

Impact of the Business Environment on the High-Quality Development of International Trade Based on Data from 30 Provinces in China

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Abstract. Superior growth in international trade is an important part of economic development. A good business environment is a necessary condition for economic development as well. This paper picks data from 2013 to 2021 and uses 30 Chinese provinces as research goals, excluding Tibet. Based on the new development concepts of innovation, coordination, green, openness, and sharing, this paper establishes the measurement system of international trade. The business environment is evaluated from four aspects: the public supply level, human resource level, market environment level, and government services level. The connection between the business atmosphere and the superior growth of international trade is empirically studied through the fixed effect model. The entropy weight method is used to assign weights to the indicators. The robust test of the regression model was carried out by the TOPSIS method. This paper also does the fractal regression and heterogeneity analysis. The research finds that: (1) Improving the business environment plays a big part in encouraging the high-quality development of international trade. However, the size of its impact varies from region to region and from level to level of economic development; (2) The business environment mainly affects international trade through human resources, market capability, and government services. The impact of public supply is significant but relatively weak; (3) The business environment has a gravely detrimental effect on the openness relative index of international trade, which includes the index of international commerce dependence. According to the research conclusion, three suggestions are put forward: improve the level of government affairs, pay attention to the introduction of talents, and optimize the market structure.

Keywords: Business environment, High-quality development of international trade, Fixed effect model, Heterogeneity analysis.

1. Introduction

The Communist Party of China's 19th National Congress report said that China's economy has transitioned from a high-speed growth stage to an excellent growth stage. It indicates that high-quality growth has emerged as the central topic of China's current and even future economic building. At present, China's international trade ranks high in the world. China is a famous large trading country, but it is not a trading power [1]. The high-quality development of external trade is an inevitable requirement for the overall sound development of China's economy. In the World Bank's 2020 Doing Business Report, China ranked 31st, up 15 places from 2019. In the Asia-Pacific region, China ranks fifth, behind Singapore, South Korea and Japan. The operation of businesses in a region is directly impacted by the business climate, which has a direct impact on the volume of investment. A good commercial environment can reduce the opening cost of enterprises as well [2]. In the end, it influences social employment, fiscal revenue, and overall economic growth. Nowadays, there is no unified assessment framework for the superior advancement of international trade and the business environment. The existing literature mainly establishes the connection between the business environment and the volume of foreign trade. Some literature also establishes the connection between the quality of international trade and industries such as the digital economy [3]. This paper uses thirty Chinese provinces as its research subject (excluding Tibet), and comprehensively considers the detailed meaning of various indicators of foreign trade development and business environment. Then it analyzes the correlation between them and puts forward relevant suggestions.

2. Method and Data

2.1. Evaluation Index System

Following the new development concept proposed by the Chinese President at the Fifth Plenary Session of the 18th CPC Central Committee in October 2015, this paper refers to the index evaluation system of Wei and Li. This research selects indicators from five dimensions: innovation, coordination, green, openness and sharing [4]. Following the principles of systematic Ness, hierarchy, static, dynamic, scientific and effective, the evaluation index system of foreign trade's high-quality development level has been constructed, including 5 first-level indicators and 7 second-level indicators (see Table 1).

Table 1. International trade high-quality development index system

First-level indicators	Second-level indicators	Indicator specification	Index attribute
innovation	The proportion of exports of new technology products	Export revenue of new products of science and technology of industrial enterprises/ export volume	+
coordination	Regional structure deviation coefficient of international trade	Import and export volume of a province/Province GDP - China's import and export volume/ national GDP	-
green	Industrial pollution control costs per unit of import and export	Industrial pollution control completed investment/ Total import and export	-
openness	Trade Competitiveness TC index	(Export value - Import value)/ Total provincial import and export value	+
	International trade dependence	Total imports and exports/ provincial GDP	+
sharing	International trade volume per capita	Total import and export of the province/ total number of people	+
	Urban units trade contribution rate of employment	Employment in urban units * Total exports/ provincial GDP	+

Despite the World Bank having created a somewhat comprehensive business environment assessment index system, there are problems such as insufficient interpretation when it is used in research on China. Li and Zhang proposed a more suitable index system for China's business environment evaluation [5]. On this basis, this research combines the actual situation and data availability of China's thirty province-level administrative regions (excluding Tibet). A new index system for evaluating the business environment is constructed (see Table 2).

Table 2. Business environment evaluation index system

First-level indicators	Second-level indicators	Indicator specification	Index attribute
Public supply	Water supply capacity	Comprehensive water supply capacity	+
	Power supply capacity	Power generation	+
	Educational service capacity	The proportion of education expenditure in public expenditure	+
	Medical service capacity	Number of practicing (assistant) physicians	+
Human resources	Manpower scale	People employed in urban units	+
		Number of registered unemployed in urban areas	-
	Manpower quality	Number of students in colleges and universities	+
	Manpower cost	Average wage of employed persons in urban units	+
Market environment	Market demand	Total retail sales of consumer goods	+
	Market structure	Number of industrial enterprises above designated size	+
		People employed in urban units of the financial industry	+
Government environment	Social security	The number of urban and rural residents covered by social endowment insurance	+
	Government expenditure	General budget expenditure of local finance	+
	Leisure environment	Park green area	+
	Infrastructure construction	Road area	+

2.2. Measurement Methods

This article measures the indicators of the international trade superior development framework by the entropy weight approach. The index weight value is determined by the level of variation in each measurement indicator's data. This approach lessens the impact of subjective human factors on the index weight. Therefore, it increases the objectivity and rationality of the measurement.

The following are the specific implementation steps:

First, each measurement indicator is initially standardized by the range approach in order to remove any discrepancies between them regarding the order of scale and dimension:

$$Y_{ij} = \begin{cases} \frac{X_{ij} - \min(X_{ij})}{\max(X_{ij}) - \min(X_{ij})}, & X_{ij} \text{ is a positive indicator} \\ \frac{\max(X_{ij}) - X_{ij}}{\max(X_{ij}) - \min(X_{ij})}, & X_{ij} \text{ is a negative indicator} \end{cases} \quad (1)$$

Where, i represents the province, j represents the measure index; X_{ij} and Y_{ij} represent the original and normalized index values respectively, and $\max(X_{ij})$ and $\min(X_{ij})$ represent the maximum and minimum values of X_{ij} respectively.

The information entropy E_j of each indication Y_{ij} must be determined in the following step:

$$E_j = \ln \frac{1}{n} \sum_{i=1}^n [(Y_{ij} / \sum_{i=1}^n Y_{ij}) \ln (Y_{ij} / \sum_{i=1}^n Y_{ij})] \quad (2)$$

The weight W_j of each measurement indication Y_{ij} is calculated in the third step:

$$W_j = (1 - E_j) / \sum_{j=1}^m (1 - E_j) \quad (3)$$

Using the above formula and assisted calculation by Stata, the weights of indicators of the superior degree of foreign trade are obtained. The business atmosphere assessment system is worked out in the same way. After weighted summation, the index of superior performance level of foreign trade *Hqtra* and business environment index *Busien* are obtained.

2.3. Model Construction

In order to test the impact of the business environment on the high-quality development of international trade in Chinese provinces, this paper constructs the following baseline regression model model:

$$Hqtra_{i,t} = \alpha_0 + \beta_0 Busien_{i,t} + \theta_0 X_{i,t} + \varepsilon_{i,t} \quad (4)$$

The subscript *i* represents the region and *t* represents the time. The explained variable *Hqtra* represents the superior advancement of international commerce. The explanatory variable *Busien* represents the business environment index. $X_{i,t}$ is the control variable, including population size index *pop* (represented by the total number of long-term residents at year's end), urbanization rate index *city* (shown by the percentage of the population that lives in cities) and urban convenience index *conveni* (represented by the number of public toilets per 10,000 population), $\varepsilon_{i,t}$ is the random disturbance term.

2.4. Description of Variables

Table 3 displays the descriptive statistical information for each variable.

Table 3. Description of Variables

	Variable	Observations (Obs)	Mean	Std. dev.	Min	Max
Explained variable	<i>Hqtra</i>	270	0.5003391	0.0942941	0.2258567	0.69242
Explanatory variable	<i>Busien</i>	270	0.292585	0.1792262	0.0151259	0.9613345
Control variable	<i>pop</i>	270	0.4632859	0.287821	0.0571	1.2684
	<i>city</i>	270	0.6088354	1.12909	1.07	8.15
	<i>conveni</i>	270	3.052407	0.1148069	0.3788546	0.8958333

2.5. Data Source

Thirty provincial administrative regions in China (excluding Tibet) from 2013 to 2021 are selected as research objects. Relevant data are mainly from the National Bureau of Statistics of China and the CSMAR database. A small amount of missing data was filled in by the interpolation method.

3. Results and Discussion

3.1. Benchmark Regression

First, the Hausman test is carried out. It shows that the P-value is 0, and the null hypothesis random effect is rejected at the significance level of 1%, indicating that the fixed effect model should be adopted. The benchmark regression outcomes are obtained using the fixed effect model (refer to Table 4).

Table 4. Benchmark Regression Results

Explanatory variable	Explained variable <i>Hqtra</i>			
	(1)	(2)	(3)	(4)
<i>Busien</i>	0.2389*** (6.65)	0.2904*** (5.16)	0.2225** (2.04)	
<i>Busien</i> ²				0.2006*** (2.96)
Control variable	No	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes
Time effect	No	No	Yes	No
_cons	0.4304*** (40.48)	0.6137*** (8.13)	0.6060*** (7.83)	0.6214*** (5.97)
Obs	270	270	270	270
<i>R</i> ²	0.1561	0.1988	0.2674	0.1406

Note: (1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; (2) The t-values are in parentheses; (3) The same goes for the table below.

Model (1) is a baseline regression that only controls individual effects without controlling variables; Model (2) is a baseline regression that only controls individual effects by adding control variables; Model (3) is a baseline regression of bidirectional fixed effects with control variables. Model (4) examines whether there is a significant difference in the impact of the squared term of *Busien* on the high-quality development of international trade. As the regression estimates demonstrate, the core explanatory variables are all significant at the significance level of at least 5%. According to the regression results of (4), the squared term of the business environment has a positive and significant impact on the high-quality development of foreign trade. In other words, there is a U-shaped relationship between the two. The possible reason is that during the early phases of the business environment's growth, the business environment mainly plays a role in China's domestic market. Its promoting effect on foreign trade is not strong or even weakened. When the business environment develops to some degree, under the backdrop of domestic and international double circulation, the domestic business environment begins to drive on foreign trade [6].

3.2. Robustness Test

To confirm that the aforementioned results are robust, the TOPSIS method was used to calculate the independent variables.

Detailed steps are as follows:

First, construct a weighting matrix R for the international trade's high-quality development level:

$$R = (r_{ij})_{n \times m} \quad (5)$$

Were,

$$r_{ij} = W_{ij} \times Y_{ij} \quad (6)$$

Second, the weighting matrix R determines the best scheme Q_j^+ , and the worst scheme Q_j^- .

$$Q_j^+ = (\max r_{i1}, \max r_{i2}, \dots, \max r_{im}) \quad (7)$$

$$Q_j^- = (\min r_{i1}, \min r_{i2}, \dots, \min r_{im}) \quad (8)$$

Third, compute each measure scheme's Euclidean distance d_i^+ from the best scheme Q_j^+ as well as d_i^- from the worst scheme Q_j^- :

$$d_i^+ = \sqrt{\sum_{j=1}^m (Q_j^+ - r_{ij})^2} \quad (9)$$

$$d_i^- = \sqrt{\sum_{j=1}^m (Q_j^- - r_{ij})^2} \quad (10)$$

Finally, each measure scheme's relative proximity to the ideal scheme, C_i , is computed as follows:

$$C_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad (11)$$

The regression results are obtained as follows (see Table 5). They are consistent with the baseline regression outcomes, illustrating that the baseline regression results were robust and highly reliable.

Table 5. Robustness Test Results

Explanatory variable	Explained variable <i>Hqtra</i>			
	(1)	(2)	(3)	(4)
<i>Busien</i>	0.2528*** (6.03)	0.3583*** (4.82)	0.2576** (2.20)	
<i>Busien</i> ²				0.1559** (2.16)
Control variable	No	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes
Time effect	No	No	Yes	No
_cons	0.4254*** (33.95)	0.6579*** (7.83)	0.6483*** (7.42)	0.5624*** (5.23)
Obs	270	270	270	270
R ²	0.1322	0.1884	0.2695	0.1260

3.3. Multi-dimension Investigation

The high-quality development of commerce worldwide is composed of five dimensions. The business environment is composed of four dimensions. In order to explore the influence degree of each dimension, this paper conducts a sub-dimensional regression. Among them, the foreign trade innovation index, foreign trade coordination index, foreign trade green index, foreign trade opening index and foreign trade sharing index are respectively represented by *Inno*, *Coor*, *Green*, *Open* and *Share*. The public service index, human resources index, market environment index and government environment index are respectively represented by *Supply*, *Human*, *Market* and *Gov*.

Table 6. Multi-dimension Regression Results

Variable	<i>Hqtra</i>	<i>Inno</i>	<i>Coor</i>	<i>Green</i>	<i>Open</i>	<i>Share</i>
<i>Busien</i>	0.29044*** (5.16)	0.4742*** (2.97)	0.8499*** (7.52)	0.5224*** (2.79)	-0.6241*** (-4.21)	0.2192*** (3.57)
<i>Supply</i>	0.1170* (1.83)					
<i>Human</i>	0.2691*** (4.44)					
<i>Market</i>	0.2999*** (4.79)					
<i>Gov</i>	0.2882*** (4.26)					
Control variable	Yes	Yes	Yes	Yes	Yes	Yes

As shown in Table 6, in the regression of multi-dimension, the human resource index, market environment index and government environment index are all significant under the 1% significance level whereas the public service index is significant at the 10% level. The human resource index measures international trade talents and serves a significant part in promoting the development of foreign trade in a province. The market is the carrier of import and export so its quality significantly determines the ability and potential of the market. The government environment represents the regional government services level. Import and export activities in all regions are carried out with the participation of the government. Therefore, a good government environment has a favorable effect on the degree of high-quality international commerce. The effect of public supply capacity on cross-border commerce is less obvious. This is probably because China's power generation, water supply and other supplies have reached a high level, so its change is not as important as other factors in international commerce. In the regression analysis of foreign trade openness and business environment, the study finds that the greater the business environment index, the lower the foreign trade openness index. This is because the business environment of each province has a more rapid and significant impact on the local market trade activities. A good business environment leads to an increase of regional GDP, which leads to the decrease of foreign trade dependence in the foreign trade openness index. Consequently, the coefficient in the regression result is negative.

3.4. Heterogeneity Regression

Different regional locations and levels of economy will also lead to different degrees of influence of the business environment on the high-quality development of international trade. In light of the New Era article, this paper divides the geographical location and economic development degree of Chinese provinces [4]. Regional heterogeneity regression is carried out according to the location of the east, middle and west. Economy-level heterogeneity regression is carried out according to the economic degree of the backward type, mediocre type and star type [4].

In the middle and eastern regions, the optimization of the business environment has a positive promoting effect on the quality of international trade. However, in the western region, the coefficient is not significant. The eastern and middle regions have great conditions, such as the circulation of talents, knowledge dissemination and industrial upgrading. This is due to their proximity to the sea, flat terrain, and a long history of developing foreign trade. They achieve better development in both the business environment and the level of global commerce. The limited economic aggregate, trade volume and other related factors in the western region may be the possible reason for the insignificant regression results [9,10].

For provinces with various economic levels, the regression results of mediocre and backward provinces are significant at the 1% level, while star cities are significant at the 5% level. This is because all aspects of the economy of star cities have reached a relatively high degree. The influence of international trade development brought by the optimization of the business environment is relatively not large, as shown in Table 7.

Table 7. Heterogeneity Regression Results

Variable	Regional heterogeneity			Heterogeneity of economic development level		
	(1) eastern	(2) middle	(3) western	(1) star-type	(2) mediocre type	(3) backward type
<i>Busien</i>	0.2291*** (3.83)	0.5241*** (5.42)	0.1697 (0.82)	0.1816** (2.31)	0.2371*** (3.66)	0.7145*** (3.74)
Control variable	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.6955*** (9.59)	0.2926* (1.72)	0.3941 (1.2)	0.6991*** (8.22)	0.4913*** (3.94)	1.037*** (3.31)
Obs	99	72	99	54	135	81
<i>R</i> ²	0.1801	0.4049	0.1930	0.1363	0.3655	0.1918

4. Conclusion

Through empirical analysis and testing, this paper studies the effect of the business environment in promoting the quality of international trade. The development of international trade is significantly aided by the business climate. However, in the initial phases of the formation of the business environment, it mainly promotes domestic market activities. So, its role in promoting foreign trade is not strong or even weakened. From the perspective of the sub-dimension, the effect of the business environment on foreign trade mainly stems from the human resource environment, market atmosphere, and government serviceability, while the impact of public supply ability on foreign trade is significant but less obvious. When other conditions remain unchanged, the impact of the commercial environment is more substantial and immediate on the domestic market. Consequently, it significantly lowers the level of openness to foreign trade. In the heterogeneity analysis, the business environment in the eastern and middle cities has a significant impact on promoting foreign trade development. Nevertheless, the impact is not significant in the western provinces. For provinces with all levels of economic development, the business environment promotes the growth of international trade significantly, especially in areas with mediocre and backward economic levels. Therefore, it is suggested that government should strive to improve the level of government services. Deepening the policy of "decentralization, management and service". Paying attention to the introduction and training of talents, and create high-quality human resource reserves, and promoting the market demand and optimize market structure.

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