Proximity, information, and loan pricing in internal capital markets: Evidence from China
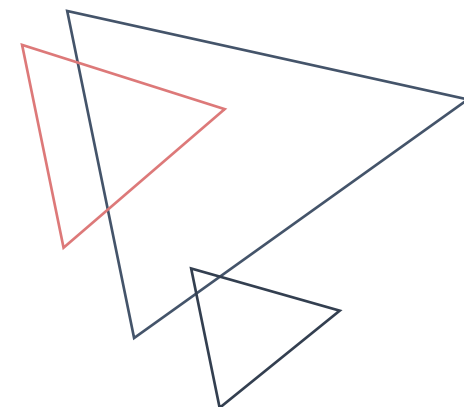
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Introduction

1 introduction

Why

- geographic proximity plays an important role in investor trading, analyst forecasts,bank lending, mergers and acquisitions, and IPOs
- knowledge about the effect of proximity on intra-group lending in internal capital markets is limited.
- previous studies on internal capital markets focus on the economic consequences or operational efficiency of firm activities and pay no attention to the role of proximity in internal capital markets.

How

- Chinese financial regulations prohibit firms from lending to each other directly, but entrusted loans are allowed.
- China Securities Regulatory Commission (CSRC) mandates that listed firms disclose all of their entrusted loans in official documents.
- Use Google Earth to identify the latitudes and longitudes of firms' addresses and then calculate the aerial distances between the geographic coordinates.

1 introduction

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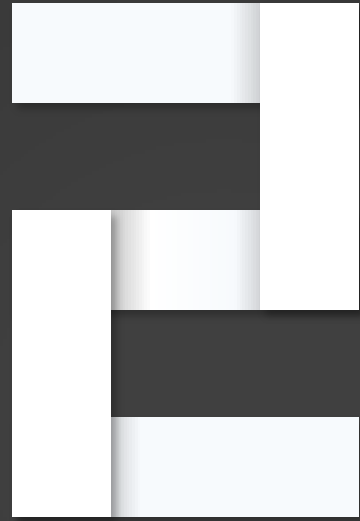
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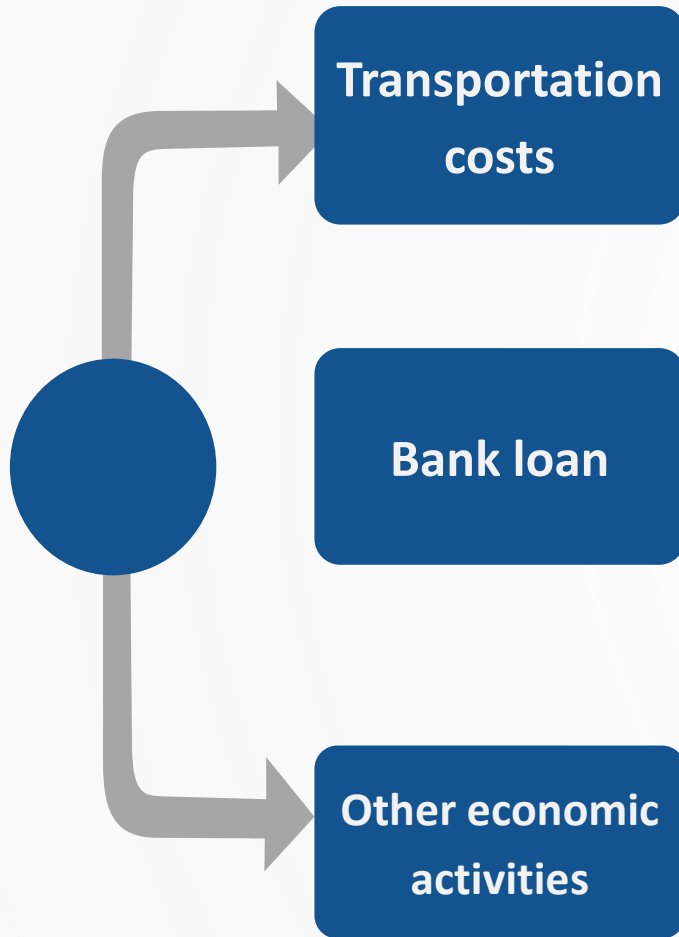
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Literature review and hypotheses

2.1 The role of geography in economic activities

Transportation costs

Geographic economics clearly shows that transportation costs associated with geographic location affect the spatial distribution of economic activities.

Bank loan

- Lending decisions : Petersen and Rajan (2002) and Sufi (2007) show that when the information asymmetry between a borrower and lender is potentially severe, the lender prefers to be closer to the borrower, because proximity makes it possible to collect more information about the borrower and monitor the firm more effectively.
- The higher information collection and monitoring costs associated with distance are reflected in loan terms.

Other economic activities

- Venture capital investment : more financing rounds, shorter durations between successive rounds, and smaller investment amounts in each round.(Lerner,1995;Tian,2011)
- Stock market : an information advantage with closer firms(Malloy ,2005).
- Active mutual fund: overweight proximate firms in their portfolios and earn substantial abnormal returns in local holdings(Coval and Moskowitz,2001).

2.2 Capital allocation in internal capital markets

- Internal capital : the market for the allocation of capital within firms (Khanna & Yafeh, 2007; Williamson, 1975).

- The **"more money" effect** (Hadlock, Ryngaert, & Thomas, 2001)3 and the **"smart money" effect** (Stein, 1997),4 have been used to describe **the increasing efficiency of capital allocation** (Gertner, Scharfstein, & Stein,1994; Hovakimian, 2011; Kuppuswamy & Villalonga, 2010).

- Some studies show that **lobbying activities, power struggles, and rent seeking behavior** on the part of division managers **can subvert the workings of an internal capital market** (Brusco & Panunzi, 2005; Rajan, Servaes, & Zingales, 2000; Scharfstein & Stein, 2000).

- A number of studies examine the risk of **controlling shareholder expropriation of minority investors**, a phenomenon referred to as "self-dealing" or "tunneling" (Djankov,La Porta, Lopez-de-Silanes, & Shleifer, 2008; Jiang et al., 2010; Johnson, La Porta, Shleifer, & Lopez-de-Silanes, 2000).

- Intra-group loans

  • Gopalan, Nanda, and Seru (2007) find that intra-group loans are an important method of supporting financially weaker firms.

  • Jiang et al. (2010) suggest that existing legal and extra-legal governance mechanisms in China are inadequate to contain the minority shareholder expropriation problem.

  • Buchuk et al. (2014) show that strict regulation and disclosure requirements for intra-group loans in the Chilean market reduce the risk of expropriation.

2.3Hypothesis development

- **First, geographic distance is important in ex-ante project screening**. Lenders can obtain additional high-quality information about closely located borrowers. In particular, distance increases the loss of "soft" information . **Geographic distance clearly influences pricing in the internal capital market by affecting the cost of information screening.**

- **Second, geographic distance is vital in ex-post project monitoring**. To monitor the moral hazard behavior of a borrower effectively in a business group, the lender firm must frequently visit the borrower firm to master its project operation and risk. **Hence, the transport, time, and energy costs incurred by distance increase the monitoring cost.**

➡️

H1. Ceteris paribus, the loan prices of intra-group firms significantly increase as the geographic distance between lenders and borrowers increases.

2.3 Hypothesis development

- As **both soft information collection and monitoring are time-consuming**, we expect the effect of distance on loan interest rates to be stronger for lenders whose managers are more time constrained

➡️ **H2a. Ceteris paribus, when lender firms' managers are more time constrained, the effect of distance on loan interest rates is stronger.**

- **Innovations in information technology** (e.g., the Internet, corporate intranet, video conferencing) reduce the need for lender firms' managers to physically visit borrower firms, and **innovations in transportation infrastructure** (e.g., highways, HSR) reduce the travel time to borrower firms when visits are needed.

➡️ **H2b. Ceteris paribus, the effect of distance on loan interest rates gradually weakens over time.**

- There is greater information uncertainty if the borrower and lender operate in different industries. we expect mature firms to offer their lenders more information and credit records than relatively young borrower firms.

➡️ **H2c. Ceteris paribus, when the borrower and lender firm operate in different industries, or the borrower firm is relatively young, the effect of distance on loan interest rates is stronger.**
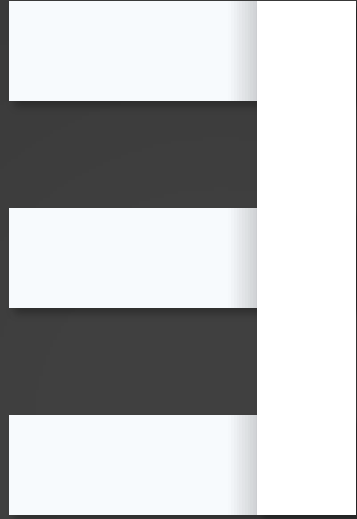
Methodology and data

3.1 Sample

- We hand-collect information on the entrusted loans of listed companies from company announcements for the **2004 to 2014** period. After excluding observations with missing and inconsistent data, our sample consists of 1091 entrusted loan announcements.

- We identify three types of business group affiliations in our samples.
  (1) Type-1: the borrower and lender are direct mutual holders(628).
  (2) Type-2: both the borrower and lender are related to the same third firm(127); for instance, if X owns Y and Y owns Z, then we treat Z as a related firm of X, although X does not hold shares of Z directly. Note that this type does not include instances where the lender and borrower have the same parent company. (127);
  (3) Type-3: both the borrower and lender are subsidiary companies belonging to the same parent company.(62)
   Among the 1091 entrusted loans announcements, we identify 797 announcements between related parties in business groups.

3.2 Variable definitions

- Distance: locations $\xrightarrow[\text{earth}]{\text{Google}}$ Latitude and longitude $\xrightarrow{\text{formula}}$ distance

  The distance variable : the natural logarithm of the distance (1+ the geographic distance).

- Firm characteristics(borrowers):
  Direct cross-ownership : equals one if the borrower and lender are directly cross-owned
  State-owned firm : equals one for SOEs
  Listed firm : equals one for listed firms
  Firm age : the natural logarithm of one plus the difference between the year the firm was established and the year the entrusted loan was made.

- Macroeconomic condition and loan characteristics
  $\textbf{FinDev}_{\textbf{Province}}$: equals one if the borrower's province is in the top 10 in the index of financial marketization reported by Fan et al. (2011)
  Loan Maturity, Loan Amount, and Loan Collateral

3.2 Variable definitions : Summary statistics

Panel A. Descriptive statistics

Variable	Unit of measurement	Mean	Std. dev.	Min	Max
Geographic distance	Kilometers	460.900	640.742	0.000	3342.749
Loan characteristics:					
Interest rate	%	6.520	2.207	0.000	20.000
Loan amount	Ten millions	19.290	30.108	0.050	300.000
Loan maturity	Year	1.500	1.317	0.080	15.000
Loan collateral	–	0.182	0.386	0.000	1.000
Firm characteristics:					
Direct Cross-ownership	–	0.763	0.426	0.000	1.000
State-owned firm	–	0.728	0.445	0.000	1.000
Listed firm	–	0.223	0.417	0.000	1.000
Frim age	Year	9.823	6.998	0.080	46.330
Macroeconomics condition:					
FinDev$_{Province}$	–	0.685	0.465	0.000	1.000

3.3 Methodology

$$Interest\ Rate_{ijt} = \beta_1 Distance_{ij} + \beta_2 Ownership\ links_{ijt} + \beta_3 Characteristics_{jt}$$
$$+ \beta_4 FinDev_{Province,jt} + \beta_5 Loan\ Terms_{ijt} + \alpha_t + \alpha_d + \alpha_r + \varepsilon_{ijt}$$

where i indexes the lender firm, j denotes the borrower firm, and t represents the time.

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Empirical results

4.1 Borrower–lender distance and loan price: Baseline result

Dependent variable	Interest rate						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Distance	0.054*	0.076**	0.071**	0.069**	0.069**		
	(0.031)	(0.031)	(0.030)	(0.030)	(0.034)		
50 km–200 km dummy						0.333*	0.299*
						(0.187)	(0.166)
200 km–700 km dummy						0.316	0.179
						(0.245)	(0.237)
More than 700 km dummy						0.618***	0.403*
						(0.217)	(0.222)
Direct cross-ownership		0.212	0.248	0.262	0.262		0.243
		(0.172)	(0.173)	(0.177)	(0.190)		(0.192)
State-owned Firm		−0.573***	−0.560***	−0.506***	−0.506***		−0.499***
		(0.170)	(0.169)	(0.171)	(0.177)		(0.179)
Listed firm		−0.172	−0.229	−0.259	−0.259		−0.279
		(0.180)	(0.176)	(0.175)	(0.187)		(0.186)
Firm age		−0.196**	−0.210**	−0.206**	−0.206**		−0.210**
		(0.095)	(0.096)	(0.095)	(0.102)		(0.102)
FinDev$_{Province}$			0.396**	0.388**	0.388**		0.413**
			(0.180)	(0.187)	(0.196)		(0.198)
Loan collateral				0.314	0.314		0.317
				(0.221)	(0.252)		(0.251)
Loan amount				0.071	0.071		0.066
				(0.055)	(0.053)		(0.053)
Loan maturity				−0.054	−0.054		−0.052
				(0.038)	(0.039)		(0.039)
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Lender firm clustering	No	No	No	No	Yes	No	Yes
Borrower firm clustering	No	No	No	No	Yes	No	Yes
Adj. R-squared	0.002	0.396	0.399	0.401	0.401	0.373	0.400
Observations	797	797	797	797	797	797	797

4.2 DID estimation

- The distance between the lender and borrower may not be exogenous due to the **lender's selection** behavior.
- The lender firm may also make decisions based on unobserved firm characteristics that also affect the borrower firm's distance from the lender firm.

- We expect that the **introduction of the HSR(high-speed railway)** reduces the cost of information communication and monitoring between borrowers and lenders.
- We use a **DID approach** to explore whether the interest rate decreases once the cities in which the borrower and lender firm are located are connected to HSR.

4.2 DID estimation

- control group : observations in which no HSR link exists between the cities of the borrower and lender firms within the sample period
- treatment group : observations in which an HSR opens between the cities of the borrower and lender firms from 2004 to 2014.
- DID model:

$$Interest\ Rate_{ijt} = \beta_1 High - speed\ Railway_{ijt} + \beta_2 Ownership\ links_{ijt}$$
$$+ \beta_3 Characteristics_{jt} + \beta_4 FinDev_{Province,jt}$$
$$+ \beta_5 Loan\ Terms_{ijt} + \alpha_t + \alpha_d + \alpha_c + \varepsilon_{ijt}$$

where i indexes the lender firm, j denotes the borrower firm, and t represents the time;
$High - speed\ Railway_{ijt}$: equals one after the opening of the HSR link between lender firm i and borrower firm j, and zero otherwise.

4.2 DID estimation

Effect of borrower-lender distance on loan pricing: DID approach.

Dependent variable	Interest rate			
	(1)	(2)	(3)	(4)
High-speed railway	−0.999*	−0.984*	−1.389**	−1.389**
	(0.618)	(0.614)	(0.597)	(0.578)
Direct cross-ownership	0.150	0.124	0.171	0.171
	(0.381)	(0.393)	(0.379)	(0.405)
State-owned firm	−0.449	−0.478	−0.263	−0.263
	(0.409)	(0.415)	(0.386)	(0.403)
Listed firm	−1.276*	−1.214*	−1.220**	−1.220*
	(0.660)	(0.658)	(0.607)	(0.627)
Firm age	−0.027	−0.027	0.041	0.041
	(0.269)	(0.271)	(0.260)	(0.266)
$FinDev_{Province}$		0.663	0.158	0.158
		(0.917)	(0.850)	(0.773)
Loan collateral			1.248**	1.248**
			(0.557)	(0.537)
Loan amount			−0.017	−0.017
			(0.126)	(0.138)
Loan maturity			−0.199**	−0.199*
			(0.097)	(0.111)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
City fixed effects	Yes	Yes	Yes	Yes
Lender firm clustering	No	No	No	Yes
Borrower firm clustering	No	No	No	Yes
Adj. R-squared	0.611	0.610	0.637	0.637
Observations	309	309	309	309

4.3.1 Robustness tests:Ownership links between borrower and lender firms

- If the distance is a proxy for the type of ownership relation between lender and borrower firms, the parent company may choose to place firms in which they have greater participation closer to its headquarters. In this case, our finding that longer distances between borrower and lender firms lead to higher loan interest rates in internal capital markets could indicate that **minority expropriation in business groups is through the pricing of internal loans.**
对较远的公司定价更高可能是由于侵占小股东利益，而不是因为信息的获取成本和监管成本较高。

- **Minority Cross-ownership :** equals one if the cross-ownership is via the minority stake(share below 50%), and zero otherwise.
- **Cash Flow Right :** refers to the ownership stake between borrower and lender.
- **Parent Lender:** equals one if the lender is the parent company of the borrower, and zero otherwise.

4.3.1 Robustness tests:Ownership links between borrower and lender firms

Effect of borrower-lender distance on loan pricing: robustness test for ownership links.

Dependent variable	Interest rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	0.068** (0.033)	0.069** (0.034)	0.069** (0.034)	0.067** (0.034)	0.070** (0.034)	0.069** (0.034)
Direct cross-ownership		0.262 (0.190)			0.320 (0.204)	
Minority cross-ownership			0.369* (0.201)		0.410* (0.214)	0.393 (0.252)
Cash flow right				−0.212 (0.256)		0.084 (0.340)
State-owned firm	−0.529*** (0.176)	−0.506*** (0.177)	−0.501*** (0.175)	−0.516*** (0.173)	−0.470*** (0.178)	−0.505*** (0.174)
Listed firm	−0.219 (0.186)	−0.259 (0.187)	−0.374* (0.215)	−0.260 (0.198)	−0.441* (0.224)	−0.368* (0.213)
Firm age	−0.227** (0.100)	−0.206** (0.102)	−0.226** (0.101)	−0.234** (0.101)	−0.200* (0.103)	−0.224** (0.102)
FinDev$_{Province}$	0.358* (0.193)	0.388** (0.196)	0.343* (0.197)	0.347* (0.196)	0.378* (0.199)	0.347* (0.199)
Loan collateral	0.311 (0.253)	0.314 (0.252)	0.321 (0.251)	0.288 (0.250)	0.326 (0.250)	0.331 (0.256)
Loan amount	0.062 (0.051)	0.071 (0.053)	0.061 (0.052)	0.060 (0.051)	0.071 (0.053)	0.061 (0.052)
Loan maturity	−0.057 (0.040)	−0.054 (0.039)	−0.061 (0.040)	−0.059 (0.040)	−0.057 (0.039)	−0.061 (0.040)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Lender firm clustering	Yes	Yes	Yes	Yes	Yes	Yes
Borrower firm clustering	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.400	0.401	0.404	0.400	0.407	0.403
Observations	797	797	797	797	797	797

Effect of borrower-lender distance on loan pricing: robustness test for loan flow direction.

Dependent variable	Interest rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	0.077** (0.035)	0.072** (0.034)	0.070** (0.034)	0.073** (0.035)	0.069** (0.034)	0.068** (0.034)
Parent lender	0.258 (0.299)	0.190 (0.304)	0.207 (0.307)	0.570* (0.319)	0.516 (0.326)	0.514 (0.323)
Direct cross-ownership	0.141 (0.192)	0.194 (0.198)	0.202 (0.201)			
Cash flow right				−0.568** (0.288)	−0.508* (0.299)	−0.453 (0.287)
State-owned firm	−0.589*** (0.185)	−0.572*** (0.184)	−0.517*** (0.181)	−0.571*** (0.175)	−0.567*** (0.174)	−0.516*** (0.173)
Listed firm	−0.159 (0.197)	−0.217 (0.193)	−0.244 (0.186)	−0.246 (0.214)	−0.276 (0.209)	−0.290 (0.198)
Firm age	−0.190* (0.103)	−0.205** (0.104)	−0.201** (0.102)	−0.207** (0.102)	−0.220** (0.102)	−0.218** (0.101)
FinDev$_{Province}$			0.379* (0.197)	0.369* (0.204)	0.308 (0.200)	0.303 (0.205)
Loan collateral			0.320 (0.254)			0.279 (0.248)
Loan amount			0.069 (0.053)			0.059 (0.052)
Loan maturity			−0.055 (0.039)			−0.063 (0.039)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Lender firm clustering	Yes	Yes	Yes	Yes	Yes	Yes
Borrower firm clustering	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.396	0.399	0.401	0.399	0.401	0.402
Observations	797	797	797	797	797	797

4.3.2&4.3.3 Robustness tests: Spread over the risk-free rate&Financial crisis

- Consider the differences in loan riskiness:calculate the **spread over the risk-free rate** by subtracting the Shanghai Interbank Offered Rate (Shibor) from the interest rate of intra-group loans

- **Financial Crisis Dummy** that equals one if the loan deal took place in 2008–2009, and zero otherwise**.**

4.3.4 Coefficient stability analysis

- We use the approach of Oster (2017) to compare the estimates of the baseline regression to **assess the extent to which omitted variables could potentially bias the results.**
- Oster (2017) defines the true coefficient as follows:

$$\beta^* = \tilde{\beta} - \tilde{\delta}\frac{(\beta_0 - \tilde{\beta})(R_{max} - \tilde{R})}{\tilde{R} - R_0}$$

The estimate and explanatory power of the baseline model are denoted by β_0 and R_0, whereas the estimate and explanatory power of the model with the full set of observed controls are given by $\tilde{\beta}$ and $\tilde{R}$. In our case, as shown in columns (1) and (5) of Table 4, β_0 equals 0.0542, R_0 equals 0.0036, $\tilde{\beta}$ equals 0.0686, and $\tilde{R}$ equals 0.4253. The value of $\tilde{\delta}$ denotes the relative importance of observed versus omitted variables in generating a selection bias. The R_{max} is the maximum explanatory power of a hypothetical regression that controls for all relevant observed and unobserved factors. Both $\tilde{\delta}$ and R_{max} are unknown.

4.3.4 Coefficient stability

Coefficient stability test for distance.

Panel A. $\delta = 1$

R_{max}	β^*	Coefficient bound
0.2	0.061	(0.061, 0.069)
0.4	0.068	(0.068, 0.069)
0.6	0.075	(0.069, 0.075)
0.8	0.082	(0.069, 0.082)
1.0	0.088	(0.069, 0.088)

Panel B. $R_{max} = 0.553$

δ	β^*	Coefficient bound
0.2	0.070	(0.069, 0.070)
0.5	0.071	(0.069, 0.071)
1.0	0.073	(0.069, 0.073)
2.0	0.077	(0.069, 0.077)
3.0	0.082	(0.069, 0.082)

Notes: This table presents the coefficient stability test of distance. δ denotes the relative importance of observed versus omitted variables in generating selection bias. R_{max} represents the maximum explanatory power of a hypothetical regression that controls for all relevant observed and unobserved factors. β^* is calculated by Eq. (3). If the coefficient bounds do not include zero, then the results can be considered to be as robust as those obtained from truly random experiments.

4.4.1 Heterogeneity :Time constraints of lender firms' managers

- Follow Giroud (2013) and measure the number of managers employed at a lender firm divided by the number of subsidiaries of the lender **(Managers/Subsidiaries):** the lower the ratio of managers to subsidiaries, the more time constrained the lender firm's managers.

- **"(employee benefits payable in parent company balance sheet/employee benefits payable in the consolidated balance sheet) * the total number of employees"** to estimate the number of employees of the parent company.

- Time constraints of the lender firm's managers :the number of employees of the parent company/the number of subsidiaries.

- The lender firm is a listed company and the lender firm is a controlling shareholder of the borrower firm.

- **High Time Constraint** : equals one if the measure of managers' time constraints is lower than its 25% percentile, and zero otherwise.

Heterogeneous effects of distance on loan pricing: time constraints of lender firms' managers.

Dependent variable	Interest rate			
	(1)	(2)	(3)	(4)
Distance × high time constraint			0.168**	0.168**
			(0.081)	(0.081)
Distance	0.073**	0.064**	0.015	0.015
	(0.032)	(0.032)	(0.021)	(0.023)
High time constraint		0.367*	−0.543	−0.543
		(0.218)	(0.437)	(0.433)
State-owned firm	−0.040	0.020	−0.003	−0.003
	(0.189)	(0.209)	(0.197)	(0.202)
Listed firm	−0.064	0.003	0.121	0.121
	(0.139)	(0.152)	(0.163)	(0.179)
Firm age	−0.080	−0.109	−0.122	−0.122
	(0.091)	(0.094)	(0.093)	(0.097)
FinDev$_{Province}$	−0.151	−0.244*	−0.189	−0.189
	(0.127)	(0.140)	(0.116)	(0.126)
Loan collateral	0.637***	0.677***	0.642***	0.642***
	(0.212)	(0.222)	(0.205)	(0.208)
Loan amount	−0.009	−0.017	−0.003	−0.003
	(0.031)	(0.030)	(0.026)	(0.028)
Loan maturity	−0.007	0.003	0.005	0.005
	(0.051)	(0.049)	(0.047)	(0.048)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Lender firm clustering	Yes	Yes	No	Yes
Borrower firm clustering	Yes	Yes	No	Yes
Adj. R-squared	0.496	0.507	0.520	0.520
Observations	311	311	311	311

4.4.2 Heterogeneity :Innovations in information technology and transportation infrastructure

- First, the National Development and Reform Commission approved the "Mid-long-term Railway Network Plan (2008)" in October 2008. A new HSR line has been inaugurated every 3 months since 2009.

- In April 2011, the Asia-Pacific Network Information Centre declared that all of the IPv4 addresses for Asia and the Pacific Region had been allocated. The number of IPv6 addresses in China has increased rapidly since the second half of 2011, becoming the second fastest in the world by the end of December 2013.

- two dummy variables: **Between 2009 and 2012** equals one for entrusted loans taken between 2009 and 2012, and zero otherwise; **Post 2012** equals one for entrusted loans taken after 2012, and zero otherwise.

- **Trend** : taking the values of 1, 2, 3, … N in the first, second, third, …Nth year.

4.4.2 Heterogeneity :Innovations in information technology and transportation infrastructure

Heterogeneous effects of distance on loan pricing: innovations in information technology and transportation infrastructure.

Dependent variable	Interest Rate				
	(1)	(2)	(3)	(4)	(5)
Distance × between 2009 and 2012			−0.296*	−0.296	
			(0.183)	(0.191)	
Distance × post 2012			−0.370**	−0.370*	
			(0.181)	(0.189)	
Distance × trend					−0.034*
					(0.020)
Distance	0.069**	0.075**	0.380**	0.380**	0.360*
	(0.034)	(0.034)	(0.177)	(0.183)	(0.186)
Between 2009 and 2012		−0.812	−0.019	−0.019	
		(0.855)	(1.004)	(1.023)	
Post 2012		−1.214	−0.116	−0.116	
		(0.895)	(1.024)	(1.047)	
Trend					0.341**
					(0.133)
Direct Cross-ownership	0.262	0.240	0.255	0.255	0.280
	(0.190)	(0.189)	(0.170)	(0.185)	(0.189)
State-owned firm	−0.506***	−0.503***	−0.516***	−0.516***	−0.494***
	(0.177)	(0.176)	(0.170)	(0.177)	(0.178)
Listed firm	−0.259	−0.269	−0.316*	−0.316	−0.277
	(0.187)	(0.191)	(0.182)	(0.193)	(0.187)
Firm age	−0.206**	−0.208**	−0.186**	−0.186*	−0.201**
	(0.102)	(0.102)	(0.094)	(0.101)	(0.102)
FinDev$_{Province}$	0.388**	0.388**	0.462**	0.462**	0.450**
	(0.196)	(0.196)	(0.199)	(0.209)	(0.212)
Loan collateral	0.314	0.277	0.238	0.238	0.306
	(0.252)	(0.250)	(0.218)	(0.248)	(0.252)
Loan amount	0.071	0.068	0.059	0.059	0.067
	(0.053)	(0.053)	(0.055)	(0.052)	(0.052)
Loan maturity	−0.054	−0.048	−0.040	−0.040	−0.051
	(0.039)	(0.039)	(0.037)	(0.039)	(0.039)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Lender firm clustering	Yes	Yes	No	Yes	Yes
Borrower firm clustering	Yes	Yes	No	Yes	Yes
Adj. R-squared	0.401	0.403	0.413	0.413	0.405
Observations	797	797	797	797	797

4.4.3 Information asymmetry and soft information collection

- **Different Industry** : equals one if the borrower firm operates in a different industry from the lender firm, and zero otherwise.

Heterogeneous effects of distance on loan pricing: information asymmetry.

Dependent variable	Interest rate			
	(1)	(2)	(3)	(4)
Distance × different industry			0.122*	0.122*
			(0.063)	(0.072)
Distance	0.069**	0.080**	0.040	0.040
	(0.034)	(0.035)	(0.035)	(0.039)
Different industry		0.580***	0.079	0.079
		(0.186)	(0.280)	(0.298)
Direct cross-ownership	0.262	0.337*	0.367**	0.367*
	(0.190)	(0.196)	(0.179)	(0.198)
State-owned firm	−0.506***	−0.497***	−0.493***	−0.493***
	(0.177)	(0.176)	(0.169)	(0.176)
Listed firm	−0.259	−0.399**	−0.393**	−0.393**
	(0.187)	(0.198)	(0.180)	(0.196)
Firm age	−0.206**	−0.183*	−0.184*	−0.184*
	(0.102)	(0.103)	(0.095)	(0.102)
FinDev$_{\text{Province}}$	0.388**	0.290	0.334*	0.334*
	(0.196)	(0.185)	(0.178)	(0.188)
Loan collateral	0.314	0.322	0.328	0.328
	(0.252)	(0.245)	(0.215)	(0.243)
Loan amount	0.071	0.075	0.070	0.070
	(0.053)	(0.052)	(0.056)	(0.053)
Loan maturity	−0.054	−0.066*	−0.060	−0.060
	(0.039)	(0.039)	(0.037)	(0.039)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Lender firm clustering	Yes	Yes	No	Yes
Borrower firm clustering	Yes	Yes	No	Yes
Adj. R-squared	0.401	0.413	0.416	0.416
Observations	797	797	797	797

4.4.3 Information asymmetry and soft information collection

- **Mature Firm** : that equals one if the borrower firm's age is above the 75th percentile across all samples, and zero otherwise.

Heterogeneous effects of distance on loan pricing: quality of soft information.

Dependent variable	Interest Rate			
	(1)	(2)	(3)	(4)
Distance × mature firm			−0.108*	−0.108*
			(0.057)	(0.065)
Distance	0.065*	0.063*	0.091**	0.091**
	(0.035)	(0.035)	(0.038)	(0.041)
Mature firm		−0.266*	0.140	0.140
		(0.154)	(0.269)	(0.286)
Direct cross-ownership	0.233	0.220	0.206	0.206
	(0.198)	(0.199)	(0.184)	(0.198)
State-owned Firm	−0.555***	−0.546***	−0.544***	−0.544***
	(0.187)	(0.186)	(0.180)	(0.187)
Listed firm	−0.605***	−0.481***	−0.466***	−0.466**
	(0.185)	(0.183)	(0.170)	(0.181)
FinDev$_{Province}$	0.408*	0.402*	0.399**	0.399*
	(0.213)	(0.212)	(0.202)	(0.211)
Loan collateral	0.457*	0.446*	0.454**	0.454*
	(0.253)	(0.253)	(0.226)	(0.254)
Loan amount	0.077	0.074	0.074	0.074
	(0.051)	(0.052)	(0.055)	(0.052)
Loan maturity	−0.081*	−0.087**	−0.085**	−0.085**
	(0.044)	(0.044)	(0.041)	(0.043)
Year fixed effects	No	No	No	No
Industry fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Lender firm clustering	Yes	Yes	No	Yes
Borrower firm clustering	Yes	Yes	No	Yes
Adj. R-squared	0.300	0.301	0.303	0.303
Observations	797	797	797	797
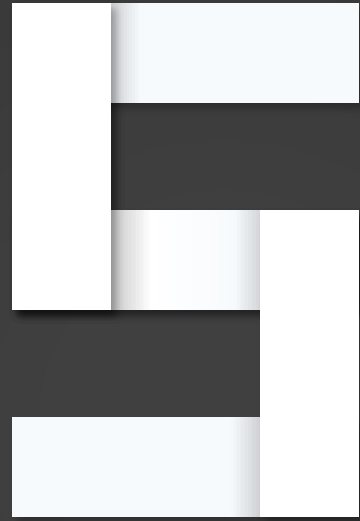
Conclusions

5 Conclusions

- Loan prices increase with the distance between borrowers and lenders.

- Lenders whose managers are time constrained are sensitive to the information collection and monitoring costs associated with distance.

- During the earlier years of our sample period, when non-personal means of monitoring and transmitting information (e.g., the Internet, corporate intranet, and video conferencing) and transportation infrastructure (e.g., highways and HSR) were either unavailable or less developed, the effect of distance on loan interest rates is strong.

- The effect of distance on loan pricing is strong for borrowers when information uncertainty is likely to be substantial and soft information is likely to be valuable, such as for young borrowers and borrowers operating in industries that are dissimilar to the lenders' main industry.

THANKS

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