

An Empirical Study of China's Monetary Policy Based on the Corresponding Analysis of the Growth Rate of Money Supply

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Abstract: The corresponding analysis results of China's money supply growth rate from 1994 to 2016 show that China has basically implemented a prudent monetary policy, and the growth rate of broad money supply is higher than that of GDP. Money supply has periodicity and short cycle. It mainly USES direct tools combined with indirect tools to regulate the money supply. Some Suggestions are put forward, such as the gradual transformation of monetary policy from multiple objectives to a single objective, the development of financing and other ways to accelerate the circulation of money, and the optimization of the use of multiple monetary tools to regulate the total money supply.

Keywords: Growth rate of money supply; Corresponding analysis; Financial innovation; Stable currency value

1. Introduction

The monetarist school of economics emphasizes that the change of money supply is the fundamental cause of the change of economic activity and price level. Carl Brenner used the term "monetarism" in 1968 to describe the basic features of the school, and it has been widely used in economic literature ever since. Monetarists believe that money is the most important in economic activities, and that the change in the money stock is the most important factor to explain the change in money income, and that inflation is a monetary phenomenon at any time.[1]

In 1995, China promulgated the first banking law, which defined the goal of China's monetary policy as: to maintain the stability of the value of RMB internally, so as to promote economic growth, and to maintain the stability of the real and effective exchange rate of RMB externally. Then, the people's bank of China announced the money supply as the intermediate target of monetary policy, so how to know the monetary policy from the perspective of changes in the money supply growth, in the regulation of economic operation how to design and implement of monetary policy, to solve the current our country's inherent motive force of economic development and promote economic growth, control inflation problem certainly has strong practical significance.

At present, there are few researches on monetary policy from the perspective of money supply in China, mainly Tang Qiming and Wang Haisheng (1997). Xie Yunshan and Wu Xuchuan (2006); Xu Yiping, Zhang Peng and Lin Guijun (2011) et al. On the basis of reviewing the history and transformation process of China's monetary policy, they conduct descriptive analysis of data and put forward several Suggestions on monetary policy during the period of system transition. The research methods are mainly subjective and qualitative. Yang Chunlei (2009) used the annual data from 1990 to 2007 to analyze the role of the growth rate of money supply and the rate of change of money velocity in the implementation of China's monetary policy through correlation analysis and variance decomposition. Based on the annual data from 1994 to 2016, this paper makes a corresponding analysis of the growth rate of money supply, conducts an empirical analysis of China's monetary policy from the perspective of the change of money supply growth with the quantitative method and puts forward corresponding Suggestions.

2. Correspondence Analysis Method and Basic Principle

Correspondence analysis, also known as (index-sample) type factor analysis, was first proposed by French statis-

ticians in 1970, whose essence is a factor analysis method. $R-Q$ J.P.Beozecri It is (indicators) factor analysis (samples) and factor analysis, starting from the r-mode factor analysis, according to the type and type factor of inner link, the indicators and the sample at the same time reflected in the same axis (called factor axis) of a graph, reveals the differences between the same index of each category, and the corresponding relationship between different indexes each category. $R Q R R Q$ For example, some sample points adjacent to each other on the graph indicate their close relationship and put them into one category. Similarly, adjacent index points on the graph can be classified into one category, and sample points of the same type can be represented by adjacent index points. Therefore, correspondence analysis can provide three aspects of information in summary: the relationship between indicators, the relationship between samples, and the relationship between indicators and samples.

Rationale: since type factor analysis and type factor analysis reflect different aspects of the same whole, there must be a connection between them. $R Q$ Correspondence analysis is an organic combination of type factor analysis and type factor analysis by means of data transformation and a transition matrix. $Z R Q$ Specifically, first of all, gives its analysis indicators covariance matrix and the analysis of the relationship between the sample points of the relationship between covariance matrix, due to the non zero characteristic root with the same, and the characteristics of root and variance of each public factor, thus tries to punctuation and sample points at the same time reflected in the same axis (namely factor axis) factor in the plane, classifying index point and sample points to consider. $A = Z^T Z B = ZZ^T Z^T Z$ 和 ZZ^T [2] If these non-zero eigenroots are denoted as, and the eigenvectors corresponding to the eigenroots of the covariance matrix are denoted as, then the eigenvectors corresponding to the eigenroots of the covariance matrix are denoted as, after the eigenroots and eigenvectors are obtained, the factor loading matrix corresponding to the index point covariance matrix can be written as. $\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_m, 0 \leq m \leq \min(p, 0)$ $A \lambda_i U_i B \lambda_i V_i = ZU_i A F$

$$F = \begin{pmatrix} u_{11}\sqrt{\lambda_1} & u_{12}\sqrt{\lambda_2} & \dots & u_{1m}\sqrt{\lambda_m} \\ u_{21}\sqrt{\lambda_1} & u_{22}\sqrt{\lambda_2} & \dots & u_{2m}\sqrt{\lambda_m} \\ \vdots & \vdots & \ddots & \vdots \\ u_{p1}\sqrt{\lambda_1} & u_{p2}\sqrt{\lambda_2} & \dots & u_{pm}\sqrt{\lambda_m} \end{pmatrix}$$

According to the relationship between type factor analysis and type factor analysis, the factor load matrix corresponding to the sample point codifference matrix can be obtained, denoted as. $R Q B G$

$$G = \begin{pmatrix} v_{11}\sqrt{\lambda_1} & v_{12}\sqrt{\lambda_2} & \dots & v_{1m}\sqrt{\lambda_m} \\ v_{21}\sqrt{\lambda_1} & v_{22}\sqrt{\lambda_2} & \dots & v_{2m}\sqrt{\lambda_m} \\ \vdots & \vdots & \ddots & \vdots \\ v_{n1}\sqrt{\lambda_1} & v_{n2}\sqrt{\lambda_2} & \dots & v_{nm}\sqrt{\lambda_m} \end{pmatrix}$$

3. The Empirical Analysis

3.1. Data sources and notations

Data for this article are from China statistical yearbook 2017.

(<http://www.stats.gov.cn/tjsj/ndsj/2017/indexch.htm>)

For financial reform since 1993 China has established the central bank system, in the true sense of the people's bank of China began to implement monetary policy in the modern sense, so we choose the Chinese statistics yearbook 2017 1994-2016 year-on-year growth rate of money supply in the five indicators: the currency in circulation, unit demand deposits and time deposits, individual account and other deposit. Sample point 1 in the empirical graph represents 1994, 2 represents 1995, and so on...23 means 2016. The statistical software SPSS22.0 is used for empirical analysis, and the program runs as follows:

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CORRESPONDENCE TABLE = all 23 (5)
/ DIMENSIONS = 2
/ MEASURE = EUCLID
/ STANDARDIZE = RCMEAN
/ NORMALIZATION = SYMMETRICAL
/ PRINT = TABLE RPOINTS CPOINTS
/ PLOT=NDIM(1,MAX) BIPLLOT(20) RPOINTS(20)
CPOINTS(20) TRROWS(20) TRCOLUMNS(20). [3]
Corresponding analysis results and graphs
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Table 1. Abstract

| The dimension | Singular value | Moment of inertia | The ratio of inertia | | Singular value of confidence | |
|---------------|----------------|-------------------|----------------------|----------------|------------------------------|-----------------------------|
| | | | Account for | The cumulative | The standard deviation | The correlation coefficient |
| 1 | 067. | 004. | 696. | 696. | 027. | 224. |
| 2 | 037. | 001. | 213. | 909. | 021. | |
| 3 | 023. | 001. | 079. | 988. | | |
| 4 | 4 | 009. | 000. | 012. | 1.000 | |
| A total of | | 006. | 1.000 | 1.000 | | |

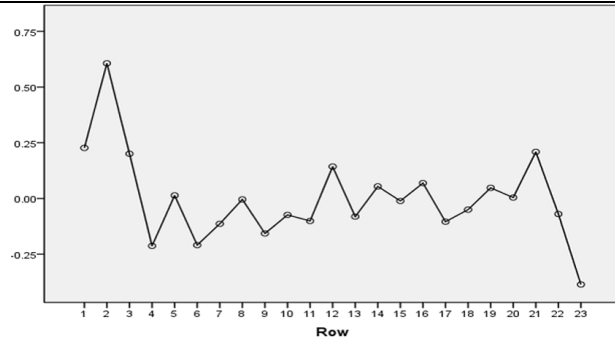


Figure 1. Two-dimensional Row class

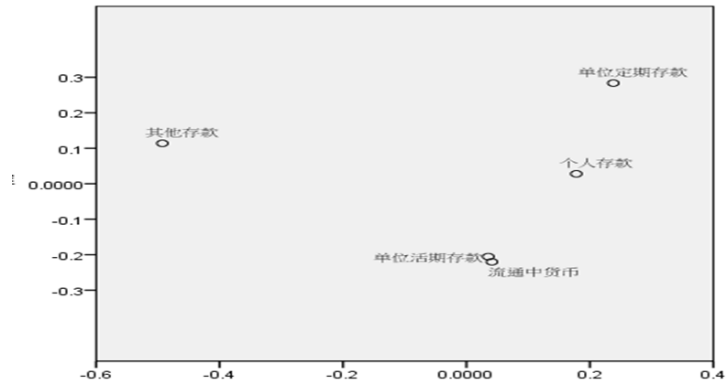


Figure 2. Column's symmetric normalization

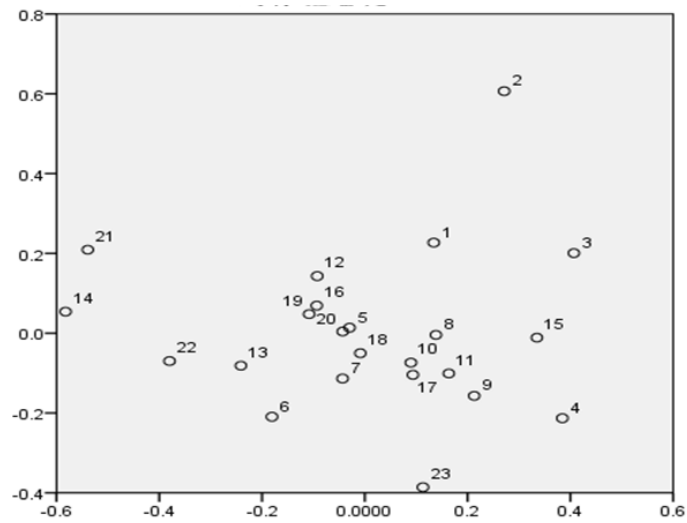


Figure 3. Rolumn's symmetric normalization

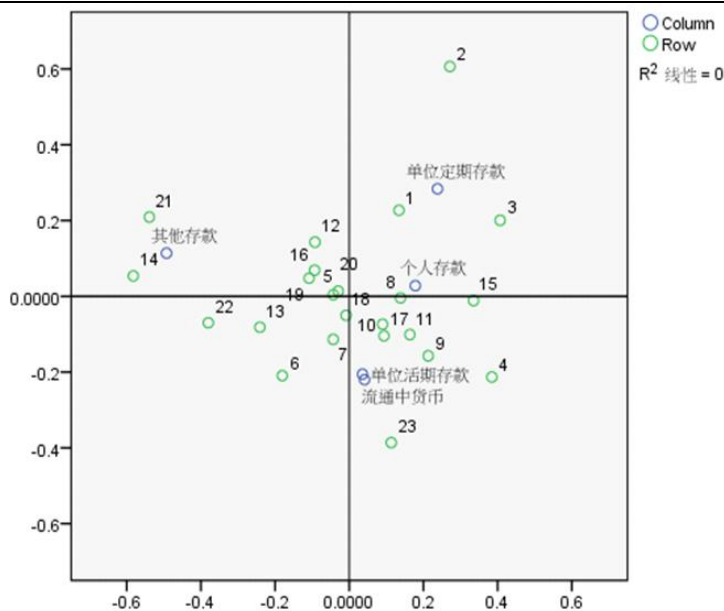


Figure 4. Row and column’s symmetric normalization

Quadratic fitting results of dimension 1 and dimension 2; where represents dimension 1 in FIG. 2,3,4, and represents dimension 2 in FIG. 2. $y = 0.05 + 0.14x + 0.77x^2$

4. Empirical Results and Policy Implications

This paper mainly conducts empirical research on China's monetary policy through corresponding analysis of the growth rate of money supply, and the main results are as follows:

(1) as can be seen from the proportion accumulation of inertia in table 1, if two dimensions are selected, the amount of information of indicators has reached 90.9%, indicating that the selected five indicators can be simplified into only considering two comprehensive indicators, which are expressed by dimension 1 and dimension 2 respectively. As can be seen from the symmetric normalization of column points in FIG. 2 Column, the four indexes in circulation, namely, currency, unit demand deposit, unit fixed deposit and individual deposit, have a relatively large impact on dimension 1, and can be regarded as the first comprehensive index. Other deposits have a greater impact on dimension 2, which can be regarded as the second comprehensive index. Obviously, the unit time deposit has a great influence on dimension 1 and dimension 2. Unit deposit belongs to the category of M2 quasi currency, liquidity is weak, the corresponding analysis results are in conformity with the reality of our country, statistics show that in the past 20 years, China's broad money supply growth in most of the annual GDP growth, but also with enterprises and residents' high sav-

ings rate in our country the obvious economic phenomena.

(2) as can be seen from the symmetry normalization of row points in FIG. 3 Row, most of the row points are concentrated, indicating that China basically implemented a stable monetary policy from 1994 to 2016, and periodically implemented the combination of expansionary and contractionary regulation policies. However, the symmetric normalization of Row category transformed in FIG. 1 dimension 2 tells us that money supply is highly volatile, with short fluctuation period, frequent fluctuation and large fluctuation range, indicating poor anti-interference ability of monetary policy and lack of independence and relative stability. Row4 in the figure shows that in 1997, the cliff appeared in 1997 because the people's bank of China adjusted the financial statistics system at the beginning of 1997, so the data since 1997 are not completely comparable with the historical data.

(3) by figure 4 rows and columns symmetric normal can see d 1 is the first comprehensive index and most of the lines of adjacent points, suggests that monetary policy in our country mainly use the first comprehensive index to adjust the money supply, the first comprehensive index refers to the currency in circulation, unit demand deposits and time deposits, such as personal savings, obvious to directly control tool is given priority to implement monetary policy; Meanwhile, a few line points, such as points 21,14,22,13,10,16,12, are adjacent to other deposits in the second comprehensive index. These points correspond to years in the late 1990s and years in this century. The second comprehensive index other deposits are mainly foreign currency deposit, trust deposits, financial

bonds, commercial paper and large negotiable certificates of deposit, etc., it shows that with the reform and opening, the change of the economic structure in our country, the rapid development of private economy, financial market gradually broaden the perfect, monetary policy tools is given priority to with direct control tool also gradually turned to combine direct and indirect tools.

5. Several Policy Suggestions Corresponding to the Empirical Results

The empirical results (I) show that China's monetary liquidity has been relatively weak, and the savings rate of residents, enterprises and institutions is high. The high savings rate is a "double-edged sword" for China's economic development. On the one hand, the high savings rate supports and promotes the rapid development of China's economy. We should solve the problem of excessively high savings rate through monetary policy, mainly by channeling savings into investment, encouraging innovation in financial investment, developing various financing methods, promoting the development of the money market, speeding up the circulation of money and improving the efficiency of transformation. To be specific, we should expand the participants of the money market, gradually absorb all kinds of financial institutions to participate in the money market, broaden the financing channels, and allow international finance companies to issue RMB bonds. Issuance of central bank bills to provide effective operational tools for the central bank to flexibly control money market liquidity; We will diversify investment products, introduce new financial products such as money market funds, short-term financing bonds, and floating rate bonds for bond forward transactions, and increase the proportion of direct financing. We will develop the commercial paper market and expand financing channels for enterprises, especially small and medium-sized enterprises.[4]

The empirical results (ii) reflect the high volatility of money supply and weak anti-interference ability of monetary policy. As a means of macro-control, monetary policy is generally affected by the economy and the economic environment is in constant change and development. Therefore, monetary policy cannot remain unchanged. In order to make monetary policy truly serve the economic system and not be disturbed by other factors, monetary policy should gradually return to its main function -- to stabilize the value of the currency.[5] It is suggested to gradually transform the functions of the central bank, which is the monetary authority of a country and is responsible for formulating and implementing monetary policies and supervising and regulating the financial industry. However, since its establishment in 1984, China's central bank has not only stabilized the currency, but also undertaken the tasks of fiscal borrowing and overdraft, loans issued by non-financial sectors,

and fund allocation, etc., so it is not a central bank in the true sense and cannot guarantee the independence, unity and authority of monetary policy. Although the new monetary policy system makes it clear that the central bank can independently implement monetary policies according to law under the leadership of the state council, due to various historical reasons, it will take some time for the central bank to fully function. At the same time, we should change the situation of monetary policy fighting alone. When formulating and implementing monetary policies, the central bank should grasp the "timing" and "degree" of regulation, be forward-looking and fully grasp the initiative.[6]

The empirical results (3) show that in recent years, China's monetary policy tools are gradually changing from direct control to indirect control. Monetary policy tools are the means adopted by the central bank to achieve monetary policy objectives, which are divided into general tools and selective tools. General monetary policy tools mainly include: open market operations, reserve requirements, rediscount; The selective monetary policy tools mainly include: loan scale control, special deposit, window guidance to financial enterprises and so on.[7] Indirect monetary policy tools are general monetary policy tools, while direct monetary tools are selective monetary tools. In the past, China's monetary policy was mainly used for direct control, namely, credit scale, cash plan and other tools. In fact, after 1998, the control of loan scale was abolished. Indirect monetary policy tools were mainly adopted to regulate the total money supply, and direct loans were adopted to correct indirect tools when they were out of control. Moreover, through the operation of monetary policy tools, the central bank influences the activities of commercial Banks and other financial institutions, thereby affecting the money supply and ultimately affecting the national macroeconomic indicators, so as to achieve the ultimate goal of monetary policy -- maintaining the stability of the value of the currency and promoting economic growth. But this does not mean that our country's monetary policy tool choice and use has been perfect. As different monetary policy instruments differ in the intensity, scope and level of influence, there should be a division of labor in the selection and use of various monetary policy instruments, especially the collocation among different monetary policy instruments.[8] For example, re-lending and reserve requirement focus on regulating medium and long-term liquidity of commercial Banks, while open market operation and rediscount mainly regulate short-term positions of commercial Banks. Therefore, the policy of re-lending and reserve requirement adjustment will inevitably lead to the impact of short-term liquidity of financial institutions, which must be appropriately supplemented by open operation market and rediscount to alleviate.

References

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- [1] 360 wikipedia. Friedman rules [EB/OL] <https://m.baikē.so.com/doc/7737670-8011765.html>. 2018.03
- [2] Yu X.L., Ren X.S. Multivariate statistical analysis. Beijing: China statistics press, 2003, 199-200.
- [3] Wu S., Pan Z. SPSS statistical analysis. Beijing: tsinghua university press, 2017, 406.
- [4] Xie Y.S., Wu X.C.. Review and prospect of China's monetary policy during the tenth five-year plan period. Journal of henan institute of financial management cadres, 2006, 127(1), 40-43.
- [5] Dong G.P. The selection of China's monetary policy during the transition period . Statistics and management, 2017, 2, 76-78.
- [6] Tang Q.M., Wang H.S. Review and prospect of China's monetary policy. Journal of huazhong university of science and technology. Social science edition, 1997, 33(1), 18-22.
- [7] 360 wikipedia. China's monetary policy tools [EB/OL] HTTP: // <https://m.baikē.so.com/doc/4092694-4291850.html>. 2018.03
- [8] Duan J.S., Zhao M.X. Analysis of monetary policy tools of the central bank of China in recent years. Contemporary finance and economics, 2005, 251(10) , 44-48.