

Transformation of Monetary Policy Transmission Mechanisms in the Digital Economy Era

Haoyu Wang

Cardiff and Vale College Changzhou, Changzhou, China

Email: qiyeel229@outlook.com

How to cite this paper: Wang, H. Y. (2024). Transformation of Monetary Policy Transmission Mechanisms in the Digital Economy Era. *Modern Economy*, 15, 1254-1264. <https://doi.org/10.4236/me.2024.1512065>

Received: October 10, 2024

Accepted: November 30, 2024

Published: December 3, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

The rise of the digital economy is reshaping monetary policy transmission mechanisms. This study employs a system dynamics approach to explore the transformation of monetary policy transmission mechanisms in the digital economy era. The research begins by constructing a macroeconomic model that incorporates both traditional financial sectors and digital financial sectors. Through model simulations, the study analyzes the impact of emerging factors such as digital payments, cryptocurrencies, and online lending platforms on the effectiveness of monetary policy. The findings suggest that the digital economy accelerates fund flows, enhancing the speed of monetary policy transmission, but may also weaken the role of certain traditional transmission channels. The study pays particular attention to the potential impact of digital currencies on monetary policy control, including the role of central bank digital currencies (CBDCs). Through international comparative analysis, the study summarizes monetary policy innovations in different countries in response to the challenges of the digital economy. The research also explores the application of big data and artificial intelligence technologies in improving the accuracy of monetary policy decision-making. However, the study also points out new challenges brought by the digital economy, such as financial disintermediation and increased cross-border capital flows. In response to these challenges, the study proposes recommendations for optimizing the monetary policy toolkit and strengthening international policy coordination. Finally, the research looks ahead to the potential applications of quantum computing in future monetary policy analysis. This study provides a theoretical framework for understanding and addressing the transformation of monetary policy transmission mechanisms in the digital economy era, contributing to more effective monetary policy strategies for central banks.

Keywords

Monetary Policy, Digital Economy, Transmission Mechanisms, Central Bank Digital Currency, Financial Technology

1. Introduction

The rapid development of the digital economy is profoundly changing the global financial landscape, bringing unprecedented challenges and opportunities to traditional monetary policy transmission mechanisms. In recent years, with the integration of Internet technology and financial innovation, emerging financial forms such as digital payments, cryptocurrencies, and online lending platforms have risen rapidly, sparking widespread discussion among academics and policy-makers about the effectiveness of monetary policy (He et al., 2017). Traditional monetary policy primarily influences the real economy through channels such as interest rates, credit, and asset prices, but the trend of financial disintermediation and the rise of the virtual economy in the digital economy era have called these channels into question. At the same time, digital technology also provides new tools and possibilities for monetary policy, such as the introduction of central bank digital currencies (CBDCs), which opens up new avenues for monetary policy implementation. The application of big data and artificial intelligence technologies holds promise for improving the accuracy and efficiency of monetary policy decision-making. However, the digital economy also brings new risks and challenges, such as intensified cross-border capital flows and threats to financial stability. Therefore, an in-depth study of the transformation of monetary policy transmission mechanisms in the context of the digital economy has important theoretical and practical significance for maintaining the effectiveness of monetary policy and safeguarding financial stability. This study aims to construct a systematic analytical framework to explore the impact of the digital economy on various aspects of monetary policy transmission and provide policy recommendations for central banks to address new challenges.

The main innovations of this study are as follows: First, it establishes a comprehensive analytical framework that integrates traditional monetary policy transmission channels with digital economy factors. Second, it provides new empirical evidence on how digital payments and cryptocurrencies affect monetary policy effectiveness. Third, it develops policy recommendations for optimizing monetary policy tools in the digital era through international comparative analysis.

2. Impact of the Digital Economy on Traditional Monetary Policy Transmission Channels

2.1. Transformation of the Interest Rate Channel

The development of the digital economy has had a profound impact on the interest rate transmission channel of monetary policy. Traditionally, central banks

influence market interest rates by adjusting benchmark rates, thereby affecting investment and consumption decisions. However, the rise of digital finance has changed the way this mechanism operates. The emergence of online lending platforms has enabled direct connection between fund suppliers and demanders, bypassing the traditional banking system, which to some extent weakens the central bank's influence on market interest rates (Baruch et al., 2021). The application of big data and artificial intelligence technologies allows financial institutions to assess risks and price more accurately, potentially weakening the impact of interest rate adjustments on credit supply. The widespread adoption of digital payments has reduced cash holding costs, potentially altering the money demand function and thus affecting the effectiveness of interest rate transmission. However, digital technology also provides new possibilities for interest rate transmission. For example, the introduction of central bank digital currencies (CBDCs) may make negative interest rate policies easier to implement, thereby expanding the operational space of monetary policy. Overall, the digital economy both challenges and enriches the interest rate channel, requiring policymakers to adopt more flexible and innovative strategies.

2.2. Transformation of the Credit Channel

In the digital economy era, the traditional credit channel faces significant changes. On one hand, fintech companies utilizing big data and artificial intelligence technologies can assess borrowers' credit risks more quickly and accurately, potentially enhancing the efficiency of the credit channel. On the other hand, the rise of new financial models such as P2P lending has caused some credit demand to bypass the traditional banking system, potentially weakening the central bank's ability to influence credit supply through measures like adjusting bank reserve requirements (Frost et al., 2019). Moreover, the application of blockchain technology may change the structure of the credit market, such as automating credit approval and management through smart contracts. These changes make the operation of the credit channel more complex and diversified. Central banks need to reassess and adjust their policy tools to adapt to this new credit ecosystem. For example, they may consider incorporating some fintech companies into the macroprudential regulatory framework or explore the use of distributed ledger technology to enhance supervision of the credit market.

As shown in **Figure 1**, the credit channel in the digital economy era exhibits diversified and complex characteristics. The traditional linear transmission path of central bank-bank-borrower has been broken, replaced by a networked structure involving multiple participants such as fintech companies and P2P platforms. This new credit ecosystem improves the efficiency of fund allocation but also increases the complexity of monetary policy transmission.

2.3. Evolution of the Asset Price Channel

In the digital economy era, the role and mechanism of the asset price channel

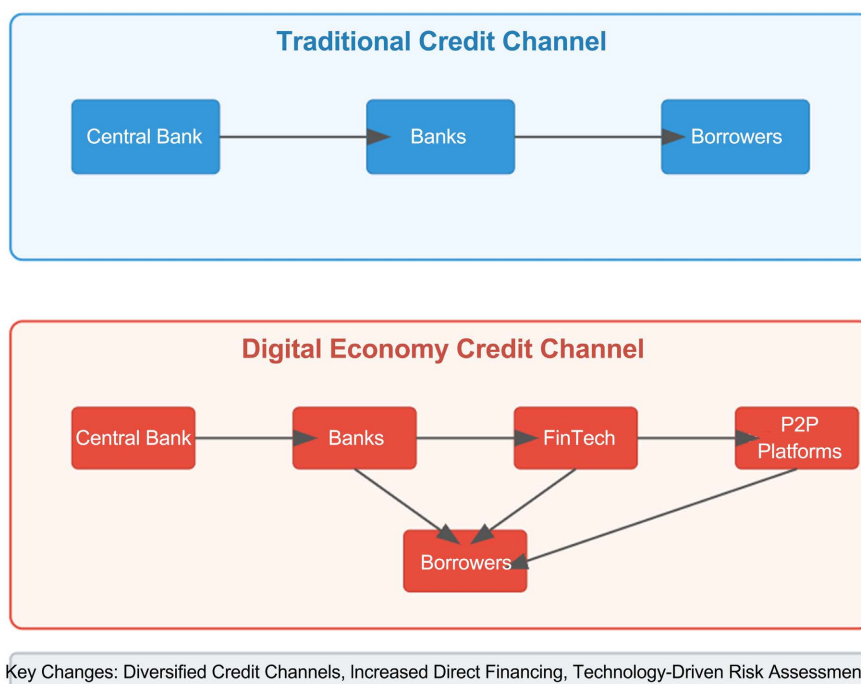


Figure 1. Transformation of the credit channel in the Digital Economy Era. Source: Author's compilation.

have also undergone significant changes. First, the emergence of digital assets (such as cryptocurrencies) has expanded asset classes, providing new avenues for monetary policy to influence asset prices. Price fluctuations in these digital assets may have spillover effects on the real economy, thereby affecting monetary policy transmission (Liu & Tsyvinski, 2021). Second, the prevalence of high-frequency trading and algorithmic trading has accelerated the adjustment speed of asset prices, potentially enhancing the transmission efficiency of monetary policy through the asset price channel. However, this may also lead to increased market volatility, posing challenges to financial stability. Furthermore, the rise of social media and online investment platforms has changed the way information is disseminated and investment decisions are made, potentially affecting the response of asset prices to monetary policy signals. Faced with these changes, central banks need to reassess the role of the asset price channel in monetary policy transmission and consider incorporating digital assets into their policy considerations. At the same time, using big data technology to monitor and analyze asset price dynamics and improving the timeliness and accuracy of policy responses have become new research directions.

3. Impact of Digital Financial Innovations on Monetary Policy Transmission

3.1. Impact of Digital Payments on Monetary Velocity

The widespread application of digital payment technologies is profoundly changing the way money circulates and its velocity, thereby affecting the transmission

of monetary policy. Mobile payments, electronic wallets, and other innovative payment methods have significantly reduced transaction costs and improved payment efficiency, which may lead to a significant increase in monetary velocity (Bech et al., 2018). Changes in monetary velocity directly affect the relationship between money supply and inflation, potentially weakening the explanatory power of traditional monetary quantity theory. For example, in the context of widespread digital payments, even if the money supply increases, its impact on price levels may not be as direct as traditional theory predicts (Deng, 2023). Moreover, the prevalence of digital payments may also change the cash-holding behavior of economic entities, affecting the stability of the money demand function. These changes pose new challenges to the formulation and implementation of monetary policy. Central banks need to reassess and calibrate their policy models to adapt to the new characteristics of the digital payment era. At the same time, strengthening the regulation and data collection of digital payment systems to more accurately grasp the state of monetary circulation has become key to the effectiveness of monetary policy.

3.2. Challenges of Cryptocurrencies to Monetary Policy Control

The rise of cryptocurrencies has brought unprecedented challenges to the formulation and implementation of monetary policy. First, cryptocurrencies, as potential monetary substitutes, may weaken central banks' control over money supply. Especially in some economies, if cryptocurrencies are widely accepted as a means of payment, it may cause some economic activities to escape central bank regulation, affecting the effectiveness of monetary policy (Bordo & Levin, 2017). Second, the high volatility of the cryptocurrency market may pose a threat to financial stability, indirectly affecting monetary policy transmission. The interaction between cryptocurrencies and the traditional financial system is becoming increasingly complex, forming new risk transmission channels. Moreover, the convenience of cross-border cryptocurrency transactions may intensify capital flows, challenging the monetary sovereignty of various countries. Faced with these challenges, central banks in various countries are exploring different response strategies, including strengthening regulation of cryptocurrencies, developing central bank digital currencies (CBDCs) to maintain the effectiveness of monetary policy, and enhancing international cooperation to address cross-border financial risks. The interaction between the cryptocurrency ecosystem and the traditional financial system is becoming increasingly complex, posing multiple challenges to central banks' monetary policy control. These challenges include weakened control over money supply, increased risks to financial stability, intensified cross-border capital flows, and challenges to monetary sovereignty. Central banks need to reposition their roles in this new financial landscape to maintain the effectiveness of monetary policy.

3.3. Impact of Online Lending Platforms on the Credit Market

The rapid development of online lending platforms is reshaping the landscape of

traditional credit markets, profoundly impacting monetary policy transmission mechanisms. These platforms utilize big data and artificial intelligence technologies to assess borrowers' credit risks more quickly and accurately, improving the efficiency of fund allocation (Fuster et al., 2019). However, this may also cause some credit demand to bypass the traditional banking system, weakening the central bank's ability to influence credit supply through measures such as adjusting bank reserve requirements. Moreover, the prevalence of online lending platforms may exacerbate the pro-cyclicality of the financial system, over-lending during economic booms and rapidly contracting during recessions, increasing macroeconomic volatility. For central banks, this means they need to reassess and adjust their policy tool mix to adapt to this new credit ecosystem. For example, they may consider incorporating some large online lending platforms into the macroprudential regulatory framework or explore the use of regulatory technology (Reg-Tech) to enhance real-time supervision of these platforms. At the same time, central banks also need to strengthen the collection and analysis of data from online lending markets to more comprehensively grasp the dynamics of the credit market and improve the accuracy of policy decisions.

4. Central Bank Digital Currency (CBDC) and Monetary Policy Innovation

4.1. CBDC Design Considerations and Policy Implications

The design of central bank digital currencies (CBDCs) involves multiple key dimensions, each of which may have profound impacts on monetary policy transmission. The interest rate mechanism design of CBDCs directly relates to the effectiveness of monetary policy. Floating-rate CBDCs may provide new avenues for implementing negative interest rate policies, enhancing central banks' policy operation space in low-interest-rate environments. Fixed-rate CBDCs, on the other hand, may become an effective lower bound for policy rates, limiting central banks' policy flexibility. The programmability of CBDCs offers possibilities for implementing more precise monetary policies. Through smart contracts, central banks can achieve conditional money issuance or interest rate adjustments, thereby more targeted influencing specific economic sectors or regions, improving policy precision and efficiency. The privacy design of CBDCs not only involves civil rights but also directly affects central banks' ability to obtain economic data, thus influencing the accuracy and timeliness of policy decisions. The trade-offs in these design choices will determine the effectiveness of CBDCs as monetary policy tools (Bordo & Levin, 2017).

The distribution model of CBDCs is another key design consideration that directly affects the transmission efficiency of monetary policy and the stability of the financial system. As shown in **Figure 2**, CBDCs can adopt a direct model (central banks directly provide CBDCs to the public) or an indirect model (distributing CBDCs through financial intermediaries). The direct model may improve the speed and efficiency of monetary policy transmission but may also lead to

deposit outflows from the banking system, affecting its credit creation capacity. The indirect model may maintain the stability of the existing financial system but may limit the innovative potential brought by CBDCs. The cross-border use of CBDCs is also an important consideration. CBDCs supporting cross-border transactions may improve the efficiency of international payments but may also exacerbate capital flow volatility, posing challenges to the independence of monetary policy. Therefore, when designing CBDCs, central banks need to balance these factors to achieve a balance between monetary policy objectives and maintaining financial stability. This requires central banks to continuously innovate policy tools and regulatory frameworks to adapt to the new financial landscape brought by CBDCs.

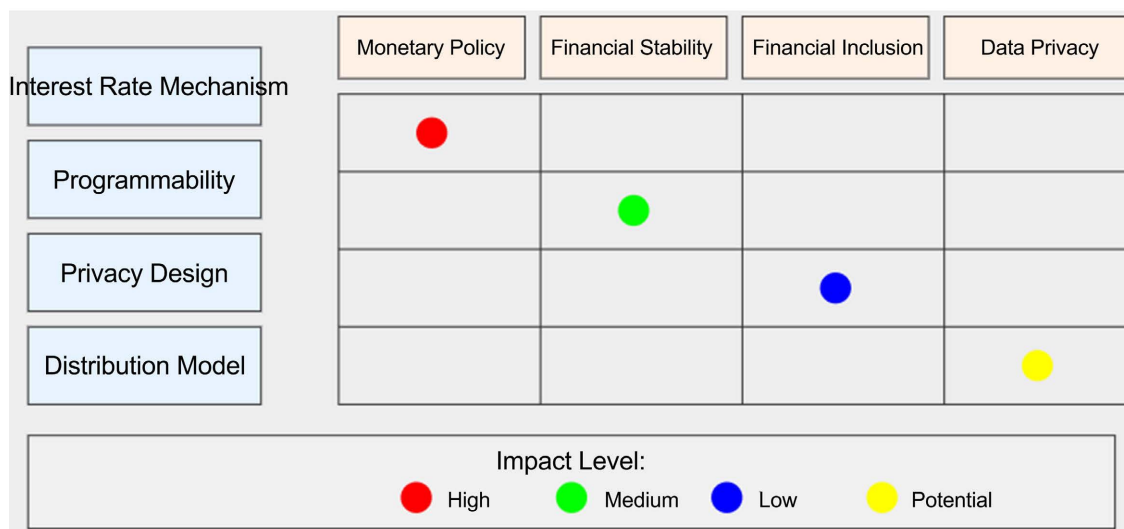


Figure 2. CBDC design considerations and policy implications. Source: Author’s compilation.

4.2. Impact of CBDCs on Monetary Policy Transmission Efficiency

The introduction of CBDCs is expected to significantly improve the transmission efficiency of monetary policy, with impacts manifesting in multiple aspects. As a new form of money, CBDCs can directly connect central banks with end-users, shortening the intermediate links in monetary policy transmission, potentially enhancing the speed and precision of policy signal transmission. This direct connection may allow interest rate adjustments to more quickly influence the behavior of economic entities, enhancing the timeliness of monetary policy. The traceability of CBDCs enables central banks to obtain economic data more quickly and comprehensively, including key information such as monetary velocity and transaction patterns, helping to improve the timeliness and accuracy of policy decisions. This enhancement in data acquisition capabilities may enable central banks to more accurately grasp economic pulses and make more targeted policy adjustments. The programmability of CBDCs provides new possibilities for implementing more flexible and precise monetary policies. Through smart contracts, central banks can achieve conditional money issuance or interest rate adjustments,

thereby more targeted influencing specific economic sectors or regions, improving policy precision and efficiency (Bindseil, 2020).

The introduction of CBDCs may also bring new challenges, potentially altering existing monetary policy transmission mechanisms. If the public holds CBDCs on a large scale, it may lead to bank deposit outflows, affecting the credit creation capacity of commercial banks, and thus changing the money multiplier mechanism. This may require central banks to reassess and adjust their policy tool mix to maintain the effectiveness of policy transmission. CBDCs may also affect the structure and operation of financial markets. For example, CBDCs may become a new safe asset, influencing the pricing benchmarks and risk preferences of financial markets, thereby changing the mechanism of the interest rate transmission channel. The cross-border use of CBDCs may increase the volatility of capital flows, impacting the exchange rate channel and increasing the complexity of monetary policy formulation. Faced with these potential changes, central banks need to closely monitor the impact of CBDCs on the financial system and economic operations, and timely adjust policy frameworks and implementation strategies. At the same time, strengthening policy coordination with other countries' central banks to address potential cross-border spillover effects of CBDCs has become an important consideration in maintaining the effectiveness of monetary policy (Auer et al., 2021).

4.3. Application of CBDCs in Cross-Border Payments and International Monetary Policy Coordination

The application of CBDCs in cross-border payments brings new opportunities and challenges for international monetary policy coordination. CBDCs have the potential to significantly improve the efficiency and transparency of cross-border payments, reduce transaction costs, and promote international trade and investment. If CBDC systems from multiple countries can achieve interoperability, it may form a more efficient, integrated global payment network. This network may enhance the international transmission effects of monetary policy, making economies more closely linked. For example, interest rate adjustments in one country may more quickly affect capital flows and exchange rates in other countries through the CBDC network. This enhanced policy spillover effect requires central banks to coordinate their policy actions more closely to avoid policy conflicts and maintain global financial stability. At the same time, the cross-border use of CBDCs may also provide emerging market countries with more opportunities to participate in the international financial system, potentially changing the existing international monetary landscape.

However, the cross-border application of CBDCs also brings new challenges. The cross-border use of CBDCs may exacerbate currency substitution effects, especially for some emerging markets and developing countries, which may face the risk of their domestic currencies being replaced by strong CBDCs, weakening the monetary policy autonomy of these countries. CBDCs may accelerate cross-

border capital flows, increasing financial market volatility and posing challenges to macroeconomic stability. To address these challenges, the international community needs to establish new cooperation mechanisms in the cross-border application of CBDCs. For example, exploring multilateral CBDC arrangements or coordinating CBDC design standards to balance efficiency improvements and financial stability. Central banks also need to strengthen information sharing and policy coordination, establish international CBDC monitoring mechanisms to timely identify and respond to potential systemic risks. At the same time, it is necessary to reassess existing international monetary policy coordination frameworks, considering the new situations brought by CBDCs, to ensure the stable operation of the global financial system (Fernández-Villaverde & Sanches, 2019).

Figure 3 illustrates the application of CBDCs in cross-border payments and its impact on international monetary policy coordination. The central circle represents the application of CBDCs in cross-border payments, the green boxes on the left indicate the benefits brought by CBDCs, the red boxes on the right show the challenges faced, and the yellow boxes at the bottom represent policy implications. The arrows indicate the direction of influence, and the legend clearly explains the meaning of each element. This diagram intuitively demonstrates the complexity of CBDC applications in cross-border scenarios and the opportunities and challenges it brings to international monetary policy coordination.

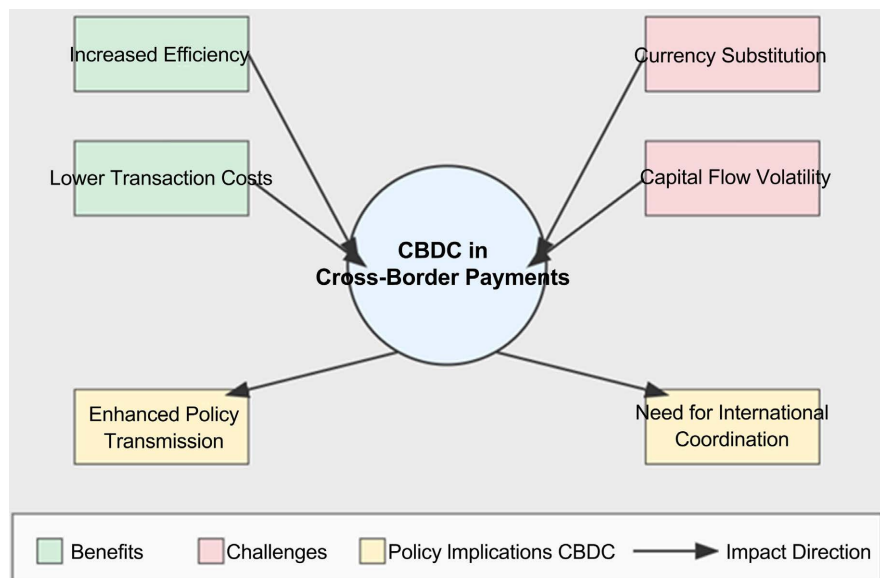


Figure 3. CBDC in cross-border payments and International monetary policy coordination. Source: Author’s compilation.

5. Conclusion

The advent of the digital economy era is profoundly changing the operational mode of monetary policy transmission mechanisms. This study, through systematic analysis of the impact of emerging factors such as digital payments, cryptocurrencies, and online lending platforms on traditional monetary policy channels,

as well as the innovative possibilities brought by central bank digital currencies (CBDCs), reveals the opportunities and challenges facing monetary policy in the context of the digital economy. The research finds that while the development of digital technology has improved the speed and precision of monetary policy transmission, it has also increased the complexity and uncertainty of the financial system. Faced with these changes, central banks need to continuously innovate policy tools and implementation methods to maintain the effectiveness of monetary policy. In particular, the design and promotion of CBDCs provide new possibilities for monetary policy, but careful consideration of their potential impact on financial stability and monetary sovereignty is needed. Moreover, the global characteristics of the digital economy require strengthening international monetary policy coordination to jointly address challenges such as cross-border capital flows. Looking ahead, with the development of frontier technologies such as quantum computing, monetary policy analysis and implementation methods may undergo even deeper transformations (Fernández-Villaverde & Sanches, 2019). In conclusion, in the digital economy era, maintaining policy flexibility, strengthening technological innovation, and deepening international cooperation will be key to ensuring the effectiveness of monetary policy.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Auer, R., Cornelli, G., & Frost, J. (2021). Rise of the Central Bank Digital Currencies: Drivers, Approaches and Technologies. *SSRN Electronic Journal*, 8, 32-45. <https://doi.org/10.2139/ssrn.3724070>
- Baruch, Y., Zhang, S., & Lereah, D. (2021). Impact of Fintech on Monetary Policy Transmission. *Journal of Financial Innovation*, 7, 1-18.
- Bech, M. L., Faruqi, U., Ougaard, F., & Picillo, C. (2018). Payments Are A-Changin' but Cash Still Rules. *BIS Quarterly Review*, 3, 67-80.
- Bindseil, U. (2020). Tiered CBDC and the Financial System. *SSRN Electronic Journal*, 21, 55-83. <https://doi.org/10.2139/ssrn.3513422>
- Bordo, M. D., & Levin, A. T. (2017). *Central Bank Digital Currency and the Future of Monetary Policy*. NBER Working Paper No. 23711.
- Deng, R. (2023). Digital Transformation of Commercial Banks, Monetary Policy Transmission Efficiency and SME Financing: Empirical Evidence from the Chinese Market. *Modern Economy*, 14, 999-1028. <https://doi.org/10.4236/me.2023.147053>
- Fernández-Villaverde, J., & Sanches, D. (2019). Can Currency Competition Work? *Journal of Monetary Economics*, 106, 1-15. <https://doi.org/10.1016/j.jmoneco.2019.07.003>
- Frost, J., Gambacorta, L., Huang, Y., Shin, H. S., & Zbinden, P. (2019). BigTech and the Changing Structure of Financial Intermediation. *Economic Policy*, 34, 761-799. <https://doi.org/10.1093/epolic/eiaa003>
- Fuster, A., Plosser, M., Schnabl, P., & Vickery, J. (2019). The Role of Technology in Mortgage Lending. *The Review of Financial Studies*, 32, 1854-1899. <https://doi.org/10.1093/rfs/hhz018>

He, D., Leckow, R., Haksar, V., Mancini-Griffoli, T., Jenkinson, N., Kashima, M., Tourpe, H. et al. (2017). Fintech and Financial Services: Initial Considerations. *Staff Discussion Notes*, 2017, 49. <https://doi.org/10.5089/9781484322383.006>

Liu, Y., & Tsyvinski, A. (2021). Risks and Returns of Cryptocurrency. *The Review of Financial Studies*, 34, 2689-2727. <https://doi.org/10.1093/rfs/hhaa113>