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# Research on the Impact of Monetary Policy on the Quality of Economic Growth in the New Normal------Empirical analysis based on Panel Data

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***ABSTRACT.*** *The game between the growth rate and quality of the Chinese economy under the conditions of the new normal economy is a hot and difficult issue in the current new normal of socialist economic development with Chinese characteristics. Traditional monetary policy regulation focuses on the regulation of the rate of economic growth. The new changes in the current economic development situation are more inclined to promote the improvement of the quality of economic growth. Therefore, how to adapt to the new normal of economic development has put forward new requirements for the regulation and reform of monetary policy. Based on the relationship between China's monetary policy regulation and the quality of economic growth under the conditions of the new normal economy, this paper selects statistical data on monetary policy regulation and the quality of economic development and growth from 2001 to 2016 to construct a dynamic panel data model of the economy and regulate monetary policy Predictive analysis with the quality of economic growth. The results show that after 2016, the economic growth rate has further slowed down and the quality of economic growth has improved significantly. In particular, it has been found that the contribution rate of the three industries after 2013 has increased significantly year-on-year. Optimize and upgrade.*

***KEYWORDS:*** *New normal of economy; Monetary policy regulation; Quality of economic growth; Dynamic panel data model.*

## 1. Introduction

Since the reform and opening up, China's economic development has attracted worldwide attention, but there are also constraints such as industrial structure, factor cost, technological innovation, resources and environment, and problems such as the balance, coordination and sustainability of economic development have become increasingly prominent. Although China has become the second largest economy in

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the world at present, the driving force of economic growth has become increasingly insufficient. The economic growth rate has gradually decreased from 14.2% of the highest value in 2007 to 6.7% in 2016. By summarizing the economic development history of all countries in the world and the current situation of China's economic development, we can see that China's economic development has turned into a "new normal": the economic growth has changed from high speed to medium speed, the economic structure has been optimized and upgraded, and the factors and investment driven has been transformed into innovation driven. In the context of economic restructuring and optimization, China's economic growth rate further slowed down to 6.57% in 2018. As China's economy plays an important role in the development of the world economy, the change of China's economic growth will also cause worldwide attention to the trend of China's economic development. Under the new normal, the game between the speed and quality of China's economic growth has become an urgent problem in China's economic growth.

As an important part of national macro-control, monetary policy changes with the changes of the economic development stage of each country. How to establish a monetary policy suitable for the economic development stage is a sustainable problem that needs to be solved by the economic community and governments of all countries. The traditional monetary policy is more aimed at the quantity of economic development, but the proposal of the new normal means that China's economy has changed from focusing on quantity to focusing on both quantity and quality, which makes monetary policy regulation must take into account the speed and quality of economic growth. Wang Chuan (2015) believed that the effective regulation of monetary policy under the new normal of economy is conducive to the transformation of economic structure and the optimization of the quality of economic growth. The coordination of monetary policy regulation and various constraints under the new normal of economic development is of great practical significance to improve the effectiveness of monetary policy and realize the sustainability of economic growth[1].

Studying the above phenomena will help us to understand the change of economic growth quality and the impact of monetary policy on the quality of economic growth under the new normal, so as to further improve the government's control policies on the quality of economic growth. It is found that it is difficult to get the data of the money supply of each municipality directly under the central government, and the money supply is equal to the theory of money demand when it is balanced, and the sum of deposits represents its nominal money demand. Therefore, this paper takes the total deposits of each municipality directly under the central government as the token variable of its money supply. Moreover, considering the economic information coverage in monetary policy tools, this paper will select more variables for research and analysis, extract public factors through principal component analysis, and then establish panel data model to analyze the relationship between monetary policy and economic growth quality of different provinces and municipalities in China from 2001 to 2016, and discuss the basis of empirical results in detail On the basis of this, the paper gives some policy suggestions.

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## 2. A study on the relationship between monetary policy and economic quality growth

In economics, economic growth has always been regarded as the increase of the total amount of products and services in a country or region. But from a deeper perspective, economic growth is not only the increase of quantity, but also the improvement of quality. Modern economic growth should be the game between the speed and quality of economic growth. With the continuous improvement of the quantity and complexity of world economic development, the difference and emphasis of speed and quality in economic growth are also strengthened. The improvement of quality in economic growth has gradually become the key to the sustainable development of regional economy. Stefan (2012) believes that economic growth research should not only include material resources related to social production, but also pay attention to spiritual factors such as happiness of social subjects[2]; Louis (2006) considered the construction of index system from the perspective of total factor productivity, and then measured the quality of economic growth[3]; Liu Chao et al. (2018) thought that in recent years, with the continuous improvement of the contribution rate of the third industry, the quality of economic growth in China has significantly increased[4]; Ren Baoping and Zhang Bei (2018) thought that the new normal is a new stage of economic development in China, because of the quality of economic development The improvement of quantity needs a new development state to support, so innovation will be the fundamental strategy to lead the new normal of high quality[5]; Xiang Shujian and Zheng Ruikun (2012) constructed the quality evaluation index system of economic growth from the aspects of economic growth sustainability, structure, efficiency, resource and environmental cost[6].

There is a two-way effect between monetary policy and economic growth. The speed and quality of economic growth will affect the formulation of monetary policy authorities' regulatory policies. On the other hand, the change of monetary policy will also affect the speed and quality of economic growth. Antzoulatos et al. (2011) believed that monetary policy regulation schemes at different stages are closely related to the trade-offs between the speed and quality of economic growth in the current period (such as the adjustment of industrial structure and consumption structure, import and export trade status, etc.)[7]; Qian Li and Hu Yuancheng (2014) studies showed that effective monetary policy can promote the improvement of economic growth rate and economic growth quality[8]; Bech and Monnet (2016) pointed out that monetary policy affects the change of economic growth rate and quality by adjusting the stock and increment of monetary funds in the economy[9]; Peng Yuchao and Fang Yi (2016) believed that monetary policy regulation mainly affects the adjustment of industrial structure through the intermediary role of financial institutions, thus affecting the stability and development of the economy[10].

It can be concluded that there is a certain regulatory relationship between monetary policy and the quality of economic growth. Through the regulation of capital market, monetary policy indirectly makes the adjustment of economic layout, resource stock increment and industrial structure, and then affects the speed and

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quality of economic growth. The quality of economic growth can be divided into three aspects: the mode of economic growth, mainly expressed by the degree of dependence on raw materials in economic growth (expressed by the growth rate of energy consumption, the dependence on foreign trade, etc.), the process (expressed by the growth rate of innovation investment, the number of patent applications, etc.) and the result (expressed by the proportion of the added value of the tertiary industry in GDP), so the economic quality Growth can be characterized by fluctuations in these three aspects. In addition, considering the great regional differences in China, the economic development of different provinces also has great differences. The study on the main factors affecting the economic development of different regions and provinces is helpful to put forward more targeted control measures.

## 3. Model setting and data description

### *3.1 Selection and explanation of indicators*

In this paper, 15 provinces and municipalities, including Beijing, Tianjin, Shanghai, Zhejiang, Guangdong, Sichuan, Anhui, Hubei, Henan, Heilongjiang, Shaanxi, Ningxia, Tibet, Xinjiang, and Qinghai, were selected as research objects. It is mainly considered that they cover eastern, central and western China, as well as coastal and inland regions. They are both representative and different. Taking the above-mentioned provinces and municipalities as the research object of economic growth quality has representative significance.

This paper selects lgM2 as the characterizing variable of money supply. The data can be obtained from the website of the National Bureau of Statistics. Then take energy consumption, tertiary industry contribution rate, foreign trade dependence, innovation investment growth rate, number of patents, etc. as the main performance aspects of the quality of economic growth, and use the principal component analysis method to extract public factors as its representative variables. Because some scholars find that it is difficult to effectively identify and measure monetary policy when conducting fewer studies, they cannot solve the problem of economic information coverage in monetary policy tools, and increase the degree of freedom when selecting more variables to reduce the prediction accuracy. Therefore, a good method is to select more variables of the same type and then perform principal component analysis to extract the common factors as the final variables. For example, changes in price levels that are greatly affected by monetary policy include consumer price indexes, industrial producer price indexes, corporate commodity transaction price indexes, and import and export price indexes. The above data are annual data, and the selection period is from 2001 to 2016.

### *3.2 The basic model*

The model established in this article is mainly based on the basic principle of macroeconomic regulation and control of economic growth by monetary policy.

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Under the allowed inflation, an increase in the money supply will inevitably stimulate economic growth, and this growth will be largely reflected in GDP. Growth, but as the quality of the new normal economic growth is proposed, this change will also have a tilt, from the rate of economic growth to the quality. From the simple data scatter chart, we can see that after 2010, the contribution rate of the three industries has continued to increase, especially after 2013, the contribution rate has accelerated, while the growth rate of GDP has slowed down step by step, which shows that the tertiary industry has a slower impact on China The driving force of economic growth has been continuously enhanced, and China's economic structural transformation has been continuously optimized and upgraded. In addition, since 2010, the growth rate of energy consumption has been decreasing year by year, and the number of innovation patents has been increasing year by year. This all indicates that the quality of economic growth is in the stage of growth.

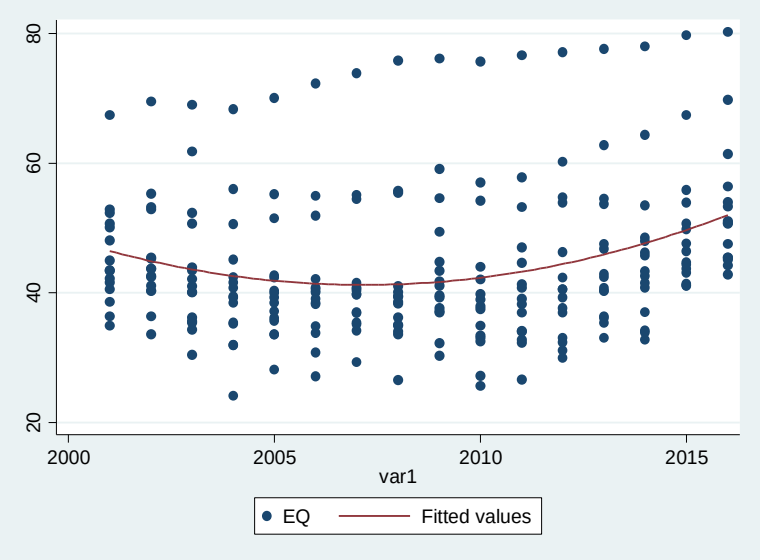


*Figure 1 Scatter diagram of contribution rate of the three industries*

On the other hand, changes in the level of the price index can effectively represent fluctuations in the inflation rate. Expansionary monetary policy will also be accompanied by an increase in price levels, especially the industrial producer price index, which will promote the quality of economic growth to a certain extent effect.

In summary, this article will use the provincial panel data model to conduct an effective study of the effect of monetary policy on the quality of economic growth, and establish the following econometric regression model:

$$\lg(EQ) = \beta_1 \lg(M_2) + \beta_2 \lg(grgdp) + \beta_3 \lg(PI) + \mu$$

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Among them, EQ represents the quality of economic growth, M2 represents the money supply, grgdp represents the growth rate of GDP, and PI represents the price index. Both the quality of economic growth and the price index are public factors after extraction using principal components.

The raw data used by the Institute are mainly from the "China Statistical Yearbook" over the years and the statistical yearbooks of various provinces. Due to the lack of data and changes in some provinces' yearbooks, more than ten representative municipalities in the east, middle, and west of the country were selected for research. The final sample capacity is 2460.

## 4. Empirical analysis

### *4.1 Descriptive statistics*

The descriptive statistical results are shown in Table 1.

*Table 1 Descriptive statistics*

| Variable | | mean value | standard deviation | Min value | Max value | observation period | |
|---|---|---|---|---|---|---|---|
| Eq | population | 44.39 | 11.35 | 24.1 | 80.2 | N= | 240 |
| | In group | | 10.35 | 32.51 | 74.21 | n= | 15 |
| | Between groups | | 5.33 | 31.05 | 67.24 | T= | 16 |
| Lnm 2 | population | 4.05 | 0.63 | 2.33 | 5.23 | N= | 240 |
| | In group | | 0.55 | 2.98 | 4.78 | n= | 15 |
| | Between groups | | 0.33 | 3.39 | 4.70 | T= | 16 |
| lnpi | population | 2.01 | 0.12 | 1.99 | 2.06 | N= | 240 |
| | In group | | 0.008 | 2.01 | 2.04 | n= | 15 |
| | Between groups | | 0.008 | 1.99 | 2.04 | T= | 16 |
| lngr | population | 1.10 | 0.22 | 0.14 | 1.49 | N= | 240 |
| | In group | | 0.07 | 0.93 | 1.18 | n= | 15 |
| | Between groups | | 0.21 | 0.23 | 1.51 | T= | 16 |

The panel is a balance panel. At the same time, because the number of time periods is 16, the number of provinces and cities is 15, and the number of periods is slightly larger than the number of provinces and cities, it can be considered that the panel data is long panel data.

### *4.2 Cross-section correlation and heteroscedasticity test between groups*

Due to the same macroeconomic environment in each province and city during the same period, there may be contemporaneous correlation between the disturbance terms, that is, cross-sectional correlation. Moreover, each province has its own

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characteristics, so the disturbance term of each province may have inter-group heteroscedasticity. Therefore, cross section correlation and cross - group heteroscedasticity tests were performed.

*Table 2 Cross section correlation test results*

| Pesaran test | | Friedman test | | Frees test | |
|---|---|---|---|---|---|
| Statistics | Pr | Statistics | Pr | Statistics | Pr |
| 7.827 | 0.000 | 50.390 | 0.000 | 1.597>0.36 | 0.000 |

Table 2 shows that all P values tend to 0, rejecting the assumption that there is no cross section correlation, that is, there is a cross section correlation. Furthermore, the inter-group heteroscedasticity test was performed. The statistics of the modified Wald test was 229.58, and the P value was also very small. If the hypothesis that the inter-group heteroscedasticity does not exist, the inter-group heteroscedasticity can be considered.

### *4.3 Analysis of measurement results*

From the above test results, we can know that there are cross-section correlations and heteroscedasticity between groups. Therefore, this paper uses the relevant commands in Stata to estimate the panel data model, and uses dynamic panels. Because economic development generally has inertia except at the time when major events occur Therefore, the lag term of the explanatory variable is added to the model setting of this article. At the same time, due to the different speeds of economic and cultural development in the eastern, central, and western regions of China, this article also conducted a regression analysis on them. The results are shown in Table 3:

*Table 3 Dynamic panel estimation results of the quality of economic development*

| Variable | Total sample | Eastern sample | Central sample | Western sample |
|---|---|---|---|---|
| One lag eq | 0.72<br>（13.38）*** | -0.52<br>（-5.64）*** | 0.69<br>（7.40）*** | -0.60<br>（8.26）*** |
| Lnm2 | 0.004<br>（1.77）* | 0.02<br>（1.21） | 0.04<br>（1.89）* | -0.39<br>（-3.79）*** |
| lnpi | 0.46<br>（0.34） | 1.42<br>（2.44）** | -0.39<br>（-0.60） | 0.21<br>（0.61） |
| lngr | -0.10<br>（-7.24）*** | -0.14<br>（-3.87）*** | -0.08<br>（-2.44）** | -0.11<br>(-8.50)*** |
| Constant term | -0.44<br>（-1.67）* | -2.19<br>（-1.93）* | 1.06<br>（1.84）* | 0.77<br>（1.10） |
| Number of samples | 2460 | 820 | 820 | 820 |
| Wald test | 481.51<br>0.000 | 294.16<br>0.000 | 202.43<br>0.000 | 206.86<br>0.000 |

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The t-statistics are reported in the table brackets, where ***,**, * indicate significant at the levels of 1%, 5%, and 10%, respectively.

It can be seen from the results of regression analysis that the quality of economic development is closely related to money supply and GDP growth rate in both the total samples and the eastern, central and western regions, and most of the coefficients are relatively significant. In addition, in addition to the west, quality of economic growth are positively related with the money supply, this shows that the quality of expansionary monetary policy on economic growth has a promoting effect, to the west, maybe, due to the different geographic factors or cultural development is relatively lack of Middle East, may give priority to GDP, namely economic growth rather than the quality.

Second, the quality of economic growth and the GDP growth rate are all present positive correlation, and are a significant, although it also verifies the modern economic growth is the economic growth and the quality of the game is long, but economic growth will drive the economic growth quality, competition between the two together, will not show the side of the recession and one's ascension, but a different relative growth rate.

## 5. Conclusions and Prospects

By establishing a dynamic panel data model of monetary policy regulation and the quality of economic growth under the new normal, and using SPSS and Stata for experimental analysis and research, the following conclusions can be drawn:

First, due to the current economic situation of China and the inertia of economic growth, the quality of China's economic growth will continue to improve for a considerable period of time. Second, it can be seen from Table 3 that the quality of economic growth is affected by GDP growth rate and currency. The supply has a large impact, so when the country adjusts its monetary policy, it can play a role in regulating its development. We can regulate the amount of broad money supply M2 and regulate the growth rate of M2 to maintain a steady reduction in GDP growth rate and achieve sustainable development of the Chinese economy. Continue to implement a prudent monetary policy, maintain policy stability, and tightly combine monetary policy regulation and economic deepening reforms to stimulate domestic demand, reduce the dependence of economic growth on foreign trade, and promote economic restructuring and transformation and upgrading.

Second, from the actual value of GDP growth rate from 2001 to 2016 and the forecast value of GDP growth rate from 2017, we can see that China's economy has changed from high-speed growth to medium-high-speed growth; considering only the contribution rate of the three industries, we can see that the Chinese economy It is currently in the phase of structural optimization, and low-energy and high-yield industries will have long-term development in the future. Combining the GDP growth rate and the contribution rate of the three industries, we can conclude that China's economic development is changing from quantity to quantity, quality, and efficiency. Therefore, low-energy-consumption, high-yield industries can be

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supported through policy control, and social funds can be gradually guided to the tertiary industry, so that the tertiary industry becomes the main driving force for economic growth, so as to promote the steady improvement of the quality of economic growth.

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