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Empirical Analysis on the Influencing Factors of China's Economic Development Quality Based on Stepwise Regression

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Abstract: *This paper selects 10 factors that affect the quality of economic development in China. Based on the data of the National Bureau of Statistics from 2018 to 2020, the key factors affecting the quality of economic development in China are analyzed by stepwise regression method. According to the empirical results, necessary policy suggestions for high-quality economic development are put forward. The empirical results show that the urbanization rate of permanent residents, the disposable income per capita of rural population, and the growth rate of infrastructure fixed asset investment have a significant role in promoting the quality of China's economic development.*

Keywords: *Economic development quality; Stepwise regression; Influencing factors*

1. Introduction

Economic development is essential to national renewal and the foundation for building a nation. Economic development has always been at the center of China's development, and high-quality development is the fundamental way out for China to cope with the unstable and uncertain international environment. Since the reform and opening up, China's economic development has maintained rapid growth, and its GDP growth has achieved remarkable results. According to the report of the 19th CPC National Congress, China's economy has shifted from a stage of high-speed growth to a stage of high-quality development. At this stage, we should not only pay attention to the speed of economic development, but also to the quality of economic development. At present, many domestic scholars have carried out research on the quality of economic development. Most of the literatures focus on constructing the evaluation system of economic development quality and measuring the quality level of China's economic development. Chen Guifu et al. (2021) adopted the principal component analysis method to construct the Economic Development quality Index (QGI) composed of 15 basic indicators based on the quality of provincial economic development in China.[1].Zhang Yunyun et al. (2019) established and revised the index system of the theoretical model of economic development quality, and conducted a comprehensive evaluation of the economic development quality level of 31 provinces (autonomous regions and municipalities) in 2016 by using the matter-element model [2].

2. Index selection and data collection

2.1. Quality indicators of economic development

In order to represent the quality of economic development in a more comprehensive way, this paper uses the Economic Development Quality Index (QGI) constructed by Chen Fugui et al. (2021) [1] in Research on The Quality Evaluation System and Influencing Factors of China's Provincial Economic Development as a measure index of economic development quality, and updates the data to the latest data from 2018 to 2020. A_i represent the basic index and weight of QGI index. If it is an inverse index, the reciprocal is taken.$\omega_i A_i$Its calculation formula is as follows:

$$Q = \sum_{i=1}^{15} \omega_i \times A_i \quad (1)$$

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Table 1: The 15 basic indicators and weights used to construct the QGI index

Basic indicators	The weight	Unit	Inverse index
GDP per capita	0.1	Ten thousand yuan	
Rate of industrialization	0.102	%	
Total imports and exports /GDP	0.043	%	
Foreign direct investment /GDP	0.048	%	
R&D funds/GDP	0.063	%	
Coefficient of variation	0.096	-	√
Average years of schooling	0.102	years	
Life expectancy	0.106	years	
Social security and employment expenditures/fiscal expenditures	0.057	%	
Thayer index	0.118	-	√
Energy consumption per unit of GDP	0.073	Tons of standard coal / 100 million yuan	√
Electricity consumption per unit of GDP	0.073	Billion kilowatt-hours/billion yuan	√
Air pollution per unit output	0.031	Tons/billion yuan	√
Sewage discharge per unit output	0.034	Tons/billion yuan	√
Solid waste emission per unit output	0.034	Tons/billion yuan	√

The data used in this paper are collated from the National Bureau of Statistics, China Statistical Yearbook, China Health Statistical Yearbook, Urban and Rural Construction Statistical Yearbook, China Energy Statistical Yearbook, etc. The air pollution level per unit of output is expressed as the sum of sulfur dioxide emissions (ten thousand tons), nitrogen oxide emissions (ten thousand tons) and particulate emissions (ten thousand tons) after adjustment, which is slightly different from the original text. Life expectancy Since only 2010 census data are available, the data used in this article are extrapolated from life expectancy at each location in 2010.Table 2 shows the calculated economic development quality indicators of each province in 2018-2020.

Table 2: Comprehensive indicators of provincial economic development quality

Year / Province	2018	2019	2020
Anhui	17.84	17.54	17.81
Beijing	25.47	24.74	26.64
Fujian	15.01	15.33	15.97
Gansu	10.67	10.89	11.14
Guangdong	16.54	16.47	17.11
Guangxi	12.2	12.37	12.64
Guizhou	11.39	11.68	11.8
Hainan	14.98	16.32	19.11
Hebei	14.62	15.08	15.6
Henan	16.25	16.45	17.05
Heilongjiang	17.35	13.66	14.55
Hubei	16.45	16.54	20.08
Hunan	17.35	17.78	18.73
Ji Lin	15.2	15.52	16.17
Jiangsu	17.31	17.57	18.45
Jiangxi	18.01	18.23	18.78

Year / Province	2018	2019	2020
Liaoning	14.5	14.2	14.44
Inner Mongolia	13.35	13.02	13.32
Ningxia	11.83	12.1	12.56
Qinghai	10.47	10.86	11.01
Shandong	15.65	15.25	15.9
Shanxi	13.11	12.76	13.24
Shaanxi	14.92	15.28	15.9
Shanghai	24.7	25.38	26.41
Sichuan	14.58	14.86	15.21
Tianjin	21.52	21.9	22.59
Tibet	12.13	12.37	12.7
Xinjiang	11.17	11.46	11.76
Yunnan	11.45	11.65	11.84
Zhejiang	18.26	17.61	18.49
Chongqing	15.4	15.32	15.69

2.2. Influencing factors

Table 3: Indicators of 10 influencing factors as the research object in this paper

Indicators	Symbol	Unit
Gross regional product	X_1	One hundred million yuan
Permanent population urbanization rate	X_2	%
Permanent population of each province	X_3	Ten thousand people
Per capita disposable income of permanent urban residents	X_4	yuan
Per capita disposable income of permanent rural residents	X_5	yuan
Revenue in the general budgets of local governments	X_6	One hundred million yuan
Total retail sales of consumer goods	X_7	One hundred million yuan
Total provincial household deposits	X_8	yuan
Real estate development fixed asset investment growth rate	X_9	%
Infrastructure fixed asset investment growth rate	X_{10}	%

In order to comprehensively consider the impact of macro factors on the quality of economic development, this paper selects the following ten indicators of 31 provinces (cities, autonomous regions) in China from 2018 to 2020 as research objects, which are respectively the gross regional product $(X)_1$), the urbanization rate of permanent population (X_2), permanent population of each province (X_3), per

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capita disposable income of permanent urban residents (X_4), per capita disposable income of permanent rural residents (X_5), general budget revenue of local finance (X_6), total retail sales of consumer goods (X_7), total household deposits of provinces (X_8), real estate development fixed asset investment growth rate (X_9) and infrastructure fixed asset investment growth rate (X_{10})

3. Model establishment and regression

3.1. Mixed OLS regression and multicollinearity test

First, mixed OLS regression was performed on the data using Stata16 software. The result of mixed OLS regression is 0.7741, and the fitting result is good.R^2Multicollinearity test was conducted on ten variables, and the results were shown in Table 4. According to the test results, the variance inflation factor VIF value is greater than 10, X_1. The VIF value of is as high as 36.24, so X is excluded$_1$ (GDP, unit: 100 million YUAN) After elimination, the multicollinearity test was conducted again, and the VIF value was less than 10. Therefore, the model is:

$$Q_{it} = \beta_1 + \beta_2 X2_{it} + \beta_3 X3_{it} + \beta_4 X4_{it} + \beta_5 X5_{it} + \beta_6 X6_{it} + \beta_7 X7_{it} + \beta_8 X8_{it} + \beta_9 X9_{it} + \beta_{10} X10_{it} \quad (2)$$

Table 4: Preliminary mixed OLS regression results

Q	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
X_1	0.000098	0.0000466	2.11	0.038	0.0001906	5.40 e-06
X_2	16.23786	3.537129	4.59	0	9.201379	23.27433
X_3	0.0003922	0.000184	2.13	0.036	0.0000262	0.0007583
X_4	0.0000785	0.000059	1.33	0.187	0.0000388	0.0001958
X_5	0.0002877	0.0001017	2.83	0.006	0.0000853	0.00049
X_6	0.0002239	0.0003104	0.72	0.473	0.0008414	0.0003937
X_7	0.0001761	0.0000992	1.78	0.079	0.0000212	0.0003734
X_8	0.0000217	0.0000107	2.02	0.046	0.000043	3.53 e-07
X_9	0.0103919	0.014422	0.72	0.473	0.018298	0.0390818
X_{10}	0.0249299	0.016937	1.47	0.145	0.0087632	0.058623
_cons	1.781186	2.204975	0.81	0.422	6.167583	2.605211

Table 5: Multicollinearity test results

Variable	VIF	1/VIF	Variable	VIF	1/VIF
X_1	36.24	0.0276			
X_7	26.78	0.0373	X_7	12.71	0.0787
X_6	18.56	0.0539	X_6	12.61	0.0793
X_4	10.26	0.0975	X_4	9.49	0.1054
X_5	8.53	0.1172	X_5	8.18	0.1223
X_3	7.59	0.1318	X_3	7.58	0.1318
X_2	4.29	0.2332	X_2	4.14	0.2415
X_8	1.75	0.5725	X_8	1.69	0.5923
X_9	1.43	0.6993	X_9	1.43	0.7000
X_{10}	1.29	0.7750	X_{10}	1.27	0.7878
Mean VIF	11.67		Mean VIF	6.67	

3.2. Stepwise regression

Table 6: Stepwise regression results

Q	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
X_5	0.0003449	0.0000582	5.93	0.000.	0002293	0.0004606
X_2	14.58093	2.900464	5.03	0.000	8.816871	20.345
X_8	0.0000225	9.93 e-06	-	0.026-	2.27. 0000422	2.77 e-06
X_{10}	0.0358395	0.0164477	2.18	0.032.	0031533	0.0685258
_cons	1.795771	1.197014	0.137-	1.50.	5830437	4.174586

After the mixed OLS regression, in order to select the most important variable from the 9 variables, we used the "forward method" to perform stepwise regression on the initial model.According to the regression results, the most important factor influencing the quality of economic development is the urbanization rate of permanent resident population (X_2), per capita disposable income of permanent rural residents (X_5), total household deposits of provinces (X_8), growth rate of investment in infrastructure fixed assets (X_{10}).The optimal model is:

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$$Q_{it} = \beta_1 + \beta_2 X2_{it} + \beta_5 X5_{it} + \beta_6 X6_{it} + \beta_8 X8_{it} + \beta_{10} X10_{it} \quad (3)$$

3.3. Analysis of empirical results

According to the empirical results, the urbanization rate of permanent population (X_2), per capita disposable income of permanent rural residents (X_5), growth rate of investment in infrastructure fixed assets (X_{10}) can significantly improve the quality of economic development. While total household deposits of provinces (X_8) is negatively correlated with the quality of economic development.

The index Q used in this paper to measure the quality of economic development mainly consists of three aspects: economic development fundamentals, social achievements, resources and environment. The fundamentals of economic development include effectiveness, coordination and innovation. Social outcomes include education, health, social equity and social protection; Resources and environment include resource consumption and environmental pollution.

The improvement of the urbanization rate of permanent residents can effectively improve the degree of social integration and promote the development of industrialization, thus improving the effectiveness of economic development and promoting high-quality economic development. The increase of per capita disposable income of permanent rural residents can effectively promote the development of social security and social equity, and thus improve the quality of economic development. The growth rate of investment in infrastructure and fixed assets can improve the quality of economic development from two aspects. On the one hand, a sound infrastructure can help improve the quality of life of residents and thus improve their health. On the other hand, sound infrastructure can also indirectly reduce environmental pollution and resource consumption. However, the more total household savings, the less household investment, which indirectly affects the innovation of economic development, and then has a negative correlation with the quality of economic development.

4. Policy Recommendations

Based on the research results of this paper, the quality of economic development can be improved from three aspects, namely, the urbanization rate of permanent residents, the per capita disposable income of permanent rural residents, and the growth rate of investment in infrastructure and fixed assets. Therefore, we propose the following policy recommendations:

1) We will continue to promote a new type of urbanization. China has reached the stage of high-speed urbanization, which is not only conducive to improving people's quality of life, but also a driving force for the high-quality development of China's economy.

2) Vigorously developing rural vitalization. The 19th National Congress of the CPC made it clear that the principal contradiction facing Chinese society has evolved into one between unbalanced and inadequate development and the people's ever-growing needs for a better life. This is also a key factor in improving the quality of economic development. To solve the problem of imbalance and inadequacy, we must vigorously develop rural revitalization and improve the income and quality of life of rural residents.

3) Stepping up infrastructure development in urban and rural areas. The improvement of infrastructure is not only the embodiment of high-quality economic development, but also an important factor to improve the quality of economic development.

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