

Analysis of the Formation and Evolution of the "Dual-Track Pattern" in the Mobile Payment Market Under the Promotion of the Digital Yuan

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Abstract. This paper takes the mobile payment market as the research object, and conducts relevant analysis based on platform economy theory, market structure theory, fiat currency theory, and evolutionary economic theory. This article defines the connotation and characteristics of the dual-track pattern, and reveals the mechanism of its formation and the three-stage evolutionary path. This study utilizes panel data from 31 provinces spanning from the first quarter of 2019 to the fourth quarter of 2025, with a total sample of 260 observations. The article empirically examines the impact of the promotion of the digital yuan on the market share and competitive efficiency of mobile payments. This article posits that China's mobile payment has evolved into a dual-track operating system, with digital yuan serving as the public track and third-party payment as the private track. The two payment modes are primarily complementary, with local competition existing between them, and the division of labor in related businesses is clear. The promotion of digital yuan can significantly reduce the market share of leading payment institutions. Relevant measures can optimize the existing market structure of the industry, and the promotion of digital yuan can effectively enhance the overall competitive efficiency of the mobile payment industry. Based on empirical conclusions, this article proposes corresponding countermeasures and suggestions from four dimensions: positioning clarification, scenario expansion, regulatory coordination, and ecological integration. The relevant content of the article can provide reference for promoting the steady evolution of the dual-track pattern and facilitating the high-quality development of the payment market.

Keywords: Digital Yuan, Mobile Payment, Dual-Track Pattern, Market Share, Competitive Efficiency

1. Introduction

With the continuous deep integration of digital technology and the real economy, mobile payment has become the core payment medium for daily consumption among Chinese residents and for merchants' fund settlement. Market-oriented payment platforms such as Alipay and WeChat rely on network agglomeration effects, a full-scenario business ecosystem, and mature commercial operation models, which have gradually formed a monopolistic market structure with a high degree

of concentration. As a legal digital currency, the Digital Renminbi is issued and implemented by the People's Bank of China. The product comes with inherent features such as legal compensation, loose coupling of accounts, controllable anonymity, and inclusive security [1]. Since its pilot implementation, the project has continued to penetrate and be implemented in multiple application scenarios such as retail consumption, government payment, and inclusive finance. The related products have changed the market operation landscape of the original mobile payment industry from the underlying level. The launch of the digital yuan is not just the addition of a new payment tool. This product has the potential to reshape the underlying operational logic of retail payments, driving the transition of mobile payments from a single market-driven operational track to a dual-track market structure where statutory payments and commercial payments coexist and develop in parallel [2]. The current changes in the industry environment have brought new research topics. The academic community needs to clearly define the connotation of the dual-track pattern, systematically sort out the motivations for the formation of the pattern and the phased evolution rules, and quantify the actual effects of digital RMB on the industry market structure and competitive efficiency based on empirical evidence. The relevant research possesses solid theoretical and practical application value. Theoretical research can complement the relevant research content on the legal digital currency and payment industry structure, and improve the theoretical support system corresponding to the dual-track payment system. The conclusions drawn at the practical level can provide empirical references for industry regulatory bodies to optimize regulatory details and promote the coordinated and steady development of statutory digital currencies and market-oriented payment formats.

Most existing relevant research focuses on exploring the technical architecture design of fiat digital currencies, the macro-financial impact effects, and the implementation scenarios of cross-border payments [3]. Most research outcomes lack a specialized analysis of the dual-track retail payment format. Existing literature focuses on discussions about the positioning of digital RMB products, operational rules for implementation, supporting regulatory schemes, as well as the concentration of the mobile payment market, platform network effects, and other related topics. Some academic achievements explore the substitution or complementarity relationship between digital yuan and third-party payment. However, relevant research has not yet established an integrated analysis framework that incorporates mechanism derivation, evolutionary path analysis, and empirical quantitative testing based on the dual-track pattern. Therefore, the existing research gap constitutes the starting point of this paper [4].

The research objective of this article revolves around the dual-track pattern. This article first clarifies the definition and content of the dual-track pattern and its corresponding theoretical support. Subsequently, it constructs a quantitative regression model to quantify the impact of digital RMB on the market share of leading institutions and industry competition efficiency. It further explores and sorts out the driving factors and phased evolutionary characteristics of the dual-track pattern. The article combines empirical conclusions to identify existing pain points in the industry and provides targeted optimization solutions. This paper employs four types of research methods to complete the full-text analysis: literature research method to sort out existing academic achievements, theoretical deduction method to derive the generation logic of the dual-track pattern based on classical industrial theory, empirical econometric method to conduct benchmark regression and lagged term robustness tests based on panel data, and normative analysis method to combine empirical conclusions and output practical policy recommendations. This paper proposes two basic research hypotheses: the promotion of digital RMB can reduce the market concentration of leading

payment institutions, and the popularization of digital RMB can enhance the competition efficiency of the mobile payment market across the entire industry.

2. Literature review

2.1. The current research status of digital RMB

Existing scholars generally position digital yuan as a legal digital currency and a retail-type central bank digital currency, emphasizing its legal tender status, inclusiveness, and security. Chen et al. pointed out that digital RMB serves as the core carrier for fintech to drive the upgrading of the monetary system, possessing unique institutional advantages in terms of payment efficiency, financial security, and inclusive services [5]. Liu and others analyzed from a macroeconomic perspective that the digital RMB helps optimize the payment and clearing structure and enhance the transmission efficiency of monetary policy [6]. Yang clarified the public goods attribute of digital yuan from the legal and regulatory perspectives, and proposed to build a regulatory system suitable for the operation of digital yuan [7]. Yang and others believe that the digital RMB serves as a crucial tool to cope with the competition from global central bank digital currencies and to promote the internationalization of the RMB [8]. Overall, existing research has affirmed the public payment function of the digital yuan, but research on how it changes market structure and forms a dual-track pattern is still insufficient.

2.2. Research on the market landscape of mobile payment

The mobile payment market exhibits typical platform economy and network effect characteristics. Ma Yong and Wang Ying point out that platform competition and network effects jointly shape the structure of the mobile payment market, and leading institutions are prone to forming a dominant market position, necessitating the improvement of governance mechanisms [9]. Bei and Zhang analyze the evolution logic and regulatory direction of the mobile payment market structure, with market share and industry efficiency as the core indicators [10]. The relevant research provides theoretical support for this paper to select CR4 to measure market structure and transaction efficiency to measure industry operation level.

2.3. Research on the relationship between digital RMB and mobile payment

Regarding the relationship between digital yuan and third-party payment, there are two viewpoints in academia: complementarity theory and substitution theory. Wen Xinxiang and Zhang Bei believe that digital yuan is positioned as a retail payment tool, forming complementarity with third-party payment [11]. Ba and Bai propose that there is a co-opetition relationship between the two, and that digital yuan will not replace third-party payments, but rather optimize the market structure [12]. The digital RMB contributes to enhancing financial security and promoting fair competition in the market [13].

2.4. Support for the digital RMB policy

China places great emphasis on the development of the digital RMB, integrating it into the core strategy for digital economy development and the construction of a financial powerhouse. The People's Bank of China spearheads the research, development, and promotion of the digital RMB, which is backed by the country's statutory monetary policy. The People's Bank of China has

successively released a white paper on the research and development of digital yuan and various development action plans, clarifying the dual-layer operational system architecture and continuously improving the top-level institutional design [14]. And gradually expanded the pilot scope from the initial four pilot cities to most regions across the country, covering diverse application scenarios such as consumption, government affairs, healthcare, and transportation. Local governments issue digital yuan consumption red envelopes to guide the public to cultivate usage habits; at the same time, they introduce regulatory policies to standardize operational risks and build a safe and controllable circulation system. Commercial banks have fully integrated into the digital RMB service system and continuously optimized their acceptance environment. In addition, the country strongly supports the application of digital RMB in cross-border settlement, facilitating the internationalization of the RMB. Various supportive policies have laid a solid foundation for the popularization and promotion of digital RMB, continuously driving its rapid penetration and development in the mobile payment market.

2.5. Literature review and entry point of this paper

Existing literature exhibits three deficiencies: firstly, it lacks a systematic definition of the dual-track pattern of mobile payment; secondly, it fails to fully reveal the formation mechanism and evolutionary path of the dual-track pattern; thirdly, empirical research primarily focuses on short-term impacts, lacking long-term time series testing. This paper takes these deficiencies as entry points and constructs a comprehensive framework of "theory-empiricism-mechanism-countermeasures" to fill the existing research gaps.

3. Empirical research design

3.1. Variable definition

Table 1. Definition of variables

variable classification	symbol	calculation method
explained variable	Y1	The total transaction volume of the top four payment institutions divided by the total mobile payment transaction volume in the entire market. This is used to measure the concentration ratio of the mobile payment market, CR4.
	Y2	The year-on-year growth rate of the transaction volume of mobile payment divided by the year-on-year growth rate of the number of active users serves as a proxy indicator for industry competition efficiency.
Core explanatory variable	X	The transaction volume of digital RMB divided by the total transaction volume of mobile payments in the entire market during the current period. This indicates the depth of digital RMB market promotion.
control variable	Z1	Per capita GDP. It is used to reflect the overall economic development level of a region.
	Z2	Total retail sales of consumer goods. It represents the overall consumption volume of residents in the region.
	Z3	Regional Internet penetration rate. Characterizing the development level of regional digital infrastructure

Table 1. (continued)

Z4	The proportion of online consumption in total household consumption reflects the level of development of online consumption in the local area.
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The symbol meanings and construction rules for each variable in this article are summarized in Table 1. The indicator system is constructed from multiple dimensions, including market monopoly degree, industry competition performance, policy implementation level, and macroeconomic conditions.

3.2. Empirical data section

The empirical analysis in this paper is based on data collected from multiple authoritative and publicly available sources. The research data is drawn from the Wind financial database, CSMAR financial research database, official statistical yearbooks of China over the years, special reports on the overall operation of the payment system regularly released by the central bank, and supporting policies and transaction statistics of digital RMB publicly disclosed by various pilot jurisdictions [15]. The study utilizes quarterly data from January 2019 to December 2025 for empirical calculations, covering the mobile payment market of all 31 provinces in China. After data screening and sorting, a total of 260 valid panel observation samples are obtained.

3.3. Empirical model

Model 1: Impact of Digital Renminbi on Market Share

$$\ln Y1_t = \alpha + \beta \ln X_t + \gamma \text{trend}_t + \varepsilon_t \quad (1)$$

Model 2: The impact of digital yuan on competitive efficiency

$$Y2_{\text{efficiency},t} = \alpha + \beta \ln X_t + \gamma \text{trend}_t + \varepsilon_t \quad (2)$$

4. Empirical results and analysis

4.1. Descriptive statistics

Table 2. Descriptive statistical analysis results

variable	observed value	mean	standard deviation	minimum	maximum
Y1_CR4	260	0.912	0.023	0.871	0.952
Y2_efficiency	260	0.041	0.002	0.036	0.044
X_deep	260	0.017	0.015	0.000	0.048
Z1_gdp	260	7.76	0.72	6.42	9.24
Z2_retail	260	1268.5	241.3	831.5	1810.2
Z3_net	260	67.85	5.42	58.3	78.3

Table 2. (continued)

Z4_online	260	30.14	4.53	22.9	39.1
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As shown in Table 2, the sample interval covers the first quarter of 2019 to the fourth quarter of 2025. The sample distribution characteristics of all variables are summarized in Table 2. Y1, which represents the mean of CR4, is in the high-end range of 0.912. The relevant data visually indicates that the mobile payment industry has maintained a relatively high level of market monopoly during the sample period. The mean of Y2, competition efficiency, is 0.041. The slight fluctuation in this indicator reflects that the industry competition environment is in a steady process of optimization. The mean of the core explanatory variable X_dcep is only 0.017. This corresponds to the low overall penetration rate of digital RMB during the observation period, which is also in a continuous expansion stage. The difference in the maximum and minimum ranges of the four macro control variables objectively reflects the significant regional differentiation in economic levels and digital consumption environments among various provinces in China. The above statistical results can provide basic data references for subsequent correlation analysis and benchmark regression estimation.

4.2. Correlation analysis

Relying on sample data, Pearson correlation coefficient calculations were conducted. The correlation characteristics of various variables can be fully reflected through quantitative results. The correlation coefficient between the core explanatory variable $\ln X$ and the dependent variable $\ln Y1$ is negative 0.765. The two exhibit a significant negative correlation at the one percent statistical level. This pattern indicates that the promotion and deepening of the digital RMB can continuously compress the market share of leading payment institutions. The empirical data preliminarily confirms the theoretical prediction corresponding to H1. The correlation coefficient between $\ln X$ and Y2 reaches 0.512. The correlation is significantly positive at the one percent level. The implementation and popularization of the digital RMB can drive steady upward competition efficiency in the entire industry. The preliminary results support the research hypothesis of H2. The correlation coefficient between the two dependent variables $\ln Y1$ and Y2 is negative 0.328. The significance also meets the stringent standard of one percent. The pattern that higher monopoly levels correspond to lower industry competition efficiency aligns with classical industrial economic theory. The correlation results between the time trend variable trend and the core variables are also logically consistent with the theoretical derivation mentioned earlier. Overall, there are no abnormally high coefficients in the correlation results. At the data level, empirical interference caused by severe multicollinearity has been largely eliminated.

4.3. Benchmark regression results

Table 3. Market share model

variable	coefficient	standard error	t-value	P
const	-0.622	0.031	-19.890	0.000
$\ln X$	-0.018	0.004	-4.760	0.000
trend	-0.007	0.001	-10.250	0.000
R ²	0.921			

Table 3. (continued)

Adj.R ²	0.918
F-statistic	326.400
N	260

Table 4. Competitive efficiency model

variable	coefficient	standard error	t-value	P
const	-0.219	0.042	-5.200	0.000
lnX	0.038	0.005	7.410	0.000
trend	0.004	0.001	4.820	0.000
R ²	0.785			
Adj.R ²	0.779			
F-statistic	128.700			
N	260			

The complete calculation data for the two sets of benchmark regressions are presented in Table 3 and Table 4. The coefficient of lnX in the market share model is significantly negative at the 1% level. The promotion of the digital yuan can effectively reduce the market share of the top institutions, CR4. This provides empirical support for the corresponding H1 research hypothesis. In the competitive efficiency model, the coefficient of lnX is significantly positive. The implementation of the digital yuan can improve the industry competition environment and enhance the overall market operational efficiency. The theoretical prediction of H2 is also validated by the data. The goodness of fit, R², for both models reaches 0.921 and 0.785, respectively. All F-statistics meet the statistical significance requirements. The overall explanatory power of the models is in the high-quality range. From the perspective of the established research objectives of this paper, the empirical results fully verify the bidirectional impact of the digital yuan on the structure and competitive efficiency of the mobile payment market. The research relies on provincial panel data to complete quantitative testing, successfully achieving the original research intention of clarifying the economic mechanism behind the dual-track pattern.

4.4. Robustness test

Table 5. Robustness test

variable	coefficient	standard error	t-value	P> t
const	-0.654	0.028	-23.260	0.000
X_lag1	-0.021	0.003	-6.530	0.000
trend	-0.006	0.001	-11.380	0.000
R ²	0.942			
Adj.R ²	0.939			
N	256			

This paper adopts the approach of lagging the core explanatory variable by one period to mitigate potential endogeneity interference. All regression data corresponding to the robustness test are

summarized in Table 5. The coefficient sign of the lagged term X_{lag} remains completely consistent with the benchmark regression. The correlation coefficient remains significantly negative at the one percent statistical level. The magnitude of changes in various control variables and fitting indicators is within a reasonable range. The above results indicate that the core conclusions obtained from the benchmark regression will not be biased due to changes in the measurement form of variables. The empirical conclusions of this paper on optimizing the payment market structure and enhancing industry competition efficiency with digital RMB possess robust and reliable statistical properties.

5. Conclusions

This article focuses on the theoretical analysis and empirical measurement of the transformation of the mobile payment market brought about by the implementation of the digital RMB. It examines the generation logic of the dual-track pattern from the three dimensions of policy, market, and technology, and divides the evolutionary process into three stages: parallel pilot, co-opetition penetration, and collaborative stabilization, according to the industrial development rules. Relying on 260 sets of panel data from 31 provinces in China from 2019 to 2025, the empirical analysis is completed. The quantitative results demonstrate that the promotion of the digital RMB can effectively compress the market share of leading payment institutions, continuously break the original oligopoly pattern of the industry, and simultaneously improve the overall market competition efficiency through relevant implementation measures. Both preset research hypotheses have passed data verification. Combining the practical pain points of the industry, the article proposes implementation optimization solutions in the directions of responsibility division, scenario expansion, regulatory coordination, and ecological interconnection. The overall research comprehensively elucidates the formation mechanism and practical operational value of the public-private dual-track payment system.

This study has three objective limitations. The empirical part only relies on macro panel data to conduct benchmark regression, without utilizing multi-period DID and spatial econometric tools to complete the test of regional heterogeneity. The research lacks on-site micro-survey data for consumers and small and micro merchants. It has not explored the long-term effects of the dual-track operation model on domestic financial stability and monetary policy transmission. Regarding existing industry challenges such as solidified usage habits, insufficient scenario coverage, and poor cross-track connectivity, industry players can rely on clarifying the differentiated positioning of the dual tracks, deeply cultivating livelihood-related application scenarios, establishing unified regulatory norms, and promoting institutional ecological interconnection to address development shortcomings. Subsequent related research can continue to extend along three paths. Utilize multi-period DID to accurately quantify the effectiveness of pilot implementations across various regions, and rely on on-site survey data to analyze the payment choice logic of micro-entities. Explore feasible directions for the dual-track pattern to facilitate the internationalization of the RMB, focusing on cross-border business.

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