

A Brief Analysis of the Factors Influencing the Demand for Money

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Abstract

There is no doubt that money plays an important role in economic life. With the development of social economy, China's economic and social development is also stable. Economic growth is a key indicator of economic development, a comprehensive concept, and an important embodiment of enhancing national strength and improving national living standards. Therefore, most countries regard economic growth as the primary goal of macroeconomic regulation and control. At the same time, however, it cannot be ignored that the international situation remains grim. It is particularly important to correctly formulate China's development strategy in all aspects. Monetary policy plays a pivotal role in economic and social development, and money demand, as an effective comparative standard of money supply, should be given sufficient attention. This paper studies the influence of money demand through econometrics to propose more effective policies.

Keywords

Monetary Policy; Money Demand; Money Supply; Gross National Income.

1. Introduction

Our country is in a period of rapid growth in income inequality. An important background is the rapid growth of money and credit. The implications of monetary policy deserve in-depth consideration. Especially due to some system-related factors, the impact of China's monetary policy differentiation may be much greater than that of mature economies, and the impact on income distribution is more significant. From the perspective of monetary policy research, the impact of money on income distribution seems to be a household name that not many people have studied. Most of them believe that the goal of monetary policy does not include achieving income fairness and cannot be used as a standard for evaluating the performance and efficiency of central banks; Others believe that monetary policy mainly acts on the total amount, and does not consider some individuals. From the perspective of income distribution research, the sources of income disparity are usually divided into primary income distribution gap and secondary income distribution gap, urban-rural disparity, urban-rural income disparity, regional disparity, and inter-group disparity, and monetary policy is not included in correlation studies. At the same time, the market still has many questions about the operation of monetary policy next year. If the modest financial easing policy continues, what will be the scale of loan investment next year? With the further recovery of the economy, it is not known when the modest financial easing policy for special periods will be reversed. These questions deserve to be investigated.

Since the Third Plenary Session of the 11 th CPC Central Committee in 1978, under the leadership of Comrade Deng Xiaoping, China has carried out reform and opening up, China's economy has developed rapidly, China's "one country, two systems" system has achieved good results, and China's economy has maintained high-speed growth. Monetary policy plays an important role in achieving many of the central bank's objectives, adjusting market interest rates by adjusting the money supply, and influencing private capital investment and aggregate demand through changes in policy market interest rates. In macroeconomic management, the

three monetary policy tools that adjust aggregate demand are minimum reserves, open market operations, and discounting policies. Maintain the balance between total social supply and aggregate demand, and balance the economy by balancing the total supply of monetary policy. When inflation leads to a situation based on aggregate demand, controlling money is more likely to control aggregate demand, increasing the money supply in the case of insufficient aggregate demand can increase the demand of the whole society, develop the economy, and we find that the content of moderate monetary policy is very important. Based on the experience of recent years, the goal of stabilizing the value of a currency is to moderately expand the money supply and support sustainable development. Correctly handling the relationship between financial risks and economic growth and improving the quality of loans is the basis for the rapid and healthy development of the national economy, and the emergence of appropriate monetary policy is a stipulation of monetary policy principles. This is the formulation of monetary policy and monetary policy, without prejudice to the principle of prudent monetary policy, according to changes in the economic situation, the policy of stabilizing the renminbi includes deflation and preventing inflation. Loose monetary policy or tight monetary policy. In fact, over the past few years, central banks' monetary policy operations have been very extensive. We should not be complacent, we still need to move forward. As an important policy of China, monetary policy plays an important role in solving these problems. As an important means of monetary policy, we cannot ignore the control of money issuance. However, it is difficult to control the supply of money. Too much money supply, exceeding the level of total social demand, is easy to cause inflation, too little is not conducive to consumption, and hinders economic and social development. So controlling the money supply is very important. For the money market to be equilibrium, the money supply must be consistent with the aggregate demand for social goods and services. However, the factors that affect the aggregate needs of society are manifold. This report analyzes the factors that affect the demand for money.

2. Case Studies

2.1. Purpose and Requirements of the Study

Money demand depends on the level of national economic development, economic structure and economic cycle, money demand refers to the level of economic development, economic structure and economic cycle differences and the formulation of monetary policy on the demand for money, is the key to a country's central bank to control the money supply. Appropriate money supply plays an important role in the sustained and stable development of the economy and society, which is conducive to the effective transmission of monetary policy and maintains the balance of the market. It is of extraordinary significance in the effective realization of the price level, full employment, economic growth and balance of payments. According to Keynes's theory of money, the actual supply of money is generally controlled by a country's central bank, which directly controls the level of M0 or base money by issuing banknotes and coins, that is, the amount of currency in an economy, which is an exogenous variable. Therefore, in order to control the money supply within a reasonable and effective range, it is necessary to analyze the influencing factors of money demand.

2.2. Model Settings

Money demand is a concept that cannot be accurately measured, but for the equilibrium money market, money demand is equal to money supply, so in this report, it is assumed that money demand is equal to money supply, and the money supply indicator is used as a demand indicator for analysis. For the central bank, it can use monetary policy to influence the behavior of private banks operating cash accounts, thereby indirectly controlling the level of M1. Therefore, in the report, the supply of money M1 represents the money supply, and then replaces the money demand analysis.

2.3. Theory

The division of three calibers of China's monetary level:

M_0 = Cash in circulation

M_1 = M_0 + Demand deposit

M_2 = M_1 + Quasi-currency (time deposit + savings deposit + customer margin of securities company + other deposit)

(1) Conditions for money market equilibrium: Money demand L must be equal to money supply M . Use the theory of money market equilibrium to study the demand for money, that is, the money supply is equal to the demand for money.

(2) The demand motivation of the currency:

First, the motivation to trade requires funds to be used for the normal transactions of individuals and businesses, and this demand depends on income, the higher the income, the greater the amount of funds required for the transaction.

Second, the prudent motive, or precautionary motive, is motivated by some funds to prevent unexpected expenses and is directly proportional to income.

Both trading motivation and preventive motivation are related to income, $L_1 = L_1(y) = ky$.

Third, speculative motives refer to people's motivation to hold a portion of their currency in order to seize favorable opportunities to purchase securities. There is an inverse relationship between speculative money demand and interest rates, depending on the interest rate (r), $L_2 = L_2(r) = -hr$. Generally speaking, the price of a bond changes inversely with the interest rate. As a result, speculative money demand moves in the same direction as bond prices.

So, the demand function for money is: $L = L_1 + L_2 = L_1(Y) + L_2(R) = KY - HR$

(3) Consumer price index CPI: CPI consumer price index is a macroeconomic index that reflects the fluctuation of the prices of consumer goods and services purchased by ordinary households, and is a representative relative figure reflecting the fluctuation of consumer goods and service prices, reflecting the fluctuation of commodity prices, and the consumption and services purchased by residents in a certain period of time. The rate of change reflects the degree of inflation and deflation. The General Consumer Price Index (last year=100) is used to reflect the inflation rate that is usually proportional to the demand for money. The higher the real inflation rate, the greater the demand for money, and vice versa.

(4) The Cairns Trap

The "Keynesian trap" or "trap of liquidity preferences" refers to the fact that money is the most liquid or flexible asset, so money is always used for trading, prevention, and speculation. Therefore, people's preference for money is called liquidity preference, and when interest rates are low, people no longer buy securities. No matter how much it increases, they must stay with them, and the preference for liquidity is limitless. Even if banks increase the money supply, interest rates will not fall again.

2.4. The Setting of the Model

Y Select the currency (M_1) supply to represent the demand for money

X_1 Select GNI to represent the level of income

X_2 Choose the total consumer price index to represent the degree of inflation (or deflation).

X_3 Select the total market value of the stock to represent the bond price

Table 1. 1994–2016-year Money M1 supply and related data

Year	Currency (M1) supply Y/100 million yuan	Gross national income X1/trillion yuan	General consumer price index (previous year=100)X2/%	The total market value of stocks is X3/100 million yuan
1994	20540.70	4.85	124.1	3690.62
1995	23987.10	6.04	117.1	3474.28
1996	28514.80	7.08	108.3	9842.39
1997	34826.30	7.88	102.8	17529.24
1998	38953.70	8.38	99.2	19521.81
1999	45837.20	8.94	98.6	26471.18
2000	53147.20	9.91	100.4	48090.94
2001	59817.60	10.93	100.7	43522.20
2002	70881.80	12.05	99.2	38329.13
2003	84118.60	13.67	101.2	42457.72
2004	95969.70	16.14	103.9	37055.57
2005	107278.80	18.60	101.8	32430.28
2006	126028.10	21.90	101.5	89403.89
2007	152560.10	27.08	104.8	327141.00
2008	166217.13	32.15	105.9	121366.43
2009	221445.80	34.85	99.3	243939.12
2010	266621.54	41.13	103.3	265423.00
2011	289847.70	48.48	105.4	214758.00
2012	308664.23	53.91	102.6	230357.62
2013	337291.05	59.02	102.6	239077.19
2014	348056.41	64.48	102.0	372547.00
2015	400953.44	68.64	101.4	531463.00
2016	486557.24	74.06	102.0	507685.00

Source: China Statistical Yearbook

2.5. Parameter Estimation

Dependent Variable: Y				
Method: Least Squares				
Date: 12/10/21 Time: 23:05				
Sample: 1994 2016				
Included observations: 23				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27382.36	62906.70	0.435285	0.6683
X1	5629.841	386.2498	14.57565	0.0000
X2	-316.9113	593.6654	-0.533821	0.5997
X3	0.067747	0.053657	1.262593	0.2220
R-squared	0.988762	Mean dependent var	163831.1	
Adjusted R-squared	0.986987	S.D. dependent var	139338.6	
S.E. of regression	15894.82	Akaike info criterion	22.34215	
Sum squared resid	4.80E+09	Schwarz criterion	22.53962	
Log likelihood	-252.9347	Hannan-Quinn criter.	22.39181	
F-statistic	557.2172	Durbin-Watson stat	1.297874	
Prob(F-statistic)	0.000000			

Figure 1. Regression results

Based on the data in Figure 1, the result of the model estimate is written as

$$Y = 27382.3607 + 5629.8412 \cdot X_1 - 316.9113 \cdot X_2 + 0.0678 \cdot X_3$$

$$(62906.6951) \quad (386.2498) \quad (593.6654) \quad (0.0537)$$

$$t = (0.4353) \quad (14.5757) \quad (-0.5338) \quad (1.2626)$$

$$R^2=0.9888 \quad \bar{R}^2=0.9870 \quad F=557.2172$$

3. Model Testing

3.1. The Test of Economic Significance

The statistical results of the model show that under the assumption of changes in other variables, for every 1 trillion yuan increase in gross national income, the average demand for money will increase by 5629.8412 trillion yuan; for every 1% increase in the total consumer price index, the demand for money will decrease by 316.9113 trillion yuan on average; and for every 1 trillion yuan increase in the total market value of stocks, the demand for money will increase by 0.0678 trillion yuan on average. Among them, the explanatory variable X2 is that the total consumer price index represents the level of inflation rate, which is generally negatively correlated, inconsistent with empirical judgment, and should be excluded.

3.2. Statistical Inference Testing

(1) Goodness-of-fit test: In this example, the r-squared coefficient $R^2=0.9888$ and the modified r-squared coefficient $\bar{R}^2=0.9870$ indicate that the model fits the sample well overall.

(2) T test: The p values of the t test corresponding to the constant term, explanatory variables X2 and X3 are 0.6683, 0.5997, and 0.2220, respectively, which are greater than 0.05, indicating that at the significance level of 0.05, it falls in the high probability interval and cannot reject the null hypothesis, that is, the explanatory variables cannot explain the currency demand of the explanatory variables well.

(3) F-test: The F-test has a value of 557.2172 and corresponds to a p-value of 0.000, so the combination of explanatory variables has a significant effect on the explanatory variable "Money Demand".

From the regression results, it can be seen that the standard deviation of the parameter estimates of individual explanatory variables is large, and the t-test of some variables is small and insignificant, the economic significance of explanatory variable X2 is not as expected, the analysis may appear multicollinearity, time series data is prone to autocorrelation, and time series data may also have heteroscedasticity, so it is necessary to test multicollinearity, autocorrelation and heteroscedasticity.

3.3. Econometric Tests

3.3.1. Multicollinearity

(1) Simple correlation coefficient test

Table 2. Correlation coefficient matrix

Variable	X1	X2	X3
X1	1.000000	-0.238799	0.921831
X2	-0.238799	1.000000	-0.226070
X3	0.921831	-0.226070	1.000000

As can be seen from the figure, there is a serious multicollinearity between the explanatory variable X1 and the explanatory variable X3

(2) Variance inflation factor

Table 3. The R2 value for auxiliary regression

Explanatory variables	The value of the R2 r-your factor	Variance widening factor VIF=1/(1-R2)
X1	0.8507	6.7000
X2	0.0573	1.0607
X3	0.8498	6.6582

Although there does not seem to be a serious multicollinearity from the variance inflation factor, based on intuitive judgment and a simple correlation coefficient test, we can judge that there is multicollinearity and it is necessary to correct it.

(3) Correction: Stepwise regression

First, the univariate regression is determined according to the size of the correlation coefficient between the explanatory variable Y and each explanatory variable. Since the correlation coefficient between the explanatory variable and the explanatory variable X1 is the largest, reaching 0.9938, the univariate regression model is determined to be $Y = -8536.9418 + 6097.5836 \cdot X1$; Immediately after that, in the process of determining the binary regression model to introduce explanatory variables X2 and X3, there were problems such as inconsistent adjustment of economic significance test, decrease of the decisive coefficient, or failure of the t test to pass, and the rise of AIC and SC, and the binary regression model could not be determined, so the regression model after multicollinearity correction was:

Dependent Variable: Y
 Method: Stepwise Regression
 Date: 12/10/21 Time: 23:19
 Sample: 1994 2016
 Included observations: 23
 Number of always included regressors: 1
 Number of search regressors: 1
 Selection method: Stepwise forwards
 Stopping criterion: p-value forwards/backwards = 0.5/0.5

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	-8536.942	5351.843	-1.595140	0.1256
X1	6097.584	148.8690	40.95940	0.0000

R-squared	0.987637	Mean dependent var	163831.1
Adjusted R-squared	0.987049	S.D. dependent var	139338.6
S.E. of regression	15857.25	Akaike info criterion	22.26358
Sum squared resid	5.28E+09	Schwarz criterion	22.36232
Log likelihood	-254.0312	Hannan-Quinn criter.	22.28842
F-statistic	1677.672	Durbin-Watson stat	1.262770
Prob(F-statistic)	0.000000		

Selection Summary

Figure 2. Regression results after multicollinearity correction

$$Y = -8536.9418 + 6097.5836 \cdot X1$$

(5351.4830) (148.8690)
 t= (-1.5951) (40.9594)
 $R^2=0.9876$ $\bar{R}^2=0.9870$ $F=1677.672$ $DW=1.2628$

(1) Economic significance test: Model statistics show that for every 1 trillion yuan increase in gross national income, the average demand for money will increase by 6097.5836 trillion yuan, which is roughly consistent with empirical judgment.

(2) Statistical inference testing:

① Goodness-of-fit test: In this example, the r-reactive coefficient $R^2=0.9876$ and the corrected $R^2=0.9870$ indicate that the model fits the sample well overall.

② t-test: The p-value of t-test corresponding to the constant term is 0.1256, and the p-value of t-test corresponding to explanatory variable x_1 is 0.0000, indicating that at the significance level of 0.05, the constant term is not significant, and the explanatory variable x_1 is significant.

③ F-test: The F-test value is 1677.672, and the corresponding p-value is 0.0000, so the combination of the explanatory variables has a significant effect on the explanatory variable "money demand".

3.3.2. Autocorrelation

(1) DW test method

Because for a model with a sample size of 23 and an explanatory variable, at a significance level of 0.05, it can be seen from the DW statistical table, $dL=1.257, dU=1.437, dL=1.257 < DW=1.2628 < dU=1.437$, Therefore, the model cannot determine whether there is first-order autocorrelation.

(2) Partial correlation coefficient test

From the partial regression coefficient test, it can be seen that the model may have second-order autocorrelation and fourth-order autocorrelation.

(3) Self-correlation corrections:

Okoren iterative method

$$Y = -6884.7292 + 6042.3931 * X_1 + [AR(2)=-0.7293, AR(4)=-0.9824]$$

$$(1896.997)(61.2339)(0.2361)(0.3017)$$

$$t = (-3.6293) (98.6772) (-3.0893) (0.3017)$$

$$R^2=0.9931 \quad \bar{R}^2=0.9917 \quad F=721.1571 \quad DW=1.6830$$

It can be judged from $DW=1.6830$ in the figure that $dU < DW < 4-dU, dU < DW < 4-dU$ indicating that under the significance level of 0.05, the model has no autocorrelation after generalized difference.

3.3.3. Heteroscedasticity

(1) GQ Test

The sample size was 23, and 5 intermediate variables were removed.

$$F = \frac{\sum e^2}{\sum e^2} = 5.00E+09 / 57944218 = 86.29$$

At $\alpha=0.05$, the numerator denominator has 7 degrees of freedom, $F_{0.05}(7,7)=3.7870$, because $F=86.29$ is greater than $F_{0.05}(7,7)=3.7870$, the null hypothesis is rejected, indicating that there is heteroscedasticity in the equation.

(2) Fixed: Weighted least squares

Setting the weight $W = \frac{1}{e^2}$, it can be seen that after the weighted least squares method eliminates heteroscedasticity, the t-test of the parameters is significant, the F-test is also significant, and the regression result is

$$Y = -9475.2591 + 6187.1105 * X_1$$

$$(112.1706) (12.5618)$$

$$t = (-84.4718) (492.5358)$$

$$R^2=0.9999 \quad \bar{R}^2=0.9999 \quad F=242591.5 \quad DW=0.9681$$

Dependent Variable: Y
 Method: Least Squares
 Date: 12/10/21 Time: 23:29
 Sample: 1994 2016
 Included observations: 23
 Weighting series: 1/RESID^2
 Weight type: Inverse standard deviation (EViews default scaling)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9475.259	112.1706	-84.47183	0.0000
X1	6187.111	12.56175	492.5358	0.0000

Weighted Statistics			
R-squared	0.999913	Mean dependent var	7.46E+08
Adjusted R-squared	0.999909	S.D. dependent var	2.40E+09
S.E. of regression	104.9150	Akaike info criterion	12.22712
Sum squared resid	231150.1	Schwarz criterion	12.32586
Log likelihood	-138.6119	Hannan-Quinn criter.	12.25195
F-statistic	242591.5	Durbin-Watson stat	0.968094
Prob(F-statistic)	0.000000	Weighted mean dep.	45715.09

Unweighted Statistics			
R-squared	0.987288	Mean dependent var	163831.1
Adjusted R-squared	0.986683	S.D. dependent var	139338.6
S.E. of regression	16079.81	Sum squared resid	5.43E+09
Durbin-Watson stat	1.226909		

Figure 3. Weighted least squares correction result

3.3.4. Lagging Variable Model

According to the graph obtained by cross-correlation, a finite distribution lag model is set:

$$Y = \alpha_0 + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \beta_3 X_{t-3} + \beta_4 X_{t-4} + \mu_t$$

Dependent Variable: Y
 Method: Least Squares
 Date: 12/10/21 Time: 23:34
 Sample (adjusted): 1998 2016
 Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4014.920	8029.319	-0.500033	0.6243
PDL01	-1658.472	2552.646	-0.649707	0.5257
PDL02	-485.0500	523.8455	-0.925941	0.3691
PDL03	1509.760	1303.860	1.157916	0.2650

R-squared	0.985812	Mean dependent var	192644.6
Adjusted R-squared	0.982974	S.D. dependent var	136691.0
S.E. of regression	17835.97	Akaike info criterion	22.60049
Sum squared resid	4.77E+09	Schwarz criterion	22.79932
Log likelihood	-210.7046	Hannan-Quinn criter.	22.63414
F-statistic	347.4016	Durbin-Watson stat	1.416755
Prob(F-statistic)	0.000000		

Lag Distribution ...	i	Coefficient	Std. Error	t-Statistic
	0	5350.67	2367.34	2.26021
	1	336.338	1523.92	0.22071
	2	-1658.47	2552.65	-0.64971
	3	-633.762	1164.45	-0.54426
	4	3410.47	3288.48	1.03710
Sum of Lags		6805.24	582.334	11.6862

Figure 4. Regression results

$$Y = -4014.9202 + 5350.6687 * X_1 + 336.3383 * X_1(-1) - 1658.4718 * X_1(-2) - 633.7616 * X_1(-3) + 3410.4687 * X_1(-4)$$

$$(8029.319)(5350.67) (1523.92)(2552.65)(1164.45)(3288.48)$$

4. Conclusion

For the purposes of this model, the demand for money depends mainly on income. The higher the income, the greater the demand for reasons such as trading. Correctly studying the demand for money in economic and social operation is conducive to the correct decision-making and implementation of monetary policy, thereby promoting the stable and high-speed operation of the economy and conducive to the coordinated development of society. At the same time, there are great shortcomings in the research process of this model, for example, the model fails to correct heteroscedasticity on the basis of autocorrelation correction, nor does it carry out lagging variable analysis on its basis, but each part is independently tested and corrected on the basis of multicollinearity correction, because autocorrelation and heteroscedasticity exist at the same time, and its independent correction method cannot be simply used, so the model needs to be further improved.

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