



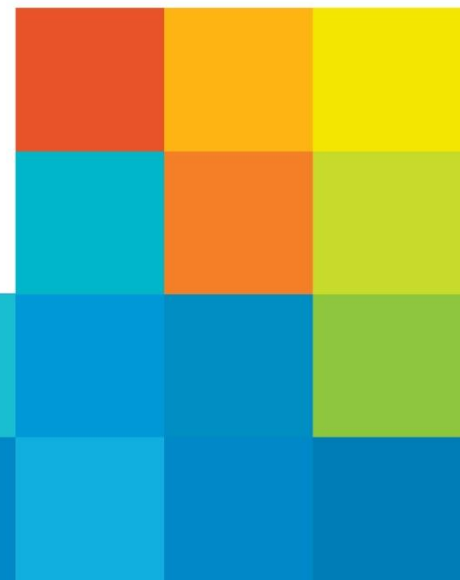
# Does FinTech crowd out banks: Evidence from China

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“We need banking  
but we don’t need  
banks anymore...”

**Bill Gates**



# 1. Motivation



# Motivation

Fintech is the most notable change in the financial landscape since GFC

## *Global FinTech Adoption Index 2019*

The adoption rate of fintech services by *consumers* has risen globally to 64% in 2019, from 16% in 2015 and 33% in 2017

- China (87%), India (87%), UK (71%), US (46%), Japan (34%)

The global rate of fintech adoption by *small and medium-sized enterprises (SMEs)* reached 25% in 2019.

- China (61%), US (23%) and UK (17%)

# How fintech enter the credit market?

Fintech firms use both *cheaper distribution channels*

- Unit cost of US financial intermediation has remained at approximately 2% for 130 years (Philippon, 2016).

and *better and alternative credit analysis* to compete with traditional bank credit (Hau et al., 2019)

- Big data and digital footprint (more information)
- Network analysis-- *Networking the peers: evidence from a P2P lending platform in China*, by X. Chen, Z. Chong, P. Guidici and B. Huang
- Text analysis -- *The Role of Punctuation in P2P Lending: Evidence from China*, by X. Chen, B. Huang and D. Ye; *The Power of Tone in P2P lending*, by X. Chen and B. Huang

# Research Question of this paper

How would Fintech development change the banking sector?

Does fintech induce a healthy competitive process, enhance efficiency in a market with high entry barriers, or rather cause disruption and financial instability?

# Existing researches

Hauswald and Marquez (2003, 2006): better informed nonbank lenders may be able to poach the profitable borrowers from incumbents.

Petersen and Rajan (2002): Fintech lenders may use technology instead of close geographic distance to generate private information on borrowers.

De Roure, et al. (2016): P2P platforms serve a market neglected by German commercial banks

Wolfe and Yoo (2018): High risk peer to peer lending substitute for bank loans while low-risk loans may be credit expansionary.

# Our research

We use a comprehensive index to proxy the variation of fintech development across Chinese prefectures

We investigate the impact of fintech development on the brick and mortar banking outreaches as well as bank loan and deposits

We assess the impact of fintech development on bank funding costs, loan pricing and risk attitude



## 2. Fintech development in China



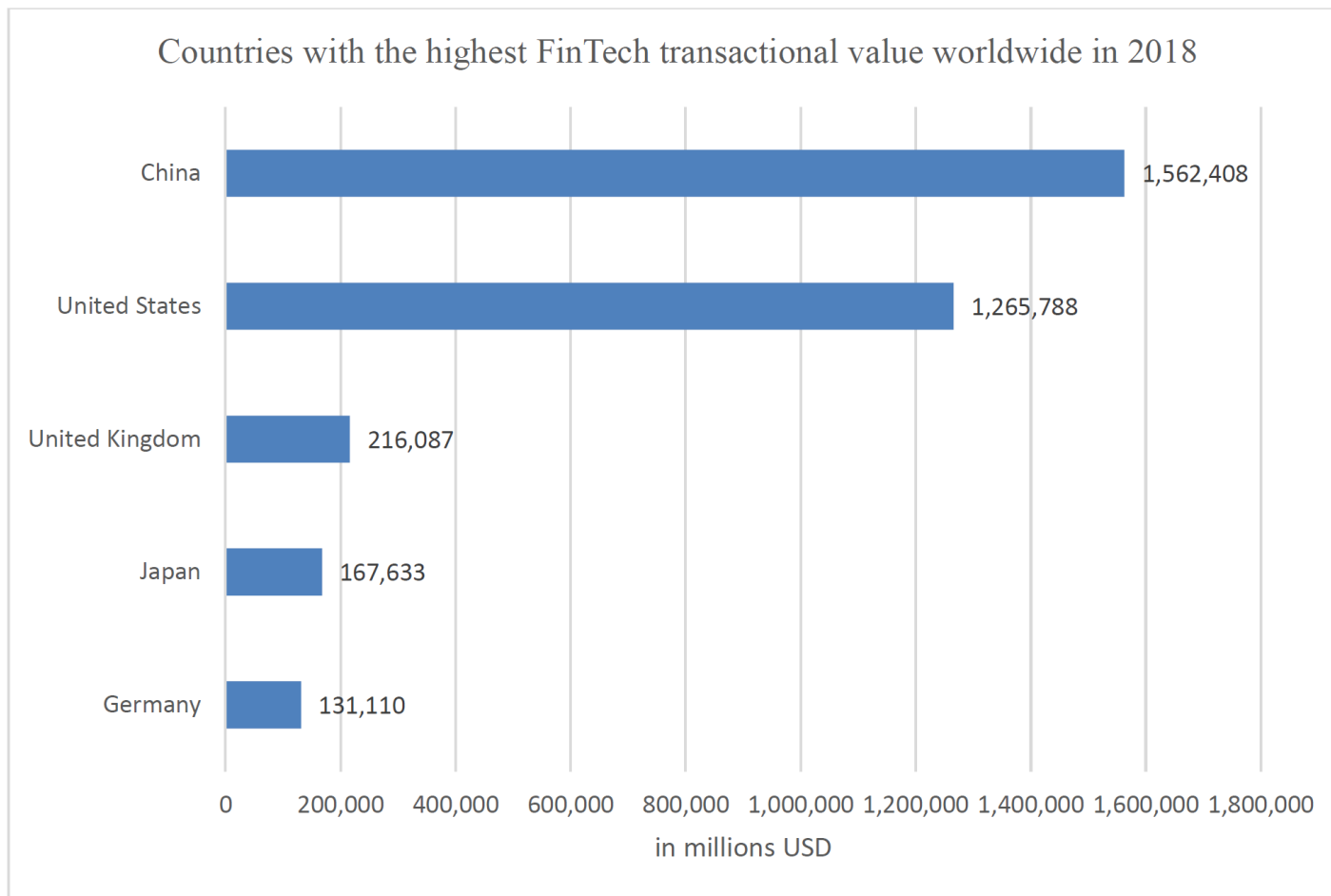
# Fintech development in China

## Driving factors

- Underdeveloped banking system
- Financially underserved population and SMEs
- Less constraining regulatory environment
- Huge tech savvy middle income class

China has been at the forefront of fintech development

- B2C model: integrating finance with real-life needs
- Mobile payments and artificial intelligence



Source: Statista (2018)

# Fintech development in China

In February 2004, Alipay (支付宝), a third-party mobile and online payment platform, was established by Alibaba Group

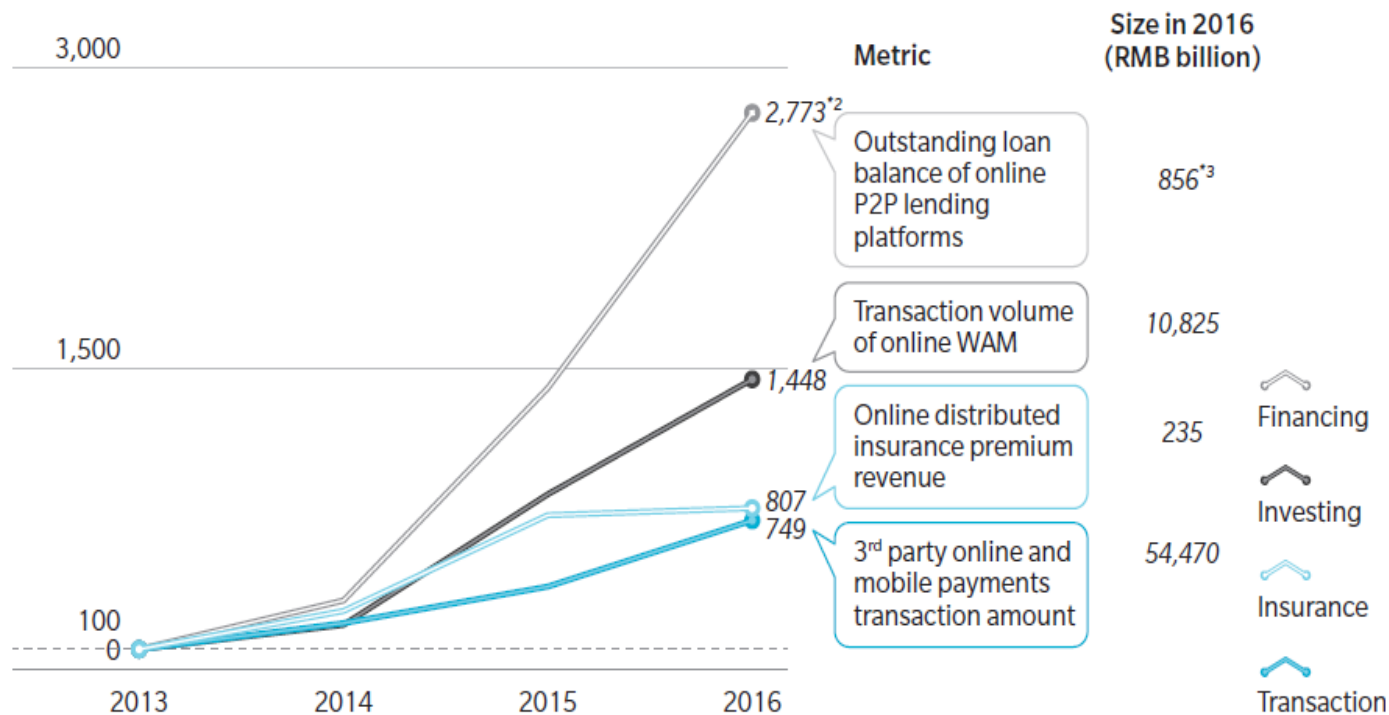
In June 2013, Yu'e Bao was promoted as a way for people to earn interest on the cash in their e-commerce accounts. It attracted 185mn customers within 18 months, giving it 600bn yuan of assets under management.

In 2014 Tencent launched Licitong, an online fund platform linked to WeChat. Within a year, it had 100bn yuan under management.

More than 50% of fund sales in China are now made via electronic platforms offered by fintech companies such as Ant Financial and Tencent

Lufax, outgrew its P2P roots to transform itself into a financial “supermarket”, offering personal loans, asset-backed securities, mutual funds, insurance and more.

# Fintech development in China



## 2. Data

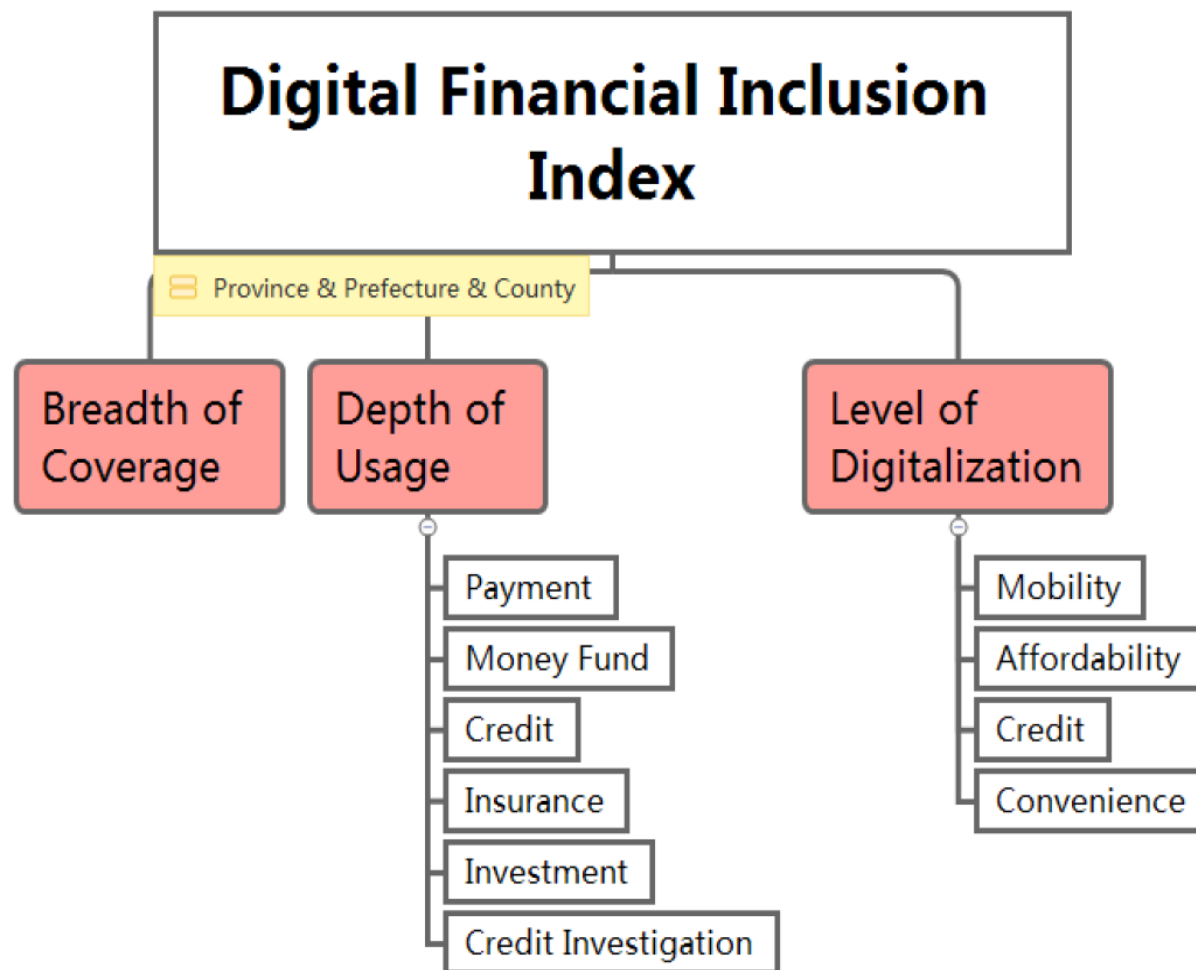


# Measurement of Fintech Development in China

An index of digital financial inclusion jointly developed by the Institute of Digital Finance, Peking University, and Ant Financial.

The index uses user data from Ant Financial to construct an index of Digital financial inclusion.

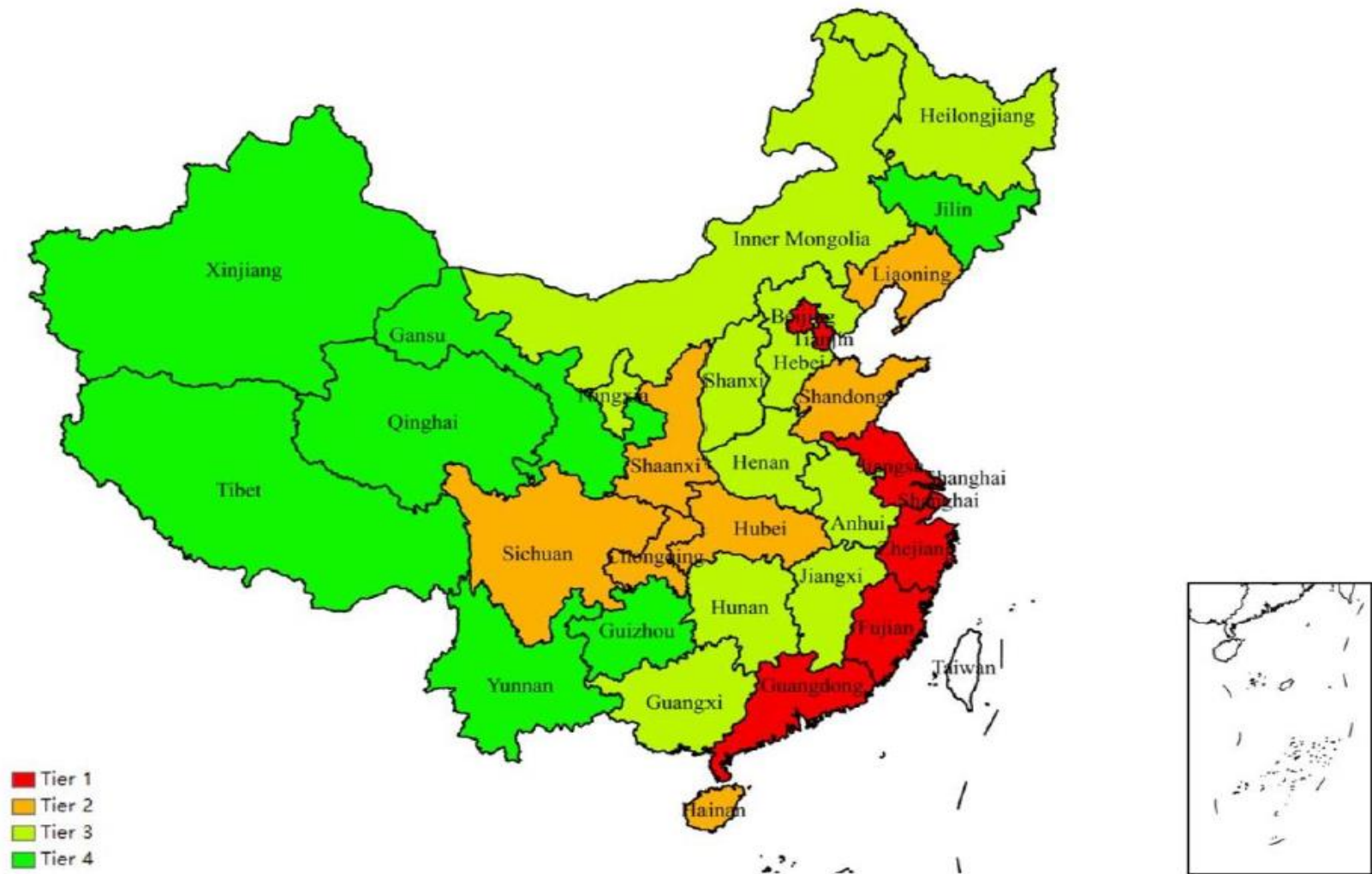
- To calculate the digital financial inclusion index, each second-level indicator is adjusted by the dimensionless method.
- Then, the second-level indicators are combined into the first-level index using the variation coefficient empowerment and exponential synthesis methods.
- Data sample: provincial, prefecture and county index for 2011-2018.



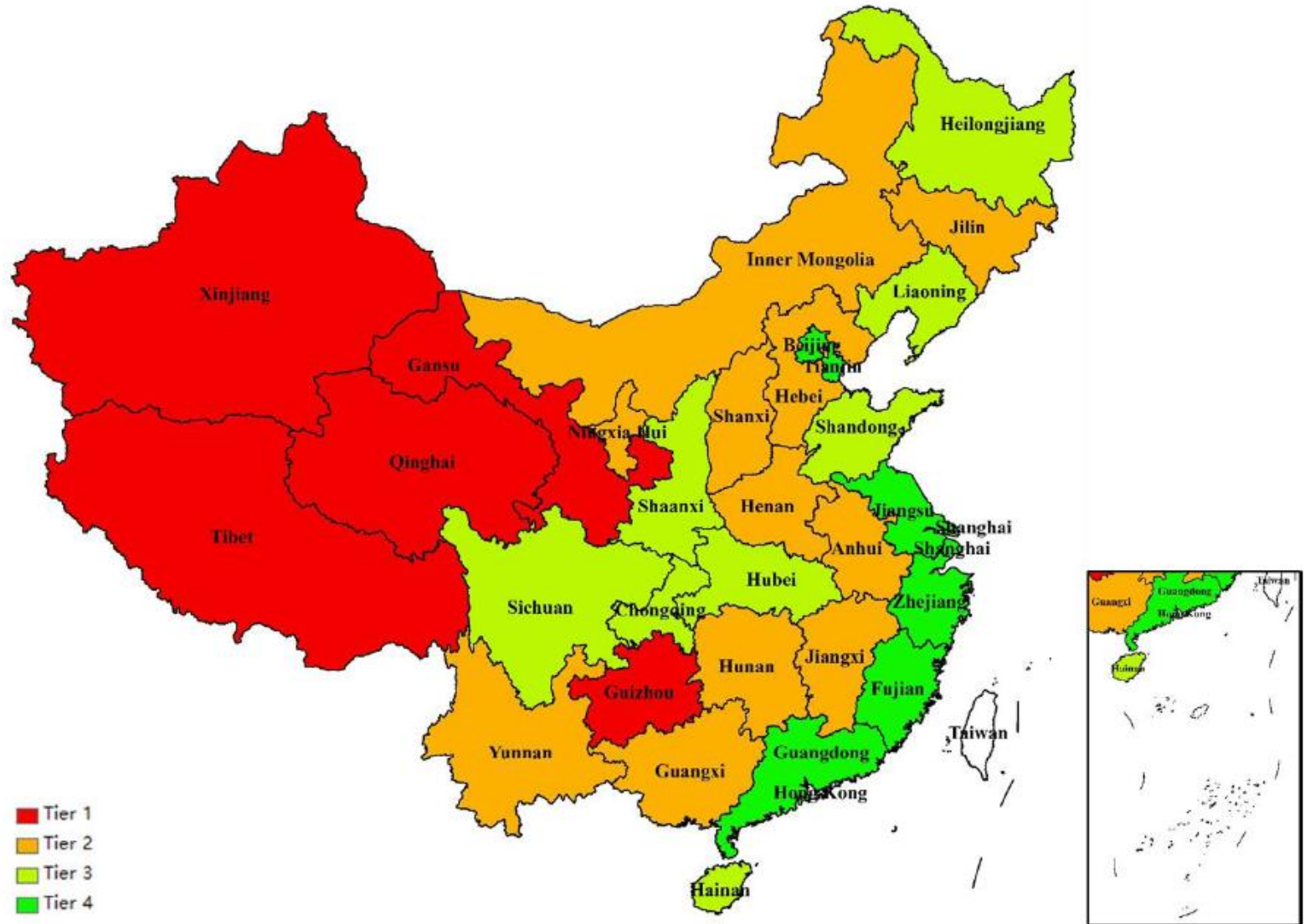


Level 1 Dimension	Level 2 Dimension		Indicator
Breadth of Coverage	Account coverage rate		Number of Alipay accounts owned by per 10,000 people
			Proportion of Alipay users who have bank cards bound to their Alipay accounts
			Average number of bank cards bound to each Alipay account
Depth of Usage	Payment		Number of payments per capita
			Amount of payments per capita
			Proportion of number of high frequency active users (50 times or more each year) to number of users with frequency of once or more each year
	Money Funds		Number of Yu'eobao purchases per capita
			Amount of Yu'eobao purchases per capita
			Number of people who have purchased Yu'eobao per 10,000 Alipay users
	Credit	Individual User	Number of users with an Internet loan for consumption per 10,000 adult Alipay users
			Number of loans per capita
			Total Amount of loan per capita
		Small & Micro Business	Number of users with an Internet loan for small & micro businesses per 10,000 adult Alipay users
			Number of loans per small & micro business
			Average amount of loan among small & micro businesses
	Insurance		Number of insured users per 10,000 Alipay users
			Number of insurance policies per capita
			Average insurance amount per capita
	Investment		Number of people engaged in Internet investment and money management Per 10,000 Alipay users
			Number of investments per capita
			Average investment amount per capita
	Credit Investigation		Number of credit investigations by natural persons per capita
			Number of users with access to credit-based livelihood services (including finance, accommodation, mobility, social contact, etc.) per 10,000 Alipay users

# Index of Digital Financial Inclusion in China (2011)



# Growth of the Index between 2011 and 2018



# Banking industry in China

4588 financial institutes regulated by China Banking and Insurance Regulatory Commission in 2018

- 1<sup>st</sup> tier -- 6 State-owned commercial banks, including ICBC, ABC, BOC, CCB, Bank of Communications (BoCom) and Postal Savings Bank of China, account for 40% of market share with 107,713 branches (50% of total)
- 2<sup>nd</sup> tier -- 12 joint equity commercial banks account for 19% of market share
- 3<sup>rd</sup> tier: city commercial banks (134), rural commercial banks (1427), village banks (1616), rural credit cooperative (812), private banks (17)
- 115 Foreign banks

66% of income in the Chinese banking system comes from traditional financial intermediation

# Data source

1. *Bank outreach*: the database of financial business operation permit issued by China Banking and Insurance Regulatory Commission

- Name, type
- Founding date, renewal date and withdrawal date
- Address: identify the longitudinal and latitudinal coordinators using Baidu map

2. Banks' *Balance sheet* and *Financial Data*: S&P Capital, Wind, etc

3. *Bank Loans*: 1.3 million loans granted to all non-financial firms by all types of banks operating in six prefectures located in Jiangsu Province for the period of 2010 to 2016

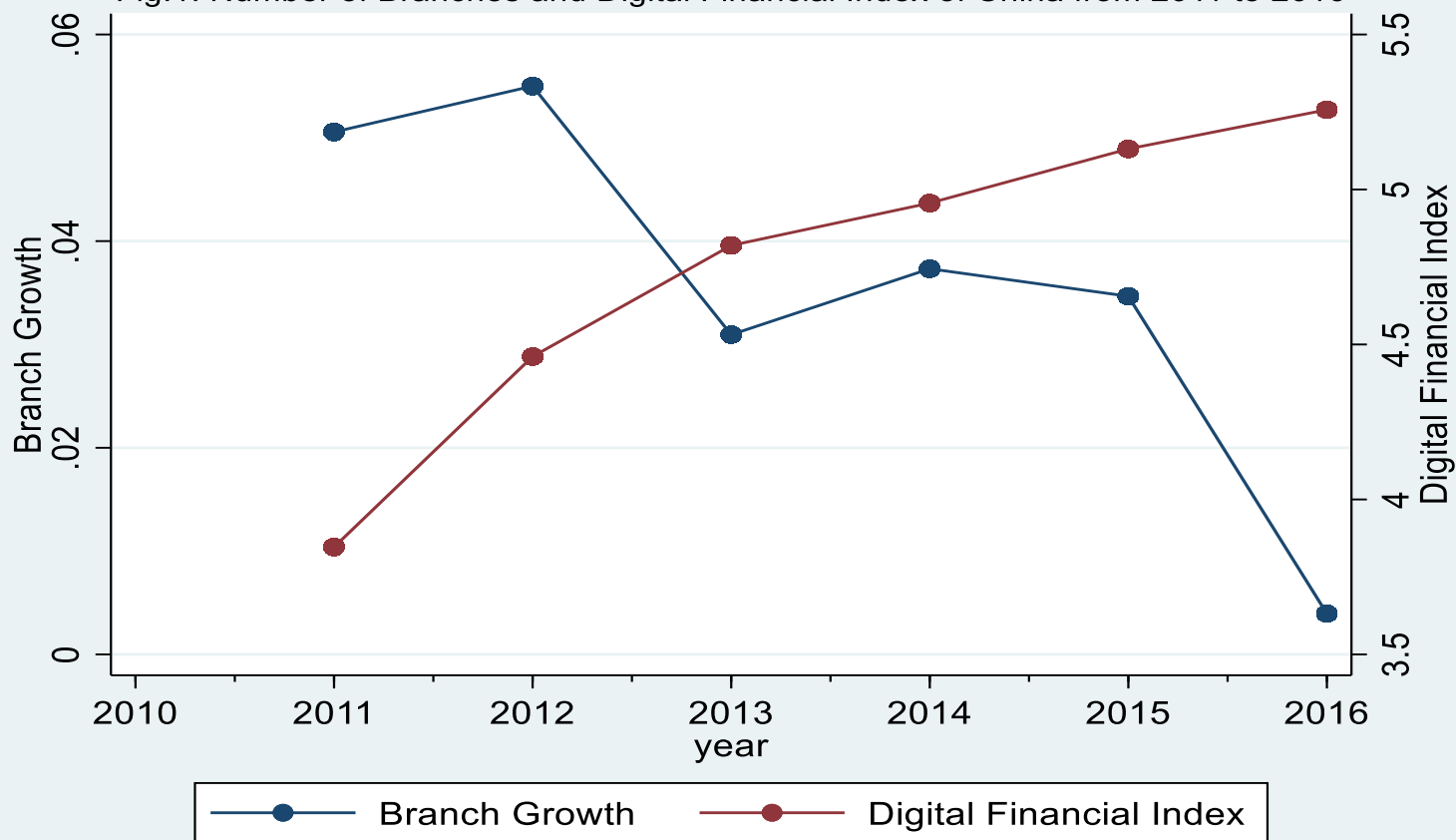
4. *China City Statistical Yearbook*

- Deposit, saving, loan
- Controls: GDP, CPI, Population, etc.

# 3. Fintech and Brick and Mortar Banking Outreaches



Fig.1: Number of Branches and Digital Financial Index of China from 2011 to 2016



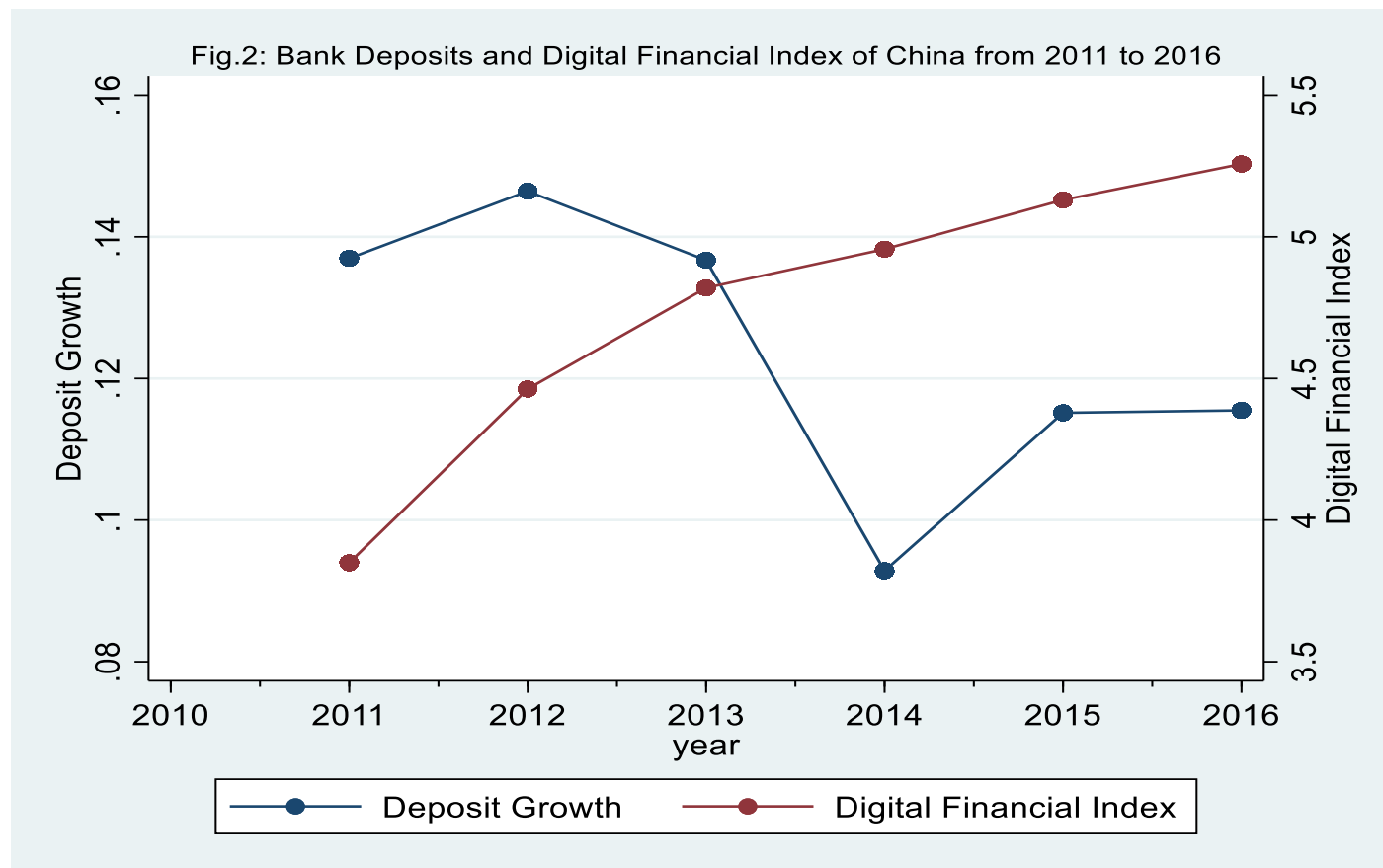
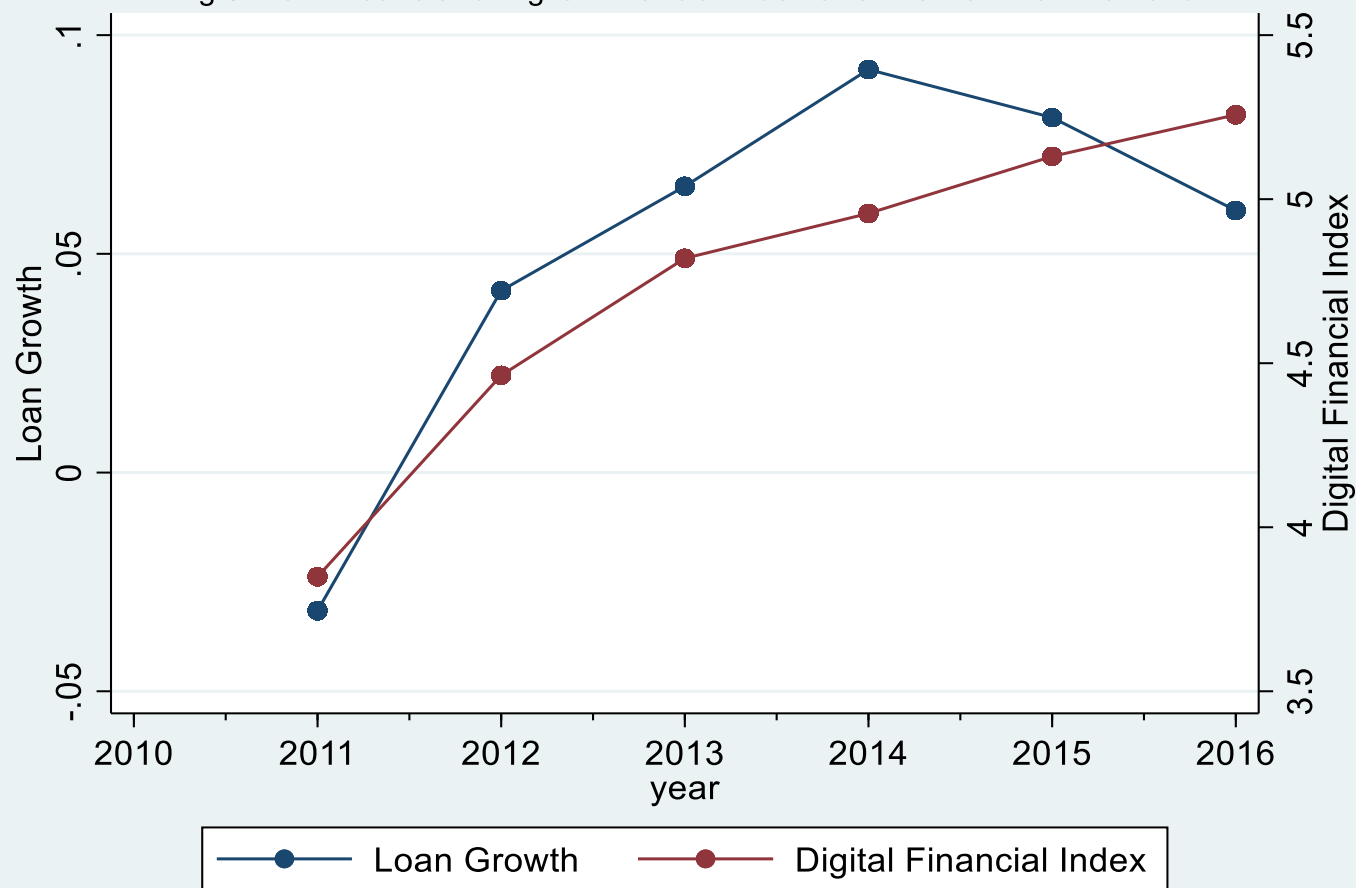




Fig.3: Bank Loans and Digital Financial Index of China from 2011 to 2016



# Empirical model

An empirical model of digital finance and bank outreaches, deposits, saving and loans:

$$y_{it} = \gamma_0 + \gamma_1 DF_{i,t-1} + \gamma_2 x_{it} + \emptyset_i + \varphi_t + u_{it}$$

- $y_{it}$ : bank outreach, loan, deposit, household savings
- $DF_{i,t-1}$ : regional Fintech development
- $x_{it}$ : controls
- $\emptyset_i$ : city effect
- $\varphi_t$ : year effect
- S.D. cluster at city level

Table 1. Number of bank branches and digital financial index

VARIABLES	(1) Lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) Lnindex3	(6) Lnindex5
L.Lnindex	-0.130*** (0.0300)					
L.ln_fin_breadth		-0.0658*** (0.0141)			-0.0714*** (0.0144)	
L.ln_fin_depth			0.0211 (0.0145)		0.0266* (0.0155)	
L.ln_fin_digial				0.00107 (0.0105)	-0.0124 (0.0107)	
L.ln_fin_inv						0.000597 (0.0185)
L.ln_fin_pay						0.131 (0.0992)
L.ln_fin_insurance						-0.0926 (0.0597)
L.ln_fin_funds						-0.0424 (0.165)
L.ln_fin_credit						0.188** (0.0781)
L.PCGDP	0.275 (0.176)	0.302* (0.178)	0.254 (0.177)	0.248 (0.176)	0.313* (0.179)	1.029*** (0.308)
L.lnCPI	-2.886*** (0.974)	-2.594*** (0.924)	-2.559*** (0.962)	-2.613*** (0.974)	-2.529*** (0.911)	-2.453 (2.267)
L.lndensity_p	0.420** (0.171)	0.453*** (0.173)	0.453*** (0.171)	0.451*** (0.170)	0.448** (0.175)	0.313 (0.306)
L.lneducation	0.426 (0.536)	0.334 (0.510)	0.802 (0.564)	0.768 (0.570)	0.373 (0.504)	-0.832 (0.953)
L.lnSOE	0.00498 (0.128)	-0.0353 (0.131)	-0.0343 (0.134)	-0.0452 (0.138)	0.00462 (0.132)	-0.0755 (0.148)
L.lnFDI	0.502 (0.413)	0.355 (0.412)	0.0254 (0.402)	0.121 (0.408)	0.254 (0.405)	0.257 (1.084)
L.lnGovernment	0.234 (0.301)	0.241 (0.309)	0.126 (0.285)	0.140 (0.289)	0.226 (0.306)	0.522 (0.326)
L.lninfrastructure	0.0956 (0.123)	0.0778 (0.124)	0.0627 (0.129)	0.0611 (0.128)	0.0822 (0.124)	-0.0636 (0.136)
Constant	12.37*** (3.342)	10.31*** (3.098)	10.32*** (3.303)	10.73*** (3.314)	9.879*** (3.059)	1.842 (10.02)
Observations	1,233	1,233	1,233	1,233	1,233	448
R-squared	0.379	0.386	0.360	0.359	0.390	0.475
Number of cityid	286	286	286	286	286	233
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
rho	0.990	0.989	0.988	0.988	0.989	0.993

Table 2. Number of bank branches (Big 5) and digital financial index

VARIABLES	(1) Lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) Lnindex3
L.Lnindex	-0.0364* (0.0188)				
L.ln_fin_breadth		-0.0193* (0.00982)			-0.0221** (0.0108)
L.ln_fin_depth			0.00740 (0.0113)		0.00866 (0.0115)
L.ln_fin_digial				-0.00262 (0.00353)	-0.00678 (0.00435)
L.PCGDP	0.280* (0.167)	0.288* (0.171)	0.274 (0.167)	0.272 (0.165)	0.292* (0.172)
L.lnCPI	-1.653** (0.819)	-1.572** (0.785)	-1.558** (0.785)	-1.578** (0.798)	-1.551** (0.773)
L.lndensity_p	0.268* (0.155)	0.278* (0.155)	0.278* (0.152)	0.275* (0.152)	0.274* (0.156)
L.lneducation	0.179 (0.269)	0.147 (0.259)	0.286 (0.287)	0.283 (0.285)	0.161 (0.260)
L.lnSOE	-0.184*** (0.0699)	-0.195*** (0.0715)	-0.194*** (0.0701)	-0.191*** (0.0719)	-0.175** (0.0678)
L.lnFDI	0.806** (0.344)	0.768** (0.339)	0.666** (0.316)	0.699** (0.325)	0.739** (0.331)
L.lnGovernment	0.459 (0.299)	0.463 (0.304)	0.428 (0.285)	0.432 (0.287)	0.458 (0.302)
L.lninfrastructure	0.0132 (0.0514)	0.00848 (0.0538)	0.00413 (0.0543)	0.00384 (0.0535)	0.0104 (0.0534)
Constant	5.988** (2.367)	5.405** (2.178)	5.385** (2.175)	5.556** (2.248)	5.286** (2.138)
Observations	1,233	1,233	1,233	1,233	1,233
R-squared	0.190	0.192	0.185	0.185	0.194
Number of cityid	286	286	286	286	286
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
rho	0.998	0.998	0.998	0.998	0.998

Table 3. Number of bank branches (Joint-equity) and digital financial index

VARIABLES	(1) Lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) Lnindex3
L.Lnindex	0.974*** (0.246)				
L.ln_fin_breadth		0.331** (0.148)			0.319** (0.160)
L.ln_fin_depth			0.589*** (0.140)		0.578*** (0.148)
L.ln_fin_digial				-0.0856 (0.0600)	0.00686 (0.0682)
L.PCGDP	0.486 (0.397)	0.409 (0.407)	0.711* (0.374)	0.463 (0.404)	0.658* (0.375)
L.lnCPI	-10.54** (4.685)	-12.30** (4.749)	-10.72** (4.851)	-12.29** (4.762)	-10.81** (4.881)
L.lndensity_p	0.945* (0.511)	0.734 (0.554)	0.624 (0.577)	0.515 (0.611)	0.769 (0.527)
L.lneducation	6.590 (4.618)	5.708 (4.632)	4.292 (4.411)	3.685 (4.500)	6.417 (4.626)
L.lnSOE	-0.0787 (0.843)	0.0764 (0.823)	0.466 (0.841)	0.303 (0.822)	0.379 (0.828)
L.lnFDI	3.694 (2.344)	4.768* (2.474)	4.521* (2.365)	5.697** (2.489)	3.529 (2.328)
L.lnGovernment	-1.322 (0.812)	-1.396* (0.797)	-1.187 (0.840)	-1.246 (0.810)	-1.472* (0.783)
L.lninfrastructure	-0.465 (0.487)	-0.372 (0.506)	-0.143 (0.481)	-0.244 (0.506)	-0.280 (0.482)
Constant	34.16 (22.10)	46.95** (22.20)	35.82 (23.28)	49.24** (22.20)	34.72 (23.17)
Observations	890	890	890	890	890
R-squared	0.738	0.730	0.737	0.726	0.742
Number of cityid	213	213	213	213	213
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
rho	0.952	0.961	0.960	0.967	0.954

Table 4. Number of bank branches (Rural financial institutions) and digital financial index

VARIABLES	(1) lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) Lnindex3
L.lnindex	-0.130 (0.118)				
L.ln_fin_breadth		-0.0841** (0.0337)			-0.0867** (0.0390)
L.ln_fin_depth			0.0354 (0.0402)		0.0433 (0.0402)
L.ln_fin_digial				0.0143 (0.0212)	-0.00195 (0.0271)
L.PCGDP	0.178 (0.203)	0.220 (0.203)	0.164 (0.206)	0.154 (0.205)	0.236 (0.205)
L.lnCPI	-5.470*** (1.464)	-5.183*** (1.444)	-5.157*** (1.463)	-5.209*** (1.473)	-5.097*** (1.415)
L.lndensity_p	0.131 (0.418)	0.166 (0.398)	0.168 (0.407)	0.173 (0.411)	0.171 (0.415)
L.lneducation	-0.915 (1.573)	-1.126 (1.639)	-0.521 (1.787)	-0.612 (1.848)	-1.077 (1.634)
L.lnSOE	0.0622 (0.367)	0.0225 (0.379)	0.0216 (0.390)	-0.0208 (0.371)	0.0411 (0.361)
L.lnFDI	-0.315 (0.867)	-0.398 (0.994)	-0.862 (0.995)	-0.698 (1.073)	-0.587 (0.918)
L.lnGovernment	0.386 (0.382)	0.422 (0.396)	0.266 (0.365)	0.298 (0.372)	0.397 (0.393)
L.lninfrastructure	0.755 (0.778)	0.743 (0.758)	0.723 (0.758)	0.720 (0.760)	0.747 (0.761)
Constant	25.58*** (5.921)	23.44*** (5.523)	23.44*** (5.695)	23.86*** (5.634)	22.69*** (5.512)
Observations	1,229	1,229	1,229	1,229	1,229
R-squared	0.163	0.169	0.160	0.159	0.171
Number of cityid	285	285	285	285	285
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
rho	0.969	0.967	0.966	0.966	0.966

Table 5. Number of bank branches (Foreign institutions) and digital financial index

VARIABLES	(1) lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) Lnindex3
L.lnindex	0.0643 (0.459)				
L.ln_fin_breadth		0.0218 (0.272)			0.0552 (0.297)
L.ln_fin_depth			0.347 (0.248)		0.385 (0.247)
L.ln_fin_digial				-0.0152 (0.0723)	-0.0239 (0.0768)
L.PCGDP	-0.0254 (0.337)	-0.0197 (0.334)	-0.0986 (0.334)	-0.0208 (0.335)	-0.103 (0.343)
L.lnCPI	1.129 (2.644)	1.134 (2.640)	1.863 (2.716)	1.289 (2.806)	2.123 (2.894)
L.lndensity_p	0.133 (0.373)	0.135 (0.375)	0.101 (0.388)	0.137 (0.372)	0.113 (0.392)
L.lneducation	4.596* (2.675)	4.645 (3.243)	3.021 (3.059)	4.502 (3.125)	3.902 (3.167)
L.lnSOE	-0.637 (0.476)	-0.632 (0.473)	-0.477 (0.508)	-0.605 (0.465)	-0.426 (0.528)
L.lnFDI	-2.176 (2.344)	-2.200 (2.309)	-2.387 (2.426)	-2.270 (2.281)	-2.557 (2.408)
L.lnGovernment	0.106 (0.769)	0.108 (0.780)	-0.0102 (0.757)	0.0875 (0.731)	-0.0989 (0.754)
L.lninfrastructure	0.788* (0.453)	0.789* (0.451)	0.848* (0.464)	0.783* (0.442)	0.838* (0.464)
Constant	-7.540 (14.67)	-7.461 (14.64)	-11.13 (15.07)	-8.027 (15.11)	-12.71 (16.01)
Observations	283	283	283	283	283
R-squared	0.365	0.365	0.374	0.365	0.375
Number of cityid	61	61	61	61	61
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
rho	0.993	0.993	0.993	0.993	0.993

Table 6. Number of bank branches (Postal Savings Bank) and digital financial index

VARIABLES	(1) lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) Lnindex3
L.lnindex	-0.0285 (0.0208)				
L.ln_fin_breadth		-0.0184* (0.0105)			-0.0189* (0.0114)
L.ln_fin_depth			0.00776 (0.0109)		0.00970 (0.0116)
L.ln_fin_digial				0.00335 (0.00339)	-0.000121 (0.00424)
L.PCGDP	0.274 (0.169)	0.283 (0.172)	0.271 (0.168)	0.269 (0.166)	0.287 (0.174)
L.lnCPI	-0.949 (0.851)	-0.884 (0.816)	-0.869 (0.815)	-0.888 (0.826)	-0.859 (0.803)
L.lndensity_p	0.220 (0.187)	0.227 (0.187)	0.227 (0.184)	0.229 (0.184)	0.228 (0.188)
L.lneducation	0.00572 (0.319)	-0.0411 (0.306)	0.0927 (0.335)	0.0713 (0.332)	-0.0301 (0.307)
L.lnSOE	-0.0416 (0.0702)	-0.0500 (0.0733)	-0.0490 (0.0722)	-0.0598 (0.0738)	-0.0458 (0.0699)
L.lnFDI	0.554 (0.355)	0.536 (0.347)	0.436 (0.328)	0.471 (0.332)	0.494 (0.342)
L.lnGovernment	0.463 (0.298)	0.471 (0.303)	0.438 (0.284)	0.445 (0.287)	0.466 (0.301)
L.lninfrastructure	0.0535 (0.0513)	0.0507 (0.0535)	0.0466 (0.0543)	0.0457 (0.0542)	0.0515 (0.0542)
Constant	2.501 (2.593)	2.024 (2.385)	1.990 (2.394)	2.109 (2.441)	1.831 (2.354)
Observations	1,233	1,233	1,233	1,233	1,233
R-squared	0.168	0.171	0.166	0.165	0.172
Number of cityid	286	286	286	286	286
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
rho	0.998	0.998	0.998	0.998	0.998



Table 7. Number of bank branches and digital financial index at the T3 and T4 prefectures

VARIABLES	(1) lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) outreach
L.lnindex	-0.116*** (0.0326)				
L.ln_fin_breadth		-0.0662*** (0.0146)			-0.0704*** (0.0154)
L.ln_fin_depth			0.0292 (0.0180)		0.0391** (0.0182)
L.ln_fin_digial				0.00629 (0.00731)	-0.00537 (0.00812)
L.PCGDP	0.275 (0.187)	0.303 (0.189)	0.260 (0.189)	0.252 (0.187)	0.317* (0.191)
L.lnCPI	-3.146*** (1.051)	-2.951*** (1.005)	-2.866*** (1.028)	-2.911*** (1.043)	-2.895*** (0.983)
L.lndensity_p	0.372** (0.188)	0.403** (0.191)	0.368* (0.190)	0.378** (0.189)	0.393** (0.194)
L.lneducation	0.384 (0.539)	0.245 (0.519)	0.681 (0.567)	0.642 (0.575)	0.263 (0.511)
L.lnSOE	-0.00177 (0.133)	-0.0402 (0.136)	-0.0198 (0.136)	-0.0494 (0.136)	-0.00807 (0.130)
L.lnFDI	0.365 (0.458)	0.280 (0.460)	-0.110 (0.441)	-0.0190 (0.452)	0.178 (0.448)
L.lnGovernment	0.311 (0.337)	0.344 (0.353)	0.248 (0.328)	0.252 (0.327)	0.346 (0.357)
L.lninfrastructure	0.140 (0.123)	0.125 (0.124)	0.122 (0.129)	0.118 (0.129)	0.131 (0.125)
Constant	13.79*** (3.534)	12.23*** (3.307)	12.10*** (3.431)	12.44*** (3.504)	11.74*** (3.224)
Observations	1,092	1,092	1,092	1,092	1,092
R-squared	0.402	0.415	0.386	0.384	0.420
Number of cityid	247	247	247	247	247
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
rho	0.989	0.988	0.988	0.988	0.988

Table 8. Number of bank branches and digital financial index -- IV estimation

VARIABLES	(1) Second stage Outreach	(2) First Stage Inindex
L.Inindex	-0.798** (0.373)	
L.broadband		0.055** (0.025)
L.PCGDP	0.407* (0.207)	0.188** (0.090)
L.lnCPI	-4.616*** (1.731)	-2.566** (1.128)
L.lndensity_p	0.286 (0.258)	-0.197 (0.232)
L.lneducation	-1.356 (1.267)	-2.631** (1.021)
L.lnSOE	0.203 (0.180)	0.332* (0.184)
L.lnFDI	2.661* (1.362)	3.070*** (0.789)
L.lnGovernment	0.726 (0.504)	0.571** (0.264)
L.lninfrastructure	0.304* (0.158)	0.251* (0.152)
Observations	1,134	1,134
Number of cityid	247	263
Year FE	Yes	Yes
City FE	Yes	Yes
Kleibergen-Paap P-value	0.0195	
Cragg-Donald Wald F	7.797	

# Table 9. Bank deposit and digital financial index

VARIABLES	(1) lnindex	(2) ln_fin_breadth	(3) ln_fin_depth	(4) ln_fin_digial	(5) ln_fin_inv	(6) ln_fin_pay	(7) ln_fin_insurance	(8) ln_fin_funds	(9) ln_fin_credit	(10) Lnindex3	(11) Lnindex5
L.lnindex	-0.0324* (0.0175)										
L.ln_fin_breadth		-0.00939 (0.00720)								-0.00590 (0.00815)	
L.ln_fin_depth			-0.0422*** (0.0112)							-0.0406*** (0.0117)	
L.ln_fin_digial				0.00402 (0.00624)						0.000727 (0.00644)	
L.ln_fin_inv					0.0125 (0.0224)						-0.0533** (0.0260)
L.ln_fin_pay						-0.0190* (0.0101)					-0.100 (0.140)
L.ln_fin_insurance							-0.0213*** (0.00556)				0.0205 (0.0721)
L.ln_fin_funds								0.00373 (0.00925)			0.754*** (0.207)
L.ln_fin_credit									-0.00767** (0.00384)		0.131 (0.0915)
L.PCGDP	0.137 (0.0915)	0.138 (0.0938)	0.119 (0.0933)	0.130 (0.0908)	0.492** (0.200)	0.125 (0.0932)	0.125 (0.0925)	0.283* (0.155)	0.124 (0.0932)	0.125 (0.0975)	0.540** (0.210)
L.lnCPI	-0.641 (0.658)	-0.578 (0.650)	-0.651 (0.652)	-0.574 (0.649)	-3.448 (3.034)	-0.720 (0.633)	-0.780 (0.646)	-1.577 (1.115)	-0.451 (0.652)	-0.655 (0.651)	-2.786 (2.493)
L.lndensity_p	0.0870 (0.108)	0.0950 (0.110)	0.0985 (0.109)	0.101 (0.112)	-0.861 (1.364)	0.0836 (0.110)	0.0746 (0.112)	-0.101 (0.141)	0.0985 (0.110)	0.0982 (0.108)	-0.864 (1.294)
L.lneducation	0.255 (0.359)	0.283 (0.358)	0.300 (0.355)	0.317 (0.358)	0.937 (1.283)	0.214 (0.363)	0.329 (0.348)	0.882 (0.698)	0.329 (0.359)	0.269 (0.352)	1.787* (1.053)
L.lnSOE	0.115 (0.0845)	0.104 (0.0838)	0.0829 (0.0849)	0.0943 (0.0873)	-0.518*** (0.179)	0.0927 (0.0857)	0.0673 (0.0843)	-0.0743 (0.113)	0.114 (0.0839)	0.0832 (0.0874)	-0.572*** (0.198)
L.lnFDI	0.0760 (0.404)	0.0114 (0.401)	0.0941 (0.397)	-0.0285 (0.398)	1.536* (0.908)	0.00379 (0.398)	0.0772 (0.395)	0.554 (0.699)	-0.00883 (0.401)	0.117 (0.398)	1.124 (0.909)
L.lnGovernment	-0.110 (0.203)	-0.115 (0.205)	-0.129 (0.193)	-0.126 (0.198)	0.0262 (0.397)	-0.140 (0.195)	-0.123 (0.202)	0.0555 (0.237)	-0.129 (0.197)	-0.120 (0.199)	-0.230 (0.427)
L.lninfrastructure	0.0138 (0.0524)	0.00825 (0.0522)	0.00124 (0.0517)	0.00335 (0.0519)	0.296** (0.137)	0.00470 (0.0527)	0.0366 (0.0531)	0.143* (0.0835)	-0.00324 (0.0522)	0.00443 (0.0521)	0.317** (0.129)
Constant	1.285 (2.540)	0.848 (2.506)	1.515 (2.519)	0.832 (2.508)	15.64 (13.59)	1.770 (2.495)	2.075 (2.502)	4.819 (4.046)	0.393 (2.496)	1.488 (2.526)	8.346 (10.88)
Observations	1,163	1,163	1,163	1,163	445	1,160	1,162	687	1,161	1,163	445
R-squared	0.209	0.208	0.216	0.207	0.166	0.208	0.218	0.146	0.209	0.216	0.248
Number of cityid	255	255	255	255	232	255	255	250	255	255	232
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
rho	0.897	0.907	0.898	0.910	0.993	0.890	0.888	0.918	0.902	0.900	0.993

# Table 10. Bank loan and digital financial index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	lnindex	ln_fin_breadth	ln_fin_depth	ln_fin_digial	ln_fin_inv	ln_fin_pay	ln_fin_insurance	ln_fin_funds	ln_fin_credit
L.lnindex	0.0134 (0.0321)								
L.ln_fin_breadth		0.00155 (0.0101)							
L.ln_fin_depth			0.00904 (0.0311)						
L.ln_fin_digial				0.0185 (0.0117)					
L.ln_fin_inv					-0.00378 (0.0329)				
L.ln_fin_pay						0.00988 (0.0181)			
L.ln_fin_insurance							4.74e-05 (0.00995)		
L.ln_fin_funds								0.00604 (0.0147)	
L.ln_fin_credit									-0.00638 (0.00643)
L.PCGDP	-0.0548 (0.0934)	-0.0532 (0.0943)	-0.0494 (0.0883)	-0.0492 (0.0890)	-0.154 (0.220)	-0.0514 (0.0893)	-0.0535 (0.0889)	-0.0194 (0.128)	-0.0421 (0.0900)
L.lnCPI	2.811 (2.540)	2.780 (2.530)	2.795 (2.543)	2.756 (2.532)	-9.307 (8.874)	2.988 (2.467)	2.791 (2.613)	3.406 (5.054)	2.438 (2.552)
L.lndensity_p	0.170* (0.0938)	0.166* (0.0919)	0.165* (0.0916)	0.187* (0.0969)	-0.624 (0.802)	0.180* (0.0974)	0.159* (0.0895)	0.0102 (0.130)	0.178* (0.0930)
L.lneducation	-1.180 (0.804)	-1.204 (0.817)	-1.206 (0.831)	-1.268 (0.850)	-2.652 (3.852)	-1.095 (0.830)	-1.196 (0.836)	1.494 (1.230)	-1.244 (0.843)
L.lnSOE	0.132 (0.332)	0.136 (0.331)	0.141 (0.333)	0.0986 (0.329)	-0.544 (0.348)	0.149 (0.326)	0.140 (0.343)	0.247 (0.611)	0.0911 (0.333)
L.lnFDI	-1.254* (0.712)	-1.219* (0.687)	-1.238* (0.687)	-1.197* (0.669)	-3.619*** (1.281)	-1.217* (0.675)	-1.212* (0.670)	-1.126 (1.012)	-1.238* (0.673)
L.lnGovernment	-0.601*** (0.161)	-0.596*** (0.161)	-0.594*** (0.156)	-0.579*** (0.153)	-0.763* (0.408)	-0.571*** (0.151)	-0.595*** (0.156)	-0.405 (0.415)	-0.592*** (0.158)
L.lninfrastructure	-0.116 (0.0833)	-0.112 (0.0813)	-0.111 (0.0804)	-0.111 (0.0806)	0.0354 (0.194)	-0.108 (0.0804)	-0.109 (0.0858)	-0.107 (0.170)	-0.111 (0.0814)
Constant	-13.29 (11.37)	-13.10 (11.34)	-13.24 (11.43)	-13.21 (11.35)	48.84 (43.22)	-14.22 (10.92)	-13.11 (11.79)	-15.54 (22.77)	-11.65 (11.45)
Observations	1,183	1,183	1,183	1,183	446	1,180	1,182	688	1,181
R-squared	0.021	0.021	0.021	0.022	0.059	0.021	0.021	0.018	0.020
Number of cityid	268	268	268	268	233	268	268	251	268
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
rho	0.579	0.569	0.571	0.625	0.957	0.605	0.552	0.125	0.613

## 4. Fintech and Financial Stability



# Yu'e Bao and Chinese Banking Industry

Launched in June 2013, Yu'e Bao is sold exclusively on Alibaba's Alipay payments service.

- **Consumer-oriented business models:**

- Clients can transfer funds immediately from Alipay to their account at Yu'e Bao;
- Clients can withdraw funds just as easily at any time without paying a penalty
- User interface: Clients can transfer funds in and out with just one click either on a personal computer or a smartphone

# Yu'eobao and Chinese Banking Industry

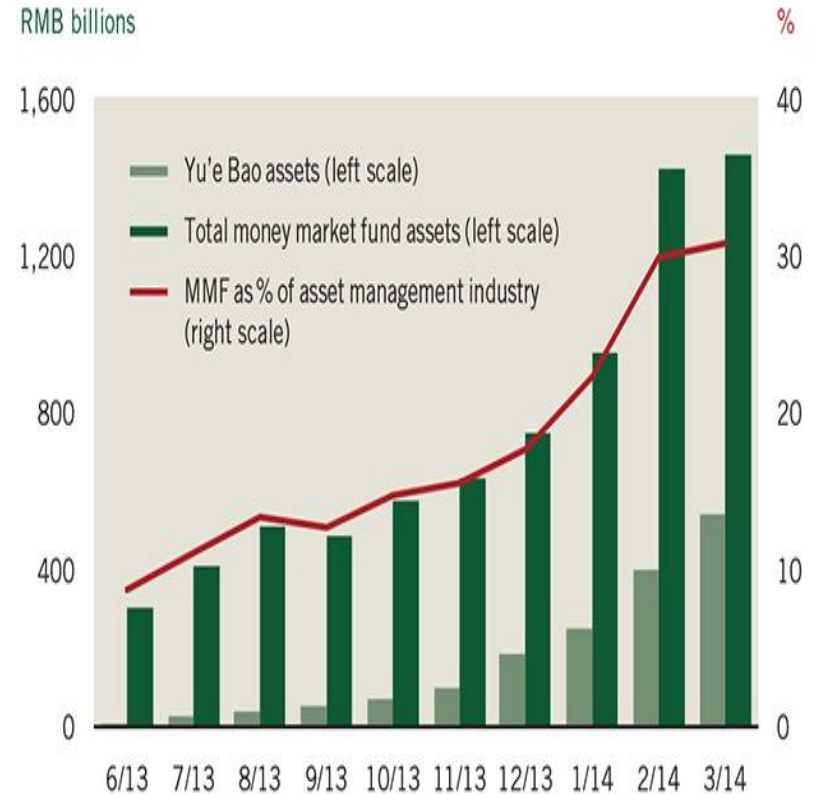
**Investment and Profit:** invests primarily in China's interbank market through Tianhong Asset Management Co. In October 2013, Alibaba spent 1.1 billion yuan to acquire 51 percent of the firm

Tianhong has been able to negotiate annualized interest rates as high as 8 percent from various banks, allowing it to offer returns of 6 percent or more to depositors in Yu'e Bao.

In effect, Alibaba is getting the banks to fund their most potent rival.

- 92 percent of Yu'e Bao's funds are parked in negotiable deposits with smaller Chinese banks.
- Big Five state-owned banks have refused to take deposits from Tianhong for competitive reasons.
- rules mandates: daily cap on investment; net assets of all money market funds managed by a single house must not exceed 200 times the firm's provisions for risk

# Money market fund and Yu'e Bao



Economist.com

Yu'e bao has been growing at a CAGR of 125% since its launch in 2013



# Empirical strategy

## Difference-in-Difference model

$$y_{it} = \beta_0 + \beta_1 Yuebao_t + \beta_2 Yuebao_t * Treat_i + \beta_3 Treat_i + \beta_4 L_{it} + \beta_5 F_{ft} + u_{lbft}$$

- **Treatment group** – areas (or banks) highly exposed to fintech development; **Control group** – areas (or banks) less exposed to fintech development
- **Time window**
  - Pre-Yuebao period: 1 Jan 2012 – June 2013
  - Post- Yuebao period: June 2013 – Dec 2014
- **Controls**
  - loan characteristics: borrowing amount, maturity and the type of loans
  - firm characteristics: firm age, ownership, size, credit rating, etc
  - Regional factors: economic structure, real GDP per capita
  - Various fixed effects: year effect, bank effect, city effect, bank\*year effect; city\*year effect

# Fintech, bank interest expense and income: DID analysis

VARIABLES	(1)	(2)
	Interest expense/ total deposit	Interest Income/ Total loan
Yuebao * High Fintech exposure regions	0.0038*** (0.0014)	0.0130*** (0.0034)
Ln(bank asset)	0.0185*** (0.0030)	0.0526*** (0.0072)
Equity to assests	-0.0360 (0.0268)	0.1426** (0.0640)
Bank fixed effects	Y	Y
Year fixed effects	Y	Y
Observations	236	236
R-squared	0.7685	0.7868

# Fintech, bank interest expense and income: DDD analysis

	(1) Interest expense /total deposit	(2) Interest income /total loan	(3) NPL ratio
Yuebao	-0.0030 (0.0020)	-0.0239*** (0.0050)	0.7514*** (0.1904)
City commercial bank*Yuebao	-0.0057*** (0.0021)	-0.0247*** (0.0053)	-0.1545 (0.1956)
City commercial bank*Yuebao * High Fintech exposure	0.0055*** (0.0016)	0.0174*** (0.0041)	0.0303 (0.1520)
High Fintech exposure	0.0074 (0.0049)	-0.0091 (0.0123)	0.6529 (0.4492)
Ln (Bank asset)	0.0126*** (0.0022)	0.0556*** (0.0054)	0.2191 (0.2217)
Capital ratio	-0.0517*** (0.0172)	0.2010*** (0.0434)	-2.6968 (1.7447)
Liquidity ratio	-0.0174*** (0.0063)	0.0290* (0.0161)	0.4802 (0.6360)
Constant	-0.2613*** (0.0512)	-1.1991*** (0.1294)	-4.9401 (5.2314)
Bank fixed effects	Y	Y	Y
City fixed effects	Y	Y	Y
Observations	680	675	649
R-squared	0.7865	0.7838	0.4995

# Fintech and bank lending (loan level data)

VARIABLES	(1) Loan spread	(2) default
Yuebao	0.0069*** (0.0008)	0.0043*** (0.0005)
Yuebao*City commercial banks	0.0041*** (0.0010)	0.0005 (0.0005)
Ln(Loan amount)	-0.0003 (0.0002)	0.0001 (0.0001)
Ln(number of borrowings)	-0.0274*** (0.0002)	0.0004*** (0.0001)
Firm age	0.0040*** (0.0001)	-0.0008*** (0.0000)
Firm age square	-0.0001*** (0.0000)	0.0000*** (0.0000)
Share of secondary industry	0.1090** (0.0479)	-0.1381*** (0.0233)
Share of tertiary industry	1.8219*** (0.0553)	0.0570*** (0.0134)
Ln(GDP per capita)	0.4167*** (0.0108)	0.0095** (0.0044)
deposit_reserve1	-0.0383 (0.0413)	-0.0194 (0.0173)
Benchmark rate	-0.0132*** (0.0009)	0.0019*** (0.0004)
Constant	-4.8577*** (0.1095)	-0.0771* (0.0401)
Firm ownership	Yes	Yes
Maturity	Yes	Yes
Loan type	Yes	Yes
Firm size	Yes	Yes
Bank Ownership	Yes	Yes
City Effect	Yes	Yes
Observations	763,406	763,406
R-squared	0.4330	0.0120

# Fintech and bank lending (loan level data)

VARIABLES	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Default	(5) Default	(6) Default
Yuebao	-0.0269*** (0.0012)	0.0018** (0.0008)	-0.0535*** (0.0015)	0.0024*** (0.0005)	0.0024*** (0.0004)	-0.0023*** (0.0006)
Yuebao*Micro and small enterprises	0.0332*** (0.0010)			-0.0000 (0.0003)		
Yuebao*SOEs		-0.0530*** (0.0030)			-0.0023*** (0.0003)	
Yuebao*short-term loan			0.0587*** (0.0013)			0.0050*** (0.0005)
Ln(amount)	-0.0184*** (0.0002)	-0.0184*** (0.0002)	-0.0185*** (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
Ln(number of borrowings)	-0.0369*** (0.0002)	-0.0370*** (0.0002)	-0.0370*** (0.0002)	-0.0000 (0.0001)	-0.0000 (0.0001)	-0.0000 (0.0001)
Firm age	0.0014*** (0.0001)	0.0015*** (0.0001)	0.0016*** (0.0001)	-0.0008*** (0.0000)	-0.0008*** (0.0000)	-0.0008*** (0.0000)
Firm age squared	-0.0000*** (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)	0.0000*** (0.0000)	0.0000*** (0.0000)	0.0000*** (0.0000)
Share of secondary industry	-1.6361*** (0.0429)	-1.5391*** (0.0428)	-1.5227*** (0.0428)	-0.0443*** (0.0160)	-0.0443*** (0.0159)	-0.0429*** (0.0159)
Share of tertiary industry	1.8633*** (0.0462)	1.8632*** (0.0463)	1.8525*** (0.0462)	0.0084 (0.0098)	0.0081 (0.0098)	0.0068 (0.0098)
Ln(GDP per capita)	0.7419*** (0.0097)	0.7163*** (0.0097)	0.6943*** (0.0097)	-0.0196*** (0.0031)	-0.0197*** (0.0031)	-0.0216*** (0.0031)
Reserve requirement	0.9456*** (0.0375)	0.9594*** (0.0375)	0.9246*** (0.0375)	-0.0657*** (0.0119)	-0.0655*** (0.0119)	-0.0682*** (0.0119)
Benchmark rate	-0.0506*** (0.0008)	-0.0507*** (0.0008)	-0.0509*** (0.0008)	0.0029*** (0.0003)	0.0029*** (0.0003)	0.0029*** (0.0003)
Constant	-7.0570*** (0.0980)	-6.8173*** (0.0976)	-6.5778*** (0.0975)	0.2282*** (0.0295)	0.2301*** (0.0295)	0.2524*** (0.0294)
Firm ownership	Yes	Yes	Yes	Yes	Yes	Yes
Maturity	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes
Firm size	Yes	Yes	Yes	Yes	Yes	Yes
Bank Ownership	Yes	Yes	Yes	Yes	Yes	Yes
City Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,325,916	1,325,916	1,325,916	1,325,916	1,325,916	1,325,916
R-squared	0.3902	0.3898	0.3906	0.0058	0.0058	0.0058

# Fintech and shadow banking (wealth management product)

	(1) Issue rate	(2) Ln(min sub amount)	(3) Term
Yuebao	0.0061*** (0.0001)	0.1533*** (0.0287)	19.8291*** (2.8026)
Yuebao * High Fintech exposure regions	0.0007*** (0.0001)	-0.1612*** (0.0226)	-25.5863*** (2.3219)
High Fintech exposure regions	-0.0045*** (0.0009)	0.1486*** (0.0386)	73.3814*** (16.6471)
Term	0.0000*** (0.0000)	0.0001*** (0.0000)	
Ln(min sub amount)	0.0010*** (0.0000)		
Reserve requirement	-0.0295*** (0.0106)	-0.7496 (1.7862)	-85.5666 (199.5796)
Deposit rate	0.0061*** (0.0003)	-0.0425 (0.0451)	0.1991 (4.9083)
Observations	73467	73467	73467
$R^2$	0.460	0.158	0.075
Adjusted $R^2$	0.458	0.154	0.072

# Conclusion

FinTech enhances competition in financial markets, provide services that traditional financial institutions do less efficiently or do not do at all, and widen the pool of users of such services.

Fintech reduces the bank outreaches. The effects are more outstanding for big 5, postal saving, rural financial institutions and in small cities

Fintech increases banks' funding cost, loan rate and default rate, indicating higher level of financial instability

**Thank you very much!**

