

The Impact of TBT on China's Mechanic and Electronic Products Exported To the US Based on Sino-US Trade Friction

Qi Shi^{a,*}, Zhijun Yan^b

School of Economics and Management, Nanjing University of Science and Technology, Nanjing 210094, China

^a915316373@qq.com, ^byanzhijun@njust.edu.cn

*Corresponding author

Keywords: TBT, Mechanic and Electronic Products, Sino-US Trade Friction

Abstract: In recent years, Sino-US trade relations have continued to deepen. The United States is already China's largest export market for goods, and mechanic and electronic products occupy a pivotal position in China's exports to the United States. However, with the gradual warming of US trade protectionism, China's exports of mechanic and electronic products to the United States are also facing severe challenges. This paper first sorts out the status quo of China's exports of mechanic and electronic products to the United States, and finds that the main obstacles to its export are the Technical Barriers to Trade (TBT) existing in the United States, and then analyze the effects of this problem, and then build a trade gravity model. Conduct an empirical test on the factors affecting the exports of China's mechanic and electronic products. The results show that the US technical trade barriers have a significant negative impact on China's exports of mechanic and electronic products. Finally, the paper puts forward some strategic suggestions for how China's mechanic and electronic products manufacturers can deal with TBT.

1. Introduction

The United States and China are the world's first and second largest economies respectively, with increasingly close trade links, and the United States is China's second largest trading partner. Structurally, the trade between China and the United States is relatively complementary. According to relevant data, among the products exported by China to the United States in 2017, the export volume of mechanical and electrical products was US\$19.854 billion, accounting for 45.84% of the total exports. It can be seen that the mechanic and electronic industry is China's key development industry, and mechanic and electronic products are also one of the most important products of China's exports to the United States.

However, for a long time, China's export of mechanic and electronic products to the United States has been bound and restricted by the United States [1]. The United States has used its own technological advantages to continuously improve the technical standards and safety requirements for the import of mechanic and electronic products, and has formed technical barriers restricting China's mechanic and electronic products, making the situation of China's mechanic and electronic products export increasingly serious.

From the Sino-US trade friction that began on March 22, 2018, the industry in which the United States conducted anti-dumping and countervailing investigations focused on China's advantageous export industries, especially the mechanic and electronic products that became the focus of US restrictions on imports. How much will China's exports of mechanic and electronic products be affected in this trade friction, and how the government and related companies should respond is a subject that needs serious consideration.

2. Analysis of China's mechanic and electronic products exported to the US

2.1 Current Status

The mechanic and electronic products referred to in this paper refer to electromechanical, audio-visual equipment and their parts and accessories. They are in Chapter 84 (Nuclear Reactors, Boilers, Mechanical Equipment and Parts) and Chapter 85 of the Customs HS Code. (Motor, electrical, audio and video equipment and its accessories). Mechanical and electrical products occupy a pivotal position in China's exports to the United States. The United States is China's largest exporter of mechanic and electronic products. In recent years, exports have been on an upward trend.

From the perspective of product structure, the current export of labor-intensive electromechanical products to the United States is growing rapidly, such as televisions, general machinery, ships, etc., but its added value is low, and the inherent core technology is relatively small. In terms of trade methods, China's exports of mechanic and electronic products are still dominated by processing trade. According to customs statistics, from January to October 2017, exports of processing trade were 481.19 billion US dollars, an increase of 7.6%, accounting for 45.8% of the export of mechanical and electrical products.

2.2 TBT is the main problem

In the context of the ongoing economic globalization, the effects of tariff barriers and traditional non-tariff barriers have steadily weakened. The technical trade measures with standards, technical regulations and conformity assessment procedures as the main content have deepened the influence on the export of mechanic and electronic products, and are increasingly used by developed countries with technological advantages. In the Sino-US trade friction, the technical barriers imposed by the United States on mechanic and electronic products will have an increasingly serious adverse impact on China's expansion of exports of mechanic and electronic products.

Technical Barriers to Trade (TBT) refers to a country that protects national security, protects human health and safety, protects the health and safety of animals and plants, protects the environment, prevents fraud, and guarantees product quality. The use of some mandatory and non-mandatory technical regulations, standards, and conformity assessment procedures for inspection of goods has set strict conditions for market access, making the requirements for imported products more difficult, and ultimately achieving the goal of restricting imports [2]. From the perspective of WTO members to the TBT Committee, the electromechanical industry is one of the most notified industries in the United States each year.

2.3 Impacts of TBT

First of all, since the beginning of Sino-US trade friction, China's mechanic and electronic products have been blocked by a large number of batches, and export trade has suffered a lot of losses. According to the statistics of the TBT notification database, at present, more than 60% of home appliance export enterprises in China have experienced foreign technical barriers, and the annual direct and indirect losses are about 50 billion US dollars. Since March 2018, the United States has had 9 TBT notifications for mechanic and electronic products. Since most of the mechanic and electronic products exported to the United States in China are labor-intensive, the prices are relatively low, and TBT has increased market access thresholds. In order to meet the standards, Chinese companies have to increase their investment, obtain information in the early stage, update equipment, and improve technology, which increases the cost of products.

Second, the TBT upgrade in the trade war will not only worsen Sino-US trade relations, but also negatively affect the overall export environment of China's mechanic and electronic products. In the trade war, the United States has improved the technical standards for China's mechanic and electronic products, and will also drive other developed countries to follow suit, making the difficulty of exporting mechanic and electronic products to other countries.

Finally, the impact of TBT is also double and has its positive side. Increasingly high quality

standards and requirements will also force some domestic enterprises to improve product quality. They will not only actively introduce new technologies and advanced equipment, but also increase the technical gold content of their products. They will also promote the upgrading of industrial technology structure and enhance their self-innovation capabilities. In addition, it also helps to incorporate environmental protection concepts into product design, thereby accelerating the green transformation of the company and achieving sustainable development. From the perspective of the government, technical barriers help to improve the improvement of relevant technical regulations in China, and to be in line with international standards, so that China's mechanic and electronic industry is standardized and legalized.

3. Empirical analysis of the factors affecting the export of China's mechanic and electronic products

3.1 Establish a trade gravity model

The trade gravitational model was first independently proposed by Tinbergen (1962) and Poyhotnen (1963). The basic implication is that the scale of bilateral trade flows between two countries is proportional to the size of their respective economies and inversely proportional to the distance between them. Tinbergen's trade gravitational expression is:

$$X_{ij} = K \frac{Y_i Y_j}{D_{ij}^2} \quad (1)$$

In order to facilitate research, the gravitational model is usually converted to a logarithmic form:

$$\ln X_{ij} = \ln K + \alpha_1 \ln Y_i + \alpha_2 \ln Y_j + \alpha_3 \ln D_{ij} + \mu_{ij} \quad (2)$$

In the formula, X_{ij} is the export value of country i to country j , Y_i is the GDP of country i , Y_j is the GDP of country j , and D_{ij} is the distance between the two countries, usually referring to the distance between the capitals of the two countries. μ_{ij} is a random disturbance term.

3.2 Variable selection and model building

First of all, since the main body of this study is China and the United States, the distance between the two countries is fixed and can be regarded as a constant, so this paper does not select the distance variable. Secondly, introducing the TBT degree variables of American mechanic and electronic products encountered in China, it can be seen from the above that TBT has the characteristics of diversity, concealment and diffusion, which has a deeper impact on mechanic and electronic products. Therefore, it is assumed that it will have side effects on the export of mechanic and electronic products in China. Therefore, this paper selects the total US trade volume of China's mechanic and electronic products exported over the years as the explanatory variable, and the explanatory variables are as follows:

$$\ln EX = \beta_0 + \beta_1 \cdot \ln CR + \beta_2 \cdot \ln GDPC + \beta_3 \cdot \ln GDPA + \beta_4 \cdot TBT + \mu_i \quad (3)$$

Among them, $\ln EX$ is the total US trade volume of China's mechanic and electronic products exports, $\ln CR$ is the central parity of RMB against the US dollar, $\ln GDPC$ is China's per capita GDP, $\ln GDPA$ is the average American GDP, TBT is the number of US TBT notifications, and β_0 is a constant term. β_1 , β_2 , β_3 , β_4 represent the regression coefficients of the equation, and μ_i is a random term.

The data range selected in this paper is from 2003 to 2017. The total trade volume of China's mechanic and electronic products exported to the United States, the US and China's per capita GDP, and the central parity of the RMB against the US dollar are all derived from the National Research Network statistics database. The number of US TBT notifications is from the TBT notification database.

3.3 Unit root test

Before performing regression analysis, in order to avoid pseudo-regression and ensure the validity of the estimation results, the time series needs to determine the unit root test for each variable, that is, to test the stability of each variable. The most common method for verifying data stability is the unit root test. The analysis was performed using the measurement software Eviews 8.0. The results are shown in Table 1.

Table.1. Unit root test

Variable	Level			1st difference		
	ADF	5%Critical Value	Conclusion	ADF	5%Critical Value	Conclusion
lnEX	-2.69044	-3.0989	unstable	-3.84303	-3.1449	stable
lnCR	-1.71782	-1.9684	unstable	-1.75337	-1.6037	stable
lnGDPC	0.528515	-3.7912	unstable	-3.38833	-3.3186	stable
lnGDPA	-0.90141	-3.0989	unstable	-3.61962	-3.1754	stable
TBT	-2.56006	-1.9882	stable	-1.38689	-3.0989	unstable

Table 1 shows that only the US TBT notification number variable itself is stationary. The export of China's mechanic and electronic products to the United States, total American GDP, China's per capita GDP, and the central parity of the RMB against the US dollar are all first-order differences at a 5% significance level, showing stability.

3.4 Granger causality test

In order to test the impact of US TBT on China's mechanic and electronic exports, the Granger causality test was used to verify whether there is a causal relationship. The results are shown in Table 2. The US TBT notification number is not the reason for the total US trade in mechanic and electronic products exported to the United States. This null hypothesis was rejected at the 10% significance level. The null hypothesis that China's total export of mechanic and electronic products to the US is not the cause of TBT notifications in the United States is accepted. This shows that there is a one-way causal relationship between the US TBT and China's mechanic and electronic exports. The US TBT has a significant impact on China's mechanic and electronic exports to the United States.

Table.2. Granger causality test

Null hypothesis	F-statistic	Prob.	Conclusion	Lag period
lnEX does not Granger Cause TBT	4.51806	0.057	Reject	1
TBT does not Granger Cause lnEX	0.07578	0.7882	Accept	1

The model is then adjusted to the following form:

$$D\ln EX = \beta_0 + \beta_1 \cdot D\ln CR + \beta_2 \cdot D\ln GDPC + \beta_3 \cdot D\ln GDPA + \beta_4 \cdot TBT + \mu_i \quad (4)$$

3.5 Model estimation and result analysis

By selecting the data samples from 2003 to 2017, the total output of China's mechanic and electronic products to the US as a dependent variable, the Eviews8.0 measurement analysis software was used to perform regression analysis on the adjusted gravity model. The results are shown in Table 3.

Table.3. Model estimation result

Variable	Coefficient	Std.E	t-Statistic	Prob.
C	-0.013824	0.058354	-0.236891	0.818
D(lnCR)	1.801172	0.646463	2.786195	0.0212
D(lnGDPC)	0.903415	0.378535	2.38661	0.0408
D(lnGPDA)	3.344693	0.685328	4.880428	0.0009

TBT	-0.002083	0.000694	-3.000202	0.015
R ² =0.918978		prob.(F-statistic): 0.000063		

From the results of Table 3, the model's coefficient of determination R² is 0.918978, the F-test value is 25.52039, and the accompanying probability is 0.000063, indicating that the model as a whole is significant, and the coefficients of each explanatory variable are significant at the test level of 10%. The regression equation obtained is:

$$D\ln EX = -0.013824 + 1.801172 \cdot D\ln CR + 0.903415 \cdot D\ln GDPC + 3.344693 \cdot D\ln GDPA - 0.002083 \cdot TBT$$

It can be seen from the equation that among the influence variables of the above explanatory variables on the explanatory variable of China's mechanic and electronic export volume, the average American GDP has the greatest influence on the explanatory variables, and the estimated elastic coefficient is 3.3447, indicating the economic strength of the United States. And the purchasing power of the country has a very important impact on the export of China's mechanic and electronic products. The increase in the average GDP of the Americans will greatly boost the export of Chinese mechanic and electronic products to the United States.

In addition, the exchange rate and China's per capita GDP also have a significant positive impact on China's exports of mechanic and electronic products to the United States. The exchange rate rises and the devaluation of the renminbi will make China's exports of mechanic and electronic products more competitive, thus pulling the export of motor products. And China's per capita GDP will also have a certain degree of impact on the export of mechanic and electronic products.

Finally, the number of US TBT notifications has a significant negative impact on China's exports of mechanic and electronic products, with a coefficient of elasticity of -0.002. The increase in the number of TBT notifications means that China's electromechanical enterprises are facing more technical barriers to trade, which will significantly reduce the export volume of China's mechanic and electronic products.

4. Conclusion

At present, the Sino-US trade war is still continuing to be fermented, which will have much impact on China's mechanic and electronic products to the United States. However, what is certain is that with the development of the situation, China's exports of mechanic and electronic products to the United States will certainly have a certain degree of fluctuations. How to reduce risks and losses is the focus of immediate attention. Through the above research, the technical barriers of the United States have a significant negative effect on the export of China's electromechanical products. Based on this, in the context of the current Sino-US trade war, this paper proposes the main strategic recommendations for China's mechanic and electronic products to deal with US TBT.

4.1 Promoting the optimization and upgrading of mechanic and electronic products

The processing trade in the United States should be upgraded from simple assembly to deep processing, from low-end processing and assembly to high-end product development, from labor-intensive links to technical and knowledge-intensive links, from external links to core links [3]. It is necessary to develop general trade exports of high value-added mechanic and electronic products and optimize the structure of export commodities. At the same time, accelerate the technological transformation of the traditional electromechanical industry, from low-level, extensive to high-level, intensive. Develop new products and new materials in the traditional export field. While consolidating the competitiveness of traditional middle and low-end products, we will develop the export of medium and high-end goods, and improve the quality and processing depth. In addition, we must strengthen government guidance, unified deployment, organizational advancement, and strive to create five comprehensive environments for the development of high-tech processing trade, namely investment environment, talent environment, financial environment, industrial supporting environment and policy legal environment.

4.2 All parties coordinate to deal with technical barriers

China's electromechanical enterprises must timely acquire the technical standards of the United States from the federal government to the states. Only by fully and timely grasping the required information can it help to meet the US technical standards. Relevant government departments and electromechanical industry associations should also expand the channels of information transmission, and provide timely assistance to enterprises to ensure smooth communication between problems and feedback [4]. In addition, enterprises should take new technology research and development and green environmental protection as one of their development goals, strictly control the quality of raw materials and parts, and reduce pollution emissions. China's technical standards should also accelerate the integration with international standards, and encourage more companies to pass international standards certification. At the same time, we will actively tackle key standards and strive to participate in the formulation of international standards.

4.3 Implement a diversified market strategy

Actively opening up new markets will help reduce the risk of Sino-US trade friction on the export of mechanic and electronic products. At present, the “Belt and Road Initiative” has created a new favorable opportunity for electromechanical exports. Chinese electromechanical enterprises need to seize opportunities, combine their own advantages, identify policy orientation, formulate a complete development strategy, and actively integrate into emerging markets along the “Belt and Road”. Through diversified product structure, market layout and local marketing strategy, the risks brought about by the Sino-US trade war are effectively dispersed. China's electromechanical enterprises need to constantly adjust their market positioning by means of emerging markets, and continuously deepen the trade division of labor with neighboring countries and enterprises, and improve the quality and technical content of products in the competition [5]. The government should take the lead and fully rely on the associations, innovation platforms and other intermediaries to set up cooperative organizations and market information databases in overseas markets, so as to achieve coordinated development of the export market of mechanic and electronic products.

References

- [1] Li Siqi, He Haiyan. The impact of US technical barriers on the export of China's mechanic and electronic products [J]. *Commercial Research*, 2011, (10): 202-207. DOI: 10.3969/j.issn. 1001-148X. 2011.10.038.
- [2] A. Patrie. *The Regional Clustering Foreign Direct Investment and Trade* [M]. Transnational Corporation, DEC, 1994.
- [3] Fung, K.C., and Lawrence J. Lau, 2001, “New estimates of US—China bilateral trade balances”. *Journal of Japanese and international economics*, 15, PP.102—130.
- [4] GORSICH E, Luis A, UHNERKEMPE M. Mapping us cattle shipment networks: Spatial and temporal patterns of trade communities from 2009 to 2011 [J]. *Preventive Veterinary Medicine*, 2016, 134(1): 82—91.
- [5] Josh Ederington, Jenny Minier. Is environmental policy a secondary trade barrier? An empirical analysis [J]. *Canadian Journal of Economics/Revue canadienne d'économique*. 2004 (1).