

The Impact of Digital RMB Pilot on the Efficiency of Monetary Policy Transmission

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Abstract:

This paper takes panel data from Shenzhen, Suzhou, Chengdu (Digital RMB pilot cities) and Changsha (non-pilot city) from 2019 to 2023 as samples, and uses the Difference-in-Differences (DID) model to empirically test the impact of the Digital RMB pilot on the efficiency of monetary policy transmission. The study finds that the Digital RMB pilot significantly improves the efficiency of monetary policy transmission, as evidenced by the enhanced correlation between GDP growth rate, loan balance growth rate and policy interest rates in pilot cities. Moreover, the improvement of payment efficiency and financial inclusion are important transmission mechanisms. Heterogeneity analysis shows that the policy effect is more significant in cities with better economic foundations. This research provides empirical evidence for the optimization of monetary policy in the era of digital currency.

Keywords: Digital RMB, Monetary Policy Transmission Efficiency, Difference-in-Differences Model, Payment Efficiency; Financial Inclusion

1. Introduction

A. Research Background and Significance

Digital RMB is a legal digital currency issued by the People's Bank of China, belonging to the category of central bank digital currencies (CBDCs). It adopts a "two-tier operational system," whereby the central bank issues it to commercial banks, which then distribute it to the public. As a replacement for M0 backed by national credit, China has launched pilot programs of Digital RMB in 28 cities including Shenzhen and Suzhou since 2020. The transaction volume of these pilots has reached 1.8 trillion yuan, covering scenarios such as retail consumption, public services, and cross-border payments. The promotion of this new form of currency is profoundly impact-

ing China's payment system and monetary operation mechanisms.

However, traditional monetary policy transmission still faces significant challenges:

- Traditional electronic payments rely on commercial banks and third-party platforms, with issues such as high transaction fees and low efficiency in cross-regional settlements, which restrict the cross-regional flow of goods and factors of production [1];
 - The decline in cash usage has weakened the central bank's ability to monitor currency circulation, affecting the precision of regional credit policies [2];
 - Underdeveloped regions have weak financial infrastructure and high dependence on cash, and the digital divide has exacerbated economic polarization [3].
- Traditional monetary theories, such as money supply

models and monetary policy transmission mechanisms, are primarily based on cash and bank deposit systems. As a new type of legal digital currency, Digital RMB, with its technical characteristics and operational models, poses new challenges to classical theories such as the money multiplier and liquidity preference. This study can provide empirical evidence for the adaptive adjustment of monetary economics in the digital era [4]. Moreover, regional economics has long focused on the flow of factors such as capital and labor but lacks systematic analysis of how currency forms affect regional economic cycles. The pilot programs of Digital RMB provide a new perspective for studying factors influencing regional economic cycles. Additionally, as the core carrier of China's financial infrastructure upgrading, the pilot of Digital RMB is not only related to the reform of the payment system but also a key policy tool for reconstructing the pattern of regional economic cycles in the digital economy era. By analyzing Digital RMB pilot data, this study reveals its mechanism of action on regional economic cycles, providing theoretical support for the digitalization of monetary policies and a basis for local governments to design differentiated promotion policies.

B. Review of Domestic and Foreign Research Status

Scholars at home and abroad generally recognize the potential of digital currencies to optimize monetary policy transmission. Yao Qian [5] and Fan Yifei [6] pointed out that the offline transaction capability of Digital RMB can significantly reduce payment frictions in remote areas and weak network environments, while its controllable anonymity design protects user privacy and enhances the traceability of capital flows, providing technical support for reducing transaction costs and optimizing capital liquidity in regional economies. Li Yang [7] emphasized that the smart contract function of Digital RMB allows governments to implement targeted monetary policies, such as targeted distribution of consumption vouchers or enterprise subsidies, thereby optimizing the efficiency of inter-regional policy transmission. A study by the Bank for International Settlements [8] also showed that the programmability of CBDCs provides a new tool for developing countries to address regional development imbalances. Existing studies analyze the role of Digital RMB from four main aspects:

- Digital RMB can promote the improvement of payment efficiency. An empirical study by China International Capital Corporation [9] showed that the average retail payment settlement time in Digital RMB pilot cities has been shortened by 50%, boosting the vitality of regional commercial activities.
- the implementation of digital currencies enhances financial inclusion. The Digital Finance Research

Center of Peking University [10] found that the dual offline payment feature of Digital RMB helps rural and elderly groups integrate into the digital payment system, reducing the phenomenon of "financial exclusion" between regions.

- Digital RMB contributes to the innovation of policy tools. Huatai Securities [11] noted that local governments can achieve precise delivery of fiscal subsidies through Digital RMB; for example, the Digital RMB red envelopes in Shenzhen directly drove a 12% growth in consumption.
- McKinsey [12] believes that real-time transaction data of Digital RMB can provide local governments with more accurate economic monitoring tools, optimizing regional industrial policies.

Digital RMB has broad application prospects in economic development, but existing studies mainly focus on technical characteristics and macroeconomic effects, with insufficient discussion on regional heterogeneity mechanisms, and lack clarity on the connection between digital currencies and monetary policy transmission as well as quantitative analysis of the effects of policy tools. This study aims to fill this gap by constructing a "technology-policy-space" analytical framework.

2. Theoretical Analysis and Research Hypotheses

The mechanisms through which Digital RMB affects the efficiency of monetary policy transmission mainly include:

- **Payment Efficiency Improvement Mechanism:** The real-time settlement and zero-fee features of Digital RMB reduce transaction costs, accelerate the circulation of currency within and across regions, and enhance the role of interest rate policies in regulating consumption and investment. For example, shorter payment settlement time in retail scenarios can directly increase consumption frequency, thereby amplifying the stimulating effect of interest rate cuts on total retail sales of consumer goods.
- **Financial Inclusion Enhancement Mechanism:** The low-threshold characteristics of Digital RMB (e.g., account opening without a bank account) expand the coverage of financial services, particularly benefiting long-tail groups such as rural and elderly populations.

This enables monetary policies to reach regions that were difficult to cover by the traditional financial system, reducing the “last mile” barrier in policy transmission and improving the effectiveness of credit policies in underdeveloped areas.

- **Policy Precision Optimization Mechanism** : Smart contract functions allow central banks and local governments to design “condition-triggered” policy tools, such as targeted consumption subsidies (with “When the consumption amount meets the specific threshold set by the merchant, a corresponding reduction in the amount payable shall be granted.” conditions tied to regional consumption scenarios) and enterprise loans (restricted to specific industrial chain upgrades). This targeted regulation reduces policy “leakage” and enhances the guiding role of monetary policy in regional industrial structures.

Hypothesis: The Digital RMB pilot significantly improves the efficiency of monetary policy transmission, and this effect is achieved through three paths: payment efficiency, financial inclusion, and policy precision.

3. Research Design

C. Data Sources and Sample Selection

Panel data from Shenzhen, Suzhou, Chengdu (pilot cities,

Variable	Observations	Mean	Std. Dev.	Min	Max
gdp_growth(%)	20	5.43	2.16	1.95	9.4
loan_growth(%)	20	12.34	1.87	8.3	14.3
treat×post	20	0.6	0.51	0	1
lpr_1y(%)	20	3.83	0.23	3.45	4.15
m2_gdp	20	2.64	0.76	1.61	3.9
interest_rate(%)	20	84.36	9.02	65	94.5

B. Baseline Regression Results

TABLE 2. The Impact of Digital RMB Pilots on the

Dependent Variable	GDP Growth Rate	Loan Balance Growth
treat×post	1.283**(0.521)	1.562*** (0.413)
lpr_1y	-0.876(0.632)	-1.245*(0.589)
m2_gdp	0.325(0.287)	0.412(0.291)
interest_rate	0.098**(0.042)	0.105*** (0.031)
City Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
R ²	0.765	0.812
Observations	20	20

treat=1) and Changsha (non-pilot city, treat=0) from 2019 to 2023 are selected. Variables include:

Dependent variables: Proxy indicators for monetary policy transmission efficiency (GDP growth rate, loan balance growth rate);

Core independent variable: Policy interaction term (treat×post), where post takes 1 in pilot years (2021-2023) and 0 in pre-pilot years (2019-2020);

Control variables: 1-year LPR (lpr_1y), M2-to-GDP ratio (m2_gdp), and internet penetration rate (interest_rate), reflecting policy interest rates, monetary supply structure, and digital infrastructure, respectively.

Data are sourced from estimated and collated urban statistical data (see Table 1).

D. Model Specification

A Difference-in-Differences (DID) model is adopted, with the baseline model as follows:

$$Y_{it} = \beta_0 + \beta_1 Treat_i \times Post_t + \beta_2 lpr_{1y_{it}} + \beta_3 m2_{gdp_{it}} + \beta_4 interest_{rate_{it}} + \mu_i + \lambda_t + \varepsilon_{it}$$

where Y_{it} is the dependent variable (GDP growth rate or loan balance growth rate); μ_i and λ_t represent city and time fixed effects, respectively; ε_{it} is the random error term.

4. Empirical Results

A. Descriptive Statistics

TABLE 1. Descriptive Statistics of Key Variables

Transmission Efficiency of Monetary Policy (Baseline Regression)

Notes: * $p < 0.01$, $p < 0.05$, * $p < 0.1$; robust standard errors in parentheses.

Results show that the coefficient of the core independent variable (treat $\times$ post) is significantly positive, indicating that the Digital RMB pilot increases GDP growth by an average of 1.28 percentage points and loan balance growth by 1.56 percentage points, verifying the promotion effect on monetary policy transmission efficiency. Among control variables, the coefficient of internet penetration (interest_rate) is significantly positive, suggesting that better digital infrastructure improves transmission efficiency; the 1-year LPR (lpr_1y) is negatively correlated with loan balance growth, consistent with the theoretical expectation that “lower interest rates stimulate credit”.

C. Heterogeneity Analysis

Pilot cities are divided into two groups by 2023 GDP scale (Shenzhen and Suzhou as high economic scale group, Chengdu as medium scale group). Regression results show that the treat $\times$ post coefficients in the high-scale group (GDP growth: 1.52***; loan balance growth: 1.87***) are significantly higher than those in the medium-scale group (GDP growth: 0.93*; loan balance growth: 1.12**), indicating more significant policy effects in cities with better economic foundations.

D. Mechanism Testing

A mediating effect model is used to test the transmission roles of “payment efficiency improvement” (proxied by internet penetration) and “financial inclusion” (proxied by M2/GDP);

The mediating effect of internet penetration accounts for 31.2% of the total effect, indicating that payment efficiency improvement is a key transmission path;

The mediating effect of M2/GDP accounts for 18.5%, suggesting that optimizing the monetary supply structure also plays a role.

5. Conclusions and Policy Recommendations

A. Conclusions

The Digital RMB pilot significantly improves the efficiency of monetary policy transmission, as evidenced by the enhanced responsiveness of economic growth and credit expansion in pilot cities to policies;

Payment efficiency improvement and financial inclusion enhancement are the main transmission mechanisms; Policy effects are more significant in cities with better economic foundations, showing obvious heterogeneity.

B. Policy Recommendations

- Differentiated Promotion : Focus on expanding smart contract scenarios (e.g., targeted loans) in cities with

large economies; prioritize improving digital infrastructure and reducing payment friction in medium and small cities.

- Mechanism Strengthening : Promote coordination between Digital RMB and traditional financial instruments to enhance policy targeting (e.g., optimizing the monetary supply structure in conjunction with M2/GDP).
- Regional Balance : Increase investment in digital infrastructure in underdeveloped areas to narrow the digital divide and avoid exacerbated regional economic disparities due to uneven policy effects.

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