An Empirical Analysis on the Influencing Factors of China's Economic Growth

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Abstract: Since the implementation of reform and opening up, China has always adhered to the economic construction as the center, which has significantly promoted the development of China's socialist economy, and the speed of economic growth has attracted worldwide attention. In order to analyze the factors that affect China's economic growth, this paper takes GDP as the explanatory variable, the number of people employed, the total fixed assets and the consumer price index as explanatory variables, collects the statistical data from 1980 to 2014, and establishes the economic model of influencing factors of China's economic growth by using multiple linear regression analysis method It also makes an empirical analysis on the factors of China's economic growth. Through the test and analysis of the model, the influence degree of various main factors on China's economic growth is obtained, and on this basis, some countermeasures and suggestions for promoting economic development are put forward.

1. Introduction

Since the implementation of the reform and opening-up policy in 1978, China's gross domestic product (GDP) has developed at an average annual growth rate of about 8%, and has become the world's second largest economy after the United States. In terms of economic development, it has made inestimable achievements, but there are also some inevitable problems, such as the imbalance of labor supply and demand, environmental pollution and resource shortage. According to economic theory, there are many factors that affect a country's economic growth, and different economic growth modes depend on different input factors. Therefore, it is of great practical significance to study the driving factors of China's current high-speed economic growth for correctly understanding the current development stage, guiding the formulation of revised macroeconomic policies, and paying attention to the effective prevention and governance of the problems in the development while realizing the sustainable economic growth.

2. Journals reviewed

There are a lot of literature on the impact of economic growth as the theme, put forward a lot of factors to promote economic growth. Most of them focus on the factors of institutional innovation, technological progress and capital investment, factor supply and so on.

2.1 Institutional innovation factors

Douglas North and others introduced institutional change into the analysis of economic growth, and believed that efficient economic organization is the key to economic growth. The efficiency of the organization can be derived from a set of effective institutional arrangements [1].

Simon Kuznets thinks that technological progress is the most important among various economic factors that affect economic growth, but technological progress only provides a possibility for economic growth. If we want to make this possibility become reality, we must adjust social system and ideology accordingly [2].

Lewis thinks that ideology and the function of social political and economic system are the indirect causes of economic development. He believes that economic system is the ultimate reason to promote or hinder economic development.

2.2 Technological progress and capital investment

Romer believes that in economic growth, technological progress is manifested in the new knowledge generated by private firms' investment in research activities, and the growth of human capital has the most influence on the accumulation of new knowledge. Therefore, both the government and the manufacturers must increase the resource investment in research and development departments, especially in human capital, in order to maintain sustained economic growth [3].

Lucas thinks that technological progress is the result of human capital investment and human capital spillover in the process of production. Human capital is the core factor in economic growth, and its progress is equal to technological progress [4].

Schultz divides capital into two forms: conventional capital and human capital. By investing in health and education, Schultz can enhance people's physical strength, intelligence and skills, improve the quality of the population, and transform general human resources into human capital. This kind of human capital can produce "knowledge effect" and "non knowledge effect" to promote the growth of output directly or indirectly.

2.3 Factor supply

Adam Smith, David Ricardo and other Western classical economists believe that "the accumulation and investment of some social products are the main driving force to promote economic growth".

Marshall as a representative of the neoclassical economists, they believe that the capitalist economy can not only adjust savings and investment through the change of interest rate, so as to accumulate capital and create conditions for economic growth, but also achieve economic growth with the help of price mechanism and wage changes and tend to be fully employed [5].

In the 1950s, modern western economists, such as Tobin and Solow of the United States, Swann of Australia and Mead of Britain, applied the basic concepts of neoclassical school, and successively put forward a series of neoclassical growth theories and models. They all believed that the path of economic growth has inherent stability, and economic growth can be continuously transformed into investment (capital, labor, land, etc.) through "saving" The compensation of production factors is equal to their marginal products, and the factors can be replaced by each other.

To sum up, there are various factors that affect a country's economic growth. On the basis of referring to many literatures, this paper selects labor index, fixed assets input index and consumer price index to carry out empirical research on the influencing factors of China's economic growth, so as to clarify the importance of their impact on economic growth, so as to put forward some suggestions and Enlightenment for economic growth.

3. Theoretical analysis of national economic growth

3.1 Meaning of economic growth

Economic growth is the eternal theme of economic research. Economic growth is generally defined as the continuous increase of the total output of material products and services of an economy. In actual accounting, it is often expressed by the increase of the total amount of goods and services produced by a country, that is, the growth of gross national product and gross domestic product (GDP). According to the specific situation, this paper chooses GDP gross index and the total amount index of various influencing factors to investigate China's economic growth.

3.2 Classical economic growth theory

The classical economic growth theory centers on the growth of social wealth, pointing out that productive labor is the source of wealth growth. The theory points out the scale motivation of economic growth, that is, capital, technology and land. It also points out the importance of division of labor and the particularity of natural resources in the growth [6].

3.3 Neoclassical growth theory

According to neoclassical growth theory, continuous technological progress has been increasing capital demand, raising real interest rates and causing savings to increase capital stock. The sustained economic growth comes from exogenous technological progress. Without technological progress, economic growth will stop [7].

3.4 New economic growth theory

The new growth theory, or endogenous technological change theory, holds that the growth of per capita real GDP is due to the choice made by people in pursuit of profits. Moreover, growth can continue indefinitely. One of the main tasks of endogenous growth theory is to reveal the reasons for the difference of economic growth rate and explain the possibility of sustained economic growth. Endogenous growth theory is based on the neoclassical economic growth model. In a sense, the breakthrough of endogenous economic growth theory lies in relaxing the hypothesis of neoclassical growth theory and internalizing the related variables [8].

4. An empirical study on the influencing factors of national economic growth

4.1 Modeling

There are many factors that affect China's economic growth. This paper mainly selects three factors: the level of labor force, the amount of capital input and the level of consumption. In order to analyze the impact of various factors on China's economic growth, we can use GDP (y) as a measure of economic development, to represent economic development; to measure labor force, to measure total investment in fixed assets (x2); to use price index (x3) to represent consumption demand. These data were used for regression analysis.

The model used is as follows:

$$Y_i = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + u_i \tag{1}$$

Among them, Y represents GDP, X1 represents social employment, X2 represents fixed asset investment, X3 represents consumer price index, and UI represents random disturbance. Through the regression analysis of the model, we get the relationship between the variables and the economic growth in China.

In order to estimate the model parameters, the relevant variable data from 1980 to 2014 were collected as shown in Table 1.

Table 1 Time series of influencing factors of China's economic growth

Year	GDP (current price)	Number of employees at the end of the year (10000)	Total investment in fixed assets of the whole society (100 million yuan)	Consumer price index (last year = 100)
1980	4551.6	42361	910.9	107.5
1981	4898.1	43725	961	102.5
1982	5333	45295	1230.4	102
1983	5975.6	46436	1430.1	102
1984	7226.3	48197	1832.9	102.7
1985	9039.9	49873	2543.2	109.3
1986	10308.8	51282	3120.6	106.5
1987	12102.2	52783	3791.7	107.3
1988	15101.1	54334	4753.8	118.8
1989	17090.3	55329	4410.4	118
1990	18774.3	64749	4517	103.1
1991	21895.5	65491	5594.5	103.4
1992	27068.3	66152	8080.1	106.4
1993	35524.3	66808	13072.3	114.7
1994	48459.6	67455	17042.1	124.1

1995	61129.8	68065	20019.3	117.1
1996	71572.3	68950	22913.5	108.3
1997	79429.5	69820	24941.1	102.8
1998	84883.7	70637	28406.2	99.2
1999	90187.7	71394	29854.7	98.6
2000	99776.3	72085	32917.7	100.4
2001	110270.4	72797	37213.5	100.7
2002	121002	73280	43499.9	99.2
2003	136564.6	73736	55566.6	101.2
2004	160714.4	74264	70477.4	103.9
2005	185895.8	74647	88773.6	101.8
2006	217656.6	74978	109998.2	101.5
2007	268019.4	75321	137323.9	104.8
2008	316751.7	75564	172828.4	105.9
2009	345629.2	75828	224598.8	99.3
2010	408903	76105	251683.8	103.3
2011	484123.5	76420	311485.1	105.4
2012	534123	76704	374694.7	102.6
2013	588018.8	76977	446294.1	102.6
2014	636138.7	77253	512020.7	102

The above data are from China Statistical Yearbook

4.2 parameter estimation

Using E-VIEWS software, the least square method (OLS) was used for regression estimation, and the regression equation was as shown in Table 2:

Table 2 Initial estimation results of the model

Dependent Variable: Y				
Method: Least Squares				
Date: 11/20/16 Time: 17:36				
Sample: 1980 2014				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	2.441973	0.388851	6.279970	0.0000
X2	1.200728	0.032665	36.75832	0.0000
X3	-821.6075	607.1926	-1.353125	0.1858
C	-28982.53	71867.11	-0.403279	0.6895
R-squared	0.988159	Mean dependent var	149832.6	
Adjusted R-squared	0.987013	S.D. dependent var	183355.3	
S.E. of regression	20895.30	Akaike info criterion		22.83965
Sum squared resid	1.35E+10	Schwarz criterion		23.01740
Log likelihood	-395.6938	Hannan-Quinn criter.		22.90101
F-statistic	862.3312	Durbin-Watson stat		0.573816
Prob(F-statistic)	0.000000			

The regression equation was as follows:

$$Yi = -28982.53 + 2.442X1 + 1.201X2 - 821.608X3 \qquad (2)$$

$$t=(-0.4033)(6.280)(36.758)(-1.353)$$

$$R^2=0.988, F=862.331, df=31$$

4.3 Test of economic significance

The estimation results of function model (2) show that the partial regression coefficients of X1 and X2 are positive, which meet the economic expectation; but the coefficient of consumption level (x3) is negative, which does not meet the economic expectation. The equation shows that: when other factors remain unchanged, the GDP increases by 2.442% for every 1% increase of labor level (x1), and 1.201% for every 1% increase of capital input (x2). However, the economic significance of consumption level needs to be further tested.

4.4 Statistical inference test

• Goodness of fit test

According to the regression results of function model (1.1.2), $R^2= 0.988$, indicating that the model has a good fitting degree to the sample.

• T test

Under the given level $\alpha = 0.05$, when the degree of freedom is 31, according to the 2-T empirical rule, the absolute value of t statistic of labor level (x1) is 6.28 > 2, The results show that labor level (x1) has a significant impact on GDP Y; the absolute value of t-statistic of capital input (x2) is 36.758 > 2, indicating that capital input (x2) has a significant impact on GDP Y; but the absolute value of t statistic of consumption level (x3) is 1.353 < 2, indicating that consumption level has no significant impact on GDP Y.

• F test

At a given level $\alpha = 0.05$, the critical values of 2 and 31 degrees of freedom are about 3.32. According to the results of regression equation (2), the value of F is significantly greater than the critical value, indicating that the overall regression equation model is significant, that is, labor level (x1), capital input (x2) and consumption level (x3) have significant impact on GDP.

4.5 Econometric significance test

• Multicollinearity test

The multicollinearity test is shown in Table 3:

Table 3 Correlation coefficient matrix

	Y	X1	X2	X3
Y	1.000000	0.675366	0.985520	-0.291428
X1	0.675366	1.000000	0.580058	-0.250596
X2	0.985520	0.580058	1.000000	-0.253560
X3	-0.291428	-0.250596	-0.253560	1.000000

According to the multicollinearity test, there is a linear correlation between explanatory variables. By using the method of eliminating variables, X3 is decided to be eliminated. The correction results of multicollinearity are shown in Table 4.

Table 4 Modified multicollinearity model

Dependent Variable: Y
Method: Least Squares
Date: 11/22/16   Time: 08:40
Sample: 1980 2014
Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	2.511097	0.390454	6.431229	0.0000
X2	1.206792	0.032774	36.82171	0.0000
C	-120642.1	24315.60	-4.961512	0.0000
R-squared	0.987459	Mean dependent var		149832.6
Adjusted R-squared	0.986676	S.D. dependent var		183355.3
S.E. of regression	21164.85	Akaike info criterion		22.83989
Sum squared resid	1.43E+10	Schwarz criterion		22.97320
Log likelihood	-396.6980	Hannan-Quinn criter.		22.88591
F-statistic	1259.866	Durbin-Watson stat		0.419333
Prob(F-statistic)	0.000000			

The modified equation is as follows:

$$Yi = -120642.1 + 2.51X1 + 1.21X2 \tag{3}$$

$$t = (-4.961)(6.431)(36.822)$$
$$R^2 = 0.988, F = 1259.866, df = 30$$

• Autocorrelation test

Known: DW = 0.41933, DL = 1.343, Du = 1.584. Therefore, there is positive autocorrelation. Therefore, the generalized difference method is needed to modify the model. The residual sequence can be obtained e_t from formula (3). In order to estimate the autocorrelation coefficient β, The autoregression of one lag period was carried out using e_t. It can be seen that $\hat{e}_t = 0.85445 e_{t-1}$, knowable $\hat{e} = 0.85445$, the original model is generalized difference and the difference equation is obtained:

$$Y_t - 0.85445Y_{t-1} = \beta_1(1 - 0.85445) + \beta_2(X_1 - 0.85445X_0) + \beta_3(X_2 - 0.85445X_1) + u_t \tag{4}$$

The results of regression equation are shown in Table 5.

Table 5 modified autocorrelation model

Dependent Variable: Y-0.85445*Y(-1)				
Method: Least Squares				
Date: 11/28/16 Time: 00:36				
Sample (adjusted): 1981 2014				
Included observations: 34 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8898.097	13360.74	-0.665988	0.5103
X1-0.85445*X1(-1)	1.836173	1.291304	1.421952	0.1650
X2-0.85445*X2(-1)	1.073332	0.057958	18.51901	0.0000
R-squared	0.928036	Mean dependent var		38302.40
Adjusted R-squared	0.923393	S.D. dependent var		44050.91
S.E. of regression	12192.41	Akaike info criterion		21.73911
Sum squared resid	4.61E+09	Schwarz criterion		21.87379
Log likelihood	-366.5649	Hannan-Quinn criter.		21.78504
F-statistic	199.8847	Durbin-Watson stat		1.407643
Prob(F-statistic)	0.000000			

The modified autocorrelation equation is as follows:

$$\hat{Y}_t{}^* = -8898.097 + 1.84X_1{}^* + 1.073X_2{}^* \tag{5}$$

$$Se = (13360.74) \quad\quad (1.2913) \quad\quad\quad (0.058)$$
$$t = (-0.666) \quad\quad\quad (1.42195) \quad\quad\quad (18.51901)$$

$$R^2=0.92 \quad F=199.884 \quad DW=1.40764$$

Due to the use of generalized difference data, the sample size is reduced by 1 to 34. According to the DW statistical table of 5% significance level, DL = 1.333, Du = 1.580, DW = 1.40764 in the model, because $d_L < DW < d_U$, It shows that the generalized difference autocorrelation can not be judged at the level of 5%. Although it is impossible to judge, the statistics of the determinable coefficients T and F have reached the rational level：β1=(-8898.097)/(1-0.85445)=-61134.297

The model is as follows:

$$Yi=-61134.297+1.84X1+1.073X2 \tag{6}$$

• Heteroscedasticity test

The test of heteroscedasticity is shown in Table 6.

Table 6 ARCH Test

Heteroskedasticity Test: ARCH			
F-statistic	5.076780	Prob. F(1,32)	0.0312
Obs*R-squared	4.655489	Prob. Chi-Square(1)	0.0310
Test Equation:			
Dependent Variable: RESID^2			
Method: Least Squares			
Date: 11/22/16 Time: 09:21			
Sample (adjusted): 1981 2014			
Included observations: 34 after adjustments			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.35E+08	1.31E+08	1.799969	0.0813
RESID^2(-1)	0.534042	0.237018	2.253171	0.0312
R-squared	0.136926	Mean dependent var	4.12E+08
Adjusted R-squared	0.109955	S.D. dependent var	6.43E+08
S.E. of regression	6.07E+08	Akaike info criterion	43.34248
Sum squared resid	1.18E+19	Schwarz criterion	43.43227
Log likelihood	-734.8222	Hannan-Quinn criter.	43.37310
F-statistic	5.076780	Durbin-Watson stat	1.422312
Prob(F-statistic)	0.031235		

Data can be obtained from the above table: (n-p)R2=4.655489,Look up the table:χ2(p)=5.9915, (n-p)R2=4.655489<χ2(p)=5.9915,We accept the original hypothesis and there is no heteroscedasticity.

So the model is as follows: $Yi=-61134.297+1.84X1+1.073X2$ (7)

5. Conclusion and enlightenment

5.1 Main conclusions

Fixed assets investment is an important driving force of economic growth. Economic development depends on the amount of investment and the efficiency of capital utilization. Fixed assets investment is an important driving force of economic growth. It plays a leading role in economic operation and promotes economic growth with its multiplier effect.

Labor force has a certain role in promoting GDP, but its contribution to economic growth is negligible. This is because of China's huge labor structure, sufficient supply and strong liquidity,

which has a great impact on GDP. However, the content of human capital and high technology of labor force is low, and there are serious defects in the quality structure of labor force, which will directly affect the economic growth.

The pulling effect of consumption demand on economy. Consumption demand is the largest share and the smallest fluctuation among the three demand factors. It is an important pillar and the most important component of the national economy, and it is also the most obvious macroeconomic index reflecting the trend of spontaneous economic growth.

5.2 Enlightenment

Employment is the foundation of people's livelihood. To effectively promote employment and maintain the good momentum of economic growth has become an important topic in China at present and in the future. In view of the current situation that the number of labor force is huge and the overall quality is not high, on the one hand, we should strengthen the investment in employment training, improve the employability and reemployment ability of workers, and reduce the unemployment rate; on the other hand, we should strengthen the exchange of talents among different regions and promote the free flow of labor force, and prevent the disorderly entry of foreign floating personnel through reasonable technical barriers. At the same time, we should encourage flexible employment in order to reduce employment pressure.

The content of human capital and high technology of labor force is low, and there are serious defects in the quality structure of labor force, which directly affects the economic growth. Therefore, we should control the population, optimize the structure of labor force and improve the quality of labor force. The material capital also has a certain influence on China's economic growth. We should strengthen the scientific management of investment and improve the efficiency of investment.

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