

Analysis of the Influencing Factors of China's M2/GDP Ratio

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Abstract

The ratio of M2 to GDP is often used to measure the degree of financial deepening and development of a country or region. Keeping the M2/GDP ratio moderate is very important for the development of national economy. However, since the reform and opening up, China's M2/GDP ratio has been on a rising trend all year round. At present, this indicator in China has been rising to 200%, and this phenomenon has become the mystery of China's currency, which is called "the mystery of China's high M2/GDP", which shows that there are some problems in China, such as the real estate market bubble, inflation and so on. Therefore, the study of the factors affecting the high M2/GDP ratio has a great role in the development of China's economy, and this paper will study the high proportion of China's M2/GDP from the perspective of money supply.

Keywords

M2/GDP; Money Supply; GDP.

1. Introductory

This chapter firstly describes the research background and significance of this paper to illustrate the necessity of researching the issue of M2/GDP, then conducts a literature review to summarise the previous research on this issue by scholars, and then describes the research content and methodology as well as the innovation points of this paper, and finally explains the basic structure of this paper.

Scholars have been conducting a lot of research on the main factors affecting M2/GDP. Especially after China's M2/GDP ratio exceeded 100 per cent for the first time in 1996, the academic research on this topic has become more and more prosperous. This chapter will summarise the relevant literature from the perspectives of theoretical and empirical research on the main factors affecting M2/GDP.

2. Conceptual Explanation of M2/GDP

The indicator M2/GDP was originally derived from the theory of financial development, where the stock of financial assets is closely related to the level of development of the country, and the ratio of M2/GDP is often used in processing calculations. The ratio can also be applied to the Fisher-Price trading equation. According to the quantity theory of money, the growth of M2 should be in line with the growth of GDP, and if M2 grows faster than GDP, i.e. if the M2/GDP ratio rises, this indicates that there is an overissuance of money, which may trigger inflation.

3. Data Collection and Selection of Variables

3.1. Data Sources

This paper is mainly concerned with China's various relevant monetary data during 1992-2021, which are obtained from the database of the National Bureau of Statistics (NBS), the China Statistical Yearbook, the People's Bank of China (PBC), and the Wind database.

This study is based on the analysis of the graphs and charts in the text, which were created by combining, comparing and calculating the data in the section.

3.2. Selection of Variables

Based on the above data, this paper takes the total saving rate as the explanatory variable X1, M2/GDP as the explanatory variable Y, and the economic growth rate, the velocity of money circulation, and the domestic credit status as the control variables X2, X3, and X4, respectively. Depending on the economic significance represented by each variable, the aggregate savings rate is denoted by $X1 = \frac{1 - \text{Final consumption}}{\text{Expenditures}}$ is denoted by the total savings rate, the economic growth rate is denoted by the $X2 = \text{GDP growth rate}$ is denoted by the economic growth rate, the velocity of money circulation is denoted by the $X3 = \frac{\text{GDP}}{\text{M2}}$ and the domestic credit ratio is denoted by $X4 = \frac{\text{Total domestic cred}}{\text{GDP}}$ is used.

3.3. Data Collation

The specific data are collated in the table below:

Table 1. 1992-2021 China's M2/GDP and X1, X2, X3, X4

times	M2/GDP (Y)	Gross savings rate (x1)	Economic growth rate (x2)	Velocity of money circulation (x3)	Domestic credit situation (x4)
1992	0.8103	0.3667	0.0986	1.2341	1.0327
1993	0.8793	0.3806	0.1660	1.1372	1.0943
1994	0.9341	0.4017	0.2358	1.0706	1.0722
1995	0.9778	0.4149	0.3118	1.0227	1.0481
1996	0.9648	0.4155	0.3634	1.0365	1.0124
1997	0.9904	0.4066	0.2612	1.0097	1.0421
1998	1.0596	0.3972	0.1707	0.9437	1.0960
1999	1.1415	0.4013	0.1100	0.8760	1.2109
2000	1.2266	0.3926	0.0688	0.8153	1.3193
2001	1.3239	0.3710	0.0630	0.7553	1.3607
2002	1.3423	0.3612	0.1073	0.7450	1.3295
2003	1.4279	0.3780	0.1055	0.7003	1.3849
2004	1.5200	0.3882	0.0979	0.6579	1.5119
2005	1.6098	0.4186	0.1290	0.6212	1.6396
2006	1.5701	0.4460	0.1777	0.6369	1.6183
2007	1.5949	0.4571	0.1574	0.6270	1.6125
2008	1.5748	0.4747	0.1715	0.6350	1.6641
2009	1.4937	0.4908	0.2308	0.6695	1.6819
2010	1.4884	0.5004	0.1820	0.6719	1.6865
2011	1.7509	0.4979	0.0917	0.5711	1.9565
2012	1.7613	0.5065	0.1825	0.5678	1.9555
2013	1.7453	0.4944	0.1840	0.5730	1.8716
2014	1.8087	0.4890	0.1038	0.5529	1.9014
2015	1.8661	0.4858	0.1010	0.5359	1.9810
2016	1.9087	0.4772	0.0853	0.5239	2.0564
2017	2.0211	0.4626	0.0704	0.4948	2.2373
2018	2.0767	0.4493	0.0835	0.4815	2.3579
2019	2.0314	0.4493	0.1147	0.4923	2.3219
2020	1.9871	0.4473	0.1049	0.5032	2.2944
2021	2.0048	0.4457	0.0779	0.4988	2.3384

4. Modelling

4.1. Setting up the Multiple Regression Model

Based on the data collected, a preliminary regression model can be developed as follows:

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + U_i \text{ (where } U_i \text{ is the random error term)}$$

4.2. OLS Estimation

(1) in the newly created EViews work file, select the data type "Year" (Year), enter the start time "1990" and the last time "2019", directly in the EViews command box type: DATAY X1 X2 X3 X4, under the corresponding Y X1 X2 X3 X4 enter the corresponding data. In the EViews command box, type DATAY X1 X2 X3 X4 directly, and enter the corresponding data under the corresponding Y X1 X2 X3 X4.

(2) Using Eviews software, type :LS Y C X1 X2 X3 X4 in the command box for least squares estimation, and the model estimation results are as follows:

Dependent Variable: Y
 Method: Least Squares
 Date: 06/20/21 Time: 06:53
 Sample: 1990 2019
 Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.441599	0.128510	11.21780	0.0000
X1	-0.365262	0.230760	-1.582865	0.1260
X2	0.076439	0.120760	0.632979	0.5325
X3	-0.858272	0.070305	-12.20782	0.0000
X4	0.506707	0.036333	13.94625	0.0000

R-squared	0.994151	Mean dependent var	1.496410
Adjusted R-squared	0.993216	S.D. dependent var	0.392008
S.E. of regression	0.032289	Akaike info criterion	-3.877197
Sum squared resid	0.026064	Schwarz criterion	-3.643664
Log likelihood	63.15795	Hannan-Quinn criter.	-3.802487
F-statistic	1062.391	Durbin-Watson stat	0.623408
Prob(F-statistic)	0.000000		

Figure 1. Least squares estimation model

From the above figure, the multiple regression equation can be tentatively expressed as:

$$y = 1.4416 - 0.3653 * x_1 + 0.0764 * x_2 - 0.8583 * x_3 + 0.5067 * x_4$$

5. Testing and Adjustment of the Model

5.1. Economic Significance Test

From the economic analysis, M2/GDP (Y) is positively correlated with the total saving rate (X1) and total domestic credit (X4), and is negatively correlated with the economic growth rate (X2), and the velocity of money circulation (X3). However, the coefficients before the total savings rate (X1) and the coefficients before the economic growth rate (X2) in the multiple regression model are negative, which is inconsistent with the economic significance, so it is considered that there is an error in the original model and needs to be adjusted.

5.2. Statistical Tests

$$y=1.4416-0.3653*x_1+0.0764*x_2-0.8583*x_3+0.5067*x_4$$

$$(0.1285) (0.2308) (0.1208) (0.0703) (0.0363)$$

$$t=(11.2178) (-1.5829) (0.6330) (-12.2078) (13.9463)$$

$$R^2=0.9942 F=1062.3910 n=30$$

From the above regression results, it is clear that R^2 The value of F value is relatively close to 1, indicating that the model fits well. \bar{R}^2 value is relatively close to 1, which indicates the goodness of fit of the model. The critical value of the statistic of F value is 2.74 and the F value is significantly greater than this critical value, so the linear relationship of the model is significantly true at 95% confidence level. The t-statistics of X3 and X4 pass the test of significance at significance level $\alpha=0.05$ while the t-test values of X1 and X2 fail the test of significance. It indicates that there may be multicollinearity, i.e., there may be a direct linear relationship with the explanatory variables and hence further tests for multicollinearity are required.

5.3. Econometric Tests

5.3.1. Correcting for Multicollinearity with Stepwise Regression

(1) The correlation coefficients of X1, X2, X3 and X4 are shown below:

Table 2. Correlation coefficients

	Y	X1	X2	X3	X4
Y	1.0000	0.6679	-0.5210	-0.9716	0.9787
X1	0.6679	1.0000	0.0327	-0.6615	0.6811
X2	-0.5210	0.0327	1.0000	0.5043	-0.5067
X3	-0.9711	-0.6615	0.5043	1.0000	-0.09138
X4	0.9787	0.6811	-0.5067	-0.9138	1.0000

From the data in the table, it is clear that there is a high correlation between X3 and X4.

(2) Analysing the above graph, we can learn that the correlation coefficient between the M2/GDP ratio (Y) and total domestic credit (X4) is the largest, so we establish the univariate regression equation as: $Y = \partial + \beta * X4 + \varepsilon$.

(3) Stepwise regression was done separately and the results are shown below:

Table 3. Stepwise regression results of the model of factors influencing the M2/GDP ratio

modelling	X1	X2	X3	X4	R^2	\bar{R}^2
Y=f(X4)				0.8586 (25.2294)	0.9579	0.9564
Y=f(X1,X4)	0.0204 (0.0441)			0.8571 (18.1104)	0.9579	0.9547
Y=f(X2,X4)		-0.1786 (-0.7452)		0.8435 (21.2003)	0.9587	0.9557
Y=f(X3,X4)			-0.8337 (-12.1857)	0.4858 (14.5119)	0.9935	0.9930
Y=f(X1,X3,X4)	-0.2742 (-1.5377)		-0.8473 (-12.5836)	0.4988 (14.7824)	0.9941	0.9934
Y=f(X2,X3,X4)		-0.0428 (-0.4405)	-0.8300 (-11.8668)	0.4838 (14.1135)	0.9936	0.9928

It can be known from the above experiment that the improvement of the model fitting goodness of fit has a great relationship with the introduction of stepwise regression, so the function model is $Y=f(X3,X4)$ is optimal, and the fitting results are as follows:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.309921	0.101649	12.88669	0.0000
X3	-0.833673	0.068414	-12.18568	0.0000
X4	0.485783	0.033475	14.51188	0.0000
R-squared	0.993517	Mean dependent var		1.496410
Adjusted R-squared	0.993037	S.D. dependent var		0.392008
S.E. of regression	0.032711	Akaike info criterion		-3.907586
Sum squared resid	0.028890	Schwarz criterion		-3.767466
Log likelihood	61.61378	Hannan-Quinn criter.		-3.862760
F-statistic	2068.963	Durbin-Watson stat		0.584299
Prob(F-statistic)	0.000000			

Figure 2. X3, X4 functional relationship

$$y=1.3099-0.8337x3+0.4858x4$$

5.3.2. Heteroscedasticity Test (White Test)

The above model was tested by WHITE test and the results obtained are shown in Figure.

Heteroskedasticity Test: White

F-statistic	2.398497	Prob. F(5,24)	0.0672
Obs*R-squared	9.995823	Prob. Chi-Square(5)	0.0754
Scaled explained SS	6.240928	Prob. Chi-Square(5)	0.2835

Figure 3. White's test

By analysing the picture above, the value of the significant level is 0.05 is lower than the concomitant probability of n (concomitant probability 0.0754) From the calculations, it is clear that the model does not suffer from heteroscedasticity.

5.4. Finalisation of the Model and Conclusions

In summary, it can be seen that the finalised model is:

$$y=1.2460-0.7882x3+0.5058x4$$

$$R^2=0.9977 F=2753.676 n=30$$

From the regression results, it can be seen that the model has a high decidable coefficient and a large F-statistic value, indicating that the value of M2/GDP has a highly linear relationship with the velocity of money circulation and domestic credit, which is highly influenced by these two factors.

6. Shortcomings of the Model and Directions for Improvement

6.1. Shortcomings of the Model

(1) The duration of the study was too short to be able to adequately demonstrate the accuracy of the conclusions. The sample size is too small, which to some extent may lead to errors and under-representation, etc.

(2) There are many influencing factors that have not yet been taken into account in the model building process, such as the rise in the quasi-money rate, the increase in the monetisation of products and factors of production, and China's financing system based on indirect financing. To a certain extent, these factors will make the model less credible, and at the same time increase the instability, and the final results may produce errors.

6.2. Directions for Improvement

(1) Increase the coverage of the data so that it can be more comprehensive and adequate, and the time of year should also be expanded to make the model more authoritative.

(2) There is a need to expand the scope of the analyses and to make them more comprehensive by constantly validating them with more examples.

7. Policy Recommendations to Control the High M2/GDP Ratio

7.1. Promoting Domestic Consumption and Reducing the Savings Rate of the Population

Over the past 30 years of reform and opening up, China's economy has developed rapidly, but a major problem is that China's development is overly dependent on foreign countries, and once foreign countries cut off our investment and exports, our economy will stagnate. In comparison with other developing countries, our savings rate is also higher than that of other countries.

(1) Reduce the income distribution gap. On the one hand, we should raise the income level of low-income people, strengthen technical training, and improve the relevant system; secondly, we should curb excessive income through taxation, and we need to continue to promote the improvement of China's income distribution system; thirdly, we should raise the income level of our farmers, in China, the interests of the farmers are of considerable importance, so the construction of new rural areas can not be delayed, and it is urgent to develop special industries with local specialities in rural areas in order to raise the income of farmers, and continuously improve the infrastructure in rural areas. The development of speciality industries with local specialities in the countryside to improve farmers' income and continuously improve the infrastructure in rural areas is a matter of great urgency.

(2) Strengthening the social security system. In order to promote consumption, it is imperative to improve the social security system. More attention should be paid to improving the insurance for the elderly and further improving the welfare protection system for enterprise employees. At the same time, we should actively promote the development of social insurance, encourage urban and rural residents to take the initiative to buy pension insurance and other social insurance, to achieve better protection.

7.2. Encouraging Innovation in Financial Instruments[6] Developing Direct Financing Markets

Indirect financing plays a pivotal role in the financing market, which accounts for a large part of our financing market. Therefore, in order to promote market stability and economic development, it is necessary to vigorously develop the financing market and encourage innovation in financial instruments.

Encouragement of innovation in financial instruments. Based on the country's current level of development, studies have shown that our population is more inclined to save. One of the factors contributing to the high savings rate is the relatively small variety of financial instruments. Because there are too few types, residents do not have more choices and tend to choose the safest but low-yielding financial instruments. Therefore, the development of a wider range of financial instruments would be of great help to economic development.

7.3. Increased Utilisation of Bank Credit Facilities

The increase in bank credit rates has a great role to play in reducing the decline in the M2/GDP ratio. This is because the investor or entrepreneur only needs to pay less money than before, but is able to get the same amount of money as before, which promotes the growth of the economy. The specific measures are as follows:

(1) Enterprises need to improve production technology and the management of employees is constantly strengthened as a way to improve the quality of employees, thus reducing the M2/GDP ratio.

(2) And enterprises need to speed up the introduction of new technologies and continuously improve their own strength. The State needs to be more lenient in lending to small and medium-sized enterprises and to increase lending to small enterprises.

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