

# The Role of Regulation and Competition in Credit Allocation: Evidence from Small Business Lending

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- Low credit supply in a local market.



- Little information available about the creditworthiness of small businesses in that market. **Because of lack of enough transactions that generate information.**



- High fraction of opaque small businesses.



- Low credit supply in the local market.

- **Vicious cycle** of low funding, high proportions of opaque businesses and underfunded local markets.
- Nevertheless, small businesses are crucial for **employment, growth and innovation** in many local markets.
- To break this vicious cycle, policymakers have introduced regulations that force lenders to extend credit to targeted markets.
- However, the **impact on borrowers**, targeted by these important regulations, remains largely **unexplored**.

- **Main question:** Do policies that promote credit access have an **impact** on targeted borrowers?
- We investigate the impact of these policies on:
  - Bank → Information production → Efficient credit allocation
- We develop a theoretical model of information production, regulation and bank competition.
- We test empirically its predictions by examining the impact of the **Community Reinvestment Act's (CRA)** lending program on small businesses.

# The Community Reinvestment Act

- Enacted in 1977, the Act aims to meet the credit needs of the underfunded communities.
- Based on census data of median family income (MFI), CRA examiners divide tracts mainly into two groups:
  - the **upper-middle** tracts with MFI **above 80%** of the surrounding Metropolitan area's MFI and
  - the **low-moderate** tracts with MFI ratio **below 80%**.
- Banks with branches in low-moderate tracts, the CRA eligible communities, are subject to periodic assessment by regulators in meeting the credit needs of these communities.

- We use the **fuzzy regression-discontinuity (RD) design**.
- We examine if loans in **newly eligible tracts** are higher compared to loans in the **ineligible tracts**, **around the 80% cut-off**.
- Then, we examine whether these **additional** loans were allocated **efficiently**, by looking at the average creditworthiness in the local market.
- We use the **Dun & Bradstreet paydex score** of a business as a measure of its creditworthiness.
  - The PAYDEX Score is a dollar-weighted indicator intended to reflect a business's past payment performance.
  - A higher paydex score of a firm is linked to better loan terms, like lower interest rates, and to more favorable trade credit agreements.
  - Hence, a higher credit score can imply economic improvement for the local market.

## Main findings

- Loans **increased** in the newly eligible tracts.
- The credit score of businesses also increased, **on average**.
- However, in local markets with **few small businesses relative to the number of competing bank branches**, we do not observe an increase in the credit score.
- Finally, in local markets with high proportion of **opaque** firms it is less likely to observe an impact on the credit score of businesses,
  - especially in markets with few small businesses relative to the number of bank branches.



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## Literature review

- **Information production and competition:** Ruckes (RFS, 2004) and Hauswald and Marquez (RFS, 2006).
- **Information production and lending relationships:** Petersen and Rajan (QJE, 1995); Petersen and Rajan (JF, 2002) and Agarwal and Hauswald (RFS, 2010).
- **Small business lending:** Berger, Saunders, Scalise and Udell (JFE, 1998); Black and Strahan (JF, 2002); Cetorelli and Strahan (JF, 2006); Rice and Strahan (JF, 2010).
- **Credit screening technologies:** Hauswald and Marquez (RFS, 2003); Cole, Goldberg and White (JFQA, 2004); Berger and Udell (JBE, 2006); Berger and Black (JBE, 2011); Levine, Lin, Peng and Xie (RFS, 2020).
- **Impact of CRA:**
  - **Residential mortgages:** Dahl, Evanoff and Spivey (JMCB, 2010); Bhutta (JLE, 2011); Agarwal, Benmelech, Bergman and Seru (WP, 2012); Avery and Brevoort (ReStat, 2015); Ding and Nakamura (WP, 2020); Begley and Purnanandam (JFE, 2021).
  - **Small businesses:** Avery, Bostic and Canner (HPD, 2005); Bostic and Lee (Cityscape, 2017); Ding, Lee and Bostic (WP, 2018).

- Theoretical model of bank competition and information production in the presence of **opaque** and **transparent** borrowers with **heterogeneous** project values.
- Most of the CRA literature has focused on whether the regulation has been effective in increasing the **quantity** of loans.
- We go a step further and examine whether the new loans have positively impacted the targeted small businesses' **creditworthiness**.
- We highlight the moderating role of markets' **micro-structure** on the impact of CRA.

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## Entrepreneurs, transparency and value of projects

- There are two groups in terms of how transparent the expected value of the project is: *informationally Transparent* (T) and *informationally Opaque* (O),
- and within each group there are entrepreneurs with **high** expected value,  $v = H > 0$ , and **low** expected value,  $v = L = 0$ , projects.
- A bank can identify the type of a T entrepreneur's project without additional effort,
- while for an O entrepreneur it needs to invest in costly screening technology to screen out the low expected value projects.

- Entrepreneurs and banks meet bilaterally and at random in continuous time with discount factor  $r$  (Diamond-Mortensen-Pissarides).
- Each bank finances one entrepreneur.
- The market consists of  $N_b$  banks ( $b$ ) and  $N_e$  entrepreneurs ( $e$ ).
- Let  $\theta \equiv \frac{N_b}{N_e}$  measure the demand adjusted bank competition.

- Match-specific heterogeneity.
- The probability of a T entrepreneur is  $q$  and the probability of an O entrepreneur is  $1 - q$ .
- Furthermore,  $\Pr(v = H|T) = \nu$  and  $\Pr(v = H|O) = \mu$ .
- The cost of funds is  $\bar{i} \geq 0$ .
- We make the following assumption

$$\mu H < 1 + \bar{i} < H.$$

- Funding **high** value projects is **efficient**, but funding **opaque** ENs is, on average, **inefficient**.

- The bank draws a signal  $s$ , which can be either **high**,  $h$ , or **low**,  $\ell$ , if the entrepreneur belongs in the  $O$  group.
- The signal can be completely uninformative  $\phi = 0$  or perfectly informative  $\phi = 1$ .
- Each bank can improve the precision of its own signal, **from  $\phi = 0$  to  $\phi = 1$** , if it incurs an **exogenously given cost  $c > 0$**  per borrower it bargains with.

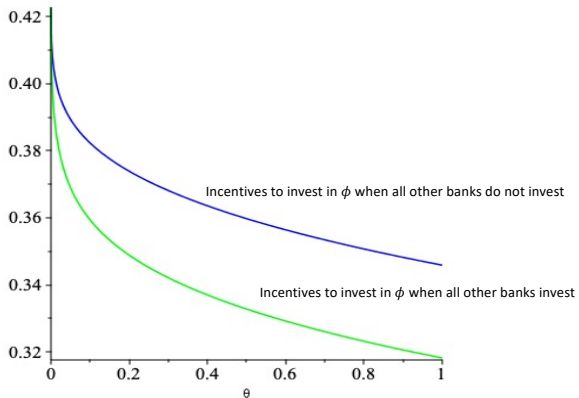


- If the search is successful, the two sides bargain.
- The **outside options** in the bargaining,  $B^o(\theta)$  and  $E^o(\theta)$ , are the utilities from going back into the market and searching anew.
- The two parties bargain over the interest rate  $i$  to maximize the **Nash product**

$$(B^d - B^o(\theta))^{\frac{1}{2}} (E^d - E^o(\theta))^{\frac{1}{2}} .$$

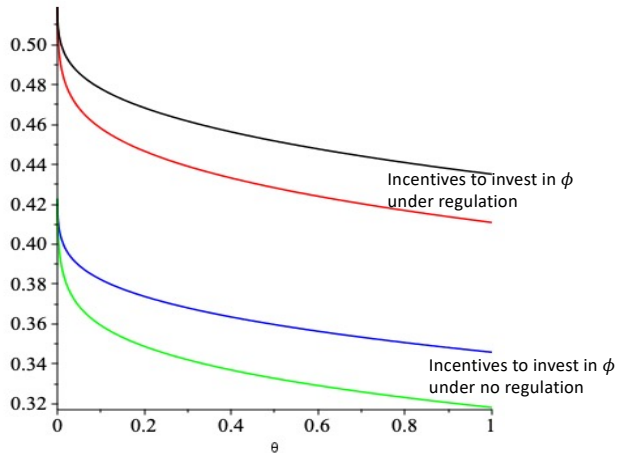
- Difference in profits between when a bank invests and when it does not invest, when all other banks either invest or not.
- If this difference is higher than  $c$ , a bank invests.

## Private incentives to invest under No Regulation



- A regulation forces banks to fund  $O$  entrepreneurs.
- We repeat the same steps to derive the incentives to invest under regulation.
- Incentives to invest under regulation are stronger, because profits when banks do not invest are very low
  - because they must fund  $O$  entrepreneurs who on average have unprofitable projects.

# Private incentives to invest under Regulation and No Regulation

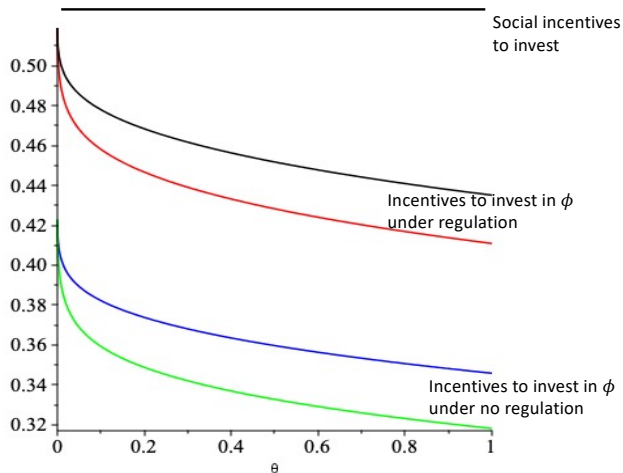


- A social planner would invest in the screening technology if and only if

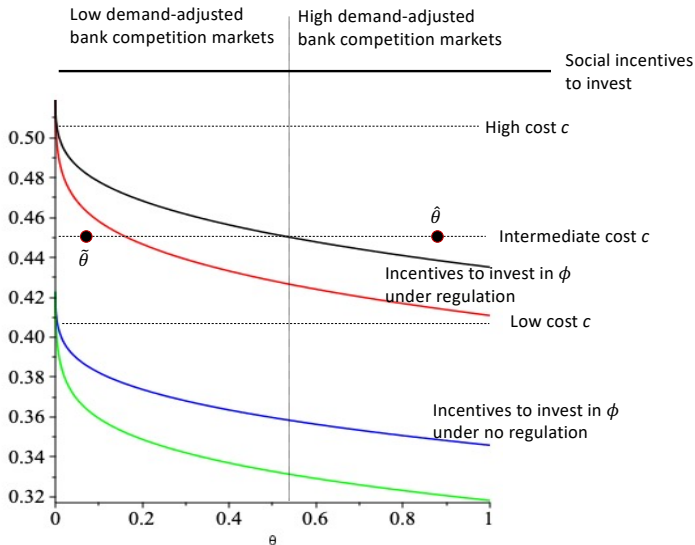
$$\underbrace{(1 - q)\mu[H - (1 + \bar{i})]}_{\text{social incentive}} > \underbrace{c}_{\text{cost}}$$

- When a bank can appropriate all the surplus in the bargaining with ENs, then social and private incentives are **aligned**.
  - Analogous to a monopolist who can practice perfect price discrimination
  - offers the socially efficient quantity.

## When there are many opaque ENs and $\mu$ is low



# Equilibrium investments in screening technology





# Testable hypotheses

## Hypothesis 1 (when $c$ is high)

Regulation decreases (or leaves unchanged) the average creditworthiness in any local market, regardless of the demand-adjusted bank competition intensity.

## Hypothesis 2 (when $c$ is low)

Regulation increases the average creditworthiness in any market, regardless of the demand-adjusted bank competition intensity.

## Hypothesis 3 (when $c$ is intermediate)

Regulation increases the average creditworthiness in local markets with **low** demand-adjusted bank competition intensity and decreases (or leaves unchanged) the average creditworthiness in local markets with **high** demand-adjusted bank competition intensity.

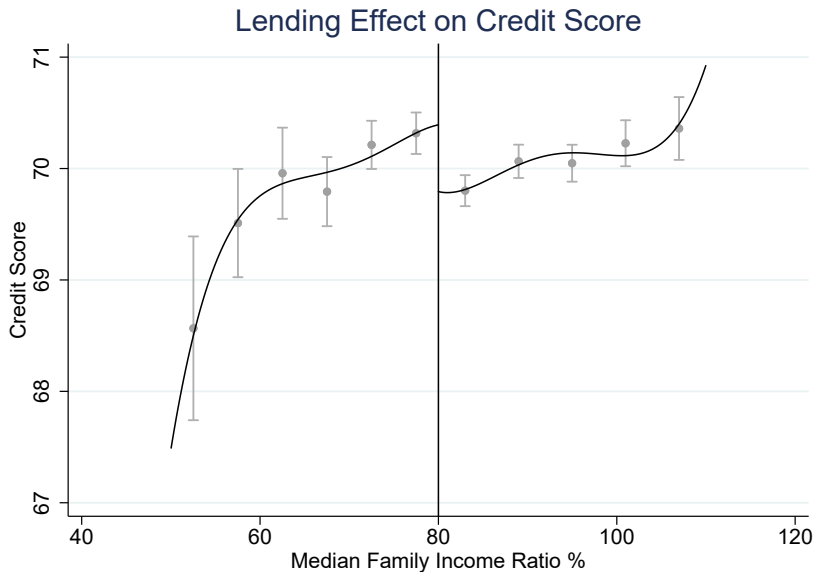
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- **CRA small business loan data** is obtained from **FFIEC**. We focus on small business loans with origination amounts of \$1 million or less.
- **Business data** is obtained from National Establishment Time Series (**NETS**). Focus on establishments that meet SBA's definition of small business.
- **Bank branch data** come from the Summary of Deposits (**SOD**), the annual survey of branch office deposits for all FDIC-insured institutions.
- To assign establishments and bank branches to census tracts, we perform **geocoding** from an establishment/bank branch latitude and longitude.

- Our sample covers the period **2011-2012**.
- Median Family Income MFI data is updated every ten years based on census data.
- CRA performance data in 2011 was based on the 2000 census information and data in 2012 was conducted using 2010 census data.
- As a result, approximately **15 percent of the tracts** that were middle-upper income in the 2000 census **moved** to the moderate-low-income classification in the 2010 census.
- We focus on these newly eligible tracts to avoid any confounding effect from relationship lending on the credit score of businesses.

**Table:** Effect of CRA eligibility on the small business lending growth.

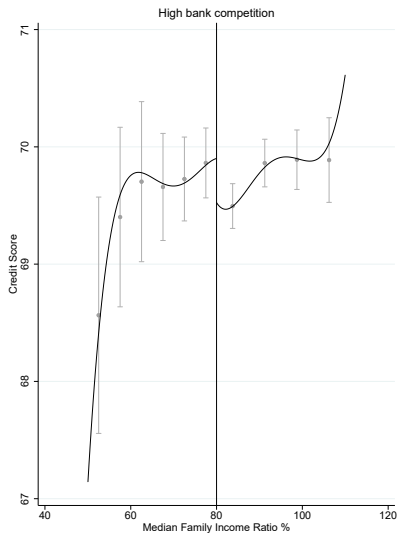
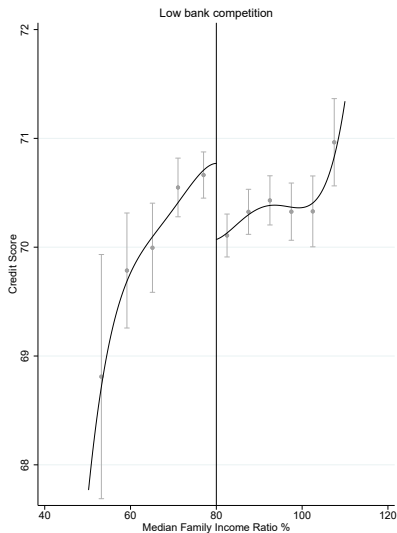
VARIABLES	All tracts		Low bank competition tracts		High bank competition tracts	
	(1)	(2)	(3)	(4)	(5)	(6)
Conventional	0.262*** (0.0193)	0.346*** (0.0199)	0.268*** (0.0274)	0.348*** (0.0265)	0.255*** (0.0274)	0.335*** (0.0284)
Bias-corrected	0.268*** (0.0193)	0.350*** (0.0199)	0.276*** (0.0274)	0.347*** (0.0265)	0.258*** (0.0274)	0.341*** (0.0284)
Robust	0.268*** (0.0222)	0.350*** (0.0229)	0.276*** (0.0317)	0.347*** (0.0306)	0.258*** (0.0323)	0.341*** (0.0327)
Observations	73366	14164	36683	7087	36683	7077
Robust 95% CI	[0.224 ; 0.312]	[0.305 ; 0.395]	[0.214 ; 0.338]	[0.287 ; 0.407]	[0.195 ; 0.322]	[0.277 ; 0.405]
Kernel Type	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
BW Type	mserd	mserd	mserd	mserd	mserd	mserd
VCE method	Cluster	Cluster	Cluster	Cluster	Cluster	Cluster
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Total	Matched	Total	Matched	Total	Matched
Order Loc.Poly.(p)	1.000	1.000	1.000	1.000	1.000	1.000
Order Bias(q)	2.000	2.000	2.000	2.000	2.000	2.000
BW Loc.Poly.(h)	11.632	11.850	10.728	12.786	12.358	12.574
BW Bias (b)	21.348	21.852	19.146	23.191	21.042	23.588



**Table:** Effect of CRA regulation on firm's credit score.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Conventional	0.824** (0.415)	1.659*** (0.498)	1.362** (0.630)	1.690*** (0.414)	1.893*** (0.479)	1.874*** (0.630)
Bias-corrected	0.933** (0.415)	1.610*** (0.498)	1.372** (0.630)	1.777*** (0.414)	1.920*** (0.479)	1.922*** (0.630)
Robust	<b>0.933*</b> (0.483)	<b>1.610***</b> (0.568)	<b>1.372**</b> (0.692)	<b>1.777***</b> (0.484)	<b>1.920***</b> (0.554)	<b>1.922***</b> (0.682)
Observations	73366	73366	73366	14164	14164	14164
Robust 95% CI	[-0.014 ; 1.879]	[0.498 ; 2.723]	[0.016 ; 2.728]	[0.829 ; 2.724]	[0.834 ; 3.005]	[0.585 ; 3.258]
Kernel Type	Epanechnikov	Epanechnikov	Uniform	Epanechnikov	Epanechnikov	Uniform
BW Type	mserd	mserd	msecomb1	mserd	mserd	msecomb1
VCE method	Cluster	Cluster	Cluster	Cluster	Cluster	Cluster
Covariates	No	Yes	Yes	No	Yes	Yes
Sample	Total	Total	Total	Matched	Matched	Matched
Order Loc.Poly.(p)	1.000	1.000	2.000	1.000	1.000	2.000
Order Bias(q)	2.000	2.000	3.000	2.000	2.000	3.000
BW Loc.Poly.(h)	14.347	14.117	15.346	12.408	10.636	11.016
BW Bias (b)	25.131	27.128	25.450	21.348	19.124	19.089

## Lending Effect on Credit Score





# The role of bank competition

**Table:** Bank competition and the effect of CRA regulation on firm's credit score.

VARIABLES	Low bank competition tracts		High bank competition tracts	
	(1)	(2)	(3)	(4)
Conventional	2.056*** (0.611)	2.244*** (0.535)	0.916 (0.856)	1.300* (0.760)
Bias-corrected	2.007*** (0.611)	2.191*** (0.535)	0.793 (0.856)	1.390* (0.760)
Robust	2.007*** (0.706)	2.191*** (0.611)	0.793 (1.012)	1.390 (0.886)
Observations	36683	7087	36683	7077
Robust 95% CI	[0.623 ; 3.392]	[0.993 ; 3.389]	[-1.191 ; 2.777]	[-0.346 ; 3.127]
Kernel Type	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
BW Type	mserd	mserd	mserd	mserd
VCE method	Cluster	Cluster	Cluster	Cluster
Covariates	Yes	Yes	Yes	Yes
Sample	Total	Matched	Total	Matched
Order Loc.Poly.(p)	1.000	1.000	1.000	1.000
Order Bias(q)	2.000	2.000	2.000	2.000
BW Loc.Poly.(h)	15.553	14.466	12.089	11.781
BW Bias (b)	27.987	27.784	20.271	20.843

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## Conclusion

- We provide evidence of the **positive** impact of **CRA's small business lending program** on the **credit score** of businesses located in low and moderate income communities.
- The program's success, however, depends crucially on the **demand adjusted bank competition** of the local market.
- In markets with few entrepreneurs relative to the number of competing bank branches, banks do not earn enough rents and hence choose not to produce information.
- The regulation in those markets leads to some waste of resources in the form of loans given to unworthy projects.
- Policy recommendations:
  - Lower information acquisition costs.
  - Promote competition among rating agencies, e.g., Dun & Bradstreet, Experian, Equifax.

Thank you!

Q&A