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The econometric analysis of forecasting the macro economy of China from the perspective of ODE

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ABSTRACT

At present, in general, there are few researches on macro economy forecasting and even fewer for China's macroeconomic forecasting. Therefore, in order to predict and analyze the overall macro economy of China analysis which can be good for its development, through the establishment of analytical models from the ODE perspective, and an adequate and effective integration of various theoretical methods such as macroeconomic theory, ordinary differential equation theory and econometric theory, a basic econometric model of China's macroeconomic forecast is formed under the perspective of the completed ODE. China's macro economy is predicted and studied on both theoretical and empirical sides, and necessary data and theory to support the good overall development of China's macro economy are provided.

KEYWORDS

The perspective of ODE; Macro economy; Econometric forecasting; Economy of China.
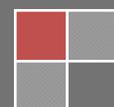
INTRODUCTION

With the deepening of the reform and opening up policy, China's macro economy has been developing constantly and rapidly to a certain extent. At present, China's macro economy is located in the second place in the whole world, only after the United States. Meanwhile, the level of Chinese people's material life has got a corresponding improvement. However, the outbreak of the financial crisis in the United States in 2008 influenced the global economy to a certain extent, and China's economy is not exceptional also. Under the influence of the crisis, China's macro economy appears a greater downward pressure. Therefore, for the current Chinese macro economy, some of the Chinese and foreign experts and scholars do not hold an optimistic attitude on the part of the development of China's macro economy. Under the influence of the negative factors, the development of China's macro economy is hindered. And in order to make a positive prediction and analysis of the good development of China's macro economy, analytical models are established from the perspective of ODE, providing necessary data to support the good overall development of China's macro economy.

AN OVERVIEW OF THE LATEST RESEARCHES ON CHINA'S MACRO ECONOMY

Along with the development of the society and the passage of time, the research on China's macro economy gradually increased. Wang Dong and Yu Lixin, in 2012, made a deeper research on how to balance China's macro economy and finds out the unbalanced factors after studying the basic investigation. Then they have a think about the factors causing an imbalance inside and outside China's macro economy, from the aspect of economic composition. After analyzing and studying the theories, it can be seen that the following policies of controlling China's macro economy should be changed from the previous "total control" to "structural control". Only by adopting such policies, can we expand and stable the internal and external demand and make a real balance inside and outside of China's economy. Therefore China's macro economy could has a development. Jiang Xuedi and Sun Ninghua, in 2012 made a deep prediction research on China's macro economic development from the aspects of energy. With investigating and studying the characteristics and the actual situation of China's macro economy, as well as adding the factors such as energy prices and conflicts to the establishment of a real economic cycle model, a dynamic average model of macro economy affected by energy price can be established, which can guarantee the data which come form the model after being proofread is similar to the actual developing characteristic of China's macro economy. From the conclusion of these researches, it is can been seen that after adding the factors such as energy prices and conflicts, the effects of the real economic cycle model and the actual China's macro economy are almost the same which is an ideal result. And the actual path which should be taken in reforming the energy price is cleared. In 2011, LI Meng has carried on a deep research on China's macroeconomic development from the aspects of environment and finance. By combining the environment, finance and physical entity, he creates a dynamic CGE system which belongs to China. By this system, through a quantitative analysis of the related production, macroeconomic indicators, financial indicators, product price and income level of residents in financial crisis, the impact of the financial crisis is studied and analyzed. And according to the results of the prediction and simulation in the research, some related guidelines and policies are proposed.

SPECIFYING THE RELATED OBJECT AND THE ALTERNATIVE OBJECT OF FORECASTING AND MEASURING CHINA'S MACRO ECONOMY

Investigate and study the exited object

A good measurement of China's macro economic forecasting requires an investigation and study of basic data and information data related to China's macro economy which must be effective, authentic and accurate. In order to ensure the effectiveness of the result, the econometric forecasting research on China's macro economy can be made from the perspectives of the ODE namely differential equation. On this basis, an alternative object can be specified for the following forecast and measuring research. In order to guarantee the effectiveness authenticity accuracy and objectiveness of the forecasting research of China's macro economy, it is needed to specify and select the object elements according to the past statistics released by the national bureau of statistics. Meanwhile, because it is also needed to consider that whether the selected data example has a guiding influence on the future development of China's macro economy and whether there is a common characteristic among the different projects and data, the survey samples used in this research are surveys made between 2011 and 2000. After repeating several experiments and demonstrations, finally 23 elements are chosen as the original object, namely: GDP on the Production Approach, the total number of employees, formation gross of fixed capital, the investment gross of the fixed capital and assets of the whole society, the balance of currency circulation, currency balance in narrow sense, currency balance in broad sense, net export of goods and services, the total amount of import and export, the gap between imports and exports, the imbalance on regular accounts, the actually used foreign capital, foreign direct investment, the amount of gold reserves, national fiscal revenue, national fiscal expenditure, long-term foreign debt holdings, short-term foreign debt, awards for the workers, final consumption, the average salary of workers, final consumption of government, final consumption of residents and etc. The Summary of the related data of China's macro economy is shown as TABLE 1.

TABLE 1: Summary of the related data of China's macro economy (1)

Year	2007	2008	2009	2010	2011
GDP on the Production Approach (hundred million Yuan)	265810	314045	340902	401202	471563
total number of employees (ten thousand people)	76990	77480	77995	76105	78134
formation gross of fixed capital (hundred million Yuan)	105435	128084	156679	182340	192350
investment gross of the fixed capital and assets of the whole society (hundred million Yuan)	137323	172828	224598	278121	301933
balance of money circulation (hundred million Yuan)	30375	34218	38245	44628	51000
gap between imports and exports (ten thousand dollars)	2618	2981	1956	1815	1815
actually used foreign capital (hundred million dollars)	783	952	918	1088	1088
average wage of workers (Yuan)	24932	29229	32736	37147	23979
final consumption of government (hundred million Yuan)	35190	40720	48746	53614	53614
final consumption of residents (hundred million Yuan)	95233	110855	122359	133290	133290
money balance in narrow sense (hundred million Yuan)	152560	166217	220001	266621	290000
money balance in broad sense (hundred million Yuan)	403442	478166	606225	725774	852000
net export of goods and services (hundred million Yuan)	23380	24229	15033	15711	15711
total amount of imports and exports (ten thousand dollars)	21737	25632	22075	29740	364210000
gap between imports and exports (ten thousand dollars)	2618	2981	1956	1815	1815
imbalance on regular accounts (thousand dollars)	371832620	426107395	297142050	305373970	201700000
amount of gold reserves (million ounces)	19.29	19.29	33.89	33.89	33.89
national fiscal revenue (hundred million Yuan)	51321	61330	68518	83101	83101
national fiscal expenditure (hundred million Yuan)	49781	62592	76299	89874	89874
long-term foreign debts (hundred million dollars)	1535	1638	1693	31.6	31.6

Specify the alternative object

Specify the 22 objects which are mentioned above and have a clear idea which one has a higher relevance with the DGP on production approach. Through a series of calculation methods, calculate the relevant data between the 22 objects and the DGP on production approach, and make a comprehensive research and analysis of the independence and complementarities existed among the objects. At last, the nine alternative objects of China's macro economy are selected, namely the total number of employees, formation gross of fixed capital, the investment gross of the fixed capital and assets of the whole society, the balance of money circulation, the gap between imports and exports, the actually used foreign capital, the average wage of workers, final consumption of government, and final consumption of residents.

THE ANALYSIS AND ESTABLISHMENT OF ECONOMETRIC FORECASTING MODEL OF CHINA'S MACRO ECONOMY UNDER THE PERSPECTIVE OF ODE

Thoughts of establishing the econometric model of China's macro economy

The traditional econometric model usually used in the past is established through treating output as the direct dependent variable and input the independent variable. In some extent, the biggest characteristic of this model is the directness, but its method and the pattern in analysis is to simple and it cannot provide the correct data. On the contrast, the biggest characteristic of econometric model of China's macro economy established under the perspective of ODE is that it can express the dynamic changing relationship among two or more variables. And especially the changes happened in short time. With showing the changes in a short time of variables as the main goal, the econometric model is established and its biggest advantage is able to directly express the dynamic relationship among the inputs which are owned by the increased data among each objects and other variables. As a result, it is requested that, during creating the model, object data should be processed according to the difference, replacing the possible differential operation. And will appear every parameter of difference data should be jointed to that of the original data to create a separate econometric model for each other. While

repeating every difference data parameters, an ODE equation has been formed. Then make list of the equation according to the form of matrix and work the Jordan canonical form of the related matrix parameters. And answer the ODE equation after obtaining the Jordan canonical form, and work out the basic expression of the contained data. And according to the specific way worked out from this basic expression, analyze the results of the econometric forecasting in the future.

Establishing the econometric model of China's macro economy

According to the differences, process the basic data parameters of the nine alternative objects and the object with only one variable to obtain the corresponding data parameters. The list is shown in TABLE 3.

TABLE 3: The statistics list of the difference of China's macroeconomic data

Year	2007	2008	2009	2010	2011
difference of GDP on the Production Approach	49495	48235	26857	60299	70361
difference of the total number of employees	590	490	515	-1890	2029
difference of formation gross of fixed capital	15285	22648	28595	25660	10009
difference of the investment gross of the fixed capital and assets of the whole society	27325	35504	51770	53523	23811
difference of the balance of money circulation	3302	3843	4027	6382	6371
difference of the gap between imports and exports	843	363	-1024	-141	0
difference of the actually used foreign capital	112	169	-34	170	0
difference of the average wage of workers	3931	4297	3507	4411	-13168
difference of final consumption of government	5072	5529	8025	4868	0
difference of final consumption of residents	15112	15621	11504	10931	0

Establish a suitable econometric model according to the data parameters from TABLE 3 and the thoughts in establishing the model. After making multiple repetitive experiments, finally eight variables of econometric model has been clearly determined, namely: GDP on the Production Approach, the total number of employees, the investment gross of the fixed capital and assets of the whole society, the balance of money circulation, the gap between imports and exports, the average wage of workers, final consumption of government, and final consumption of residents

Calculate the econometric model of these eight variables in a related way to obtain the main statistical parameters which can satisfy the required index of the econometrics and statistics. And the most important thing is that after being adjusted, the determined parameters are all above 0.9834, much greater than the required minimum number 0.95. Therefore, it can be seen that the reliability and credibility of the econometric model established under the perspective of the ODE is very high, and the effect is clearly obvious.

Matrix drew from the econometric model of matrix can solve the Jordan canonical form be on the basis of ordinary differential equation theory. During solving process, only solving and calculating the Jordan canonical form in the constant coefficient matrix and obtaining the transformation matrix which is special for this form are enough. And the transformation matrix is referred to the matrix made up of every eigenvectors. Through the above operations, a basic forecasting econometric model of China's macro economy can be established successfully from the perspective of ODE.

The forecasting analysis of the econometric model of China's macro economy

Based on the above research and analysis, the present paper makes a prediction and analysis for China's macro economy from the year of 2012 to 2015. From what has been mentioned above, it can be seen that the variable of output refers to the macro economy which here is only related to the variable of time. So, we can introduce the corresponding variables of time in the next few years into the model and work out the output situation of the macro economy in the next few years. Calculate the data according to the above calculation method, and the results are shown in TABLE 4.

TABLE 4: The statistics list of forecasting analysis data of China's macro economy

Year	GDP on the Production Approach (hundred million Yuan)
2012	505987
2013	541913
2014	580388
2015	622176

From the research, it can be seen that China's macro economy had been in a rapid and continued growth until 2008. Since 2008, there has appeared a short period of turmoil and the showing way of the changes brought by turbulence is the

downward pattern. Only after the country and the government promulgating a series of relevant policies and measures at the critical moments, China's macro economy had become stable slowly. And it began to appear a gradually rising trend around the year of 2011. The biggest difference between this rising trend and that appeared before 2008 is the rising speed. Compared with the rising trend appeared before 2008, the speed of the rising trend of 2011 is slow, but it has a strong visibility. It also means in a period of time of the future, China's macro economy is still in a good development trend. At the same time, the good development trend is bound to lay a good foundation for the future economic development in a long time period, which will promote the trend of rapid macroeconomic development of the later stage.

CONCLUSION

In conclusion, through theoretical analysis of various researches both at home and abroad on forecasting China's macro economy, although many of which are for theories themselves, prediction researches have been made from a number of different aspects in the process of making the actual predictions. And especially there are more prediction researches of input and output, but very few prediction researches on China's macro economy are based on time or some complex models. It is because there lacks of prediction researches on China's macro economy based on time or some complex models that leads to the fact that accuracy of analyzing prediction results is not high. In order to make up for the above problems and have a deep research on the latest achievements in the forecasting study of Chinese macro economy both at home and abroad, under the perspective of the ODE, a research model of China's macro economic forecasting is set up. After getting data on the basis of investigations and studies, make some relevant research and analysis of these data. And after establishing the ODE model, add the alternative objects and the corresponding data into the econometric analysis. Through repetitive experiments, eight variables are selected to be used in the econometric model. Using the time as independent variable, the econometric model of China's macro economy is set up which can predict the developing trend of China's macro economy in the future and provide data to support the constant development of China's macro economy.

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