

Motivation

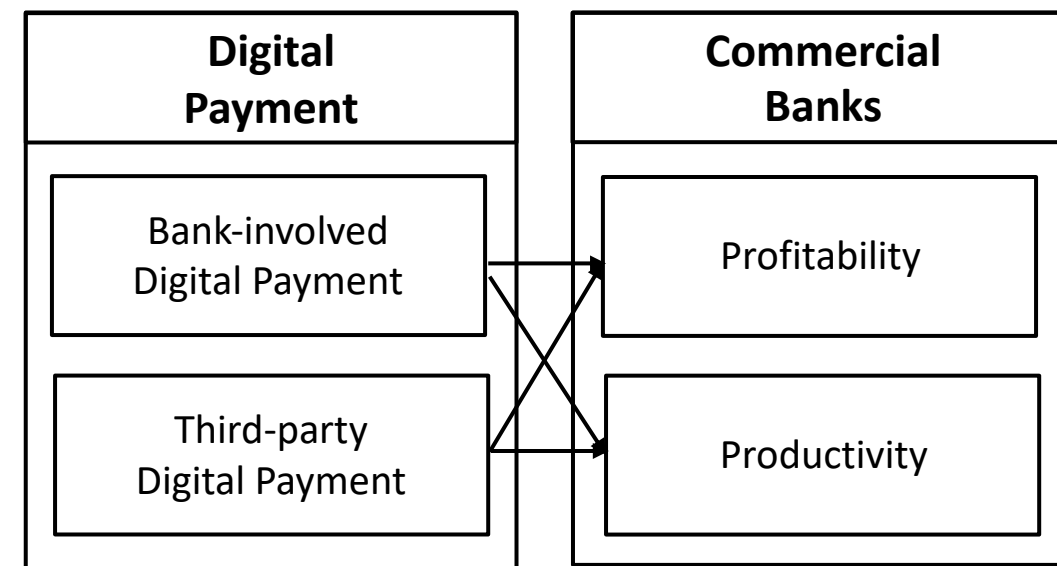
With the development of digital payment, the impact of newly developed technology on traditional financial industry has attracted scholars' attention. This project aims to analyze the relationship between digital payment and commercial banks in China with empirical methods.

Objectives:

- 1) Evaluate and determine the impact of digital payment on commercial banks with suitable methods;
- 2) Discover how traditional commercial banks were affected and the relationship between digital payment and commercial banks.

Hypothesis:

- 1) Bank-involved digital payment has a positive impact on commercial banks;
- 2) Third-party digital payment has a negative impact on commercial banks.



Data and Data Preparation

Data Collection
<Manually>

Data Extraction
<Python>

Data Calculation
<R>

Model Building
<STATA>

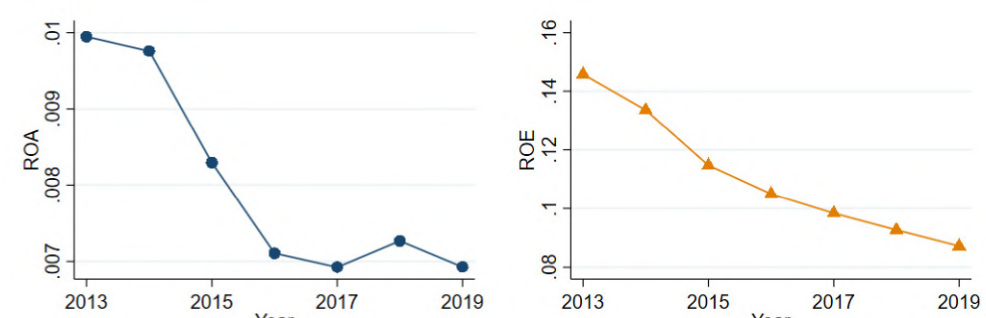
Commercial Banks

Data: Financial information of 81 commercial banks in China (2013 – 2019).

Source: Orbis, a dataset that provides information of banks all over the world.

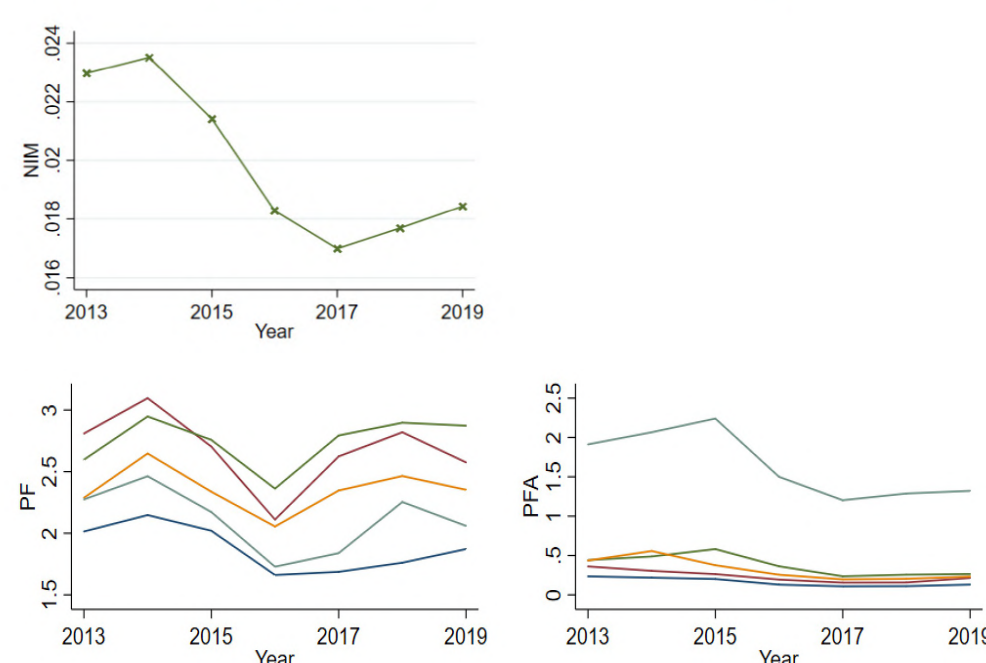
Profitability

- Return on assets (ROA)
Ratio of net profit to total assets
- Return on equity (ROE)
Ratio of net profit to shareholder's equity
- Net income margin (NIM)
Ratio of net interest income to total asset



Cost

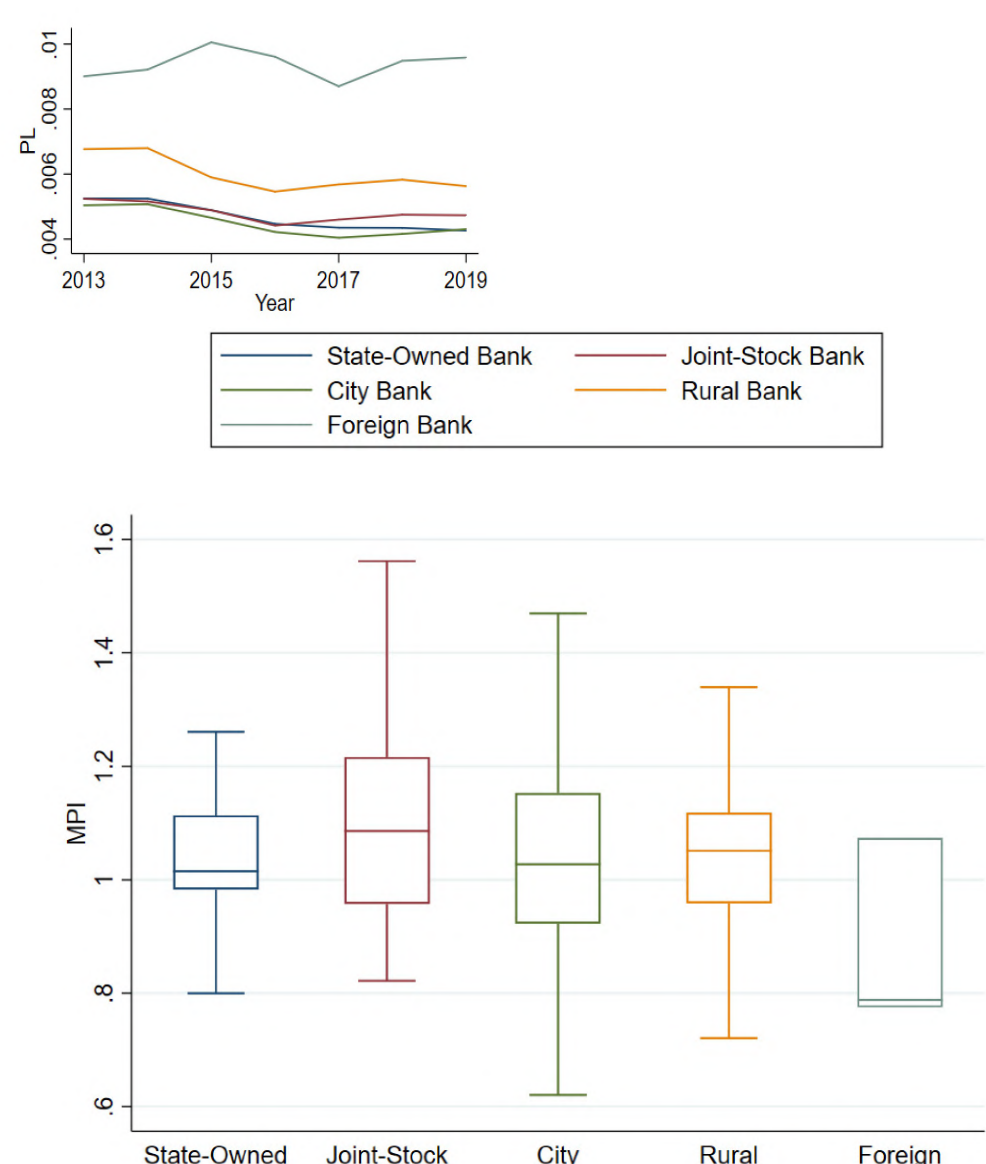
- Price of funds (PF)
Ratio of total interest expenses to total deposits and other short funding
- Price of fixed assets (PFA)
Ratio of other operating expenses to fixed assets
- Price of labor (PL)
Ratio of personnel expenses to total assets



Productivity

Definition: How much profitability can be generated by given costs (PF, PFA, and PL).

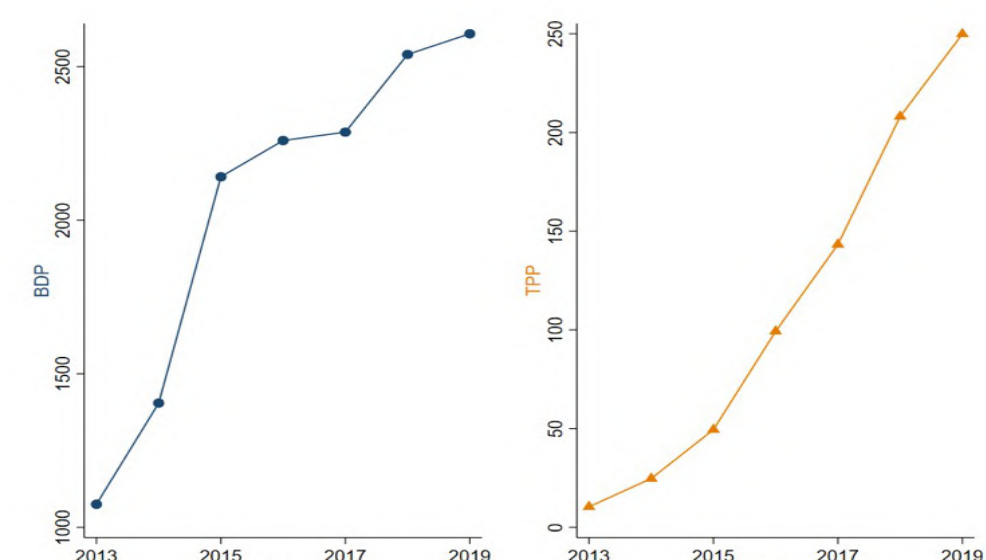
Evaluation: Malmquist productivity index (MPI).



Digital Payment

Data: Transaction amount of bank-involved digital payment and of third-party digital payment from 2013 to 2019

Data source: China Payment System Development Report



Analytical Methods and Results

Since the dataset includes financial information of 81 commercial banks in China from 2013 to 2019, analytical methods suitable for panel data have been applied.

- **System Generalized Method of moments (GMM)** : to test the correlation between digital payment and profitability of commercial banks;
- **Panel Vector Auto-Regressive (VAR) method** : to test the long-term relation between growth in digital payment and productivity of commercial banks.

System GMM

Comparing with the Fixed-effect model and differential GMM, System GMM is more suitable to avoid potential endogenous problems.

Variables	Dependent variable		
	ROA	ROE	NIM
LNBDP	0.0074739 * (0.0038617)	0.0197739 (0.0338326)	0.028642 *** (0.0088168)
LNTPP	-0.001776 ** (0.0007076)	-0.0064358 (0.0066297)	-0.003761 ** (0.0013904)

Results:

- Bank-involved digital payment (BDP) has a positive impact on profitability of commercial banks in general, especially on NIM;
- Third-party digital payment (TPP) has a negative impact on profitability of commercial banks.

Panel VAR

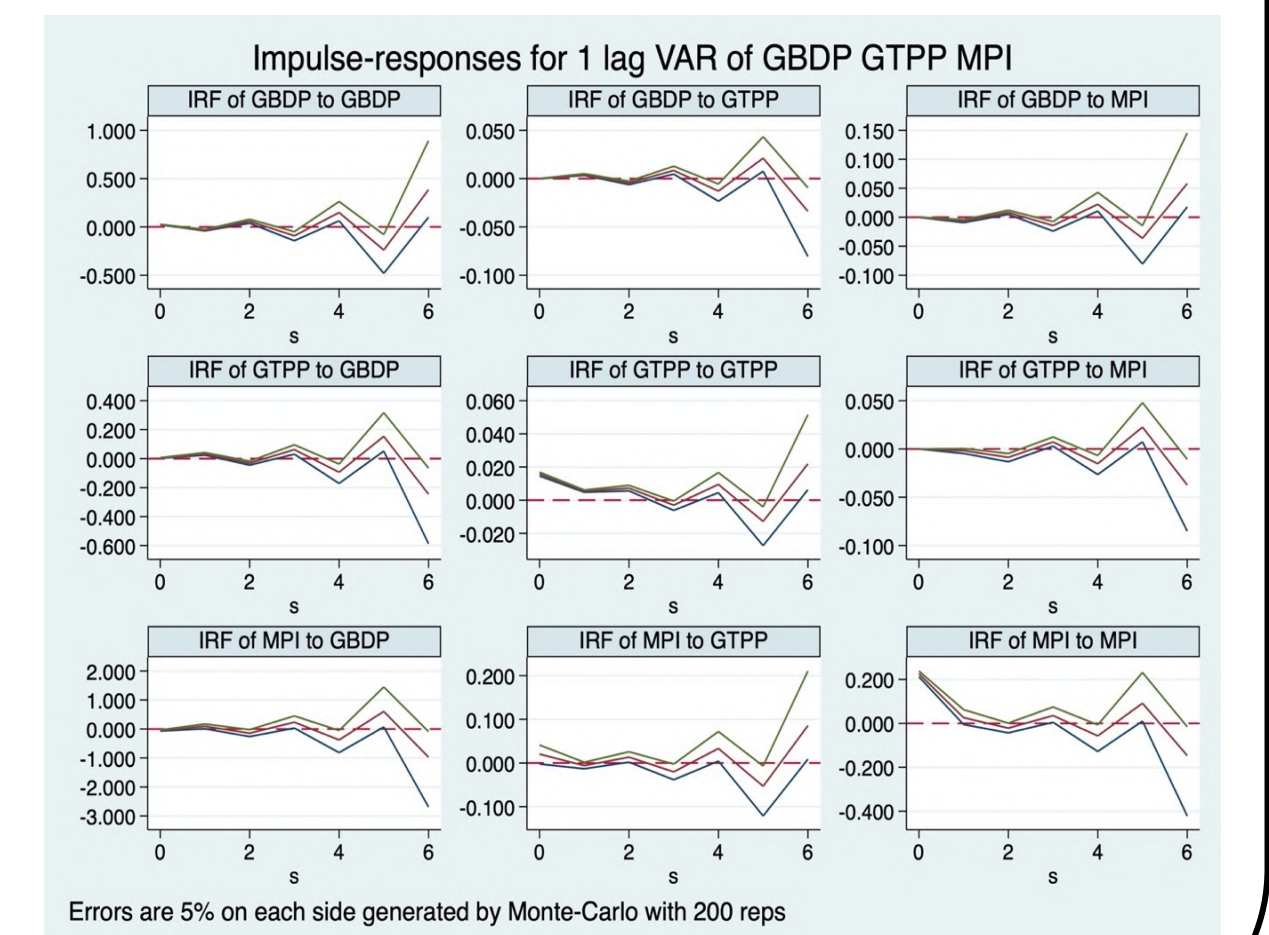
Panel VAR

- Growth in bank-involved digital payment has a **positive** impact on the growth in productivity of commercial banks;
- Growth in third-party digital payment has a **negative** impact on the growth in productivity of commercial banks.

Granger causality test

- Growth in bank-involved digital payment is the granger cause of growth in productivity of commercial banks.

	MPI
1-lagged GBDP	4.016574 * (2.114196)
1-lagged GTPP	-0.52683 ** (0.2536008)



Conclusion

Based on the results of analytical methods, the impact of digital payment does exist:

- The bank-involved digital payment provides commercial banks with newly development technology that helps traditional financial industry save operating costs, attract more customers, improve productivity, and obtain more efficiency;
- Third-party digital payment intensifies the competition between traditional financial industry and newly developed market, which leads to a lower profitability of commercial banks.

Future Work

- 1) Include more commercial banks in China and check the annual reports to avoid missing values in the dataset;
- 2) Take stock structure of commercial banks into consideration and compare the impact of digital payment on different type of commercial banks;
- 3) Consider the location of commercial banks that may also affect the impact of the digital payment.