Impact of Network Finance Development on Inflation: Evidence from Chinese Financial Market

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Abstract. At present, financial network has attracted a lot of money from reality to the network platform and currency in circulation had seen a considerable impact, so this article is to discuss whether electronic money will have an impact on inflation from the perspective of qualitative and quantitative respectively which is original. This paper also adds lag length to the model which proves to be helpful. Eventually this paper will make some recommendations to monetary policy.

Introduction

From 1990’s, several foreign papers have analyzed the problem. King deems it would be more difficult for central bank to have control on commercial bank’s behavior and monetary. [1] Solomon points out that ‘If monetary aggregates include the issued e-coins, then the monetary supplier will be expanded’. [2] But Friedman still holds that the influence on central bank’s control by transactions of public and enterprise is limited [3] Elham, Hawkins regards that the central bank should take the effect into consideration. [4,5] Look back domestic, Xie gave a definition: a third way of financing different from direct financing and indirect financing. [6] He sorted network finance into two kinds: to increase efficiency of current business; active application of funds like transaction and settlement, meanwhile he doesn’t take MMF as long-lasting: once the interest rate liberalization has succeeded, the very reason MMF is so hot will be gone too. [7] Ou, Zhang discussed from 3 aspects: monetary supply, demand & velocity of money. [8,9] Besides, Zhou, Xu raised 2 effects leading to inflation by empirical tests on velocity of money. [10] Tan, Tang reached similar results respectively from the aspect of monetary supply formula. [11,12] Shang, Hu put seigniorage into consideration and Shang points out that interest rate could be more effective as intermediate target in the future. [13,14]

This paper focuses on channels how network finance influences inflation which are all shown in next part. In the last part, this paper will offer several suggestions for monetary policy effectiveness.

The Role of Network Finance Plays in Inflation

Aspect of Monetary Demand & Supply

In modern monetary theory, there is: M=m*B. In China, MMFs have no need to hold required reserves. In contrast, money multiplier m is an endogenous variable. Electronic money is virtual currency but can still have a substitution effect on the real currency in circulation. To verify the conclusion, statistics were obtained from the website of PBC. It can be seen from Fig. 1 that the proportion M0 to M1 decreased from 21.83% to 16.97% and the share of M0 in M2 dropped from 7.88% to 4.81%. So, it can be assumed that electronic money has a certain substitution effect, therefore, the demand of the general circulation of the currency (real money) will decline.

Look at the currency multiplier formula, m=1/(rd+rt*t+e+k). First, as mentioned above, the electronic money has a substitution effect on cash, thus reducing k. However, under normal circumstances, the money multiplier k> 1. Therefore rd+rt*t+e-1<0. Again,
In Eq. 1, a decrease in $k$ will increase the money multiplier. Second, $r_d$ and $r_t$ are determined by the central bank and are exogenous. Moreover, owing to high degree of liquidity, the demand for time deposits will rise, causing $t$ to increase and $m$ to decrease. Finally, commercial banks also reduce the excess reserve ratio so that $e$ decreases and the $m$ increases. Therefore, the concrete result depends on the combined contribution of $k$, $t$, and $e$, which needs empirical analysis. In Keynes' theory of liquidity preference, the demand function of money can be expressed as:

$$M_d/P = L(Y, i)$$  \hspace{1cm} (2)$$

In Eq. 2, the money demand is positively correlated with the income, negatively related to the interest rate, namely $dL/dY > 0$, $dL/di < 0$. We can see that on the one hand, the development of network finance reduces the demand for money generated by trading and prevention motivation, which means $dL/dY$ decreases. On the other hand, through network people can converse different financial assets very quickly which greatly increases the demand for speculation. Moreover, speculation in different markets means that investment outcomes are more sensitive to changes of interest rate. Therefore, we can know that $dL/di$ will decrease.

When the money market is balanced, the money supply is equal to the money demand, namely $M_s/P = L(Y, i)$. Then take the natural logarithm of it, then transportation and differential can be obtained:

$$dP/P = (dM_s/M_s - (\partial L/\partial Y)dY + \partial L/\partial i*di)/L(Y, i)$$ \hspace{1cm} (3)$$

In Eq. 3, $dP/P$ represents the rate of inflation, which is determined by the growth rate of money supply and demand and the general trend of money supply is expanding from above analysis, so $dM_s$ increased. At the same time, because of the lower sensitivity of income to trading and prevention needs and a reverse of interest rates to the speculative demand, which makes the right-most term of the Eq. 3 decrease, then the inflation rate will increase. This is what we call the amplification effect.

**Aspect of Money Velocity**

On one hand, innovation of financial products greatly reduces the cost of fund transfer and transaction, which causes the speed of money circulation to increase; on the other hand, thriving network financial grants more people access to a variety of online financial products, so the number of speculative transactions in the market has greatly increased. The effect of currency velocity can be found by studying the Fisher trading equation: $MSV = PY$. Differential on both sides of the equation obtained:

$$dP/P = (dM_s/M_s + dV/V - dY/Y)$$ \hspace{1cm} (4)$$

From Eq. 4, we can know that the rate of inflation is in the same direction with the money supply and changing velocity of money. However, according to the statistics, China is currently in a stage of declining currency circulation speed, which keeps the inflation rate in a relatively stable state.
The reason may be that the substitution effect is stronger than the accelerated circulation effect.

**Empirical Test**

Through above analysis, this paper will take inflation index CPI\(_{t-1}\) as explained variable since CPI often has strong autocorrelation. Besides, we also use narrow money multiplier m and narrow money velocity v because based on past research, they can reflect the fluctuation of price well. According to experience, the lagged period mt-1 is chosen as an explanatory variable. This paper intends to use the annual data from 2004 to 2016 for CPI and m, and statistics from 2005 to 2016 for v. [15]

Considering great difference between some sample data, logarithm of variables CPI, m, CPI\(_{t-1}\) are used to reduce the heteroscedasticity of the model, with the elastic relationship between each explanatory variable and CPI except the variable v because it’s small enough so the logarithm will be negative. First, the ADF test finds that vt is not stable, then the model is shown as follow:

\[
\ln CPI_t = \beta_1 + \beta_2 \ln m_{t-1} + \beta_3 \Delta v_t + \beta_4 \ln CPI_{t-1} + \varepsilon
\]

From the ADF test, ln CPI\(_t\), ln mt-1, \(\Delta v_t\), ln CPI\(_{t-1}\) are same order integration and all variables are no longer unit root, so we can organize co-integration test on these variables. Due to the number of samples, this paper uses the Engle-Granger two-step test. The OLS test results obtained are in Table 1. Thus, a complete estimation equation of the adjusted model can be obtained:

\[
\ln CPI_t = 5.569 + 0.484 \ln m_{t-1} + 0.5 \Delta v_t + 0.219 \ln CPI_{t-1} + \varepsilon
\]

<table>
<thead>
<tr>
<th>variables</th>
<th>coefficient</th>
<th>std deviation</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln m(_{t-1})</td>
<td>0.484</td>
<td>0.0617</td>
<td>2.78</td>
<td>0.463</td>
</tr>
<tr>
<td>(\Delta v_t)</td>
<td>0.5</td>
<td>0.687</td>
<td>2.18</td>
<td>0.072</td>
</tr>
<tr>
<td>ln CPI(_{t-1})</td>
<td>0.219</td>
<td>0.3</td>
<td>4.06</td>
<td>0.0066</td>
</tr>
<tr>
<td>(\beta_1)</td>
<td>5.569</td>
<td>1.41</td>
<td>3.95</td>
<td>0.0075</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.785</td>
<td>Prob. = 0.0198</td>
<td>Durbin-Watson stat= 1.35</td>
<td></td>
</tr>
</tbody>
</table>

T-values of all parameters are significant, and R2 is 0.785, which is convincing. Then run ADF test on residuals again, the first order of the residuals was stationary, so we get that ln CPI\(_t\), ln mt-1, \(\Delta v_t\), ln CPI\(_{t-1}\) are co-integration variables, with long-term equilibrium relationship. At the same time, we can see that the coefficient of each parameter is still small, indicating that the development of network finance in our country is still on early stage. It can be believed that with the deepening of the Internet and financial links in the future, the coefficients will somewhat increase.

**Conclusions and Implications**

From above, the following conclusions can be drawn: the increase of electronic money brought by the development of network finance has a positive correlation with inflation and empirical test also confirms that the growth of electronic money can raise the price through monetary supply & demand and the speed of money circulation. So, the hypothesis in the beginning of this paper can be proved.

Although the development of internet finance has given a boost to China's financial sector after the financial crisis, it still makes the central bank's monetary policy effectiveness decline, the macro policies weakened, and show some negative effects in social. To better strengthen the vital role of the central bank in the economy, some policy advise are made according to the conclusions: First, the central bank should improve its statistical work in the field of network finance and strengthen
the monitoring of some important economic magnitude and add it to the reference for policy analysis like changing traditional intermediary goals. Second, the central bank hasn’t established regulatory authorities for the field of network finance while there have been various irregularities and vicious speculation in this industry which caused extremely bad economic and social consequence. Lastly, I think that central bank must also vigorously promote the development in the field of network finance because it’s a win-win choice and the inevitable choice for social prosperity and national development.

References