Research on the Relationship between the Supply of Money and the Consumption of Residents

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Abstract

In the fourth decade of reform and opening up, although the contribution rate of household consumption to economic growth has increased significantly. However, the consumption rate of residents is declining, and the money supply, as the intermediary target of monetary policy, has important reference significance for China's economic development. Therefore, this paper mainly studies the relationship between money supply and consumption level and consumption structure. This paper selects the generalized money supply as the proxy variable of money supply, the total retail sales of social consumer goods as the proxy variable of residents' consumption level, and the composition of urban residents' consumption expenditure as the proxy variable of residents' consumption structure. The empirical research in this paper mainly includes stationarity test, cointegration test, error correction model, Granger causality test, impulse response analysis and variance decomposition analysis. The main conclusions of this empirical study are: there is a long-term stable equilibrium relationship between money supply and consumption level, and the error correction model conforms to the negative correction mechanism, but the effect of reflecting the interaction between the two variables is not obvious. Granger causality test results show that money supply is the Granger cause of residents' consumption level. There is also a long-term stable equilibrium relationship between money supply and consumption structure, and the error correction model also conforms to the negative correction mechanism. However, there is no Granger relationship between money supply and consumption structure. Through the analysis of variance decomposition, it is found that the mutual contribution rate between money supply and consumption expenditure of urban residents is heterogeneous.

Keywords

Money supply; consumption level; consumption structure; error correction model.

1. BACKGROUND

Since the reform and opening up more than 40 years ago, China's economy has been developing with gratifying momentum. As one of the important macro-control policies in China and even in the world, monetary policy plays a key role in the development and stability of the national economy. However, looking back on the development process of China's market economy and the related monetary policy control measures, such as the Asian financial crisis in 1997 and the global economic crisis in 2008, it is not difficult to find that the transmission mechanism of money supply acting on economic variables is not as smooth as expected, as one of the important control measures in monetary policy The driving effect on Residents' final consumption is not as significant as expected.

It can be seen that the contribution of consumption rate to China's economic growth rate is even higher than that of China's economic growth rate of 5.5% in the final year, which shows

that the contribution of consumption rate to China's economic growth rate is even higher than that of China's economic growth rate of 5.5% in the last year. However, since the 1990s, the consumption rate of Chinese residents has shown a downward trend, which is far lower than the average level of developed countries in the same period. For example, in 2017, the consumption rate of Chinese residents was 39.5%, while that of Britain and the United States was as high as 65%. Under the background that the relationship between money supply and residents' consumption is not obvious, and the continuous and positive economic development coexists with the decline of residents' consumption rate, it is of great practical necessity to study and analyze the actual correlation between money supply and residents' consumption, which is one of the financial variables regulating economic variables.

2. METHODOLOGY

2.1. Methods of Literature Research

By combing and summarizing the research literature on money supply and household consumption, this paper draws lessons from the relevant research of two dimensions at home and abroad, and puts forward the research direction of this paper.

2.2. The Method of Combining Theoretical Analysis with Empirical Analysis

This paper first expounds the transmission mechanism of monetary policy on the real economy as one of the macro-control policies, and explores the internal mechanism of the influence of the intermediate target's money supply on the relevant economic variables. Then, combined with theoretical analysis, this paper makes an empirical analysis on the relationship between the broad money supply and residents' consumption level, the generalized money supply and the residents' consumption structure.

2.3. Combination of Qualitative Analysis and Quantitative Analysis

This paper first makes a descriptive qualitative analysis on the time series variables of money supply and residents' consumption, and then makes a quantitative analysis on the correlation between them.

2.4. Time Series Analysis Method

As for the research on the correlation between generalized money supply and residents' consumption level, this paper selects the monthly data from 2005 to 2019, constructs two groups of time series variables to make error correction model for empirical analysis.

2.5. Technology Roadmap (Figure 1)

3. EMPIRICAL RESEARCH

3.1. Model Building and Data Sources

Looking at many literatures, most of them choose the total retail sales of social consumer goods as the proxy variable of residents' consumption level. Therefore, this paper also takes the total retail sales of social consumer goods as the proxy variable of residents' consumption level, which is recorded as CS, with the unit of 100 million yuan. In recent years, the literature research results show that with the continuous development of mobile payment, the difficulty of narrow money supply (M1) accounting is increasing, while the broad money supply (M2) is equal to the sum of narrow money supply and bank fixed deposit, which is less affected. Moreover, the generalized money supply (M2) can not only reflect the potential purchasing power of residents, but also comprehensively reflect the basic situation of the national economy. Therefore, this paper takes the generalized money supply (M2) as the proxy variable of money supply, with the unit of 100 million yuan. Select the monthly data from January 2005 to

December 2019, a total of 180 observations. The above data are collected from the official website of the National Bureau of statistics of China. In order to reduce the seasonal impact, this paper deals with the total retail sales of consumer goods and money supply variables with X-12

This paper uses the econometric software stata12 to process the relevant data and empirical research. seasonality.
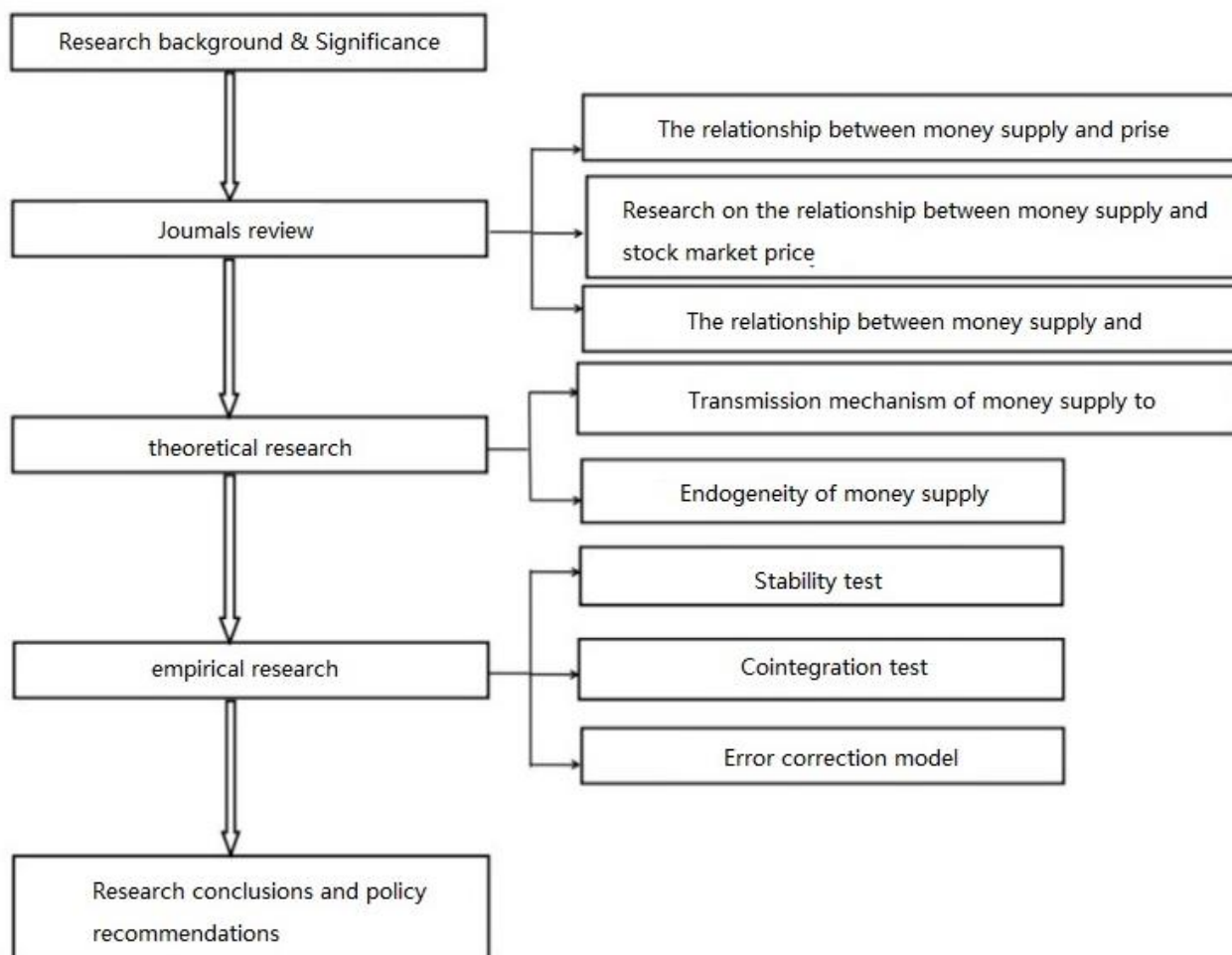

Figure 1. Technology Roadmap

3.2. Unit Root Test of Consumption Level and Money Supply

The results of stationarity test on time series of residents' consumption level and money supply are shown in Table 1 and Table 2.

Table 1. Unit root test results of residents' consumption level (monthly data from 2005 to 2019)

Augmented Dickey-Fuller test for unit root				
Variable	Test Critical values (5%)	t-Statistic	prob.*	Results
CS	-2.885	1.520	0.9976	instable
D (CS)	-2.888	-18.712	0.00	stable

Table 2. Unit root test results of money supply (monthly data 2005-2019)

Augmented Dickey-Fuller test for unit root				
Variable	Test Critical values (5%)	t-Statistic	prob.*	Results
M2	-2.885	6.705	1.0000	Instable
D(M2)	-2.885	-11.180	0.00	Stable

It can be seen from table 1 that the t statistic value of the original series of residents' consumption level is greater than - 2.885, while that of the first-order difference sequence {D (CS)} is less than - 2.885. Therefore, the time series of residents' consumption level is of first order and is recorded as CS ~ I (1).

Similarly, according to the T statistical value of money supply series and its first-order difference sequence {D (M2)} in table 2, we can see that the time series of money supply (2005-2019) is of first order and is recorded as M2 ~ I (1).

Based on the results of stationarity test in table 1 and table 2, although the original series of residents' consumption level and money supply is not stationary, the two variables are both stationary after the first-order difference, that is, the two variable series have the same integrity. Therefore, the cointegration analysis of the consumption level and money supply can be carried out.

3.3. Cointegration Test

In this paper, Engle Granger two-step cointegration test (E-G two-step) is selected to test the co integration, OLS method is used to test the first-order autocorrelation of the model, and the Lagrange multiplier (LM) method is used to test the high-order autocorrelation of the model. The first step is to test and calculate the random interference term; the second step is to test the autocorrelation of the random interference term.

From table 1 and table2, we can know that the household consumption level series and money supply series are the first-order single integration series, which can be used for cointegration test. The steps are as follows:

Firstly, the OLS regression analysis of the household consumption level series and money supply series shows that the OLS regression equation of the residents' consumption level to the money supply is as follows:

CS=611.65+0.0182M2 (3-1)

(8.45) (280.96)

R^2= 0.9978   F= 78937.36   DW=0.3122

The sample size is 180 and the number of explanatory variables is 1. The random interference term of the regression model (3-1) is e_ 1. When the confidence level α = 0.05, the critical lower limit D in the DW distribution table_ L = 1.7201, critical upper limit D_ u=1.7471. According to the regression equation (3-1), the DW value is less than its critical lower limit value, so E_ There is at least one order positive autocorrelation.

Second, continue to verify E_ Whether there is second order autocorrelation. The auxiliary regression equation is as follows:

E_ 1=33.7796-0.00004M2+0.6224E_ 1 (-1)+0.2788E_ 1 (-2) (3-2)

(0.88) (-1.10)   (8.51)   (3.77)

R^2= 0.7286   F=155.73   DW=2.0366

Among them, e_ 1 (- 1) is the first order lag term of random error term, e_ 1 (- 2) is the second order lag term. The Lagrange multiplier of the auxiliary regression equation (3-2) is LM (3-2).

According to the formula LM = (number of observations - degrees of freedom) * R ^ 2, LM (3-2) = 127.505. When the confidence level α = 0.05, the critical value x in the chi square distribution table is obtained_ 0.05 ^ 2 (3) = 7.8147, because LM (3-2) is greater than and because E_ 1 (- 1) and E_ The regression coefficients of 1 (- 2) are statistically significant, so the regression model (3-1) has second-order sequence correlation.

Third, test E_ Whether there is a third-order sequence correlation, the auxiliary regression equation is as follows:

E_ 1=35.5907-0.00004M2+0.6024E_ 1 (-1)+0.2332E_ 1 (-2)+0.0773E_ 1 (-3) (3-3)

(0.91)   (-1.16)   (7.91)   (2.67)   (1.00)

R^2= 0.7294   F=115.90   DW=1.9879

Similarly, let LM (3-3) be the Lagrange multiplier of the auxiliary regression equation (3-3). According to the formula, LM (3-3) = 126.1862. When the confidence level α = 0.05, the critical value X_ 05 ^ 2 (4) = 9.4877, although LM (3-3) is greater than, but E_ The regression coefficient of 1 (- 3) is not statistically significant, so there is no third-order sequence correlation in model (3-1).

Fourth, according to the analysis of the above steps, regression model (3-1) has second-order sequence correlation. Furthermore, in order to eliminate the sequence correlation of model (3-1), the second-order generalized differential regression model (GLS) is constructed as follows:

CS=137.1282+0.0180M2+0.6261AR(1)+0.2733AR(2)   (3-4)

(3.48)   (89.00)   (8.57)   (3.70)

R^2=0.9783   F=7921.23   DW=1.9650

The sample size is 178, and the number of explanatory variables is 1_ 2. When the confidence level α = 0.05, the critical lower limit D_ L = 1.706, critical upper limit D_ u=1.760. Because the DW value of regression model (3-4) is greater than that of D_ u. And less than 4-D_ u. So E_ There is no autocorrelation. The model (3-4) belongs to the non-equilibrium error.

Fifthly, after the conclusion of unbalanced error is obtained, the unit root test is carried out as shown in Table 3.

Table 3. Random interference term (E) of generalized difference regression model (3-4)_ 2) Unit root test results of

Null Hypothesis: E_2 has a unit root				
Augmented Dickey-Fuller test for unit root				
T-Statistic	Prob.*	Critical Value (1%)	Critical Value (5%)	Critical Value (10%)
-12.998	0.000	-3.484	-2.885	-2.575

It can be seen from the above results that the sequence {E_ 2} According to the critical value table of MacKinnon cointegration test, when the confidence level α = 0.05, C (α) = - 3.3715. Because of the sequence {E_ 2} The statistical value of T is less than C (α), so the time series {E_ 2} It's smooth.

Based on the analysis of the above five steps, it can be concluded that there is a long-term stable equilibrium relationship between money supply and residents' consumption level, as shown in the following equation:

CS=137.1282+0.0180M2 (3-5)

The above cointegration equation (3-5) shows that in the long run, there is a positive correlation between the generalized money supply and the consumption level of residents. The

specific economic implication is that every 1% increase in the generalized money supply, the residents' consumption level will increase by 0.0180%. Therefore, it can be concluded that the money supply has an impact on the consumption level of residents, but according to the correlation coefficient in the model, it shows that the impact is not obvious. Then we can draw the conclusion that the increase of broad money supply is only a less significant factor in the improvement of residents' consumption level.

There is a cointegration relationship between money supply and consumption level, but the correlation is not obvious. The reasons include but are not limited to the following. First, residents' consumption is mainly affected by residents' disposable income, that is, consumption is a function of income, while the impact of money supply on Residents' consumption level is indirect. Therefore, the sensitivity of residents' consumption level to money supply variables is relatively low. Second, the transmission channel of money supply affecting residents' consumption may be hindered by factors, such as residents' pessimistic attitude towards economic development, residents' expectation of monetary policy adjustment has not yet formed a basis of trust, and the degree of interest rate marketization needs to be further improved. All these will have an impact on the transmission channel of the impact of money supply on Residents' consumption. Third, the traditional consumption concept of Chinese residents also has a more obvious impact on Residents' consumption behavior, which is manifested in more cautious consumption expenditure.

3.4. Error Correction Model

Although as shown in equation (3-5), there is a long-term stable equilibrium relationship between money supply and residents' consumption level. However, due to the short-term influence of many economic factors, this long-term stable equilibrium relationship is not stable in the short term. Therefore, according to Hendry's modeling method, the first-order lag sequence of the residual sequence of the cointegration equation (3-5) is taken as the explanatory variable of the short-term equation, and the error correction model of the sum of the household consumption level series and the money supply series is established. Finally, the short-term adjustment equation is obtained as follows:

$[D(CS)=-0.6782E]\_2(-1)+817362-0.2742D(CS(-1))-0.2227D(CS(-2))$

(-5.22)   (3.98) (-2.55)   (-2.91)

$-0.0093D(M2(-1))-0.0120D(M2(-2))$ (3-6)

(-2.57)   (-3.52)

$R^2=0.5288$ F=37.93   DW=2.0994

According to the short-term adjustment equation (3-6), in the short term, as far as the growth of residents' consumption level is concerned, the coefficients of D (CS (- 1)) and D (CS (- 2)) of the lag period of the growth of residents' consumption level are both negative, and the error correction term The coefficient is negative, that is, 67.82% will reduce the change rate of the future growth of residents' consumption level, which will have an impact on the growth of residents' consumption level in the next month.

The growth of money supply has a negative effect on the growth of residents' consumption level in the short term, and the negative impact of money supply growth on the growth of residents' consumption level is greater than that of the first period.

Similarly, after the cointegration test, the short-term adjustment equation of residents' consumption level to money supply is as follows:

$[D(M2)=7.5428E]\_2(-1)+3100.817-5.6053D(CS(-1))-3.5236D(CS(-2))$

(2.61)   (6.79) (-2.35)   (-2.07)

-0.4704D(M2(-1))-0.2188(M2(-2)) (3-7)

(-5.87)　　　　　　(-2.89)

R^2=0.2761　　　F=12.89　　　　　DW=2.0542

From the short-term adjustment equation (3-7), as far as the money supply itself is concerned, the level of money supply in the first and second lag periods has a negative impact on the current money supply, which indicates that the change trend of the money supply in the short term tends to return to the normal level. The coefficient of error correction is positive, which indicates that the error correction mechanism can promote the increase of money supply in the short term.

The coefficient of the lag one period and two lag periods of the value-added of the residents' consumption level is negative, which shows that the change of the value-added of the residents' consumption level still lags behind for two periods, and has a negative impact on the value-added of the money supply.

3.5. Granger Causality Test

Granger causality test can be used to test whether the lag value of one variable can explain the current value of the other variable. Generally speaking, if the result of Granger causality hypothesis test of variable a to variable B is that the confidence level of accepting the original hypothesis exceeds 10%, it means that the original hypothesis cannot be rejected under the confidence level of 10%, that is, a is not the Granger cause of B, and vice versa.

On the basis of the previous analysis, this section continues to make Granger causality test on the relationship between money supply and residents' consumption level, so as to further analyze the relationship between the two.

Because the cointegration equation (3-5) of money supply and household consumption level has a second-order sequence correlation, so the lag order of Granger causality test is 3-order. The test results are shown in the table below.

Table 4. Granger causality test results

Parwise Granger Causality Tests			
Lags:3			
Null Hypothesis:	Number of obs	F-Statistic	Prob > F
M2 does not Granger Cause CS	176	6.87	0.0096
CS does not Granger Cause M2	176	2.45	0.1190

It can be seen from table 4 above that since 0.96% is less than 10% and 11.9% is greater than 10%, money supply is the Granger cause of residents' consumption level, but residents' consumption level is not Granger cause of money supply.

4. RESEARCH CONCLUSIONS AND POLICY RECOMMENDATIONS

4.1. Research Conclusions

As we all know, consumption has become an important driving force for the sustainable development of China's economy, and with the gradual deepening of supply side structural reform, it is indispensable to explore the influencing factors of residents' consumption level and consumption structure. Money supply is an important carrier of monetary policy affecting the real economy, and residents' consumption is also an important variable of the real economy.

Therefore, this paper makes theoretical and Empirical Analysis on the relationship between money supply and residents' consumption level and consumption structure.

First, money supply is the product of base money and money multiplier, which will be adjusted with the changes of economic variables related to real economic development. At the same time, money supply affects GDP, price and final consumption through credit channels. Therefore, from the theoretical analysis, there is a correlation between money supply and household consumption.

Second, on the basis of theoretical analysis and empirical analysis, the conclusions are as follows: there is a long-term stable equilibrium relationship between money supply and residents' consumption level, money supply and residents' consumption structure; there is some adjustment mechanism that makes the short-term fluctuation of money supply, residents' consumption level and residents' consumption structure converge to long-term equilibrium.

Thirdly, on the basis of error correction model and Granger causality test, it is found that only money supply is the Granger cause of residents' consumption level. Through the impulse response function, it is found that the response of money supply and household consumption level to the system shock is positive, and tends to be stable at a certain value in the first five periods; the response of money supply and residents' consumption structure to the system shock is also positive, and they all converge to a certain value in the first three periods. It is worth noting that the contribution rate of money supply to urban residents' living consumption expenditure is higher than that of money supply to urban residents' development consumption expenditure after variance decomposition analysis; moreover, the contribution rate of urban residents' survival consumption expenditure to money supply is higher than that of urban residents' development type consumption expenditure to money supply. This shows that there is heterogeneity in the differential decomposition between money supply and household consumption structure.

4.2. Policy Recommendations

Through theoretical and empirical analysis, there is a long-term stable equilibrium relationship between money supply and residents' consumption level, money supply and residents' consumption structure. Based on relevant theories and empirical analysis, this paper puts forward the following policy recommendations:

First, steadily and continuously promote interest rate marketization. The marketization of interest rate can adjust and control the money supply scientifically and flexibly, and enhance the interest rate sensitivity of residents. When the market interest rate changes, the money supply will change, and the residents can adjust their investment and consumption behavior in time, so as to make the transmission channel of interest rate of monetary policy more smooth.

Second, we should further improve the credit policies of banks and other financial systems. We should not only rely on the credit policy of the banking system, but also pay attention to the improvement of diversified credit channels such as micro credit, consumer finance and private lending, so as to develop and improve China's credit market and build a virtuous circle of money supply system. In addition, we should promote the residents to properly realize the economic behaviors of credit consumption and credit investment, and ultimately promote the upgrading of residents' consumption structure and the improvement of residents' consumption level, so as to inject continuous impetus into the healthy and sustainable development of China's economy. Fourth, create a high-quality and efficient environment for healthy economic development. The Chinese government needs to pay more attention to the improvement of economic fundamentals, give full play to the complementary role of macro-control and micro-control, and cooperate with the "visible hand" of the government and the "invisible hand" of the market, so as to reduce the fluctuation range of the economy and ensure the sound and rapid

development of the economy. So as to stabilize the money supply and residents' income, enhance residents' confidence in the healthy development of the market, so as to promote the current investment and consumption of residents, and form a healthy development of a virtuous circular economy.

Third, improve the social security system. At the same time, we should vigorously promote the sound development of commercial insurance and form a multi-level residential insurance security system. To ensure the basic living needs of residents, improve their ability to resist risks, and reduce the amount of savings made by residents to cope with preventive expenditures, the amount of money flowing in the market will increase, the consumption base of residents will be enriched, and the consumption potential of residents will be further released. In addition, combining with the poverty alleviation policy implemented by the state, giving full play to the flexibility of the role of monetary policy and properly increasing the current income of poor areas and poor residents will release huge consumption potential.

Fourth, build and improve the personalized and diversified financial market. With the increasingly diversified investment demand of residents, it is necessary to build a diversified financial market to match it, and give full play to the regulatory role of the financial market on the real economic market, especially the capital market and foreign exchange market, to meet the personalized and diversified consumer demand of residents by regulating the money supply. In addition, the Internet consumer financial market has a great correlation with the upgrading of residents' consumption structure. Focusing on the guidance and encouragement of its development will contribute more to the improvement of residents' consumption level and the upgrading of consumption structure.

Fifth, we should encourage and guide urban residents to increase their development oriented consumption expenditure. At present, the consumption structure of Chinese residents is gradually transforming and upgrading, especially for urban residents, whose demand for diversified consumption is increasing, and the proportion of development-oriented consumption expenditure is increasing. Therefore, it is necessary to increase the money supply of residents' development oriented consumption expenditure, encourage and guide urban residents to carry out development oriented consumption expenditure, meet and further guide the diversification of residents' consumption, and promote the further transformation and upgrading of China's consumption structure.

Sixth, increase residents' disposable income through multiple channels and guide them to form a reasonable consumption concept. The most important factor restricting the improvement of residents' consumption is disposable income. Therefore, the government needs to take multiple measures to increase residents' disposable income. At the same time, it should guide residents to change their traditional consumption concept through propaganda and education to form a consumption concept matching with residents' income level, so as to improve residents' consumption level and optimize their consumption structure. In addition, relevant research shows that there is a huge regional heterogeneity in the consumption level and consumption structure of urban and rural residents in China. The government needs to increase the disposable income level of rural residents and guide their consumption concept, so as to tap the internal driving force in the sustainable and healthy development of China's economy.

As a hot research technology, moving target tracking technology has been widely used in various fields. With the help of low cost, low power consumption, self-organization and high error tolerance of wireless sensor networks, moving target tracking based on wireless sensor networks also has broad application prospects.

5. THANK

At the time when the thesis is finished, it is the last quarter of master's career. Despite the myriad thoughts, the main theme is still joy and gratitude. The passage of time has always been silent. I went to the classroom early and waited for many teachers to bathe in our financial theory knowledge. When I was free, I sat on the east side of the third floor of the library at 7 a.m. and read with the company of the sun. Wandering around the campus and encountering all kinds of fruit trees, nothing is better than talking with fruits. In the evening, I sprinkled my sweat of joy on the playground .What a wonderful life for graduate students. Thank you for everything in Nanyuan.

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