Rivalry, Market Structure and Innovation: The Case of Mobile Banking

Presenter: Zhaozhao He
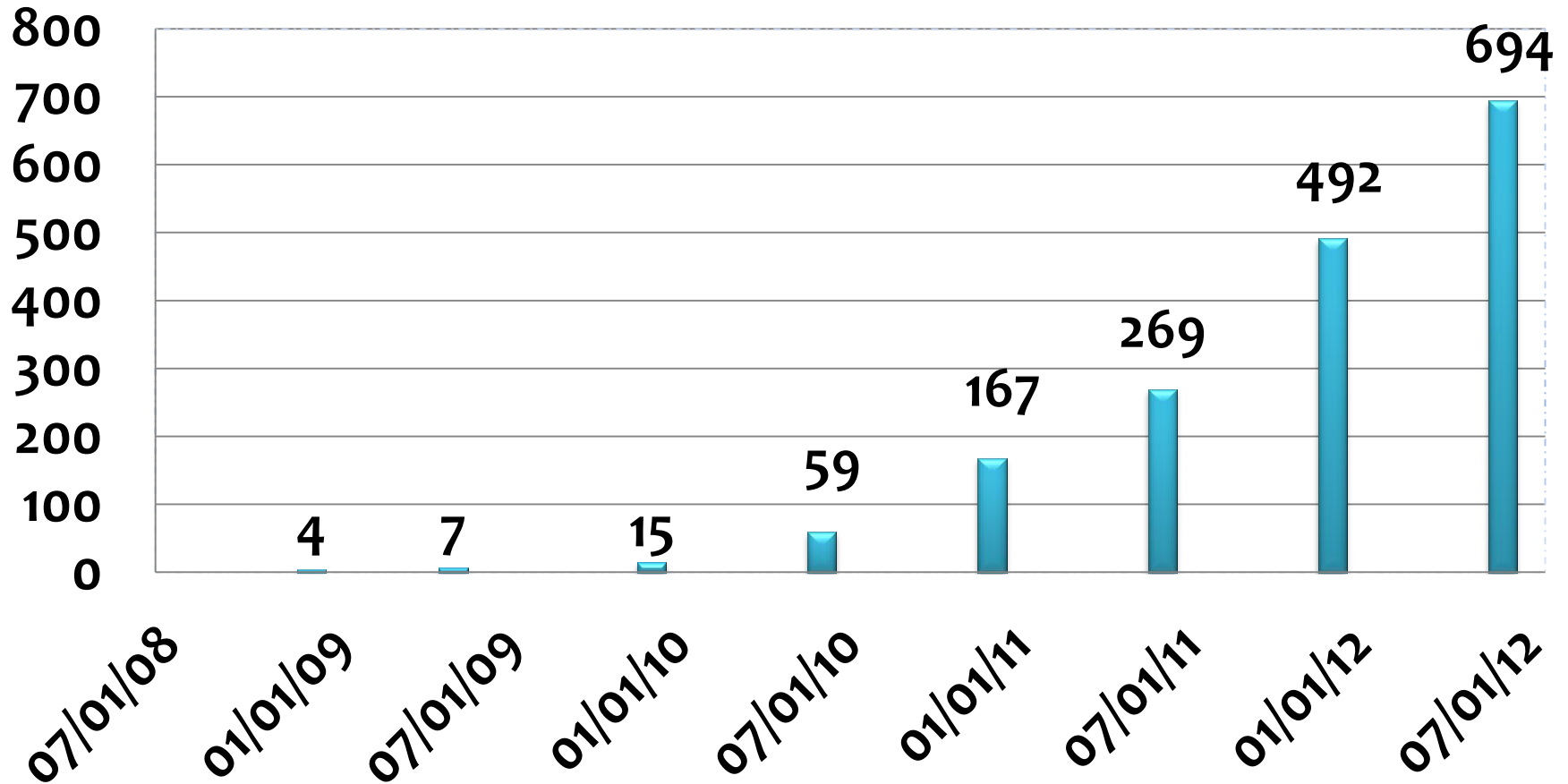University of Kansas
09/23/2014

Research Questions

- Whether rivalry and market structure affect technology diffusion.

- Are there any interactive effects of rivalry and market structure during the technology adoption process?

Rapid Growth of Mobile Banking Apps

Cumulative Number of Banks with iPhone Apps
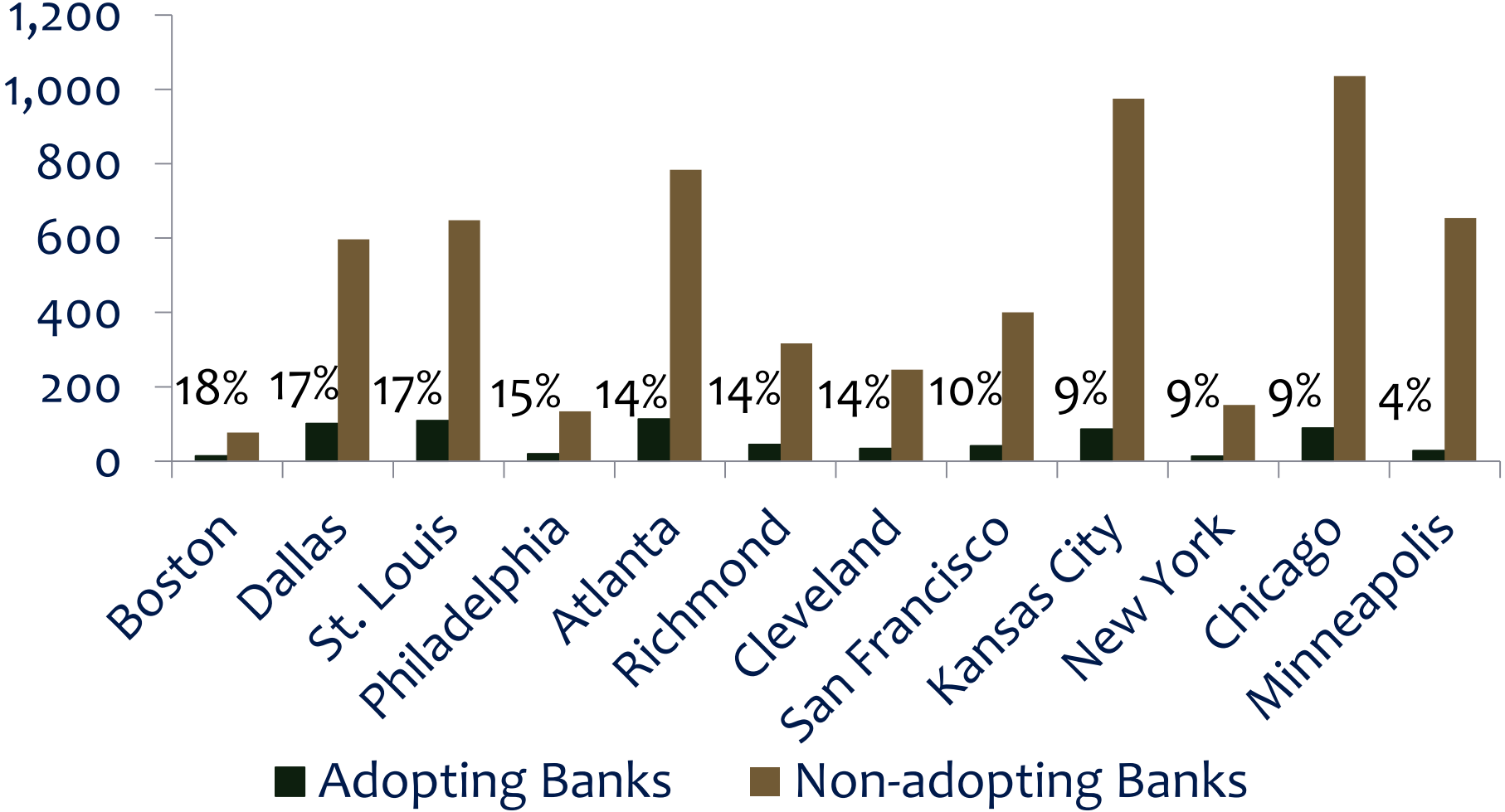

Source: iTunes Store

What Is A Mobile Banking App?

- Definition from the Federal Reserve survey (March, 2012)
  - Mobile Banking: SMS – Mobile Web – Mobile App
- Mobile apps provide customized financial services.
- Mobile apps versus Online banking websites
- Fast customers' adoption of smartphones

Adoption by Regional Fed as of Mid-2012

Bar chart showing Adopting Banks and Non-adopting Banks by regional Fed. Y-axis: 0 to 1,200.

Region	Percentage
Boston	18%
Dallas	17%
St. Louis	17%
Philadelphia	15%
Atlanta	14%
Richmond	14%
Cleveland	14%
San Francisco	10%
Kansas City	9%
New York	9%
Chicago	9%
Minneapolis	4%

Legend: ■ Adopting Banks ■ Non-adopting Banks

Why Do Banks Adopt Apps?

- To Enhance Customer Relationship
  - American Banker (February 6, 2012)
- Competitive Pressure
  - American Banker (February 6, 2012)
- To Replace Branches and Labor
  - American Banker (September 10, 2012)

This Paper

- To date, there are no academic research papers on the adoption of mobile banking apps.

- Applying a Cox proportional hazard model to study the joint impact of market structure and rivalry on the probability of adoption.

- Using unique, hand-collected data on mobile app adoption by 694 banks between 2008 and 2012.

- Addressing endogeneity concern that adoptions are simultaneous reactions to unmeasured factors by an instrumental variables approach.

Literature Review

- Mixed evidence on the role of market concentration:
  - **Adoption of ATMs:** Hannan and McDowell (1984)
  - **Adoption of Small Business Credit Scoring**: Akhavein, Frame, and White (2005)
- Mixed evidence on the (dynamic) role of competitive rivalry
  - **Adoption of Internet Banking:** DeYoung, Lang and Nolle (2007)
- **Joint role** of rivalry and market concentration:
  - Hannan and McDowell (1987)

Main Data Source-- iTunes

iTunes—An Illustration

Data

- Adoption data from iTunes Store (694 adopters)
- Other data sources:
  - FDIC (bank financials, branch deposit data)
  - Bureau of Labor Statistics (demographic data)
- Final Sample contains 99,960 bank-quarter observations from 2008:Q3-2012:Q2
- iPhone app as a proxy for the mobile banking app technology

Majority Banks Had iPhone Apps First

	Android apps Adopted FIRST					Both Adopted at Same Time	iPhone apps Adopted FIRST	Total Testing Samples
Time Lag (Month)	<-4	-4	-3	-2	-1	0	>0	
# of Banks	4	5	5	6	5	159	369	553
Percent	0.7%	0.9%	0.9%	1.1%	0.9%	28.8%	66.7%	100%

Hypotheses

- Market Structure—*HHI_Deposits* (?)
  - Herfindahl-Hirschman Index of deposits in a local market, defined at the MSA level

- Competitive Pressure—*Local Rivals* (+)
  - % of rival banks (using branch presence) in a local market with mobile apps in a given quarter

- **Joint Effects**—*Local Rivals*HHI_Deposits* (+)
  - Banks compete on non-price attributes in concentrated markets (Scherer and Ross, 1929, pp.595).
  - Milliou and Petrakis (2011)

Summary Statistics (Key Variables)

Variables	Adopters (Obs=694)		Non-Adopters (Obs=99,291)		Diff-in-means
	Mean	Std. Dev.	Mean	Std. Dev.	
Local Rivals (%)	33.51	18.48	11.42	13.27	**22.08***
HHI_Deposits	0.19	0.10	0.21	0.13	**-0.02***

Main Results

Dependent Variable: ADOPT	Odds Ratios	
	(1)	(2)
(Predicted) Local Rivals	1.1149***	1.0901***
	(7.49)	(5.89)
HHI_Deposits	0.8393	0.0978**
	(-0.75)	(-2.55)
Local Rivals * HHI_Deposits		**1.0979***
		(2.91)
N	99,960	99,960

Instruments for *Local Rivals*=Rivals' outside-market deposit shares, MSA dummy Controls= lnAssets, lnage, Tier1, Core Deposits, Service Revenue, Labor Cost, Workers and Salary, Advertising, Branch Intensity, Asset Growth, market conditions, financial distress, and **MSA** & **Year FEs**. t-statistics are based on **robust** standard errors **clustered** by **MSA**.

Other Tests

- Sort sample into quartiles by *HHI_Deposits* and estimate the effect of *Local Rivals* on each subgroup

- This interactive effect is stronger for banks headquartered in MSA areas.

- This joint effect exists for the speed of adoption estimated from a Tobit model.

The Impact of Adoption on Performance

Dependent Variables	Profitability			Costs		
	ROA	SERVICE REVENUE	ADVERTISE	BRANCH INTENSITY	WORKER /Branch	LABOR COST
	(1)	(2)	(3)	(4)	(5)	(6)
POST ADOPT	0.0587	0.0477***	0.0589***	0.0265	0.0027**	0.0015***
	(1.62)	(9.79)	(4.67)	(0.14)	(2.18)	(9.58)
TIME SINCE ADOPTION	0.026**	0.0066***	0.0137***	0.1349	-0.0005	0.0004***
	(2.41)	(4.72)	(2.91)	(1.33)	(-0.82)	(9.86)
N	10,868	10,868	10,868	10,868	10,868	10,868
Adjusted R²	0.45	0.68	0.59	0.98	0.95	0.51

Notes: Sample includes adopters only. All Ordinary Least Squares (OLS) regressions include **bank FEs, year FEs**, and full set of **controls**. t-statistics are based on **robust** standard errors **clustered** by bank.

Conclusions

- Rivals spur mobile app diffusion.

- The impact of rivalry adoptions on potential adopters is stronger in more concentrated markets, consistent with the economic theory of the oligopolistic competition.