22	9,709.94	10,388.57
% Change Borrower Surplus		-0.96	15.37
% Change Total Welfare		-0.06	12.36
Change in Bank Default Prob		-1.13	-

- Short run: bank profits increase by 0.8%, borrower surplus drops by 1%
  - 1.1 pp reduction in banks' default probability required to make borrowers' surplus as well off as without consolidation.
- Long run: total welfare increases by 12%.

Discussion

- Active debate around need of bank consolidation in the EU. ECB Banking Supervision Authority:

  > *In principle, banking is a good thing. But when the banking sector grows too large, an economy can become overbanked. And this too can seriously harm the health [...] of the entire economy. (Daniéle Nouy, 9/2017)*
  >
  > *Several countries in Europe are currently over-banked [...]. This over-banking is a clear signal that further consolidation is needed. (Pentti Hakkarainen, 6/2018)*
  >
  > *[W]e are part of a set of European institutions that regard integration as a positive, desirable goal. (Ignazio Angeloni, 3/2019)*

- We show that exercise of market power may cause a reduction in banks NPL, even after controlling for consolidation-related efficiencies.

Concluding remarks

- The Spanish banking sector restructuring program allows us to compare effects of M&A and bank business groups on P, q and C.
- With respect to business groups, M&A increase price and reduce quantity. On the other hand, they significantly reduce volume of NPL in the economy.
- Bank mergers can be effective in improving financial stability, especially as a remedy to crises produced by banks' excessive risk taking.
- Short-run welfare gains from improved financial stability outweigh losses from reduced credit supply. In the long run, small cost efficiencies generate substantial increase in surplus.

Appendix

Features of the program

1. Prompted by EC worries regarding crisis' impact on financial stability in EU, thus allowing Spain to do the bail-out.
2. Very fast! Number of savings banks went from 37 to 12 in just 18 months (11/2009–12/2010).
3. Massive: banks that merged during 11/2009–12/2010 were worth 1,300BE in 12/2008. Total value of US M&A transactions in 2009 and 2010 (combined) $\approx$ 1,400USD billion.
4. Similar to restructuring programs contemporaneously considered in, e.g., Germany, Greece and Italy, to solve same structural problems.

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Timing

1. Early 2009: EcoFin agreed to transfer the EU rescue program money directly to a bank fund set up by Spanish government.
2. June 2009: Royal Decree 9/2009 set up FROB with initial fund of 9BE, then raised to 99BE.
3. November 2009: first merger – start of restructuring program.
4. November 2009–December 2010: 12 mergers.

Overall, total number of banks went from 59 to 18 in about three years.

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FROB

- Be it a M&A or a SIP, the merger receives public money from the *fondo de reestructuración ordenada bancaria* (FROB).
- FROB intervention conditional to submission of plan making specific merger proposal.
- Partial bail-out system: FROB to subscribe, on a transitory basis, the capital of the new institution.
- In its first phase (2009–2011), FROB made investments for about 10BE, and targeted those banks that were not on the brink of bankruptcy.

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How it happened

- Early in the program, M&A took place between savings banks sharing main regional market.
  - Within-region M&A allowed savings banks' governing bodies to avoid loss of control on bank activities.
  - Constraints to political initiatives against across-region M&A came by Constitutional Court.
  - Banco de España solicited remaining savings banks to form SIP. SIP allowed them to keep legal and lending independence.
- Outcome: M&A within region, SIP across regions.
  - 2/3 of SIP between savings banks operating in regions ruled by different parties.
- Yet, large heterogeneity in M&A and SIP province-level overlap.

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Date	Merging parties	New bank	Type	FROB	# Regions
November 2009	Caja Castilla la Mancha, Cajastur	Cajastur	SIP	0	2
March 2010	Caixa Sabadell, Caixa Terrasa, Caixa Manlleu	Unnim	M&A	380	1
March 2010	Catalunya Caixa, Caixa Tarragona, Caixa Manresa	Catalunya Caixa	M&A	1,250	1
March 2010	Caja Espaa, Caja Duero,	Ceiss	M&A	525	1
April 2010	Caja Navarra, Caja Canarias, Caja Burgos	Banca Cívica(*)	SIP	977	3
May 2010	Unicaja, Caja Jaén	Unicaja	M&A	0	1
May 2010	La Caixa, Caixa Girona	La Caixa	M&A	0	1
June 2010	Caja Murcia, Caixa Penedés, Sa Nostra, Caja Granada,	BMN	SIP	915	4
June 2010	Caja Madrid, Bancaja, Caja Ávila, Caja Segovia, Caja Rioja, Caixa Laietana, Caja Insular de Canarias,	Bankia	SIP	4,465	6
June 2010	Caixa Galicia, Caixanova,	Novacaixagalicia	M&A	1,162	1
July 2010	CAI, Caja Círculo de Burgos, Caja Badajoz	Caja 3	SIP	0	3
July 2010	Bilbao Bizkaia Kutxa, CajaSur	Bilbao Bizkaia Kutxa	SIP	800	2

Notes: The table uses information from International Monetary Fund (2012), Banco de España (2015), Banco de España (2017). (*): Banca Cívica later acquired Caja Sol-Caja Guadalajara in December 2010.

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Non-coordinated credit policies

	Rejected Application
Bank1	0.200*
	[0.117]
Bank2	0.252*
	[0.131]
Bank3	0.065
	[0.117]
Bank4	0.038**
	[0.016]
Bank5	.
	.
Bank6	.
	.
Observations	1,005
R-squared	0.884
Bank-Firm FE	YES

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Dependent var: dummy $= 1$ if information request followed by credit rise.
- Independent var.s: dummy for each bank within same SIP, and SIP group-firm FE.
- Sample: banks within same SIP requesting information on same firm.
- Significant coeff.: differential lending policy wrt avg bank in same SIP.

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Descriptive statistics

Panel A: Banks

VARIABLES	December 2008					
	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	N
TA (BE)	28.4	13.10	47.60	1.56	173.00	37
Capital Ratio (%)	5.62	5.04	1.71	3.83	9.58	37
NPL (%)	3.61	3.47	1.49	1.65	6.36	37
Credit/Deposits	1.85	1.83	0.36	1.27	2.62	37
ROA (%)	0.49	0.41	0.22	0.24	0.96	37
(Credit to RE and Construction)/TA (%)	30.57	30.08	8.82	14.80	46.68	37
Max(Market Share) (%)	19.59	17.67	14.47	0.96	48.01	37

Panel B: Firms

VARIABLES	December 2008					
	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	N
TA (ME)	1.89	0.45	5.36	0.04	6.94	280,420
Total Liabilities/TA (%)	72.75	80.04	73.66	18.66	100.00	280,420
Liquid Assets/TA (%)	9.75	3.20	15.78	0.00	43.82	280,420
ROA (%)	4.35	5.53	18.61	-23.22	28.02	280,420

Panel C: Bank-Firm Relationships

VARIABLES	November 2007–November 2009					
	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	N
ΔLog(Credit)	-0.36	-0.19	2.50	-4.74	4.65	421,991
NPL (%)	5.62	0.00	23.33	0.00	0.00	421,991

Panel D: Bank-Firm Relationships

VARIABLES	November 2009–November 2011					
	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	N
ΔLog(Credit)	-0.49	-0.21	2.18	-4.39	3.89	370,551
NPL (%)	5.94	0.00	21.27	0.00	0.00	370,551

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Checks

	Panel A: All Savings Banks			Panel B: Median		
VARIABLES	Means		Difference	Means		Difference
	M&A	SIP		M&A	SIP	
NPL (%)	3.720	3.151	0.205	3.825	3.553	0.272
			(0.523)			(0.648)
TA (BE)	36.200	23.400	12.800	37.100	14.800	22.300
			(16.600)			(18.500)
Capital Ratio (%)	4.932	5.888	-0.956	5.004	5.822	-0.818
			(0.596)			(0.594)
ROA (%)	0.462	0.513	-0.051	0.413	0.519	-0.106
			(0.076)			(0.060)
Credit/Deposits	1.829	1.859	-0.030	1.808	1.809	-0.001
			(0.126)			(0.142)
(Credit to RE and Construction)/TA (%)	28.761	31.562	-2.801	28.592	30.737	-2.145
			(3.105)			(3.028)
Max(Market Share) (%)	17.107	21.830	-4.723	17.791	20.975	-3.184
			(5.084)			(6.011)
(FROB funds)/TA (%)	1.016	1.115	-0.099	1.115	1.016	0.099
			(0.528)			(0.528)
	Panel C: Main Bank			Panel D: Standard Deviation		
VARIABLES	Means		Difference	Means		Difference
	M&A	SIP		M&A	SIP	
NPL (%)	4.446	4.991	-0.534	0.596	1.476	-0.880
			(0.820)			(0.596)
TA (BE)	70.200	46.400	23.800	40.500	15.800	24.700
			(43.800)			(27.700)
Capital Ratio (%)	4.457	5.422	-0.966	0.613	1.968	-1.355
			(0.771)			(0.765)
ROA (%)	0.635	0.773	-0.138	0.190	0.229	-0.039
			(0.122)			(0.083)
Credit/Deposits	2.004	2.004	-0.040	0.264	0.270	-0.006
			(0.219)			(0.098)
(Credit to RE and Construction)/TA (%)	26.556	25.195	1.361	4.345	11.010	6.665**
			(8.544)			(2.398)
Max(Market Share) (%)	23.288	31.077	-7.789	7.490	9.411	-1.921
			(10.156)			(3.126)
(FROB funds)/TA (%)	1.115	1.016	0.099	-	-	-
			(0.528)			-

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

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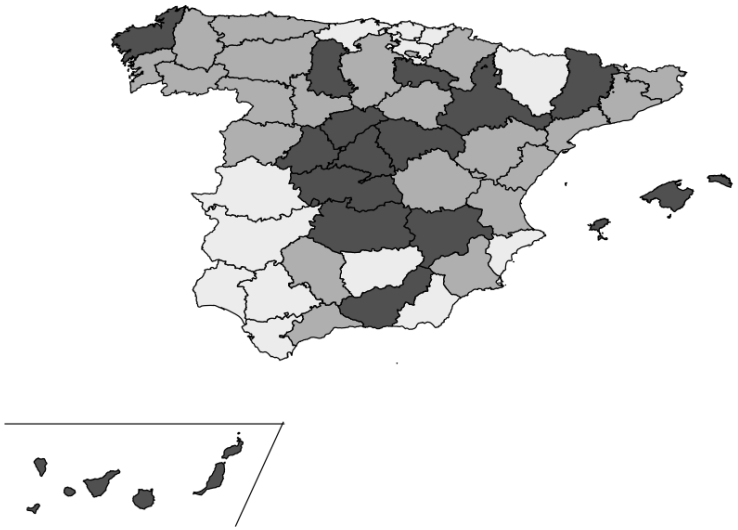
Geographical variation



- Light grey: provinces where market shares of all M&A / SIP banks are smaller than 13% in November 2009.
- Dark grey: provinces where market share of at least one M&A / SIP banks is above 13%, and largest M&A / SIP bank is in the top 5 of all banks in the province.
- 13%: 25th percentile of the distribution of largest market shares at province level.

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Common trends

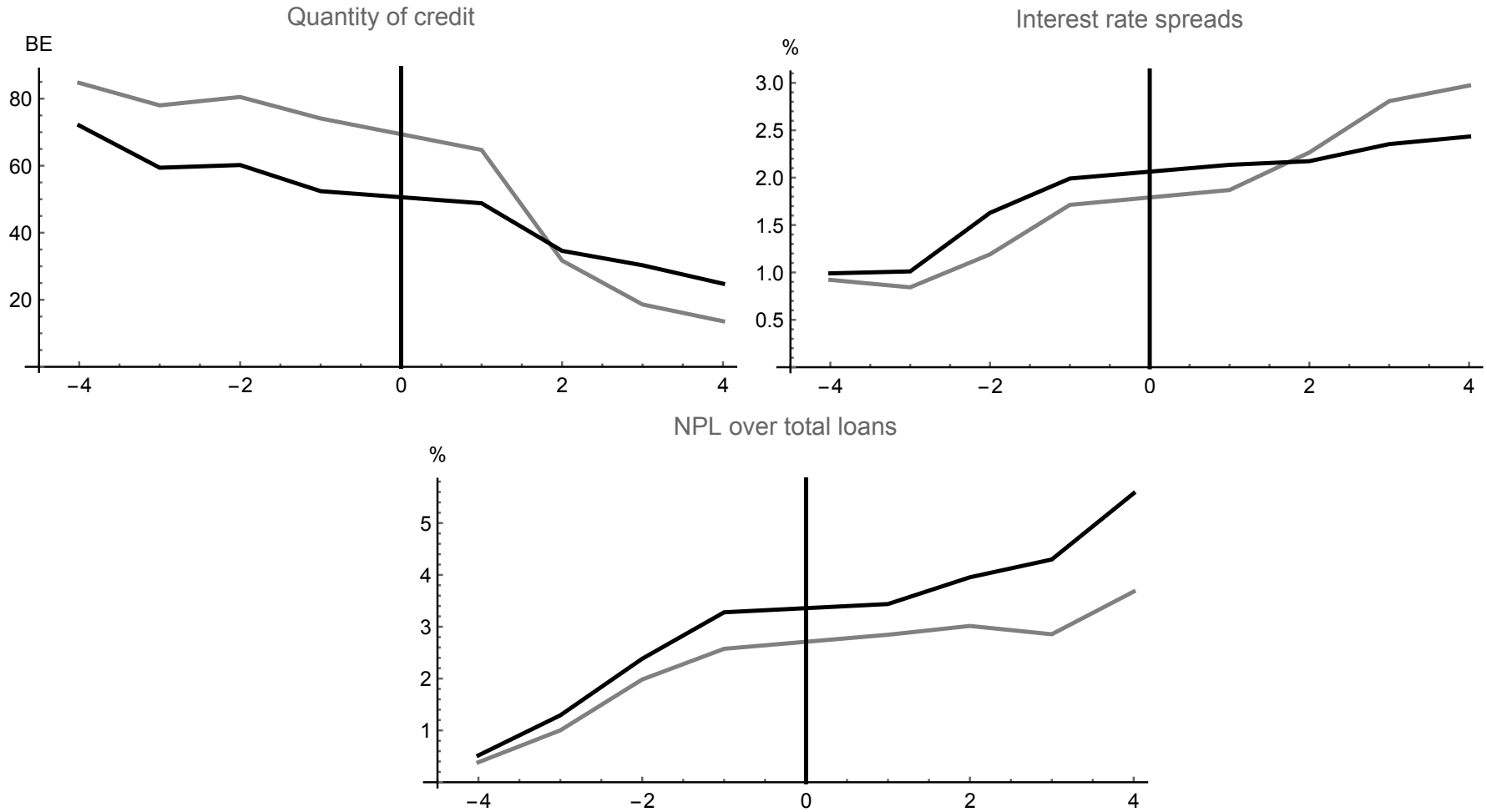

Figure: M&A: grey; SIP: black.

▸ Placebo ▸ Back

Placebo

	(1)	(2)	(3)	(4)
			OLS, weighted average IR	Weighted OLS, three maturity buckets
VARIABLES	ΔLog(Amount)	ΔLog(Amount)	Spread Loans $<$ 1M	Spread Loans $<$ 1M
M&A	-0.036	0.044	-0.061	-0.005
	[0.022]	[0.033]	[0.043]	[0.032]
Observations	421,991	194,865	299	895
R-squared	0.109	0.492	0.860	0.709
Industry-Location-Size FE	YES	NO	NO	NO
Firm FE	NO	YES	NO	NO
Time FE	NO	NO	YES	YES
Maturity FE	NO	NO	NO	YES
Bank Controls	YES	YES	YES	YES
Firm Controls	YES	NO	NO	NO

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Pre-period: 11/2007–11/2009 (before program started).

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Alternative fixed effects

VARIABLES	(1) All	(2) All	(3) All
Post x M&A	-0.194*** [0.024]	-0.259*** [0.035]	-0.145*** [0.017]
Observations	792,542	350,700	527,614
R-squared	0.118	0.493	0.543
Industry-Location-Size-Time FE	YES	NO	NO
Bank FE	YES	YES	NO
Firm-Time FE	NO	YES	NO
Firm-Bank FE	NO	NO	YES
Time FE	NO	NO	YES
Bank Controls	YES	YES	YES
Firm Controls	YES	NO	YES

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

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Alternative clustering – lending

	Growth rate			Quarterly change	Growth rate			Quarterly change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	All	SME	Large	All	All	SME	Large	All
Post x M&A	-0.194***	-0.194***	-0.173	-0.041***	-0.259***	-0.263***	-0.192	-0.054***
	[0.022]	[0.022]	[0.154]	[0.011]	[0.036]	[0.037]	[0.157]	[0.017]
Observations	792,542	776,962	15,103	756,339	350,700	336,981	13,719	328,414
R-squared	0.118	0.119	0.221	0.477	0.493	0.496	0.445	0.720
Industry-Location-Size-Time FE	YES	YES	YES	YES	NO	NO	NO	NO
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm-Time FE	NO	NO	NO	NO	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES	NO	NO	NO	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Clustering at the industry-province-size-bank level instead of firm-level.

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Alternative clustering – NPL

	Growth rate			Quarterly change	Growth rate			Quarterly change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	All	SME	Large	All	All	SME	Large	All
M&A	-0.027***	-0.027***	-0.028	-0.018***	-0.024***	-0.024***	-0.028	-0.017***
	[0.004]	[0.004]	[0.020]	[0.003]	[0.005]	[0.006]	[0.020]	[0.004]
Observations	112,560	109,885	2,442	104,534	38,003	36,024	1,979	34,020
R-squared	0.221	0.222	0.409	0.237	0.724	0.726	0.698	0.803
Industry-Location-Size FE	YES	YES	YES	YES	NO	NO	NO	NO
Firm FE	NO	NO	NO	NO	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES	NO	NO	NO	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Clustering at the industry-province-size-bank level instead of firm-level.

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NPL and systemic risk

VARIABLES	(1) ΔCoVaR Mergers	(2) ΔCoVaR All	(3) ΔCoVaR All
NPL	0.023**	0.039***	0.053***
	[0.011]	[0.008]	[0.006]
Observations	519	519	1,052
R-squared	0.514	0.576	0.651
Bank FE	YES	YES	YES
Bank Controls	YES	YES	YES
Macro Variables	YES	YES	YES

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Study effect of NPL on contribution of each bank to systemic risk using CoVaR methodology (Adrian and Brunnermeier, 2016).
- CoVaR: value at risk (VaR) of financial system conditional on a bank being under distress based on evolution of its bond yields.
  - (1): CoVaR of savings banks that did SIP or M&A during 11/2009–12/2010. (2)-(3): all Spanish banks.
  - (1)-(2): NPL of savings banks that did SIP or M&A during 11/2009–12/2010. (3): NPL of all savings banks.
- Increase in bank NPL $\rightarrow$ increase in bank's contribution to systemic risk.

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Results on NPL

VARIABLES	(1) All	(2) SME	(3) Large	(4) All (Avg Level)
Post x M&A	-0.021**	-0.022**	-0.007	-0.043***
	[0.009]	[0.009]	[0.068]	[0.006]
Observations	792,542	776,962	15,103	756,339
R-squared	0.132	0.131	0.301	0.160
Industry-Location-Size-Time FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Sample with all firms.

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NPL – spillover effects

	NPL of Banks Outside the Restructuring Program		
	(1)	(2)	(3)
VARIABLES	All	Exposed Firms	Non-Exposed Firms
Loan Application Rejected by M&A Bank	-0.009	-0.024	-0.001
	[0.017]	[0.026]	[0.024]
Observations	13,823	7,425	5,619
R-squared	0.127	0.149	0.191
Industry-Location-Size FE	YES	YES	YES
Average Bank Controls	YES	YES	YES
Firm Controls	YES	YES	YES

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Spillovers to other banks?
  - Sample of banks not involved in restructuring program (commercial banks, cooperative banks).
  - Dep. var.: dummy=1 if firm *i* reported NPL to a bank outside the restructuring program by 2011.
  - Ind. var.: dummy=1 if M&A rejected firm *i*'s application.
  - Non-exposed: firm with zero credit from M&A banks before restructuring program.

Back

Exploit geographical variation

- M&A within region, SIP across regions.
- Question: are the results explained by differences in consolidation form or geographical presence?
- Consider provinces where M&A and SIP overlap, construct following test:
  - Fix within-province market shares.
  - Take provinces where both M&A and SIP had large market shares before restructuring program.
  - Compare effects of M&A and SIP.
- Idea: if results explained by differences in capability to exercise market power at local level, then no differential effect in the provinces where M&A and SIP banks are comparably large in the benchmark.

Organization v. Location

	(1)	(2)	(3)	(4)
	Comparably large market shares			
VARIABLES	ΔLog(Credit)	ΔLog(Credit)	Δ(%NPL)	Δ(%NPL)
Post x M&A	-0.123***	-0.181***		
	[0.037]	[0.056]		
M&A			-0.021***	-0.032***
			[0.006]	[0.009]
Observations	282,694	122,498	44,421	15,126
R-squared	0.111	0.490	0.206	0.723
Industry-Location-Size-Time FE	YES	NO	NO	NO
Industry-Location-Size FE	NO	NO	YES	NO
Firm-Time FE	NO	YES	NO	NO
Firm FE	NO	NO	NO	YES
Bank FE	YES	YES	NO	NO
Bank Controls	YES	YES	YES	YES
Firm Controls	YES	NO	YES	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Comparably large: provinces where, before the program started, M&A and SIP banks had large mrkt share *and* main bank in each group is in top 5.

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Exploit geographical variation

- Are SIP and M&A different in the level of efficiencies they generate?
- Ideal test: check differences in C, keeping fixed market power effect.
- Consider provinces where M&A and SIP overlap:
  - Fix within-province market shares.
  - Take provinces where M&A and SIP banks had comparably small market shares before restructuring program.
  - Compare effects of M&A and SIP.

Efficiencies absent market power

	(1)	(2)
	Comparably small market shares	
VARIABLES	Δ(%NPL)	Δ(%NPL)
M&A	0.006	-0.015
	[0.008]	[0.017]
Observations	14,943	5,864
R-squared	0.305	0.726
Industry-Location-Size FE	YES	NO
Firm-Time FE	NO	NO
Firm FE	NO	YES
Bank Controls	YES	YES
Firm Controls	YES	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Provinces where, before program, M&A and SIP banks had small mrkt share.

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Commercial banks

	(1)	(2)	(3)	(4)	(5)	(6)
			OLS	Weighted OLS		
VARIABLES	ΔLog(Credit)	ΔLog(Credit)	Weighted average IR	Three maturity buckets	Δ(%NPL)	Δ(%NPL)
Post x M&A	-0.232***	-0.335***	0.233***	0.208***		
	[0.019]	[0.024]	[0.047]	[0.069]		
Post x SIP	-0.023	-0.061**	0.044	-0.016		
	[0.019]	[0.025]	[0.044]	[0.057]		
M&A					-0.006***	-0.006***
					[0.001]	[0.002]
SIP					0.001	-0.006***
					[0.002]	[0.002]
Observations	1,707,488	1,204,581	1,365	3,562	294,386	168,442
R-squared	0.139	0.444	0.785	0.853	0.186	0.680
Industry-Location-Size-Time FE	YES	NO	NO	NO	NO	NO
Industry-Location-Size FE	NO	NO	NO	NO	YES	NO
Bank FE	YES	YES	YES	YES	NO	NO
Firm-Time FE	NO	YES	NO	NO	NO	NO
Firm FE	NO	NO	NO	NO	NO	YES
Time FE	NO	NO	YES	YES	NO	NO
Maturity FE	NO	NO	NO	YES	NO	NO
Bank Controls	YES	YES	YES	YES	YES	YES
Firm Controls	YES	NO	NO	NO	YES	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Compare M&A and SIP to commercial banks (not part of the restructuring program).

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Risk taking

VARIABLES	(1) ΔLog(Credit) All	(2) ΔLog(Credit) SME	(3) ΔLog(Credit) Large	(4) ΔLog(Credit) All	(5) ΔLog(Credit) SME	(6) ΔLog(Credit) Large
Post x M&A x Risky Firm	-0.215***	-0.209**	-0.405***	-0.315***	-0.308***	-0.411***
	[0.065]	[0.069]	[0.095]	[0.049]	[0.051]	[0.116]
Post x M&A x Safe Firm	-0.172*	-0.178*	0.173	-0.219**	-0.233***	0.108
	[0.091]	[0.094]	[0.141]	[0.074]	[0.075]	[0.172]
M&A x Risky Firm	0.017	0.013	0.139	0.061	0.054	0.161
	[0.048]	[0.047]	[0.166]	[0.059]	[0.057]	[0.147]
Observations	790,774	778,295	14,932	350,700	336,981	13,719
R-squared	0.062	0.062	0.265	0.493	0.496	0.446
Industry-Location-Risk-Time FE	YES	YES	YES	NO	NO	NO
Bank FE	YES	YES	YES	YES	YES	YES
Firm-Time FE	NO	NO	NO	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	NO	NO	NO

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

- Split the Post x M&A interaction to capture the separate contribution of safe and risky firms to the fall in lending produced by M&A.
- Risky and Safe groups defined based on distance to default (Altman Z-Score).

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Structural model - demand estimation

VARIABLES	
Interest Rate	-42.85**
	(21.85)
Log of Total Assets	2.65***
	(0.56)
Capital Ratio (%)	18.66***
	(5.30)
ROA	2.97
	(6.25)
Credit/Deposits	0.25*
	(0.09)
(Credit to RE and Construction)/TA	-0.96
	(0.73)
Bank FE	Yes
Province-Month FE	Yes
N Obs	45,061
R^2	0.480
Robust standard errors in brackets	
*** p<0.01, ** p<0.05, * p<0.1	

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