COMPETITION BETWEEN ARM'S LENGTH AND RELATIONAL LENDERS: WHO WINS THE CONTEST?

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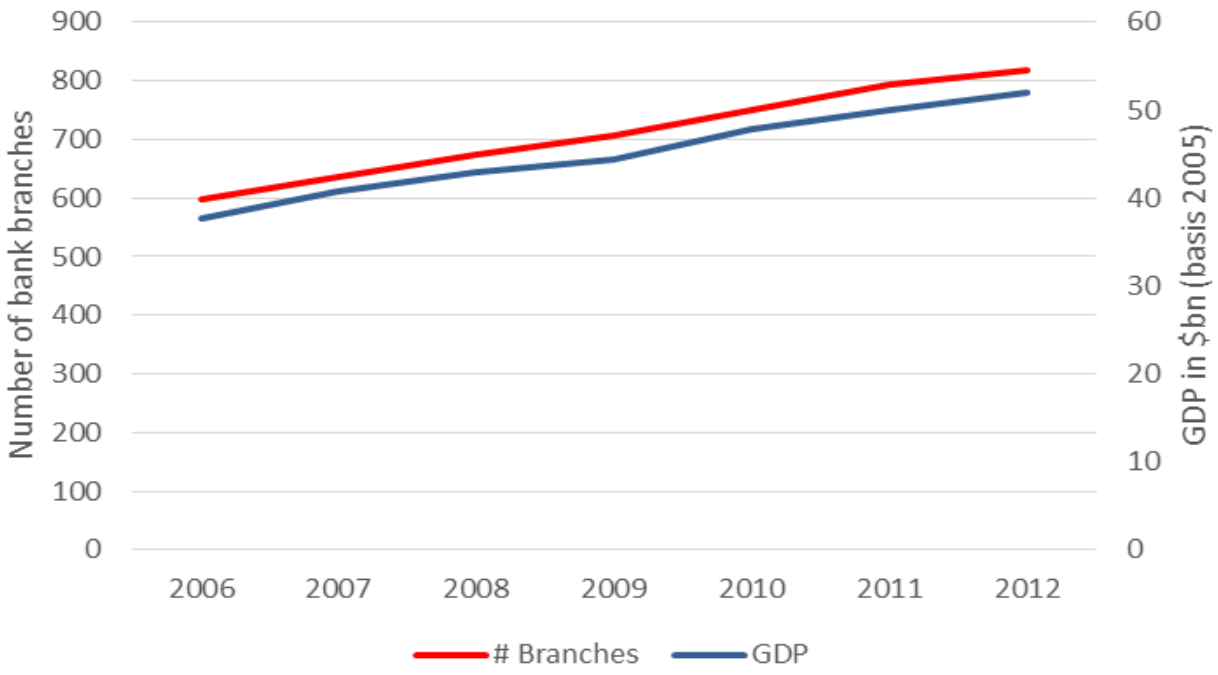
The views expressed here do not reflect official positions of the Federal Reserve Bank of Chicago.

Motivation I

- Understand the effect of bank competition
  - Credit availability
  - Loan (firm) performance
- Difficult to test
  - Most existing work uses Difference-in-Difference between regions
  - Many measures of competition are driven by demand
- **What we do:**
  - Use local bank branch competition
    - Branches are important despite e-bank and ATM: Micro-credit, Identity verification
    - Proximity and soft information generation
  - Test in the same geographic region
    - Control for demand
    - Identification strategy provides exogenous variation

Motivation II

- **Field of Study:** Dominican Republic
  - Steady bank branch expansion and economic growth
  - Ideal natural laboratory for the study of competition



Contribution: Empirical Strategy

- We address concerns about the existing literature by
  - studying differences within firms in the same region,
  - exploiting branch network expansion (2007-11) that affected competition to existing branches by different extents,
    - e.g., a new bank branch will compete more intensely with an existing branch located one block away than with an existing branch located five blocks away.
    - Location endogenous to entrant but exogenous to existing branches, which are the subject of study
    - Banks don't relocate after entrances; empirical observation
- This approach does not rely on
  - cross-regional comparison
  - firm characteristics

Further Contribution: Lending Technology

- We observe the **lending technology of the incumbent and the entrant** and can study the extent to which they affect competition
- In Dominican Republic's credit market there is a clear distinction between:
  - Relational lenders: using hard (bureau) and self-collected soft information,
  - Arm's length lenders: relying mostly on hard (bureau) information.
- Relational lenders have dedicated teams trained to evaluate sales and inventories of firms without formal accounting
- Hard information component relies on credit registry information and firms' financial statements when available

Literature Review

- Local banking
  - Degryse and Ongena (2005): Spatial price discrimination
  - Agarwal and Hauswald (2010): Distance and private information
  - Gilje et al. (2016), Nguyen (2019): local housing and sme loans
- Branching deregulation (geographical dif in dif)
  - Celerier and Matray (2017): Household financial access
  - Favara and Imbs (2015): Mortgage and housing
  - Jayaratne and Strahan (1996): Economic development
- Other geographical dif in dif
  - Guiso et al. (2004): Financial development and economic development
  - Rajan and Ramcharan (2011): Political institutions and financial development-barriers to financing

Data Sources

1. **ADOPEM**: the largest lender to SMEs in the Dominican Republic in terms of number of borrowers provides administrative data on all borrowers
2. **Dominican Republic Credit Bureau**: provides detailed information on the financial activity of these borrowers in other financial institutions
3. **Dominican Republic Office of Free Access to Public Information**: provides detailed information about the geographic location of existing branches as well as the date and location of new branch openings for all regulated financial institutions operating in the country

Final Data Set

- Credit data at the firm, branch, and year level.
  - Focus on firms with more than one lender in a given year and at least two yearly observations
    - **Loan size**
    - Loan issuance
    - **Performance**
- Sample
  - 2008-2012
  - 5,614 unique firms at 326 branches
  - 25,043 observations at the firm-branch-year level

Descriptive Statistics – Extended Loan Amount

	Mean	N	Min.	Median	Max.
Panel A: Rural firm locations					
All lender	10.45	11,646	7.78	10.35	15.90
Relational lender	10.38	9,917	7.78	10.31	15.90
Arm's length lender	10.84	1,729	7.91	10.82	15.37
Panel B: Urban firm locations					
All lender	10.22	13,397	6.68	10.24	15.13
Relational lender	10.13	10,746	7.82	10.13	14.35
Arm's length lender	10.55	2,651	6.68	10.46	15.13

Measuring Local Bank Competition

$$Comp_{bt-1} = \sum_{n=1}^{N_{t-1}} exp^{\theta * distance_{b,b_n}}$$

- $Comp_{bt-1}$ is the total competition intensity for bank branch b as the summation of competition with each branch
- *Comp* changes with branch openings in the Dominican Republic
- Competition intensity for a given competitor b_n with respect to an incumbent branch b declines as b_n are further away from b.
  - The decay parameter adjusts the strength of the weighting.
  - The two extreme examples: Competition does not decrease: $\theta = 0$
    - Competition decreases rapidly: θ is negative and its absolute value is large

Measuring Local Bank Competition

$$Comp_{bt-1} = \sum_{n=1}^{N_{t-1}} exp^{\theta * distance_{b,b_n}}$$

- Decay parameter, θ, is estimated as part of the regression and is different in rural and urban locations (initial assumption, supported by regression output)
  - in (urban) high density areas a branch located 5 km's away does not pose a threat
  - in (rural) low density areas the closest competitor might as well be 5 km's away
- For urban locations estimated decay parameter is -1.27
- For rural locations estimated decay parameter is -0.03.
  - Non-parametric approach based on number of banks at different radii resulted in similar results but lower significance levels.

Identification Strategy – Baseline Specification

$$y_{ibt} = \alpha_{it} + \alpha_{Bt} + \alpha_{iB} + \beta Comp_{bt-1} + \varepsilon_{ibt}$$

- Y denotes our measure for loan outcomes: extended loan amount, loan issuance, loan performance
- Competition intensity measure is separately calculated for relational and arm's length lender branches
- Firm-time, Bank-time and Bank-firm fixed effects
  - Firm level changes in credit demand
  - Aggregate bank level changes in credit supply
  - Bank-firm specialization

Effect on Loan Amount: Baseline Results

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0364**			-0.0698**		
	(0.0168)			(0.0351)		
Comp - Branches by relational lender		-0.0825***			-0.1549***	
		(0.0234)			(0.0558)	
Comp - Branches by arms' length lender			0.0137			-0.0105
			(0.0407)			(0.0406)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Robustness Checks:

- Competition via placebo openings
- Robustness with credit lines
- Robustness with different decays
- Non-parametric approach

Lending Technology of Incumbent & Entrant

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0498***			-0.1734***		
	(0.0170)			(0.0665)		
Comp - All branches	0.0154*			0.1474**		
* Relational lender	(0.0087)			(0.0739)		
Comp - Branches by relational lender		-0.0881***			-0.1121	
		(0.0253)			(0.1261)	
Comp - Branches by relational lender		0.0131			-0.0521	
* Relational lender		(0.0199)			(0.1194)	
Comp - Branches by arms' length lender			-0.0425			-0.1775***
			(0.0337)			(0.0668)
Comp - Branches by arms' length lender			0.0269**			0.2545***
* Relational lender			(0.0128)			(0.0896)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Loan Performance: Baseline Results

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	0.0064			-0.0129		
	(0.0085)			(0.0151)		
Comp - Branches by relational lender		0.0094			0.0089	
		(0.0104)			(0.0264)	
Comp - Branches by arms' length lender			0.0055			-0.021
			(0.0158)			(0.0173)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Loan Performance: Lending Technology of Incumbent & Entrant

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	0.0055			0.0670***		
	(0.0081)			(0.0212)		
Comp - All branches	0.0009			-0.0590***		
* Relational lender	(0.0019)			(0.0221)		
Comp - Branches by relational lender		0.0056			0.1230***	
		(0.0091)			(0.0398)	
Comp - Branches by relational lender		0.0088			-0.0775**	
* Relational lender		(0.0068)			(0.0387)	
Comp - Branches by arms' length lender			0.0081			0.0366
			(0.0195)			(0.0262)
Comp - Branches by arms' length lender			-0.0012			-0.0517**
* Relational lender			(0.0032)			(0.0234)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Comments

- Competition reduces lending by incumbent and deteriorates performance
- Relational lenders can protect their lending from arm's length entrants
  - Given asymmetry of information arm's length might be able to steal away mostly the bad borrowers (good ones might be lured by incumbent with better conditions-more credit)
- Relational lenders can not protect their lending from other relational lenders
- Competition does not deteriorate loan performance in rural areas
  - Suggests competition is particularly beneficial when access to finance is low

Substitution Analysis

- It is possible that banks compete more intensively over borrowers located near the entrant
- We compute a substitution measure between a firm and the incumbent branch *b* estimate with a set of competitors b_1, b_2 .. b_n:

$$Subst_{ibt-1} = \sum_{n=1}^{N_{t-1}} exp^{\theta * distance_{i,b_n}}$$

- We use the same decay parameter as before
- The change in this measure will be larger for borrowers located closer to the entrant

Subsititution and Competition Analysis: Intensive Margin

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0266			0.0677*		
	(0.0244)			(0.0345)		
Subst - All branches	-0.0132			-0.1555		
	(0.0486)			(0.1697)		
Comp - Branches by relational lender		-0.0054			-0.1241**	
		(0.0604)			(0.0572)	
Subst - Branches by relational lender		-0.0979			-0.4089***	
		(0.0672)			(0.1528)	
Comp - Branches by arms' length lender			-0.0452			-0.0042
			(0.0314)			(0.0411)
Subst - Branches by arms' length lender			-0.1374**			0.8414***
			(0.0644)			(0.3076)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	7,746	7,746	7,746	13,397	13,397	13,397

Aggregate effects

Firm location:	Rural	Rural	Urban	Urban
Comp - Branches by relational lenders	0.1093***		0.1644***	
	(0.0175)		(0.0436)	
Comp - Branches by arm's length lenders		0.0202		0.0158
		(0.0131)		(0.0197)
Firm FE	Y	Y	Y	Y
City-Time FE	Y	Y	Y	Y
N	5,758	5,758	6,609	6,609

- In the aggregate entrance of relational lenders increases credit availability; information production
- In the aggregate entrance of arm's length lenders is a zero sum game; no additional information added to the credit system

Conclusion

- Local bank competition strongly affects lending
- Direction of the effect depends on the entrant's and the incumbent's technologies
  - Arm's length lenders seem to lose borrowers to both relational and arm's length lenders
  - Relational lenders seem to be able to defend from competition by arm's length lenders but not from competition by other relational lenders
- Loan performance does not deteriorate in rural areas (lower access to finance)

Appendix

Descriptive Statistics – Competition Measure

	Mean	Min.	Median	Max.
Panel A: Rural firm locations				
All branches	57.50	4.17	38.98	223.63
Branches by relational lender	7.54	0.74	6.00	38.63
Branches by arm's length lender	49.96	1.79	33.21	196.08
Panel B: Urban firm locations				
All branches	4.79	0.00	4.97	14.27
Branches by relational lender	0.60	0.00	0.46	2.95
Branches by arm's length lender	4.20	0.00	4.25	13.28

Extensive Margin analysis

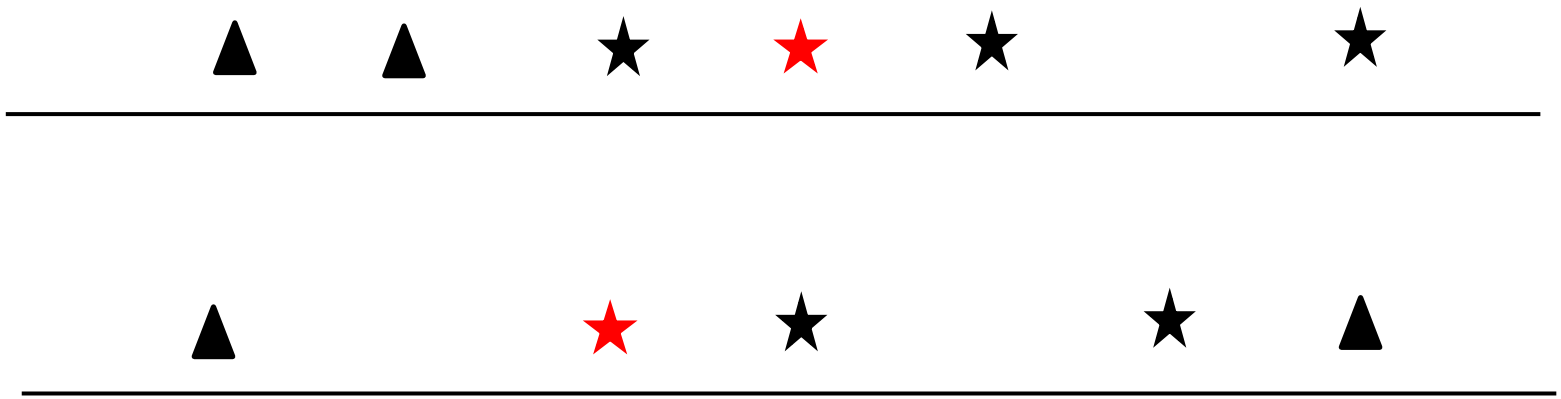
- We include every firm with multiple bank-loan relationships
  - Construct actual and potential firm-branch pair based on set of banks in the estimation
  - The dependent variable is 1 if there is a loan extended at a particular year from a bank to a firm

	Mean	N
Panel A: Rural firm locations		
All lender	0.192	446,801
Relational lender	0.325	203,312
Arm's length lender	0.081	243,489
Panel B: Urban firm locations		
All lender	0.141	729,245
Relational lender	0.205	359,864
Arm's length lender	0.078	369,381

Extensive Margin analysis

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp – All branches	-0.0075			-0.0073*		
	(0.0050)			(0.0042)		
Comp – Relational lender new branch		-0.0032			-0.0193	
		(0.0122)			(0.0119)	
Comp – Arm's length lender new branch			0.0085			-0.0026
			(0.0076)			(0.0033)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	446,801	446,801	446,801	729,245	729,245	729,245

Substitution Analysis: Illustration



Firm

Incumbent

Entrant

Subsititution and Competition Analysis: Extensive Margin

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0018			-0.0035		
	(0.0037)			(0.0026)		
Subst - All branches	-0.0076			-0.0676***		
	(0.0073)			(0.0244)		
Comp - Branches by relational lender		0.0255			-0.0013	
		(0.0184)			(0.0063)	
Subst - Branches by relational lender		-0.0365**			-0.1145***	
		(0.0153)			(0.0114)	
Comp - Branches by arms' length lender			-0.0129			-0.0025
			(0.0108)			(0.0034)
Subst - Branches by arms' length lender			0.0119			0.0255*
			(0.0090)			(0.0148)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	348,134	348,134	348,134	722,660	722,660	722,660

Robustness – Placebo Test

Placebo regressions are randomly drawing the opening year of newly opened branches during our observation period based on 500 simulation runs.

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches (Placebo)	-0.0132			-0.0309		
	(0.0192)			(0.0360)		
Comp - Branches by relational lender (P		-0.0442			-0.0713	
		(0.0370)			(0.0897)	
Comp - Branches by arm's length lender			0.0125			-0.0212
			(0.0171)			(0.0406)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Back to baseline results

Robustness – Loan amount with credit lines

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0369**			-0.0773**		
	(0.0171)			(0.0354)		
Comp - Branches by relational lender		-0.0820***			-0.1534***	
		(0.0238)			(0.0543)	
Comp - Branches by arm's length lender			0.0114			-0.0208
			(0.0388)			(0.0421)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Back to baseline results

Robustness – Lower and higher decay for urban firm locations

Decay parameter:	-0.64	-0.64	-0.64	-1.91	-1.91	-1.91
Comp - All branches	-0.0336**			-0.0976*		
	(0.0148)			(0.0522)		
Comp - Branches by relational lender		-0.0956***			-0.1677**	
		(0.0305)			(0.0744)	
Comp - Branches by arm's length lender			-0.0032			-0.0304
			(0.0177)			(0.0643)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	13,397	13,397	13,397	13,397	13,397	13,397

Back to baseline results

Robustness – Non-parametric approach

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
N banks 1 - All branches	-0.0598			-0.004		
	(0.0562)			(0.0120)		
N banks 2 - All branches	-0.0827			-0.0074		
	(0.0878)			(0.0099)		
N banks 3 - All branches	-0.0447			0.0026		
	(0.0745)			(0.0094)		
N banks 1 - Branches by relational lender		-0.1887***			-0.0493***	
		(0.0561)			(0.0152)	
N banks 2 - Branches by relational lender		-0.2677***			-0.0182	
		(0.0839)			(0.0235)	
N banks 3 - Branches by relational lender		0.0871			-0.0223	
		(0.0778)			(0.0196)	
N banks 1 - Branches by arm's length lender			0.0395			0.0221*
			(0.0970)			(0.0115)
N banks 2 - Branches by arm's length lender			-0.0104			-0.0085
			(0.1191)			(0.0110)
N banks 3 - Branches by arm's length lender			-0.0264			0.0114
			(0.1028)			(0.0106)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397

Circle definition: 10,000, 25,000, and 50,000 inhabitants; hence different circle radii for rural and urban areas

Back to baseline results

Subsititution and Competition Analysis: Extensive Margin

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0018			-0.0035		
	(0.0037)			(0.0026)		
Subst - All branches	-0.0076			-0.0676***		
	(0.0073)			(0.0244)		
Comp - Branches by relational lender		0.0255			-0.0013	
		(0.0184)			(0.0063)	
Subst - Branches by relational lender		-0.0365**			-0.1145***	
		(0.0153)			(0.0114)	
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			(0.0108)			(0.0034)
Subst - Branches by arms' length lender			0.0119			0.0255*
			(0.0090)			(0.0148)
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	7,746	7,746	7,746	13,397	13,397	13,397

Intensive Margin Analysis with Separate Decays

Firm location:	Rural	Rural	Rural	Urban	Urban	Urban
Comp - All branches	-0.0364**			-0.0698**		
	(0.0168)			(0.0351)		
Comp - Branches by relational lender		-0.0687***			-0.1188***	
		(0.0186)			(0.0380)	
Comp - Branches by arm's length lender			0.0274			-0.0345
			(0.0262)			(0.0385)
Decay parameter	-0.03	-0.02	-0.01	-1.27	-0.82	-0.01
Firm-Time FE	Y	Y	Y	Y	Y	Y
Bank-Time FE	Y	Y	Y	Y	Y	Y
Bank-Firm FE	Y	Y	Y	Y	Y	Y
N	11,646	11,646	11,646	13,397	13,397	13,397