

Financial Technology and Monetary Policy Reform

Yingkai Ma

Institute of Economics and Finance, Russian University of Transport (MIIT), Moscow, Russia

myk1143506172@gmail.com

Abstract. With the wide application of computer technology in the financial field, financial technology has aroused widespread concern in the industry. Relying on artificial intelligence, big data and blockchain, financial technology has promoted the innovation of financial products and services and the transformation and upgrading of finance. With the emergence of financial technology, new payment methods such as mobile phone payment and third-party payment are constantly emerging, which reduces people's preference for cash, promotes the development of payment methods, and blurs the level of money supply. The rapid development of financial technology not only optimizes the allocation of financial resources, but also affects the effectiveness of monetary policy. In this paper, financial technology is brought into the framework of micro-banking, and the micro-mechanism of its influence on monetary policy reform is analyzed theoretically. The development of financial technology improves the efficiency of financial business, solves the pain points in traditional financial industry, and promotes the development of financial industry and even the whole society. Financial technology will cause fluctuations in GDP in the short term and promote the improvement of GDP in the long term. The development of financial technology promotes the increase of money supply, but it also weakens the measurability and controllability of money supply.

Keywords: Financial Technology, Monetary Policy, Reform

1. Introduction

Monetary policy reform needs to have expected goals. After the 1970s, the view that price stability should be the primary goal of monetary policy has gradually become the consensus of theoretical circles and central banks in many western developed countries, and the "inflation targeting system" has been widely used in developed countries. The implementation of global quantitative easing monetary policy has played a certain role in stimulating economic recovery and alleviating liquidity trap, but it has also promoted asset price bubble and aggravated financial market distortion, so the call for withdrawing from quantitative easing monetary policy has been very strong [1]. A remarkable feature of technology enabling the high-quality development of the financial industry is that emerging technologies such as big data, blockchain and artificial intelligence have gradually become a new production factor and driven the financial industry to transform into digitalization and intelligence.

Will factors such as the development of financial technology and the assets and liabilities of banks lead to differentiated results? If we can clarify the relevant issues, it will help to give full play to the liquidity creation and regulation ability of monetary policy and promote the reform of monetary policy under the background of financial technology development.

2. About financial technology

With the wide application of computer technology in the financial field, financial technology has aroused widespread concern in the industry. Literally speaking, financial technology is a combination of finance and technology, but in practical terms, financial technology has richer connotations. From the technical point of view, financial technology refers to the application of new technologies in the financial industry, covering digital innovation and technology-driven business model innovation in the financial field; From the perspective of industry, financial technology refers to technology start-ups competing with traditional banks and financial market participants to provide a series of financial services such as mobile payment, crowdfunding platform and international transfer [2-3].

In addition, with the development of information technology, concepts such as financial technology and internet finance came into being. Although these two concepts are similar, there are essential differences. Therefore, analyzing the similarities and differences between them can better understand the definition of financial technology. With the deep integration and development of finance and technology, not only scholars have expressed their opinions, but also authoritative organizations have put forward the definition of financial technology. Relying on artificial intelligence, big data and blockchain, financial technology has promoted the innovation of financial products and services and the transformation and upgrading of finance.

Scholars at home and abroad have made rich research on the liquidity creation effect of monetary policy, and the theoretical mechanism mainly includes the change of credit demand, the restriction of bank loanable funds scale, the change of bank financing cost and the adjustment of bank risk-taking behavior [4-6]. In the micro-influence mechanism of monetary policy in financial technology, the premise of using quantitative tools is that the central bank can effectively regulate the money supply, and there is a stable relationship between money supply and output; The implementation of price regulation requires financial institutions to have a high degree of relevance, adaptability and sensitivity to market interest rates, so the central bank's adjustment of market interest rates can effectively guide micro-subjects' financing and other behaviors. If the price level rises rapidly, the inflation expectation is serious, the risk-seeking behavior in the financial market gathers, and the financial bubble expands again, it will force the Fed to adopt the second radical exit strategy. From the actual situation, the United States adopted the first exit strategy.

3. Money supply theory

Monetary policy is the principle and policy implemented by the central bank to adjust economic operation according to economic development. The effectiveness of monetary policy is reflected in the whole process from the implementation to the expected goal, that is, the central bank uses different monetary policy tools to control intermediate goals such as money supply and interest rate, and achieves the ultimate goal through different transmission channels. The specific transmission path is shown in Figure 1:

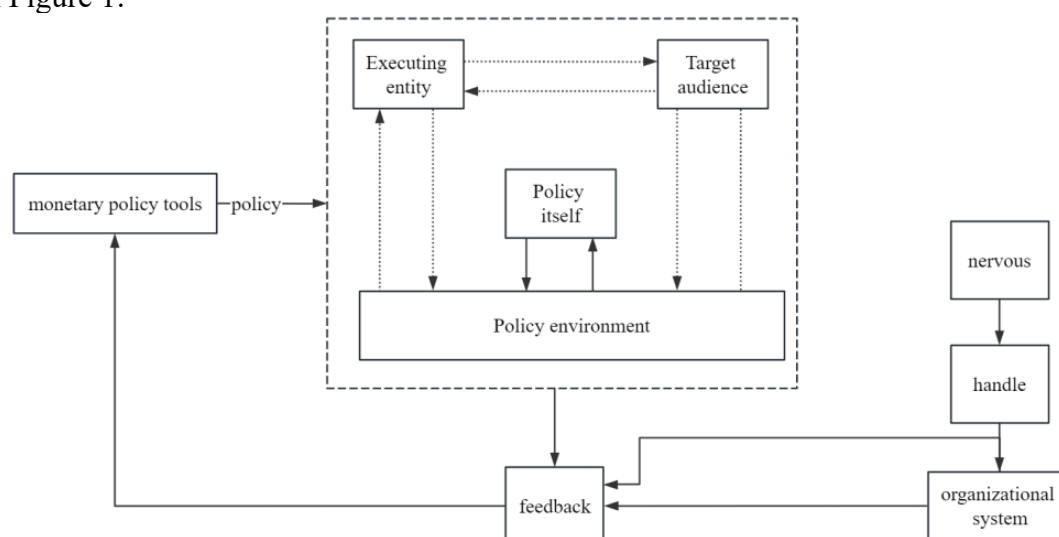


Figure 1 Transmission path map of monetary policy

In terms of money supply theory, both classical and neoclassical economics believe that economic changes come from changes in the real economy, such as the progress of production technology and the increase of raw material prices, which emphasizes the dichotomy between money and economy and holds that money is neutral [7]. On the basis of currency neutrality, classical and neoclassical economics believe that a country's money supply is determined by objective exogenous factors such as its gold stock, net inflow and mining quantity. In the era of metal currency, money supply is equal to the mining quantity of gold and other monetary metals. In the era of bank notes, the issuance of

bank notes has a fixed quantitative relationship with the stock of gold. Keynes's money exogenous theory holds that the central bank can adjust the money supply externally by using monetary policy tools according to the change of money demand, so as to achieve the purpose of intervening in economic operation.

Currency multiplier refers to the multiple relationship between the money supply and the base currency. The base currency generates several times its deposits through several deposits and loans of commercial banks, that is, the deposit-creating function of the base currency. After the 1950s, the development of diversified financial institutions such as trust, securities, funds and insurance, the emergence of computer technology and the emergence of financial derivatives made the preconditions of traditional money supply theory divorced from reality, that is, commercial banks were the main body of finance and deposits were the source of money creation [8]. Simply put, non-bank financial institutions also have the ability to create credit and deposit money. The monetary policy of the central bank is no longer the only channel to regulate the money supply. The money supply is determined by the central bank, commercial banks and non-bank financial institutions, as well as the public and enterprises. It is an endogenous variable generated by the continuous game of many factors.

4. Theoretical analysis of the influence of financial technology on monetary policy reform

4.1 The influence of financial technology on the intermediate goal of monetary policy

Money supply is the main economic statistical index compiled by the central bank. Before the emergence of financial technology, the government could accurately calculate the specific value of money supply mainly through financial indicators. With the emergence of financial technology, new payment methods such as mobile phone payment and third-party payment are constantly emerging, which reduces people's preference for cash, promotes the development of payment methods, and blurs the level between money supply [9].

According to the influencing factors of the money multiplier, the money multiplier is determined by the deposit reserve ratio, the ratio of cash to demand deposits, the ratio of time deposits to demand deposits and other factors, so the formula of money supply can be expressed as:

$$M = B * m = B * \frac{(1+k)}{k + (r_d + r_e)(1+t)} \quad (1)$$

M stands for money supply, B stands for base money, m stands for money multiplier, k stands for the ratio of cash to demand deposits, that is, the cash leakage rate, r_d stands for the statutory deposit reserve ratio, r_e stands for the excess deposit reserve ratio, and t stands for the ratio of time deposits to demand deposits, which is also called the fixed living ratio. Financial technology has influenced the size of k, r_d, r_e, t , thus changing the controllability of money supply.

Financial technology has promoted the decline of excess deposit reserve ratio. Excess deposit reserve is a reserve fund used by banks to pay for liquidation, which occupies the total amount of loans available to financial institutions. Therefore, the higher the excess deposit reserve ratio of banks, the higher the opportunity cost. This has increased the scale of demand deposits to some extent. The development of financial technology also promotes the innovation of financial products [10].

Financial technology has promoted the process of interest rate marketization, which has caused interest rate fluctuations. Under the background of financial technology, the changing trend of interbank lending rate is shown in Figure 2.

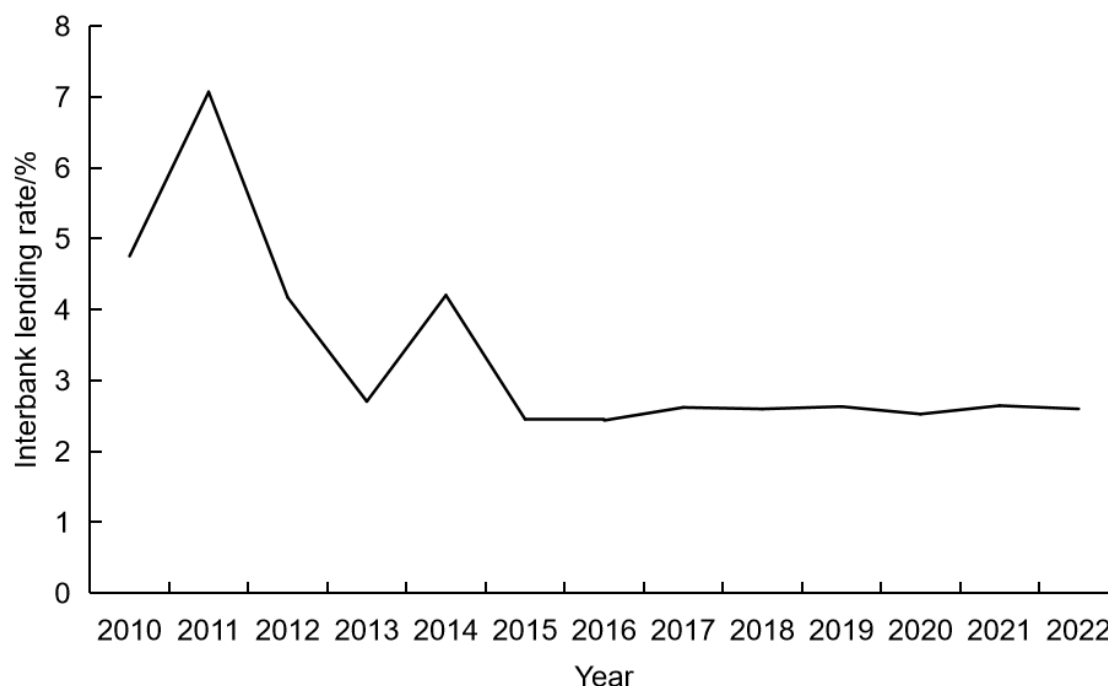


Figure 2 Trend chart of interbank lending rate (data source: wind database)

It can be seen that the interbank lending rate fluctuates greatly. Since 2015, the fluctuation has become smaller and the interest rate has shown a downward trend. This shows that the balance between supply and demand of interbank lending rate has been broken and fluctuated greatly in a short period of time. With the deep integration of finance and technology, interbank lending rate has decreased and the fluctuation range has gradually weakened.

4.2 The influence of financial technology on the credit transmission channel of monetary policy banks

First, from the bank's point of view, the central bank uses monetary policy tools to directly affect the bank's credit scale, and then regulates the actual investment and consumption, while banks cannot adjust on the balance sheet to offset the impact of policy changes on the credit scale. Secondly, from the perspective of enterprises, for borrowers, obtaining credit from banks and external financing channels (such as stocks and bonds) are not completely replaceable, which means that financing in the real economy is highly dependent on bank loans.

When monetary tightening limits the scale of bank credit, borrowers cannot obtain alternative funds through other channels, such as issuing bonds, to make up for the reduction of bank credit, but must cut investment expenditure. The development of financial science and technology can reduce the sensitivity to the central bank's monetary policy by adjusting the structure of assets and liabilities, and have higher autonomy, thus weakening the transmission effect of monetary policy bank credit channels.

As the transmission terminal of monetary policy, the real economy, the enterprise's own situation and economic decision-making all affect the transmission effect of monetary policy. At the same time, according to the effective premise of the second link of bank credit channel, enterprises have played a key role in the transmission of monetary policy [11]. The diversification of commercial banks' profit sources makes it easier for them to take other measures to partially offset the central bank's control over their loanable funds and loan scale. For example, the development of financial technology has increased the profit channels of commercial banks, and the increased assets can be converted into credit assets during the period of monetary tightening to ease the bank's capital liquidity, so as to resist the impact of tight monetary policy, thus weakening the transmission effect of the credit channels of monetary policy banks.

The development of financial technology gains resource advantages through its inclusive effect, breaks the time and geographical restrictions and broadens the external financing channels of

enterprises, that is, enterprises can obtain funds from various channels except banks, thus weakening their dependence on bank credit and reducing their sensitivity to the impact of monetary policy. When the currency is tightened, enterprises and other real economies can actively seek external financing under the background of financial technology, break the restrictions of bank credit and ease their own liquidity constraints, which shows that the development of financial technology has weakened the dependence of enterprises on bank credit, thus negatively affecting the effectiveness of the transmission of monetary policy through bank credit channels.

4.3 The influence of financial science and technology on the ultimate monetary policy goal

Generally speaking, economic growth, full employment, price stability and balance of payments are the ultimate goals of monetary policy. The ultimate goal of some countries' economic policies has become to maintain the stability of their currencies, reduce inflation, and keep their international payments in balance. Due to the limited degree of marketization development, the institutional mechanism of economic transformation and the imbalance of international payments, some countries pursue monetary policies with different goals. Multi-objective system and single-objective system will have similar regulatory effects, and the stable development of economy will automatically coordinate the balance between multi-objective systems. In order to enhance the efficiency of monetary policy, the adjustment of multi-objective monetary policy should be focused, that is to say, the target of monetary policy should have a certain tolerance intervals, and the target proportion of tolerance intervals will be dynamically adjusted and changed.

The development of financial science and technology makes the interest rate rise, and the relationship between money and interest rate is more complicated, and the interaction between them is also more complicated [12]. Traditional monetary policy tools, which simply adjust the money supply and interest rate, have been unable to cope with the development of financial technology. On the contrary, a new monetary policy tool based on price and combining money supply adjustment with interest rate marketization can meet these needs.

The development of financial science and technology has caused the change of the center of gravity of the ultimate goal of monetary policy, that is, the primary goal of monetary policy at present is to balance the relationship between "economic growth" and "financial stability". Because the ultimate goal of monetary policy is unique and there is no intermediate goal of monetary policy, the developed economies represented by the united states have created nominal anchors of monetary policy goals to improve their ability to regulate and control monetary policy. It is necessary to find new indicators that better match the degree of economic development as nominal anchors of monetary policy objectives, such as producer price index and money supply after economic development adjustment, and find new nominal anchors of monetary policy objectives through simulation and exploration in order to prepare for long-term inflation targets.

5. Conclusions

A remarkable feature of technology enabling the high-quality development of the financial industry is that emerging technologies such as big data, blockchain and artificial intelligence have gradually become a new production factor and driven the financial industry to transform into digitalization and intelligence. Monetary policy is the principle and policy implemented by the central bank to adjust economic operation according to economic development. The development of financial technology has improved the efficiency of financial business, solved the pain points in traditional financial industry, and promoted the development of financial industry and even the whole society. The influence of financial technology on credit transmission channels is reflected in that on the one hand, financial technology increases the total amount of monetary loans of financial institutions, on the other hand, it weakens the transmission effect of bank credit channels. Financial technology will cause fluctuations in GDP in the short term and promote the improvement of GDP in the long term. The development of financial technology promotes the increase of money supply, but it also weakens the measurability and controllability of money supply.

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