Risk-Taking and Monetary Policy Transmission: Evidence from Loans to SMEs and Large Firms

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Monetary Policy Transmission under Heterogeneity

$$\text{Interest rates} \underbrace{\underbrace{\Rightarrow \text{Firm Credit}}_{\text{Heterogeneity}} \Rightarrow \text{Investment, Employment}}_{\text{Monetary Policy Effectiveness}}$$

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Two types of heterogeneity are critical:

1. Size of the firm
2. Type of collateral

Firm and Bank Heterogeneity are Important

Theory: The power of monetary policy depends on heterogeneity

1. Possible trade-off between stimulating the economy and long-run growth depending on:
   - which firms get finance—default risk $+$misallocation of resources
2. Possible trade-off between stimulating the economy and financial stability depending on:
   - which banks take risk—leverage regulation

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- Listed firms account for 26% of employment and 44% of gross output
- Mixed results on small firms responding more/less/same relative to large firms to monetary policy shocks
- Mixed results on whether different responsiveness is driven by financial frictions

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We use supervisory administrative data for a more representative sample for the U.S. economy

Related Literature

- Monetary Policy, Financial Frictions and Risk Taking

  Bernanke and Gertler (1989), Bernanke, Gertler, and Gilchrist (1989), Rajan (2005), Stiglitz and Weiss (1981), Adrian and Shin (2009), Dell'Ariccia, Laeven, and Suarez (2017), Paligorova and Santos (2017), Jiménez, Ongena, Peydró, and Saurina (2014), Ioannidou, Ongena and Peydró (2014)

- Firm/Bank Heterogeneity in Monetary Policy Transmission

  Gertler and Gilchrist (1994), Jeenas (2019), Cloyne, Ferreira, Froemel, and Surico (2018), Ottonello and Winberry (2020), Greenwald, Krainer, and Paul (2020),

- Financial Contracts and Propagation of Shocks

  Kiyotaki and Moore (1997), Kiyotaki, Moore, and Zhang (2021), Benmelech and Bergman (2012), Lian and Ma (2020), Kermani and Ma (2021), Berger and Udell (1990), Luck and Santos (2019), Rauh and Sufi (2010), Benmelech, Kumar, and Rajan (2020), Rampini and Vishwanathan (2020), di Giovanni, Kalemli-Ozcan, Ulu, and Baskaya (2019), Ivashina, Laeven, Moral-Benito (2020)

- Effectiveness of Monetary Policy/Financial Stability Risk of Corporate Leverage

  Tenreyro and Thwaites (2016), Coimbra and Rey (2017), Kiyotaki, Moore, and Zhang (2021), Brauning, Ivashina, Ozdagli (2022)

Bringing together: Bernanke and Gertler (1989) + Kiyotaki and Moore (1997)

$\Rightarrow$ Transmission via credit demand of firms with heterogenous collateral and default risk

Data and Facts

Y-14: Supervisory Data on Bank Lending

- Collected as part of the FR Capital Assessments and Stress Testing (CCAR) exercise for all bank holding companies with total consolidated assets above $50 bil ($100 bil in 2019).
- Firm-bank-loan-quarter level with a reporting threshold of $1 million.
- Contractual terms and firm balance sheet items.
- 2012Q3–2019Q4, **all sectors**. Almost 4 million loan-level observations for 150,000+ corporations, of which 60,000+ have <u>assets less than 10 million.</u>

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Coverage:

- The banks subject to CCAR account for over 85% of the total assets in the banking sector and provide around 70% of all commercial and industrial lending.
- **Supervisory data on private firms' financing: representative relative to Compustat, QFR, Dealscan, CapitalIQ, SBFS,...**
- Y14 firms account 65% of U.S. corporate sector debt and 78% of aggregate U.S. gross output.

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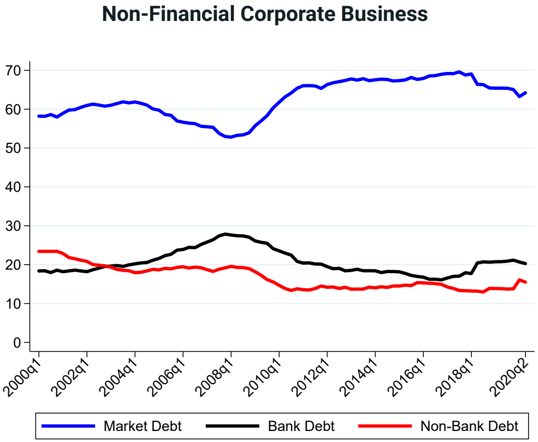
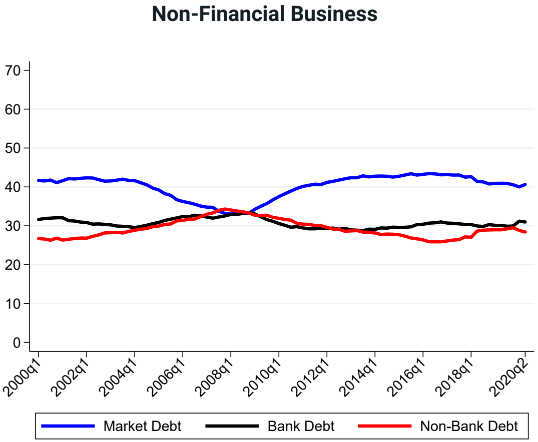
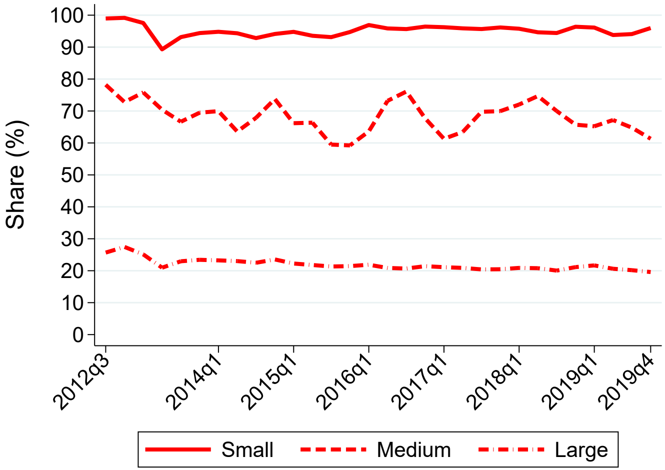
- Y14 firms account 65% of U.S. corporate sector debt and 78% of aggregate U.S. gross output.
- SBA/Census definition: SMEs: 56% of employment, 52% of output

What do we know: U.S Financial Accounts (Flow of Funds)



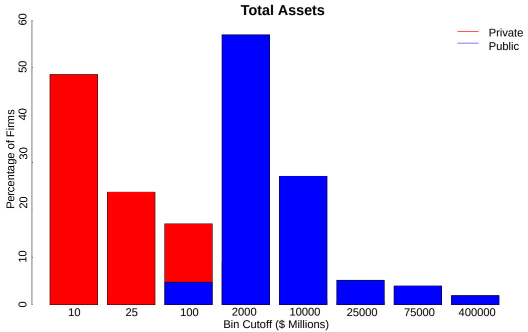


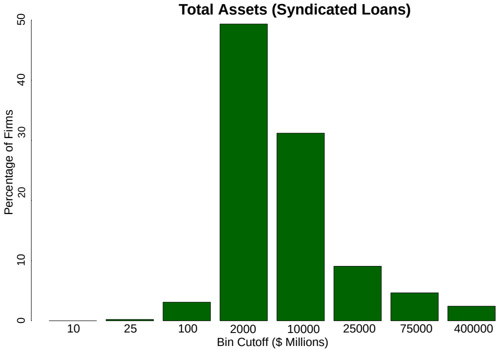
Private Firms' Share of Bank Debt in FR Y-14



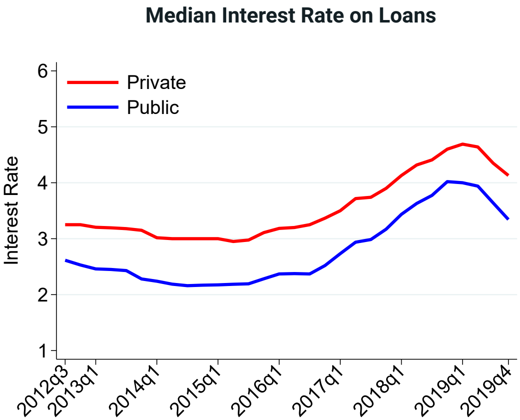
- The entire balance sheet debt of SMEs is bank debt

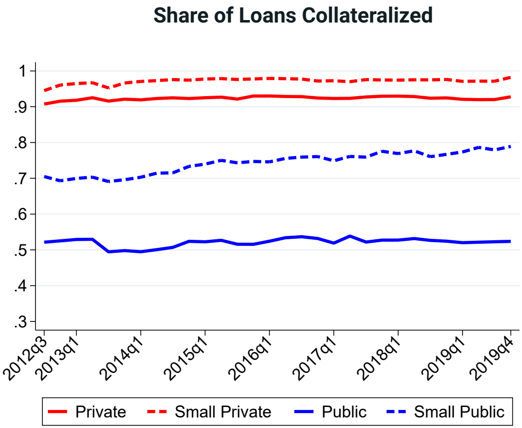
Firm Size Distribution: Private vs. Public Firms Census





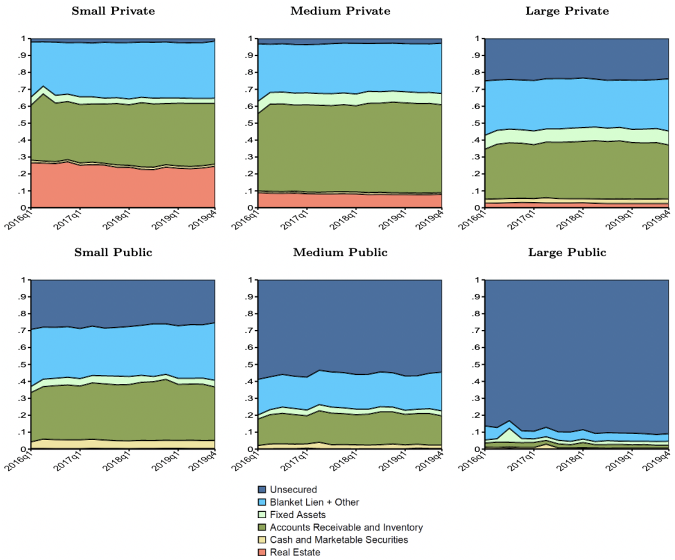
Private firms and SMEs pay higher interest rates and need collateral to borrow





Collateral Types and Financial Constraints

Blanket Lien: All   Blanket Lien: Private



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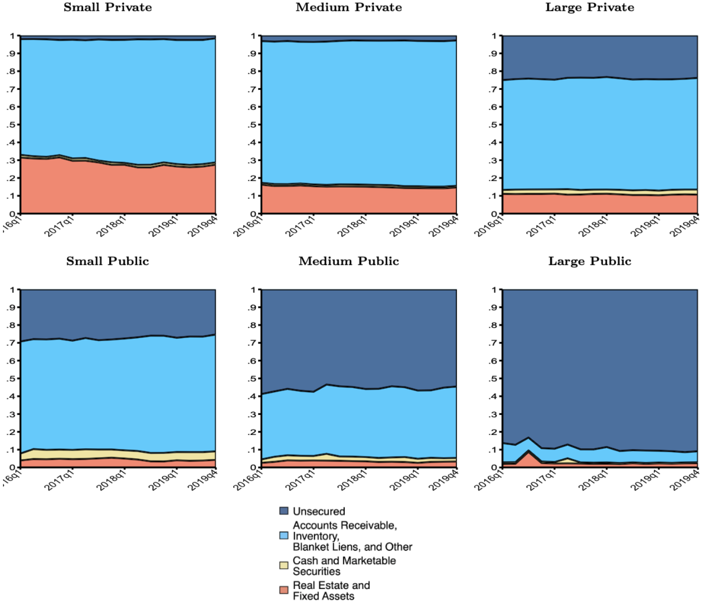

- ⇒ Asset-based: Real estate, fixed assets, cash&securities
  ⇒ Earnings and operation-based: Blanket-liens and accounts receivable & inventory
- Securing financing through AR&I and blanket liens falls monotonically across the size distribution and is replaced by unsecured lending.

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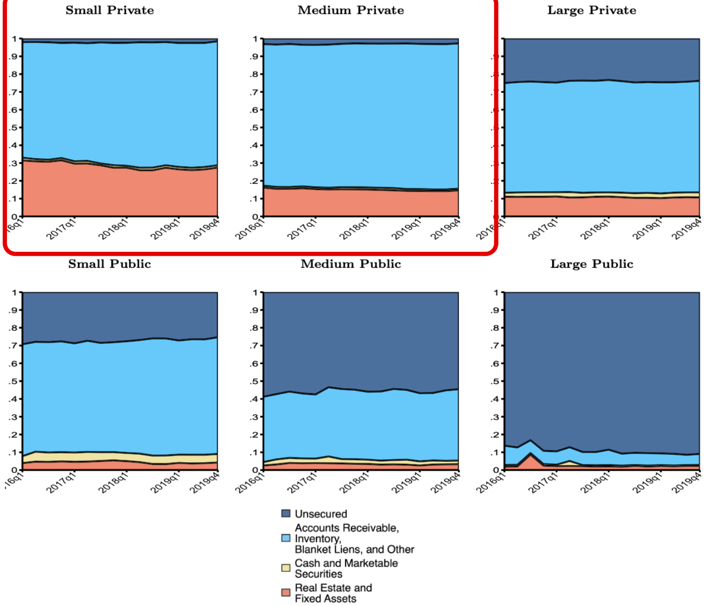

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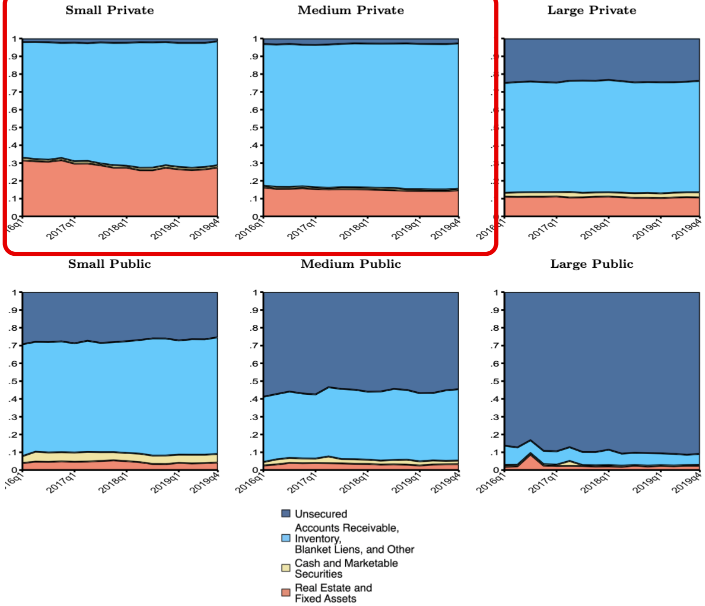

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- SMEs rely mostly on AR&I and blanket liens rather than real estate or fixed assets.
- **Lian and Ma (2017), Kermani and Ma (2021)**: importance of earnings based-lending instead of asset based-lending for public/large firms in U.S.
- **Ivashina et al. (2020)** for all firms in Peru, Spain

  ⇒ More important for private firms and SMEs in U.S. based on actual collateral data.

Mapping Heterogeneity in Credit Markets and Monetary Policy Transmission: Firm Side

Mapping Heterogeneity and Monetary Policy Transmission

1. Private firms, especially SMEs, rely on bank credit.
2. When accessing bank credit, these firms:
   a) face higher interest rates b) use different types of collateral
3. SMEs have higher investment and sales growth; high and low leverage firms/SMEs have similar real outcomes, on average.

How does monetary policy transmit differentially through these margins?

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Varying Firm Credit Demand Over Time (Aggregate Loans to Firm-Bank Level):

$$\log \sum_{l \in \mathcal{L}(f,b,q)} Y_{f,b,q}(l) = \alpha_{f,b} + \alpha_{s,q} + \alpha_{b,q} + \kappa(\textbf{Leverage}_f \times \text{MP}_q) + \vartheta_{f,b,q}$$

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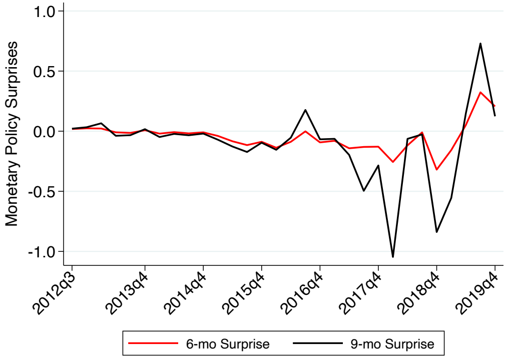
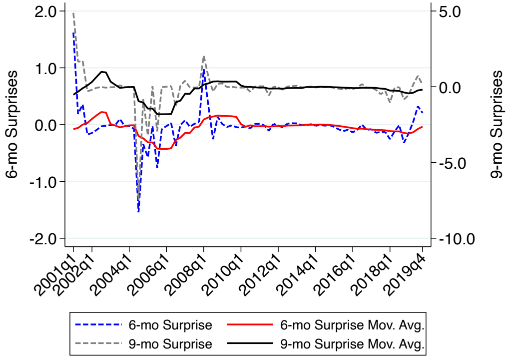
Y: loan amount, loan spread; $\mathcal{L}(f,b,q)$: set of loans between firm (f)-bank (b) at quarter q; **control other firm level variables.**

$MP_q =$ MP surprise, measured with high frequency methodology around FOMC announcements and aggregated to quarterly frequency as in Ottonello and Winberry (2021).

Monetary Policy Surprises





Monetary Policy and Credit Outcomes: Firm Credit Demand

	Quantity: Log(Loan)			Price: Log(1+i)		
	All	Private	Public	All	Private	Public
High Leverage Firm $\times$ MP Surprise$_q$	-0.4212***	-0.8478***	-0.0498	-0.0262***	-0.0395***	0.0156**
	(0.0772)	(0.1221)	(0.2075)	(0.0027)	(0.0035)	(0.0046)
Observations	2460475	2140482	319985	2472261	2150197	322056
Adjusted R^2	0.945	0.939	0.837	0.768	0.768	0.676
Bank $\times$ Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank $\times$ Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm $\times$ Time F.E.	No	No	No	No	No	No

- High leverage firms borrow more, paying higher rates during expansionary policy.
- All firm results are driven by private firms.

Size and Leverage

Monetary Policy and Credit Outcomes: The Role of Leverage and Size

	Quantity			*Prices*		
	Log(Loan)	Log(Loan)	Log(Loan)	Log(1+i)	Log(1+i)	Log(1+i)
High Leverage Firm $\times$ MP Surprise$_q$	-0.4212***		-0.1503^{+}	-0.0262***		-0.0189***
	(0.0772)		(0.0856)	(0.0027)		(0.0026)
SME $\times$ MP Surprise$_q$		0.5530***	1.0737***		0.0140***	0.0288***
		(0.1012)	(0.1984)		(0.0014)	(0.0028)
High Leverage Firm $\times$ SME $\times$ MP Surprise$_q$			-0.7368***			-0.0199***
			(0.1633)			(0.0032)
Observations	2460475	2460475	2460475	2472261	2472261	2472261
Adjusted R^2	0.945	0.945	0.945	0.768	0.767	0.768
Bank$\times$ Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes
Bank$\times$ Time F.E	Yes	Yes	Yes	Yes	Yes	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- Results are driven by leveraged SMEs.

Collateral

Mapping Credit Market Heterogeneity and Monetary Policy Transmission at the Loan Level: The Role of Collateral

$$\log \mathsf{Y}_{l,f,b,q} = \alpha_{f,b,q} + \beta \textbf{Collateral Type}_l + \kappa(\textbf{Collateral Type}_l \times \mathsf{MP}_q) + \vartheta_{l,f,b,q} \quad (1)$$

Control other loan level variables: maturity, loan types, new originations

Collateral, Loans and Spreads: Within Loan Variation

	Quantity: Log(Loan)		Prices: Log$(1+i)$	
	Private Firms	*Public Firms*	*Private Firms*	*Public Firms*
Collateralized	0.4181***	-0.8910***	-0.0058***	0.0108***
	(0.0606)	(0.0760)	(0.0012)	(0.0009)
Collateralized $\times$ MP$_q$	-2.3107***	-2.0066*	-0.0264*	-0.0092
	(0.4394)	(0.7709)	(0.0105)	(0.0100)
Observations	1371794	485440	1377795	481327
Adjusted R^2	0.282	0.284	0.357	0.378
Bank $\times$ Firm $\times$ Time F.E.	Yes	Yes	Yes	Yes

$^{+}\ p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

- For private borrowers, collateralizing a loan is associated with improved access to credit.
- For public borrowers, it is the opposite.

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Bank × Firm × Time F.E.	Yes	Yes	Yes	Yes

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- Access to credit effect is even stronger for private firms during loose MP.

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- In normal times, private firms can borrow at lower cost by posting collateral.
- It is the opposite for public firms, who pay a higher cost when posting collateral.

Role of Collateral Type in Monetary Policy Transmission

	Quantity: Log(Loan)		Prices: Log$(1+i)$	
	Private Firms	*Public Firms*	*Private Firms*	*Public Firms*
Asset-based	0.0278	-1.6386***	-0.0010	0.0195***
	(0.0546)	(0.0719)	(0.0012)	(0.0010)
Earnings & Operations-based	0.6912***	-0.4388***	-0.0085***	0.0054***
	(0.0608)	(0.0949)	(0.0012)	(0.0009)
Asset-based × MP$_q$	-1.5839***	-0.3345	-0.0260*	0.0305*
	(0.4050)	(0.7612)	(0.0107)	(0.0120)
Earnings & Operations-based × MP$_q$	-2.5402***	-4.0888***	-0.0293*	-0.0300**
	(0.4689)	(0.9127)	(0.0107)	(0.0106)
Observations	1371794	485440	1377795	481327
Adjusted R^2	0.310	0.330	0.366	0.390
Bank × Firm × Time F.E.	Yes	Yes	Yes	Yes

$^{+}\ p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

- Normal times access to finance effect for private borrowers is from earnings and operation based collateral.

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- During expansionary policy both type of collateral increase borrowing, but only earnings and operation based collateral at lower cost for private borrowers.

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Bank × Firm × Time F.E.	Yes	Yes	Yes	Yes

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- Both type of collateral signal distress in normal times and during expansionary policy for public firms.

Collateral, Leverage and Credit Demand

Leverage is against Earnings and Operations Collateral

Dep. Var: Log(Loan)	(1)	(2)	(3)
High Earnings and Operations Collateral $\times$ MP$_q$	-0.2363**		-0.1758*
	(0.0843)		(0.0788)
High Leverage Firm $\times$ MP$_q$		-1.1746***	-1.1657***
		(0.1400)	(0.1376)
Observations	2140485	2140485	2140485
Adjusted R^2	0.937	0.937	0.937
Bank $\times$ Firm FE	Yes	Yes	Yes
Direct Effect of MP$_q$	Yes	Yes	Yes

A Primer on the Mechanism

Heterogenous Firms, Credit and Investment

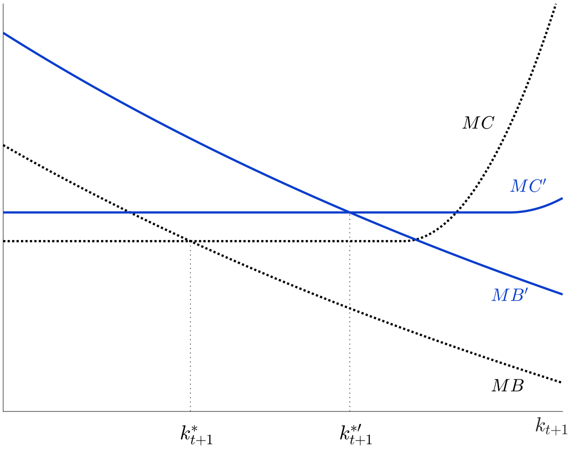
- The pioneering work of **Bernanke-Gertler, 1989 and Kiyotaki-Moore, 1997** linking firm networth, external financing cost and investment

  $\Rightarrow$ default risk or collateral constraint, not both

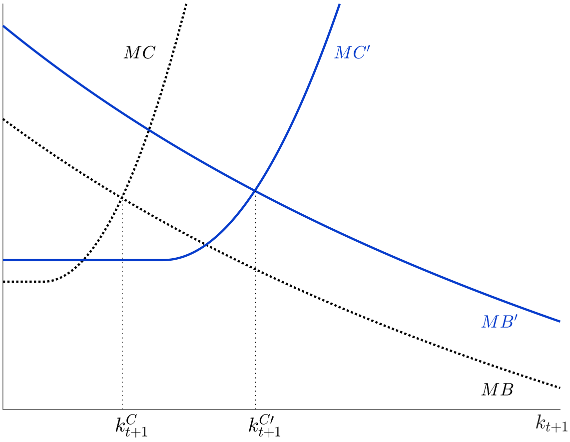
- Ottonello-Winberry, ECMA, 2021 Heterogenous firm new keynesian model with default risk—theoretically ambiguous

Ottonello-Winberry, ECMA, 2021

(a) Risk-Free Firm



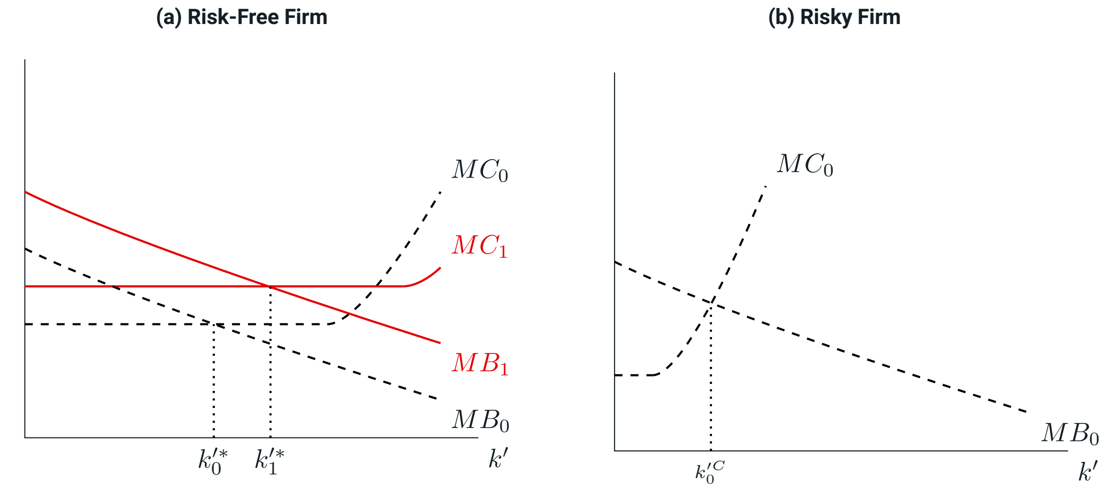
(b) Risky Firm



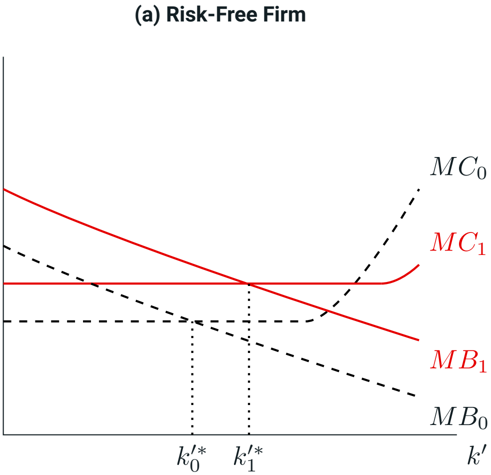
More Power on the Existing OW Mechanism?

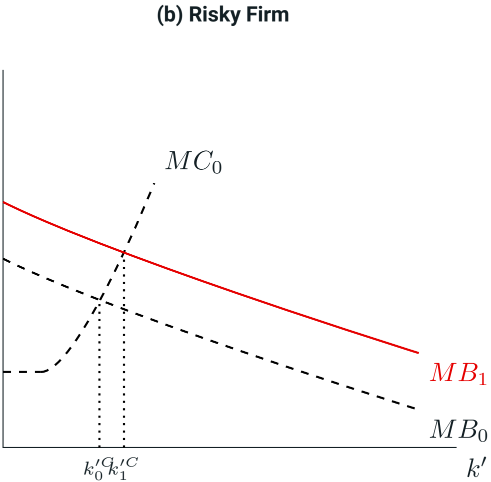
- Expansionary monetary policy can flatten out the MC curve by decreasing the severity of financial friction via higher net worth
- This effect can be stronger if slope of MC is endogenous to earnings/operations based constraint relaxation—as shown in the data

Intuition w/Operational Collateral Constraint



Intuition w/Operational Collateral Constraint





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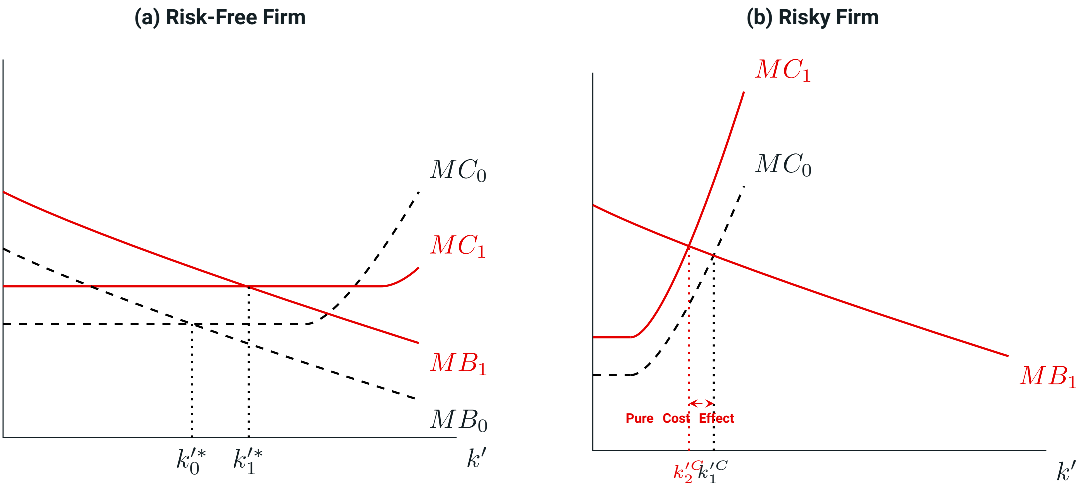

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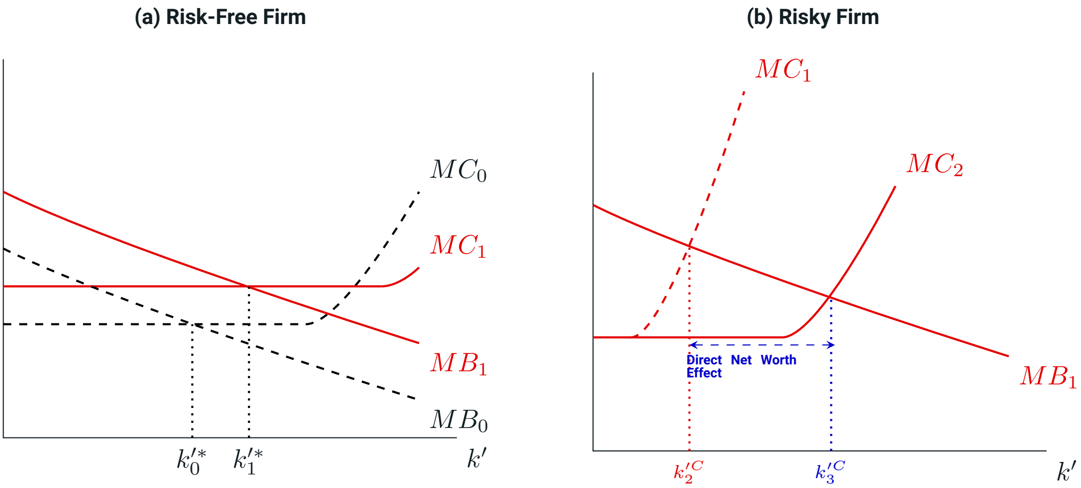
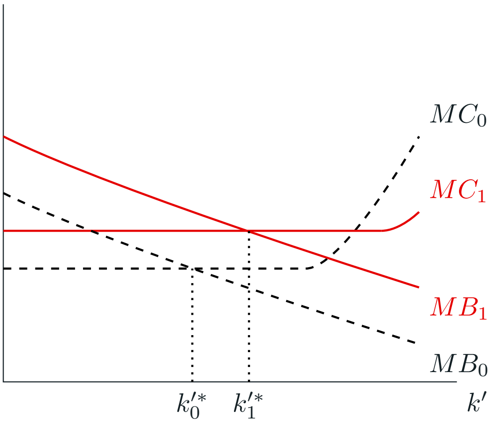
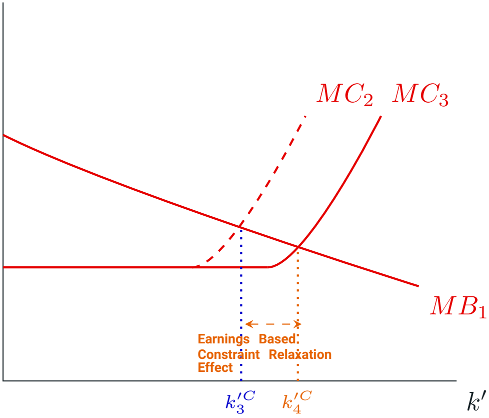


Intuition w/Operational Collateral Constraint

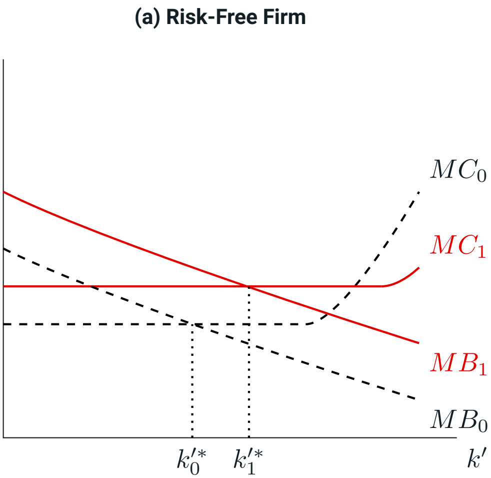
(a) Risk-Free Firm

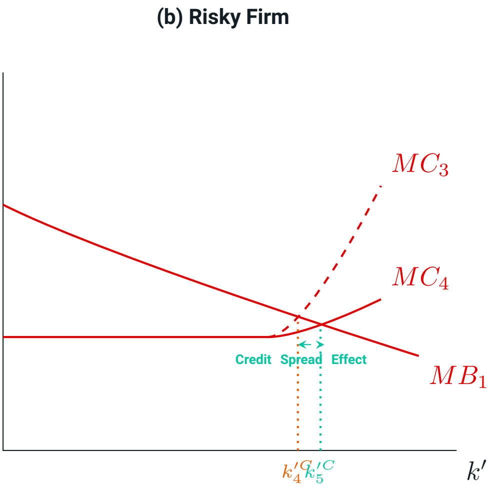


(b) Risky Firm

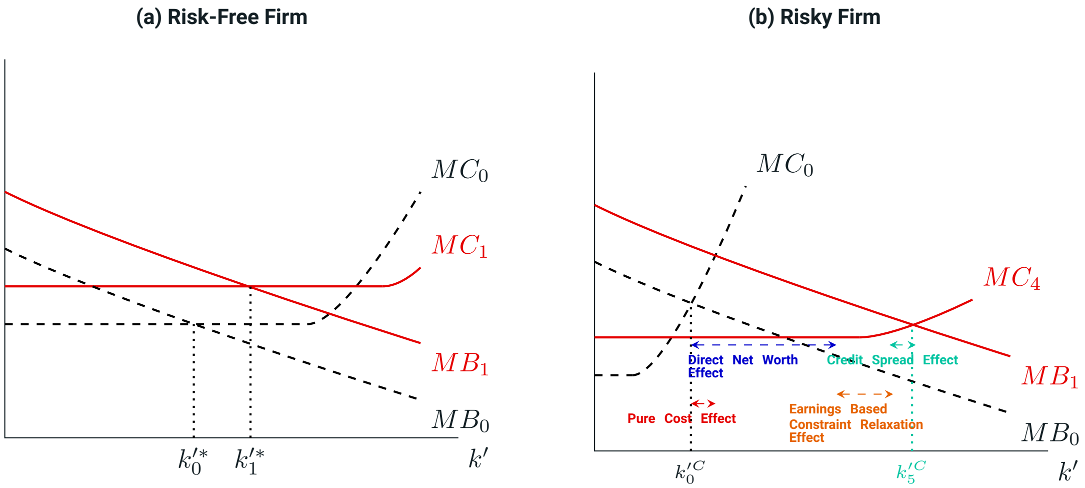


Intuition w/Operational Collateral Constraint





Intuition w/Operational Collateral Constraint



Takeaways

- We document new facts about the U.S. credit market that highlight the importance of heterogeneity in firm size and type of collateral.
- Correlation (collateral, default risk) > 0 for listed firms but < 0 for private firms, indicating access to finance role of collateral for smaller firms.
- Private firms/SMEs mostly use "earnings/operational" collateral rather than fixed assets, that increases these firms' "ability to pay" under expansionary monetary policy.

Takeaways

- We document new facts about the U.S. credit market that highlight the importance of heterogeneity in firm size and type of collateral.
- Correlation (collateral, default risk) > 0 for listed firms but < 0 for private firms, indicating access to finance role of collateral for smaller firms.
- Private firms/SMEs mostly use "earnings/operational" collateral rather than fixed assets, that increases these firms' "ability to pay" under expansionary monetary policy.
- Monetary policy effectiveness depends on **credit demand from SMEs** who borrow using "earnings/operational" collateral.
- Although banks do not lend to firms who defaulted before, there are possible risks to financial stability as more leveraged firms borrow more in a low rate environment.

Appendix

Aggregate Impact: Macro Regression

$$\log \sum_{l \in \mathcal{L}(f,b,q)} Y_{f,b,q}(l) = \alpha_{f,b} + \kappa_0^{\text{Agg}} \text{MP}_q^{MA} + \vartheta_{f,b,q}$$

$$\Longrightarrow \widehat{\log Y_{f,b,q}} = \hat{\alpha}_{f,b} + \hat{\kappa}_0^{\text{Agg}} \text{MP}_q^{MA}$$

Taking difference with respect to $q-1$

$$d \log \widehat{Y_{f,b,q}} = \hat{\kappa}_0^{\text{Agg}} \Delta \text{MP}_q^{MA}$$

Multiplying each side by $\omega_{f,b,q-1}$ such that $\sum_{f,b} \omega_{f,b,q-1} = 1$ and adding across all bank-firm (b,q) pairs at time q

$$\omega_{f,b,q-1} \widehat{\log Y_{f,b,q}} = \omega_{f,b,q-1} \hat{\kappa}_0^{\text{Agg}} \Delta \text{MP}_q^{MA}$$

$$\widehat{d \log Y_q} = \hat{\kappa}_0^{\text{Agg}} \Delta \text{MP}_q^{MA}$$

$$\frac{\text{Average}\{\widehat{d \log Y_q}\}}{\text{Average}\{\text{Agg. Loan Growth}_q\}} = 0.03$$

Aggregate Impact: High Leverage Firms

$$\log \sum_{l \in \mathcal{L}(f,b,q)} Y_{f,b,q}(l) = \alpha_{f,b} + \kappa_0 \text{MP}_q^{MA} + \kappa_1 \times \textbf{High Leverage Firm}_f \times \text{MP}_q^{MA} + \vartheta_{f,b,q}$$

$$\implies \widehat{\mathrm{d}\log Y_{f,b,q}} = \hat{\kappa}_0 \Delta\text{MP}_q^{MA} + \hat{\kappa}_1 \times \textbf{High Leverage Firm}_f \times \Delta\text{MP}_q^{MA}$$

Multiplying each side by $\omega_{f,b,q-1}$ such that $\sum_{f,b} \omega_{f,b,q-1} = \omega_{q-1}^{HL} + \omega_{q-1}^{HL} = 1$ and adding over (f,b)

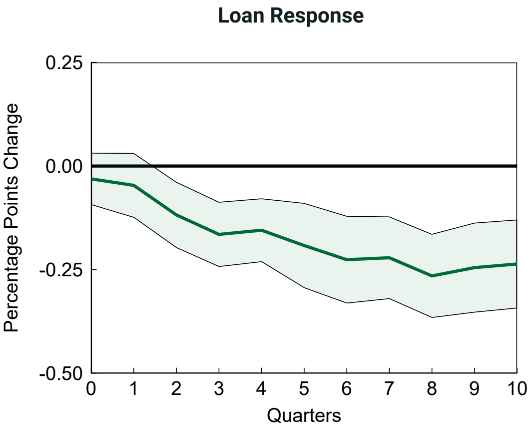
$$d \log \widehat{Y}_q = (1 - \omega_{q-1}^{HL}) \hat{\kappa}_0 \Delta\text{MP}_q^{MA} + \underbrace{\omega_{q-1}^{HL}}_{\text{Share of Total Loans by High Leverage Firms}} (\hat{\kappa}_0 + \hat{\kappa}_1) \Delta\text{MP}_q^{MA}$$

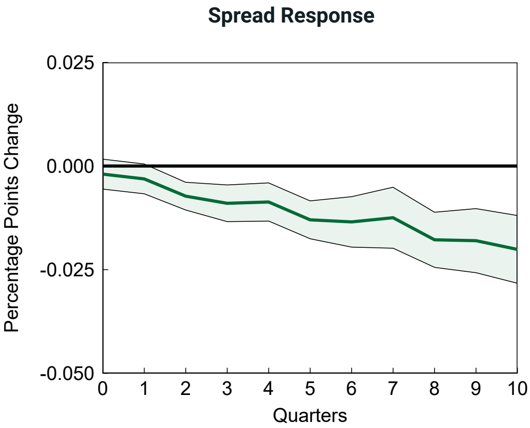
Hence,

$$\frac{\text{Avg}\left(\omega_{q-1}^{HL}(\hat{\kappa}_0 + \hat{\kappa}_1)\Delta\text{MP}_q^{MA}\right)}{\text{Avg}\left(d \log \widehat{Y}_q\right)} = 0.5$$

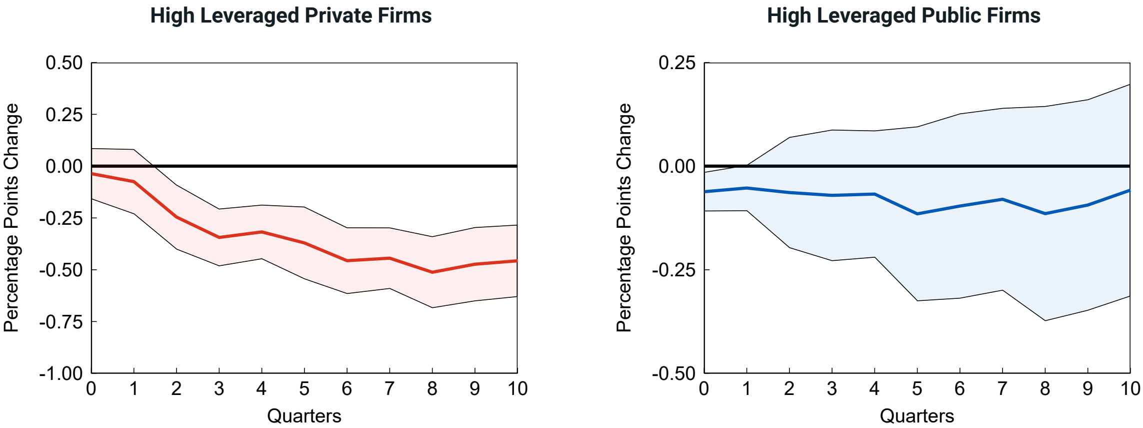
Dynamic Responses

Dynamic Response of Leveraged Firms to MP Surprises, Conditional on Credit Supply

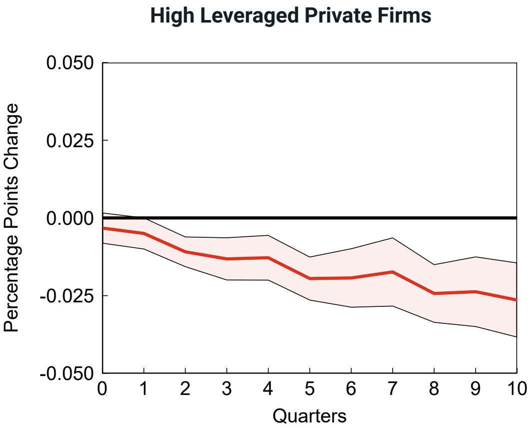


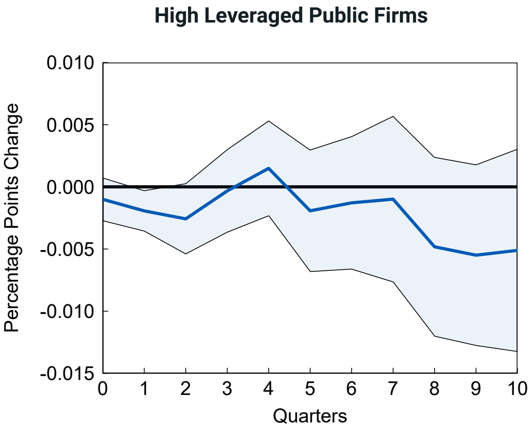


Dynamic Loan Responses—Driven by Private Firms



Dynamic Loan Spread Responses—Driven by Private Firms





Collateral and Credit Demand

Collateral Type and Credit Demand are both Important for Monetary Policy Transmission

Full Results

PRIVATE FIRMS:	*Quantity* Log (Loan)	*Prices* Log $(1+i)$
Fixed assets and real estate$_q$ $\times$ MP Surprise$_q$	-0.0606	-0.0008
	(0.0811)	(0.0017)
Cash and marketable sec.$_q$ $\times$ MP Surprise$_q$	-0.1948	0.0009
	(0.1258)	(0.0026)
Act. receiv. and inventory$_q$ $\times$ MP Surprise$_q$	-1.0223***	-0.0118***
	(0.1391)	(0.0026)
Blanket lien and other$_q$ $\times$ MP Surprise$_q$	-0.5070***	-0.0018
	(0.1064)	(0.0018)
Observations	2650313	2781417
Adjusted R^2	0.734	0.647
Bank$\times$Firm F.E	Yes	Yes
Bank$\times$Time F.E	Yes	Yes

- During expansionary policy both AR&I and blanket lien type of collateral increase borrowing, but lower cost effect mainly comes from AR&I for private borrowers (from normal time effect)

Collateral Type and Credit Demand are both Important for Monetary Policy Transmission Full Results

PRIVATE FIRMS:	*Quantity* Log (Loan)	*Prices* Log $(1+i)$
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Bank$\times$Firm F.E	Yes	Yes
Bank$\times$Time F.E	Yes	Yes

- During expansionary policy both AR&I and blanket lien type of collateral increase borrowing
- Normal time negative effect of posting AR&I collateral on spread dominates the positive effect coming from higher credit demand.

Risk Taking by Banks and Financial Stability

What about risk taking by banks?

Do ‘bad’ banks knowingly lend to ‘bad’ firms, when monetary policy is easy?

- What do leveraged banks do?
- Do banks prefer certain collateral (more-less risky?)
- Do banks lend to firms who defaulted on them before?

Varying Bank Credit Supply Over Time (Aggregate Loans to Firm-Bank Level):

$$\log \sum (Y_l)_{f,b,q} = \alpha_{f,b} + \alpha_{f,q} + \kappa(\textbf{Leverage}_b \times \text{MP}_q) + \vartheta_{f,b,q}$$

Monetary Policy and Credit Outcomes: Bank Credit Supply

	Quantity: Log(Loan)			Price: Log(1+i)		
	All Firms	Private Firms	Public Firms	All Firms	Private Firms	Public Firms
Bank Leverage$_{q-1}$	$\boxed{0.3699^{***}}$	$\boxed{0.3486^{**}}$	$\boxed{0.3957^{**}}$	$\boxed{-0.0079^{***}}$	$\boxed{-0.0041}$	$\boxed{-0.0106^{***}}$
	$\boxed{(0.0857)}$	$\boxed{(0.1077)}$	$\boxed{(0.1127)}$	$\boxed{(0.0019)}$	$\boxed{(0.0026)}$	$\boxed{(0.0020)}$
Bank Leverage$_{q-1}$ $\times$ MP Surprise$_q$	0.7481^{+}	1.7704^{**}	0.4098	0.0162^{+}	0.0293^{*}	0.0110
	(0.4307)	(0.5686)	(0.5292)	(0.0085)	(0.0138)	(0.0088)
Observations	633771	337330	296129	639054	340486	298156
Adjusted R^2	0.911	0.930	0.864	0.854	0.860	0.820
Bank$\times$Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes
Bank$\times$Time F.E	No	No	No	No	No	No
Firm$\times$Time F.E	Yes	Yes	Yes	Yes	Yes	Yes

- Leveraged banks lend more at lower prices during normal times (lower price for public firms)

Monetary Policy and Credit Outcomes: Bank Credit Supply

	Quantity: Log(Loan)			Price: Log(1+i)		
	All Firms	Private Firms	Public Firms	All Firms	Private Firms	Public Firms
Bank Leverage$_{q-1}$	0.3699***	0.3486**	0.3957**	-0.0079***	-0.0041	-0.0106***
	(0.0857)	(0.1077)	(0.1127)	(0.0019)	(0.0026)	(0.0020)
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Bank$\times$Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes
Bank$\times$Time F.E	No	No	No	No	No	No
Firm$\times$Time F.E	Yes	Yes	Yes	Yes	Yes	Yes

- During expansionary policy leveraged banks lend less to private firms

Do Banks Prefer Certain Collateral?

PRIVATE FIRMS:	*Quantity* Log (Loan)	*Prices* Log $(1+i)$
Fixed assets and real estate$_q$ $\times$ MP Surprise$_q$	-1.0468***	-0.0107*
	(0.2082)	(0.0051)
Cash and marketable sec.$_q$ $\times$ MP Surprise$_q$	-0.9140**	-0.0040
	(0.2931)	(0.0062)
Act. receiv. and inventory$_q$ $\times$ MP Surprise$_q$	-2.1088***	-0.0135*
	(0.3011)	(0.0052)
Blanket lien and other$_q$ $\times$ MP Surprise$_q$	-0.9747***	-0.0105*
	(0.2348)	(0.0045)
Observations	1362500	1365280
Adjusted R^2	0.472	0.442
Bank $\times$ Firm F.E	Yes	Yes
Firm $\times$ Time F.E	Yes	Yes

- During expansionary policy ALL collateral increase credit supply, but lower cost effect mainly comes from normal times effect of cash and AR&I. Full Results

Do banks take risk by lending to firms with loan losses?

	Private Firms		Public Firms	
	Log (Loan)	Log $(1+i)$	Log (Loan)	Log $(1+i)$
$(\text{CCO/Loan})_{q-1}$	-0.0612	-0.0001	-0.2491	-0.0058
	(0.0553)	(0.0022)	(0.2025)	(0.0052)
$(\text{CCO/Loan})_{q-1} \times \text{MP Surprise}_q$	$\boxed{2.8959^{**}}$	0.0327	-1.4709	-0.0450
	$\boxed{(0.8349)}$	(0.0268)	(1.6931)	(0.0446)
Observations	310023	297044	285175	277986
Adjusted R^2	0.933	0.874	0.868	0.835
Bank$\times$Firm F.E	Yes	Yes	Yes	Yes
Firm$\times$Time F.E	Yes	Yes	Yes	Yes

$^{+}\ p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

- With expansionary policy banks lend less to firms who defaulted on them before

Firm Leverage and Financial Stability

Leverage, NPL and Default Probabilities

	Default Probability								
	All Firms			*Private Firms*			*Public Firms*		
Firm Leverage$_{q-1}$	0.0448***		0.0496***	0.0412***		0.0367***	0.1044***		0.1266***
	(0.0028)		(0.0074)	(0.0027)		(0.0063)	(0.0214)		(0.0327)
Non-Performing Loan$_{q-1}$		0.0181***	0.0175**		0.0525***	0.0519***		0.0002	-0.0007
		(0.0049)	(0.0048)		(0.0115)	(0.0114)		(0.0038)	(0.0038)
Observations	1656049	535836	535836	1454694	415830	415830	201355	120006	120006
Adjusted R^2	0.601	0.810	0.811	0.601	0.822	0.822	0.576	0.663	0.673
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- High leverage predicts default both for private and public firms

Leverage, NPL and Default Probabilities

	Default Probability								
	All Firms			*Private Firms*			*Public Firms*		
Firm Leverage$_{q-1}$	0.0448***		0.0496***	0.0412***		0.0367***	0.1044***		0.1266***
	(0.0028)		(0.0074)	(0.0027)		(0.0063)	(0.0214)		(0.0327)
Non-Performing Loan$_{q-1}$		0.0181***	0.0175**		0.0525***	0.0519***		0.0002	-0.0007
		(0.0049)	(0.0048)		(0.0115)	(0.0114)		(0.0038)	(0.0038)
Observations	1656049	535836	535836	1454694	415830	415830	201355	120006	120006
Adjusted R^2	0.601	0.810	0.811	0.601	0.822	0.822	0.576	0.663	0.673
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- NPL predicts default only for private firms

Do high leverage firms likely to be delinquent in the future due to easy monetary policy?

	Dep. Var: Non-Performing Loans		
	All Firms	Private Firms	Public Firms
High leverage firm$_i$ $\times$ MP Surprise$_q$	-0.0498**	$\boxed{-0.0594^{**}}$	-0.0705^{+}
	(0.0153)	$\boxed{(0.0164)}$	(0.0377)
Observations	2469016	2150032	318976
Adjusted R^2	0.647	0.636	0.700
Bank$\times$Firm f.e	Yes	Yes	Yes
Bank$\times$Time f.e	Yes	Yes	Yes
Firm$\times$Time f.e	No	No	No

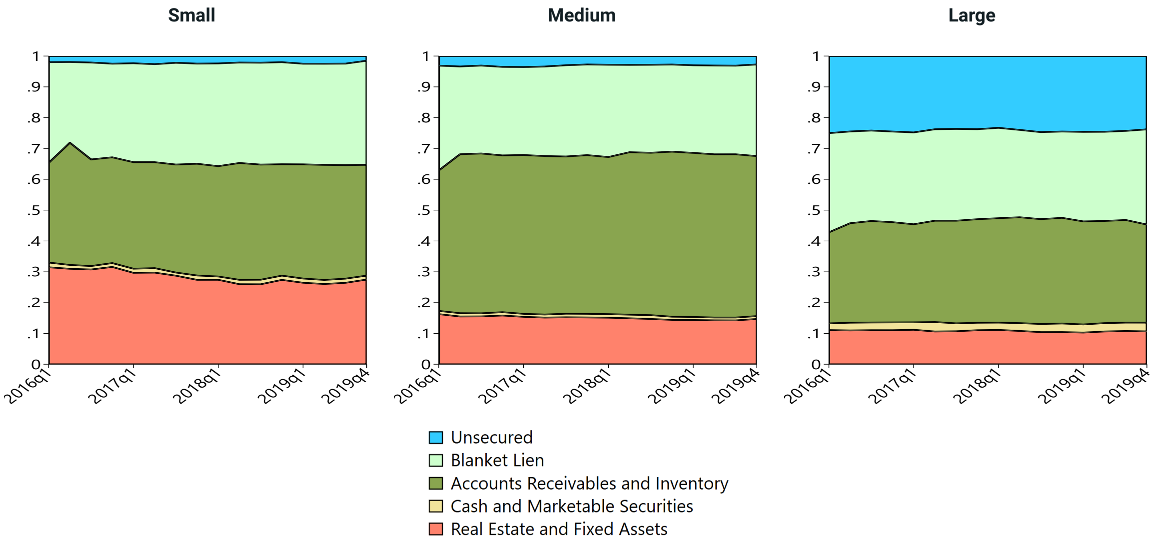
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- If you are high leverage firm, expansionary policy make it more likely that you will be delinquent (result comes from private firms)

Appendix: Figures

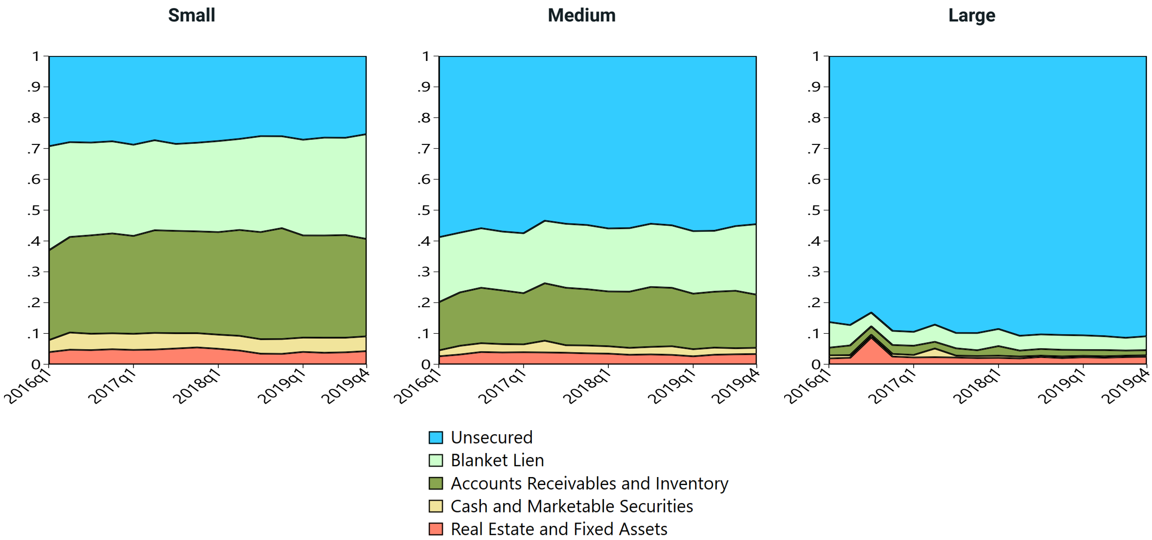
Collateral Types Private Firms: Loan Values

Back

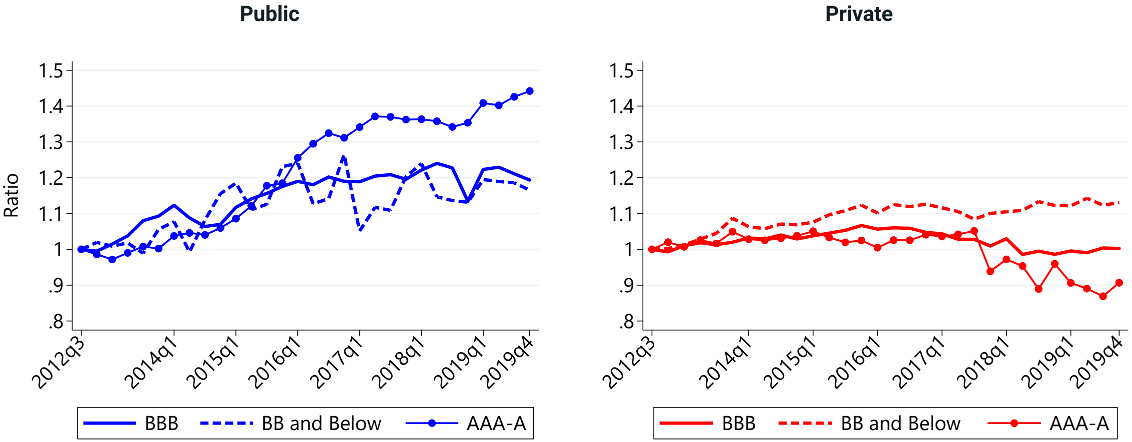


Collateral Types Public Firms: Loan Values

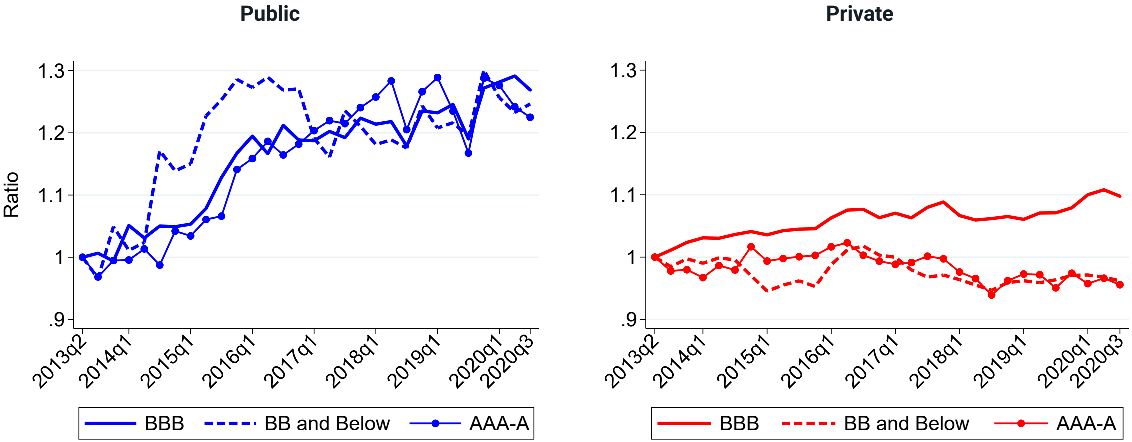
Back



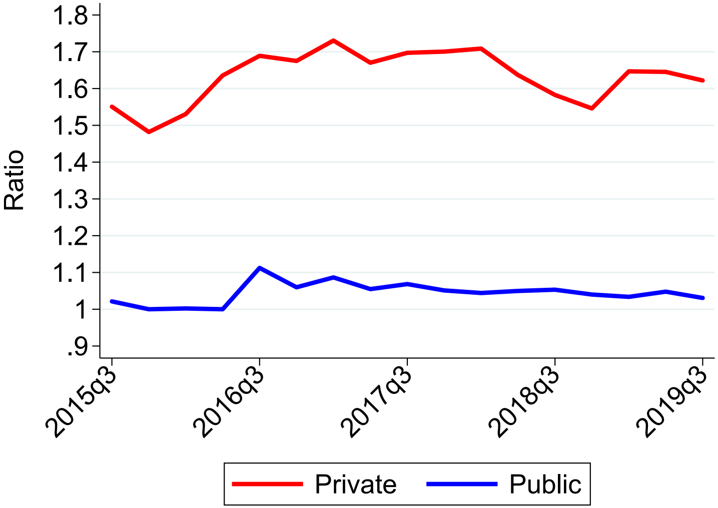
Leverage: Fixed Ratings



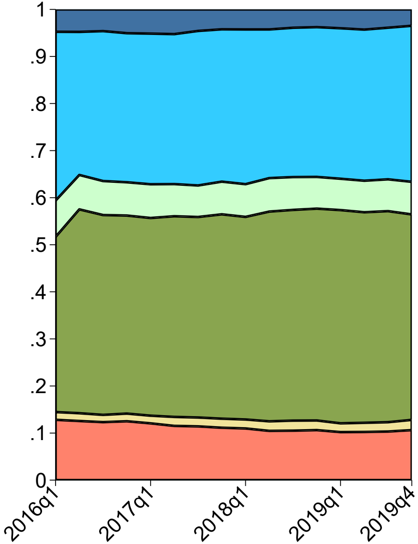
Leverage: Time Varying Ratings



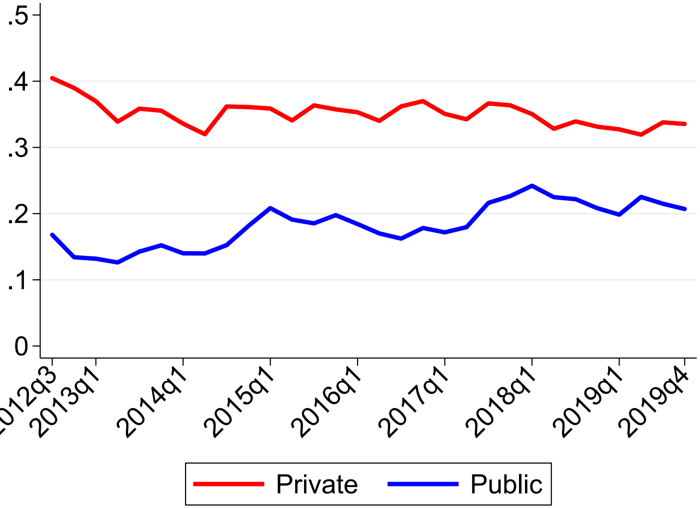
Collateral to Loan Ratio−Intensive Margin: Private vs. Public



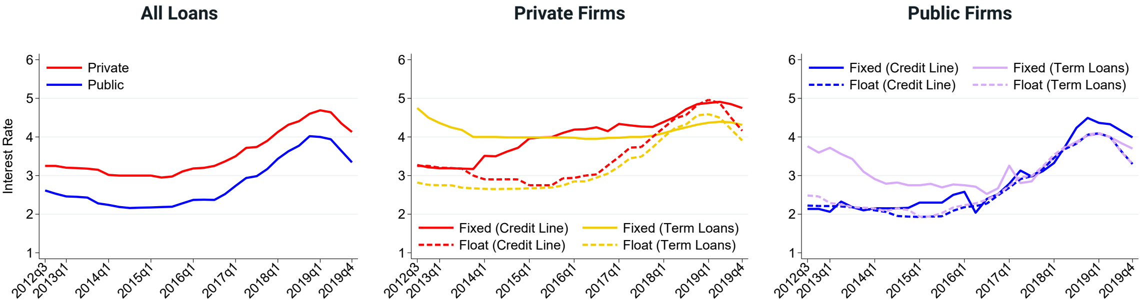
Collateral Type for SMEs



Loan shares Maturity Less than 1 Year

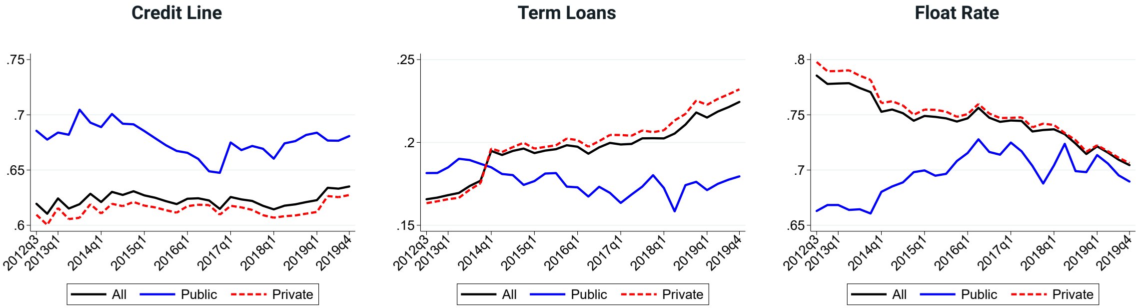


Interest rates: Fixed versus Floating



Interest rates on New Originations

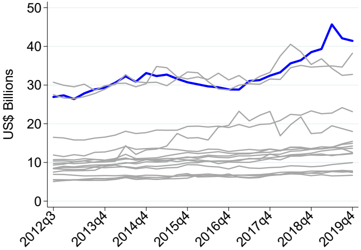
Loan shares: Credit Lines/Term loans and Floating/Fixed Rates



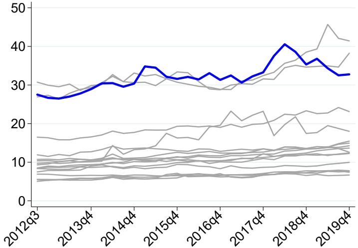
Mean Commited Exposure by Sector

Back

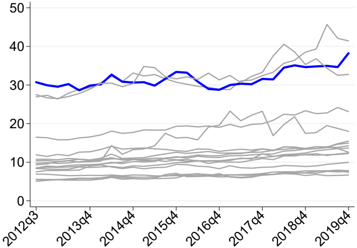
Mining, Quarrying, and Oil and Gas Extraction



Information

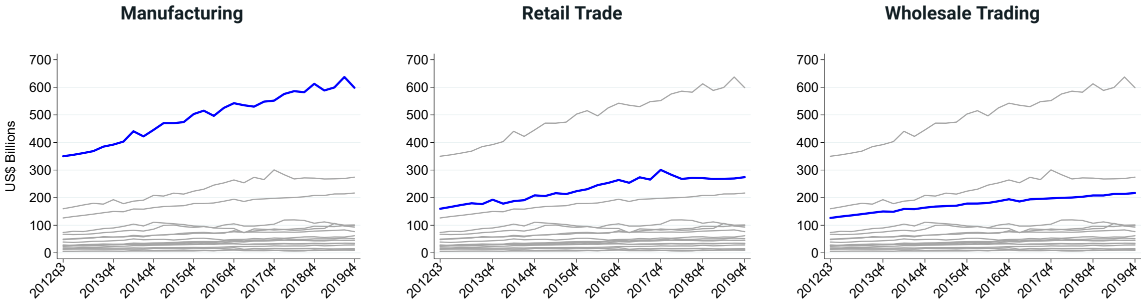


Utilities

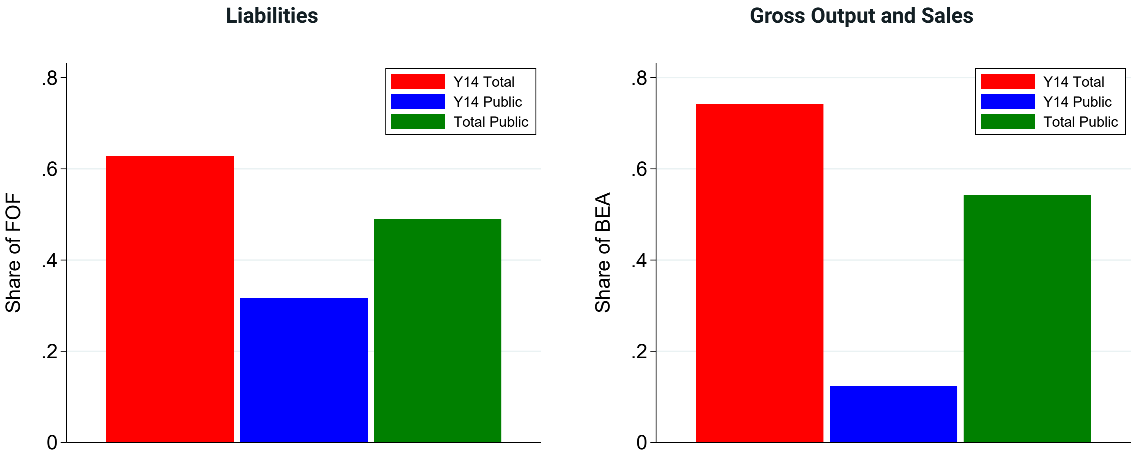


Total Committed Exposure by Sector

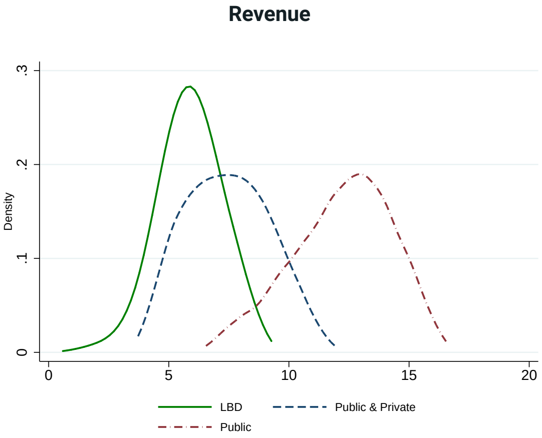
Back

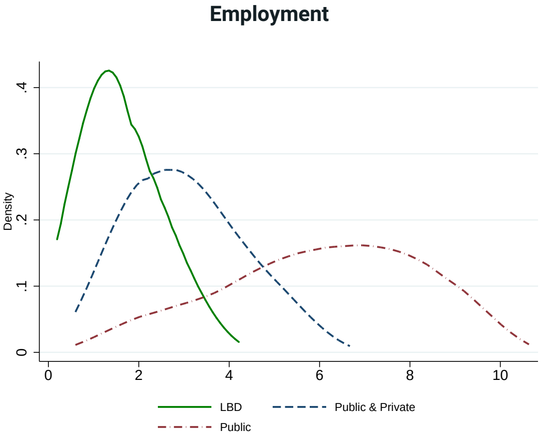


Y14 firms account for much larger share of US Corporate Debt and Output Back



Distributions Dinlersoz et. al (2018) Back

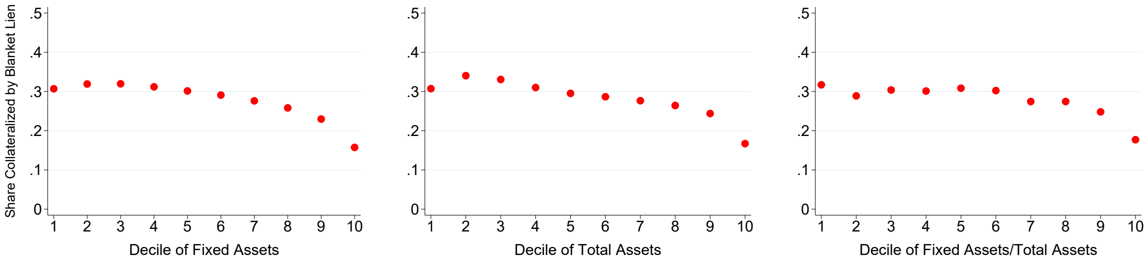




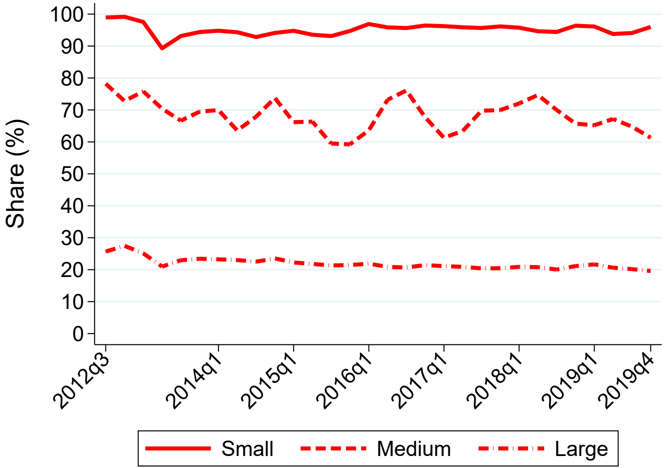
Loan Share Collateralized by Blanket Liens: All Firms

Back

Loan Share Collateralized by Blanket Liens: Private Firms Back



Private Firms' Share of Bank Debt in FR Y-14: Based on All Commitments Back



Appendix: Tables

Time Variant Firm Leverage

	Quantity: Log(Loan)			Price: Log(1+i)		
	(1) All Firms	(2) Private Firms	(3) Public Firms	(4) All Firms	(5) Private Firms	(6) Public Firms
Firm Leverage$_{q-1}$	0.0078	-0.0231	0.0619	-0.0023^{+}	-0.0025^{+}	0.0002
	(0.0222)	(0.0263)	(0.0674)	(0.0012)	(0.0012)	(0.0014)
Firm Leverage$_{q-1}$ $\times$ MP Surprise$_q$	-1.3212***	-1.8097***	-0.0484	-0.0899***	-0.0951***	-0.0082
	(0.1809)	(0.2410)	(0.7931)	(0.0096)	(0.0097)	(0.0209)
Observations	2199353	1935430	263915	2210232	1944550	265674
Adjusted R^2	0.946	0.940	0.839	0.772	0.774	0.674
Bank$\times$Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes
Bank$\times$Time F.E	Yes	Yes	Yes	Yes	Yes	Yes
Firm$\times$Time F.E	No	No	No	No	No	No

Time Variant Bank Leverage

	Quantity: Log(Loan)			Price: Log(1+i)		
	(1) All Firms	(2) Private Firms	(3) Public Firms	(4) All Firms	(5) Private Firms	(6) Public Firms
Bank Leverage$_{q-1}$	0.3699***	0.3486**	0.3957**	-0.0079***	-0.0041	-0.0106***
	(0.0857)	(0.1077)	(0.1127)	(0.0019)	(0.0026)	(0.0020)
Bank Leverage$_{q-1}$ $\times$ MP Surprise$_q$	0.7481^{+}	1.7704**	0.4098	0.0162^{+}	0.0293*	0.0110
	(0.4307)	(0.5686)	(0.5292)	(0.0085)	(0.0138)	(0.0088)
Observations	633771	337330	296129	639054	340486	298156
Adjusted R^2	0.911	0.930	0.864	0.854	0.860	0.820
Bank$\times$Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes
Bank$\times$Time F.E	No	No	No	No	No	No
Firm$\times$Time F.E	Yes	Yes	Yes	Yes	Yes	Yes

Extensive Margin Private

	Quantity			*Prices*		
	Log (Loan)	Log (Loan)	Log (Loan)	Log $(1+i)$	Log $(1+i)$	Log $(1+i)$
Collateralized$_q$	0.2888***	0.3467***	0.4181***	-0.0023***	-0.0045***	-0.0058***
	(0.0353)	(0.0523)	(0.0606)	(0.0005)	(0.0009)	(0.0012)
Collateralized$_q$ $\times$ MP Surprise$_q$	-0.9698***	-2.1818***	-2.3107***	-0.0130***	-0.0190*	-0.0264*
	(0.1719)	(0.3730)	(0.4394)	(0.0033)	(0.0073)	(0.0105)
Observations	2984365	1563912	1371794	3128248	1564644	1377795
Adjusted R^2	0.724	0.454	0.282	0.634	0.428	0.357
Bank$\times$Firm F.E	Yes	Yes	No	Yes	Yes	No
Bank$\times$Time F.E	Yes	No	No	Yes	No	No
Firm$\times$Time F.E	No	Yes	No	No	Yes	No
Bank$\times$Firm$\times$Time F.E	No	No	Yes	No	No	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Extensive Margin Public

	Quantity			*Prices*		
	Log (Loan)	Log (Loan)	Log (Loan)	Log $(1+i)$	Log $(1+i)$	Log $(1+i)$
Collateralized$_q$	-0.6190***	-0.6384***	-0.8910***	0.0074***	0.0081***	0.0108***
	(0.0481)	(0.0490)	(0.0770)	(0.0006)	(0.0006)	(0.0009)
Collateralized$_q$ $\times$ MP Surprise$_q$	-0.6125*	-0.4756	-2.0066*	-0.0233***	-0.0157*	-0.0092
	(0.2575)	(0.3938)	(0.7709)	(0.0050)	(0.0069)	(0.0100)
Observations	644446	634710	485440	639445	629677	481327
Adjusted R^2	0.506	0.490	0.284	0.479	0.513	0.378
Bank$\times$Firm F.E	Yes	Yes	No	Yes	Yes	No
Bank$\times$Time F.E	Yes	No	No	Yes	No	No
Firm$\times$Time F.E	No	Yes	No	No	Yes	No
Bank$\times$Firm$\times$Time F.E	No	No	Yes	No	No	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Role of Collateral Type I: Private Firms

Back Credit Demand Back Credit Supply

	Quantity			*Prices*		
	Log (Loan)	Log (Loan)	Log (Loan)	Log $(1+i)$	Log $(1+i)$	Log $(1+i)$
Fixed assets and real estate$_q$	0.0362	-0.0298	0.0332	0.0015**	0.0009	-0.0000
	(0.0324)	(0.0433)	(0.0494)	(0.0005)	(0.0009)	(0.0012)
Cash and marketable sec.$_q$	0.2225***	0.3331***	0.3270***	-0.0049***	-0.0070***	-0.0093***
	(0.0361)	(0.0536)	(0.0713)	(0.0006)	(0.0010)	(0.0013)
Act. receiv. and inventory$_q$	0.5424***	0.7790***	0.8924***	-0.0046***	-0.0082***	-0.0102***
	(0.0406)	(0.0509)	(0.0535)	(0.0006)	(0.0010)	(0.0013)
Blanket lien and other$_q$	0.3668***	0.4817***	0.5787***	-0.0024***	-0.0046***	-0.0053***
	(0.0332)	(0.0431)	(0.0514)	(0.0005)	(0.0008)	(0.0010)
Fixed assets and real estate$_q$ $\times$ MP Surprise$_q$	-0.0606	-1.0468***	-1.1313***	-0.0008	-0.0107*	-0.0178*
	(0.0811)	(0.2082)	(0.2485)	(0.0017)	(0.0051)	(0.0072)
Cash and marketable sec.$_q$ $\times$ MP Surprise$_q$	-0.1948	-0.9140**	-0.7354^{+}	0.0009	-0.0040	-0.0054
	(0.1258)	(0.2931)	(0.4310)	(0.0026)	(0.0062)	(0.0093)
Act. receiv. and inventory$_q$ $\times$ MP Surprise$_q$	-1.0223***	-2.1088***	-2.3031***	-0.0118***	-0.0135*	-0.0227**
	(0.1391)	(0.3011)	(0.3342)	(0.0026)	(0.0052)	(0.0077)
Blanket lien and other$_q$ $\times$ MP Surprise$_q$	-0.5070***	-0.9747***	-0.6990*	-0.0018	-0.0105*	-0.0120^{+}
	(0.1064)	(0.2348)	(0.3015)	(0.0018)	(0.0045)	(0.0065)
Observations	2650313	1362500	1192230	2781417	1365280	1199252
Adjusted R^2	0.734	0.472	0.307	0.647	0.442	0.376
Bank$\times$Firm F.E	Yes	Yes	No	Yes	Yes	No
Bank$\times$Time F.E	Yes	No	No	Yes	No	No
Firm$\times$Time F.E	No	Yes	No	No	Yes	No
Bank$\times$Firm$\times$Time F.E	No	No	Yes	No	No	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Role of Collateral Type I: Public Firms

	Quantity			*Prices*		
	Log (Loan)	Log (Loan)	Log (Loan)	Log $(1+i)$	Log $(1+i)$	Log $(1+i)$
Fixed assets and real estate$_q$	-1.4410***	-1.4400***	-1.8022***	0.0178***	0.0174***	0.0219***
	(0.0609)	(0.0703)	(0.0757)	(0.0009)	(0.0009)	(0.0011)
Cash and marketable sec.$_q$	-0.5642***	-0.5283***	-0.7002***	0.0034**	0.0048***	0.0060**
	(0.0633)	(0.0697)	(0.1222)	(0.0011)	(0.0011)	(0.0020)
Act. receiv. and inventory$_q$	-0.1679*	-0.2192**	-0.2921*	0.0032***	0.0036***	0.0028*
	(0.0690)	(0.0756)	(0.1187)	(0.0007)	(0.0008)	(0.0013)
Blanket lien and other$_q$	-0.3759***	-0.3934***	-0.5355***	0.0045***	0.0052***	0.0073***
	(0.0483)	(0.0505)	(0.0913)	(0.0005)	(0.0005)	(0.0009)
Fixed assets and real estate$_q$ $\times$ MP Surprise$_q$	1.0635*	0.9617^{+}	-0.3164	0.0139	0.0060	0.0275*
	(0.4006)	(0.5166)	(0.8001)	(0.0097)	(0.0105)	(0.0127)
Cash and marketable sec.$_q$ $\times$ MP Surprise$_q$	-1.7177**	-1.6142*	-2.5546^{+}	0.0041	0.0216^{+}	0.0760**
	(0.5340)	(0.6360)	(1.4276)	(0.0102)	(0.0116)	(0.0246)
Act. receiv. and inventory$_q$ $\times$ MP Surprise$_q$	-1.7494***	-2.8136***	-5.5757***	-0.0399***	-0.0287***	-0.0465**
	(0.3921)	(0.5887)	(1.1364)	(0.0055)	(0.0072)	(0.0134)
Blanket lien and other$_q$ $\times$ MP Surprise$_q$	-0.7591*	-1.1205*	-2.2961*	-0.0333***	-0.0226**	-0.0203^{+}
	(0.3102)	(0.4592)	(0.9398)	(0.0047)	(0.0065)	(0.0116)
Observations	644446	634710	485440	639445	629677	481327
Adjusted R^2	0.538	0.523	0.339	0.491	0.525	0.398
Bank$\times$Firm F.E	Yes	Yes	No	Yes	Yes	No
Bank$\times$Time F.E	Yes	No	No	Yes	No	No
Firm$\times$Time F.E	No	Yes	No	No	Yes	No
Bank$\times$Firm$\times$Time F.E	No	No	Yes	No	No	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Role of Collateral Type II: Private Firms

	Quantity			*Prices*		
	Log(Loan)	Log(Loan)	Log(Loan)	Log(1+i)	Log(1+i)	Log(1+i)
Asset-based	0.0544^{+}	-0.0204	0.0278	0.0009^{+}	-0.0001	-0.0010
	(0.0301)	(0.0458)	(0.0546)	(0.0005)	(0.0009)	(0.0012)
Earnings & Operations-based	0.4106***	0.5765***	0.6912***	-0.0038***	-0.0067***	-0.0085***
	(0.0402)	(0.0545)	(0.0608)	(0.0005)	(0.0009)	(0.0012)
Asset-based $\times$ MP$_q$	-0.1172	-1.5071***	-1.5839***	-0.0021	-0.0165*	-0.0260*
	(0.1277)	(0.3319)	(0.4050)	(0.0031)	(0.0077)	(0.0107)
Earnings & Operations-based $\times$ MP$_q$	-1.4829***	-2.5766***	-2.5402***	-0.0173***	-0.0203*	-0.0293*
	(0.2144)	(0.4032)	(0.4689)	(0.0035)	(0.0074)	(0.0107)
Observations	2984365	1563912	1371794	3128248	1564644	1377795
Adjusted R^2	0.731	0.474	0.310	0.635	0.435	0.366
Bank $\times$ Firm F.E.	Yes	Yes	No	Yes	Yes	No
Bank $\times$ Time F.E.	Yes	No	No	Yes	No	No
Firm $\times$ Time F.E.	No	Yes	No	No	Yes	No
Bank $\times$ Firm $\times$ Time F.E.	No	No	Yes	No	No	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The Role of Collateral Type II: Public Firms

	Quantity			Prices		
	Log(Loan)	Log(Loan)	Log(Loan)	Log(1+i)	Log(1+i)	Log(1+i)
Asset-based	-1.2454***	-1.2489***	-1.6386***	0.0146***	0.0148***	0.0195***
	(0.0543)	(0.0607)	(0.0719)	(0.0008)	(0.0008)	(0.0010)
Earnings & Operations-based	-0.3105***	-0.3421***	-0.4388***	0.0041***	0.0048***	0.0054***
	(0.0516)	(0.0538)	(0.0949)	(0.0005)	(0.0006)	(0.0009)
Asset-based $\times$ MP$_q$	0.5611	0.5472	-0.3345	0.0116	0.0088	0.0305*
	(0.3421)	(0.4600)	(0.7612)	(0.0086)	(0.0094)	(0.0120)
Earnings & Operations-based $\times$MP$_q$	-1.3400***	-1.7572***	-4.0888***	-0.0364***	-0.0260***	-0.0300**
	(0.2895)	(0.4475)	(0.9127)	(0.0046)	(0.0064)	(0.0106)
Observations	644446	634710	485440	639445	629677	481327
Adjusted R^2	0.530	0.516	0.330	0.486	0.521	0.390
Bank $\times$ Firm F.E.	Yes	Yes	No	Yes	Yes	No
Bank $\times$ Time F.E.	Yes	No	No	Yes	No	No
Firm $\times$ Time F.E.	No	Yes	No	No	Yes	No
Bank $\times$ Firm $\times$ Time F.E.	No	No	Yes	No	No	Yes

$^{+}\ p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Time Invariant Leverage

	Private Firms				Public Firms			
	Quantity		*Prices*		*Quantity*		*Prices*	
	Log (Loan)	Log (Loan)	Log $(1+i)$	Log $(1+i)$	Log (Loan)	Log (Loan)	Log $(1+i)$	Log $(1+i)$
High Leverage Firm $\times$ MP Surprise$_q$	-0.8478***		-0.0395***		-0.1679		-0.0045	
	(0.1221)		(0.0035)		(0.2162)		(0.0051)	
High Leverage Bank $\times$ MP Surprise$_q$		0.5429***		0.0066*		0.1605		0.0059*
		(0.1319)		(0.0027)		(0.1559)		(0.0022)
Observations	2140482	349527	2150197	352806	319985	307355	322056	309448
Adjusted R^2	0.939	0.929	0.768	0.858	0.837	0.862	0.675	0.818
Bank$\times$Firm F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank$\times$Time F.E	Yes	No	Yes	No	Yes	No	Yes	No
Firm$\times$Time F.E	No	Yes	No	Yes	No	Yes	No	Yes

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Longer Term Rates: Private Firms

	Quantity		*Prices*	
	Log(Loan)	Log(Loan)	Log$(1+i)$	Log$(1+i)$
Firm Leverage	0.0114		-0.0019*	
	(0.0198)		(0.0008)	
Firm Leverage $\times$ MP Surprise$_q$	-0.6175***		-0.0416***	
	(0.0632)		(0.0030)	
Bank Leverage		0.3024**		-0.0038
		(0.1056)		(0.0025)
Bank Leverage $\times$ MP Surprise$_q$		0.4438*		0.0169**
		(0.2075)		(0.0049)
Observations	1935430	337330	1944550	340486
Adjusted R^2	0.940	0.930	0.774	0.860
Bank $\times$ Firm F.E.	Yes	Yes	Yes	Yes
Bank $\times$ Time F.E.	Yes	No	Yes	No
Firm $\times$ Time F.E.	No	Yes	No	Yes

Longer Term Rates: Public Firms

	Quantity		*Prices*	
	Log(Loan)	Log(Loan)	Log$(1+i)$	Log$(1+i)$
Firm Leverage	0.0831		-0.0007	
	(0.0571)		(0.0013)	
Firm Leverage $\times$ MP Surprise$_q$	0.19835		-0.0108	
	(0.2792)		(0.8099)	
Bank Leverage		0.3776**		-0.0102***
		(0.1048)		(0.0019)
Bank Leverage $\times$ MP Surprise$_q$		0.0897		0.0092**
		(0.1929)		(0.0027)
Observations	263915	296120	265674	298156
Adjusted R^2	0.839	0.864	0.674	0.820
Bank $\times$ Firm F.E.	Yes	Yes	Yes	Yes
Bank $\times$ Time F.E.	Yes	No	Yes	No
Firm $\times$ Time F.E.	No	Yes	No	Yes