

Analysis of Factors Affecting Total Imports and Exports of Jiangsu Province Based on Multiple Linear Regression Model

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Abstract: In the past 40 years of reform and opening up, China's economy has maintained rapid development and growth. Import and export trade is the engine of economic growth. In recent years, Jiangsu's import and export trade has expanded rapidly, becoming a major foreign trade province, and has achieved leapfrog development and connotative improvement in terms of trade methods, business entities, trading partners, and import and export structure. The glorious achievements in the development of Jiangsu's import and export trade have benefited from the country's reform and opening up policies and institutional changes, as well as the results of comprehensive promotion of factors such as manufacturing and foreign investment. The development of import and export trade has played an important role in Jiangsu's economic growth, industrial structure upgrade and employment stability. Since 2000, Jiangsu's regional GDP has been in the forefront among the selected 30 provinces and cities. The total value of imports and exports of goods accounted for more than 1/4 of the country's total imports and exports. Therefore, this paper focuses on the development of Jiangsu Province. An empirical study of the factors affecting the total export value will provide a reasonable basis for the rational formulation of policies to promote the development of Jiangsu's import and export trade.

1. Influencing factors of Jiangsu's total imports and exports

Since 2000, Jiangsu has seized the three historical opportunities of China's accession to the WTO, the recovery and growth of the world economy, and the transfer of international industries. It has developed and expanded its operating entities, diversified and expanded international markets, optimized its trade structure, and continuously strengthened its international competitiveness. Jiangsu's import and export trade has developed rapidly. In 2003, 2005, and 2007, the total value of Jiangsu's import and export exceeded US \$ 100 billion, US \$ 200 billion, and US \$ 300 billion. Although the subsequent global financial crisis has slightly delayed the pace of Jiangsu's foreign trade development, in 2010 and 2011 after the crisis, the total value of Jiangsu's foreign trade import and export crossed two steps of US \$ 400 billion and US \$ 500 billion. At this stage, all kinds of special customs supervision areas and venues in Jiangsu are set up. China's first comprehensive bonded zone, the Suzhou Industrial Park Comprehensive Bonded Zone, was established. Since then, Yangzhou, Changzhou, Changshu, Wujiang, Wuzhong, Huaian and other export processing zones and Zhangjiagang Bonded Port Zone have been established successively. Subsequently, the Chinese economy entered a new normal, and Jiangsu's foreign trade entered a new stage of pursuing high-level and high-quality development. At this stage, the total value of Jiangsu's foreign trade imports and exports fluctuated at a high level of more than 500 billion U.S. dollars, which increased to a record 661.92 billion U.S. dollars in 2018, an increase of nearly 14 times compared with 2000 before joining the WTO.

Many domestic and foreign scholars have conducted in-depth research on the influencing factors of Jiangsu's import and export trade, and believe that our province's export trade is significantly affected by its own FDI, GDP, and labor force; while import trade is affected by its FDI, GDP, and domestic investment. Significantly affected. Based on the characteristics of Jiangsu's import and

export trade and its own development rules, this paper explores the impact of Jiangsu's regional GDP, investment in fixed assets, foreign investment, and exchange rates on Jiangsu's total imports and exports.

(1) Impact of regional value on total imports and exports of Jiangsu Province

Since 2000, Jiangsu's dependence on foreign trade has shown a volatile growth trend, and its total import and export volume has also shown a volatile growth. Due to the rapid development of science and technology, the production efficiency and production capacity of enterprises have been greatly improved. At the same time, the quality of products has also reached international standards, laying a solid foundation for the development of Jiangsu's import and export trade. . At the same time, the state is also actively implementing fiscal policies to stabilize prices by adjusting tariffs and giving fiscal and tax subsidies, so that the development of Jiangsu's import and export trade is competitive in the country.

(2) Impact of the whole society's investment in fixed assets on the total imports and exports of Jiangsu Province

Investment in fixed assets is an important means for the society to increase fixed assets, expand production scale, and develop the national economy. It is also an important condition for improving the people's material and cultural living standards. As an important part of the total capital formation, fixed asset investment has played a decisive role in the growth of Jiangsu's GDP, and its annual investment has also continued to increase. Investment is the driving force for socio-economic development. The development of export trade promotes consumption and investment demand in the region, which indirectly increases the demand for import and export in the region.

Since the reform and opening up, Jiangsu's fixed assets have maintained a high growth rate. In order to actively adapt to the complex and ever-changing domestic and foreign environment, the investment field of Jiangsu Province resolutely implements a series of policies and policies of the central government, takes the "rich people and strong provinces" and "two firsts" as a whole to accelerate the pace of fixed asset investment. It played an important role in promoting the sustained acceleration of Jiangsu's economy. From 2000 to 2018, Jiangsu's investment in fixed assets increased from 256.99 billion yuan to 55.95416 billion yuan, a stage of rapid economic and social development in Jiangsu Province, and a stage of continuously expanding investment scale.

(3) Impact of foreign-invested enterprises on the total imports and exports of Jiangsu Province

Jiangsu Province is one of the fastest and most productive provinces in the country's open economy. The economic aggregate of Jiangsu Province has maintained rapid double-digit growth for 15 consecutive years, and is much higher than the national average. Since the reform and opening up, Jiangsu Province has attracted a large number of foreign direct investment with its superior location advantages, good investment environment and strong economic strength. Especially since 2000, with the acceleration of the process of economic globalization, the level of opening up of Jiangsu Province has been continuously improved, and the introduction of foreign direct investment has achieved leapfrog development. Jiangsu has become one of the regions where foreign investment is most concentrated in China.

The establishment of foreign-invested enterprises in Jiangsu has not only brought advanced technology and equipment to Jiangsu's import and export industry, but also brought advanced management systems and operating concepts to Jiangsu's enterprises. The more advanced foreign concepts and mature business practices have spread through foreign direct investment, which has played a good role model for local enterprises in Jiangsu, which has helped local enterprises in Jiangsu learn and innovate, and improved the competitiveness of Jiangsu enterprises. The use of foreign direct investment will inevitably lead to the accumulation and transfer of scarce factors such as capital and technology in Jiangsu, which will cause the proportion of the factors to change. The rational use of foreign direct investment will help Jiangsu's industry to shift from labor-intensive to capital-intensive This kind of change is conducive to the optimization and upgrading of Jiangsu's import and export industry and to the technological progress of the import and export industry.

(4) Impact of exchange rate on total imports and exports of Jiangsu Province. The exchange rate is an important factor affecting a country's exports. Under normal circumstances, when the local

currency appreciates against foreign currencies, the export volume will decrease. On the contrary, when the local currency depreciates against the foreign currency, the export volume will increase. The world economy is converging at an alarming rate, the economies of various countries are intermingled with each other, and economic activities are frequent. The exchange rate has played a huge role as a link to economic interaction, and the exchange rate has gradually become an important macroeconomic variable of a country. A perfect exchange rate system is bound to bring positive benefits to a country's economy.

2. Theoretical analysis

(1) Data source

The data in this article are from "Jiangsu Statistical Yearbook" (2000-2018). X1-X4 represent the regional GDP (100 million yuan), the total investment in fixed assets (100 million yuan), and the total investment of foreign-invested enterprises (US \$ million).), RMB to US dollar exchange rate (USD = 100 yuan) (Yuan), Y represents the total value of imports and exports (100 million yuan).

Table 1. Index values of explanatory variables and explained variables

Index Years	GDP (100 million yuan) X1	Total investment in fixed assets (100 million yuan) X2	Total investment of foreign-invested enterprises (US \$ million) X3	RMB to USD exchange rate (USD = 100) (Yuan) X4	Total imports and exports (RMB billion) Y
2000	8553.69	2569.97	75004	827.84	3778.09
2001	9456.84	2823.2	92001	827.7	4250.65
2002	10606.85	3450.12	125484	827.7	5819.14
2003	12442.87	5233	150014	827.7	9408.46
2004	15136.78	6557.05	216981	827.68	14141.49
2005	18769.32	8165.38	265720	819.17	18672.24
2006	21965.61	10069.22	324300	797.18	22639.51
2007	26296.15	12268.06	382030	760.4	26588.98
2008	31357.00	15300.55	415930	694.51	27243.4
2009	34905.98	18949.88	444400	683.10	23145.64
2010	41962.18	23184.28	508106	676.95	31531.857
2011	49788.20	26692.62	572851	645.88	34861.954
2012	54870.91	30854.2	625000	631.25	34598.37
2013	60690.44	36373.32	666376	619.32	34114.871
2014	66123.71	41938.62	718131	614.28	34630.772
2015	71255.93	46246.87	782154	622.84	33983.022
2016	77350.85	49663.21	879868	664.23	33634.8
2017	85869.76	53277.03	965818	675.18	40022.1
2018	92595.40	55994.16	1056042	661.74	43802.4

(2) Build a model

Assume that the regression model is $Y = C_0 + C_1X_1 + C_2X_2 + C_3X_3 + C_4X_4 + \mu$ (μ is the error term). First, the correlation coefficients between the explanatory variables are calculated to obtain a correlation coefficient matrix. It can be seen from Table 2 that the correlation coefficients between the explanatory variables are high, which proves that serious multicollinearity does exist.

Table 2. Correlation coefficient matrix

	X ₁	X ₂	X ₃	X ₄
X ₁	1.000			
X ₂	0.997	1.000		
X ₃	0.994	0.987	1.000	

X ₄	-0.851	-0.840	-0.846	1.000
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For this reason, a stepwise regression method is used to solve the multicollinearity problem. First, make a unilabiate linear regression of Y against X1, X2, X3, and X4. The results show that the adjusted coefficient (R2) after adding the equation of X3 is the largest, which is 0.8792. Therefore, based on X3, other variables are added in order to gradually regression. After comparison, the declining coefficients of the equations after adding X2 and X4 gradually improved the most, and the t test of each parameter was significant, so choose to keep. Finally, after X1 was added, the determination coefficient did not improve, so it was eliminated.

Finally, the variables X2, X3, and X4 remain. The regression model estimation results are as follows:

$$Y = 44190.39 - 1.07X_2 + 0.09X_3 - 52.94X_4 + \mu$$

$$(4.70) \quad (-6.22) \quad (8.47) \quad (-4.75)$$

$$R^2 = 0.9752 \quad \text{Adjusted } R^2 = 0.9702$$

$$F = 196.25 \quad DW = 1.811$$

(3) Model inspection

1. Normal distribution test

One of the basic assumptions of the multiple linear regression model is that the error terms follow a normal distribution. This paper uses the swilk test, with a p-value of 0.0704, which is greater than 0.05, and accepts the null hypothesis, that is, it conforms to the normal distribution.

2. Test of homogeneity of variance

For a multiple linear regression model, all error terms need to satisfy the conditions with the same variance. In this paper, a hettest is used. The p-value is 0.8195, which is greater than 0.05. The null hypothesis is accepted, that is, all error terms have the same variance.

3. Independence test

The independence test means that for all observations, their error terms are independent of each other. By plotting the residual sequence diagram (see Figure 1), it can be seen that there is no autocorrelation in the equation.

3. Conclusion and suggestion

(1) Model-based conclusions

Based on the multiple linear regression model established based on the total import and export volume of Jiangsu Province and related data from 2000 to 2018, Jiangsu's total import and export trade volume is significantly positively correlated with the total investment of foreign-invested enterprises, and significantly negatively correlated with the total investment in fixed assets of the whole society. The exchange rate of RMB to USD is significantly negatively correlated, and there is a significant spontaneous foreign trade constant. With other conditions unchanged, the total investment of foreign-invested enterprises increased by 10,000 US dollars, and the total value of imports and exports increased by an average of 109.3 million yuan; the total investment in fixed assets of the whole society decreased by 100 million yuan, and the total value of imports and exports increased by an average of 102 million yuan; the RMB exchange rate Reduced by 1 percentage point, the total volume of imports and exports decreased by an average of 5.335 billion yuan.

According to theoretical analysis, the regional GDP has a great impact on the total import and export trade of Jiangsu Province, but there is a large economic gap between Jiangsu's southern Jiangsu and northern Jiangsu. The economic development history of southern Jiangsu is higher than that of central and northern Jiangsu. The strength foundation is good, and the city's economic foundation is relatively good, especially the industrial foundation is superior to that of central and northern Jiangsu. However, northern Jiangsu has always been dominated by agriculture and fishery, and its industrial foundation is relatively weak. Second, southern Jiangsu is close to the core of the Yangtze River Delta, and Shanghai and Hangzhou are closely connected. The development of such adjacent areas cannot be ignored. Even though the GDP of southern Jiangsu is related to the total

imports and exports of Jiangsu Province, but it is not obvious in Central and Northern Jiangsu, this may be the reason why the total import and export trade of Jiangsu is not related to the GDP.

(2) Policy recommendations

1. Promote North-South linkage and promote common regional development. Further promote the joint development strategy of the southern and northern Jiangsu urban agglomerations. The Jiangsu Provincial Government strengthened exchanges and cooperation through classified guidance, guided the transfer of industries, funds, and technology from south to north, and accelerated the revitalization of northern Jiangsu. Southern Jiangsu should follow the laws of economic development and connect some industries to northern Jiangsu. At the same time, Northern Jiangsu must seize the opportunity, actively strengthen communication and cooperation with Southern Jiangsu, actively undertake the industrial transfer of Southern Jiangsu, seek the best points of labor division and cooperation, strive to promote the development of northern Jiangsu, focus on the adjustment of northern Jiangsu's industrial structure, and take effective Measures will be taken to accelerate the modern service industry, highlight the development of advanced manufacturing and productive service industries, continue to narrow the gap between the rich and the poor in southern and northern Jiangsu, and realize the rapid development of Jiangsu's overall economy.

2. Reduce investment in fixed assets

At present, the problem of overcapacity in our country is becoming increasingly daunting, and capitalist countries are also facing the problem of overcapacity. Overcapacity on the one hand will cause product prices to plummet, on the other hand, it will reduce investment expectations of enterprises and consumer expectations of residents, so foreign trade and even economic growth are facing more and more downward pressure.

3. The appropriate exchange rate system

So far, China has a managed floating exchange rate, but it still relies heavily on the US dollar. Therefore, the relaxation of exchange rate controls and the decentralization of exchange rate reserves have a reducing effect on China's exchange rate fluctuations. At the same time, enterprises' awareness of risks will be enhanced, and precautionary measures will be strengthened, so that even when the exchange rate fluctuates more frequently, the foreign trade volume will not change significantly.

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