FinTech Adoption and Household Risk-Taking

From Digital Payments to Platform Investments

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Based on joint work with **Claire Yurong Hong** (SJTU) and **Xiaomeng Lu** (Fudan)

Household Finance in the Age of FinTech

- The current wave of "Fin + Tech" is unique in that:
  - FinTech **platforms** with giant user bases and high technological efficiency.
  - Financial services delivered directly via the convenience of **super apps**.
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- In China, activities central to household finance migrating onto FinTech platforms.
  - Consumption: online consumption accounts for 25% of the total.
  - Investments: 30% of mutual fund purchases.
  - Payments: digital payments everywhere.

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- Our paper: How widespread adoptions of FinTech can reshape household finance and enhance financial inclusion.
  - Can FinTech improve risk-taking by helping breakdown the traditional barriers faced by households in their participation of financial markets?
  - Who benefits the most from the financial inclusion via FinTech?

Alipay: A FinTech App that Bundles "Everything"

Imagine if

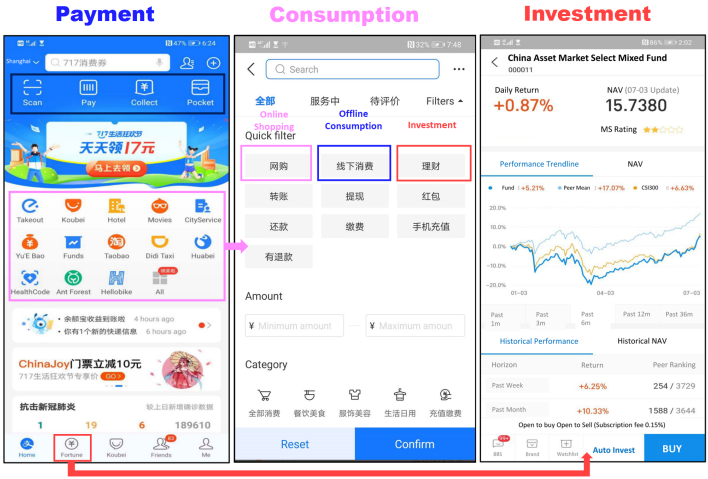
1. Main-Street Banks
2. Wall Street's Brokers
3. Boston's Asset Managers
4. Connecticut's Insurers

all shrunk to fit into

1. One Single App

that almost everyone used.

— The Economist, Oct 8th 2020



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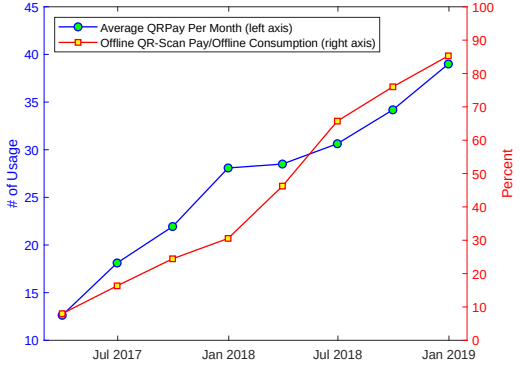
1. Reduction or even elimination of the physical costs of participation.
2. Reduction of the psychological barriers:
   - Via FinTech adoptions, individuals acquire familiarity through repeated usages of digital payments on the all-in-one super-apps.
   - As familiarity leads to trust, repeated usages of digital payments can help lessen the psychological barriers that prevent households from market participation.

A Unique Explosion of FinTech Penetration

买菜也能扫码支付了 绍兴首家智慧农贸市场下月使用

2017-12-22 7:16 | 绍兴晚报

"Use QR-Code Scan to pay at local farmer's markets."



Summary of Main Findings

- County-level evidence:
  - One standard deviation increase in FinTech penetration predicts 0.8%$\sim$2.2% increases in risky-fund purchase over the next month.
  - Use Distance to Ant to capture the exogenous variation in FinTech penetration.
- Individual-level evidence:
  - One standard deviation increase in FinTech adoption predicts 1.4%$\sim$2.7% increases in risky fund purchase over the next month.
  - Systematic vs. idiosyncratic Fintech adoption.
  - Further evidences on risky share, portfolio volatility and portfolio diversification.
- Financial inclusion via FinTech: Who benefits more?
  - Individuals with higher risk tolerance (proxied by their consumption volatility).
  - Counties under-served by traditional banks (proxied by # of bank branches).

Related Literature

- Household finance and portfolio choices: Merton (1971) and Campbell (2006).
- Familiarity and trust as a driver of low participation and under risk-taking. Hong, Kubik, and Stein (2004) and Guiso, Sapienza, and Zingales (2008).
- Technology and household finance:
  - Platform investments in mutual funds: Hong, Lu, and Pan (2022).
  - Tech and household investments: Barber and Odean (2002), Choi, Laibson, and Metrick (2002), Bogan (2008), D'Acunto, Prabhala, and Rossi (2019), and Reher and Sokolinski (2021).
  - Digital payments, mobile money, and financial inclusion/liberation: Jack and Suri (2011), Agarwal et al. (2019), Suri, Bharadwaj, and Jack (2021), Ouyang (2021), Buchak, Hu, and Wei (2022).
- Consumption volatility and risk aversion: Mankiw and Zeldes (1991).

Data Summary

A random sample of 50,000 individuals from Ant Group

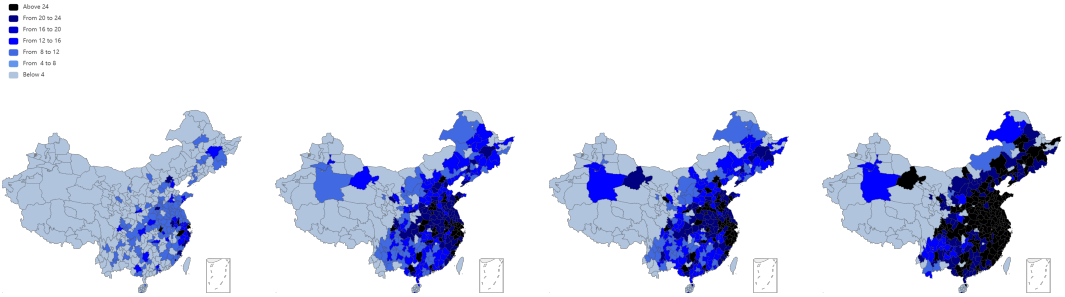
- Monthly payments, consumption, and investments from Jan 2017 to Mar 2019.
- Risky mutual funds: Bond, Mixed, Equity, Index, QDII, and Gold.

Variable	Mean	Median	STD	N
Age	30.4	29.0	7.8	50,000
Female	0.6	1.0	0.5	50,000
Consumption (yuan)	2,155	1,259	17,064	50,000
Consumption σ_C	1.01	0.73	0.92	50,000
QRPay (# per month)	21.40	15.70	19.22	50,000
AliFrac	0.54	0.56	0.22	50,000
Risky Purchase	9.2%	0.0%	28.9%	1,350,000
#Funds	3.71	2.00	5.85	28,393
#Assets	1.93	1.00	1.30	28,393
Risky Share	50.8%	51.1%	46.2%	28,393
Portfolio σ_W	2.13%	0.18%	4.66%	28,393

- σ_C: Consumption growth volatility
- Risky Purchase: $= 1$ if purchase any risky fund in a month
- Risky Share: Fraction of risky investments out of total holdings
- σ_W: Portfolio return volatility

Measuring FinTech Penetration

- QRPay$_t^i$: individual i's number of Alipay payments during month t.
- City-level FinTech penetration: QRPay$_t^i$ averaged across i in a given city.



Can FinTech Improve Household Risk-Taking? County-Level Evidence

- Calculate county-level variables as the individual average

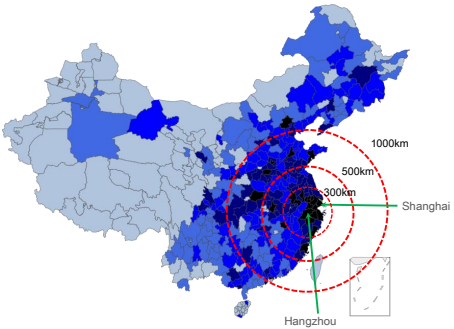
$$\text{Risky Purchase}^{c}_{t+1} = a * \text{Log(QRPay)}^{c}_{t} + \sum \text{b*Controls}^{c}_{t} + \epsilon^{c}_{t}$$

	(1)	(2)	(3)	(4)
Log(QRPay)	2.190***	0.781***	1.057***	1.017***
	(5.57)	(4.34)	(4.85)	(4.59)
Log(GDP)	-0.596***	-0.147	-0.275**	-0.266**
	(-3.95)	(-1.30)	(-2.25)	(-2.15)
Log(Income)	0.236*	0.406***	0.155	0.162
	(1.97)	(3.78)	(1.25)	(1.30)
Log(Population)	-0.07	0.042	0.053	0.056
	(-0.78)	(0.47)	(0.53)	(0.56)
Fixed Effects		month	month&province	month×province
Observations	20,852	20,852	20,852	20,852
R-squared	0.119	0.334	0.351	0.387

- One std increase in Log(QRPay) $\Rightarrow$ Next-month increase of **0.8%** to **2.2%** in risky purchase.

Can FinTech Improve Household Risk-Taking? County-Level Evidence

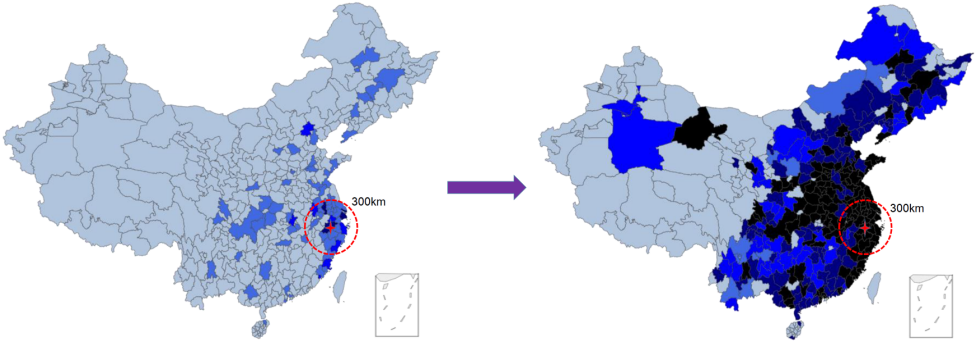
Use "Distance to Ant" to capture the exogenous shocks to FinTech exposure:



	Y=Log(QRPay)			
	All	⩽1000 km	⩽500 km	⩽300 km
Log(Dist to Ant) (a)	-0.268***	-0.184***	-0.140***	-0.167***
	(-14.31)	(-6.55)	(-3.60)	(-4.01)
Controls, Time FE	Y	Y	Y	Y
Observations	20,852	12,402	5,902	4,212
R-squared	72.8%	71.9%	71.4%	69.3%
F-stat of (a)	204.80	42.91	12.94	16.05
	All	⩽1000 km	⩽500 km	⩽300 km
Log(Dist to SH) (b)	-0.237***	-0.133***	-0.048	-0.062
	(-12.20)	(-4.58)	(-0.95)	(-1.03)
Controls, Time FE	Y	Y	Y	Y
Observations	20,852	12,402	5,902	4,212
R-squared	71.5%	70.8%	70.1%	67.1%
F-stat of (b)	148.82	20.99	0.91	1.06

Can FinTech Improve Household Risk-Taking? County-Level Evidence

Also take advantage of the time-varying FinTech penetration:



Can FinTech Improve Household Risk-Taking? County-Level Evidence

	First Stage			Second Stage		
	Y=Log(QRPay)			Y=Risky Purchase		
$\widehat{\text{Log(QRPay)}}$				2.335**	2.150**	3.534***
				(2.11)	(2.09)	(2.81)
Log(Dist to Ant)	-0.167***	-0.230***	-0.340***			
	(-4.01)	(-4.88)	(-5.56)			
Log(Dist to Ant)*Time		0.071***	0.071***			
		(8.04)	(4.72)			
Controls	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
City FE	N	N	Y	N	N	Y
Observations	4,212	4,212	4,212	4,212	4,212	4,212
R-squared	69.3%	69.4%	83.2%	38.7%	38.7%	42.8%

Can FinTech Improve Household Risk-Taking? Individual-Level Evidence

$$\text{Risky Purchase}^i_{t+1} = a * \text{Log(QRPay)}^i_t + \sum b * \text{Controls}^i_t + \epsilon^i_t$$

	Y=Risky Purchase							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(QRPay)	2.719***	2.206***	2.660***	1.413***				
	(7.78)	(8.13)	(6.07)	(6.32)				
Sys Log(QRPay)					3.387***	2.786***	4.811***	2.743***
					(8.15)	(8.57)	(5.74)	(6.18)
Idio Log(QRPay)					1.047***	0.991***	1.058***	1.009***
					(5.00)	(5.09)	(5.04)	(5.25)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	N	Y	N	Y	N	Y	N	Y
User FE	N	N	Y	Y	N	N	Y	Y
Observations	1,300,000	1,300,000	1,300,000	1,300,000	1,299,844	1,299,844	1,299,844	1,299,844
R-squared	1.2%	2.2%	28.4%	29.4%	1.3%	2.3%	28.6%	29.5%

- Sys Log(QRPay)^i_t: Predicted part of Log(QRPay)^i_t that can be explained by same-county peers
- Idio Log(QRPay)^i_t: Idiosyncratic component of Log(QRPay)^i_t that cannot be explained by peers

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Time FE	N	Y	N	Y	N	Y	N	Y
User FE	N	N	Y	Y	N	N	Y	Y
Observations	1,300,000	1,300,000	1,300,000	1,300,000	1,299,844	1,299,844	1,299,844	1,299,844
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Financial Inclusion via FinTech — Individuals with Higher Risk Tolerance

Is risk-taking improvement stronger for more risk-tolerant individuals?

- Age (young) and gender (male) (e.g., Barber and Odean, 2002)
- Proxy individuals' risk tolerance by their consumption volatility σ_C (Merton, 1971).

$$\sigma_C = \sigma_W = \text{risky share} \times \sigma_R = \frac{1}{\gamma} \frac{\mu - r}{\sigma_R}$$

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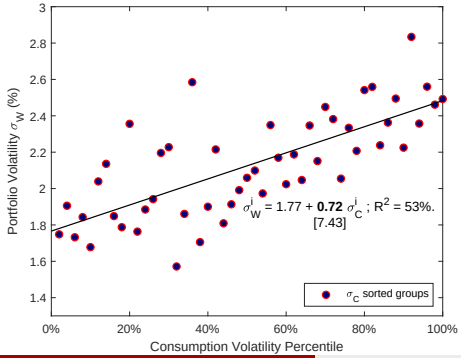

	$Y = \sigma_W$		
Log(QRPay)	0.261***	0.263***	0.383***
	(9.46)	(9.49)	(7.87)
Log(QRPay)*σ_C		0.083***	0.079***
		(2.82)	(2.67)
Log(QRPay)*Log(C)			-0.007
			(-0.29)
Log(QRPay)*Female			-0.166***
			(-2.98)
Log(QRPay)*Log(Age)			-0.092***
Controls	Y	Y	Y
Observations	28,393	28,393	28,393
R-squared	1.7%	1.7%	1.8%

Financial Inclusion via FinTech — Counties Under-Served by Banks

	Y=Risky Purchase$_{t+1}$		
	(1)	(2)	(3)
Log(QRPay)	2.154***	2.134***	0.875***
	(5.31)	(5.15)	(3.78)
Log(QRPay)*LowBank	0.364**	0.410**	0.427**
	(2.09)	(2.30)	(2.11)
Log(QRPay)*Log(GDP)		-0.005	0.024
		(-0.06)	(0.24)
Log(QRPay)*Log(Income)		0.049	0.269**
		(0.55)	(2.61)
Log(QRPay)*Log(Population)		0.085	0.087
		(1.23)	(1.13)
Controls	Y	Y	Y
Province*Time FE	N	N	Y
Observations	20,202	20,202	20,176
R-squared	13.3%	13.4%	40.1%

Financial Inclusion via FinTech — Counties Under-Served by Banks

Is risk-taking improvement stronger for counties under-served by financial institutions?

- Proxy financial-service coverage by number of county-level bank branches
- **Matched individual sample**: match each low-coverage county individual with a high-coverage county individual, by age, gender, consumption, and consumption volatility

Effect of FinTech on σ_W: Coefficients on Log(QRPay)

	Low Bank	High Bank	Difference		Low Bank	High Bank	Difference
All	0.505***	0.245***	0.260**				
	(5.26)	(2.82)	(2.01)				
High Risk Tolerance (σ_C)	0.701***	0.359***	0.342*	Low Risk Tolerance (σ_C)	0.339***	0.122	0.217
	(4.60)	(3.02)	(1.78)		(2.86)	(0.96)	(1.25)
Age [30,55]	0.486***	0.077	0.409***	Age<30 or Age>55	0.529***	0.467***	0.062
	(4.37)	(0.73)	(2.66)		(3.22)	(3.26)	(0.28)
High Consumption (C)	0.651***	0.176	0.475**	Low Consumption (C)	0.356***	0.305**	0.05
	(4.69)	(1.43)	(2.57)		(2.68)	(2.48)	(0.28)

Implications on Portfolio Performance

		Monthly Fund Alpha, 2019.4-2021.12					
		VW			EW		
		All Funds	Ant Funds	Ant Investor Held	All Funds	Ant Funds	Ant Investor Held
Bond	Mean	0.02%	0.04%	0.05%	0.01%	0.02%	0.02%
	t-stat	(0.88)	(1.05)	(0.74)	(0.20)	(0.27)	(0.36)
Mixed	Mean	1.00%*	1.04%*	1.18%*	0.97%**	1.03%	1.23%*
	t-stat	(1.72)	(1.72)	(1.91)	(2.08)	(2.05)	(2.02)
Equity	Mean	0.46%	0.80%	1.00%*	0.60%	0.72%	0.78%
	t-stat	(1.01)	(1.41)	(1.83)	(1.35)	(1.50)	(1.58)

Diversification Benefits

	Log(#Funds)	Log(#Assets)	Variance Reduction	Sharpe Ratio
Log(QRPay)	0.106***	0.067***	1.432***	0.955***
	(19.46)	(17.96)	(14.91)	(11.87)
Log(Age)	-0.068***	-0.052***	-0.782***	-0.640***
	(-12.96)	(-14.78)	(-9.49)	(-10.38)
Female	-0.155***	-0.109***	-1.347***	-1.393***
	(-15.89)	(-17.86)	(-7.17)	(-11.20)
Log(C)	0.001	-0.006**	-0.159**	0.068
	(0.30)	(-2.28)	(-2.20)	(1.19)
σ_C	0.019***	0.010***	0.156**	0.082
	(3.92)	(3.15)	(2.19)	(1.39)
Constant	1.494***	1.111***	5.662***	11.690***
	(161.27)	(173.01)	(28.26)	(81.77)
Observations	20,033	20,033	20,033	20,033
R-squared	6.2%	7.1%	3.3%	3.4%

Conclusions

- We study Household Finance in the age of FinTech and find that
  - FinTech penetration improves risk-taking, more for risk-tolerant individuals.
  - Counties with low banking coverage benefit more from FinTech penetration.
- Interpretations of our findings:
  - FinTech convenience reduces physical costs, increasing participation.
  - By bundling digital payments together with financial products, FinTech platforms help reduce the psychological barriers to risk-taking, as repeated usages of super apps build familiarity and trust.
- Future of FinTech:
  - Brighter for emerging economies lacking financial infrastructures.
  - From Tech to Fin, more content building.