

A Preliminary Empirical Study on the Influencing Factors of China's Economic Growth

Yilang Luo^{1,*}, Wenbo Li²

¹School of Finance, Anhui University of Finance and Economics, Bengbu, China

²School of Economics and Resource Management, Beijing Normal University, Beijing, China

Abstract: Many countries or regions around the world have seen their economic growth slow in recent years due to the impact of the COVID-19 pandemic. It is of great significance to the world that China's economy is the first to recover from the impact of COVID-19. This paper selects the data of various economic development indicators of China from 2002 to 2021, establishes the multiple linear regression model of economic growth, and makes a preliminary analysis of the influencing factors of China's economic growth. This paper explores the influence of export, consumption and investment on China's economic growth. Finally, it puts forward relevant suggestions for further high-quality sustainable development of China's economy.

Keywords: COVID-19, Economic growth, Influencing factors, High-quality development.

1. Introduction

In recent years, the COVID-19 pandemic has brought many risks and challenges to the global economy. The global economy continues to slow down and the economic environment is complex and volatile. As the second largest economy in the world, the epidemic continues to occur frequently in China, and both the demand side and the supply side of the domestic economy have suffered significant negative impacts, and the economy is facing considerable downward pressure (Chen and Guo, 2020). In order to stabilize the domestic economy as soon as possible and further stabilize and develop the economy in a good way, it is of great practical significance to make an empirical analysis on the influencing factors of our economic growth. This paper selects the "three carriages" which promote the economic growth in the macroeconomic theory, namely export, consumption and investment, analyzes which indicator plays a more significant role in the process of our country's high-quality economic growth, and gives the focus on the course of our economic development in the future.

2. Literature Review

China is the first major economy to recover after the economic slowdown caused by the COVID-19 (Wang and Zhang, 2021). At present, a number of scholars have done research on how to promote China's economic growth. Wang (2022) points out that for a country, national consumption can promote domestic demand, thus enhancing internal impetus, stimulating consumption and ultimately achieving the purpose of economic growth. However, at the present stage, the research on our economic growth mainly focuses on factors such as material, system and model, while the attention on national consumption is seriously insufficient. Fan (2022) held the view that the international economic and trade field is constantly expanding, and China's foreign trade volume is also growing. In the context of the continuous development of the global COVID-19 pandemic, the international market is complex and changeable, and Chinese foreign trade enterprises will face huge development opportunities and challenges. According to the current trend

of international economic and trade development, our country should focus on supporting advantageous industries, give full play to industrial advantage, enhance brand influence and international reputation of local international transnational corporations, increase dynamics of foreign trade and investment to combine them with national development strategy, effectively safeguard our country's economic interests in the international market and raise our international position in foreign trade. What's more, Internet Technologies have broken the boundaries of traditional geographical space, which has helped accelerate the decline in energy consumption intensity through economic growth, research and development investment, human capital, financial development and industrial structure upgrading (Ren et al., 2021).

3. Research Design

3.1. Index selection

This study refers to many scholars' research on economic growth, and makes a preliminary study on the factors that promote China's economic growth (Ren et al., 2014; Liu et al., 2021; Zhao et al., 2022).

3.1.1. Gross domestic product

Gross domestic product (GDP) is one of the most important indicators to measure a region's economic situation. Gross Domestic Product (GDP) is the final result of production activities of all resident units of a country in a specific period. It is the core index to measure the economic development of a country. In the course of my development in recent decades, the GDP growth rate has been among the highest in the world. In this paper, China's GDP from 2002 to 2021 is selected as one of the main research indicators to better study economic development.

3.1.2. Total exports

Total exports usually refer to the total value of a country's foreign trade exports. To be specific, the total amount of export refers to the total value of a country's exports to foreign countries in a certain period, which is called the total amount of export. This paper studies the total export volume within the scope of China. By taking the total export volume as one of the research indicators, we can specifically explore the role

of export and international trade in economic development from 2002 to 2021. Generally, the higher the total export volume, the more likely to have a trade surplus, that is, in international trade, the more easily funds flow to our side, so generally, the higher the total export volume, the more active the economic development, the higher the level of economic development.

3.1.3. Household consumption level

National consumption is directly related to the living standard and the scale of domestic demand. If the consumption level of residents in a region or country is high, the country or region will have a higher degree of affluence. On the economic level, the country's economic development is relatively good. On the other hand, a high level of consumer consumption means a higher income, which means that the enterprises in the country have better earnings and the national economic development is stable. Among all kinds of statistical data and data, residents' consumption level is the most direct data showing domestic consumption demand, as well as one of the important indicators to study changes in the retail market and reflect economic and economic degree. In this study, the consumption level of Chinese residents is selected. Through regression analysis, the relationship between it and economic growth can be studied to see its specific role in economic growth. Generally speaking, the higher the average consumption level, the more prosperous the economy, and the higher the living standard and happiness of the people.

3.1.4. Total social investment in fixed assets

Social investment in fixed assets is a comprehensive index reflecting the scale, speed, proportion and direction of

investment in fixed assets. It represents the workload of construction and purchase of fixed assets in monetary form. In this paper, China's social fixed asset investment in the past 20 years is selected as one of the research indicators, focusing on the driving effect of investment on regional economy to provide directional guidance for economic development.

3.2. Data sources

In this study, various kinds of economic indicators in China from 2002 to 2021 are selected as sample size, and the data used are from China Statistical Yearbook produced by National Bureau of Statistics of China.

3.3. Variable selection

3.3.1. Explained variable

In this study, GDP from 2002 to 2021 is selected as explanatory variable Y.

3.3.2. Explanatory variables

According to the expression of the above index selection, the following indexes are selected as explanatory variables: total export (X1), resident consumption level (X2), total social fixed asset investment (X3), μ is the random error term.

4. Model Construction and Test

4.1. Correlation chart and trend chart analysis

The trend chart for each variable is as shown in Figure 1. From Figure 1, we can see that each explanatory variable changes in the same direction as the explained variable, and the gap becomes larger as the time goes by.

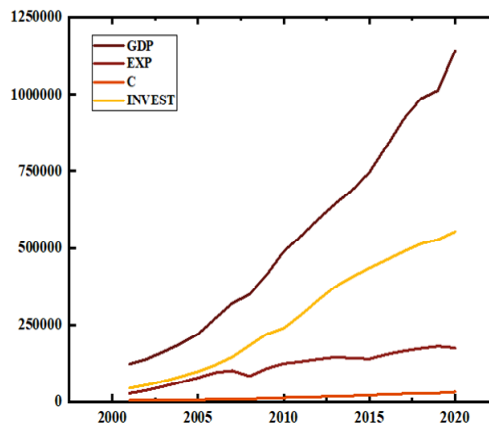


Figure 1. Trend chart of explanatory variables and explained variables

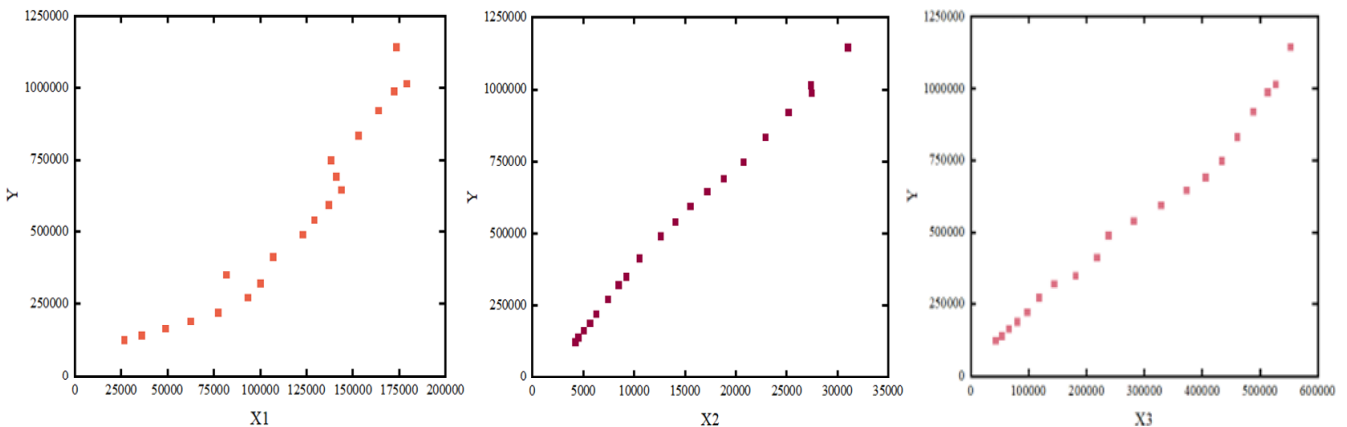


Figure 2. Correlation graph between each explanatory variable and the explained variable

The correlation graph between each explanatory variable X1, X2, X3 and the explained variable Y is shown in Fig. 2, and the results show that there is a positive and high linear correlation between each explanatory variable and the explained variable. Therefore, the linear regression model is selected in this paper, and the model is preliminarily defined as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu.$$

4.2. OLS parameter estimation

The least squares estimation of GDP and other index data in Table 1 is carried out in this paper. The parameter estimation results are shown in Table 3.

Table 3. Results of multiple regression estimation

Variable	Y
X1	0.8995***
X2	32.8191***
X3	-0.0133
R ²	0.9988
Prob(F-statistic)	0.0000
N	20

Note: Standard errors are in parentheses. *, **, *** indicate significant at the statistical level of 10%, 5%, and 1% level, respectively.

According to Table 3, the results estimated by the multiple linear regression model can be obtained as follows:

$$\begin{aligned} \hat{Y}_i &= -45059.31 + 0.8995X_1 + 32.8191X_2 - 0.0133X_3. \\ s &= (11249.25) (0.2078) (2.2101) (0.1295) \\ t &= (-4.0055) (4.3296) (14.8497) (-0.1026) \\ R^2 &= 0.9988 \quad \bar{R}^2 = 0.9986 \quad F = 4599.533 \quad D.W. \\ &= 0.7889 \quad n = 20 \end{aligned}$$

According to the results of the model estimation, the decidable coefficient $R^2 = 0.9988$ and the modified decidable coefficient $\bar{R}^2 = 0.9986$, the model as a whole fits the sample well; when the significance level $\alpha = 0.05$, the value of the F-statistic of the model is 4599.533, which is much larger than its critical value, and the regression equation is significant. That is, the total exports of China, the level of consumption of the population, and the amount of investment in fixed assets of the whole society have a significant impact on China's gross domestic product, i.e., economic growth; however, the parameters of the explanatory variable X_3 are negative and cannot pass the economic significance test, and when the significance level $\alpha = 0.05$, the absolute value of the t-statistic value of the explanatory variable X_3 is less than 2 and the p-value is $0.9195 > 0.05$. The significance test cannot be passed. Therefore, the established model needs to be revised.

4.3. Model test and correction

4.3.1. Test and correction of multicollinearity

The test results of correlation coefficient are shown in Table 2. It can be seen that there is a high linear correlation among all explanatory variables, and the minimum value is 0.9379, which is bigger than 0.8. This indicates that the model has severe multicollinearity.

Table 2. Correlation coefficient matrix table

Correlation	Y	X1	X2	X3
Y	1	0.9519	0.9984	0.9914
X1	0.9519	1	0.9379	0.9574
X2	0.9984	0.9379	1	0.9892
X3	0.9914	0.9574	0.9892	1

To further verify, test the variance inflation factor of the

model, as shown in Table 3.

Table 3. VIF calculation results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
X1	0.0432	91.6748	12.5958
X2	4.8845	197.2648	48.8522
X3	0.0168	255.0254	70.5662

Experience shows that if the variance inflation factor is greater than or equal to 10, there is severe multicollinearity between this explanatory variable and other explanatory variables. It can be seen from Table 3 that the variance inflation factors of the three explanatory variables are 12.5958, 48.8522 and 70.5662 respectively, all of which are much higher than 10, indicating the existence of serious multicollinearity. In this paper, stepwise regression is used to correct the multicollinearity among explanatory variables in the model.

As can be seen from Table 2, the simple correlation coefficient between residents' consumption level (X2) and the explained variable GDP (Y) is the highest, indicating that residents' consumption level is the most important factor affecting GDP. Therefore, a basic unary regression model is established with X2 as the explanatory variable, and then the remaining explanatory variables are introduced into the unary regression equation respectively. The results of stepwise regression analysis are shown in Table 5.

Table 5. Stepwise regression results

Variable	Y
X1	0.8871***
X2	32.6125***
R ²	0.9988
Prob(F-statistic)	0.0000
N	20

Note: Standard errors are in parentheses. *, **, *** indicate significant at the statistical level of 10%, 5%, and 1% level, respectively.

According to the results obtained after stepwise regression, when the significance level $\alpha=0.05$, based on the unary regression equation of X2, explanatory variable X3 cannot pass the test. Therefore, variable X3 is removed and the final equation obtained by stepwise regression analysis is:

$$\hat{Y}_i = -44316.16 + 32.6125X_1 + 0.8871X_2.$$

$$s = (8353.441) \quad (0.8845) \quad (0.1637)$$

$$t = (-5.3051) \quad (36.8723) \quad (5.4175)$$

$$R^2 = 0.9988 \quad \bar{R}^2 = 0.9987 \quad F = 7325.679 \quad D.W. = 0.7769 \quad n = 20$$

The model is improved after modification and the multicollinearity of the model can be eliminated. The coefficient of determinability and the adjusted coefficient of determinability are both greater than 0.99, indicating that the model has a high degree of fitting to the samples and has passed the test of economic significance. Moreover, F statistic is 7352.679, and its adjoint probability is close to 0, indicating

that the overall linear relationship of the model is significant, indicating that each explanatory variable has a significant impact on the explained variable gross domestic product Y.

4.3.2. Test and correction of autocorrelation

We use DW test to check whether the model has autocorrelation. Because $n=20$, $k=2$, when the significance level is 0.05, $dL=1.100$, $dU=1.1537$, and $DW=0.7769 < dL$ can be obtained from the table. Therefore, it is preliminarily judged that there may be a first-order positive correlation in the model. In order to further verify the existence of high-order autocorrelation in the model, the partial correlation coefficient test method was used to test the model.

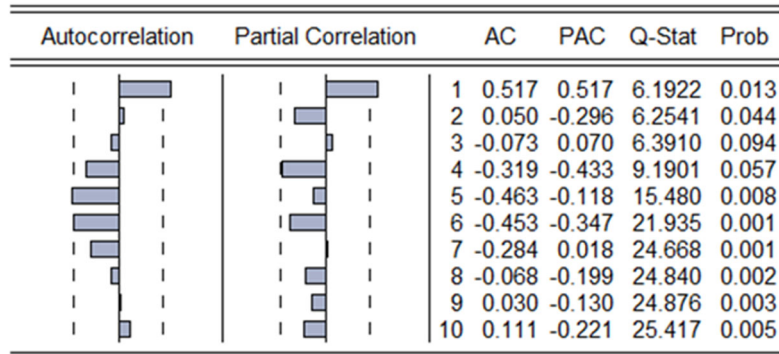


Figure 3. Partial correlation coefficient test results

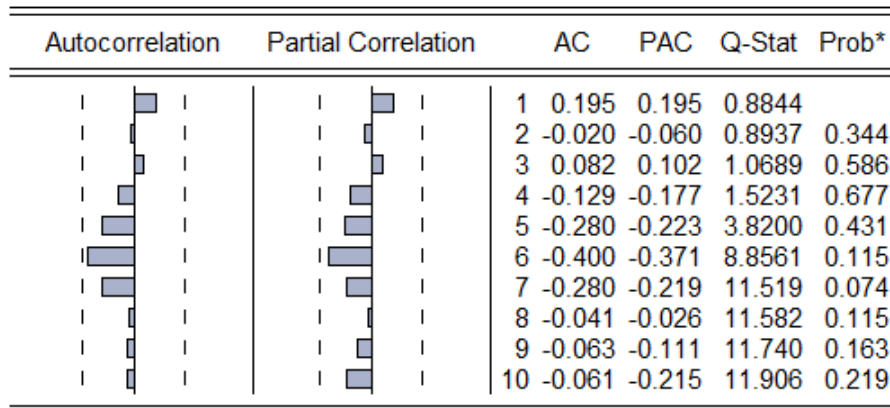
It can be seen from the partial correlation coefficient histogram in Fig. 3 that the straight squares in the first phase exceed the dashed line and the P-value is less than 0.05, so it can be determined that the model has first-order autocorrelation.

Since the above tests show that there is a first-order autocorrelation in the model, it is necessary to apply the

generalized difference method to add AR(1) to the model for correction. We can get the revised model as follows:

$$\hat{Y}_i = -36300.89 + 0.6240X_1 + 34.1609X_2 + [AR(1) = 0.7235].$$

$$R^2 = 0.9993 \quad F = 7748.450 \quad D.W. = 1.5335$$



*Probabilities may not be valid for this equation specification.

Figure 4. Test results of the modified model by partial correlation coefficient method

It can be seen from Fig. 4 that the histogram of partial correlation coefficient shows that the straight square in the first phase no longer exceeds the dotted line and the P-value of Q statistic is also greater than 0.05, so it can be determined that the modified model eliminates the first-order autocorrelation.

4.3.3. Test of heteroscedasticity

In order to verify whether the modified model still has heteroscedasticity, the residual diagram of the model is drawn as shown in Figure 5.

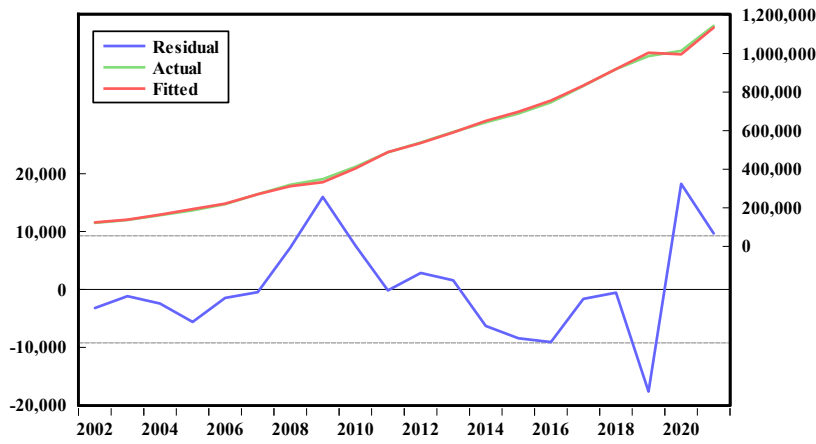


Figure 5. Residual trend chart

It can be roughly seen from Fig. 5 that the residuals do not gradually increase over time, so there may be no heteroscedasticity in the model. For further verification, White test and ARCH test were conducted. From the results of the White test, it can be known that $nR^2 = 11.3891 < \chi_{\alpha}^2(p) = \chi_{0.05}^2(10) = 18.307$, with a concomitant probability of 0.3280 greater than the given 0.05; meanwhile, from the results of the ARCH test, it can be known that the results showing to a lag of one period, $(n-p)R^2 = 2.9697 < \chi_{\alpha}^2(p) = \chi_{0.05}^2(1) = 3.841$. In summary, there is no hetero-skedasticity in the model. Through the above series of tests, we determined the final model as follows:

$$Y = -36300.89 + 0.6240X_1 + 34.1609X_2 + [AR(1) = 0.7235].$$

$$(13662.39) \quad (0.1921) \quad (1.1247) \quad (0.1841)$$

$$(-2.6570) \quad (3.2486) \quad (30.3747) \quad (3.9292)$$

$$R^2 = 0.9993 \quad \bar{R}^2 = 0.9992 \quad F = 7748.450 \quad P(F) = 0.0000 \quad D.W. = 1.5335$$

5. Conclusions and Suggestions

Based on the estimated and revised economic growth model, we know that the total export and retail sales of consumer goods have a significant influence on the GDP of China. In addition, if the least squares estimate of the total social fixed assets investment is carried out separately, it is found that the total social fixed assets investment also has a significant impact on the GDP. Based on the existing research and literature, and combined with the results of this study, this paper proposes the following policy recommendations on how to further promote economic growth and high-quality economic development in China.

5.1. Expanding export trade and driving economic growth through international trade

From the conclusion of this paper, export trade can effectively drive economic growth. Expanding foreign trade further can effectively export all kinds of industrial manufactured goods in our country. Our country should actively exert its own advantages, expand export trade, while improving quantity, further optimize the level of manufacturing, output a large number of high-quality products, so as to effectively occupy the international market, promote the domestic and even the world economic growth and high-quality development.

5.2. Promoting personal consumption and promoting economic vitality through consumption

National consumption level is an important factor that affects economic growth and embodies economic vitality. If we want to promote the high-quality growth of our economy, it is indispensable to promote the effective improvement of residents' consumption level, so as to promote the economic development through consumption. The essence of consumption to promote economic development is to make the market have more wealth, so as to promote the expansion of production, from the scale of the whole society is the process of increasing wealth.

5.3. Further improving infrastructure and promoting efficient economic development

Investment in infrastructure, which allows businesses and businesses to operate more efficiently, increases productivity and better serves economic goals. If China continues to improve the quality of infrastructure construction and services, better facilitate production activities and ensure a stable and orderly production order, it can optimize the economic development model and promote high-quality and sustainable economic growth.

Acknowledgment

This paper was supported by the National Innovation and Entrepreneurship Training Program for Undergraduates in China (202210378138) and the Undergraduate Research Innovation Fund Project of School of Finance of Anhui University of Finance and Economics (JR2022004).

References

- [1] Chen, S., and Guo, J. 2020. Analysis of the economic impact of COVID-19: long-term perspective and short-term response. *Economic Theory and Management* 8, 32-44. (in Chinese)
- [2] Fan, S. 2022. Development trend of international economy and trade and strategic choice of China's foreign trade. *China Business Theory* 20, 31-33. (in Chinese)
- [3] Liu, D., Ji, X., and Zhu, L. 2021. Analysis of temporal changes and influencing factors of marginal propensity to consume of urban and rural residents. *Statistics and Decision* 37(14), 117-120. (in Chinese)
- [4] Ren, S., Hao, Y., Xu, L., Wu, H., and Ba, N. 2021. Digitalization and energy: How does internet development

- affect China's energy consumption? *Energy Economics* 98, 105220.
- [5] Ren, S., Yuan, B., Ma, X., and Chen, X. 2014. International trade, FDI (foreign direct investment) and embodied CO2 emissions: a case study of China's industrial sectors. *China Economic Review* 28, 123-134.
- [6] Wang, J. 2022. On the relationship between economic growth and national consumption. *Exhibition Economics* 12, 21-23. (in Chinese)
- [7] Wang, Q., and Zhang, F. 2021. What does the China's economic recovery after COVID-19 pandemic mean for the economic growth and energy consumption of other countries? *Journal of Cleaner Production* 295, 126265.
- [8] Zhao, S., Cao, Y., Feng, C., Guo, K., and Zhang, J. 2022. How do heterogeneous R&D investments affect China's green productivity: Revisiting the Porter hypothesis. *Science of the Total Environment* 825, 154090.