Many Markets Make Good Neighbors: Multimarket Contact and Deposit Banking
Hatfield and Wallen (2023)

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Introduction

Motivation and Goal

- Industry concentration has increased at the national level, but decreasing at the local level (Ksieh and Rossi-Hansberg (2021), Rossie-Hansberg et al. (2021)).
- If local is the relevant measure, why have markups and profitability increased? (De Loecker et al. (2020), Barkai (2020))
- Firms behave less competitively even though they face more competition.

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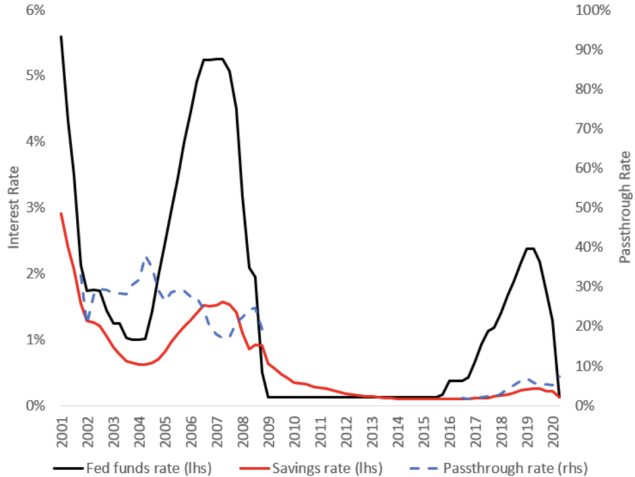
- Firms behave less competitively even though they face more competition.
- **This paper proposes multimarket contact as a solution to this puzzle**
  - Build model that shows an increase in multimarket contact leads firms to behave less competitively.
  - Empirically show this relationship in the deposit market.

Motivation and Goal

- The decrease in passthrough is evidence of an increase in market power in the deposit market.



Preview of Results

- **Model:** Multimarket contact leads to less competitive behavior.
  - Mergers lead to worse consumer outcomes even if they do not increase local concentration.
  - Markups are positively correlated with higher local concentration and multimarket contact.

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- **Model:** Multimarket contact leads to less competitive behavior.
  - Mergers lead to worse consumer outcomes even if they do not increase local concentration.
  - Markups are positively correlated with higher local concentration and multimarket contact.
- **Empirical Analysis:**
  - In the deposit market, multimarket contact enables banks to behave as if the local market was twice as concentrated.
  - Estimate that markups have increased by 27% for retail industries while the propensity for retail networks to overlap has more than tripled.

Related Literature

- **Multimarket contact and collusive behavior.**
  - Bernheim and Whinston (1990) formalize the idea that multimarket contact can facilitate collusion.
  - Empirical evidence: Busse (2000), celular phones; Ciliberto and Williams (2014), airlines; Jans and Rosenbaum (1990), cement; Fernandez and Marin (1998), hotels; Schmitt (2018), hospitals.
- **Concentration and anticompetitive behavior in the banking industry.**
  - Dreschsler et al (2017), Granja and Paixão (2020), Corbae and D'Erasmo (2020, 2021).
  - Collusive behavior in asset markets: Duffie and Stein (2015), LIBOR; Cai and Jahanshahloo (2019) foreign exchange market.

Theory

Model: Market Structure

Bertrand competition model with M markets, F firms.

- Market structure $k \in \{0,1\}^{F,M}$, where $k_{fm} = 1$ if firm f operates in market m.
- f is *national* if $k_{fm} = 1$ for more than one m.
- f is *local* if $k_{fm} = 1$ for only one m.
- A *merger* where f adquires $\hat{f}$ is a change in k where $k^f_m = 1$ for all m of the acquired firm, and $k^{\hat{f}}_m = 0$ for all m.
- A *market extension merger* where for all m either $k^f_m = 0$ for all m of the acquired firm, and $k^{\hat{f}}_m = 0$.

Model: The Stage Game

- Each firm f chooses a price $p_{f_{m \in [0,\infty]}}$ and an aggresiveness $a_m^f \in [0, \infty]$ in each market m..

- The quantity demanded of firm f by consumers in market m is:

$$Q_m^f(p_m, a_m) \equiv \psi_m D\left(\min_{\bar{f} \in F}\left\{p_m^{\bar{f}}\right\}\right) \times \mathbb{1}_{\{f \in \mathbf{A}_m(r_m)\}} \frac{a_m^b}{\sum_{\bar{f} \in \mathbf{A}_m(p_m)} a_m^{\bar{f}}}$$

where ψ_m is the market size, D is a strictly decreasing and concave demand, $\mathbf{A}_m(p_m)$ is the set of firms with the lower price in m and r_m is the set of firms that operate in m.

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- Profits of firm f in market m are:

$$\Pi^f(p, a) = \sum_{m \in M} Q_m^f(p_m, a_m)(p_m^f - c)$$

  where c is the marginal cost of production.

Model: The Repeated Game

- p° is the stage game monopoly price.
- **In the stage game**, if more than one firm operates in each market, then each firm obtains profits zero in every pure Nash equilibrium.
- **In an economy with one market**, If $|\mathbf{F}(m)| \leq \frac{1}{1-\delta}$ then any price $p \in [c, p^\circ]$ is sustainable; otherwise only $p = c$ is sustainable.
- **In the multimarket economy**, prices p and quantities q are substained if:

$$\frac{1}{1-\delta} \sum_{m \in M} (p_m - c)\, q_m^f \geq \sum_{m \in M} (p_m - c)\, \psi_m D(p_m) \text{ for each firm } f,$$

$$\text{and } \sum_{f \in F} q_m^f = \psi_m D(p_m) \text{ for each market } m.$$

Merger ramifications, multimarket contact and competition

- **Theorem 1:** Let $\hat{\kappa}$ be a merger under κ and suppose that $\hat{\kappa}$ is sufficient for competition: Then any prices sustainable under κ are also sustainable under $\hat{\kappa}$.
  - The price is never lower after a merger even if the merger is a market extension merger.

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- **Theorem 2:** Suppose that for two markets *m* and *n* of equal size, less local firms in market *m*, and same national firms in both markets, then *In any highest-profit equilibrium for national firms,* $p_m \geq p_n$..
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- **Theorem 3:** Suppose that for two markets *m* and *n* of equal size, less firms in market *m*, and all national firms in *n* also in *m*, then *In any highest-profit equilibrium for national firms,* $p_m \geq p_n$..
  - If the market has more multimarket contact, then it has a higher price.

Deposit Banking Model

- Capacity $k \in \{0, \psi_m\}^{F,M}$.
- Merger results in a new capacity $k_m^{\hat{f}} = k_m^f + k_m^{\hat{f}}$.
- Consumer's demand depend on FED rate f and preference for liquidity λ:

$$D(r, f) \equiv (1 + \lambda)\frac{r}{f + \lambda r}$$

- Quantity of consumers of bank b in market m is:

$$Q_m^b(r_m, a_m) \equiv \psi_m \mathbb{1}_{\{b \in \mathbf{A}_m(r_m)\}} \frac{a_m^b}{\sum_{\tilde{b} \in \mathbf{A}_m(r_m)} a_m^{\tilde{b}}}$$

.

- Banks choose $r_m^b \in [0, f]$ and $a_n^b \in [0, \infty]$. Profits of bank b in market m are:

$$\Pi_m^b(r_m, a_m, f) \equiv Q_m^b(r_m, a_m) D\left(r_m^b, f\right)\left(f - r_m^b\right) - \underbrace{c \max\left\{0, Q_m^b(r_m, a_m) - \kappa_m^b\right\}}_{\text{Consumers over capacity}}$$

Deposit Banking: Example

- 2 markets m (2 banks), n (5 banks) with size $\psi_m = \psi_n = 1$, $f = 1$, $\lambda = 3$, $c = 0$, capacities are 1, $\delta = 7/9$
- No banks is in both markets.
- Monopoly profits are substained in m but **not** in n.

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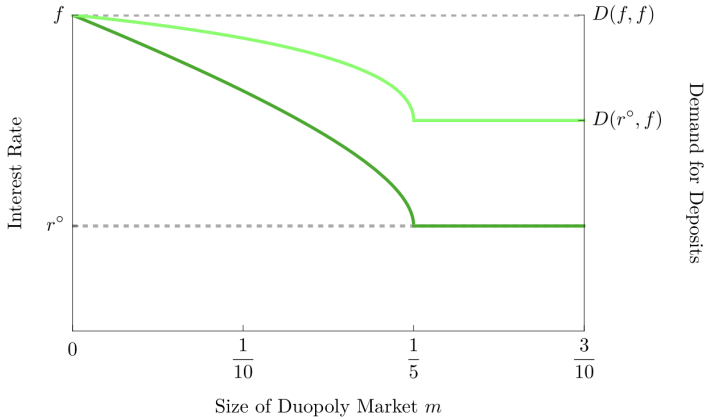
- No banks is in both markets.
- Monopoly profits are substained in m but **not** in n.
- After a **merger** where bank in m acquires bank in n (market extension merger).
- Now the monopoly profits are substained in m and n.
- Bank has a ”slack” in the concentrated market m, so it reduces supply in n.

Deposit Banking: Example

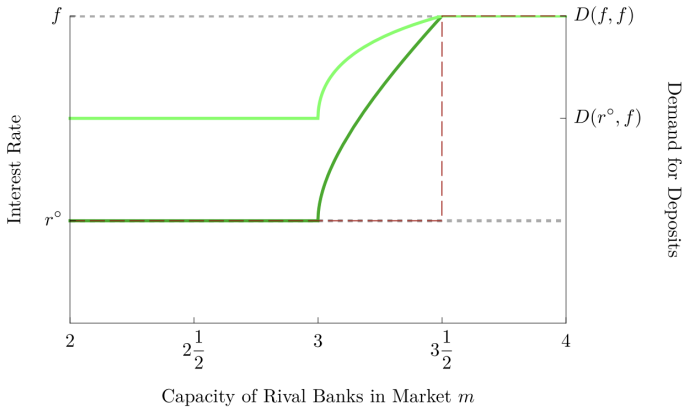
- r_n^* in dark green, consumer demand in light green.[1]
- Only one bank in both market.



[1] Postmerger: 2 markets m (2 banks), n (5 banks) with size $\psi_m = \psi_n = 1$, $f = 1$, $\lambda = 3$, $c = 0$, capacities are 1, $\delta = 7/9$, r_0 is the monopoly rate, f is the competitive rate.

Deposit Banking: Example

- r_n^* in dark green, r_m^* in dash red, consumer demand in light green.[2]
- Only one bank in both market.



[2] Postmerger: 2 markets m (5 banks), n (5 banks) with size $\psi_m = \psi_n = 1$, $f = 1$, $\lambda = 3$, $c = 0$, capacities are 1, $\delta = 7/9$, r_0 is the monopoly rate, f is the competitive rate.

Deposit Banking Model: Merger ramifications, multimarket contact and competition

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- **Theorem 2:** In markets that only differ in local concentration,
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- **Theorem 3:** In markets that only differ in multimarket contact,
  - If the market has more multimarket contact, then it has a higher spread and higher capture rate.

Empirical Analysis

Data and Definitions

- SOD data: 2019 counties, 146 banks.
- RateWatch: deposit interest rate, use only rate-setting branches by quarters.
- Multimarket contact between banks *i* and *j* in market *m*:

$$\text{MMC}_{i,j} \equiv \sum_c \left(\theta_c^i \cdot \theta_c^j\right)^{\frac{1}{2}}$$

where $\theta_c^i \equiv \frac{q_c^i}{\sum_{\tilde{c}} q_{\tilde{c}}^i}$ be the sales portfolio share of firm *i* in market *c*.

- Multimarket contact in county *c*:

$$\text{MMC}_c \equiv \frac{\sum_i \sum_{j \neq i} \text{MMC}_{i,j} q_c^i q_c^j}{\sum_i \sum_{j \neq i} q_c^i q_c^j}$$

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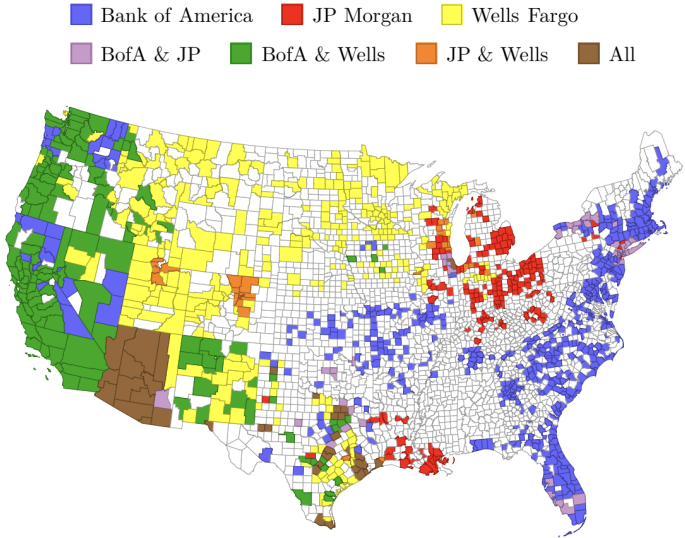
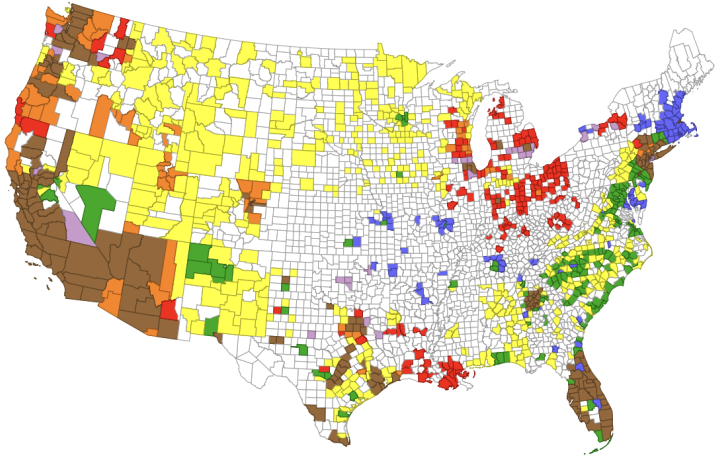
Branch network 2005



Branch network 2018



Deposit spread

- Bank market power is measured by deposit spread beta (1-passthrough rate):

$$\Delta y_{b,t} = \alpha_b + \beta \Delta \mathrm{FF}_t + \epsilon_{b,t}$$

where $y_{b,t}$ is the deposit spread and FF_t is Fed Funds rate.

Table 1: **Deposit Spread Beta**

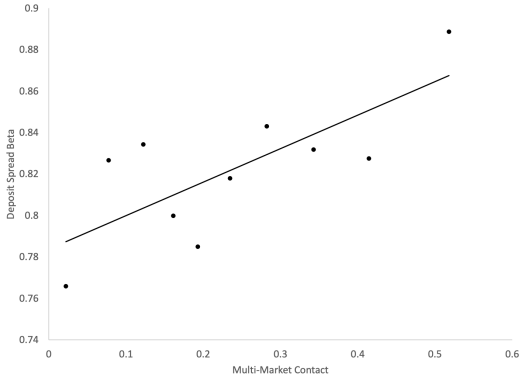
	Δ Savings Spread			
	(1)	(2)	(3)	(4)
Sample	2001-2020	2001-2006	2007-2009	2010-2020
ΔFF	0.791**	0.640**	0.833**	0.957**
	(0.045)	(0.034)	(0.087)	(0.006)
Quarter FE	N	N	N	N
Bank FE	Y	Y	Y	Y
Branch FE	Y	Y	Y	Y
Adjusted R^2	0.73	0.60	0.68	0.95
N	53,376	13,833	8,649	30,790

Deposit spread: Across Bank-Branches Estimates

- For each branch b in market m, estimate:

$$\Delta y_{b,t} = \alpha_b + \beta_b \Delta \mathrm{FF}_t + \epsilon_{b,t}$$

where $\Delta y_{b,t}$ is the change in the deposit spread and $\Delta \mathrm{FF}_t$ is the change in the FED rate.



Within-bank and Across-County Estimates

- $\Delta y_{b,t} = \alpha_t + \alpha_b + \zeta_{s(b),t} + \chi_{i(b),t} + \gamma \Delta \text{FF}_t \times \text{MMC}_{c(b),t} + \epsilon_{b,t}$[3]

Table 2: **Deposit Spread Betas and Imperfect Competition**

	Δ Deposit Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF × MMC	0.070**	0.056**			0.070**	0.056**
	(0.03)	(0.02)			(0.03)	(0.02)
Δ FF × Branch-HHI			0.031	0.096**	0.007	-0.013
			(0.03)	(0.04)	(0.04)	(0.04)
Quarter FE	Y	Y	Y	Y	Y	Y
Branch FE	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Bank × Quarter FE	Y	Y	Y	N	Y	Y
State × Quarter FE	Y	N	Y	N	Y	N
Adjusted R^2	0.919	0.914	0.915	0.765	0.919	0.914
N	43,787	43,885	48,432	53,376	43,787	43,885

[3] Standard errors clustered by county-by-year level, 2001-2020.

Within-bank and Across-County Estimates

- If each local market is an island, multimarket contact enables banks to behave as if the local market was twice as concentrated.

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Quarter FE	Y	Y	Y	Y	Y	Y
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Bank FE	Y	Y	Y	Y	Y	Y
Bank × Quarter FE	Y	Y	Y	N	Y	Y
State × Quarter FE	Y	N	Y	N	Y	N
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Deposit Market Contact and Merger Activity

- The Network $\mathrm{MMC}_{i,j}$ of acquiring bank *i* and target bank *j* is

$$\text{Network } \mathrm{MMC}_{i,j} = \frac{\sum_{n \neq i} \mathrm{MMC}_{i,n} q^j_{c(n)}}{\sum_n q^j_{c(n)}}$$

  where *n* are other national banks, $\mathrm{MMC}_{i,n}$ is the multimarket contact of *i* and *n*, and $q^j_{c(n)}$ is the quantity of target bank *j* 's deposits that overlap with *n*.

- We estimate the association between mergers and multimarket contact:

$$\text{Merger}_{i,j,t} = \alpha_{i,t} + \beta \text{ Network } \mathrm{MMC}_{i,j} + \xi X_{i,j,t} + \epsilon_{i,j,t},$$

  where $\alpha_{i,t}$ is an acquirer bank-by-time fixed effect and $X_{i,j,t}$ are control variables.

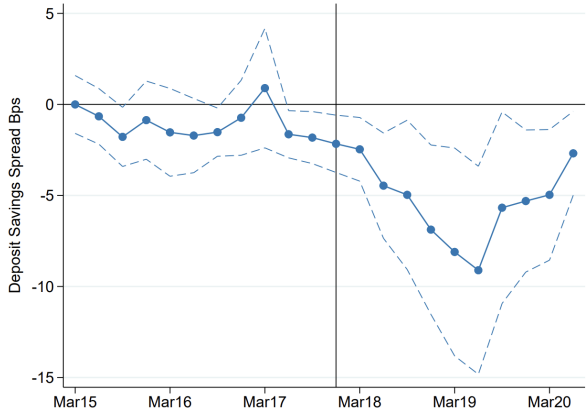
Deposit Market Contact and Merger Activity

Table 3: **Mergers and Deposit Market MMC**

	(1)	(2)	(3)	(4)
Network $MMC_{i,j}$	0.537**	0.565**	0.563**	0.508**
	(0.07)	(0.07)	(0.07)	(0.07)
Distance	-0.124**	-0.119**	-0.119**	-0.120**
	(0.01)	(0.01)	(0.01)	(0.01)
HHI	-0.023	0.015		
	(0.02)	(0.02)		
Δ HHI	0.386**			
	(0.08)			
Pop Growth	1.446**			
	(0.26)			
Deposits Growth	0.011			
	(0.02)			
Bank $\times$ Year FE	Y	Y	Y	N
Bank and Year FE	Y	Y	Y	Y
Adjusted R^2	0.18	0.18	0.18	0.17
N	9,052	9,052	9,052	9,052

Deposit Market Branch Warfare

- $y_{b,t} = \alpha_t + \beta_t T_{c(b)} + \epsilon_{b,t}$,
  where $y_{b,t}$ is the deposit spread for branch b, and $T_{c(b)}$ is 1 if Wells Fargo or JP Morgan Chase has a branch in the county of branch b.



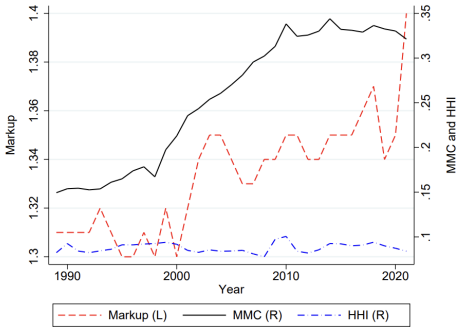
Multimarket Contact and Retail Industries

- Use data from Dun and Bradstreet (D&B) and data on public firms from CRSP and Compustat.
- Constructs the sales portfolio using:

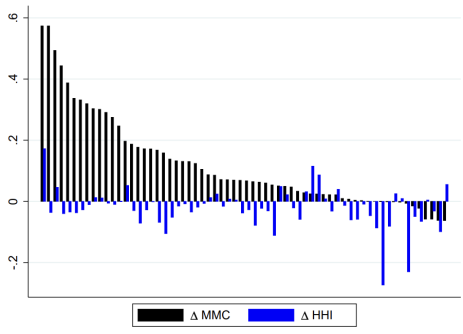
$$\hat{q}_c^i = \frac{\text{establishments}_c^i}{\sum_{j \in ind(i)} \text{establishments}_c^j} \text{population}_c$$

where $\text{establishments}_c^i$ is the number of establishments of firm i in county c and $ind(i)$ is the industry of firm i.

Multimarket Contact and Retail Industries



(a) Time Trends



(b) Cross-Sectional Changes

Conclusions

Conclusions

- Reconcile puzzle of U.S. deposit markets becoming less concentrated and less competitive.
  - Banks' threat of competitive behavior in other markets to discipline behavior in markets with more competitors.
  - Overlaps reduce passthrough rate and increase markups.
  - Banks are twice as likely to merge into markets with high multimarket contact.
- Framework to studying how multimarket contact decreases competition.
- Antitrust regulators may need to consider multimarket contact when evaluating mergers.

Thank you!