Some borrowers are more equal than others:

Bank funding shocks and credit reallocation

O.De Jonghe (National Bank of Belgium)
H.Dewachter (Ghent Uni., NBB)
K.Mulier (Uni. of Zurich)
S.Ongena (ECB)
G.Schepens

5th Research Workshop MPT (Brussels, NBB)
February 1-2, 2018

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2774441

Funding shock and credit supply: literature

Funding shock and credit supply: literature

- Absorbing the funding shock: domestic credit
  - Ivashina and Scharfstein (2010), Puri et al. (2011), Iyer et al. (2014)

Funding shock and credit supply: literature

- Absorbing the funding shock: domestic credit
  - Ivashina and Scharfstein (2010), Puri et al. (2011), Iyer et al. (2014)
- Cross border spillovers of funding shocks
  - Cetorelli and Goldberg (2011, 2012), Claessens and van Horen (2013), De Haas and van Lelyveld (2014), Albertazzi and Bottero (2014), Ongena, Peydro and van Horen (2015),...

Funding shock and credit supply: literature

- Absorbing the funding shock: domestic credit
  - Ivashina and Scharfstein (2010), Puri et al. (2011), Iyer et al. (2014)
- Cross border spillovers of funding shocks
  - Cetorelli and Goldberg (2011, 2012), Claessens and van Horen (2013), De Haas and van Lelyveld (2014), Albertazzi and Bottero (2014), Ongena, Peydro and van Horen (2015),...
- Heterogeneity in credit reduction
  - Between foreign-domestic portfolio (Giannetti and Laeven (2012))
  - Within foreign portfolio (De Haas and van Horen (2013), Liberti and Sturgess, *forthcoming*)
  - **Within domestic credit portfolio? $\Rightarrow$ THIS PAPER**

Motivation: Are all borrowers equal?

$$(1 + E[R_K]) = p * (1 + R_L) + (1 - p) * \gamma * (1 + R_L) - c$$

Motivation: Are all borrowers equal?

$$(1 + E[R_K]) = p * (1 + R_L) + (1 - p) * \gamma * (1 + R_L) - c$$

1. Sector presence? (bank's share in a sector)
   - Higher presence $\rightarrow$ market power $\rightarrow$ higher interest rates
   - Rent extraction (Klein (1971), Monti (1972))

Motivation: Are all borrowers equal?

$$(1 + E[R_K]) = p * (1 + R_L) + (1 - p) * \gamma * (1 + R_L) - c$$

1. Sector presence? (bank's share in a sector)
   - Higher presence $\rightarrow$ market power $\rightarrow$ higher interest rates
   - Rent extraction (Klein (1971), Monti (1972))

2. Sector specialization? (sector's share in a bank)
   - Important role for loan portfolio diversification in banking literature (e.g. Diamond (1984), Winton (1999))
   - Superior information $\rightarrow$ better screening $\rightarrow$ lower monitoring costs

Motivation: Are all borrowers equal?

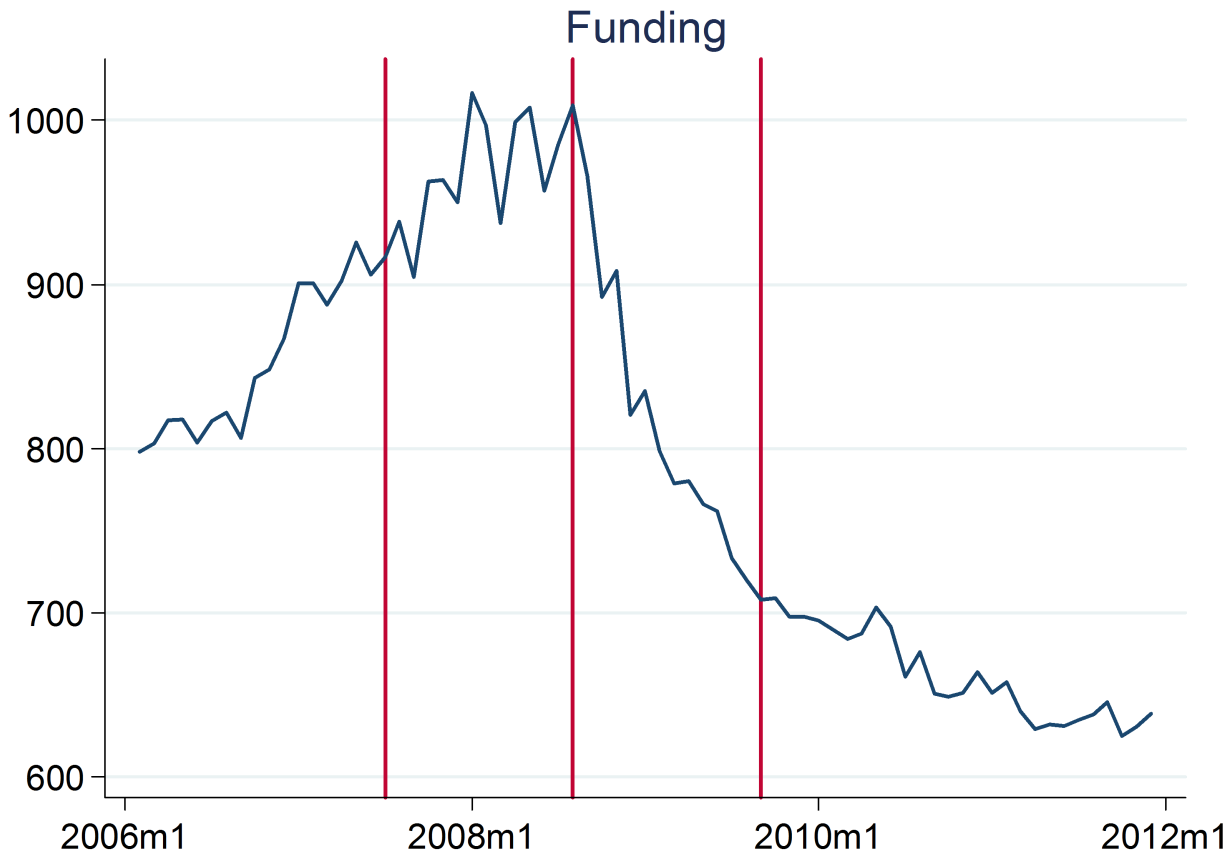
$$(1 + E[R_K]) = p * (1 + R_L) + (1 - p) * \gamma * (1 + R_L) - c$$

1. Sector presence? (bank's share in a sector)
   - Higher presence $\rightarrow$ market power $\rightarrow$ higher interest rates
   - Rent extraction (Klein (1971), Monti (1972))

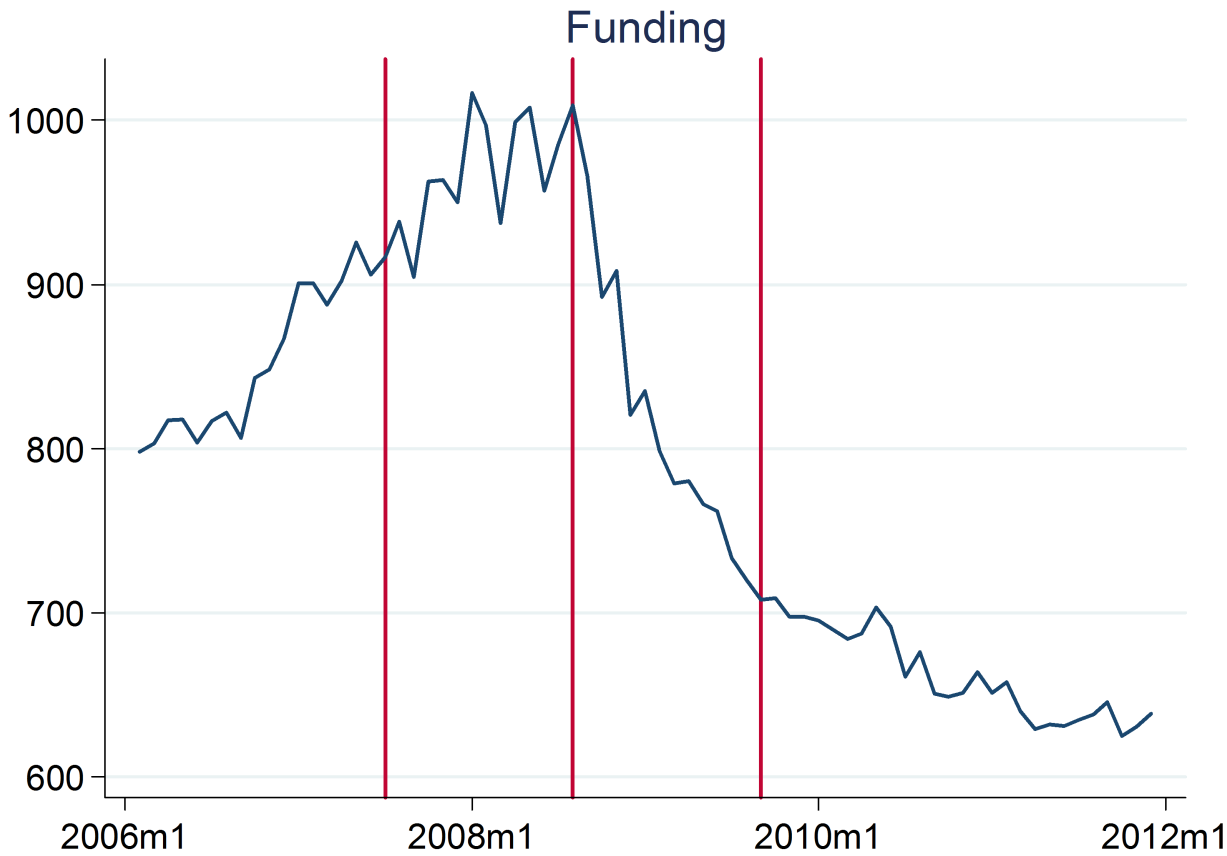
2. Sector specialization? (sector's share in a bank)
   - Important role for loan portfolio diversification in banking literature (e.g. Diamond (1984), Winton (1999))
   - Superior information $\rightarrow$ better screening $\rightarrow$ lower monitoring costs

3. Firm characteristics: risk, size and age?
   - Higher likelihood of repayment
   - Flight to quality

The aggregate shock



The aggregate shock



- But, huge cross-sectional variation across banks!
- $\Delta\%$ IBL_b (2009:08 - 2008:08): -0.043 (mean), 0.11 (st.dev)

Data

- Bank-firm-level credit data: Central Corporate Credit Register
- Bank data: Regulatory Bank Balance Sheets and Income Statements
- Firm data: Central Balance Sheet Office

$\Rightarrow$ 1 year before and after the Lehman collapse in Belgium

Data

- Bank-firm-level credit data: Central Corporate Credit Register
- Bank data: Regulatory Bank Balance Sheets and Income Statements
- Firm data: Central Balance Sheet Office

  $\Rightarrow$ 1 year before and after the Lehman collapse in Belgium

$$
\begin{aligned}
CREDIT_{bf} = \quad & \beta_1 \; Sector \; Presence_{bs} * \Delta\%Funding_b \\
& + \beta_2 \; Sector \; Specialization_{bs} * \Delta\%Funding_b \\
& + \beta_3 \; Sector \; Presence_{bs} + \beta_4 \; Sector \; Specialization_{bs} + \alpha_{LSS} + \upsilon_b + \epsilon_{bf}
\end{aligned}
$$

Data

- Bank-firm-level credit data: Central Corporate Credit Register
- Bank data: Regulatory Bank Balance Sheets and Income Statements
- Firm data: Central Balance Sheet Office

$\Rightarrow$ 1 year before and after the Lehman collapse in Belgium

$$\begin{aligned} CREDIT_{bf} = \quad & \beta_1 \ Sector\ Presence_{bs} * \Delta\%Funding_b \\ & + \beta_2 \ Sector\ Specialization_{bs} * \Delta\%Funding_b \\ & + \beta_3 \ Sector\ Presence_{bs} + \beta_4 \ Sector\ Specialization_{bs} + \alpha_{LSS} + \upsilon_b + \epsilon_{bf} \end{aligned}$$

$$\text{CREDIT}_{bf} = \text{3 measures of bank-firm level credit growth}$$

$$\Delta\% \text{ Funding}_b = \frac{\text{[post shock funding - pre shock funding]}}{\text{pre shock total assets}}$$

$$\text{Sector Presence}_{bs} = \frac{\text{pre shock credit granted to sector s by bank b}}{\text{pre shock total credit granted to sector s}}$$

$$\text{Sector Specialization}_{bs} = \frac{\text{pre shock credit granted to sector s by bank b}}{\text{pre shock total credit granted by bank b}}$$

Main findings

Main findings

- Does bank funding affect credit supply? **YES!**
  - A 9.2 percent shock (sample average) leads to a 2.3 percentage points decrease in loan growth

Main findings

- Does bank funding affect credit supply? **YES!**
  - A 9.2 percent shock (sample average) leads to a 2.3 percentage points decrease in loan growth
- Are all borrowers equal? **NO!**
  - Firms can partly offset credit rationing by
    1. matching with a **bank with larger sector presence** (std. $\Uparrow$ reduces impact by 20%)
    2. matching with a **bank with larger sector specialization** (std. $\Uparrow$ reduces impact by 13%)
    3. **improving** their **financial characteristics** (std. $\Uparrow$ reduces impact by 10%)

Funding shocks and credit supply

	(1) Δ% Credit$_{bf}$	(2) Increase in credit$_{bf}$	(3) Large decrease in credit$_{bf}$
Panel A			
Δ% Funding$_b$	0.259***	0.267*	-0.355***
	(0.0806)	(0.135)	(0.130)
Bank controls	YES	YES	YES S
Firm FE	YES	YES	YES
Observations	47,205	47,205	47,205
R-squared	0.455	0.463	0.481
Panel B			
Δ% Funding$_b$			
Bank controls			
Location-sector-size FE			
Observations			
R-squared			

Bank clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Funding shocks and credit supply

	(1) Δ% Credit$_{bf}$	(2) Increase in credit$_{bf}$	(3) Large decrease in credit$_{bf}$
Panel A			
Δ% Funding$_b$	0.259***	0.267*	-0.355***
	(0.0806)	(0.135)	(0.130)
Bank controls	YES	YES	YES
Firm FE	YES	YES	YES
Observations	47,205	47,205	47,205
R-squared	0.455	0.463	0.481
Panel B			
Δ% Funding$_b$			
Bank controls	YES	YES	YES
Location-sector-size FE	YES	YES	YES
Observations	160,224	160,224	160,224
R-squared			

Bank clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Funding shocks and credit supply

	(1) Δ% Credit$_{bf}$	(2) Increase in credit$_{bf}$	(3) Large decrease in credit$_{bf}$
Panel A			
Δ% Funding$_b$	0.259***	0.267*	-0.355***
	(0.0806)	(0.135)	(0.130)
Bank controls	YES	YES	YES
Firm FE	YES	YES	YES
Observations	47,205	47,205	47,205
R-squared	0.455	0.463	0.481
Panel B			
Δ% Funding$_b$	0.250***	0.316*	-0.480***
	(0.0653)	(0.156)	(0.112)
Bank controls	YES	YES	YES
Location-sector-size FE	YES	YES	YES
Observations	160,224	160,224	160,224
R-squared	0.295	0.276	0.289

Bank clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Funding shock impact and credit reallocation

$$CREDIT_{bf} = \beta_1\ Sector\ Presence_{bs} * \Delta\%Funding_b + \beta_2\ Sector\ Specialize_{bs} * \Delta\%Funding_b + \beta_3\ Sector\ Presence_{bs} + \beta_4\ Sector\ Specialize_{bs} + \alpha_f + \upsilon_b + \epsilon_{bf}$$

	(1) $\Delta\%$ Credit$_{bf}$	(2) $\Delta\%$ Credit$_{bf}$	(3) Increase in credit$_{bf}$	(4) Large decrease in credit$_{bf}$
$\Delta\%$ **Funding**$_b$	**0.250***** (0.065)			
Sec presence$_{bs}$ * $\Delta\%$ **Fund**$_b$		**-0.612***** **(0.175)**	**-1.130***** **(0.237)**	**1.043***** **(0.304)**
Sec specialize$_{bs}$ * $\Delta\%$ **Fund**$_b$		**-0.210***** **(0.076)**	**-0.529***** **(0.170)**	**0.539***** **(0.106)**
Bank FE	NO	YES	YES	YES
Bank Controls	YES	NO	NO	NO
Location-sector-size FE	YES	YES	YES	YES
Observations	160,224	160,224	160,224	160,224
R-squared	0.295	0.298	0.282	0.292

Bank clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Funding shock impact and credit reallocation

$$CREDIT_{bf} = \beta_1\ Sector\ Presence_{bs} * \Delta\%Funding_b + \beta_2\ Sector\ Specialize_{bs} * \Delta\%Funding_b + \beta_3\ Sector\ Presence_{bs} + \beta_4\ Sector\ Specialize_{bs} + \alpha_f + \upsilon_b + \epsilon_{bf}$$

	(1) $\Delta\%$ Credit$_{bf}$	(2) $\Delta\%$ Credit$_{bf}$	(3) Increase in credit$_{bf}$	(4) Large decrease in credit$_{bf}$
$\Delta\%$ **Funding**$_b$	**0.250***** (0.065)			
Sec presence$_{bs}$ * $\Delta\%$ **Fund**$_b$		**-0.612***** **(0.175)**	**-1.130***** **(0.237)**	**1.043***** **(0.304)**
Sec specialize$_{bs}$ * $\Delta\%$ **Fund**$_b$		**-0.210***** **(0.076)**	**-0.529***** **(0.170)**	**0.539***** **(0.106)**
Bank FE	NO	YES	YES	YES
Bank Controls	YES	NO	NO	NO
Location-sector-size FE	YES	YES	YES	YES
Observations	160,224	160,224	160,224	160,224
R-squared	0.295	0.298	0.282	0.292

Bank clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

- std. $\Uparrow$ in **sector presence** reduces impact average funding shock with 20% (2.5% $\Rightarrow$ 2.0%)
- std. $\Uparrow$ in **sector specialization** reduces impact average funding shock with 13% (2.5% $\Rightarrow$ 2.18%)

Further channels and implications

- What role for firm risk, size and age? Further redistribution?

- What about the real impact for firms?

Further channels and implications

	RISK REALLOCATION	REAL EFFECTS	
	(1)	(2)	(3)
	Δ % **Credit**$_{bf}$	Δ% **Fixed assets**$_f$	Δ% **Assets**$_f$
Δ% **Funding**$_b$			
Sec presence$_{bs}$ * Δ% **Funding**$_b$	**-0.520***** (0.132)		
Sec specialization$_{bs}$ * Δ% **Funding**$_b$	**-0.252***** (0.081)		
Total assets$_f$ * Δ% Funding$_b$	0.003 (0.021)		
Age$_f$ * Δ% Funding$_b$	0.001 (0.001)		
Leverage$_f$ * Δ% Funding$_b$	**0.102***** (0.031)		
Pledged collateral$_f$ * Δ% Funding$_b$	**0.020***** (0.006)		
Financial pressure$_f$ * Δ% Funding$_b$	**0.033***** (0.011)		
Observations	141,364		
R-squared	0.368		
Firm controls	YES		
Bank FE	YES		
Location-sector-size FE	YES		
Sector FE	NO		

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Further channels and implications

	RISK REALLOCATION	REAL EFFECTS	
	(1)	(2)	(3)
	Δ % **Credit**$_{bf}$	Δ% **Fixed assets**$_f$	Δ% **Assets**$_f$
Δ% **Funding**$_b$		**0.730****	**0.771***
		(0.311)	(0.454)
Sec presence$_{bs}$ * Δ% **Funding**$_b$	**-0.520*****	**-0.517***	**-0.549**
	(0.132)	(0.264)	(0.335)
Sec specialization$_{bs}$ * Δ% **Funding**$_b$	**-0.252*****	-0.004	0.170
	(0.081)	(0.106)	(0.156)
Total assets$_f$ * Δ% Funding$_b$	0.003	**-0.044****	**-0.053***
	(0.021)	(0.020)	(0.030)
Age$_f$ * Δ% Funding$_b$	0.001	-0.002	-0.001
	(0.001)	(0.001)	(0.001)
Leverage$_f$ * Δ% Funding$_b$	**0.102*****	-0.108	-0.095
	(0.031)	(0.089)	(0.120)
Pledged collateral$_f$ * Δ% Funding$_b$	**0.020*****	-0.006	-0.012
	(0.006)	(0.015)	(0.016)
Financial pressure$_f$ * Δ% Funding$_b$	**0.033*****	-0.006	-0.011
	(0.011)	(0.011)	(0.024)
Observations	141,364	114,436	114,436
R-squared	0.368	0.157	0.341
Firm controls	YES	YES	YES
Bank FE	YES	NO	NO
Location-sector-size FE	YES	NO	NO
Sector FE	NO	YES	YES

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Robustness

What about potential bias due to correlation of sector position with alternative explanations?

- Bank fixed effects rule out bank specific events (e.g. bank recapilization).
- Control for average loan maturity of a bank in a given sector (share $\geq$ 1y).
- Control for geographical specialization and presence (provincial level).
- Control for bank-firm relationships: length of relationship and main bank.

Robustness

What about potential bias due to correlation of sector position with alternative explanations?

- Bank fixed effects rule out bank specific events (e.g. bank recapilization).
- Control for average loan maturity of a bank in a given sector (share $\geq$ 1y).
- Control for geographical specialization and presence (provincial level).
- Control for bank-firm relationships: length of relationship and main bank.

Alternative shock definitions?

- Interbank liabilities shock or net funding shock.
- Change the length of the shock from 1 month to 30 months.

Robustness

What about potential bias due to correlation of sector position with alternative explanations?

- Bank fixed effects rule out bank specific events (e.g. bank recapilization).
- Control for average loan maturity of a bank in a given sector (share $\geq$ 1y).
- Control for geographical specialization and presence (provincial level).
- Control for bank-firm relationships: length of relationship and main bank.

Alternative shock definitions?

- Interbank liabilities shock or net funding shock.
- Change the length of the shock from 1 month to 30 months.

Ruling out alternative explanations

- Foreign exposures
- Pre-Lehman solvency or liquidity issues
- Government interventions

Robustness

What about potential bias due to correlation of sector position with alternative explanations?

- Bank fixed effects rule out bank specific events (e.g. bank recapilization).
- Control for average loan maturity of a bank in a given sector (share $\geq$ 1y).
- Control for geographical specialization and presence (provincial level).
- Control for bank-firm relationships: length of relationship and main bank.

Alternative shock definitions?

- Interbank liabilities shock or net funding shock.
- Change the length of the shock from 1 month to 30 months.

Ruling out alternative explanations

- Foreign exposures
- Pre-Lehman solvency or liquidity issues
- Government interventions

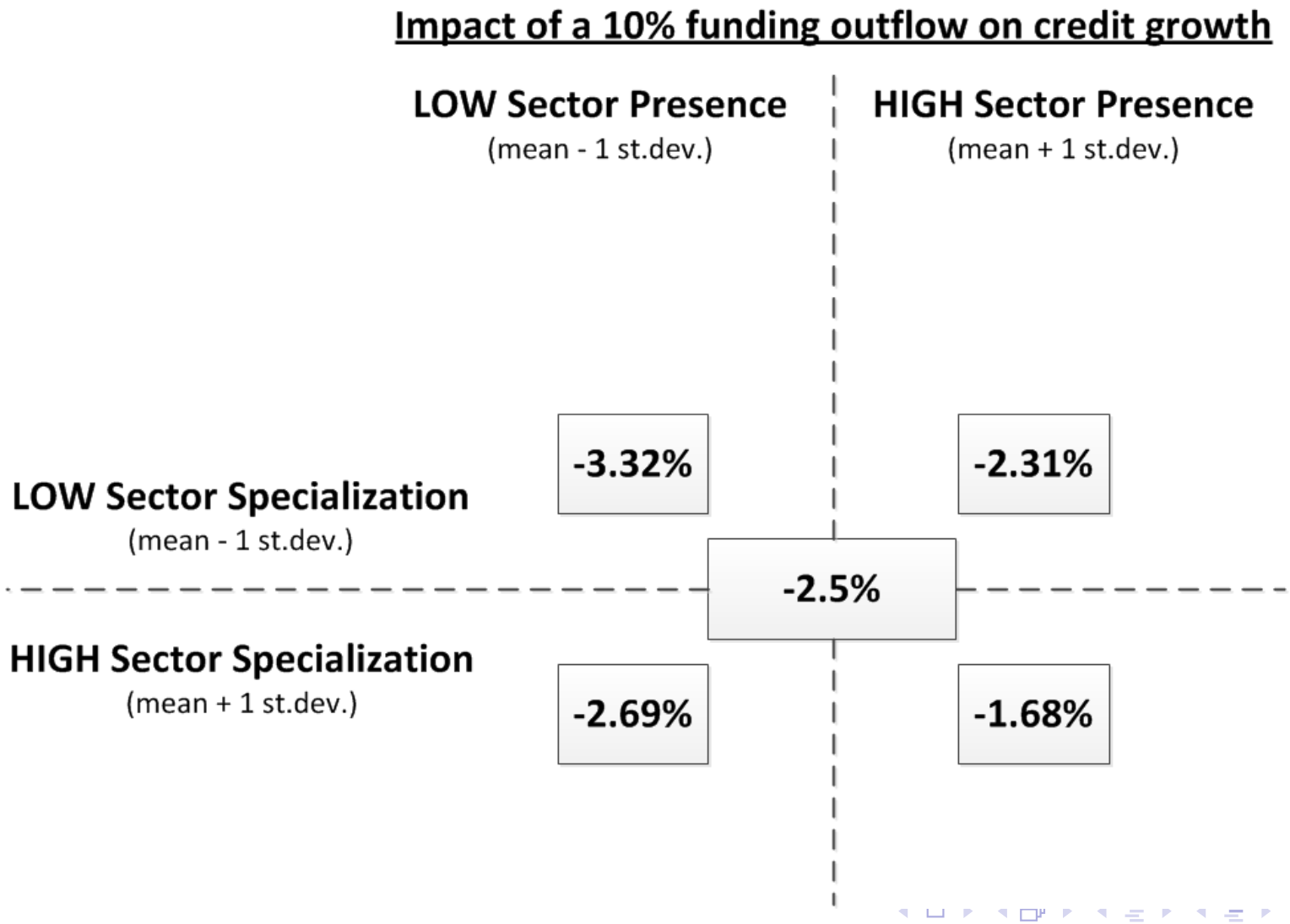
$\Rightarrow$ **Reallocation based on sector presence, sector specialization and firm risk is very robust.**

Conclusions

- Does bank funding affect credit supply? **YES!**
- Are all borrowers equal? **NO!**

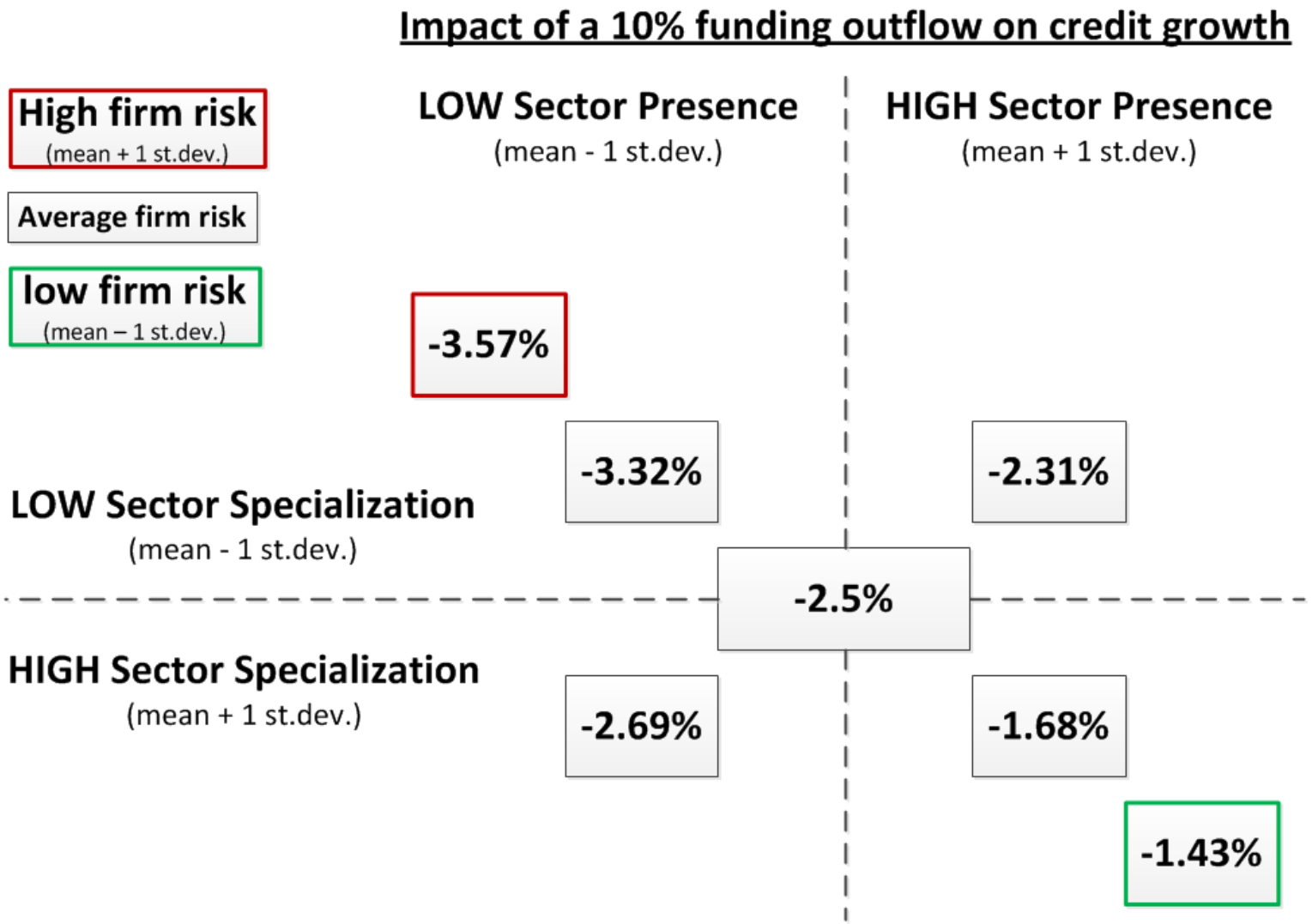
Conclusions

- Does bank funding affect credit supply? **YES!**
- Are all borrowers equal? **NO!**



Conclusions

- Does bank funding affect credit supply? **YES!**
- Are all borrowers equal? **NO!**



Policy Implications

- Bank market power and credit supply
  - Higher cost of credit/lower credit volumes
    ⇕
    Stability of access to credit in times of crisis
  - Focus on geographical dimension
    ⇕
    Focus on sectoral dimension
- Lending concentration and credit supply (Basel Committee, 2006)
  - Portfolio concentration limits
    ⇕
    Having sufficient information
- Design of SME lending guarantee programs

Thank you for your attention

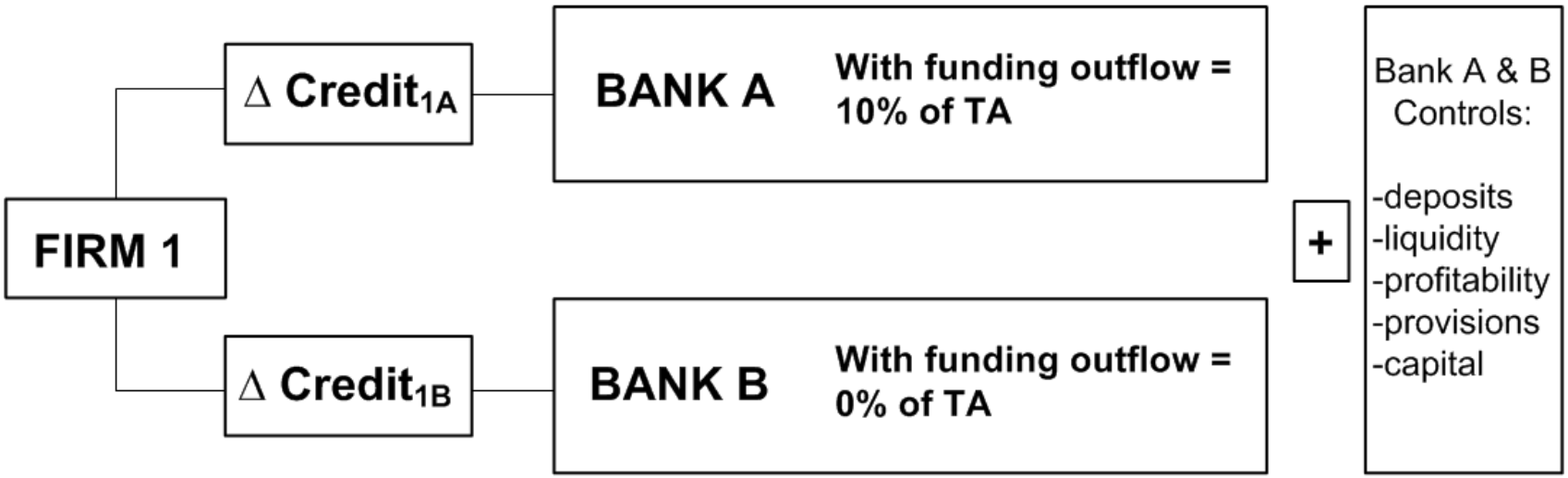
Rent extraction

Table: Sector presence, sector specialization and rent seeking

VARIABLES	(1) Debt burden$_f$	(2) Debt burden$_f$	(3) Debt burden$_f$
Sector presence$_{bs}$	0.0444**	0.0408*	0.0347*
	(0.0218)	(0.0235)	(0.0188)
Sector specialization$_{bs}$	0.00447	-0.000661	0.0126
	(0.0296)	(0.0253)	(0.0280)
Observations	89,986	89,986	89,986
R-squared	0.186	0.221	0.222
Location-sector-size FE	Yes	Yes	Yes
Firm Controls	No	Yes	Yes
Bank Controls	No	No	Yes

Identifying credit supply

Empirical setup



➔ **We isolate credit supply** (from credit demand) by investigating how *banks with different degrees of funding outflow* changed their lending towards *the same firm*