

Principal Component Regression Analysis, Research on The Influencing Factors and Countermeasures of Economic Growth in Anhui Province

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Abstract

TAiming at the influencing factors of economic growth in Anhui Province, by analyzing the economic development data of Anhui Province from 2010 to 2021, seven influencing factors are selected for empirical analysis, and the principal component regression model is established by Eviews software. The coefficients of the output value of the primary industry, the output value of the secondary industry, the output value of the tertiary industry, the fiscal expenditure, and the urbanization rate of the permanent population are all positive, which has a promoting effect on the economic growth of Anhui Province. The growth rate of fixed asset investment The consumer price index of residents is negatively correlated with the economic growth of Anhui Province, and corresponding rationalization suggestions are put forward for the current economic growth of Anhui Province.

Keywords

Economic Growth, Influencing Factors, Principal Component Regression Analysis.

1. Model setting

1.1. Factors affecting the economic growth in Anhui Province

There are many actual factors affecting economic growth in the real society. Considering the actual situation of economic development in Anhui Province and the collection of data, the influencing factors of economic growth in Anhui Province mainly include the following seven aspects.

1.1.1. Output value of the primary industry

The primary industry mainly includes planting industry, forestry, animal husbandry, aquaculture industry and other industries that directly take natural objects as the production object, and the primary industry is the foundation. Only when the primary industry develops steadily, can the secondary and tertiary industries have the opportunity to develop vigorously.

1.1.2. Output value of the secondary industry

The secondary industry mainly refers to the processing and manufacturing industry, which uses the basic materials provided by the nature and the primary industry for processing. The secondary industry is the pillar, providing products for social development.

1.1.3. Output value of the tertiary industry

The tertiary industry refers to other industries other than the primary and secondary industries, with a wide range, mainly including transportation, communications, commerce, catering, finance, education, public services and other intangible production departments. The tertiary industry is the focus, providing strong support for the growth of social wealth and economic development.

1.1.4. Growth rate of fixed-asset investment

Growth rate of fixed asset investment = nominal development speed of fixed asset investment-100%= scale of fixed asset investment in the reporting period / scale of fixed asset investment in the base period-100%.

Investment in fixed assets is expressed in the form of money, the amount of work for enterprises to build and purchase fixed assets in a certain period of time and the changes in costs related to it. Including real estate, buildings, machinery, machinery, means of transport, and enterprises for capital construction, renovation, major repair and other fixed assets investment.

1.1.5. Fiscal expenditure

Fiscal expenditure, also known as public expenditure, is the control and use of the monetary social resources concentrated in the private sector in order to perform its own functions.

1.1.6. Consumer price Index

The consumer price index, also known as the CPI, indicates the purchasing power of residents in a certain area. If the CPI rises slowly, it will have a favorable impact on economic development. If the CPI falls or grows too fast, the market will inflate, when the economy stagnates and the currency depreciates.

1.1.7. Urbanization rate of permanent residents

Urbanization rate of permanent resident population = urban resident population / total regional population. When the urbanization rate of permanent population increases and the urban population increases, it shows that the economy is developing rapidly, people's living standards are improving and the income is growing.

1.2. Variable selection

This article for data collection and research, selected in 2010-2021 in Anhui province per capita GDP (Y) as an explanatory variable, the first industry output (X1), the second industry output (X2), the third industry output (X3), the growth rate of investment in fixed assets (X4), fiscal expenditure (X5), the consumer price index (X6), the permanent population urbanization rate (X7) annual data as an explanatory variable. This paper aims to study the influencing factors of economic growth in Anhui Province and put forward the corresponding countermeasures.

The model is set as:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} \quad (1)$$

2. Model estimation

This paper uses the principal component regression analysis method to estimate the parameters of the above model to analyze the main influencing factors affecting the economic growth of Anhui Province. The specific steps of estimation are as follows:

(1) Since there are 7 selected explanatory variables, in order to avoid multicollinearity problems among explanatory variables, dimension reduction analysis is conducted. By extracting the principal components of the model, then the score of the principal components is calculated, and which principal components are adopted.

(2) Taking the per capita GDP of Anhui Province as the explained variable and the score of principal components as the explanatory variable, the index parameters of the above regression model equation were calculated, and the data was tested to verify the accuracy of the calculation.

3. Empirical analysis

3.1. Select the samples

In order to highlight the analysis, this paper specially selects the economic growth data of Anhui Province from 2010 to 2021, and analyzes and studies the influencing factors affecting the economic growth of Anhui Province. All the data in this paper are selected from the Anhui Provincial Statistical Yearbook and the Statistical Bulletin of Anhui Province.

3.2. Sample data and analysis

Table 1: Data of economic growth and influencing factors of Anhui Province from 2010 to 2021

a particular year	Area per capita total output value (Yuan / person) Y	Primary industry output value (100 million yuan) X1	Second industry output value (100 million yuan) X2	Third industry output value (100 million yuan) X3	Growth rate of fixed- asset investme nt (%)X4	fiscal expendit ure (100 million yuan) X5	consu mer price index (%)X6	The urbaniz ation rate of perman ent resident s (%)X7
2010	21923	1600.57	6395.99	5253.23	33.55	2587.61	103.1	43.20
2011	27303	1867.99	8189.09	6227.83	27.82	3302.99	105.6	44.80
2012	30697	2018.57	9247.89	7075.22	23.90	3961.01	102.3	46.50
2013	34404	2173.16	10233.43	8177.44	21.20	4349.69	102.4	47.86
2014	37580	2294.95	10982.59	9242.11	16.50	4664.10	101.6	49.15
2015	39692	2376.05	10838.34	10616.78	12.70	5239.01	101.3	50.50
2016	43686	2489.76	11517.48	12300.46	11.70	5522.95	101.8	51.99
2017	49092	2582.27	12681.24	14412.71	11.00	6203.81	101.2	53.49
2018	56063	2638.00	14094.44	17278.47	11.80	6572.15	102.0	54.69
2019	60561	2915.97	14970.00	18959.52	9.20	7392.22	102.7	55.81
2020	62411	3184.68	15671.69	19824.26	5.10	7473.59	102.7	58.33
2021	70321	3360.60	17613.20	21985.40	9.40	7591.05	100.9	59.39

As shown in the above table, from 2010 to 2021, the per capita GDP of Anhui province has been rising, and the output value of the three major industries is also developing steadily. The investment rate of fixed assets is growing too fast, and the growth rate of fiscal expenditure and the urbanization rate of permanent resident population has slowed down in recent years.

3.3. Principal component regression model analysis

Using the principal component regression method, the regression equation is directly established using the above seven explanatory variables, and the cumulative contribution rate of variance is more than 85% as the principal component extraction standard to determine and

extract one principal component. One principal component function can be written according to the eigenvector (load) matrix in the middle:

$$F = 0.3717X_1 + 0.3717X_2 + 0.3679X_3 - 0.3545X_4 + 0.3733X_5 - 0.2103X_6 + 0.3751X_7 \quad (2)$$

This one principal component expresses the information of 88.3% of the six explanatory variables. Taking the standardized value of all explanatory variables in the sample data into the above principal component function equation, we can calculate the score formula of the principal components

$$\hat{Y}_1 = 0.356F \quad (3)$$

3.4. Estimate the regression equation

$$\hat{Y}_1 = 0.356F \quad (4)$$

Take into the above regression equation, and get the restored regression equation is:

$$\hat{Y}_1 = 0.1323X_1 + 0.1323X_2 + 0.131X_3 - 0.1262X_4 + 0.1329X_5 - 0.0749X_6 + 0.1335X_7 \quad (5)$$

The greater the absolute value of the explanatory variables on the right side of the above equation, the greater the influence is on the Y of the explained variable, the output rate of the permanent population (X5), the growth rate of fixed assets investment (X4) and the per capita price index (X6).

4. Conclusion and policy recommendations

In reality, there are many practical factors that affect economic growth. Considering the actual situation of economic development in Anhui Province and the collectability of data, the factors that affect economic growth in Anhui Province mainly include the following seven aspects. The above empirical analysis shows that in order to maintain the sustained and stable economic growth in Anhui Province, it is necessary to start with the urbanization rate of the permanent population, accelerate economic development, increase fiscal expenditure, increase the output value of the secondary industry, macro-control the consumer price index of residents and the growth rate of fixed asset investment to ensure the steady economic growth of Anhui Province.

4.1. Promote the integration of the three major industries and focus on the secondary industry

At present, the driving force of economic growth in Anhui province is mainly the secondary industry and the tertiary industry. In order to ensure steady economic growth, it is necessary to promote the integration of the three major industries, among which to vigorously develop the secondary industry and steadily develop the primary and tertiary industries. Anhui province should implement macro-positive economic and fiscal policies, gradually improve the quality of economic development, and gradually transform to a new industrial economic development mode of high and new technology.

To develop the secondary industry, we should further guarantee the reasonable and sufficient liquidity in terms of monetary policy. In terms of fiscal policy, we should further reduce taxes and fees, reduce enterprise costs, and increase investment in capital construction, education, research and development. In terms of market environment management, we should further stimulate market vitality and mobilize all enthusiasm to develop the economy. First of all, we should relax market access restrictions in all walks of life and encourage private enterprises to enter all walks of life. Secondly, we should speed up the market-oriented reform of state-owned enterprises, so that market entities of all types of ownership can enjoy equal treatment. Third, reform the land property rights system in rural areas and activate rural investment. Fourth, we should further open up to the outside world and create a good international environment.

4.2. Increase the urbanization rate of permanent residents

Improving the urbanization rate of the permanent population in Anhui Province is conducive to the development of urban economy, providing a solid talent reserve for the secondary and tertiary industries, and conducive to the integration of the three industries. Moreover, the increase of the permanent population will drive the urban related consumption, product upgrading, drive the industrial development, and escort the economic growth of Anhui Province. Of course, the higher the urbanization rate is not the better. We should be steadily improved on the basis of our own strength. We should not rush to achieve success, otherwise it will have a negative impact on economic growth.

First, efforts should be made to improve the quality of urbanization of agricultural transfer population. This is the primary task of urbanization. We should continue to deepen the reform of the registered residence system, broaden the channels for the whole family settlement of agricultural migrants who have stable employment in cities, constantly improve the convenience of settlement, and earnestly safeguard the rural rights and interests of farmers who settle in cities. We will accelerate the coverage of basic public services in cities and towns to the permanent population, focus on the new generation of migrant workers, promote the expansion of insurance coverage, ensure that the children of migrant workers receive compulsory education in their permanent residence, and strengthen the employment services and skills training of migrant workers.

Second, focus on promoting the coordinated development of large, medium-sized and small cities and towns. To promote the transformation of the development mode of mega-cities, mega-cities should pay attention to the problem of "big city disease", orderly relieve the non-core functions of the central urban area, reasonably control the size of the city, population density and development intensity, promote the development of multi-center, multi-level and cluster, and radiate the surrounding cities and counties to cultivate and develop modern metropolitan areas. We will promote the urbanization construction with the county seat as an important carrier, support the accelerated development of a number of counties with better conditions, continue to accurately supplement the weak and weak points, and better meet the employment and home needs of farmers in the county seat.

Third, efforts should be made to improve the level of livability and industry in cities. Urban construction should strive to create high-quality living space for urban residents, strive to provide more inclusive and convenient public services, increase the supply of education and medical care, childcare and elderly care, domestic services, sports and fitness, public culture and other services, and accelerate the creation of a quarter hour convenient life circle. The policy and planning should promote urban renewal in an orderly manner, accelerate the improvement of flood control and drainage facilities, start the implementation of aging and renovation of gas and other pipelines, improve the living conditions of residents, and improve the level of urban safety. The government should pay more attention to the construction of

urban ecological environment and support the construction of park city demonstration areas that practice the new development concept.

4.3. Reasonably increase government expenditure and stabilize the economic development

Reasonable increase of government financial expenditure has greatly promote the economic growth of Anhui province. The increase in fiscal expenditure will lead to an increase in social demand and promote the upgrading and development of related industries. Fiscal expenditure can improve the efficiency of social capital production, promote economic development, and provide great help to the integration and upgrading of the whole industry. Finally, the investment in related industries based on financial expenditure can affect the investment direction of social capital, attract them to invest in relevant industries, and provide more funds for the development of the industry, which is conducive to promoting economic development. Generally, clarifying the functions of the government, finance and market is the most basic link to do a good job of financial expenditure management. To be specific, the government should transform its responsibility into financial responsibility, while the market regulation is mainly carried out by market resources. The two should be clear, so as to better coordinate and effectively carry out the work. On the other hand, when setting the scope of financial funds, we should fully consider the coordination of the development scope of the market. For example, in order to make the development of the market more orderly and fair, we need the market itself to deal with various problems and affairs, as well as the range of resources it can provide. The government should resolutely release to the market, and it will not interfere with it; On the contrary, if some matters cannot be achieved by the market itself, then the government should actively assume its responsibilities and provide certain financial support when the market needs it.

Perfecting the performance evaluation mechanism and performance appraisal mechanism will greatly promote the improvement of financial management quality. To be specific, we should formulate institutionalized and standardized performance evaluation norms, strictly implement them, and constantly expand the scope of performance evaluation, which can play a great incentive role and promote the formation of an invisible competition among financial management staff. In such an environment, we can achieve the efficiency of financial management work, and at the same time, reduce the occurrence of work and management problems to a certain extent.

4.4. Maintain price stability, strengthen macro-control, and reasonably reduce the growth rate of fixed asset investment

The government maintains the relative stability of prices, the relative increase of residents' income and the increase of social consumption expenditure, promoting the development of relevant industries and stimulating economic growth. Investment fluctuation will lead to the same direction of economic fluctuation, and there is a multiplier effect between it and total output. Investment in fixed assets refers to the expenditure of enterprises or related units on purchasing equipment, plants, etc. When the investment increases, it will immediately increase the demand for investment goods, increase the output of investment goods production enterprises, increase employment, and increase the income of residents, which is conducive to promoting the increase of consumption demand. Investment and economic growth are mutually promoting and restricting each other. Generally speaking, the moderate growth of investment can promote the sustainable development of the economy; Insufficient investment growth may slow down economic development; Excessive investment growth may cause overheating of the economy. Therefore, Anhui Province should strengthen macro-control,

reasonably reduce the growth rate of fixed asset investment in Anhui Province, and promote economic growth.

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