Growing Like Germany:
Local Public Debt, Local Banks, Low Private Investment

Mathias Hoffmann [1] Iryna Stewen [2] Michael Stiefel [3]

[1] University of Zurich [2] Johannes Gutenberg University Mainz [3] University of Zurich

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Research questions

- Germany's persistent current account surplus and low government investment.
- Is private investment lower than it should be?
- Could the structure of the financial system be to blame?
- Inspiration from literature on emerging markets (China):
  - Domestic financial frictions could be a driver of low private investment and current account surplus.
  - Specifically: preferential lending of local banks to local governments could lead to "local crowding out".

Our story: background

- Small and medium-sized enterprises (SMEs) are the backbone of Germany's economy and are heavily dependent on (local) banks for credit. link
- Germany's local public banks (savings banks) have a statutory mandate for municipal lending and are under direct political control of local municipalities. Local cooperative banks do not face these constraints. link
- Two developments suggest that the frictions associated with this institutional setting have become more acute over the last decade:
  - Decline in 'the municipal spread' of public sector lending over bank's refinancing rates. link
  - Fiscal austerity (debt brake): state- and federal level governments have shifted a lot of expensive tasks to municipalities.

Our story

municipal debt crowds out SME lending in Germany's locally segmented banking markets

- Decline in municipal lending rates makes municipal lending ever less attractive.
- Since savings banks have to lend to municipalities, this imposes a shadow cost on them that other banks can avoid.
- Fiscal austerity at state- and federal level due to the debt brake has increased credit demand of municipalities further.
- Savings banks try to break-even elsewhere: captive customers–SMEs!
  - SMEs dependent on local (public) banks that lend a lot to government pay higher interest rates and have lower investment.
  - For the average firm investment is 5 percent lower due to crowding out and aggregate investment was around 30-40 billion euro p.a. lower due to this effect
  - 75 percent of this effect is explained by the fiscal pressure imposed on municipalities by the debt brake.

Our story: contribution and policy implications

- First paper to document local crowding out for a developed economy.
- We show that crowding out of private investment can happen in a low-interest rate environment. In fact, the low interest-rate environment is key for our mechanism.
- It matters how/where government debt is financed. Financing it in locally segmented credit markets may not be a good idea.
- We show that fiscal austerity at the state- and federal level may lead to perverse effects–the crowding out of private investment.

Related Literature

- Local crowding out of corporate lending Huang et al. JF 2020 and financial "repression" during the Euro crisis Becker and Ivashina RF 2018
- Effects of low interest rates on bank lending: Heider et al. RFS 2019, Brunnermeier and Koby 2019, Basten and Mariathasan 2018
- Broader literature on the bank lending channel: Khwaja and Mian AER 2008, Huber AER 2018, Popov and Rocholl JFI 2018
- Links between politics and banking in Germany and the role of Sparkassen: Englmaier et al. JEEA 2017, Markgraf J. of Politics 2019, Koetter and Popov 2018, Bian et al 2017
- Preferential lending to connected borrowers in emerging markets: Song et al. AER 2011

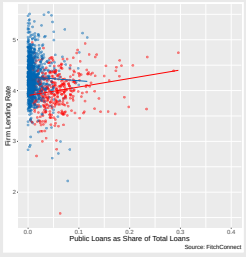
Germany's banking system

Germany's banking system consists of three pillars:

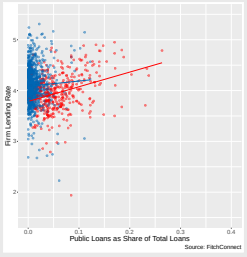
- Sparkassen (Savings banks)
  - Currently, 390 savings banks in Germany
  - Regional principle
  - By law, savings banks maximize the benefit to the public, not profits
  - Owned by municipalities: Local politicians form supervisory board
- Volksbanken/Raiffeisen banken (Cooperative banks)
  - Currently, 875 cooperative banks in Germany
  - Similar regional principle
  - Held by members (usually local customers)
- Commercial banks (e.g. Deutsche Bank, Commerzbank, ...)

Municipal debt drives up interest rates for firms – but only for savings banks!

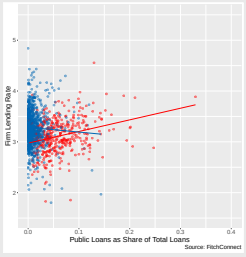
[2010]



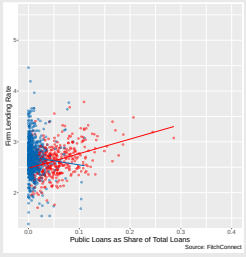
[2012]



[2014]



[2016]



Data

Dafne

- Income statements and balance sheets for up to 1.4 million German firms
- Bank relationships

Fitch Connect

- Bank balance sheet information (net interest margin, loans as a share of balance sheet)
- Loans to public sector

Empirical analysis focuses on the period 2010-2016

Mechanism: empirical implications

- To guide our empirical analysis, we propose a stylized theoretical model in the spirit of Brunnermeier and Koby (2020). model
- For constrained banks ($\lambda = \overline{\lambda}$), the break-even spread θ and firm lending rate $i_t^{F,b}$ are increasing in municipal lending share of a bank λ and decreasing in municipal spread.
  We estimate

$$i_t^{F,b} = \underbrace{\mathbf{a} \times \Lambda_t^b + \mathbf{b} \times \Lambda_t^b \times \textsc{Municipal Spread}_t}_{\theta_t^b} + \underbrace{\textsc{time} + \textsc{region} + \textsc{bank controls}}_{i_t^{U,b}} \tag{1}$$

$\longrightarrow$ First part (θ), should be significant only for constrained (i.e. savings) banks, not for cooperative banks.... Empirics

Constructing firm-level exposures to local banks

Step :

For all the firms f in year t compute an exposure to spreads charged by local public banks, $\mathcal{SPK}_t^f$:

$$\mathcal{SPK}_t^f = \sum_{b \in \mathcal{B}_t(f)} \omega_t^{f,b} \times \widehat{\theta}_t^b \times \mathbf{1}_{b=\text{LOCAL PUBLIC BANK}} \tag{2}$$

- where $\mathcal{B}(f)$: the set of all firm f bank connections

Firm-level evidence: reduced form

We estimate the following reduced form regression

$$\text{INV}_t^f = \alpha \times \mathcal{SPK}_t^f + \beta \times \boldsymbol{\eta}^f \times \mathcal{SPK}_t^f + \boldsymbol{\beta}' \boldsymbol{X_t^f} + \boldsymbol{\delta}_t^f + u_t^f \tag{3}$$

- INV_t^f: investment rate of firm f in year t
- $\boldsymbol{\eta}^f$ generic measure of the firm's ability to substitute bank finance
- $\boldsymbol{X}_t^f$: vector of time-varying firm-specific controls
- $\boldsymbol{\delta}_t^f$: vector of fixed effects (firm, municipality-time, and sector-time)

α: our coefficient of interest. We expect $\alpha < 0$.

$\mathcal{SPK}_t^f$ constructed using bank-level information and geographical info only $\Rightarrow$ Plausibly exogenous!

	Dependent variable: Investment Rate				
	(1)	(2)	(3)	(4)	(5)
SPK	−1.317***	−1.047***	−0.883**	−0.822**	−0.881**
	(0.410)	(0.368)	(0.367)	(0.369)	(0.371)
$SPK \times \eta$	1.968***	1.392***	1.364***	1.307***	1.345***
	(0.251)	(0.185)	(0.185)	(0.187)	(0.193)
Firm size		−0.368***	−0.369***	−0.370***	−0.368***
		(0.021)	(0.021)	(0.022)	(0.022)
Equity share		0.331***	0.331***	0.332***	0.327***
		(0.032)	(0.032)	(0.031)	(0.032)
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	No	No	No
County-Time FE	No	No	Yes	Yes	No
Sector-Time FE	No	No	No	Yes	No
County-Sector-Time FE	No	No	No	No	Yes
Clustered SE	County-Sector	County-Sector	County-Sector	County-Sector	County-Sector
Observations	1,886,235	1,865,386	1,865,386	1,865,386	1,865,386
R^2	0.356	0.372	0.372	0.373	0.417

Results are robust to the adoption of granular IV GIV and different measures of the firm's ability to substitute bank finance link .

What's the economic significance of these estimates?

The standard deviation of $\mathcal{SPK}$ is 80 bps.

Hence $\alpha \approx -0.8$ implies a 64 bps decline in the investment rate

The investment rate (investment as a fraction of fixed assets) is around 15 percent.

Hence, a one-standard deviation increase in $\mathcal{SPK}$ implies a 4 percent (0.0064/0.15) decline in investment

Transmission mechanism and the role of fiscal austerity

- $\mathcal{SPK}$ drives bank liabilities and interest rates paid by firms liabilities/interest rates
- the effect of $\mathcal{SPK}$ is driven by firms in more locally segmented counties

  high/low segmentation counties
- use state-level debt brakes and consolidation needs interacted with a municipality's fiscal situation at the beginning of the sample as instrument for the share of local banks public lending.

The role of fiscal austerity

- Banks with higher public debt shares charge higher interest rates to their private borrowers. This crowds out private investment in locally segmented banking markets.
- Fiscal austerity at the state and federal levels and the financing of public debt by local banks are two sides of the same coin.
- Fiscal consolidation at state and federal level generates a pressure on municipal budgets. Thus, municipalities turn to "their" banks for borrowing.
- We construct a measure of state level consolidation needs (FP) for federal state s as

$$\text{FP}_t^s = -\min\left(\text{DEFICIT}_t^s - \text{CONSOLIDATION PATH}_t^s, 0\right)$$

where DEFICIT_t^s is the state's public deficit relative to GDP, CONSOLIDATION PATH is the projected structural deficit for state s in year t as stipulated by the debt brake.

The role of fiscal austerity

- Fiscal pressure at the state level directly impacts municipalities and leads to incerased public debt shares on local bank balance sheets. Due to statutory public lending requirement, this effect would be stronger for savings bnks and in municipalities with high public debt to begin with.
- We capture this idea by running regressions of the form

$$\begin{aligned}\lambda_t^b =& \gamma \times \textsc{LocalPublicDebt}_{2010}^{c}(b) + \delta \times \textsc{LocalPublicDebt}_{2010}^{c}(b) \times \textsc{FP}_t^{s(b)} \\ &+ \phi \mathbf{1}_b \times \textsc{LocalPublicDebt}_{2010}^{c}(b) + \rho \mathbf{1}_b \times \textsc{LocalPublicDebt}_{2010}^{c}(b) \times \textsc{FP}_t^{s(b)} \\ &+ \psi \mathbf{1}_b \times \textsc{FP}_t^{s(b)} + \kappa \mathbf{1}_b + \textsc{Controls}_t^b + \nu_t^b \end{aligned} \tag{4}$$

where $\textsc{LocalPublicDebt}_{2010}^{c}(b)$ is the ratio of local public debt to local GDP in municipality $c(b)$ in 2010 and $\mathbf{1}_b$ is a "savings bank"- indicator dummy.

Fiscal pressure and savings bank municipal lending: results

	Dependent variable: Bank's Share of Municipal Lending, λ
Local Public Debt in 2010	0.087***
	(0.022)
Local Public Debt in 2010 $\times$ FP	$-$6.700**
	(2.633)
SPK-Dummy $\times$ Local Public Debt in 2010	0.108
	(0.092)
SPK-Dummy $\times$ LocalPublicDebt in 2010 $\times$ FP	31.296**
	(12.406)
SPK-Dummy $\times$ FP	$-$1.384
	(1.042)
SPK-Dummy	0.037***
	(0.003)
Region-Time FE	Yes
Clustered SE	County
Observations	9,335
R^2	0.504

The role of fiscal austerity

- Take the guidance from the regression above and generate a measure of the extent to which state-level consolidation needs weigh on local public finance.
- Local fiscal pressure

$$\text{LFP}_t^b = \frac{1}{1 - \text{LPD}_{2010}^b \times \text{FP}_t^{s(b)}} \tag{5}$$

- We use LFP_t^b and its interaction with the municipal spread as instruments for $\Lambda_t^b = \frac{1}{1-\lambda}$ and $\Lambda_t^b \times$ MUNICIPALSPREAD in the bank-level interest-rate regression

$$i_t^{F,b} = \mathbf{a} \times \Lambda_t^b + \mathbf{b} \times \Lambda_t^b \times \text{MUNICIPAL SPREAD}_t + \text{TIME} + \text{REGION} + \text{BANK CONTROLS}$$

- Then we get the fitted values $\widehat{\theta}_t^b$ from IV regression to reconstruct $\mathcal{SPK}_t^f$ and re-run our baseline investment regression.

Firm lending rates: IV regression

	Firm Interest Rate	
	savings banks	cooperative banks
$\Lambda(fit)$	1.085	-0.483
	(1.080)	(4.243)
	[F_{1stage}=10.87]	[F_{1stage}=5.85]
	[F_{cond}=22.24]	[F_{cond}=11.91]
	[$p < 0.001$]	[$p < 0.01$]
$\Lambda\times$ Municipal Spread (fit)	-1.456^{**}	-0.613
	(0.0.679)	(4.042)
	[F_{1stage}=11.54]	[F_{1stage}= 5.67]
	[F_{cond}=23.95]	[F_{cond}=11.61]
	[$p <$0.001]	[$p <$0.01]
Deposit Share	-1.718^{***}	-1.817^{**}
	(0.645)	(0.784)
(log) Total Assets	-0.060^{***}	-0.099^{***}
	(0.018)	(0.015)
State-Time FE	Yes	Yes
Clustered SE	County	County
Observations	2,742	6,514
R^2	0.828	0.735

Firm-level results, λ_t^b explained by state-level austerity

	Dependent variable:		
	Investment	Bank Liability Growth	Interest Rate
	(1)	(2)	(3)
$\mathcal{SPK}$	-0.605^{***}	-3.740^{***}	0.175^{**}
	(0.183)	(1.147)	(0.074)
$\mathcal{SPK} \times \eta$	0.781^{***}	1.294^{***}	-0.038^{*}
	(0.085)	(0.436)	(0.021)
Firm size	-0.370^{***}	-0.626^{***}	-0.001
	(0.022)	(0.029)	(0.001)
Equity Share	0.332^{***}	2.265^{***}	-0.058^{***}
	(0.032)	(0.101)	(0.005)
Firm FE	Yes	Yes	Yes
County-Time FE	Yes	Yes	Yes
Sector-Time FE	Yes	Yes	Yes
Clustered SE	County-Sector	County-Sector	County-Sector
Observations	1,865,386	215,833	180,817
R^2	0.373	0.461	0.766

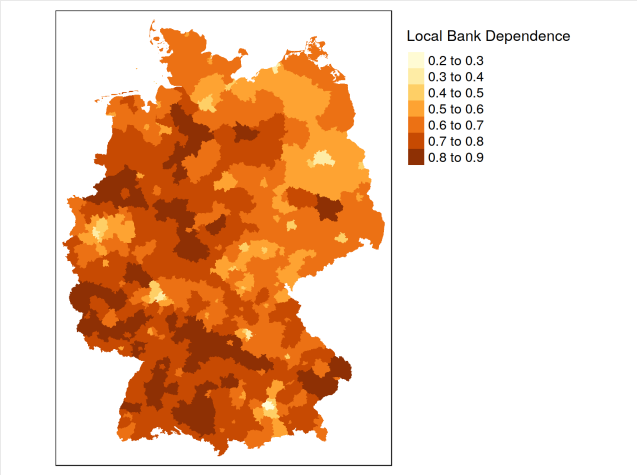
Robustness and extensions

- richer fixed effects
- sample splits: W-Germany only
- placebo treatments: $\mathcal{SPK}$ created from cooperative local banks

Conclusions

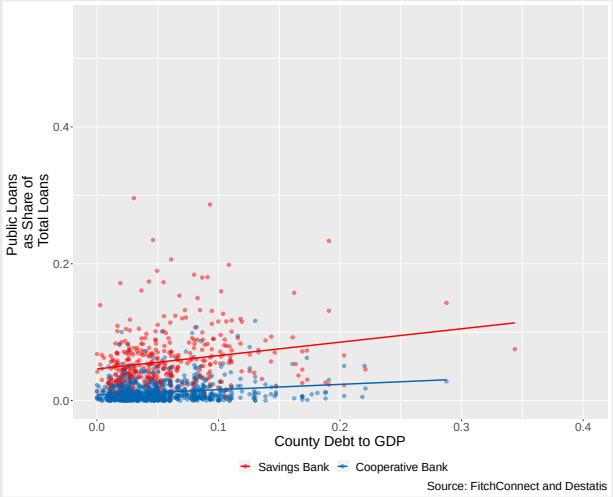
- The local segmentation of Germany's credit market coupled with the political influence on local banks is a key factor behind low private investment.
- Fiscal consolidation imposes adjustment burden on local governments which turn to local public banks for finance. This crowds out private investment in locally segmented credit markets. Ca. 3/4 of the crowding out could be driven by fiscal austerity.
- Our mechanism is strengthened in a low-interest rate environment.
- A new channel through which quantitative easing and monetary policy with low-for-long interest rates can reduce the lending to the private sector.
- A new channel through which fiscal austerity can have contractionary effects.
- These results could hold lessons for many other countries in which banks with an explicit mandate for public lending are a feature of the banking landscape and where credit markets are segmented along regional lines.

Segmented markets: Local banks dominate in firm relationships across Germany



back

Local banks are important lenders to the public



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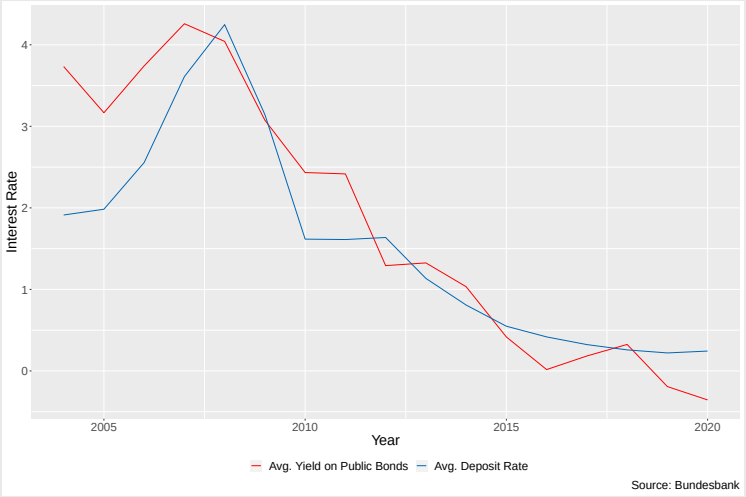
The declining attractiveness of municipal lending



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Mechanism: a stylized model

Simple model of bank lending in the mould of Brunnermeier and Koby (2020). Banks

- ... have market power in private lending (firms) (i^F) and deposit (i_D) markets.
- ... face an equity constraint and a supply of deposits that is not perfectly elastic.
- ... also engage in competitive municipal lending market (i_P).
- Local public banks face a statutory public lending requirement: $\overline{\lambda} \leqq \lambda$

We can then show that the firm-lending rate can be written as

$$i_t^{F,b} = \theta_t^b + i_t^{U,b} \tag{6}$$

where θ, the Lagrange multiplier on the statutory public lending requirement, is

$$\theta = \frac{\frac{1}{\varepsilon_D} - (i_P - i_D)}{1 - \overline{\lambda}} \tag{7}$$

Mechanism: empirical implications

The break-even spread

$$\theta = \frac{\frac{1}{\varepsilon_D} - (i_P - i_D)}{1 - \overline{\lambda}}$$

- For constrained banks ($\lambda = \overline{\lambda}$), the break-even spread is increasing in λ.
- An exogenous increase in $\overline{\lambda}$ makes it more likely that the statutory public lending requirement becomes binding for previously unconstrained banks.
- As the interest rate on public debt declines, the bank optimally wants to hold a smaller fraction of its balance sheet to municipal loans and increases θ.
- Banks with a less elastic supply of funds (deposits), will charge a higher break-even spread *ceteris paribus*.

back

...and it is – bank-level results

	Dependent variable: Firm Interest Rate			
	savings banks		cooperative banks	
Λ	1.866***	1.734***	−1.278	−1.203
	(0.377)	(0.482)	(0.993)	(1.003)
$\Lambda \times$ Municipal Spread	−0.838***	−0.620**	−0.502	0.187
	(0.203)	(0.293)	(0.767)	(0.813)
Tier1 Regulatory Capital Ratio		0.013**		0.001
		(0.006)		(0.003)
County FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Clustered SE	County	County	County	County
Observations	2,849	6,603	1,960	4,883
R^2	0.901	0.792	0.906	0.791

back

Transmission mechanism: $\mathcal{SPK}$ drives bank liabilities and interest rates paid by firms

◂ back

	Dependent variable:	
	Bank Liability Growth	Interest Rate
	(1)	(2)
$\mathcal{SPK}$	-6.916^{***}	0.295^{*}
	(2.451)	(0.172)
$\mathcal{SPK}^{*}\eta$	2.279^{**}	-0.091^{**}
	(0.961)	(0.044)
Firm size	-0.622^{***}	-0.001
	(0.029)	(0.001)
Equity Share	2.260^{***}	-0.058^{***}
	(0.098)	(0.005)
Firm FE	Yes	Yes
County-Time FE	Yes	Yes
Sector-Time FE	Yes	Yes
Clustered SE	County-Sector	County-Sector
Observations	216,916	181,742
R^2	0.460	0.766

GIV Results

	Dependent variable:		
	Investment	Bank Liability Growth	Interest Rate
	(1)	(2)	(3)
$\mathcal{SPK}$	−0.997***	−7.177**	0.340*
	(0.366)	(3.001)	(0.194)
	[F_{1stage}=2620]	[F_{1stage}=2513]	[F_{1stage}=2362]
	[F_{cond}=5300.3]	[F_{cond}=4744.2]	[F_{cond}=4752.4]
	[p <0.001]	[p <0.001]	[p <0.001]
$\mathcal{SPK} \times \eta$	1.419***	2.436**	−0.150***
	(0.191)	(1.195)	(0.046)
	[F_{1stage}=674.6]	[F_{1stage}=1105]	[F_{1stage}=1012]
	[F_{cond}=5178.4]	[F_{cond}=3724.8]	[F_{cond}=3903.5]
	[p <0.001]	[p <0.001]	[p <0.001]
Firm size	−0.368***	−0.649***	0.0001
	(0.022)	(0.034)	(0.001)
Equity share	0.327***	2.317***	−0.057***
	(0.032)	(0.132)	(0.005)
Firm FE	Yes	Yes	Yes
County-Sector-Time FE	Yes	Yes	Yes
Clustered SE	County-Sector	County-Sector	County-Sector
Observations	1,865,386	215,833	180,817
R^2	0.417	0.639	0.851

◂ back

Other measures of η yield similar results

◂ back

	Dependent variable: Investment Rate			
	η = Firm size	η = Employment	η = Age	η = Number of banks
	(1)	(2)	(3)	(4)
$\mathcal{SPK}$	−0.881**	−3.480***	−0.925**	−1.598***
	(0.371)	(0.822)	(0.363)	(0.496)
$\mathcal{SPK} \times \eta$	1.345***	3.158***	0.058***	1.488***
	(0.193)	(0.357)	(0.012)	(0.331)
η				−0.023***
				(0.003)
Firm size	−0.368***	−0.310***	−0.371***	−0.371***
	(0.022)	(0.024)	(0.022)	(0.022)
Equity share	0.327***	0.305***	0.329***	0.329***
	(0.032)	(0.035)	(0.033)	(0.033)
Firm FE	Yes	Yes	Yes	Yes
County-Sector-Time FE	Yes	Yes	Yes	Yes
Clustered SE	County-Sector	County-Sector	County-Sector	County-Sector
Observations	1,865,386	420,716	1,916,405	1,916,405
R^2	0.417	0.520	0.422	0.422

Transmission mechanism: the effect of $\mathcal{SPK}$ is driven by firms in more locally segmented counties

◂ back

	Dependent variable:					
	Investment Rate		Bank Liability Growth		Interest Rate	
	High	Low	High	Low	High	Low
$\mathcal{SPK}$	−1.279**	−0.467	−10.327***	−2.969	0.637***	−0.151
	(0.550)	(0.495)	(3.061)	(4.072)	(0.229)	(0.296)
$\mathcal{SPK} \times \eta$	1.656***	1.006***	3.199***	1.058	−0.171**	−0.092
	(0.286)	(0.265)	(0.851)	(1.766)	(0.068)	(0.078)
Firm size	−0.393***	−0.350***	−0.638***	−0.656***	0.0002	0.0001
	(0.025)	(0.021)	(0.038)	(0.035)	(0.003)	(0.002)
Equity share	0.335***	0.321***	2.407***	2.246***	−0.054***	−0.060***
	(0.035)	(0.033)	(0.123)	(0.153)	(0.008)	(0.007)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
County-Sector-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE	County-Sector	County-Sector	County-Sector	County-Sector	County-Sector	County-Sector
Observations	858,158	1,007,228	100,545	115,288	87,218	93,599
R^2	0.419	0.415	0.642	0.636	0.851	0.851