

Distance in Bank Lending: The Role of Social Networks

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- 1 Introduction
- 2 Setup, data, and empirical model
- 3 Main results
- 4 Robustness
- 5 Conclusion

① Social networks

- Facilitate the exchange of **information**
- Widespread and visible (Facebook, Twitter, WeChat)

② Asymmetric **information** in bank lending

- Key issue, costly to overcome
- Social connectedness: enhance access to soft information?

Research question

- Effect of social connectedness on bank lending?
 - **Social connectedness vs. physical distance vs. cultural distance**

Contribution

- 1 Social connectedness as **informal information channel**
- 2 **Physical distance**
 - Transportation costs? (Degryse and Ongena 2005)
 - Local soft information? (Agarwal and Hauswald 2010)
- 3 **Lending barriers** posed by physical and cultural distance (Giannetti and Yafeh 2012; Fisman, Paravisini, and Vig 2017)
 - Can social connectedness compensate?
 - How do distance and connectedness interact?

Research question

- Effect of social connectedness on bank lending?
 - **Social connectedness** vs. **physical distance** vs. **cultural distance**

Contribution

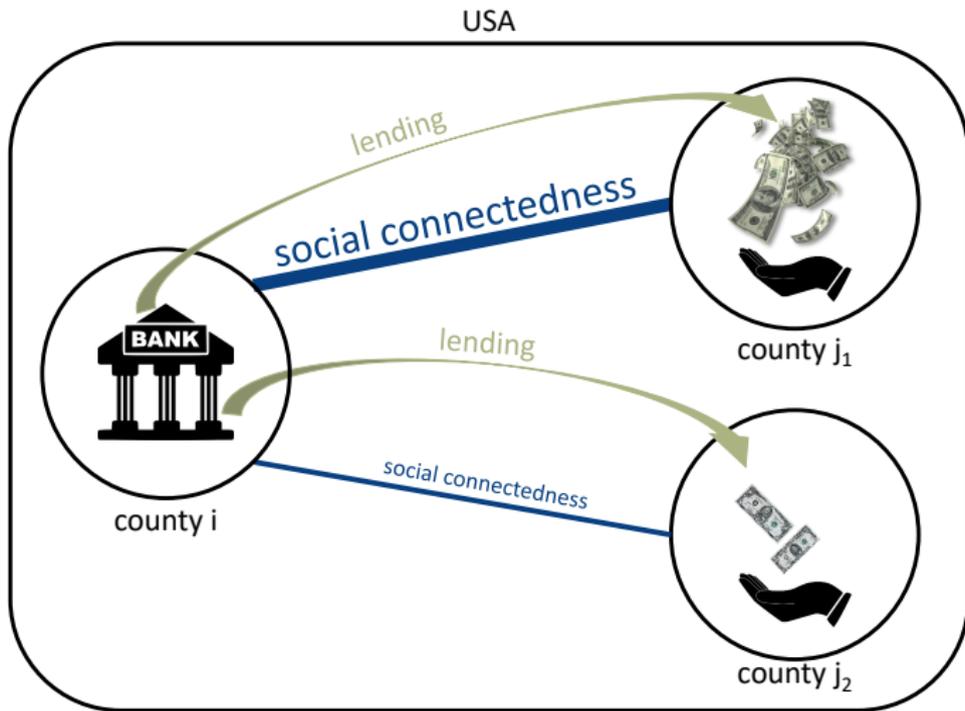
- 1 Social connectedness as **informal information channel**
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 - Local soft information? (Agarwal and Hauswald 2010)
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 - Can social connectedness compensate?
 - How do distance and connectedness interact?

- Social connectedness based on **facebook friendship links**
 - Bailey, Cao, Kuchler, Stroebel, and Wong 2018
- **New measure** of cultural differences within the US
- Lending to SMEs (CRA) and mortgage lending (HMDA)

- Nature of **credit constraints**
 - Strategies to overcome these?
- **Anti-trust** policies
 - Competition: geographical vs. socio-cultural?
- Data on online **social networks** as information channels in finance
 - Suited to analyze real-world outcomes?

Outline

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$$\ln(\text{loan volume})_{ij} = f(\text{social connectedness}_{ij}, \\ \text{physical distance}_{ij}, \text{cultural distance}_{ij}, \text{controls}_{ij})$$

Lending data

Source: FFIEC

- Small and medium-sized enterprises (CRA)
 - Loan volumes
 - Mortgages (HMDA)
 - Loan volumes and characteristics
 - Loan applications
- Aggregate at county-pair level
- **Destination county**: location of the property or firm
 - **Source county**: closest branch of the issuing bank (FDIC)

Social connectedness

Source: Bailey, Cao, Kuchler, Stroebel, and Wong 2018

- Snapshot of the **universe of Facebook friendships** within the US
 - Normalized by the product of county-pair populations
 - Scaled by an *unknown factor* for confidentiality
- Final variable [0;100]
 - *Relative* friendship probability of 2 people in 2 counties
- Proxy for real-world social networks

- **Theoretical foundation**

- Models of regional subcultures (Elazar 1984; Lieske 1993)
- Cultural identity determined by ethnic ancestry, religious beliefs, racial background, and social environment

- **39 variables** at county level

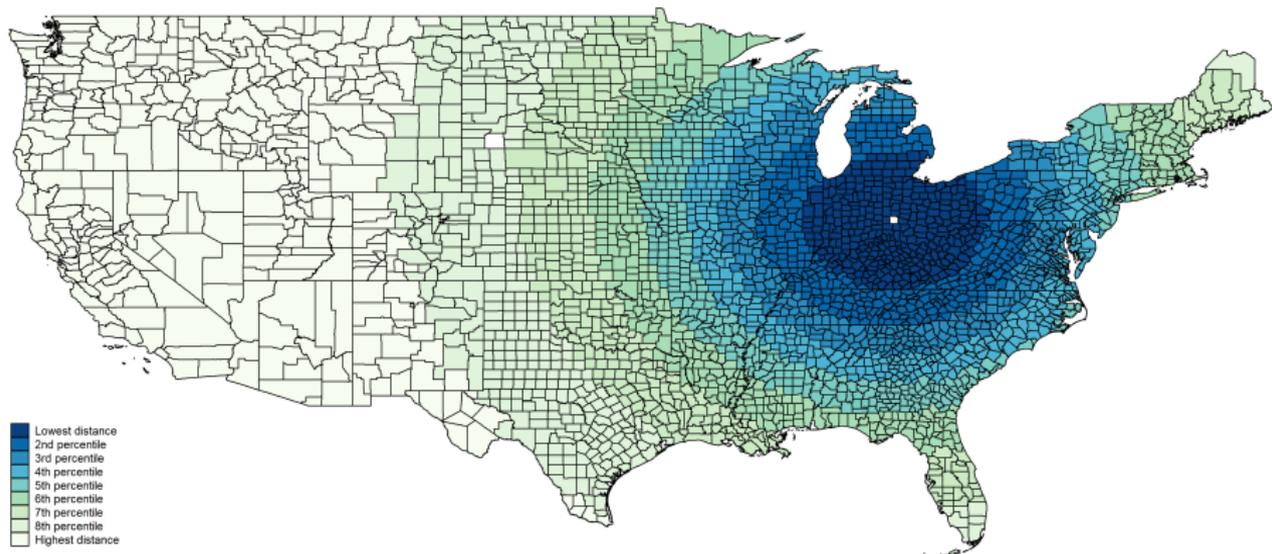
- 2010 US Census
- 2010 US Religious Congregations and Membership Study

- **Final measure** [0;100]

- Sum of absolute differences between counties
- Equal weighting across (sub)categories

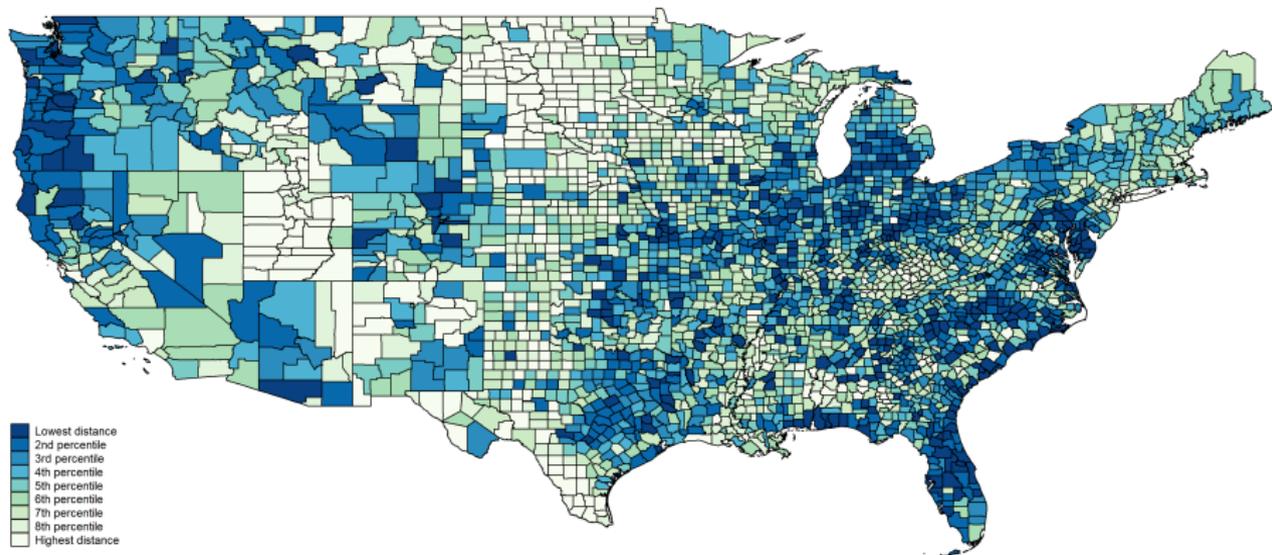
Physical distance

Montgomery County, Ohio



Cultural distance

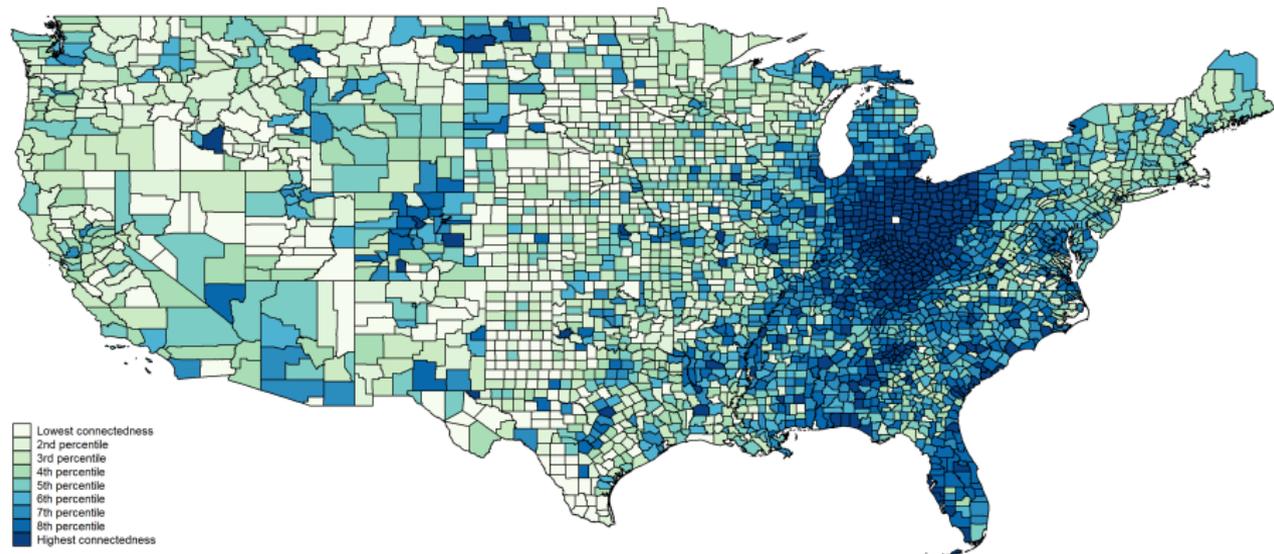
Montgomery County, Ohio



► Culture clusters

Social connectedness

Montgomery County, Ohio



Summary statistics at county-pair level

Loans to small and medium-sized enterprises

	N	Mean	Median	SD	Min	Max
Volume of SME loans [thous. USD]	66,684	1,057	142	9,132	0	1,296,303
log(Volume of SME loans)	66,684	11.9	11.9	2.0	0.0	21.0
Social connectedness	66,684	20	2	35	0	100
Physical distance [miles]	66,684	578	413	566	4	4,996
log(Physical distance)	66,684	5.8	6.0	1.3	1.5	8.5
Cultural distance	66,684	17	16	7	0	72
GDP growth differential	66,684	3.6	2.7	3.4	0.0	46.9
Unemployment differential	66,684	1.5	1.1	1.4	0.0	21.4
Gross migration	66,684	108	0	346	0	2,327
Gross trade [million USD]	66,684	85	38	114	0	814
% commuting	66,684	0.2	0.0	0.9	0.0	28.4
Same state	66,684	0.2	0	0.4	0	1
Common border	66,684	0.1	0	0.3	0	1
Same highway	66,684	0.1	0	0.3	0	1
Years since highway construction	66,684	5	0	15	0	79
Historical travel costs	56,265	7	5	4	1	38
Relative Facebook county rank	57,105	0.04	0.02	0.05	0.00	0.48

$$\begin{aligned} \ln(\text{loan volume})_{ij} = & \beta_1 \cdot \text{social connectedness}_{ij} \\ & + \beta_2 \cdot \text{physical distance}_{ij} + \beta_3 \cdot \text{cultural distance}_{ij} \\ & + \gamma \cdot \text{controls}_{ij} + \alpha_i + \alpha_j + u_{ij} \end{aligned}$$

- i : source county; j : destination county
- **Controls**: migration, commuting, trade, GDP-growth and unemployment differential, same state, common border
- Explanatory variables are **lagged by one year**
- Standard errors: clustered at the source and destination county levels

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The role of distance and connectedness

Dependent variable:	(1)	(2)	(3)	(4)
	log(volume of SME loans)			
Social connectedness	0.011*** (0.001)			0.007*** (0.001)
Physical distance		-0.376*** (0.040)		-0.263*** (0.048)
Cultural distance			-0.031*** (0.007)	-0.014* (0.007)
County-pair level controls	Yes	Yes	Yes	Yes
Source county FE	Yes	Yes	Yes	Yes
Destination county FE	Yes	Yes	Yes	Yes
No. of obs.	66,684	66,684	66,684	66,684
Adj. R ²	0.520	0.522	0.516	0.525
Adj. R ² within	0.123	0.127	0.116	0.132
P-value for H0: no difference to coefficient in column (4)				
Social connectedness	0.002			
Physical distance		0.066		
Cultural distance			0.097	
Standardized beta coefficients				
Social connectedness	0.20			0.12
Physical distance		-0.24		-0.17
Cultural distance			-0.12	-0.05

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Source county FE	Yes	Yes	Yes	Yes
Destination county FE	Yes	Yes	Yes	Yes
No. of obs.	66,684	66,684	66,684	66,684
Adj. R ²	0.520	0.522	0.516	0.525
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Instrumental variable approaches

	(1)	(2)	(3)	(4)
Dependent variable:		log(volume of SME loans)		
IV:	same highway	years since construction	historical travel cost	Facebook rollout
Social connectedness	0.027** (0.013)	0.027* (0.014)	0.027*** (0.005)	0.012** (0.006)
Physical distance	-0.038 (0.153)	-0.042 (0.161)	-0.031 (0.073)	-0.168 (0.126)
Cultural distance	-0.005 (0.010)	-0.006 (0.010)	-0.005 (0.007)	0.009 (0.009)
County-pair level controls	Yes	Yes	Yes	Yes
Source county FE	Yes	Yes	Yes	Yes
Destination county FE	Yes	Yes	Yes	Yes
No. of obs.	66,684	66,684	56,223	56,852
Adj. R ²	0.507	0.507	0.515	0.541
Adj. R ² within	0.098	0.100	0.102	0.116
Instrument (1st stage)	2.951*** (0.000)	0.055*** (0.000)	4.07*** (0.000)	161.506*** (0.000)
F-value (1st stage)	34.341	30.52	136.6	163.5

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Heterogeneities: bank size, supply and demand

Dep. var.: log(Volume of ...)	(1) SME loans	(2) Mortgage loans	(3) Loan demand	(4) Loan supply
Social connectedness	0.010*** (0.001)	0.027*** (0.003)	0.003*** (0.001)	0.024*** (0.003)
Social connectedness · Large banks	-0.006*** (0.001)	-0.039*** (0.003)	0.003*** (0.001)	-0.042*** (0.003)
Physical distance	-0.184*** (0.043)	-0.030 (0.111)	-0.090*** (0.034)	0.087 (0.095)
Cultural distance	-0.015** (0.007)	-0.015 (0.012)	-0.004 (0.004)	-0.010 (0.011)
County-pair level controls	Yes	Yes	Yes	Yes
Source county FE	Yes	Yes	Yes	Yes
Destination county FE	Yes	Yes	Yes	Yes
Loan demand control	No	No	No	Yes
No. of obs.	66,684	34,483	34,483	34,483
Adj. R ²	0.538	0.502	0.412	0.588
Adj. R ² within	0.155	0.439	0.198	0.536

► Baseline results CRA and HMDA

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► Baseline results CRA and HMDA

Heterogeneities: information sensitivity of loans

	(1)	(2)	(3)	(4)
Dep. var.:	without	with	kept	sold
log(Volume of mortgage loans ...)	guarantees	guarantees	on book	off book
Social connectedness	0.016*** (0.003)	0.004 (0.004)	0.013*** (0.003)	0.007** (0.004)
Physical distance	-0.405*** (0.152)	-0.864*** (0.151)	-0.421*** (0.145)	-0.553*** (0.144)
Cultural distance	-0.045*** (0.017)	-0.018 (0.021)	-0.002 (0.013)	-0.019 (0.016)
County-pair level controls	Yes	Yes	Yes	Yes
Source county FE	Yes	Yes	Yes	Yes
Destination county FE	Yes	Yes	Yes	Yes
No. of obs.	34,483	34,483	34,483	34,483
Adj. R ²	0.262	0.297	0.365	0.318
Adj. R ² within	0.066	0.044	0.105	0.045

► Baseline results CRA and HMDA

Heterogeneities: information sensitivity of loans

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- Physical distance vs. transportation costs
- Alternative measures of cultural distance
- Dyadic and state-level clustering of standard errors
- Alternative specifications of IV approaches
- Head-quarter vs. branch locations

⇒ **Results are robust**

⇒ Analyses reveal additional insights (see paper)

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- 1 Social connectedness explains bank lending outcomes
 - **Anti-trust policies** may have to consider this additional dimension
- 2 Results in line with **informal information channel**
 - May help to explain **geographically more and more dispersed banks**
- 3 **Lending barriers** associated with distances
 - Less relevant when accounting for social connectedness
 - **Can be overcome by social connectedness**

Thank you

Comments, questions, suggestions?

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Appendix

Categories, sub-categories, and variables

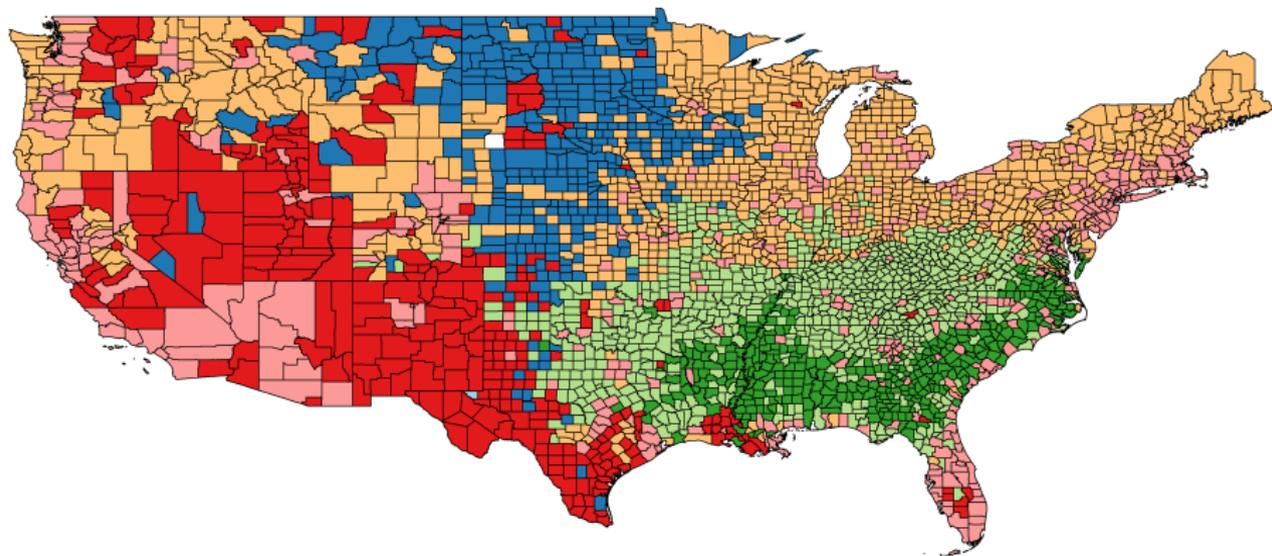
<u>Ethnic ancestry</u>	<u>Racial origin</u>	<u>Religious beliefs</u>
% American	% Asian	% Black Protestant
% British	% black	% Evangelical Protestant
% Eastern European	% Hispanic	% Mainline Protestant
% French	% Native American	% Catholic
% German	% white	% Mormon
% Greek		% Orthodox
% Irish		
% Italian		
% Northern European		
% Russian		
% Sub-Saharan African		

Social environment

Age	Mobility
% 19 or younger	% 5 years not moved
% 20 to 29	Occupation
% 30 to 64	% agriculture
% over 64	% construction
Education	% manufacturing
% \geq college degree	% service
% < high-school diploma	Population
Family	% urban
% two-parent families	% total
% females in labor force	Racial diversity
Income inequality	Gini coefficient of
Gini coefficient	racial origins

Culture

Geographical clusters at county level



◀ Cultural distance

Summary statistics at county-pair level

Mortgage loan sample

	N	Mean	Median	SD	Min	Max
Volume of mortgage loans [K USD]	34,483	1,559	242	8,667	0	412,072
log(Volume of mortgage loans)	34,483	10.5	12.4	5.2	0.0	19.8
Loan demand [thousand USD]	34,483	2,206	360	11,391	0	540,533
log(Loan demand)	34,483	13.0	12.8	1.5	0.0	20.1
Social connectedness	34,483	33	4	42	0	100
Physical distance [miles]	34,483	452	272	501	5	4,898
log(Physical distance)	34,483	5.4	5.6	1.4	1.6	8.5
Cultural distance	34,483	14	13	7	0	47
GDP growth differential	34,483	3.2	2.4	3.2	0.0	37.1
Unemployment differential	34,483	1.3	1.0	1.2	0.0	20.3
Gross migration	34,483	177	1	451	0	2,327
% commuting	34,483	0.4	0.0	1.7	0.0	33.0
Gross trade [million USD]	34,483	68	21	111	0	1,056
Same state	34,483	0.3	0.0	0.5	0.0	1.0
Common border	34,483	0.2	0.0	0.4	0.0	1.0

The role of distance and connectedness

Full table including coefficients of controls

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Cultural distance			-0.031*** (0.007)	-0.014* (0.007)
GDP growth differential	-0.008 (0.007)	-0.007 (0.008)	-0.006 (0.008)	-0.006 (0.008)
Unemployment differential	-0.016 (0.021)	-0.020 (0.022)	-0.010 (0.020)	-0.004 (0.020)
Gross migration	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Gross trade	0.001*** (0.000)	0.000 (0.000)	0.001*** (0.000)	0.000 (0.000)
% commuting	-0.072*** (0.011)	-0.069*** (0.010)	-0.060*** (0.010)	-0.064*** (0.010)
Same state	0.305*** (0.067)	0.274*** (0.084)	0.716*** (0.069)	0.092 (0.068)
Common border	0.925*** (0.052)	0.963*** (0.080)	1.201*** (0.058)	0.821*** (0.063)
Source county FE	Yes	Yes	Yes	Yes
Destination county FE	Yes	Yes	Yes	Yes
No. of obs.	66,684	66,684	66,684	66,684
Adj. R ²	0.520	0.522	0.516	0.525
Adj. R ² within	0.123	0.127	0.116	0.132

← Baseline results

Baseline regression: SME vs. mortgage lending

Dep. var.: log(Volume of ...)	(1) SME loans	(2) Mortgage loans
Social connectedness	0.007*** (0.001)	0.009*** (0.003)
Physical distance	-0.263*** (0.048)	-0.486*** (0.109)
Cultural distance	-0.014* (0.007)	-0.035** (0.015)
Source county FE	Yes	Yes
Destination county FE	Yes	Yes
No. of obs.	66,684	34,483
Adj. R ²	0.525	0.157
Adj. R ² within	0.132	0.052
Standardized beta coefficients		
Social connectedness	0.12	0.07
Physical distance	-0.17	-0.13
Cultural distance	-0.05	-0.05

◀ Heterogeneities