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Research on the Impact of Electronic Currency on Money Demand and Supply

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Abstract

With the rapid development of electronic payment technology, its impact on the economic system has gone far beyond the scope of daily payment behaviors and is profoundly reshaping the basic theoretical framework of currency demand and supply. In the context of the digital economy era, traditional monetary theories exhibit obvious theoretical limitations when explaining the new economic phenomena caused by electronic money. This research has dual theoretical value: on the one hand, through a systematic analysis of the impact mechanism of electronic money on core variables such as the money multiplier and circulation speed, it can improve the existing monetary theory; on the other hand, the research results will provide important theoretical support for China to formulate cash management policies that are adapted to the development of the digital economy. This paper will analyze the complex influence of electronic money on currency supply and demand, and propose targeted policy recommendations.

Keywords

Electronic currency, Money demand, Money supply

1. Introduction

There is a significant theoretical divergence in the academic community regarding the impact of electronic currency on the velocity of money circulation. Berentsen's (1998) research indicates that electronic currency can significantly enhance the efficiency of money circulation through means such as reshaping the central bank's monetary transmission mechanism, regulating base money, and the money multiplier. However, Hu (2014) based on the perspective of virtual currency put forward an

opposite assertion, arguing that the substitution effect of electronic currency as a transaction medium for the real economy will lead to a substantial slowdown in the velocity of money circulation. In the Chinese market context, the electronic currency form represented by third-party payment demonstrates three levels of substitution effects: Firstly, the substitution of mobile payment for credit cards and cash has formed an irreversible trend; Secondly, electronic currency not only replaces the traditional precautionary cash demand but also extends to the substitution of financial assets such as bonds; Finally, this multi-level substitution effect is restructuring the boundaries between monetary levels and significantly influencing the velocity of circulation through accelerating the transformation of monetary forms.

The mechanism by which electronic money affects the money supply mainly operates through the dual influence on the money multiplier (m) and the base money (B). The core transmission path is as follows: The popularization of electronic money significantly affects the money multiplier by changing the reserve requirement ratio and the cash leakage rate; at the same time, it directly impacts the scale of base money by substituting for cash demand, thereby reconstructing the entire process of money creation. It is worth noting that although electronic money has a structural impact on the payment system, due to the unique institutional advantages of the central bank which includes the monopolistic payment and settlement system, the autonomous interest rate pricing power, and the privilege of legal tender issuance. The effectiveness of its monetary policy execution can still remain relatively stable. In terms of inflation transmission, electronic money exhibits a dual acceleration mechanism: the first is the "quantity amplification effect", which means expanding the money supply directly pushes up the price level; the second is the "speed acceleration effect", which significantly accelerates the circulation speed of money by improving payment efficiency (Zhou et al., 2011). What is more alarming is that the increase in the volatility of the money multiplier will form a positive feedback loop, and this multiplier effect may cause inflation management to face a "whip effect", that is, small policy adjustments may generate overshoot risks through the amplification mechanism (Guo, 2015).

The stable operation of the monetary system fundamentally relies on the dynamic equilibrium relationship between money supply and demand. This fundamental proposition implies that when studying the economic impact of electronic money, a dual analytical framework including both the supply side and the demand side must be constructed. The current domestic research mainly focuses on the macro level, concentrating on exploring the effects of electronic payment on three key variables: the cyclical fluctuations of money circulation speed; the substitution elasticity between different levels of money; and the internal mechanism of the structural transformation of M0-M2.

2. The Impact of Electronic Currency on Money Demand

With the advent of the digital economy era, electronic currency has witnessed an explosive growth trend. According to the latest data from the International Monetary Fund, the global scale of electronic

payment transactions has exceeded 100 trillion US dollars, with an annual growth rate of over 15%. In the Chinese market, the annual transaction volume of third-party mobile payment exceeds 350 trillion yuan, with a penetration rate of over 86%, forming a pattern where account-based electronic currency represented by Alipay and WeChat Pay and legal electronic currency represented by Digital RMB coexist.

In terms of application scenarios, electronic currency has expanded from the initial e-commerce payment to various fields of daily life. In retail consumption scenarios, mobile payment via scanning codes accounts for over 65%; in the field of cross-border payment, the application of blockchain technology has enabled the trading scale of cryptocurrencies such as Bitcoin to exceed 2 trillion US dollars; in the financial investment field, stable coins and other new electronic currency products are reconfiguring the asset allocation methods. It is worth noting that the research and development process of central bank electronic currency (CBDC) is accelerating. Currently, more than 130 countries and regions around the world have conducted related research, and countries such as the Bahamas and Nigeria have officially launched legal electronic currency.

2.1 The Electronic Money has Enhanced the Liquidity of Financial Assets

Under the tide of the digital economy era, the transformation of payment methods has evolved from a simple technological iteration to a profound financial revolution. The penetration rate of mobile payment terminals has exceeded the 85% market threshold, marking the historical leap of electronic payment from supplementary payment methods to the mainstream transaction medium. This transformation not only changed consumers' payment habits but also restructured the underlying operational logic of the entire financial market.

With the transformation of fintech and the widespread application of mobile payment devices, electronic payment is increasingly used as the payment method for daily transactions. The rapid development of electronic payment, especially this convenient and efficient payment method, has already exerted a strong substitution effect on traditional cash payment methods. Moreover, fund holders often consider the profitability and liquidity of funds when making asset choices. Generally, cash and current assets have high liquidity and quick realization, but their profitability is not high; while assets with higher profitability cannot simultaneously possess the feature of being able to be converted at any time. However, the emergence of electronic currency has brought some financial products that combine high returns and high liquidity to asset holders. They can convert high-level currency into low-level currency at any time while maintaining high profitability, enabling holders to fulfill their daily transactional functions. This can increase the liquidity of financial assets and make them monetized.

2.2 The Electronic Payment has Reduced the Demand for Cash Currency in Households

Electronic money has reduced the demand for cash currency among households. This change is mainly reflected in two aspects: Firstly, because electronic money combines liquidity and profitability, it has

reduced the conversion costs between different levels of currencies. People can convert bond-form currency into cash at any time to obtain additional liquidity for daily transaction payments. This will change the previous situation where residents reduced more low-level currencies and instead held higher-level currencies. Through this transformation, the demand for cash currency M0 among households has decreased. Secondly, electronic payment can accelerate the conversion between low-level and high-level currencies. Moreover, the low conversion costs and the trend of financial assets monetization make it more profitable for residents to hold higher-yielding and more liquid financial assets. To some extent, this has raised the opportunity cost of transactional currency demand, causing the holders of such transactional currency to reduce their holdings.

2.3 The Electronic Currency Has an Impact on the Traditional Theory of Money Demand

On the one hand, the widespread use of electronic currency has had a certain impact on the transactional demand for money in post-Keynesian economics. Electronic currency will cause changes in the structure of money demand. In the theory before the introduction of electronic payment, this conversion cost was merely regarded as the handling fees and commissions required when converting between different liquid assets. However, the changes brought about by electronic payment methods are not only the reduction of handling fees and commissions, but more importantly, they stem from the efficiency and convenience inherent in it.

On the other hand, electronic currency will have an impact on the precautionary money demand in post-Keynesian economics. First, electronic currency will have a certain substitution effect on precautionary cash demand. Since electronic currency has the characteristics of high returns and strong liquidity, which are not available when holding cash, low-cost electronic currency can replace precautionary money and be used to prevent potential uncertainties in future income without the need to separately retain a portion of precautionary cash. This will reduce the precautionary money demand. Second, electronic currency will replace higher-level currencies such as bonds. This substitution effect will make the hierarchy among different currencies become blurred, thereby accelerating the speed of circulation among them.

2.4 The Electronic Currency has Changed the Structure of Currency Demand

The widespread adoption of electronic currency has significantly altered the traditional structure of currency demand. In terms of transactional demand, the substitution effect of electronic payment for cash is particularly prominent. According to data from the People's Bank of China, the proportion of cash in circulation (M0) in the broad money supply (M2) has decreased from 6.5% in 2012 to 3.8% in 2022. The instant settlement feature of mobile payment has increased transaction efficiency by approximately 40%, while reducing the transaction cost per transaction to one-tenth of that of cash transactions. This change has led to a continuous weakening of the motivation for enterprises and individuals to hold cash, and a significant change in the interest elasticity of currency demand.

In terms of precautionary currency demand, there is a structural adjustment feature. Although the popularization of electronic wallets makes it more convenient to reserve emergency funds, the frequent occurrence of cybersecurity incidents has generated new precautionary demands. In 2022, global cryptocurrency theft cases caused losses of over 3.8 billion US dollars, prompting investors to allocate 5-15% of their assets to secure storage solutions such as cold wallets. At the same time, the emergence of financial innovation tools such as smart contracts has enabled precautionary funds to be automatically transferred to interest-bearing assets such as money market funds, changing the traditional zero-yield holding method of precautionary funds.

In the era of electronic currency, speculative currency demand presents new characteristics. Cryptocurrencies such as Bitcoin have attracted a large amount of speculative funds due to their high price volatility. In 2021, global cryptocurrency trading volume exceeded 1.5 trillion US dollars, with speculative transactions accounting for over 60%. At the same time, financial innovation has given rise to various derivatives and leverage trading tools, further amplifying speculative demand. The rise of DeFi platforms has enabled users to conveniently conduct operations such as collateral lending and liquidity mining. This "financial democratization" phenomenon significantly enhances the speculative nature of electronic currency. It is worth noting that there is a mutual relationship of waxing and waning between speculative demand for electronic currency and traditional currency demand. When a large amount of funds flow into the cryptocurrency market, it often reduces the demand for legal tender.

3. The Impact of Electronic Currency on Money Supply

Electronic currency has significantly altered the composition of base money. With the widespread adoption of electronic payments, cash in circulation (M0) has been continuously replaced. Data from the People's Bank of China shows that in 2022, the number of mobile payment transactions reached 158.5 billion, an increase of 29% year-on-year. This led to a decrease in the ratio of circulating cash to GDP from 9.5% in 2015 to 6.3% in 2022. This substitution effect directly reduced the cash liability items in the central bank's balance sheet. At the same time, the reserve structure of banks at the central bank has also been adjusted due to changes in the electronic currency clearing mechanism. Some legal reserves may be converted into excess reserves.

3.1 The Impact of Electronic Currency on the Base Currency

3.1.1 Electronic Currency Affects Physical Cash and M0 by Regulating the Money Supply

Electronics play a significant role in the money supply. From multiple aspects such as payment convenience, investment security, and cross-border payment efficiency, electronics demonstrate their remarkable substitution advantages, which are gradually changing people's payment habits and the way they use money. The payment convenience of electronic money has already dominated the domestic payment field. Its convenience and speed have led more people to choose to use electronic money, thus

reducing the use of cash. This change not only makes trade more efficient but also reduces transaction costs, enabling the influence of electronic money in the payment field to continuously expand. Electronic money significantly reduces the risk of speculative premiums through technological means, squeezing out the space for cash speculation. This means that electronic money also demonstrates its safety in the investment field. Investors can use electronic means for investment more confidently, reducing the risk of losses due to market fluctuations. In the cross-border payment market, the proportion of electronic money is also rising rapidly. The traditional cross-border payment process is cumbersome and costly, while electronic money can greatly improve the efficiency of cross-border payment and reduce payment costs, thereby promoting the flow of funds and the convenience of transactions on a global scale.

The rapid growth of electronic money payment is injecting new impetus into China's non-cash payment market. Whether it is traditional consumer payment or support for new intelligent scenarios, electronic money has achieved convenient non-cash support. At the same time, the cross-border payment market has also become an important direction for the use of electronic money. Driven by multiple factors, electronic money payment is releasing tremendous energy, promoting a significant increase in the proportion of non-cash payment in our country, and accelerating the pace of the decline in the proportion of cash usage among the public.

3.1.2 The Impact of Electronic Currency on Reserve Requirements Regulates the Money Supply

Due to its convenient payment, efficient asset allocation, and frictionless cross-border transfer features, electronic currency is gradually replacing the traditional functions of bank account asset storage and payment settlement. This trend has led more and more people to convert their bank deposits into electronic currency for holding, thereby affecting the scale of savings deposits of commercial banks. With the rapid growth of the user base of electronic currency, this substitution effect is expected to further strengthen in the coming years. Electronic currency not only squeezes bank deposits but also reduces the demand for reserve deposits of banks. This change has a profound impact on money supply. Electronic currency is changing people's asset holding methods and the deposit structure of banks, thereby influencing the entire money supply system. This new type of currency form not only enhances the efficiency of financial transactions but is also quietly changing our financial ecosystem and the monetary supply mechanism.

With the rapid development of electronic currency and the rapid development of the digital economy, electronic currency is gradually becoming a new way of money supply. With its convenient and efficient characteristics, electronic currency is favored by a large number of users, causing some bank deposits to be converted into electronic currency, thereby affecting the demand for reserve deposits of commercial banks. This transformation not only reduces traditional bank deposits but also affects the structure and speed of money supply. Electronic currency plays an important role in reshaping the

currency circulation method, regulating the money supply volume, and promoting the digital transformation of the financial system.

Technologies such as electronic currency payment and smart contract programming provide a new method of automation and programming for asset management, significantly improving the efficiency of fund transfer and conversion and making asset allocation more convenient and efficient. At the same time, electronic currency also solves the problem of too long traditional international payment settlement cycles with its fast and convenient global cross-border payment capabilities. Under the combined effect of these two factors, not only does the liquidity of electronic currency's own funds significantly increase, but its effect will also spread and permeate throughout the social funds liquidity, thereby leading to an overall improvement in the efficiency of commercial bank customer fund allocation.

3.2 The Impact of Electronic Currency on the Money Multiplier

The monetary multiplier mechanism is subject to structural influences. Electronic money has accelerated the capital turnover by enhancing payment efficiency. Empirical studies have shown that the widespread adoption of electronic money has increased the monetary multiplier in China from 4.2 times in 2010 to 6.8 times in 2022. This amplification effect stems from two aspects: Firstly, the centralized deposit custody model of third-party payment platforms has changed the traditional path of deposit derivation; Secondly, the non-monetary functions of various "electronic wallets" have blurred the boundaries between M0 and M1, and the fund pool business of non-bank payment institutions has actually participated in the process of money creation.

3.2.1 Electronic Currency's Impact on the Cash Leakage Rate Regulates the Money Supply

The social funds of our country's commercial banks are expected to flow in large quantities into the digital currency of the People's Bank of China. This includes both the autonomous access of the public individuals and institutions, as well as the active purchase of digital currency by commercial banks to meet their liquidity needs. At the same time, the technical feature of automatic circulation supported by digital currency assets also displaces the functions of traditional bank accounts at the level of transaction efficiency. Under the combined influence of these effects, the shift of social deposits to the digital currency of the People's Bank of China will be a clear and significant development trend.

Whether in the domestic consumption payment market, speculative trading market or cross-border payment market, digital currency quickly occupies the traditional cash territory by virtue of its own technological advantages. Under the combined influence of multiple substitution effects, the cash in the hands of our country's commercial banks is facing problems such as severely weakened functions and idle resources. The significant decline in a large proportion of cash business is bound to cause the previous business model of commercial banks based on cash circulation to gradually collapse. Cash management and loss costs have become their main expenditures, and the cash loss rate has been rising significantly.

In the short term, digital currency replaces a large amount of cash, reduces the cost of cash leakage, and the proportion of the cash item in the cash flow formula under the multiplier formula has decreased, resulting in the amplification of the multiplier effect. Data shows that digital currency is expected to completely replace the cash in the payment market within the next 5 years, the circulation speed of cash will drop by more than 50%, and the proportion of cash leakage cost will decrease significantly accordingly. From the perspective of the monetary multiplier calculation formula, this is equivalent to reducing the margin item and bringing about the amplification of the monetary multiplier effect. It is predicted that at that time, the growth rate of M2 money supply in China will rise by 2 percentage points compared to the current level.

From a medium and long-term perspective, when the marginal effect of cash being replaced by digital currency diminishes, this is more likely to be manifested as the effect of other digital factors on the monetary multiplier. This gradually weakens the role of digital currency in the fluctuation of the monetary multiplier. In a longer 10-year cycle, when cash payment returns to a niche market and is completely replaced by digital currency, the role of cash as a variable for the monetary multiplier will weaken to 0. At this time, the changes in the monetary multiplier will largely depend on the influence of factors such as the loan-to-deposit ratio of banks and other factors. The model predicts that this will lead to a relatively stable overall fluctuation of the monetary multiplier in the next 10 years.

3.2.2 Electronic Money Affects the Fixed-versus-variable Ratio by Regulating the Money Supply

The introduction of digital currency by the People's Bank of China has a profound impact on the fixed-liquid ratio. Digital currency changes the way money transmits to the economy by increasing the speed of capital flow in the private sector and affects the calculation of the money multiplier. Real-time settlement and smart contract technology in the financial market make it more efficient and flexible. This change not only affects the operation mode of the financial system but also has a positive promoting effect on the macroeconomy.

The widespread introduction of digital currency by the People's Bank of China has led to an increase in the proportion of current deposits, and subsequently, a change in the fixed-liquid ratio model. The immediate withdrawal feature of digital currency, flexible interest rate adjustment, and the comprehensive impact of financial innovation have prompted the public to re-select deposit types and pose new challenges to the management of commercial banks' funds. This change not only alters the competitive landscape of deposit markets but also brings new challenges and tests to the risk management of financial institutions.

The popularization of digital currency has required commercial banks to deal with both the adjustment of deposit structure and the reorganization of the entire asset-liability structure. Through measures such as enhancing high-liquidity assets, optimizing the matching of assets and liabilities, and expanding digital currency payment services, commercial banks strive to adapt to the new financial landscape and address various challenges and opportunities brought by digital currency. This adjustment not only

affects the bank's business strategy but also generates new demands for the stable operation of the financial system.

3.2.3 The Impact of Electronic Currency on the Excess Reserve Ratio Regulates the Money Supply

The People's Bank of China is promoting the use of digital currency to reduce the amount of funds in transit held by commercial banks. The characteristics of digital currency, such as instant settlement and efficient clearing, enable banks to more flexibly allocate funds and reduce the demand for excess reserves. This change has a substantive impact on the excess reserve ratio.

With the widespread adoption of digital currency, it has played an important role in the money supply. The convenience and popularity of digital currency have led to the transfer of traditional bank deposits to digital currency, which has affected the demand for reserve funds by commercial banks. The rise of digital currency may prompt commercial banks to increase excess reserves, which becomes a potential constraint on the money supply and further affects the lending capacity of commercial banks and the financing environment of the economy. Digital currency indirectly affects the overall monetary supply situation of the economy through changes in banks' reserve strategies, and this new change deserves the high attention of the central bank and regulatory authorities.

The central bank's implementation of moderate regulatory measures on the interest rate of excess reserves aims to stimulate commercial banks to use funds more flexibly and effectively, especially for the support of economic development. This adjustment can promote the optimization of financial resource allocation and the realization of commercial banks' responsibilities. From a macro perspective, this adjustment has positive significance for promoting the healthy and stable development of the entire economic system.

4. The Policy Recommendations

With the rapid development of electronic currency, its impact on the demand and supply of currency has become increasingly significant, and corresponding policies are urgently needed for guidance and regulation.

In terms of monetary policy adjustments, the central bank should quickly establish a new monetary policy framework that is adapted to the development of electronic currency. On one hand, it is necessary to redefine the statistical scope of money supply, including mainstream electronic currencies in the M0 category, and consider establishing higher-level monetary statistical indicators such as M4. On the other hand, it is necessary to innovate monetary policy tools, such as developing targeted rediscount tools for electronic currency or establishing an electronic currency reserve system. The People's Bank of China can refer to the regulatory experience of the Swedish central bank on electronic krona, establish a dedicated electronic currency monitoring system, and track the issuance, circulation, and return of electronic currency in real time.

Financial regulatory measures need to focus on two issues: one is to regulate market order, and the other is to prevent financial risks. It is suggested to formulate the "Electronic Currency Management Regulations", clearly defining core regulatory indicators such as the qualification requirements of the issuer, the reserve ratio, and anti-money laundering obligations. For stable coins and other new electronic currencies, the principle of "same business, same risk, same regulation" should be implemented, requiring them to meet the same capital adequacy ratio and liquidity requirements as traditional financial institutions. At the same time, an electronic currency risk early warning mechanism should be established, focusing on risks such as electronic currency runs, technical security risks, and cross-border flow risks.

In terms of international cooperation, China should actively participate in the rule-making work of international organizations such as the BIS and IMF regarding electronic currency, and promote the establishment of a global unified electronic currency regulatory standard. It is suggested to sign bilateral regulatory memorandums with major trading partner countries, and conduct in-depth cooperation in areas such as anti-money laundering, data flow, and consumer protection. Regarding the regulatory challenges of global stable coins such as Libra, it is advisable to advocate the establishment of a multilateral regulatory sandbox mechanism to test the effectiveness of cross-border regulatory collaboration in a controlled environment. In addition, cooperation with developing countries in the construction of electronic currency infrastructure should be strengthened to promote the establishment of an inclusive international electronic currency governance system.

References

Chen, X. D. (2024). *Research on the Impact of the People's Bank of China's Digital Currency on China's Money Supply*. Heilongjiang University.

Guo, L. (2015). Empirical Study on the Inflation Effect of Electronic Money Development in China. *Journal of Finance Theory and Practice*, (11), 43-46.

Hu, Z. Y. (2014). Theoretical Research on the Impact of Virtual Currency on Money Supply and Demand. *Southern Finance*, (10), 9-16.

Huang, W. B. (2023). *Research on the Impact of Legal Digital Currency on China's Monetary Policy*. Nanchang University.

Jia, L. P., Zhang, J., & He, Z. Y. (2019). The Intrinsic Mechanism of Electronic Money on the Effectiveness of Monetary Policy—Based on the Perspective of Third-Party Payment. *International Finance Research*, (09), 20-31.

Meng, C. (2022). *Research on the Impact of Digital RMB Issuance from the Perspective of Money Supply and Demand on the Internationalization of the Renminbi*. University of Electronic Science and Technology of China.

Shi, X. L., & Zhou, Z. N. (2018). Electronic Payment, Money Substitution and Money Supply. *Research on Financial Economics*, *33*(04), 24-34.

Shi, X. L., & Zhou, Z. N. (2018). Research on the Impact of Electronic Payment Development and Electronic Money Substitution on Money Demand. *Journal of Central Finance University*, (12), 77-86.

Yan, J. J., & Lin, Y. X. (2020). Research on the Impact of Electronic Money on the Effectiveness of Monetary Policy Indicators. *Investment Research*, *39*(05), 52-66.

Yang, S. G., Liao, H. Y., & Liu, S. W. (2018). The Impact of Electronic Money Development, Base Money Supply and Monetary Policy Effectiveness. *Journal of Hunan University of Science and Technology (Social Sciences Edition)*, *21*(05), 53-63.

Zhou, G. Y., & Xu, Z. K. (2011). Empirical Research on the Impact of Electronic Money on Inflation. *Finance Theory and Practice*, *32*(06), 14-19.

Zhou, G. Y., & Zhang, Y. J. (2018). Holding Motivation, Electronic Money Substitution and Money Supply. *Finance Research*, (11), 172-187.