

Sharing the Pain? Credit Supply and Real Effects of Bank Bail-ins

Thorsten Beck^{1,2} Samuel Da-Rocha-Lopes^{3,4} André F. Silva⁵

¹Cass Business School ²CEPR ³EBA⁴Nova SBE ⁵Federal Reserve Board

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Motivation

- ▶ Bailouts were the preferred resolution mechanism during the crisis
 - ▶ In the euro area, accumulated financial sector assistance reached 8% of GDP between 2008-2014 (ECB, 2015)
- ▶ However, large costs for taxpayers (Philippon and Salord, 2017)
 - ▶ Public guarantees also lead to increased risk-taking (Gropp et al., RFS 2011; Dam and Koetter, RFS 2012)
- ▶ *Regulatory response*: introduction of formal bank bail-in regimes
 - ▶ Private investors and creditors (e.g., junior bondholders) bear the costs of restoring a distressed bank
 - ▶ Banks can theoretically now fail without resorting to public funding, though extraordinary public support is still possible (Avgouleas and Goodhart, JFR 2015)
- ▶ Despite the hypothetical advantages of bank bail-ins (e.g., Klimek et al., JEDC 2015), there is little empirical evidence on the effects of this new resolution tool on credit supply or the real economy ...

This paper

Research Questions

- ▶ Are bank bail-ins effective in preventing a credit crunch?
- ▶ What are the effects of this resolution tool on the real economy?

Ideal experiment:

1. Random bank failure(s) and resolution(s)
2. Firms and banks are randomly matched

In reality:

1. Exploit unexpected bank failure in Portugal and subsequent bail-in
2. Endogenous bank-firm match: credit that firm i obtains from bank b is an equilibrium outcome resulting from credit supply and demand
⇒ Isolate credit supply by comparing lending across banks *within* the same firm (Khwaja and Mian, AER 2008)

Background

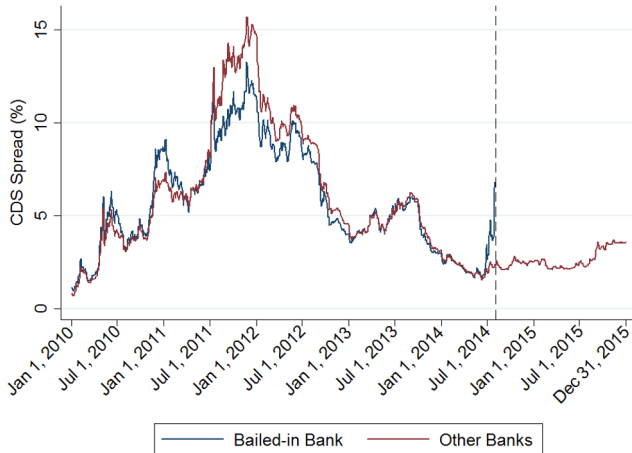
- ▶ Unexpected collapse and subsequent resolution of a major bank in Portugal (BES) in August 2014 → “one of Europe’s biggest financial failures” (FT, 2014)
 - ▶ 3rd largest bank operating in Portugal: €81bn assets in 2013:Q4
 - ▶ Considered a Significant Credit Institution by the ECB
 - ▶ Market share of 19% of credit granted to non-financial corporations

- ▶ Resolution implied that:
 1. Sound activities and assets were transferred to a “good bank”
 2. Shareholders and junior bondholders were left with the toxic assets in a “bad bank” which is in liquidation
 3. €4.9bn of capital of newly-created bank fully provided by Portugal’s Bank Resolution Fund → But loan to the Fund from 8 member banks (€0.7bn) and another from the Portuguese government (€3.9bn)

- ▶ Portuguese resolution regime in force was, in substance, very similar to the final European resolution framework (World Bank, 2016)

Background

- ▶ Bank failure was purely idiosyncratic → due to “seriously detrimental management acts” (BoP, 2014) where managers secretly lent money to firms of the Group owned by the same family (Economist, 2014)



Other Banks: CGD, BPI, BCP. Source: Thomson Reuters Datastream

Data

1. Portuguese Credit Register: quarterly information on credit exposures above 50 euros between *all* banks and *all* non-financial firms operating in Portugal
2. Individual Information of Interest Rates: matched firm-bank interest rate information on all new loans from June 2012
3. Firm and Bank Balance Sheet Data: financial information with annual frequency for virtually *all* Portuguese firms and banks
 - ▶ 40,927 firms, 98 banks
 - ▶ 116,245 firm-bank lending relationships
 - ▶ Period: 2013 to 2015

Identification strategy

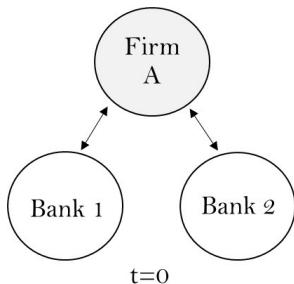
1st Step: Within-Firm Analysis

Are there any significant changes in the supply of credit by banks more exposed to the bail-in?

Identification strategy

1st Step: Within-Firm Analysis

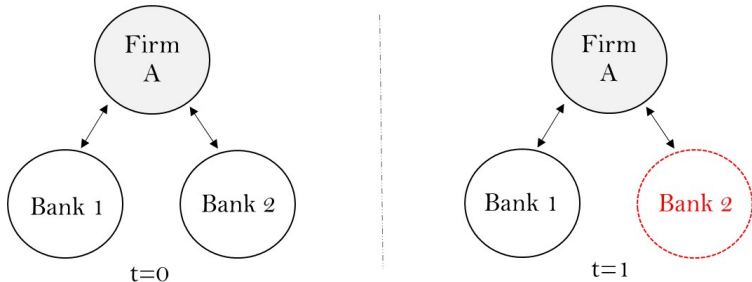
Are there any significant changes in the supply of credit by banks more exposed to the bail-in?



Identification strategy

1st Step: Within-Firm Analysis

Are there any significant changes in the supply of credit by banks more exposed to the bail-in?



- ▶ Following Khwaja and Mian (AER 2008) → isolate credit supply (from credit demand) by comparing the change in lending by banks more and less exposed to the shock *within* the same firm

Identification strategy

Within-Firm Specification

$$\Delta \log(Credit)_{bi} = \beta(BankExposure_b) + \delta' X_{bi} + \alpha_i + \varepsilon_{bi} \quad (1)$$

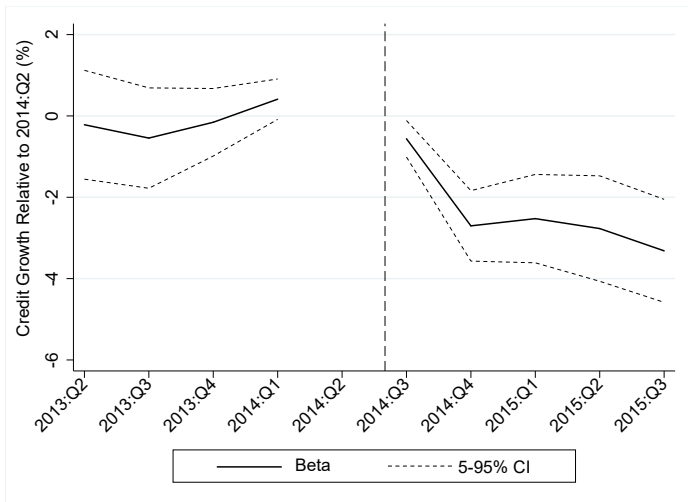
- ▶ $\Delta \log(Credit)_{bi}$: change in (log) committed credit from bank b to firm i
 - ▶ As in Khwaja and Mian (AER 2008), quarterly data for each credit exposure time-averaged into a single pre (2013:Q4-2014:Q2) and post-shock (2014:Q3-2015:Q3) period
- ▶ $BankExposure_b$: percentage assets of each bank exposed to the bail-in
 1. % assets that was effectively bailed-in for the resolved bank
 2. Specific contribution to the ad-hoc loan granted to the Bank Resolution Fund for the 8 participating banks (as a % assets)
 3. And 0 for all other banks
- ▶ α_i : firm FE capturing observed and unobserved firm-specific determinants of credit flows, including changes in credit demand

1.1. Credit supply – within-firm estimates: main results

	$\Delta \log TotalCredit_{bi}$				$\Delta \log CreditLines_{bi}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Exposure	-0.989*** (0.311)	-1.143*** (0.320)	-1.520* (0.824)		-2.723*** (0.863)	
Bank Exposure \times SMEs				-1.441* (0.829)		-2.659*** (0.881)
Bank Exposure \times Large Firms				-3.133*** (0.836)		-4.048*** (0.866)
No. Observations	116,245	116,245	116,245	116,245	39,573	39,573
No. Firms	40,927	40,927	40,927	40,927	14,320	14,320
Adj. R^2	0.001	0.047	0.049	0.050	0.103	0.103
Bank Controls	N	N	Y	Y	Y	Y
Firm FE	N	Y	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y
Credit Lines with \neq Banks	N	N	N	N	Y	Y

- ▶ 1 SD increase in bank exposure to the bail-in \rightarrow 3.0% decrease of total credit and 5.7% decrease of granted credit lines

1.1. Credit supply – within-firm estimates: main results



Note: each coefficient estimate in each quarter corresponds to a different KM regression - where the outcome variable is $\Delta \log(Credit)_{bi}$ between that quarter and 2014:Q2 (before shock). *Bank Exposure* standardized with mean 0 and SD of 1

1.2. Credit supply – within-firm estimates: other tests

1. *Heterogeneity*: ↓ reduction of credit for firms with ↓ profitability and with NPLs in the pre-period; Credit supply contraction concentrated in firms that had the bailed-in bank as their main lender [▶ Table](#)
2. *Alternative Bank Exposure Measure*: change in bank-specific CDS spread from 1 month before to the day of the resolution → for the 4 Significant Institutions with available CDS data [▶ Table](#)
3. *Include Firms With Single Bank Relationships* → replace firm FE with a group (location-industry-size) FE to control for credit demand as in De Jonghe et al. (2018) [▶ Table](#)
4. Use *total credit excluding credit lines* as outcome variable, or *alternative pre and post-shock windows* [▶ Table](#)

Identification strategy

2nd Step: Cross-Sectional (Between-Firm) Analysis

Given the tightening of credit, were firms more exposed to the bail-in (i.e., that were borrowing from more exposed banks) able to:

- (i) substitute funding from other banks?
- (ii) maintain interest rates on credit?
- (iii) sustain level of investment and employment?

- ▶ Within-firm specification not appropriate to examine aggregate effects → ignores the *extensive margin of credit*
- ▶ Solution: estimate a related cross-sectional (between-firm) effect of firm exposure to the shock while still accounting for demand factors

Identification strategy

Between-Firm Specification

$$\Delta \log(Y)_i = \beta(\text{FirmExposure}_i) + \tau' F_i + \delta' \bar{X}_i + \hat{\alpha}_i + \varepsilon_i \quad (2)$$

- ▶ FirmExposure_i : weighted average of BankExposure_b across all banks lending to a firm \rightarrow using as weights the pre-period share of total credit of each bank
 - ▶ F_i : firm characteristics measured in the pre period. We also include industry and district FE
 - ▶ \bar{X}_i : bank controls averaged at the firm-level according to the share of total credit granted to the firm by each bank
-
- ▶ Control for credit demand by including in (2) the vector of firm-level dummies estimated from the KM within-firm regression (1) $\rightarrow \hat{\alpha}_i$
e.g., Bonaccorsi Di Patti and Sette (JFI 2016), Cingano et al. (RFS 2016)

2.1. Credit supply – cross-sectional estimates

	$\Delta \log TotalCredit_i$		$\Delta \log CreditLines_i$	
	(1)	(2)	(3)	(4)
Firm Exposure	-0.374 (0.352)		-1.785*** (0.485)	
Firm Exposure \times SMEs		-0.378 (0.355)		-1.839*** (0.572)
Firm Exposure \times Large Firms		-0.267 (0.607)		-0.526 (1.135)
No. Observations / Firms	40,927	40,927	14,320	14,320
Adj. R^2	0.378	0.378	0.175	0.175
Firm and Bank Controls	Y	Y	Y	Y
Credit Demand	Y	Y	Y	Y
Industry and District FE	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y
Credit Lines with \neq Banks	N	N	Y	Y

- ▶ No relative change in overall credit for more exposed firms ▶ Robustness
- ▶ But binding contraction of credit lines to more exposed SMEs: a 2.2% decrease for a 1 SD increase in firm exposure to the resolution

2.2. Firm exposure to the bail-in and credit conditions

	$\Delta IntRate_i$ All New Credit		$\Delta IntRate_i$ Credit Lines Only		$\Delta Maturity_i$	$\Delta Collateral_i$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Exposure	2.335 (3.027)		17.97*** (4.306)		-53.29*** (12.00)		2.125** (0.793)	
Firm Exposure \times SMEs		1.495 (3.331)		17.67*** (2.923)		-51.82*** (4.361)		2.130** (0.797)
Firm Exposure \times Large Firms		24.47*** (6.805)		25.44** (11.61)		-91.80** (42.29)		1.984** (0.762)
No. Observations / Firms	31,472	31,472	12,429	12,429	31,472	31,472	31,472	31,472
Adj. R^2	0.097	0.097	0.082	0.082	0.031	0.031	0.076	0.076
Loan Characteristics	Y	Y	Y	Y	Y	Y	Y	Y
Firm and Bank Controls	Y	Y	Y	Y	Y	Y	Y	Y
Credit Demand	Y	Y	Y	Y	Y	Y	Y	Y
Industry and District FE	Y	Y	Y	Y	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y	Y	Y

- ▶ 1 SD increase in firm exposure to the bail-in \rightarrow 20bps increase in interest rates on credit lines, 1 month decrease in loan maturity, and 2.8 percentage points increase in the share of collateralized credit

Results so far...

1. Banks more exposed to the resolution tightened credit supply significantly at the intensive margin for SMEs and large firms -
2. Yet, firms borrowing from more exposed banks compensated this overall credit contraction with funding from other banks *they already had a relationship with* [▶ Table](#) +
3. However, binding contraction of credit lines available to SMEs and moderate tightening of credit conditions -

- ▶ **Remaining Question:** Did the resolution have any effects on real outcomes e.g., investment, employment?

3.1. Firm exposure to the bail-in and investment

	$\Delta \log \text{TangibleAssets}_i$			$\Delta \log \text{FixedAssets}_i$		
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Exposure	-1.680*** (0.312)	-1.497*** (0.327)		-1.349*** (0.249)	-1.000** (0.396)	
Firm Exposure \times SMEs			-1.531*** (0.337)			-1.018** (0.394)
Firm Exposure \times Large Firms			-0.489 (1.322)			-0.460 (1.242)
No. Observations / Firms	14,320	40,927	40,927	14,320	40,927	40,927
Adj. R^2	0.045	0.041	0.041	0.043	0.039	0.039
Firm and Bank Controls	Y	Y	Y	Y	Y	Y
Credit Demand	Y	Y	Y	Y	Y	Y
Industry and District FE	Y	Y	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y
Credit Lines with \neq Banks	Y	N	N	Y	N	N

- ▶ 1 SD increase firm exposure \rightarrow 2.0% decrease in investment at SMEs

3.2. Firm exposure to the bail-in and employment

	$\Delta \log \text{No. Employees}_i$			$\Delta \log \text{No. Worked Hours}_i$		
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Exposure	-1.183** (0.410)	-0.945*** (0.182)		-1.644*** (0.326)	-1.154*** (0.163)	
Firm Exposure \times SMEs			-0.971*** (0.180)			-1.182*** (0.169)
Firm Exposure \times Large Firms			-0.190 (0.501)			-0.325 (0.525)
No. Observations / Firms	14,320	40,927	40,927	14,320	40,927	40,927
Adj. R^2	0.080	0.041	0.041	0.054	0.047	0.047
Firm and Bank Controls	Y	Y	Y	Y	Y	Y
Credit Demand	Y	Y	Y	Y	Y	Y
Industry and District FE	Y	Y	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y
Credit Lines with \neq Banks	Y	N	N	Y	N	N

- ▶ 1 SD increase firm exposure \rightarrow 1.3% decrease in the no. of employees and 1.5% decrease in total number of worked hours at SMEs

3.3. The role of firms' internal liquidity

- ▶ If dampening effects of bank resolution are indeed driven by tighter credit line limits for more exposed SMEs → we should observe heterogeneous effects according to their pre-shock liquidity position
- ▶ *Why?* Option for firms to access liquidity from credit lines should be more valuable when internal liquidity is scarce (Campello et al., RFS 2011)
- ▶ *Berg (RFS 2018):* while liquid SMEs absorb credit supply shocks by using existing cash buffers, illiquid SMEs increase cash holdings when a loan application is rejected and reduce investment and employment

3.3. The role of firms' internal liquidity

	$\Delta \log$ <i>CashHoldings_i</i>	$\Delta \log$ <i>Investment_i</i>	$\Delta \log$ <i>Employment_i</i>
Firm Exposure x High Liquidity SMEs	-13.579*** (3.899)	-0.093 (0.861)	-0.113 (0.309)
Firm Exposure x Low Liquidity SMEs	13.416*** (4.249)	-1.680*** (0.420)	-1.644*** (0.135)
No. Observations / SMEs	40,234	40,234	40,234
Adj. R^2	0.022	0.040	0.067
Firm and Bank Controls	Y	Y	Y
Credit Demand	Y	Y	Y
Industry and District FE	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y

- ▶ Low liquidity SMEs more exposed to the bail-in respond by increasing cash holdings while decreasing investment and employment

Summary and Policy Implications

(1) Fears that enforcing market discipline through a bail-in would result in panic and contagion effects did not materialize

- ▶ Banks more exposed to the resolution significantly reduced credit supply to SMEs and large firms → but affected firms compensated the contraction in overall credit with other sources of funding

(2) However, a bank bail-in is not a silver bullet

- ▶ Resolution led to lower investment and employment at SMEs with higher exposure to the bail-in and lower pre-shock internal liquidity
- ▶ Driven by binding contraction of granted credit lines to these SMEs and increase in their cash holdings

Appendix - Within-firm estimates: Heterogeneity

$\Delta \log TotalCredit_{b_i}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bank Exposure	-1.651** (0.827)	-1.641* (0.834)	-1.480* (0.811)	-1.630** (0.800)	-1.934** (0.817)	-1.322 (0.808)	-1.842** (0.837)	-1.605* (0.821)	-0.439 (0.830)
BE \times Firm Assets ($D_i=Small$)	0.650*** (0.213)								
BE \times Firm No. Employees ($D_i=Small$)		0.430** (0.180)							
BE \times Firm Age ($D_i=Young$)			-0.117 (0.224)						
BE \times Firm Capital Ratio ($D_i=Low$)				0.230 (0.283)					
BE \times Firm ROA ($D_i=Low$)					0.817*** (0.292)				
BE \times Firm Current Ratio ($D_i=Low$)						-0.371 (0.278)			
BE \times Firm Interest Coverage ($D_i=Low$)							0.447 (0.335)		
BE \times Firm with a NPL in the Pre-Period								1.648** (0.762)	
BE \times Firm Main Lender is the Bailed-in Bank									-3.132*** (0.399)
No. Observations	116,245	116,246	116,247	116,248	116,249	116,250	116,251	116,252	116,253
No. Firms	40,927	40,927	40,927	40,927	40,927	40,927	40,927	40,927	40,927
Bank Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y	Y	Y	Y

▶ Back

Appendix - Robustness Tests

	$\Delta \log TotalCredit_{bi}$					
	Alternative Bank Exposure Measure (CDS Spread Reaction)			Including Firms With Only One Bank Relationship		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Exposure	-1.917*** (0.297)	-2.031*** (0.345)		-0.714*** (0.261)	-1.339** (0.649)	
Bank Exposure \times SMEs			-1.787*** (0.350)			-1.283* (0.652)
Bank Exposure \times Large Firms			-5.956*** (1.703)			-2.915*** (0.667)
No. Observations	40,783	40,783	40,783	160,457	160,457	160,457
No. Firms	17,445	17,445	17,445	85,139	85,139	85,139
Adj. R^2	0.001	0.054	0.054	0.053	0.055	0.055
No. Banks	4	4	4	98	98	98
Bank Controls	N	Y	Y	N	Y	Y
Firm FE	N	Y	Y	N	N	N
Location-Size-Sector FE	N	N	N	N	Y	Y
No. Bank Relationships > 1	Y	Y	Y	N	N	N

Appendix - Robustness Tests

	$\Delta \log Credit_{bi}$ (Excluding Credit Lines)			$\Delta \log Credit_{bi}$ (2014:Q2-2015:Q3)		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Exposure	-0.963*** (0.366)	-1.108 (0.808)		-1.430*** (0.303)	-2.000** (0.826)	
Bank Exposure \times SMEs			-1.063 (0.806)			-1.812** (0.832)
Bank Exposure \times Large Firms			-1.925* (0.986)			-5.460*** (0.927)
No. Observations	96,584	96,584	96,584	97,130	97,130	97,130
No. Firms	35,365	35,365	35,365	34,861	34,861	34,861
Adj. R^2	0.001	0.015	0.015	0.001	0.029	0.030
Bank Controls	N	Y	Y	N	Y	Y
Firm FE	N	Y	Y	N	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y

▶ Back

Appendix - Robustness Tests

	$\Delta \log$ <i>TotalCredit_i</i>		$\Delta \log$ <i>CreditLines_i</i>		$\Delta \log$ <i>TotalCredit_i</i>		$\Delta \log$ <i>CreditLines_i</i>	
	Alternative Firm Exposure Measure (Bank Exposure: CDS Spread Reaction)				Alternative Firm Exposure Measure (Bank Exposure: Dummy = 1 for Bailed-in Bank)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Exposure	-0.520 (0.446)		-2.747 (1.585)		-0.032 (0.021)		-0.114*** (0.034)	
Firm Exposure × SMEs		-0.605 (0.454)		-3.051* (1.522)		-0.032 (0.022)		-0.117*** (0.034)
Firm Exposure × Large Firms		0.888 (1.103)		3.291 (2.275)		-0.028 (0.039)		-0.033 (0.116)
No. Observations / Firms	17,444	17,444	5,420	5,420	40,927	40,927	14,320	14,320
Adj. R^2	0.299	0.299	0.162	0.162	0.378	0.378	0.175	0.175
Firm and Bank Controls	Y	Y	Y	Y	Y	Y	Y	Y
Credit Demand	Y	Y	Y	Y	Y	Y	Y	Y
Industry and District FE	Y	Y	Y	Y	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y	Y	Y	Y	Y

Appendix - New vs. Existing Lending Relationships

	<i>NewLending Relationship_i</i>		$\Delta \log TotalCredit_i$ (except bailed-in bank)	
	(1)	(2)	(3)	(4)
Firm Exposure	-0.659 (0.423)		4.566*** (0.558)	
Firm Exposure \times SMEs		-0.674 (0.433)		4.540*** (0.585)
Firm Exposure \times Large Firms		-0.220 (0.809)		5.359*** (1.042)
No. Observations / Firms	40,927	40,927	40,927	40,927
Adj. R^2	0.058	0.058	0.342	0.342
Firm and Bank Controls	Y	Y	Y	Y
Credit Demand	Y	Y	Y	Y
Industry and District FE	Y	Y	Y	Y
No. Bank Relationships > 1	Y	Y	Y	Y

- ▶ More exposed firms as likely to start new lending relationships as less exposed firms – but average firm already had 4 bank relationships
- ▶ 1 SD increase firm exposure \rightarrow 5.94% increase in credit from other banks