

Analysis of the Impact of Third-party Payment on Currency Demand

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Abstract: With the rapid popularization of mobile Internet, mobile offline third-party payment has penetrated into all aspects of daily transactions, and has a profound impact on people's consumption habits, payment methods and original financial management concepts. According to the view of network economy in microeconomics, the growing third-party mobile payment has produced considerable positive network externalities. With the continuous expansion of payment scope, payment objects have produced economies of scale, and marginal costs have fallen, thus obtaining considerable competition. force. As the direct target of third-party mobile payment, cash is inevitably replaced. Previous researches usually focused on macroeconomic indicators such as currency creation multiplier and cash leakage rate for mobile payment for macro analysis. This article will analyze the corresponding changes in different types of currency demand under the continuous impact of third-party payment according to the classification of currency demand levels, and explore the impact of the resulting monetary demand structure and the impact on the role of macro monetary policy.

Keywords: Third-party payment, Currency demand hierarchy, Transactional currency demand, Speculative currency demand.

1. Introduction

Third-party payment was born in my country in 2004 after the "SARS" pneumonia. While the epidemic restricted offline consumption, it also promoted consumers' recognition of safe and efficient third-party payment methods. Accompanying the rapid growth of transaction volume is the expansion of the scope of third-party payment users in my country. Third-party payment, especially third-party mobile payment, has profoundly changed the consumption behavior of Chinese residents and the proportion of asset mix. Among them, changes in the level of money demand will be directly reflected in the monetary policy multiplier and the velocity of money circulation, which will have an impact on the effect of my country's macroeconomic policies. Therefore, it is necessary to systematically analyze the mechanism and effect of third-party payment on the level of money demand.

The theoretical principle of third-party payment determines that it has had a profound impact on the field of currency demand. First of all, compared with traditional cash payment, third-party payment has lower transaction costs and more convenient and comfortable transaction experience, which brings a substitute for traditional cash transactions, that is, reduces the transactional currency demand in currency demand. Secondly, the rapid development of third-party payment, especially the rapid development of its third-party mobile payment, has significantly strengthened the liquidity of financial assets represented by commercial bank demand deposits, clarifying the level of currency demand for third-party payment. Undoubtedly, it has strong practical and theoretical significance.

2. Theoretical Analysis

Most of the previous studies used money supply as a substitute variable for money demand. Because money demand is not easy to measure directly. The Quantity of Money Equation proposed by Irving Fisher explains the relationship between the quantity of money, the velocity of

money, the general price level, and the total amount of transactions.

$$MV = PT$$

M is the amount of money in circulation, V is the velocity of money circulation, P is the general price level, and T is the total amount of transactions in society. Fisher believes that in the short term, the velocity of money circulates little or even does not change. Therefore, there is a direct proportional relationship between the money supply in circulation and the price level and the transaction volume in society:

$$M = PT \div V$$

The total amount of transactions in society within a certain period of time is directly reflected by the national income. In the short term, according to the Keynesian point of view, the price is rigid, so there is a certain proportional relationship between the total amount of transactions in society and the total amount of money. According to this, it can be seen that there is a corresponding proportional relationship between the total currency volume when the national income is relatively stable at the price level:

$$Y = MV \div P$$

If the price level itself is sticky or elastic, this formula needs to be further transformed into the relationship between nominal national income and money supply:

$$PY = MV$$

An important variable to what extent the money supply affects nominal national income is the velocity of currency circulation. According to previous theoretical research results, the development of third-party payment has a double impact on the velocity of currency circulation. On the one hand, it reduces transactionality. Currency expenditure thus reduces the velocity of currency circulation, but on the other hand, third-party payment reduces the cost of withdrawals, which increases speculative motives and preventive motives, and increases the velocity of currency itself. Therefore, it is necessary to analyze the impact of the third payment from the perspective of money demand.

2.1. Analysis based on Keynesianism

Keynes' money demand function is:

$$L = ky - hr$$

Keynes believed that money demand can be divided into three levels: transactional money demand, precautionary money demand, and speculative money demand. Among them, the demand for transactional money and the demand for preventive money are directly related to income. With the rise of income, consumers' money expenditures for transactional and speculative purposes are on the rise. The speculative demand for money is directly inversely related to the interest rate. The underlying principle is that the interest rate is a price for selling currency liquidity. The higher the interest rate, the greater the opportunity cost of speculative activities.

2.2. Analysis based on the new quantity theory of money

Friedman believed that Irving Fisher's equation, which simply related the quantity of money to output and price equivalently, was too simple to explain the changes in the quantity of money in the new era. He advocated the study of related theories on the quantity of money from the side of money demand. The demand for money is mainly determined by three factors: wealth, the proportion of various wealth held by people and its rate of return. The third part is people's preference and interest in different forms of wealth. The formula for the new quantity theory of money boils down to:

$$M = f\left(P, rb, re, \frac{dp}{p}, w, Y, u\right)$$

M is the wealth held by the wealth owner in the form of money, P is the general price level, rb is the market bond interest rate, re is the market bond interest rate, $\frac{dp}{p * dt}$ is the expected return on material assets, and ω is the relationship between non-human wealth and human wealth. The proportion of Y is the nominal national income.

With the development of third-party payment, the labor cost required for financial investment shows a downward trend, which will cause the ratio of non-human wealth to human wealth to expand, thus increasing the overall demand for money. But for the internal influence of money demand, the new quantity theory of money cannot give a clear answer.

2.3. The impact of third-party payment on the currency demand mechanism

In the money demand model, the main money demand can be decomposed into transaction money demand, speculative money demand and precautionary money demand. According to Keynes' liquidity preference theory, a basic difference between the above three kinds of money demand is the liquidity of the matching money supply, that is, the transactional money demand requires the highest liquidity of the corresponding money supply, and the speculative money demand requires the highest liquidity. The liquidity of the matching money supply is high. The liquidity of the money supply required by the precautionary money demand is the lowest.

In the process of continuous development of third-party payment, the original cash used for transaction needs, that is, M0, is constantly replaced by faster, more convenient and safer third-party mobile payment. On the other hand, the

liquidity of third-party mobile payment is even higher than that of traditional cash to a certain extent. The cash that consumers can carry in daily consumption activities is limited, and the liquidity in high-value cash transactions is far lower. payment to a third party.

For speculative currency demand and preventive currency demand, on the one hand, because the third-party payment funds will eventually be stored in the third-party payment platform (because the third-party payment platform is connected to the commercial banking system), third-party payment can replace cash. It will be converted into bank deposits to increase the money supply for investment. According to the equilibrium model of money supply and demand, the equilibrium interest rate will continue to decline. As interest rates continue to fall, the cost of money for speculation and prevention continues to fall. On the other hand, because third-party payment accelerates the discount and conversion between financial institutions and investment products, the liquidity of the corresponding money supply continues to increase. Under the joint effect of these two aspects, it will lead to the rise of speculative money demand and precautionary money demand.

3. Main Assumptions and Variable Design

According to the above analysis, it can be found that the rapid development of third-party payment will theoretically inhibit the demand for transactional money and promote the demand for speculative money and preventive money. So the following assumptions are made:

H1: The development of third-party payment has an inhibitory effect on the demand for transactional money.

H2: The development of third-party payment can promote speculative money demand and precautionary money demand.

Speculative money demand and precautionary money demand can be equivalent to the total social investment, and can be equivalent to the total social savings under the condition of product market equilibrium. That is, it can be expressed by the following formula:

$$M_1 - M_0 = L$$

Therefore, transactional money demand can be represented by M0 according to the nature of money market equilibrium, while speculative money demand and precautionary money demand can be represented by M2-M0. There is a lack of previous research on the decomposition of speculative money demand and precautionary money demand. However, under the framework of this article, not distinguishing between the two has little impact on the final conclusion. According to Keynes' money demand theory, both speculative money demand and precautionary money demand are affected by interest rates at the same time. is the non-transactional demand for money. Therefore, this paper classifies the two as one dependent variable for research.

Generally speaking, the influencing factors of speculative money demand are currently recognized as interest rate, inflation rate, national income level and the rate of return of the stock and bond market. Combined with previous research results, this paper will select the following variables as research objects.

Consumer Price Index (CPI), in Fisher's money quantity equation, the price factor has a direct effect on inflation. A change in price will directly cause a change in the quantity demanded of money. This paper selects the annual CPI data

(chain ratio) as one of the explanatory variables.

Monthly average interest rate (RATE), due to the large amount of interbank offered rate data and the difficulty of query and analysis. This paper selects the monthly average interest rate issued by banks determined by the People's Bank of China to determine the looseness of the central bank's monetary policy.

Cumulative industrial growth rate (SIDV), in previous studies, some scholars believe that there is a stable relationship between national income and money demand. Keynes believed that short-term income changes can have an impact on money demand, while Friedman believed that long-term income changes can have an impact on money demand. However, due to the lack of monthly GDP data, according to previous views, the monthly macroeconomic national income indicators can be obtained from the industrial growth rate. Therefore, if December 2015 is set as the base period 1, and the monthly industrial growth rate is s_t , then the cumulative industrial industrial growth rate of the monthly time t unit away from it is:

$$SIDV = \prod_{i=1}^t (1 + s_i)$$

Table 1. Conclusions of variable descriptive statistics

| | number | min | max | mean | sd |
|-------|--------|------------|-----------|-----------|------------|
| CPI | 168 | 97.5 | 108.1 | 102.379 | 1.34146 |
| RATE | 168 | 0.81% | 6.43% | 2.32506% | 0.7704841% |
| LSIDV | 168 | 0.1781462% | 16.26372% | 9.820082% | 4.761985% |
| LE | 168 | 2.079442 | 12.37582 | 8.534977 | 2.909936 |
| LM0 | 168 | 10.06328 | 11.37906 | 10.79085 | 0.35873 |
| LNMO | 168 | 12.52184 | 14.46225 | 13.64138 | 0.5843606 |

From the results of descriptive statistics, it can be seen that the logarithmic value of LE, that is, the third-party payment amount, is generally between 2.079442 and 12.37582, indicating that the sample changes greatly. It shows that the amount of third-party payment has changed greatly in the past 14 years, which is beneficial to obtain effective parameter estimates.

If the statistics of a set of data, such as mean value, variance,

Third-party payment transaction volume (E), the third-party payment referred to in this article is a narrow concept of third-party payment, which only includes third-party mobile payment and third-party online payment, and selects the annual data of third-party payment transaction volume as an explanatory variable.

4. Descriptive Statistics and Empirical Analysis

According to the research variables determined in the previous chapter, a total of 168 groups of relevant research samples were collected, and the time span was from 2006 to 2020. Among them, M0, M1, M2 data, and data related to the average interest rate level come from the People's Bank of China. For the third-party payment data, we consulted iResearch's third-party payment market survey reports for each quarter from 2006 to 2020, and obtained the corresponding data on third-party payment. In order to reduce the impact of heteroscedasticity on measurement results, logarithms are taken for monetary data, cumulative industrial growth rate and third-party payment.

and correlation coefficient, do not change over time, it can be called stationary data, and it can be directly applied to the prediction of future data. However, most time series data are not stationary, so it is necessary to conduct a stationarity test. The following is the ADF unit root test. The first step of the ADF unit root test is to analyze the images of the time series of each variable to determine whether the unit root test model contains intercept items and trend items.

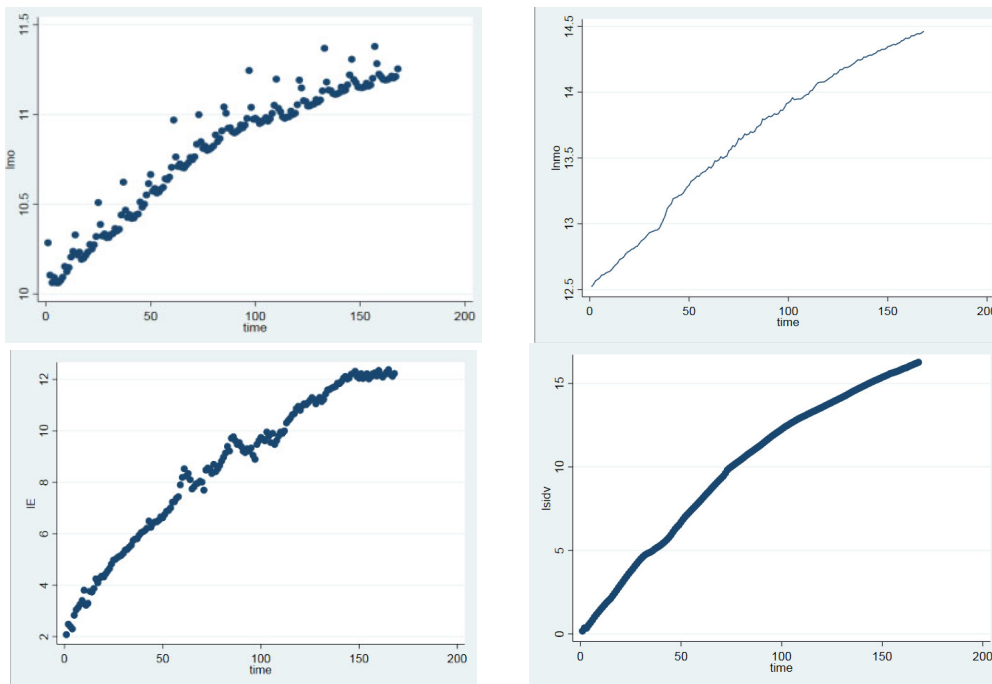


Figure 5. Fluctuation characteristic diagrams of LNM0, LM0, LSIDV, LE

Observing the fluctuation feature map shows that there should be trend items in the above four variables, and there is

no intercept item from the graph. The following table is the test result table of ADF

Table 2. ADF test results

| | number | 5% critical level | P value | conclusion |
|---------|---------|-------------------|---------|----------------|
| CPI | -2.020 | -2.886 | 0.2779 | non-stationary |
| RATE | -4.953 | -2.886 | 0.000 | stationary |
| LSIDV | -16.475 | -2.886 | 0.000 | stationary |
| LE | -2.489 | -2.886 | 0.1181 | non-stationary |
| LM0 | -1.321 | -2.886 | 0.6195 | non-stationary |
| LNMO | -2.551 | -2.886 | 0.1036 | non-stationary |
| D(CPI) | -3.029 | -2.886 | 0.0323 | stationary |
| D(LE) | -3.145 | -2.886 | 0.0234 | stationary |
| D(LMO) | -3.797 | -2.886 | 0.0029 | stationary |
| D(LNMO) | -3.887 | -2.886 | 0.0021 | stationary |

From the ADF test, it can be seen that the time series represented by the four groups of variables CPI, LE, LMO, and LNMO have unit roots and are non-stationary time series. After the first difference, it appears to be stationary.

The cointegration relationship means that the linear combination of multiple non-stationary time series integrated with the same order is stable. Explain that the relationship between some variables in the economic system is balanced in the long run. This paper chooses the Johansen test, that is,

to test based on the regression coefficient. The Johansen test is essentially the rank of the test matrix. If the matrix is full rank, it means that the VAR equation of the matrix is stable. If the rank $s < n$, it means that there are s cointegration. The cointegration equation obtained from this test is as follows:

$$\begin{aligned} \text{LNMO} &= 13.08154 + 0.0170962\text{LE} \\ \text{LMO} &= -10.55762 - 0.0451579\text{LE} \end{aligned}$$

Table 3. Johansen test results

| maximum | Parms | LL | eigenvalue | statistic | 5% critical value |
|---------|-------|-----------|------------|-----------|-------------------|
| 0 | 48 | 955.789 | . | 196.8520 | 104.94 |
| 1 | 59 | 1006.2253 | 0.45537 | 95.9809 | 77.74 |
| 2 | 68 | 1024.9032 | 0.20151 | 58.6552 | 54.64 |
| 3 | 75 | 1039.8534 | 0.16465 | 28.7609* | 34.55 |
| 4 | 80 | 1047.9588 | 0.09324 | 12.5140 | 18.17 |
| 5 | 83 | 1054.0944 | 0.07126 | 0.2428 | 3.74 |
| 6 | 84 | 1054.2158 | 0.00146 | . | . |

That is to say, it can be seen that in the long-term, third-party payment and non-cash money demand change positively, while cash money demand changes negatively. And the STATA results show that there are only three linearly independent co-integration variables. The largest eigenvalue test shows that the null hypothesis that the "cointegration rank" is 0 can be rejected at the level of 5%, but the null hypothesis that the "cointegration rank" is 3 cannot be

rejected. At the same time, the vector error correction model of the system is estimated by Johansen's MLE method. The error correction model is a hybrid model that integrates long-term impacts and short-term shocks, and avoids short-term fluctuations by taking into account seasonal factors and the interference of unexpected situations. The following figure is the error correction model:

Table 4. Error Correction Model

| | LNMO | LMO |
|---------------|---------------------------|----------------------------|
| Constant term | -0.0770982 (0.1059144) | 0.009951 (0.0116853) |
| D(LE) | 0.2068370 (0.078031)* | -0.2228421 (0.0779587)* |
| ET(-1) | 0.799097 (0.0477953)* | 0.1390847 (0.0564201)* |

At the 5% significance level, the error correction terms are all significant. It shows that in the long run, the disequilibrium will return to the equilibrium state. When DLNMO and DLMO were the explained variables, the coefficients before DLE were greater than 0 and less than 0, and the corresponding P values were all less than 0.05. This shows that the level of third-party payment has a significant decreasing effect on the demand for cash money, while it has a significant increasing effect on the demand for non-cash

money.

Granger causality test is used to detect the causal relationship between variables, and to explain the position of the causal relationship between the two. To establish the Granger causality test, the data group is required to be stable in time series, so the VAR model is established by applying the results of the first-order difference, and the lag period is selected as 3 (here because AIC=minimum information +2) The minimum amount of information is 1 after the first-order

difference, so the lag period is selected as 3. Table 5 shows

the results of the Granger causality test.

Table 5. Granger causality test

| Null hypothesis | Chi-square | P-value | conclusion |
|---|------------|---------|------------|
| D(IE) is not the cause of the change of D(LMO0) | 7.8443 | 0.02 | reject |
| D(LE) is not the cause of the change in D(LNMO) | 8.4086 | 0.015 | reject |
| D(LNMO) is not the cause of the change in D(LE) | 2.4674 | 0.291 | accept |
| D(LNMO) is not the cause of the change in D(LE) | 0.63718 | 0.727 | accept |

The results of the Granger causality test are consistent with expectations, that is, the change in the amount of third-party payment is the cause of the change in the transactional money demand and the non-transactional money demand, while the transactional money demand and the non-transactional money demand are not the reason for the third-party payment. The reason for the change in the payment amount. In economics, it can be understood that the rapid development of third-party payment has reduced people's holdings of cash and increased the choice of bank deposits with poor liquidity, which has led to changes in the currency demand system. On the other hand, changes in the entire currency demand system have no obvious impact on the amount of third-party payments. The main factors affecting third-party payments are the rapid development of the Internet economy and the continuous improvement of telecommunications infrastructure.

The impulse response function can reflect the long-term dynamic relationship between variables, which helps to better analyze the long-term impact of third-party payment on money demand. The figure below is the impulse response plot.

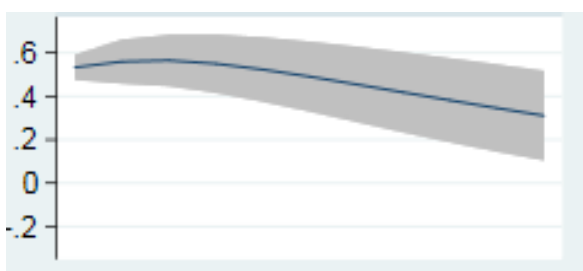


Figure 6. Impulse Response Plot of LMO to LE



Figure 7. Impulse response plot of LNMO to LE

Third-party payment has an obvious weakening effect on transactional money demand, but has a significant promoting effect on non-transactional money demand, that is, speculative money demand and preventive money demand. At the same time, it is noted that in the short term, the demand for transactional currency does not immediately decline under the impact of third-party payment. Rather, it presents an accelerated downward trend after a relatively horizontal trend for a period of time. Economics can be explained by economies of scale. With the continuous promotion of third-party payment, the use of third-party payment has a positive

marginal scale effect, which makes its substitution effect for cash increase rapidly, which is reflected in an accelerated decline on the impulse response graph. role. Similarly, the demand for non-transactional currency is showing a rising trend because third-party payment reduces the cost of speculative currency activities and preventive currency activities and the scale economy dividends brought about by the continuous promotion of third-party payment.

5. Results and Discussion

The development of third-party payment will have a substitution effect on usage, thus causing a decline in the demand for transactional currency. But at the same time, the emergence and development of third-party payment will reduce investment and financing costs, promote the improvement of financial efficiency, and cause an increase in the return on investment. Therefore, it will promote the growth of speculative currency demand. With the decline of transactional currency demand and the growth of speculative currency demand, the entire level of currency demand will change, and the proportion of speculative currency demand will increase.

The relative increase in the proportion of speculative money demand in the total money demand will lead to a relative increase in the interest rate coefficient of money demand, which will lead to an increase in the effect of fiscal policy and a decrease in the effect of monetary policy. Because with the relative increase of speculative money demand, the coefficient of interest rate in the Keynesian money demand function $L=KY-HR$ will increase, and the amount of increase in interest rate caused by the same increase in government purchases will decrease, and the crowding out effect will decline, making fiscal policy more effective. While increasing the same money supply, the decline in interest rates will be more limited, thus reducing the effect of monetary policy. In order to better play the role of macro-control, we should scientifically understand the impact of changes in the level of money demand on the effects of fiscal and monetary policies. Therefore, this paper proposes the following measures:

1. Strengthen relevant theoretical research in the field of third-party payment
2. Strengthen risk management and control capacity building
3. Innovative policy combination model

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