# The Influence of Digital Economy Development Level on China's Export Trade

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**Abstract.** At present, the global digital economy is developing rapidly. How to develop digital economy and enhance the digital competitiveness of Chinese export enterprises is of strategic significance to promoting China's economic development. General Secretary Jinping Xi pointed out that it is necessary to speed up the transition from a big trade country to a strong trade country, consolidate the traditional advantages of foreign trade, actively cultivate new competitive advantages, and expand the space for foreign trade development. Therefore, this paper conducts an empirical study on the influencing factors in the process of export trade, analyzes the relationship between the development of digital economy development and export trade, analyzes the direction and degree of the influence of digital economy development level on China's export trade, and puts forward policy suggestions to promote the development of digital economy and promote China's export trade.

**Keywords:** Digital Economy · Export Trade · Digital Competitiveness

## 1 Introduction

With the continuous development of digital technology, the digital economy has developed into a new economic form. In the digital wave, the digital economy also affects the development of China's foreign trade. The extensive use and integration of digital technology is conducive to increasing my country's export trade volume and optimizing the export trade structure. China's digital economy will continue to maintain a strong momentum of development in the future, accurately enabling the steady development of foreign trade.

## 2 Status of China's Export Trade

### 2.1 China's Total Export Trade

Exports play a positive role in promoting China's economic growth. China's trade in goods and services exports have developed steadily. As can be seen from Fig. 1, China's export of goods declined slightly in 2015 and 2016, down by 2.9% and 7.7%, respectively,


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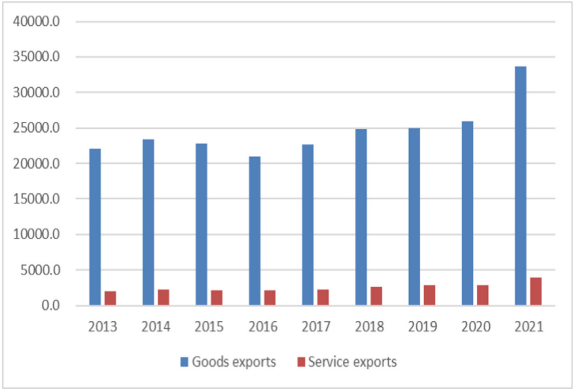


**Fig. 1.** Changes in China's exports of goods and service from 2013–2020 (unit: US $100 million). Data source: China Statistical Yearbook 2021, Ministry of Commerce data

mainly due to the impact of the more complex and severe international situation. In 2017, it reversed two consecutive years of decline. China's services exports maintained a steady growth, reaching $394.27 billion in 2021, which was a 40.5% increase compared to last year. According to the Ministry of Commerce, knowledge-intensive services account for more than half, including personal cultural and entertainment services, intellectual property royalties, and telecommunications computers and information services [5].

Although the share of services trade in China's export trade has been increasing year after year, the proportion is still low, with only 11.72% in 2021. This shows that China's competitiveness in service trade needs to be improved, including further optimizing its export trade structure and transforming its economic growth mode. The development of digital economy can effectively promote the growth of service trade exports. The wide application of digital technology can break the restrictions of traditional service trade, reduce transaction costs, improve transaction efficiency and service trade-ability [1].

### 2.2 Structure of Export Trade Mode

Processing trade is the important part of China's open economy. With the continuous development of digital economy and the deep integration of digital technology and traditional industries, many foreign trade processing enterprises have carried out digital network upgrading, and some enterprises have adopted the technical route of promoting digital manufacturing and Internet$^{+}$ manufacturing, spanning the manufacturing stage of Internet$^{+}$ manufacturing.

According to Fig. 2, general trade exports were $2049.848 billion, accounting for 60.9% of the total export in 2021, 33.4% higher than last year; processing trade exports were $826.299 billion, accounting for 24.6%, 17.6% higher than last year. The proportion of processing trade exports decreased, while the proportion of general trade exports increased. In 2021, China's general trade exports accounted for 60.9%, while processing trade accounted for 24.6%, as shown in Fig. 3.

The development of digital economy has accelerated the development of industrial automation. Many enterprises update intelligent equipment and improve the level of


**Fig. 2.** Changes in China's export trade mode in 2015–2021 (unit: $100 million). Data source: According to China statistical monthly report

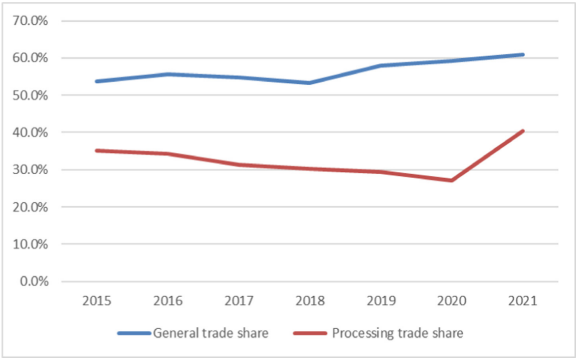


**Fig. 3.** The proportion of China's export trade mode from 2015 to 2021. Data source: According to China statistical monthly report

automation. "Machine replacement" can effectively promote the technical transformation of enterprise production capacity, thus forming new advantages in the development of processing trade.

### 2.3 Export Commodity Structure

The proportion of manufactured goods greatly exceeded that of primary products. In 2011, China's export of primary products reached $100.55 billion, accounting for 5.3%, and industrial products reached $1,797.84 billion, accounting for 94.7%, as shown in Fig. 4. The proportion of China's primary products in total exports has continued to decline, and the proportion of manufactured goods in total exports has increased steadily. Since 2012, China's primary products have accounted for about 5% of its total exports, while industrial goods have accounted for more than 95%. In 2021, China's exports of primary products reached $139.44 billion, down to 4.15% and exports of industrial products reached $3228.79 billion, which increased to 95.98%. This shows that China's

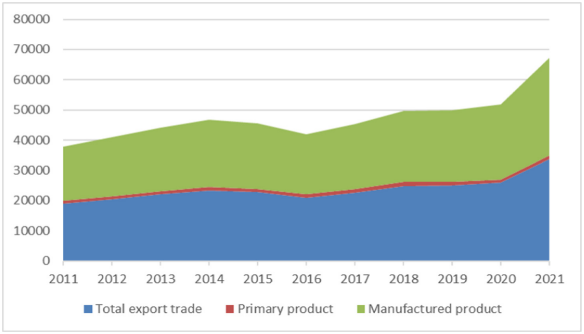


**Fig. 4.** China's total exports, primary products and industrial goods in 2011–2021 (US $100 million). Data source: China Statistical Yearbook 2021, China Statistical Monthly Report 2021

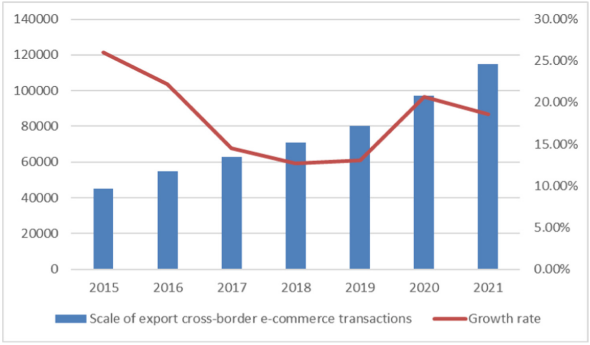


**Fig. 5.** Scale and Growth Rate of Cross-border E-commerce Transactions in China in 2015–2021 (Unit: 100 million RMB). Data source: 2020 China Cross-border E-commerce Market Data Report

export trade structure has shifted from the export of primary products to the export of manufactured goods, and from labor-intensive manufactured goods to capital and technology-intensive manufactured goods.

With the development of digital economy, digital technology will be widely used in all aspects of socialized mass production, which will help to further optimize the structure of China's export commodities.

### 2.4 Export Cross-Border E-Commerce

Due to national policy support and improved market environment, China's cross-border e-commerce exports have maintained a trend of rapid expansion. According to online economic statistics, the transaction scale of China's export cross-border e-commerce market increased from 4.5 trillion RMB in 2015 to 11.5 trillion RMB in 2021, with an average annual growth rate of 18%, as shown in Fig. 5.

From 2015 to 2021, the scale of cross-border e-commerce transactions increased rapidly. In recent years, the world economy has been continuously sluggish, coupled with the impact of COVID-19 in 2020, and the escalating trade frictions, and China's

foreign trade exports are facing severe challenges. With the support of the national digital economy development strategy, cross-border e-commerce has become an important force to enhance the development of foreign trade, and will effectively promote the further optimization of China's export trade structure [2].

## 3 Empirical Analysis of the Influence of Digital Economy Development Level on China's Export Trade

### 3.1 Sample Selection

This paper will establish a multiple regression model to explore the influence of digital economy development level on China's export trade, because the export trade has many factors, so the digital economy development level index (digital economy index) as the core variables of the model, join trade openness, general trade, processing trade, primary products, industrial goods, explanatory variables, using multiple regression model empirical analysis of digital economy development level on China's export trade direction and degree.

In the empirical analysis, the monthly data of seven variables from January 2016 to December 2021 were selected as research data, totalling 504 data. Except for the data of digital economy indicators from Caixin insight, all other data came from the General Administration of Customs of China. Meanwhile, the 5% significance level is chosen as the rejection probability of the multiple regression model. Accordingly, when the decision to accept the null hypothesis is made, the probability of a correct conclusion is 95%.

### 3.2 Model Construction

The multiple regression model established in this paper is designed as follows:

$$\hat{Y} = c + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \beta_5 * X_5 + \beta_6 * X_6 + \mu$$

In the formula, $\hat{Y}$ is the goods export variable, $X_1$ is the digital economic index variable, $X_2$ is trade openness variable, $X_3$ is general trade variable, $X_4$ is processing trade variable, $X_5$ is primary product variable, $X_6$ is manufactured product variable, c is a constant term, $\beta_1$ is the parameter of the goods export volume variable to the digital economic index, $\beta_2$ is the parameter of the variable of export to trade, $\beta_3$ is the parameter of the goods export amount variable to the general trade variable, $\beta_4$ is the parameter of the goods export amount variable to the processing trade variable, $\beta_5$ is the parameter of the goods export amount variable to the primary product variable, $\beta_6$ is the parameter of the goods export volume variable and $\mu$ is the residual item.

### 3.3 Model Test Analysis

Since this paper collects time series data, it is necessary to test the stationarity of the data. This paper uses EViews software to perform unit root test, and the results are as in Table 1.

**Table 1.** Test of unit root for all variables

| Symbol | ADF value | Conclusion |
|---|---|---|
| Y | −4.406983 | steady |
| X1 | 0.754695 | non-steady |
| X2 | −4.564 | steady |
| X3 | 3.8507 | non-steady |
| X4 | −6.016714 | steady |
| X5 | 1.3477 | non-steady |
| X6 | −5.899510 | steady |
| DX1 | −9.0324 | steady |
| DX3 | −7.2506 | steady |
| DX5 | −2.2571 | steady |

Note: DX1, DX3, and DX5 are the first-order differential sequences of X1, X3, and X5.

Date: 04/15/22 Time: 23:26
Sample (adjusted): 2016M04 2021M12
Included observations: 69 after adjustments
Trend assumption: Linear deterministic trend
Series: Y1 X1 X2 X3 X4 X5 X6
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.753097 | 213.7516 | 125.6154 | 0.0000 |
| At most 1 * | 0.501918 | 117.2371 | 95.75366 | 0.0008 |
| At most 2 | 0.322738 | 69.14477 | 69.81889 | 0.0565 |
| At most 3 | 0.284791 | 42.25566 | 47.85613 | 0.1517 |
| At most 4 | 0.145225 | 19.12820 | 29.79707 | 0.4837 |
| At most 5 | 0.103654 | 8.300948 | 15.49471 | 0.4338 |
| At most 6 | 0.010815 | 0.750325 | 3.841466 | 0.3864 |

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

**Fig. 6.** Results of the cointegration test for the model

Dependent Variable: Y
Method: Stepwise Regression
Date: 04/15/22 Time: 23:34
Sample: 2016M01 2021M12
Included observations: 72
No always included regressors
Number of search regressors: 7
Selection method: Stepwise forwards
Stopping criterion: p-value forwards/backwards = 0.05/0.051

| Variable | Coefficien... | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| X3 | 0.000752 | 7.56E-05 | 9.943000 | 0.0000 |
| X2 | 4137636. | 475221.9 | 8.706745 | 0.0000 |
| X6 | 0.000118 | 4.08E-05 | 2.885532 | 0.0053 |
| X1 | 27.68717 | 7.100293 | 3.899440 | 0.0002 |
| C | -29048.16 | 8219.594 | -3.534013 | 0.0007 |

| | | | |
|---|---|---|---|
| R-squared | 0.976249 | Mean dependent var | 212514.8 |
| Adjusted R-squared | 0.974831 | S.D. dependent var | 45517.84 |
| S.E. of regression | 7221.349 | Akaike info criterion | 20.67439 |
| Sum squared resid | 3.49E+09 | Schwarz criterion | 20.83249 |
| Log likelihood | -739.2779 | Hannan-Quinn criter. | 20.73733 |
| F-statistic | 688.4706 | Durbin-Watson stat | 2.137243 |
| Prob(F-statistic) | 0.000000 | | |

Selection Summary

Added X3
Added X2
Added X6
Added X1
Added C

*Note: p-values and subsequent tests do not account for stepwise selection.

**Fig. 7.** Parameter estimation results for the model

According to the unit root test, Y, $X_2$, $X_4$, $X_6$ original sequence is smooth, and $X_1$, $X_3$, $X_5$ are the first order single whole. And then do the cointegration test (Fig. 6).

The results of the cointegration test show that the above variables can establish a regression model. Parameter estimation using Eviews yields the results in Fig. 7.

From the above parameter estimation results, obtain the following regression equation:

$$\hat{Y} = -29048.16 + 27.69X_1 + 4137635.89X_2 + 0.00075X_3 + 0.00012X_6$$

Best of fit test: Model adjustment determination coefficient is 0.9748, with high goodness of fit.

Equation significance test: the F-value is 688.47, corresponding to the p-value is less than 0.05, and the overall linear relationship of the equation is significantly established.

Significant test of variables: the linear effects of X1, X2, X3 and X6 on Y were significant. Digital economy has a positive impact on export trade. For every additional unit of digital economy, export trade has increased by an average of $27.69 million.

### 3.4 Empirical Results

In the multiple regression model, the variables are stable and cooperative; the goodness of fit of the model is high, the overall linear relationship of the equation is significant, and the linear influence of digital economy, trade openness, general trade and manufactured goods on goods exports is significant.

According to the parameter estimation of the model, it can be concluded that digital economy, trade openness, general trade, manufactured goods have a positive impact on export trade, it also shows that the digital economy development level has a significant impact on China's export trade, and present a positive impact, namely the digital economy growth, export trade will grow.

Trade openness is the proportion of a country's total import and export trade in total GDP. The higher the value, the higher the country's trade openness, the more significant the impact on export trade. The regression analysis results of this model also verify the conclusion that the higher the value of trade openness, the more significant the impact on export trade [3].

## 4 Policy Recommendations

### 4.1 Increase the Financial Input in the Development of Digital Technology

Help enterprises to accelerate the deep integration with the new generation of information technology. The development of digital technology requires not only the internal scientific and technological research and development activities of enterprises, but also the support and assistance of government departments. The government needs to increase its support for the development of digital technology and help enterprises to accelerate the process of deep integration with the digital economy. Only by enhancing the digital competitiveness of enterprises can they improve the labour productivity of enterprises, reduce the transaction costs of enterprises' exports, and thus promote export trade. Continue to grow and create new advantages in export competition.

### 4.2 Pay Attention to the Further Opening of Import Trade

It is very important to change the import trade from "big in and big out" to "excellent in and excellent out". While using the digital economy for industrial transformation and upgrading, we will shift from extensive development mode to intensive development mode, from processing and manufacturing at the low end of the value chain to independent innovation at the middle and high end, so as to create new trade growth points.

### 4.3 Cultivate Professional Talents for Digital Innovation

It is recommended to add digital economy-related disciplines to the category of higher education and set up relevant majors. At the same time, focusing on the training goals of digital professional talents, carry out industry-university-research cooperation in the field of digital economy, so as to realize the symbiosis and integration of universities and digital economy industrial parks, so as to create digital competition new advantage, inject new development impetus into China's export trade [4].

## 5 Conclusions

This paper selects the monthly data of goods export volume, general trade, processing trade, primary products, manufactured products, and trade openness from January 2016 to December 2021 as samples, and establishes a model based on trade openness, general trade export volume, the export value of processing trade, the export value of primary products, and the export value of manufactured products are the explanatory variables, the export trade value is the explained variable, and the digital economy development level index (digital economic index) is the regression model of the core explanatory variable to discuss the digital economy. The direction and extent of the impact of development level on China's export trade. The empirical results show that the development level of the digital economy plays a significant role in promoting general trade exports, processing trade exports, and primary product exports. Aside from the variable of the digital economy, which has a significant impact on export trade, it is worth paying attention to the impact of the variable trade openness on export trade. The higher the degree of trade openness of a country, the more it can promote the development of the country's export trade, and there is a more significant relationship between the two. Therefore, this paper further puts forward relevant policy suggestions based on the empirical results: increase financial investment in the development of digital technology to help enterprises accelerate the in-depth integration with the new generation of information technology; attach importance to the further opening of import trade, and shift from "big in and big out" to "Excellent in and excellent out"; cultivate professional talents in digital innovation and create new advantages in digital competition.

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