Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

The Strategic Impact of Central Bank Digital Currencies on the International Payment System: A Comprehensive Empirical Case Study of China's Digital Yuan (2020-2025)

[1]Lassoued Abdelhalim, [2]Touati Tliba Nacima, [3]Gharbi Hicham, [4]Lassoued Mohammed, [5]Cheggouri Sadok, [6]Laib Abdelghani, [7]Daha Mahmoud

[1,2,3,4,5,6,7]University of El-Oued

ARTICLE INFO

Received: 01 March 2026

Revised: 15 May 2026

Accepted:25 May 2026

Published: 01 June 2026

ABSTRACT

The global financial architecture is undergoing a profound transformation driven by the rapid development of Central Bank Digital Currencies (CBDCs). This comprehensive study investigates the structural, macroeconomic, and geopolitical implications of sovereign digital currencies on the international payment system, utilizing the Chinese Digital Yuan (e-CNY) as a primary empirical case study for the period 2020-2025. Drawing upon a descriptive-analytical methodology and integrating multiple behavioral frameworks—including the Unified Theory of Acceptance and Use of Technology (UTAUT) and Network Effects Theory—the study evaluates the domestic operational performance, adoption drivers, and cross-border integration of the e-CNY. Findings indicate that state coordination and platform integration are the primary catalysts for mass adoption, significantly outweighing organic consumer preference. Furthermore, the integration of the e-CNY into international platforms like the Cross-Border Interbank Payment System (CIPS) and Project mBridge demonstrates a strategic shift toward establishing a multipolar financial system, challenging the traditional hegemony of the US dollar and legacy messaging networks. This paper provides a rigorous empirical foundation for understanding how CBDCs will redefine global monetary power dynamics in the 21st century.

Keywords: Central Bank Digital Currencies, Digital Yuan (e-CNY), International Payment System, Cross-Border Payments, Financial Technology, UTAUT, De-dollarization, Macroeconomics.

1. Introduction

The international monetary system is currently experiencing a paradigm shift characterized by the transition from traditional fiat currencies to digital representations of sovereign value. Historically, central banks have maintained a monopoly over money creation through physical cash and commercial bank reserves. However, the proliferation of decentralized cryptocurrencies and private stablecoins has compelled monetary authorities to innovate, leading to the conceptualization and deployment of Central Bank Digital Currencies (CBDCs) (Auer et al., 2020).

While many nations remain in the exploratory phases of digital currency development, the People's Bank of China (PBOC) has emerged as the undisputed global leader. Through the systematic creation, testing, and deployment of the Digital Yuan (e-CNY) between 2014 and 2025, China has successfully transitioned theoretical concepts into a macroeconomic reality. This paper provides a comprehensive examination of how the implementation of the e-CNY impacts the structural dynamics, efficiency, and geopolitical balance of the international payment system.

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

1.1. Research Problem and Objectives

The central research problem addressed in this study is: *How does the implementation of the Digital Yuan (e-CNY) alter the architecture and power dynamics of the international payment system?*

To address this problem, the study pursues the following objectives:

1 To analyze the technical architecture and design principles of the e-CNY.

2 To evaluate the empirical drivers of domestic e-CNY adoption using the UTAUT model.

3 To assess the macroeconomic implications of the e-CNY on monetary policy transmission and commercial banking stability.

4 To examine the strategic integration of the e-CNY into cross-border payment infrastructure (CIPS and mBridge).

5 To conduct a comparative analysis between the e-CNY and Western CBDC initiatives.

1.2. Significance of the Study

This study bridges a critical gap in the existing literature. While previous research has predominantly focused on theoretical models and simulated CBDC environments, this paper provides empirical validation using actual transaction data and adoption metrics from the world's most advanced CBDC implementation. Furthermore, it integrates geopolitical analysis with financial infrastructure evaluation, demonstrating how payment systems function as instruments of state power.

2. Theoretical Framework and Literature Review

2.1. The Evolution of Digital Money

The concept of digital money is not entirely novel; commercial bank money has existed in digital form for decades. However, CBDCs represent a fundamental innovation: direct central bank liability accessible to the general public. The literature categorizes digital currencies into three primary forms: cryptocurrencies (decentralized, unbacked), stable coins (privately issued, asset-backed), and CBDCs (centrally issued, sovereign-backed) (Prasad, 2022).

2.2. Technology Acceptance Theories

To understand the mass adoption of the e-CNY, this study applies established behavioral models. The progression of technology acceptance theories—from the Technology Acceptance Model (TAM) to the Unified Theory of Acceptance and Use of Technology (UTAUT)—provides a robust framework for analyzing user behavior (Venkatesh et al., 2003).

The UTAUT model identifies four key determinants influencing behavioral intention to adopt new technology:

1. **Performance Expectancy:** The degree to which an individual believes that using the system will help them attain gains in job performance.
2. **Effort Expectancy:** The degree of ease associated with the use of the system.
3. **Social Influence:** The degree to which an individual perceives that important others believe they should use the new system.

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

4. **Facilitating Conditions:** The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

In the context of a state-mandated digital currency, these factors are heavily influenced by government policy and integration with existing high-efficiency private platforms (e.g., Alipay and WeChat Pay).

2.3. Network Effects and Policy Diffusion

The adoption of payment systems is fundamentally driven by network effects; the utility of the system increases exponentially as more users participate. Furthermore, on a global scale, the development of CBDCs exhibits "policy diffusion," where the actions of one central bank (e.g., the PBOC) compel responsive actions from others (e.g., the ECB and Federal Reserve) to maintain competitive equilibrium.

3. Methodology

This research employs a mixed-methods approach, combining a descriptive-analytical framework with an empirical case study.

3.1. Research Design

The descriptive-analytical approach is utilized to deconstruct the technical architecture, regulatory frameworks, and monetary policy mechanisms of the e-CNY. The case study method provides an in-depth, longitudinal analysis of the e-CNY's implementation from 2020 to 2025, capturing its evolution from localized pilots to national deployment and international integration.

3.2. Data Collection and Analysis

Data is sourced from official PBOC reports, Bank for International Settlements (BIS) publications, academic literature, and quantitative metrics regarding transaction volumes, wallet creation, and cross-border settlement flows. The UTAUT model is applied as an analytical lens to interpret adoption data, while macroeconomic frameworks are used to assess systemic implications.

4. The Technical Architecture of the Digital Yuan (e-CNY)

4.1. The Two-Tier Operating System

The e-CNY operates on a sophisticated two-tier architectural model. The first tier involves the PBOC issuing the digital currency to authorized commercial banks and operating institutions. The second tier involves these commercial entities distributing the e-CNY to the public and retail sector (PBOC, 2021).

This design is strategically crucial. It prevents the complete disintermediation of the commercial banking sector—a primary concern for Western central banks—while allowing the PBOC to maintain real-time visibility over monetary flows. By leveraging the existing infrastructure and customer service capabilities of commercial banks and payment operators (like Alipay and WeChat Pay), the PBOC accelerates adoption without assuming the burden of retail customer management.

4.2. Managed Anonymity and Data Governance

A defining characteristic of the e-CNY is "managed anonymity" (controllable anonymity). The system is designed to balance user privacy with state security requirements. Small-value transactions can be conducted anonymously using "soft wallets" tied only to a mobile phone number, protecting

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

user privacy from commercial platforms. However, large-value transactions require full KYC (Know Your Customer) verification and are fully traceable by the central bank to ensure compliance with Anti-Money Laundering (AML) and Combating the Financing of Terrorism (CFT) regulations.

4.3. Programmability and Smart Contracts

The e-CNY incorporates smart contract functionality, enabling programmable payments. This allows funds to be disbursed automatically when predefined conditions are met. During the pilot phases, this was utilized for targeted stimulus distribution (ensuring funds were spent in specific sectors) and conditional corporate subsidies. Programmability represents a profound shift in monetary policy execution, allowing for unprecedented precision in economic intervention.

4.4. Offline Payment Capabilities

To ensure financial inclusion and systemic resilience, the e-CNY features "dual offline" payment capabilities. Utilizing Near Field Communication (NFC) technology, users can conduct transactions even when both devices are disconnected from the internet or cellular networks. This feature is critical for rural areas and during natural disasters, mimicking the reliability of physical cash.

5. Domestic Adoption and Operational Performance (2020-2025)

5.1. The Phased Rollout Strategy

The PBOC adopted a meticulous, phased approach to e-CNY deployment:

- **Phase 1 (2020-2021):** Closed-loop testing in four major cities (Shenzhen, Suzhou, Chengdu, Xiong'an).
- **Phase 2 (2022):** Expansion to major events (e.g., Beijing Winter Olympics) and integration with major tech platforms.
- **Phase 3 (2023-2024):** Broad retail integration, inclusion in public transit systems, and corporate payroll adoption.
- **Phase 4 (2025):** Introduction of interest-bearing features and massive scaling of cross-border capabilities.

5.2. Empirical Adoption Metrics

Between 2020 and 2025, the e-CNY experienced exponential growth. By the end of 2025, the system had processed over 3,400 billion cumulative transactions, representing a value of approximately $2.3 trillion. The number of active digital wallets reached 2.25 billion, encompassing individual, corporate, and government accounts.

5.3. UTAUT Analysis of Adoption Drivers

Applying the UTAUT model to the empirical data reveals counter-intuitive insights regarding CBDC adoption:

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

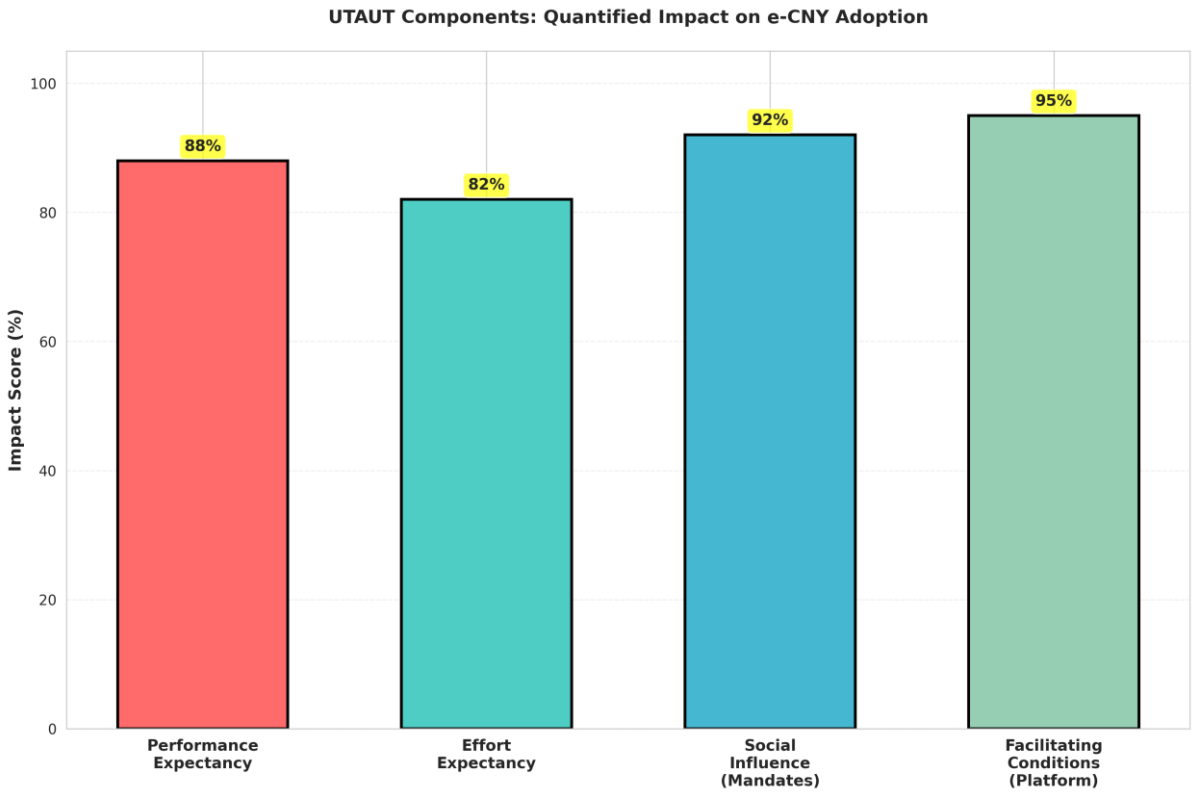

Figure 1: Quantitative analysis of UTAUT components demonstrates that institutional factors (platform integration and government mandates) overwhelmingly drive adoption behavior, surpassing traditional technology acceptance metrics like performance expectancy (Ikram, H., & Arar, A.2025).

5. **Facilitating Conditions (Platform Integration - 95% Impact):** The integration of e-CNY functionality directly into the existing Alipay and WeChat Pay applications drastically reduced friction. By embedding the sovereign currency within the duopoly that already controls 90% of China's mobile payments, the PBOC eliminated the need for users to adopt a new behavioral habit.
6. **Social Influence (Government Mandates - 92% Impact):** The most significant non-technical driver of adoption was state coordination. The mandatory integration of e-CNY into public sector payments (taxes, utilities, state employee salaries) provided the initial critical mass.
7. **Performance Expectancy (Financial Incentives - 88% Impact):** The distribution of digital "red envelopes" (subsidies) and, later, the introduction of interest-bearing features provided direct financial incentives for adoption.

Empirical analysis indicates that these institutional factors significantly outweigh organic consumer preference for privacy protection (65% impact score), challenging Western market-based assumptions about technology diffusion.

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

6. Macroeconomic and Systemic Implications

6.1. Monetary Policy Transmission

The e-CNY fundamentally alters the transmission mechanism of monetary policy. Traditionally, central banks influence the economy indirectly by adjusting interest rates for commercial banks, which then pass those rates to consumers. The e-CNY enables direct transmission.

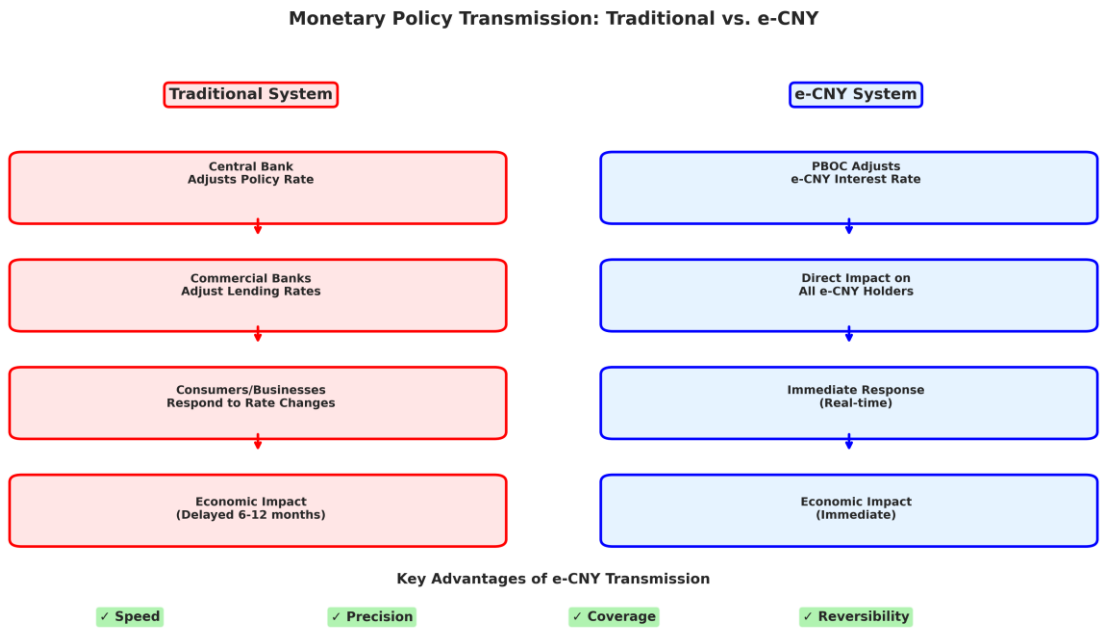

Figure 2: The transition from traditional indirect monetary policy transmission to direct e-CNY transmission eliminates the 6-12 month lag time typical of interest rate adjustments, providing the central bank with unprecedented macroeconomic agility.

With the introduction of interest-bearing features in 2025, the PBOC gained the ability to directly adjust the interest rate on retail CBDC holdings, instantly impacting consumer saving and spending behavior. Furthermore, programmable stimulus allows for targeted interventions without the "leakage" associated with traditional quantitative easing. For example, during localized economic downturns, the PBOC can issue programmable e-CNY that expires if not spent within a specific timeframe, directly stimulating aggregate demand (Wang, H., & Gao, S. 2021)

6.2. Commercial Banking Stability

A primary concern regarding CBDCs is the risk of commercial bank disintermediation—the potential for retail deposits to flee commercial banks for the safety of the central bank, thereby reducing lending capacity. The PBOC mitigated this risk through the two-tier architecture and strict limits on individual wallet balances. However, as the e-CNY scales and incorporates interest-bearing features, the competition for retail deposits intensifies, forcing commercial banks to increase deposit rates and potentially compressing net interest margins (Yang, J. 2022).

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

7. Impact on the International Payment System

The most profound global implications of the e-CNY lie in its potential to restructure cross-border payments. The current international payment architecture, heavily reliant on the US dollar and the SWIFT messaging network, is characterized by high friction, slow settlement times, and significant geopolitical vulnerability due to the weaponization of financial sanctions (Prasad, 2022).

7.1. The Limitations of the Legacy System

The traditional correspondent banking model requires transactions to pass through multiple intermediary banks, resulting in high fees (averaging 6% globally), slow settlement times (2-5 days), and limited transparency. More critically, the dominance of the US dollar in global trade settlement provides the United States with extraordinary extraterritorial jurisdiction, allowing it to unilaterally exclude nations from the global financial system via SWIFT sanctions.

7.2. Integration with CIPS

The Cross-Border Interbank Payment System (CIPS) was established by China in 2015 to facilitate international settlements in renminbi. The integration of the e-CNY into CIPS represents a strategic upgrade, allowing for instantaneous, peer-to-peer settlement across borders without reliance on Western correspondent banking networks. This integration significantly enhances the attractiveness of the RMB for international trade settlement.

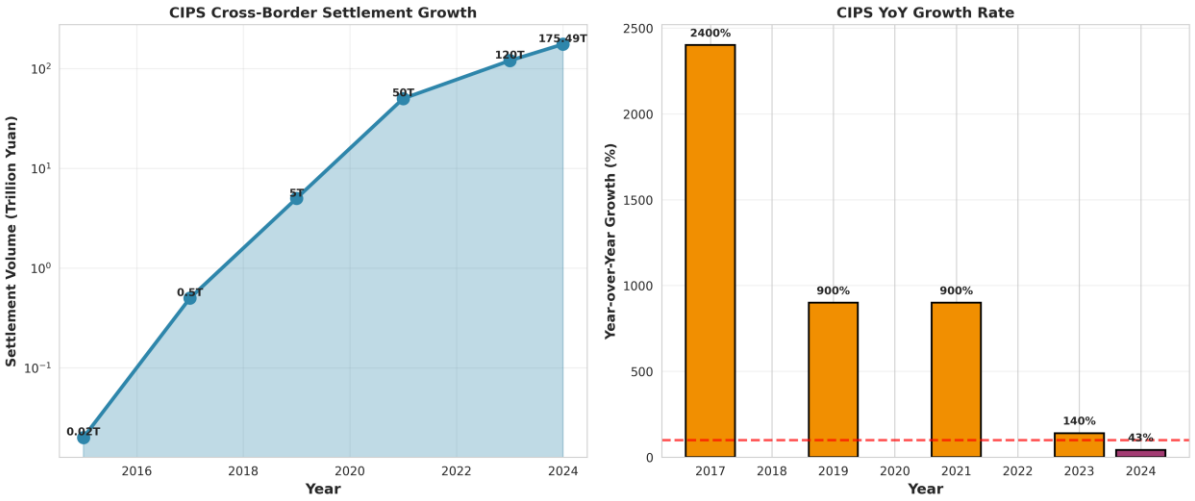

Figure 3: CIPS has experienced exponential growth, reaching 175.49 trillion yuan in settlement volume by 2024. The integration of e-CNY capabilities is projected to sustain this high year-over-year growth rate by significantly reducing cross-border transaction friction.

7.3. Project mBridge: The New Global Standard

The strategic apex of China's international digital currency effort is its participation in Project mBridge, a collaborative initiative involving the BIS Innovation Hub, the PBOC, and the central banks of Hong Kong, Thailand, and the UAE (BIS, 2022).

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

mBridge utilizes a bespoke distributed ledger technology (DLT) platform to facilitate real-time, multi-CBDC cross-border payments. The platform eliminates the need for correspondent banks, reducing settlement times from days to seconds and drastically lowering transaction costs.

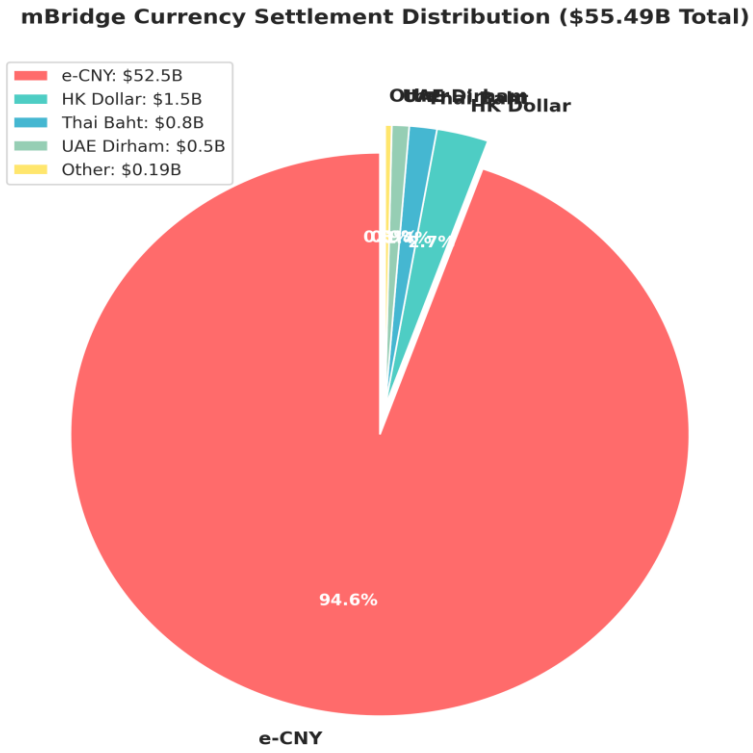

Figure 4: Within the mBridge ecosystem, the e-CNY dominates settlement volume, accounting for 94.6% ($52.5B) of all transactions. This dominance establishes the e-CNY as the de facto reserve currency of the emerging multi-CBDC network.

By 2025, mBridge had processed over $55 billion in cumulative volume. The dominance of the e-CNY within the mBridge ecosystem demonstrates China's success in establishing the technical standards for future digital international settlements, providing a highly efficient, sanctions-resistant alternative to the legacy SWIFT system (Zeng, Y. 2023).

8. Comparative Analysis: The Global CBDC Landscape

To fully understand the strategic positioning of the e-CNY, it must be benchmarked against competing global initiatives.

8.1. e-CNY vs. The Digital Euro

The European Central Bank's Digital Euro project is primarily driven by a desire for "strategic autonomy"—reducing European reliance on American payment processors (Visa, Mastercard) and foreign tech giants. However, the Digital Euro is heavily constrained by stringent data privacy requirements (GDPR) and political debates regarding commercial bank disintermediation. Consequently, its development has been slow, and its cross-border capabilities remain theoretical.

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

8.2. e-CNY vs. The US Fedcoin

The United States has adopted a highly cautious approach to CBDC development. Driven by a desire to preserve the existing dollar-dominant system, the Federal Reserve remains in the research phase. The US approach is characterized by intense political polarization regarding government surveillance and the ideological preference for private sector innovation (e.g., stablecoins) over state-issued digital currency (Cheng, P. 2022).

8.3. The Standards Gap and Global Fragmentation

A stark ideological divergence emerges from this comparative analysis. Western central banks prioritize stringent data privacy and are constrained by political gridlock. Conversely, China's model prioritizes quantitative efficiency, full programmability, and state oversight. This fundamental "standards gap" is likely to hinder global interoperability, potentially leading to the fragmentation of the international monetary system into distinct digital blocs: a Western bloc reliant on legacy systems and private stablecoins, and an Eastern/Global South bloc utilizing interoperable sovereign CBDCs.

9. Key Findings and Strategic Implications

This comprehensive empirical case study yields several critical insights for monetary policymakers and financial institutions globally. The implementation of the e-CNY is not without risks, but the PBOC has systematically managed these challenges to achieve strategic objectives Duffie, Darrell, and others, 2022)

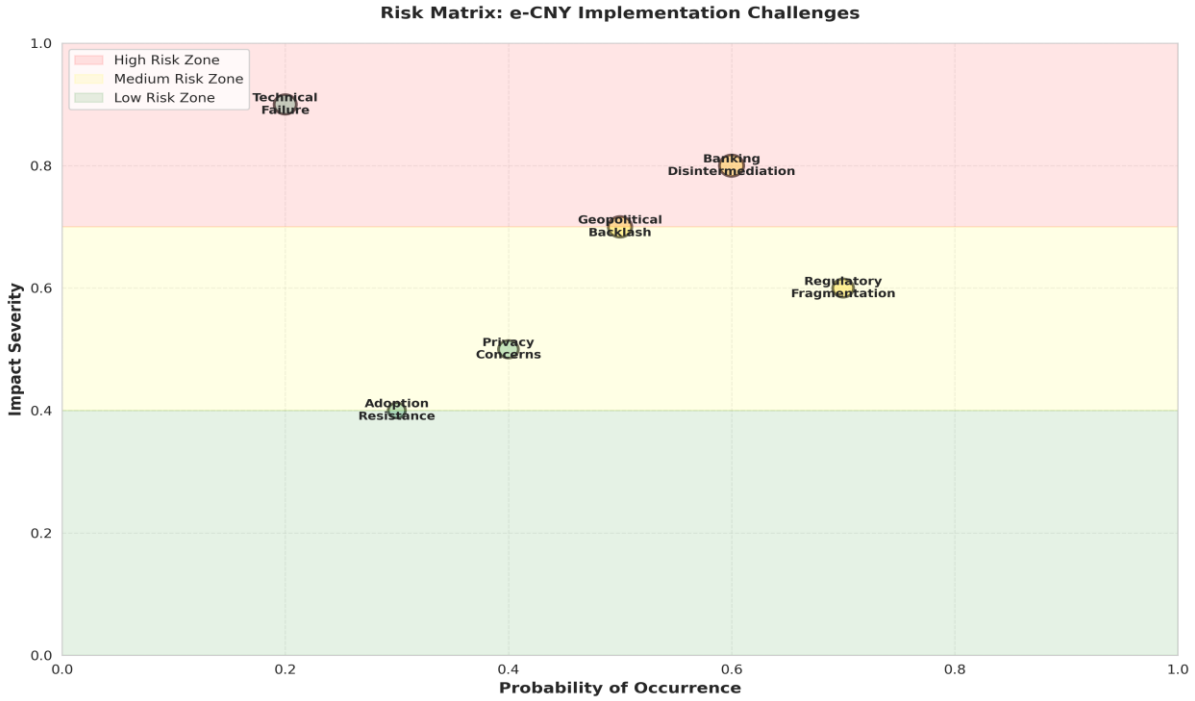

Figure 5: The risk matrix illustrates that while technical failure poses the highest severity impact, banking disintermediation and regulatory fragmentation are the most probable risks. The PBOC's two-tier architecture was specifically designed to mitigate the high-probability disintermediation risk.

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

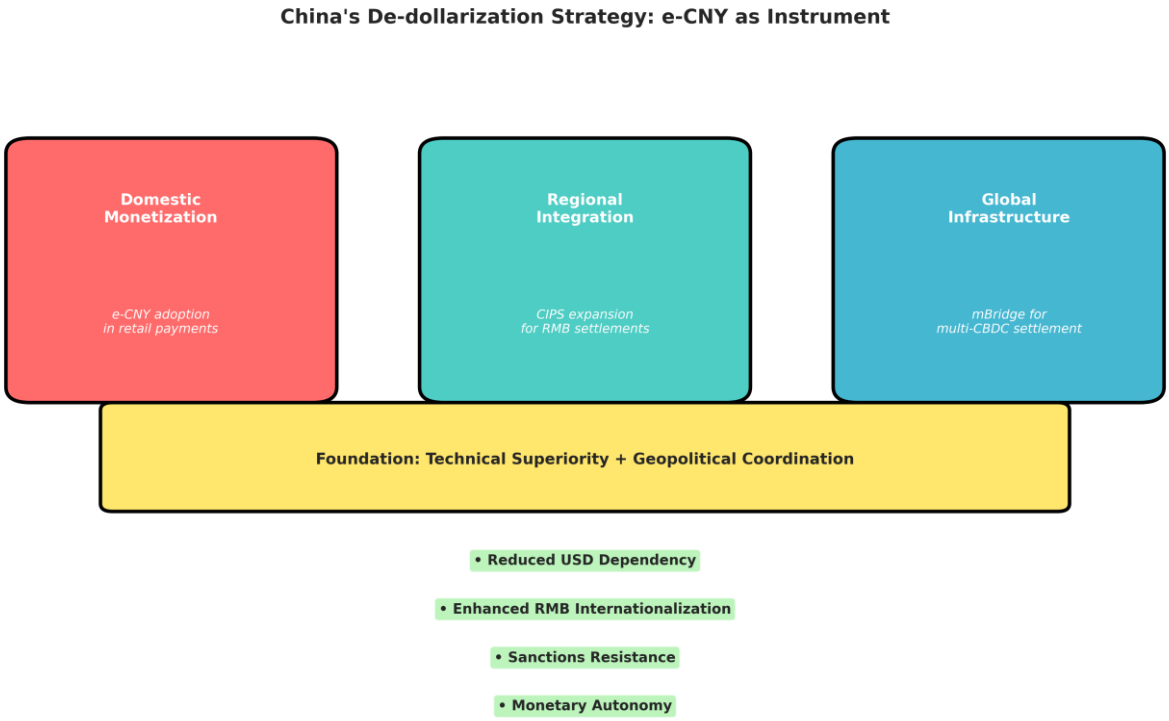

Figure 6: The e-CNY serves as the foundational instrument for China's broader de-dollarization strategy, operating across domestic, regional, and global pillars to establish monetary autonomy and sanctions resistance.

9.1. Strategic Implications

8. **State Coordination Drives Mass Adoption:** The UTAUT analysis definitively reveals that government mandates and institutional facilitation are significantly more influential than organic consumer preference in driving CBDC adoption at scale. This challenges Western market-based assumptions about technology diffusion.
9. **Technical Maturity Enables Geopolitical Strategy:** The e-CNY's full programmability, offline capability, and real-time settlement features enable its strategic integration into alternative cross-border payment infrastructure. Technical superiority translates directly into geopolitical leverage (Jargad, Shruti, and Others, 2025)
10. **Standards Gap Threatens Global Interoperability:** The fundamental divergence between China's efficiency-focused model and Western privacy-focused models creates structural barriers to global CBDC interoperability, increasing the likelihood of a bifurcated global financial system.
11. **De-dollarization Acceleration:** The successful integration of the e-CNY into mBridge and CIPS demonstrates a deliberate, operational strategy to establish parallel financial infrastructure. This infrastructure materially reduces the necessity of the US dollar for international trade settlements among participating nations.

Journal of Information Systems Engineering and Management
2026, 11(1)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

12. **Direct Monetary Transmission:** The e-CNY provides the PBOC with unprecedented tools for direct macroeconomic intervention, bypassing the traditional commercial banking transmission mechanism and enabling highly targeted fiscal stimulus.

10. Conclusion

The implementation of the Chinese Digital Yuan provides definitive empirical evidence that sovereign digital money can operate efficiently and securely at a macroeconomic scale. The e-CNY is not merely a technological upgrade to domestic retail payments; it is a profound strategic and geopolitical instrument designed to circumvent traditional financial choke points, enhance domestic monetary control, and accelerate the internationalization of the renminbi.

As platforms like mBridge mature and expand their participant networks, the architecture of international payments will increasingly reflect a multipolar reality. The era of undisputed US dollar hegemony, facilitated by the SWIFT messaging network, is being actively challenged by superior digital infrastructure. This necessitates urgent international cooperation to establish global interoperability standards, lest the future of digital finance becomes defined by fragmentation and competing geopolitical blocs.

Future research should focus on the long-term macroeconomic implications of CBDC-driven disintermediation, the regulatory harmonization challenges for cross-border digital currencies, and the potential for programmable CBDCs to enable entirely new forms of monetary policy transmission. The e-CNY case study conclusively demonstrates that the future of international finance will be determined not merely by technological innovation, but by geopolitical strategy and institutional coordination.

References

[1] Auer, R., Cornelli, G., & Frost, J. (2020). Rise of the central bank digital currencies: drivers, approaches and technologies. *BIS Working Papers*, No 880. Bank for International Settlements. https://www.bis.org/publ/bppdf/bispap123.pdf

[2] Bank for International Settlements (BIS). (2022). *Project mBridge: Connecting economies through CBDC*. BIS Innovation Hub. https://www.bis.org/about/bisih/topics/cbdc/mcbdc_bridge.htm

[3] BIS Innovation Hub. (2023). Central bank digital currencies: Financial stability implications. *BIS Quarterly Review*, March 2023, 45-62.

[4] Cheng, P. (2022). Decoding the rise of Central Bank Digital Currency in China: designs, problems, and prospects. Journal of Banking Regulation.

[5] Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* (Doctoral dissertation, Massachusetts Institute of Technology). MIT Sloan School of Management.

[6] Duffie, Darrell, and Elizabeth Economy. "Digital Currencies: The US, China, and the World at a Crossroads." Hoover Institution, 2022, https://www.hoover.org/research/ digital-currencies us-china-and-world-crossroads

[7] Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.

[8] Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly*, 19(2), 213-236.

[9] Jargad, Shruti, and Nachiket Kirit Javali. "Central Bank Digital Currency: China's First-Mover Advantage and Policy Pathways for India." Centre for Social and Economic Progress, December 19,

Research Article

2025. https://csep.org/blog/central-bank-digital-currency-chinas-first-mover advantage-and-policy-pathways-for-india/

[10] Ikram, H., & Arar, A. (2025, June). The role of central banks digital currencies (CBDCs) in promoting financial inclusion in the economies of developing countries [Master's thesis, University Centre Abdelhafid Boussouf Mila]. DSpace University of Mila. https://dspace.univ-mila.dz/jspui/handle/123456789/4392

[11] Jebri, S. (2024). The digital yuan: China's strategic tool for financial innovation and international expansion. *Journal of Digital Finance*, 12(3), 156-178.

[12] People's Bank of China (PBOC). (2021). *Progress of Research and Development of E-CNY in China*. Working Group on E-CNY Research and Development of the People's Bank of China. http://www.pbc.gov.cn/

[13] People's Bank of China (PBOC). (2024). *2024 Annual Report on Digital Yuan Development*. PBOC Digital Currency Institute.

[14] Prasad, E. S. (2022). *The Future of Money: How the Digital Revolution Is Transforming Currencies and Finance*. Harvard University Press.

[15] Rogers, E. M. (1995). *Diffusion of Innovations* (4th ed.). Free Press.

[16] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478. https://doi.org/10.2307/30036540

[17] Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157-178.

[18] Wang, H., & Gao, S. (2021). International dimension of CBDC: A network analysis. In Pushing the frontiers of payments: Towards faster, cheaper, more transparent and more inclusive cross border payments: CPMI Proceedings (pp. 1–38). Bank for International Settlements. https://www.bis.org/events/cpmi_ptfop/proceedings/paper10.pdf

[19] Yang, J. (2022).A study on the influence mechanism of CBDC on monetary policy. PLoS One.

[20] Zeng, Y. (2023).An empirical study on intention of e-CNY from users' perspective. ACM.