An Empirical Analysis on the Influencing Factors of Anhui’s GDP

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Abstract: In recent years, the GDP of Anhui Province has grown rapidly and is in a relatively high position in the country. This is due to the active integration of Anhui Province into the integrated development of the Yangtze River Delta, which has led to the overall development of Anhui Province. But Anhui’s GDP development is not limited to this, in order to narrow the distance with the country and the Yangtze River Delta developed areas, Anhui Province actively seek ways to improve. This paper starts from the factors that affect the GDP of Anhui Province, uses the statistical data of Anhui Province from 2000 to 2019, and selects the household consumption level, gross industrial output value and fiscal expenditure as explanatory variables to establish a multiple linear regression model to quantitatively analyze the factors that affect the GDP of Anhui Province, and puts forward suggestions for the development and improvement of the GDP of Anhui Province in the future.

Keywords: Gross domestic product, influencing factors, econometric analysis.

1. Introduction
Gross domestic product refers to the final results of production activities of all resident units in a country (or region) within a certain period of time, calculated at market prices. Gross domestic product reflects the economic strength and market size of a country (or region), is the core indicator of national economic accounting, and is an important data to measure the economic status and development level of a country or region. As the most important indicator in macroeconomics, it is extremely necessary to study GDP for the economic development of a country or a region. From 2000 to 2020, after more than 20 years of active development and exploration, the GDP of Anhui Province has almost doubled from 312.533 billion yuan in 2000 to 3,868.063 billion yuan in 2020. This is due to the fact that Anhui Province has actively integrated into the integrated development of the Yangtze River Delta, and its
economic growth has been very rapid. It is one of the provinces with the fastest economic growth in the past ten years. Its national ranking has risen from 14th 10 years ago to 11th last year, and it is expected to go further this year. However, although the GDP of Anhui Province is in a steady upward trend, it is still far from the GDP of the provinces along the Yangtze River Delta, such as Jiangsu, Zhejiang, and Shanghai. Moreover, Anhui recently proposed that its GDP will reach 6.5 trillion yuan in the next five years, narrowing the gap with the whole country. Therefore, there is still a long way to go for the future development of Anhui’s GDP. Starting from the change mileage of Anhui’s GDP, this paper empirically analyzes the relevant factors affecting the development of Anhui’s GDP, and puts forward corresponding countermeasures and suggestions for the future development of Anhui’s GDP.

2. literature review
In Li Guochang and Li Zhen[1]’s "Empirical Study on Anhui’s Construction Industry’s GDP", it can be clearly shown that the construction industry has a strong driving effect on the steady growth of Anhui’s GDP and promotes the urbanization process of Anhui. In 2016, the GDP and the total output value of the construction industry reached 2,411.79 billion yuan and 604.71 billion yuan respectively, an increase of 2,131.24 billion yuan and 581.15 billion yuan respectively over 1998, both of which have maintained growth rates. In addition, the construction industry accounts for a large proportion of Anhui’s GDP. Li Guochang and Li Zhen believe that in Anhui Province, there is a strong positive interaction between the driving of the construction industry to GDP and the promotion of GDP to the construction industry. Wu Qiong and Liu Yongchao[2] confirmed in the "Empirical Analysis of the Factors Influencing GDP in Anhui Province Based on Econometric Models" that the year-end balance of savings deposits in urban and rural areas in Anhui, the total investment in fixed assets in Anhui, and the GDP in Anhui in the previous period will have a significant impact on Anhui. GDP has a decisive impact. The elasticities of the influencing factors calculated by taking the logarithm of these three are 0.273433%, 0.131822% and 0.462797%, which shows that the influence factors of these three factors on the GDP of Anhui are extremely significant. Liang Haonan[3] conducted a study on the total GDP of Anhui Province from 2000 to 2017 in "An Empirical Study on the Influencing Factors of GDP in Anhui Province - Based on Multiple Regression Analysis", sorted out the literature and selected the factors that are most likely to affect the total GDP, and made a qualitative analysis. Combined with quantitative analysis, the study concluded that changes in household consumption level, research and experimental development (R&D) expenditure, energy consumption, total import and export trade, and foreign direct investment are the main factors affecting Anhui’s GDP. Zhu Jiyu and Li Jian[4]
in "The Development of Tourism Economy Based on the Correlation Analysis of GDP and Tourism Revenue - Taking Tourism in Anhui Province as an Example" through quantitative analysis of GDP and tourism revenue, it is found that tourism revenue and GDP have a great mutual influence, the correlation between the two is higher than the resource abundance. Qin Chao and Zhu Linbo[5] studied the relationship between FDI (foreign investment) and GDP in "Empirical Analysis of the Relationship between FDI and GDP Growth in Anhui", through the time series balance test and cointegration test, as well as Granger causality test, etc. Methods, it is found that FDI (foreign investment) has a significant promoting effect on the GDP of Anhui Province.

Based on the above studies, most scholars either focus on one main aspect to study the influencing factors of GDP, or combine various aspects to analyze its impact on GDP. It can be seen that there are many factors affecting GDP, not an isolated factor. impacted results. In addition, there are still weak links in the research. The research on Anhui’s GDP is more biased towards qualitative analysis and less emphasis on quantitative analysis; when analyzing the impact of various influencing factors on Anhui’s GDP, it should not be ignored that each influencing factor may interact with each other characteristics of influence. In order to achieve the goal of Anhui's GDP growth in the next five years, and to seek more favorable factors for the development of Anhui’s GDP, a quantitative analysis is required.

### 3. Model settings

#### 3.1 Variable selection

Selected by the explanatory variable

This empirical analysis mainly analyzes the influencing factors of Anhui’s GDP, so this paper selects the GDP of Anhui Province as the explained variable

Explanatory variable selection

Macroeconomic Factors:

- **Resident consumption level**: Resident consumption level refers to the degree to which residents meet people's needs for survival, development and enjoyment in the process of consuming material products and labor services. Consumption will drive economic growth, so it is necessary to study the impact of residents' consumption level on Anhui’s GDP.

- **Gross industrial output value**: Gross industrial output value refers to the newly added value of industrial enterprises in the production process. As an important pillar industry in the national economy, industry should have a great impact on the GDP.

- **Fiscal expenditures**: Fiscal expenditures are public expenditures or government expenditures, which are the government’s control and use of social resources in the form of currency that are centralized from the private sector in order to perform its
own functions. Government spending will also drive consumption growth, thereby increasing GDP.

Policy factors: In the more than 20 years of Anhui's development, in order to increase the GDP of Anhui Province, the Anhui Provincial Government issued a series of documents to promote the increase of production activities and consumption in Anhui Province, which has a great impact on the rapid growth of Anhui’s GDP. Development, policy factors contributed. However, since policy factors are qualitative factors and are difficult to collect and define, dummy variable analysis is not performed on them.

3.2 Model settings
In order to verify the correlation between the explained variables and the above explanatory variables, we use the econometric model as:

\[ Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu_t \]  

(1)

Among them, \( Y \) is the GDP of Anhui Province (unit: 100 million yuan), \( X_1 \) represents the consumption level of residents in Anhui Province (unit: yuan), \( X_2 \) represents the gross industrial output value of Anhui Province (unit: 100 million yuan), \( X_3 \) represents the fiscal expenditure of Anhui Province (unit: ten thousand yuan).

4. Data Sources
In order to better estimate the model parameters and make the estimated parameters best fit the current situation, this paper constructs a time-series dataset of the GDP of Anhui Province from 2000 to 2019, and the data is mainly from the "Statistical Yearbook" of Anhui Province.

5. Model estimation and tuning
5.1 Model building

Model initial estimate
Use Eviews software to generate \( Y_t, X_1, X_2, X_3 \) and other data, and perform OLS regression on these data. The results are shown in Figure 1:

From the analysis of OLS regression results, it can be seen that the coefficient of determination is 0.9999, and the corrected coefficient of determination is also 0.9999, and the model fitting degree is very good. The F statistic is 44146.86, indicating that the regression equation as a whole is very significant. Both \( X_1 \) and \( X_2 \) passed the T test, indicating that these two variables have a significant impact on \( Y \). However, \( X_3 \) failed the t-test, indicating that there may be multicollinearity.

Multicollinearity test
Use Eviews software to test multicollinearity, and get the correlation coefficient matrix as shown in Figure 2:
It can be seen from the correlation coefficient matrix that the correlation coefficient between the explanatory variables is relatively high, and the model has serious multicollinearity.

Corrected for multicollinearity

Use the stepwise regression method to correct the multicollinearity, and do the unary regression of Y to X1, X2, and X3 respectively. The results are shown in Table 1:

<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter estimates</td>
<td>1.6273</td>
<td>2.9148</td>
<td>0.0005</td>
</tr>
<tr>
<td>T statistic</td>
<td>74.0740</td>
<td>24.7562</td>
<td>48.9697</td>
</tr>
<tr>
<td>R^2</td>
<td>0.9967</td>
<td>0.9715</td>
<td>0.9926</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>0.9965</td>
<td>0.9699</td>
<td>0.9921</td>
</tr>
</tbody>
</table>

Among them, the coefficient of determination adjusted by X1 as the regression
equation is the largest. Based on X1, other variables are added in sequence for stepwise regression. The results are shown in Table 2:

Table 2  Regression results with new variables added

<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>Adjusted R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1 X2</td>
<td>1.2294 (58.7078)</td>
<td>0.7406 (19.4918)</td>
<td>0.9998</td>
<td></td>
</tr>
<tr>
<td>X1 X3</td>
<td>1.0013 (15.2991)</td>
<td>0.0002 (9.6533)</td>
<td>0.9994</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Table 3, when X3 is newly added, the adjusted coefficient of determination has increased, but it is still slightly smaller than the adjusted coefficient of determination by newly added X2, and the newly added X2 equation not only improves the most, but also the t of each parameter. The test is more significant, so choose to keep X2.

Use Eviews software to perform stepwise regression test to verify the above calculation results. The results are shown in Figure 3:

![Figure 3 Eviews Stepwise Regression Results](image)

As can be seen from Figure 3, the above calculation results are correct, and the equation system should retain X1 and X2.
Thus, the regression result after correcting the severe multicollinearity effect is:

\[ Y = -867.4081 + 1.2294X_1 + 0.7406X_2 + u \] (2)
\[ T = (-15.5766) \ (58.7078) \ (19.4918) \]
\[ R^2 = 0.9999 \quad \text{Adjusted } R^2 = 0.9999 \]
\[ F = 60688.1400 \quad \text{DW} = 1.6530 \]

### 5.2 Model checking

**Economic significance test**

It can be seen from the revised model that the level of residents' consumption and the gross industrial output value are positively correlated with the gross domestic product of Anhui, which is in line with the general meaning of economics and people's general cognition.

**Statistical inference test**

**Goodness of fit test:** It can be seen from the revised model that \( R^2 = 0.9999 \), and the revised coefficient of determination is also 0.9999, which indicates that the overall fitting degree of the model is good and the accuracy is high.

**F test:** Set the significance level to 0.05, and find that the critical value of the degree of freedom (3, 16) is 3.24 in the F distribution table, and the F statistic in the model is 60888.14, which is much larger than 3.24, which indicates that the level of household consumption and the combined industrial output value has a very significant impact on the GDP of Anhui Province.

**T-test:** Set the significance level to 0.05, and find the critical value of 16 degrees of freedom in the t-distribution critical value table as 2.1199, while the t-statistic of \( X_1 \) is 58.7078 and the t-statistic of \( X_2 \) is 19.4918, both of which are greater than the critical value. Therefore, the null hypothesis is rejected, and it is proved that both the level of household consumption and the gross industrial output value have a significant impact on the gross domestic product of Anhui.

**Econometric Test**

**Multicollinearity test**

After the multicollinearity test and correction, the model removes the fiscal expenditure from the explanatory variables, which can achieve the purpose of reducing the multicollinearity, but this may cause setting bias.

**Heteroskedasticity test**

The heteroscedasticity test was carried out using the White test method by Eviews software, and the obtained results are shown in Figure 4:
As can be seen from the figure, the auxiliary regression model of White's test has nR²=2.2360. Under the condition that the significance level is set at 0.05, the critical value is 5.9915, and 2.2360<5.9915, and the null hypothesis is accepted. It can be seen from the test that there is no heteroscedasticity.
Autocorrelation test
From Figure 3, it can be concluded that after correcting multicollinearity, in the corrected model regression result, the DW value is 1.6530. And because n=20, k=2, under the condition of significance level \( \alpha = 0.05 \), \( d_{L} = 1.125 \), \( d_{U} = 1.538 \), \( 1.6530 = \text{DW} < 4 - d_{U} \), so there is no first-order autocorrelation, so there is no higher-order autocorrelation.

The revised model is then tested by B-G test, and the test results are as follows:
As can be seen from Figure 5, the accompanying probability corresponding to nR2 is greater than the significance level, and the accompanying probabilities corresponding to RESID(-1) and RESID(-2) are also greater than the significance level, which fails the significance test, which also proves that the adjusted model has no autocorrelation and is practical.

6. Conclusions and Recommendations
Based on the data from 2000 to 2019, this paper conducts an empirical analysis of Anhui’s GDP. It can be concluded that the two factors that have the greatest impact on Anhui’s GDP are the level of residents’ consumption and the total industrial output. Under the condition that other variables remain unchanged, for every 1 yuan increase in household consumption level, on average, the GDP of Anhui Province will increase by 122.94 million yuan; under the condition that other variables remain unchanged, for every increase in industrial output value 100 million yuan, the GDP of Anhui Province increased by 74.06 million yuan on average. Through empirical analysis of Anhui’s GDP in the past 20 years, we can draw the following relevant inspirations and suggestions:

(1) The level of household consumption is an important indicator reflecting the overall economic activity. Consumption has a great pulling and stimulating effect on GDP. Therefore, it is necessary to improve the level of household consumption and boost the GDP of Anhui Province. Therefore, in this province, it is necessary to continuously adjust the relationship between investment and consumption, optimize the consumption environment, introduce relevant policies to regulate the market, at the same time protect the wages of laborers, introduce policies to increase the income of laborers, and ensure and improve the consumption capacity of residents. Of course, one cannot ignore the other. While improving the consumption level of urban residents, it is also necessary to help rural residents to improve their consumption level, especially for Anhui Province’s goal of reaching a GDP of 650 million in the next five years. result.

(2) The gross industrial output value accounts for a large proportion in the national economy, and industry is the dominant force of the national economy. Therefore, in
order to increase the GDP of Anhui Province, attention should be paid to the development of industry. Anhui Province should continue to vigorously implement and strengthen the strategy of industrializing the province, and continuously strengthen the leading position of industry. At the same time, the construction of infrastructure will be strengthened to provide a foundation for industrial development. Industrial enterprises in this province can actively utilize the abundant coal, mineral resources and other resources in Anhui province, and give full play to the resource endowment in this province. Of course, the government should also introduce relevant support and protection policies to promote the development of industries in Anhui Province, thus playing a role in driving the development of GDP.

(3) Although the impact of fiscal expenditure on Anhui's GDP is not as significant as the level of residents' consumption and total industrial output, it also has a specific role. The government can appropriately increase fiscal expenditure, drive the increase in consumption through fiscal expenditure, and strengthen infrastructure construction, thereby driving the growth of GDP.

(4) The government can issue relevant policies to ensure and promote the growth of GDP from various perspectives such as consumption, investment, import and export, in order to achieve the goal of GDP reaching 650 million yuan in the next five years and narrow the gap with the national average, to shorten the distance with the developed cities around the Yangtze River Delta.

(5) Pay attention to the protection of ecological civilization. In the process of economic development, it will inevitably have a certain impact on the environment, especially in the process of industrial development, the impact on the environment has always been greater. In the process of driving the increase of GDP, it is necessary to strengthen the construction of ecological civilization, promote the green economy, adhere to sustainable development, and minimize environmental pollution when developing industries. We firmly believe that lucid waters and lush mountains are invaluable assets. Thereby prompting the whole province to make joint efforts to build an Anhui with rapid economic development and beautiful environment.

References

[4] Zhu Jiyu, Li Jian. Looking at the development of tourism economy based on the correlation analysis of GDP and tourism revenue——Taking tourism in Anhui Province as an example