Analysis of Monetary Policy Transmission Mechanism in the Digital Economy Era

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Abstract: With the rapid development of the digital economy, characterized by digitalization, networking, intellectualization, and platformization, the traditional monetary policy transmission mechanism is undergoing profound transformation. This paper systematically analyzes the impact of the digital economy on monetary policy transmission from multiple dimensions. It reveals that the digital economy has altered the stability, structure, and interest rate elasticity of money demand, while diversifying money supply subjects, blurring traditional monetary classification boundaries, and increasing the difficulty of central bank control. Regarding specific transmission channels, the digital economy has reshaped interest rate formation mechanisms, improved transmission efficiency, but also introduced uncertainty due to private digital currencies; it has diversified credit market structures, enhanced credit accessibility, and brought new risks; it has complicated asset price transmission by incorporating digital assets and intensified exchange rate volatility through cross-border digital currency flows. To address challenges such as anonymous transaction monitoring inefficiencies and cross-border regulatory gaps, the paper proposes a synergistic governance system combining technological innovation and policy regulation: technical means including blockchain-based penetrative monitoring, smart contract programmability, and privacy computing ensure traceability and controllability of transmission processes; policy measures such as classified hierarchical supervision, innovative monetary policy tools, and cross-border coordination mechanisms improve regulatory precision and stability. This study provides theoretical and practical references for optimizing monetary policy frameworks in the digital economy era, facilitating precise and efficient monetary policy implementation and maintaining economic and financial stability.

1. Introduction

With the rapid development of information technology, the digital economy has become a core engine driving global economic growth. It takes digital knowledge and information as key production factors, relies on modern information networks as important carriers, and relies on the effective application of information and communication technologies, covering a wide range of fields including digital industrialization, industrial digitization, and digital technology innovation. Against this backdrop, the degree of digitalization, networking, and intellectualization in economic activities continues to deepen, which not only reconstructs traditional modes of production, exchange, distribution, and consumption but also exerts a profound impact on the macroeconomic policy system, with the monetary policy transmission mechanism being particularly severely affected.

As a core component of the digital economy, digital currencies have developed rapidly in recent years. Since the birth of Bitcoin, various encrypted digital currencies such as Ethereum and Litecoin have continued to emerge. Their characteristics of decentralization, anonymity, and cross-border circulation pose fundamental challenges to traditional monetary theories and monetary policy transmission mechanisms. At the same time, central banks around the world are actively promoting the research, development, and application of digital currencies. The technological exploration and practical progress of central bank digital currencies are changing the existing form and circulation mode of money, thereby reshaping the transmission paths and implementation effects of monetary

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The popularization of digital payment systems has profoundly changed the speed of money circulation and transaction patterns. The widespread application of digital payment tools such as mobile payments and third-party payments has greatly improved the efficiency of capital flow and significantly reduced transaction costs. While this transformation enhances economic operation efficiency, it also accelerates the transmission speed of monetary policies. However, due to the diversification of payment scenarios and the complexity of capital flows, it also increases the difficulty and complexity of monetary policy regulation.

At the theoretical level, traditional theories of monetary policy transmission mechanisms are built on the foundation of the real economy and traditional financial systems. In the digital economy environment, the core assumptions and transmission paths of these theories have undergone substantial changes. In-depth research on the laws of monetary policy transmission in the digital economy era helps to expand and improve the theoretical system of monetary policies, providing a solid theoretical support for policy formulation.

At the practical level, the development of the digital economy has brought about profound changes in the implementation environment of monetary policies, and the effectiveness of traditional policy tools and transmission mechanisms is facing severe challenges. By exploring the impact mechanism of the digital economy on monetary policy transmission, it can provide practical references for central banks to optimize policy formulation, improve the precision and effectiveness of monetary policies, and maintain economic and financial stability. In addition, the cross-border circulation of digital currencies and the internationalization trend of digital payment systems highlight the importance of international coordination of monetary policies. Relevant research can provide a theoretical basis for strengthening international policy collaboration and addressing global financial challenges.

2. Connotation and Characteristics of the Digital Economy

The digital economy is an economic form driven by the effective application of information and communication technologies, with digital knowledge and information as core production factors and modern information networks as key carriers. Its core structure covers three dimensions: digital industrialization, industrial digitization, and digital governance. Digital industrialization refers to the information and communication industry, including electronic information manufacturing, telecommunications, software and information technology services, and the internet industry. As a leading industry for digital economy development, it provides technical support, products, services, and solutions for the digital transformation of the overall economy. Industrial digitization refers to the improvement of production quantity and efficiency in traditional industries through the application of digital technologies, with its additional output forming an important part of the digital economy, embodied in integrated application forms such as industrial internet, intelligent manufacturing, and smart agriculture. Digital governance involves optimizing administrative management systems and innovating service supervision models through digital technologies to modernize institutional mechanisms in administrative decision-making, execution, organization, and supervision.

The digital economy exhibits distinct core characteristics. Digitalization is its primary feature, with data as a key production factor supporting value creation and economic operation, similar to fundamental resources in the industrial economy era. Enterprises achieve precise grasp of market demand, optimization of production processes, and innovation of products and services through data collection, analysis, and application. The networking characteristic relies on infrastructure such as the internet and internet of things to break temporal and spatial constraints, promote rapid information dissemination and efficient resource allocation, and facilitate cross-entity and cross-regional economic collaboration and value exchange. The intelligent characteristic continues to strengthen with the development of technologies such as artificial intelligence, machine learning, and big data analytics, making economic links such as production and services increasingly automated, precise, and adaptive, thereby improving the efficiency and quality of economic activities. Platformization is a typical business model of the digital economy, where various digital platforms connect multi-sided

users, reduce transaction costs, promote information sharing and resource matching, and optimize market operation efficiency.

These characteristics exert profound multi-dimensional impacts on economic operation. On the production side, the application of digital and intelligent technologies significantly improves production efficiency, reduces production costs, and drives industrial structure upgrading and innovative development. Enterprises optimize supply chain management through big data analytics, reduce resource waste, enhance production precision and flexibility, and promote the transformation of manufacturing towards intelligence and servitization. On the consumption side, networking and platformization expand consumer choice, reduce information acquisition and transaction costs, enable personalized customization services, meet diverse consumer needs, and reshape the consumption market pattern.

In terms of market structure, the digital economy promotes the reconstruction of market competition patterns. Emerging digital enterprises rise rapidly with technological advantages and model innovations, creating competitive pressure on traditional enterprises, driving market survival of the fittest and structural optimization. However, the development of the digital economy is accompanied by new challenges, including prominent risks in data security and privacy protection, potential exacerbation of social inequality due to the digital divide, and threats to fair market competition from platform monopoly phenomena. These issues require collaborative responses from governments and all sectors of society to achieve the healthy and sustainable development of the digital economy.

3. Impact of the Digital Economy on Monetary Policy Transmission Mechanism

3.1. Impact on Money Demand

In the digital economy era, the stability of money demand has undergone significant changes. Traditional money demand theory holds that there is a relatively stable functional relationship between money demand and variables such as income and interest rates. However, the development of the digital economy has complicated this relationship. The popularization of digital payment instruments has greatly improved transaction convenience and significantly reduced the public's reliance on cash. [1] Consumers can make payments around the clock via smart devices, directly accelerating the velocity of money circulation and increasing the volatility of money demand. Concentrated payment behaviors in specific consumption scenarios can significantly alter the rhythm of money circulation in the short term, making the short-term fluctuation characteristics of money demand more prominent.

The digital economy has profoundly transformed the structure of money demand. In terms of transactional money demand, the continuous expansion of online transaction scale has increased the demand for electronic money, correspondingly reducing reliance on traditional transactional money such as cash and demand deposits. In e-commerce transactions, funds mainly flow between platform accounts and bank accounts in the form of electronic money, drastically reducing the frequency of cash usage. Precautionary money demand has transformed due to innovations in fintech products; internet wealth management products and money market funds, through balanced allocation of liquidity and profitability, have partially replaced traditional precautionary cash holdings. The structural changes in speculative money demand are more evident: the rise of digital currency and digital asset markets has provided new speculative channels, prompting the reallocation of funds across different asset classes and altering the traditional form of speculative money demand.

The digital economy has significantly enhanced the interest rate elasticity of money demand. In the traditional economy, imperfect financial markets and information asymmetry limited the role of interest rates in regulating money demand. In the digital economy environment, fintech has improved market transparency and efficiency, accelerated information dissemination, enabling market participants to obtain real-time interest rate changes and adjust asset allocation strategies. When interest rates change, investors can quickly transfer funds between products with different interest rates through digital financial platforms, making money demand more sensitive to interest rate

fluctuations and challenging the stability assumption of the traditional money demand function.

3.2. Impact on Money Supply

The digital economy has broken the single structure of traditional money supply subjects. In the traditional financial system, central banks monopolize the issuance of base money, and commercial banks create money supply through deposit creation mechanisms. In the digital economy era, non-bank financial institutions and technology companies have begun to participate in the money supply process. For example, third-party payment institutions issue electronic money, which performs transaction medium and value storage functions in retail scenarios, increasing market liquidity. Although such electronic money is based on fiat currency, its issuance and circulation have diversified money supply subjects. The emergence of digital currencies has further challenged monetary issuance rights; decentralized digital currencies, with issuance mechanisms independent of central bank regulation, have potentially reshaped the future money supply landscape despite their current limited scale.[2]

The digital economy has posed fundamental challenges to the classification of traditional money supply tiers. Traditional classifications such as M0 (currency in circulation), M1 (M0 + corporate demand deposits), and M2 (M1 + savings deposits + time deposits) are based on liquidity and financial institution business scopes. In the digital economy, digital payment instruments and digital currencies have altered liquidity characteristics, making traditional classifications inaccurate. Electronic money, with circulation speed between cash and demand deposits, and complex liquidity features of new financial products like internet wealth management products, have blurred tier boundaries, requiring central banks to re-examine and adjust classification standards.[3]

The digital economy has increased the difficulty for central banks to control money supply. On one hand, diversified subjects and forms of money make it hard for central banks to accurately grasp the actual scale of money supply, as supervision and statistics on third-party payment institutions and digital currency transactions are inadequate. On the other hand, rapid fintech innovation, such as micro-lending services with innovative credit models, has destabilized the money multiplier, weakening the effectiveness of central banks' control over money supply through base money adjustment.

3.3. Impact on Interest Rate Transmission Mechanism

The digital economy has transformed the interest rate formation mechanism. In traditional financial markets, interest rates are mainly determined by central bank policy tools and market supply-demand. In the digital economy era, big data and artificial intelligence enable market participants to obtain comprehensive information, influencing interest rate formation. Fintech companies use transaction and credit data to accurately assess risks and price, providing personalized interest rate services, making interest rates more aligned with actual market conditions. Additionally, digital currency markets have formed independent interest rate systems, which, though weakly linked to traditional rates, may increasingly influence the overall interest rate system as markets develop, complicating formation mechanisms.[4]

The digital economy has significantly improved interest rate transmission efficiency. Digital financial platforms have broken temporal and spatial constraints of traditional markets, accelerating policy signal transmission. Central bank monetary policy adjustments can quickly reach market participants through digital channels, with market reactions promptly reflected in interest rate changes. When interest rate policies adjust, rates of internet wealth management and online lending products respond rapidly, enabling real economy entities to feel policy impacts faster. Meanwhile, digital technologies have enhanced financial market integration, with stock, bond, and money markets achieving cross-market interest rate transmission through information sharing and transaction linkage, unblocking traditional transmission bottlenecks.

Digital currencies play a dual role in interest rate transmission. On one hand, central bank digital currencies (CBDCs) provide new monetary policy tools; central banks can directly influence market interest rates by adjusting CBDC rates, achieving more precise regulation. On the other hand, price fluctuations of private digital currencies may disrupt transmission mechanisms; unstable exchange

relations with fiat currencies may trigger abnormal capital flows between markets, affecting fund supply-demand and interest rates in traditional financial markets, increasing transmission uncertainty.[5]

3.4. Impact on Credit Transmission Mechanism

The digital economy has reshaped credit market structure through fintech development. In traditional credit markets, commercial banks dominated with business relying on offline channels and manual verification. Fintech has spawned new institutions like internet financial platforms, which broke traditional monopolies with technological advantages and innovative models. P2P lending platforms connect borrowers and lenders online, reducing information asymmetry and providing new financing channels for SMEs and individuals; consumer finance companies use big data for rapid credit approval, meeting diverse consumer credit needs. These new institutions have intensified competition and diversified the credit market structure.

Fintech has improved credit accessibility and service efficiency. Big data and AI have enhanced financial institutions' risk identification capabilities, enabling more comprehensive assessment of borrowers' creditworthiness and serving groups neglected by traditional institutions. Internet platforms integrate multi-dimensional data to build credit evaluation models, expanding credit coverage. Online credit processes simplify application and approval, reduce manual intervention, shorten disbursement cycles, lower operational costs, and improve convenience. Supply chain finance platforms, combined with blockchain, achieve precise matching of fund supply and financing needs, further optimizing credit resource allocation.

While improving credit transmission efficiency, the digital economy also brings new risks. Fintech platforms can respond to monetary policy adjustments in real time, accelerate credit disbursement, shorten transmission lags, and improve allocation precision. However, digital credit markets face credit and cybersecurity risks; complex risk transmission paths of new credit models may affect transmission stability and effectiveness without proper supervision, requiring credit regulatory and risk management systems adapted to the digital economy.

3.5. Impact on Asset Price Transmission Mechanism

The digital economy has dual impacts on stock prices. On one hand, emerging tech enterprises spawned by the digital economy drive stock market growth, attracting capital inflows with innovative models and technological advantages, pushing up stock prices and boosting related sectors. On the other hand, the effectiveness of traditional enterprises' digital transformation directly affects their market valuation: successful digital strategies improve market expectations and stock prices, while lagging transformation may lead to valuation downgrades. The digital economy intensifies market competition and technological iteration, increasing business uncertainty and frequent stock price fluctuations.[6]

The digital economy has changed bond market operation and pricing mechanisms. Digital economy enterprises' bond financing enriches market varieties; fintech applications in bond issuance and trading improve efficiency, with blockchain enabling paperless issuance and settlement, enhancing security and confidence. However, the digital economy increases issuers' credit risks: technological iteration and market competition may affect operational stability, leading to credit rating fluctuations and impacting bond pricing.

The digital economy's impact on real estate prices shows structural characteristics. Digital industrial agglomeration and smart city construction enhance regional attractiveness, driving demand and price growth; digital technologies like big data and VR property viewing improve market transparency, enabling developers to accurately grasp demand and optimize project positioning. However, the digital economy may exacerbate real estate market differentiation: regions with rapid digital development see significant price increases, while traditional industrial regions may face insufficient demand.

Asset price changes have more complex impacts on monetary policy transmission. In the digital economy, diversified household asset allocation (including digital currencies and assets) makes wealth effects uncertain: traditional asset price increases may be offset by digital asset declines.

Corporate investment decisions depend not only on traditional Tobin's q effects but also on digital technology development and industry competition, diversifying transmission paths and increasing the difficulty of influencing the real economy through asset price channels.

3.6. Impact on Exchange Rate Transmission Mechanism

The digital economy has changed the fundamental mechanism of exchange rate formation. Traditionally determined by foreign exchange supply-demand and macroeconomic fundamentals, exchange rates are now impacted by digital currency cross-border transactions, which enable rapid global capital flows beyond traditional regulation, altering foreign exchange supply-demand. Internationalization of digital payment tools has changed traditional foreign exchange transaction models and market structures, making exchange rate formation influenced by more digital factors and more complex.[7]

The digital economy has intensified exchange rate volatility uncertainty. In the digital era, rapid information dissemination enables global economic and financial news to instantly affect market expectations, causing frequent fluctuations. High volatility in digital currency markets may transmit to foreign exchange markets through asset allocation adjustments, triggering currency supply-demand changes and exchange rate fluctuations. Sharp digital currency price swings may prompt investors to adjust traditional currency assets, changing demand and increasing stability challenges.

The digital economy strengthens international spillover effects of monetary policy transmission. Fintech reduces costs and thresholds for international capital flows, facilitating global allocation. Expansionary monetary policy may trigger rapid capital outflows, currency depreciation, and impacts on other countries through trade and capital channels; contractionary policy may attract inflows and appreciation, with similar cross-border effects. Tighter interconnections between countries' monetary policies in the digital economy highlight the importance of international policy coordination.

4. Technical and Policy Paths to Eliminate Negative Impacts of Digital Currency Transmission

In the process of reshaping the monetary policy transmission mechanism, digital currencies have also triggered a series of issues such as ineffective monitoring of anonymous transactions, difficulties in cross-border flow supervision, and distortions in transmission paths. Addressing these challenges requires the collaborative integration of technological innovation and policy regulation to build a governance system of "technology empowering supervision and policies guiding innovation", thereby realizing the standardization and efficiency of the digital currency transmission mechanism.

4.1. Technical Means: Building a Precise Regulation and Monitoring System for Digital Currency Transmission

Blockchain-based penetrative monitoring technology provides technical support for solving the anonymity dilemma. Relying on the traceable nature of blockchain ledgers, through the development of professional on-chain analysis tools and the construction of a digital currency transaction mapping analysis system, dynamic marking of transaction addresses, capital flows, and associated accounts is implemented to accurately identify regulatory evasion techniques such as "mixing services" and "privacy coin protocols". [8] Clustering analysis algorithms are used to associate anonymous addresses with common behavioral characteristics to physical entities, establishing an "address-subject-behavior" mapping relationship that enables central banks to effectively track the actual flow of policy funds. A real-time monitoring and early warning module is simultaneously developed to automatically trigger alerts for large abnormal transactions and concentrated cross-border capital flows, providing technical guarantees for the precise regulation of monetary policy transmission.

The programmability of smart contracts creates conditions for optimizing transmission paths. "Policy-responsive" smart contracts are embedded in the Central Bank Digital Currency (CBDC) system. When monetary policies are adjusted, smart contracts can automatically execute operations such as fund injection and interest rate adjustments to ensure policy signals directly reach target areas. To address the interference of irrational fluctuations of private digital currencies on transmission paths, "stability mechanism embedding" technology is developed, which anchors fiat currency exchange

rates or a basket of assets through smart contracts to suppress the impact of sharp price fluctuations on speculative money demand. "Regulatory node smart contracts" are deployed in cross-border digital currency transactions to realize real-time reporting and compliance verification of transaction information, effectively reducing the unbounded risks of cross-border flows.[9]

Privacy computing technology achieves a balance between data utilization and privacy protection. Technologies such as federated learning and secure multi-party computing are adopted to establish a digital currency transaction data analysis platform based on privacy computing, enabling central banks, commercial banks, and payment institutions to share transaction data under the premise of "data availability without visibility" and build a complete monitoring profile of monetary policy transmission. For the sensitivity of retail digital currency transaction data, "data desensitization + differential privacy" processing technology is developed to form aggregated statistical data after removing personal identification information, which not only meets the policy analysis needs of central banks but also complies with privacy protection regulations. Zero-knowledge proof technology is used to verify the compliance of digital currency transactions, confirming whether transactions comply with policy guidelines without exposing transaction details.[10]

Digital identity and account systems significantly enhance transmission transparency. A unified digital identity system for digital currencies is constructed, binding physical identities with digital currency accounts to realize a "real-name controlled anonymity" transaction model. Legal digital identity authentication ensures the true traceability of digital currency accounts, solving the regulatory vacuum caused by anonymous transactions. A "hierarchical permission management" mechanism is embedded in the account system, where central banks possess the highest-level data query and regulation permissions to real-time monitor digital currency circulation across different industries and regions; commercial banks and payment institutions obtain corresponding permissions according to regulatory requirements to ensure the transparency of policy transmission. Cross-institutional account association analysis technology is developed to identify regulatory evasion behaviors through multi-account transaction splitting, preventing the weakening of transmission efficiency caused by funds "shifting from real to virtual" sectors.

4.2. Policy Means: Improving the Regulatory Framework and Coordination Mechanism for Digital Currency Transmission

A classified and hierarchical regulatory framework for digital currencies clarifies regulatory boundaries. Differentiated supervision is implemented according to the characteristics of different types of digital currencies, clarifying the legal positioning and regulatory subjects of various digital currencies. For CBDCs, special issuance and circulation management measures are formulated to standardize the responsibility boundaries of commercial banks in the two-tier operation system, ensuring their stability as the main channel of monetary policy transmission. Private digital currencies are regulated by function: stablecoins with payment functions are subject to reserve systems and risk reserve requirements referencing payment institution standards; investment-oriented cryptocurrencies are included in the regulatory scope of financial assets, prohibiting their circulation as currency. A "risk isolation zone" between digital currencies and the traditional financial system is restricting business interactions between commercial banks and digital currency exchanges to prevent cross-market risk transmission.

Innovation of monetary policy tools adapted to digital currencies enhances regulatory effectiveness. Traditional monetary policy tools are optimized to adapt to the characteristics of digital currency transmission, and exclusive regulatory tools are developed. A "digital currency reverse repurchase" tool is introduced in open market operations to adjust market liquidity through two-way transactions between CBDCs and assets such as government bonds, improving short-term interest rate transmission efficiency. To address the instability of the digital currency money multiplier, a "dynamic adjustment mechanism for digital currency reserves" is established to real-time adjust reserve ratios based on the scale and circulation speed of electronic money of third-party payment institutions, enhancing the ability to control money supply. Pilot "digital currency targeted drip irrigation" tools are implemented to low-interest digital currency loans to key areas through smart

contracts, reducing the "siphon effect" in traditional credit transmission. A digital currency interest rate corridor mechanism is constructed to guide market interest rates to fluctuate within a reasonable range by setting upper and lower limits for CBDC deposit and lending rates.

A coordinated governance mechanism for cross-border digital currency flows effectively reduces external shocks. Efforts are made to promote the formulation of globally unified regulatory rules for cross-border digital currency flows under the frameworks of international platforms such as G20 and IMF, clarifying classified regulatory standards and cross-border transaction information reporting requirements. Participation in multilateral central bank digital currency bridge projects is strengthened to build cross-border payment systems based on common standards, enabling the monitoring and evaluation of cross-border transmission effects of monetary policies. A "whitelist system for cross-border digital currency flows" is established to grant cross-border transaction qualifications to compliant institutions and implement cross-border joint punishment for violating entities. A macro-prudential management system for cross-border digital currency flows is constructed, with regulatory measures imposed on short-term large-scale digital capital flows and a dynamic adjustment mechanism for cross-border transaction quotas established to mitigate the interference of external shocks on domestic policy transmission.

A full-chain risk prevention and control system for digital currency transmission ensures transmission stability. A full-process "monitoring-warning-disposal" mechanism is established, with a national unified digital currency risk monitoring platform built to integrate data resources from multiple departments, real-time monitor key indicators such as transaction scale, price fluctuations, and capital flows, and establish a risk assessment index system. Contingency plans are formulated for potential systemic risks, clarifying measures such as suspension of digital currency redemption and transaction restrictions in crisis situations, and a digital currency risk reserve pool is established. Compliance inspections of financial institutions' digital currency businesses are strengthened, focusing on identifying issues such as algorithmic discrimination and data leakage to prevent technical risks from evolving into transmission mechanism failures. Industry self-discipline is promoted, with a compliance commitment system and blacklist system for digital currency enterprises established to form a collaborative governance pattern between government supervision and industry self-discipline.

5. Conclusion

The vigorous development of the digital economy is profoundly reshaping the global economic and financial landscape. Its characteristics of digitalization, networking, intellectualization, and platformization have brought about an all-round transformation of the monetary policy transmission mechanism. This paper systematically sorts out the impact paths of the digital economy on the monetary policy transmission mechanism, analyzes the new challenges faced by the transmission mechanism in the context of digital currency emergence, and explores the response strategies through the synergy of technology and policies, providing theoretical and practical references for constructing a monetary policy framework adapted to the digital economy era.

The digital economy has reconstructed the micro-foundation of monetary policy transmission. At the level of money demand, digital payments have accelerated the velocity of circulation, fintech products have reshaped the demand structure, and enhanced interest rate elasticity has made the demand function more dynamic. At the level of money supply, the quasi-money creation function of third-party payments and the diversified issuers of digital currencies have broken the traditional hierarchical division, and the instability of the money multiplier has significantly increased the difficulty of regulation.

Specific transmission channels have shown systematic changes. The interest rate formation mechanism presents a dual-track feature of "policy regulation + market pricing", with improved transmission efficiency accompanied by increased regulatory complexity. Credit transmission has broken through the boundaries of the banking system, and new formats have improved credit availability while bringing new risks. Asset price transmission has become more complex due to the inclusion of digital assets, and traditional wealth effects and Tobin's q effects show uncertainty under

the influence of digital asset price fluctuations. Exchange rate transmission has intensified volatility due to cross-border flows of digital currencies, amplifying the international spillover effects of monetary policies.

While optimizing transmission efficiency, digital currencies have brought special challenges, including risks such as ineffective monitoring of anonymous transactions, impacts on monetary sovereignty, and cross-border regulatory vacuums. Technological innovation has provided the key to solving these problems. Technologies such as blockchain-based penetrative monitoring and smart contract programmability have built a "technology-empowered supervision" architecture, enabling traceability and controllability of the transmission process.

Systematic policy responses have formed a governance closed-loop: classified and hierarchical supervision clarifies legal positioning, innovative tools enhance regulatory precision, and cross-border coordination and risk prevention systems ensure stability. Looking ahead, with the deep integration of digital technologies and finance, monetary policy transmission will become more precise and efficient. Central banks need to continuously track new developments, deepen understanding of laws, improve policy toolkits while safeguarding monetary sovereignty and financial stability, strengthen international coordination, and build a transmission system adapted to the high-quality development of the digital economy to provide support for stable global economic growth.

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