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The Influence and Countermeasures of Technical Barriers to Trade on the Export of Electromechanical Products in China

(Full Paper)

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ABSTRACT

Since the entry of China into WTO, the increasingly active foreign trade activities of China have played a huge role in promoting the economic growth and development of our country. At the same time, TBT (Technical barriers to Trade) has developed rapidly and become a non-tariff barrier for the export of Chinese foreign trade enterprises. As a result, the export of mechanical and electrical products in China has been greatly affected by the TBT of importing countries. In this paper, the current situation of technical barriers to trade in the export of mechanical and electrical products in China is first expounded, and the negative and positive effects of technical barriers to trade on the export of mechanical and electrical products of our country are analyzed. Then, based on the trade gravity model, using the panel data of 26 trading countries of China from 2008 to 2017, this paper empirically investigates the influence of importing country's TBT on the export of mechanical and electrical products of China, and analyzes the reasons why Chinese mechanical and electrical products export encounters with TBT according to the above research. According to these reasons, the corresponding countermeasures are put forward.

Keywords: Technical barriers to trade (TBT), electromechanical products, export

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INTRODUCTION

Since the reform and opening-up, China's economic growth has become increasingly remarkable, and the implementation of the "One Belt And One Road" strategy in recent years has made China's foreign trade more active. However, due to the differences in international trade policies, international status, world discourse power and national customs and features, different countries have different trade attitudes towards imported products, and each country has set certain trade barriers against the imported products of different countries. Technical Barriers of Trade (TBT) have a great impact on China's exports, which has become the first non-tariff barrier that China's foreign Trade enterprises are facing.

In international trade, TBT refers to the measures adopted by commodity importing countries for the implementation of trade import control, usually in the form of laws, decrees, regulations, standards and certification systems. It mainly involves many technical regulations and standards such as science and technology, product quality and certification, safety, health and environmental protection, as well as their conformity assessment procedures and standards, but not the measures covered by SPS agreement.

The emergence of the TBT in the world is driven by the rapid development of economic globalization, the rapid development of trade liberalization and the popularization of "sustainable development". The reasons for the rise of TBT are as follows: firstly, in the international trade, the starting point of each country is to safeguard the interests of the country, since most of the traditional non-tariff barriers are obviously contrary to the "spirit of WTO", so when these barriers are gradually cancelled, the more concealed technical trade barrier is favored by the trade countries and are continuously pushed out. Secondly, the loopholes and exceptions in the WTO agreement provide corresponding legal basis for the implementation of TBT. Thirdly, the global voices calling for environmental protection are getting louder and louder. The status of relevant environmental protection organizations in countries around the world has been greatly enhanced, and the influence of these organizations on the decision-making of governments is also increasing. Fourth, sustainable development provides strong theoretical support for the wide implementation of TBT.

The rapid development of TBT has great influence on the export of mechanical and electrical products in China. According to the international trade classification standards, mechanical and electrical products belong to the category of machinery and transport equipment. According to the data of national bureau of statistics, China's machinery and transport equipment export accounted for

46.92% of the total export value in 2016, and the ratio was basically unchanged in recent ten years, fluctuating around 47%, accounting for nearly half of China's total export value. It can be seen that the export of mechanical and electrical products has great influence on China's foreign trade development. With the rise and development of TBT, although the export of mechanical and electrical products in China has been going up in general, there has been a small decline in the last two years. According to the data listed in the annual report of China's technical trade measures (2016), the direct loss caused by technical trade barriers of mechanical and electrical products in China reached 40,716.521 million us dollars in 2015. In the same year, the total export of mechanical and electrical products decreased by 11386 million us dollars, down by 1.06% compared with the previous year. Therefore, the rising trend of export volume has ended and turned downward. It can be seen that TBT has a particularly significant impact on the export of electromechanical products in China.

LITERATURE REVIEW

Foreign Research Results

Fontagné and Orefice (2018) matched TBT's database with WTO concerns and compared it with a panel of French exporters to arrive at the complex effects of restrictive TBT on different trade balances. In addition, they estimated the overall level, thus demonstrating that the effects of restrictive TBT on reducing exports were magnified in more uniform areas.

Yousefi and Liu (2013) selected the trade cases of China, Japan, South Korea and the United States in the manufacturing industry and used the gravity model to obtain the impact of TBT on the trade value. The results showed that TBT had a certain negative impact on long-term trade and was not conducive to economic development, and suggested that governments reduce the number of non-tariff barriers.

Bao (2014) adopts the method of heterogeneity enterprise and analyzes the influence of the technical trade barriers implemented by our country on imports of China. This research based on the samples of all import restriction measures (such as TBT, tariff, license and quota) implemented in China from 1998 to 2006, the modified two-stage gravity model was used to modify the model. The results show that TBT reduces the import probability of China and potential trading partners, but it increases the import amount with existing trading partners. It is further proved that although the technical trade barriers set by China have a relatively stable impact on trade volume, the impact of TBT on trade probability varies greatly among different industries and countries.

Domestic Research Results

Cai *et al.* (2017) used the panel data of China and 22 international trading partners from 2000 to 2015, introduced the variable of intellectual property based on the expanded trade gravity model, and conducted an empirical analysis of "TBT's impact on the export of high-tech products in China". The analysis results show that China should consider the IPR protection policies of the importing countries when dealing with the TBT of the importing countries.

Chen *et al.* (2014) analyzed and compared the total export value of electromechanical products from 2008 to 2012 in an in-depth way by combining the theories of technical trade barriers, and conducted profound research and exploration on the current situation of electromechanical products suffering from TBT in China by applying theoretical and empirical analysis. It was concluded that TBT set up by developed countries has a promoting effect on the export of electromechanical products in China.

Li (2014) analyzed the current situation and causes of Chinese electromechanical products' export suffering from EU TBT, and demonstrated the impact of EU TBT on Chinese electromechanical products' export by combining theoretical research and empirical analysis. The results show that in the short term, the TBT set by EU has a certain inhibitory effect on the growth of China's mechanical and electrical product export. In the long run, the determination and action of Chinese electromechanical enterprises to upgrade and improve their products and keep close to international standards make TBT play a role in promoting the green transformation of Chinese electromechanical enterprises to a certain extent. Finally, based on the analysis of the three levels of corporate, government, and industry associations, the countermeasures were proposed.

The Literature Review

To sum up, TBT has become the largest non-tariff barrier that China's foreign trade enterprises are facing in recent years, as the foreign trade activities of various countries become increasingly active and the export products of the exporting countries are frequently confronted with the technical barriers to trade of the importing countries. Many scholars have studied the effects of TBT on electromechanical products and put forward their own views and opinions. Some are analyzed from an empirical perspective, some from a theoretical perspective, and some are combined with theoretical analysis and empirical analysis. This paper mainly focuses on the export of electromechanical products in China, analyzes the status quo of TBT suffered by foreign trade enterprises of electromechanical products in China, and studies the impact of TBT on the export of electromechanical products in China from positive and negative theoretical and empirical perspectives respectively. Based on the above analysis results, further analysis is made on the causes of TBT in China's electromechanical products export, and corresponding countermeasures and Suggestions are put forward according to these reasons.

THE CURRENT SITUATION IN CHINA ABOUT MECHANICAL AND ELECTRICAL PRODUCTS EXPORTS SUFFERED FROM TECHNICAL BARRIERS TO TRADE

Mechanical and electrical products, including machinery and transportation equipment, various electronic products, instrumentation and electrical equipment, account for about 47% of total exports every year. And this part is also the biggest impact of China's export products on changes in total exports.

In recent years, the export volume of China's mechanical and electrical products has generally shown an upward trend, but there has been a slight decline in 2008 and 2015. In 2007, the export volume was 577044.7 million US dollars. Under the impact of the 2008 financial crisis, the economies of all countries in the world have experienced decline in different degrees. Because of this, export volume of Chinese mechanical and electrical products fell after two consecutive years of rising. With the slow recovery of the world economy, the export volume of Chinese mechanical and electrical products has risen for five years after 2010. In 2015, the export volume of mechanical and electrical products decreased slightly compared with 2014, and decreased by 11,386 million dollar, accounting for 1.06%. In 2016, the decline was more dramatic than that in 2015. The figure continued to decrease by 74905.7 million dollar, accounting for 7.07%.

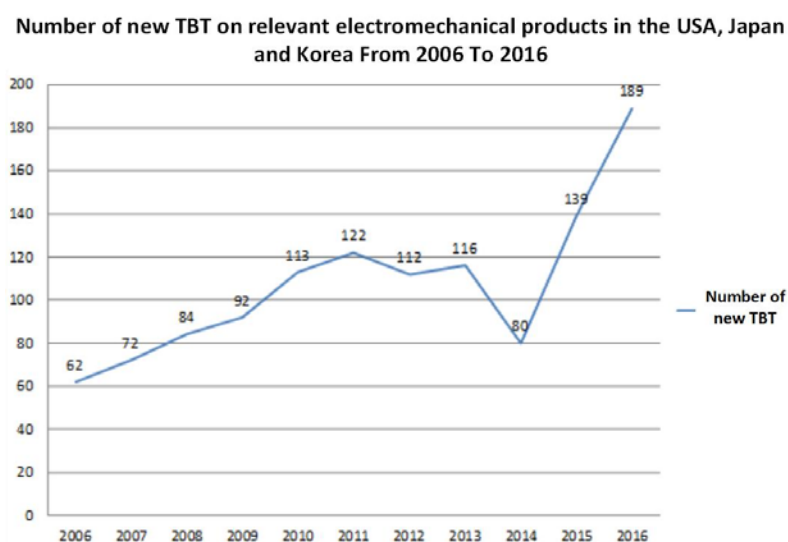
As the export of electromechanical products increases, the technical barriers to trade are also increasing. The following is an analysis from the two aspects—the number and export volume of TBTs (Technical Barriers to Trade) in major exporters of electromechanical products and the change in export losses of Chinese electromechanical products under TBT.

Analysis of the Number and Export Volume of TBT in Major Exporters of Mechanical and Electrical Products

In recent years, Chinese mechanical and electrical products are mainly exported to the United States, Japan and South Korea. The average annual export volume of mechanical and electrical products exported to these three countries accounts for nearly 30% of the total exports every year.

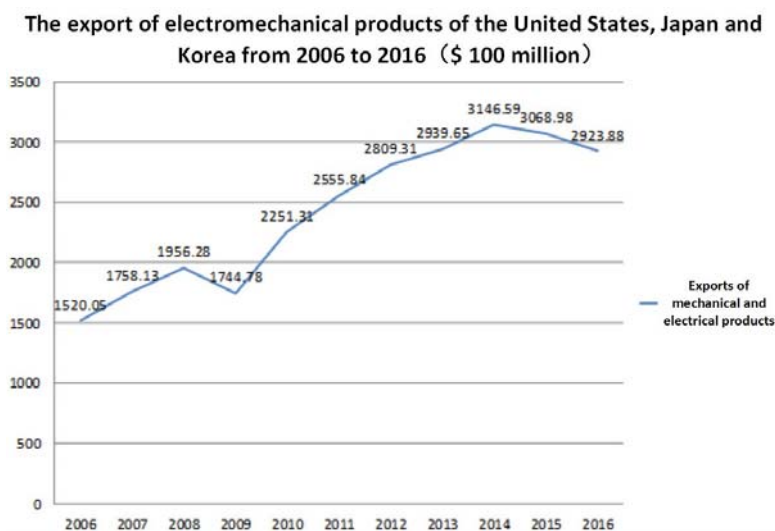
As shown in Figure 1, the total number of TBTs, which were related to mechanical and electrical products in the US, Japan and Korea, showed an upward trend from 2006 to 2011. And as shown in Figure 2, although the export volume of Chinese mechanical and electrical products were increasing year by year in addition to 2009, the growth rate was still small. Between 2011 and 2014, the number of new TBTs in the United States, Japan and South Korea fell, and the export volume of these three countries has increased considerably compared with previous years. However, the sudden surge in the number of new TBTs in the United States, Japan and South Korea began in 2014, which directly led to a decline in the corresponding export volume.

As a consequence, you can see that the increase of TBT in the importing countries has a negative effect on the export volume of Chinese mechanical and electrical products. In addition, slight increase usually slow down the growth rate of export volume, and sudden surge may even affect the export of Chinese mechanical and electrical products. And that means the end of the growth trend and the beginning of the downward trend.



Source: WTO official website TBT IMS database

Figure 1: Number of new TBTs for mechanical and electrical products in the US, Japan and Korea in 2006-2016



Source: The United Nations Comtrade database

Figure 2: Exports of mechanical and electrical products exported by China, Japan, and Korea from 2006 to 2016

Changes in Export Losses of China's Mechanical and Electrical Products after Encountering TBT

In 2013, Chinese mechanical and electrical products suffered from TBT. And after that, the export loss reached 27587.29 million dollar, accounting for 41.67% of total TBT losses. In 2014, the loss reached 31,173.69 million dollar, increasing by 13.0% compared with 2013, accounting for 41.28 of the total loss. %. In 2015 the loss reached 40,716.52 million dollars, increasing by 30.6% compared with 2014, accounting for 43.60% of the total loss.

The growth rate of direct loss of TBT in Chinese electromechanical enterprises and national foreign trade enterprises suddenly increased after the surge in the number of new TBTs in 2014, which was changed from 13.0% and 14.1% to 30.6% and 23.6% respectively. In the short term, the increase in the number of new TBTs has directly affected the export of Chinese electromechanical products, resulting in an accelerated increase in direct losses of electromechanical enterprises.

THE IMPACT OF TECHNICAL BARRIERS TO TRADE ON THE EXPORT OF CHINA'S MECHANICAL AND ELECTRICAL PRODUCTS

Negative Impacts

Export Suppressed Effect

The technical trade barriers set by the importing countries to protect their own interests will block the electromechanical export enterprises that do not meet their technical or certification requirements from the international market, resulting in the reduction of supply in the international market of mechanical and electrical products. Supply curve S move left to become S'. As shown in Figure 3, after the supply and demand reached a new equilibrium, other conditions remaining unchanged, the export volume of electromechanical products decreases from Q1 to Q2. Therefore, in terms of the quantity of mechanical and electrical products exported, the TBT of the importing country will cause certain obstacles to the entry of China's electromechanical export enterprises into the international market. The short-term export to China's electromechanical products has a certain inhibitory effect.

This part of the product was either rejected if it did not meet the international standards or the requirements of the importing country in terms of technology or certification, or because the exporting company could not afford the high cost of entering the international market due to the huge new cost. Forced these parts of technologies or products to withdraw from the international market. For whatever reason, the production of the company cannot be completed smoothly, and more losses are caused to the enterprise by losing the order and returning the order. For example, in 2014, the direct loss of China's exports to Latin American countries was 2.27 billion US dollars. In 2015, with the substantial increase in the number of new TBTs in 2014, the loss reached 5.71 billion US dollars, more than doubled.

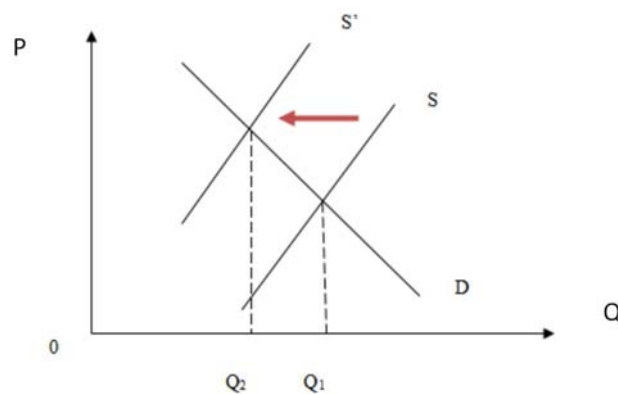


Figure 3: Short-term analysis of TBT's impact on the export of electromechanical products in China

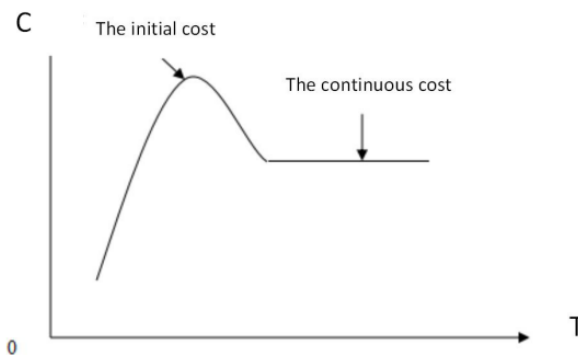


Figure 4: Effects of importing country TBT on export cost of mechanical and electrical products in China

Leading To An Increase In The Export Cost Of China's Mechanical And Electrical Products

In order to meet the technical requirements and certification standards of importing countries and reduce the impact of TBT set up by importing countries, China's electromechanical enterprises have to invest more, reset technology, improve processes and purchase more sophisticated testing equipment, hiring more professional technicians to test the products, which lengthens the production and testing cycle, coupled with the increase of various expensive international certification fees, increasing the cost of mechanical and electrical products exports under various factors. For example, in 2014, the increased cost of China's electromechanical enterprises reached US\$9.41 billion, and in 2015 it was US\$15.11 billion. In 2016, it reached a new record high of US\$24.34 billion.

However, this increase in export costs refers not only to the initial cost of the TBT in the importing country that year, but also to ongoing costs. As shown in Figure 4, the exporting country's electromechanical enterprises have spent a considerable initial cost in order to allow their electromechanical products to enter the international market. However, after entering the market, enterprises only need to make fixed costs, so the continuous cost is basically stable.

Affecting The International Image Of China's Mechanical And Electrical Products And Enterprises

Since some of China's electromechanical enterprises have not met the technology or certification standards of importing countries, these enterprises have suffered direct economic losses. At the same time, foreign media have also made negative publicity and even slammed them, leading the confidence of the products of overseas consumers to China's electromechanical has been hit hard, which has greatly reduced the image of China's mechanical and electrical products and enterprises in the international market. As a result, the share of China's mechanical and electrical products in the international market has decreased, which has weakened the international competitiveness of China's mechanical and electrical products exports.

Leading To Imbalance Between Supply And Demand In The Domestic Mechanical And Electrical Products Market

Due to the variety of TBT, the strict requirements of technical standards, and the differences in technical level and environmental awareness among Chinese and foreign countries, TBT in the importing countries has blocked the “unqualified” Electromechanical enterprises from the international market, resulting in China's electronics exports were blocked. For this part of the export-blocked electronics, if it is resold to a third country, it will increase costs, reduce China's foreign exchange earnings, and affect the growth rate of China's exports of mechanical and electrical products. If it is resold to the domestic market, it will lead to a slowdown in the growth rate of mechanical and electrical products, and even a decline. At the same time, domestic electromechanical products are oversupply, as shown in Figure 5. The right shift of the domestic electromechanical product supply curve causes the price to decrease, from P1 to P2, and some domestic electromechanical enterprises will reduce profits and even lose money to bankruptcy.

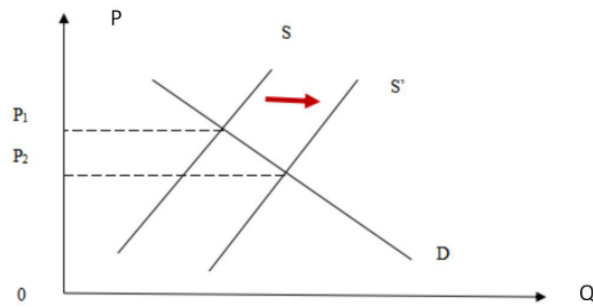


Figure 5: Analysis of supply and demand of domestic mechanical and electrical products after blocked product resale

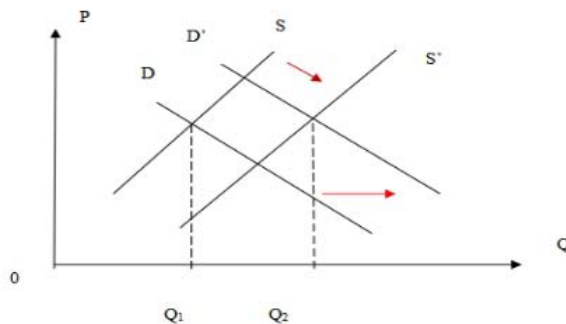


Figure 6: Long-term analysis of the effects of importing country TBT on the export of mechanical and electrical products in China

Positive Influence

Conducive To Improving The Quality Of China's Mechanical And Electrical Products

Faced with more complicated and demanding product standards in importing countries, companies that choose to improve, optimize and upgrade their products in the face of difficulties, while trying to break TBT, also improve the quality of products and provide consumers with more Excellent product service.

As shown in Figure 6, in the long run, China's electromechanical enterprises have made technological improvements in order to enable the smooth completion of production, in order to meet the technical and certification requirements of importing countries. This technology improvement makes China's export of electromechanical products more capable. Meeting the needs of consumers in importing countries, causing their demand to increase, the demand curve shifts to the right, from D to D'. As a result, the supply curve of China's electromechanical products export market moved to the lower right, and the curve changed from S to S'. After reaching a new equilibrium, the export volume of China's mechanical and electrical products increased, from Q1 to Q2. Therefore, in the long run, the importing country TBT has a certain positive impact on the export of China's mechanical and electrical products.

Conducive To Promoting The Upgrading Of China's Industrial Structure

From a long-term perspective, the driving force of economic development lies in technological innovation. Enterprises that can break through TBT must make certain improvements or innovations in production technology, promote the upgrading of industrial structure, and accelerate the rapid development of China's economy transforming to high quality development.

Conducive To The Active Integration Of China's Mechanical And Electrical Products With International Standards

In the short-term, most of the enterprises that have been eliminated by TBT have not paid enough attention to the technical standards and various related policies of the importing countries. The asymmetry of information has caused huge losses for these enterprises. On the other hand, this also precisely promotes the active and active attention of China's electromechanical enterprises in the direction of changes in international standards, and has a certain role in promoting the environmental awareness of China's electromechanical foreign trade enterprises and fostering export-oriented awareness of legalization and legalization. At the same time, it also promoted the process of connecting China's mechanical and electrical products with international standards.

EMPIRICAL ANALYSIS OF THE IMPACT OF TECHNICAL BARRIERS TO TRADE ON THE EXPORT OF MECHANICAL AND ELECTRICAL PRODUCTS IN CHINA

Model Specification

26 importing countries, including the United States, Japan, Canada, Switzerland and India, which have trade transactions with mechanical and electrical products in China from 2008 to 2017, were randomly selected to make statistics on their per capita GDP, population size, innovation capacity index, TBT notification quantity and intellectual property protection index. On this basis, the impact of technical trade barriers of importing countries on the exports of mechanical and electrical products in China was studied. Therefore, the gravity model of trade is set as:

$$\text{LnExport}=\alpha_1+\alpha_2\text{LnTBT}+\alpha_3\text{LnIPR}+\alpha_4\text{LnCI}+\alpha_5\text{LnPOP}+\alpha_6\text{LnGDP}+\mu \quad (1)$$

Variable Description And Data Source

Explained Variable -- China's Mechanical And Electrical Product (Export)

Mechanical and electrical products are classified according to the international trade standard classification SITC/ rev.3. Mechanical and electrical products belong to the category of machinery and transport equipment, and combined with the United Nations Comtrade database, the specific data of 26 trading countries selected for the export of mechanical and electrical products of foreign trade enterprises from 2008 to 2017 are obtained, and these data are taken as explanatory variables.

TBT Notification Quantity (TBT)

According to the classification standards of the customs HS catalogue and the international standard classification of CIS, a total of 22 categories of standards related to mechanical and electrical products were selected for professional division. Considering the continuity and long-term nature of TBT notification quantity in time, the paper adopted the accumulated TBT notification quantity and conducted query statistics on the TBT notification quantity of mechanical and electrical products in each country from 2008 to 2017. The data comes from the TBT IMS database on the WTO's official website.

Intellectual Property Protection Index (IPR) And Capacity Of Innovation Index (CI)

In recent years, TBT is often combined with the degree of protection of intellectual property rights, and the competitiveness and innovation ability of each country directly leads to the different requirements on imported products. The global competitiveness report, published by the world economic BBS (WEF) in the last decade, has acquired the IPR and CI indices, which have averaged an annual quantitative analysis of the capacity of 137 countries around the world, and have been divided into 1 to 7 grades (7 is the highest) for each capacity index including IPR and CI. The article uses these two indices to quantify the extent of intellectual property protection and innovation in the importing countries, both of which have a range of 1 to 7, 1 is the lowest degree, and 7 is the highest degree.

See table 1 for detailed information of specific variables:

Table 1: Variables And Variable Descriptions

Variables	Variable Descriptions	The Minimum Values	The Maximum Values
Export	Exports of electromechanical products to trade partners in China (US \$10,000)	2294	21840066.6
TBT	Notification of technical trade barriers in importing countries	1	202
IPR	Intellectual property protection index (1-7) for importing countries	2.3	6.6
CI	Innovation capacity index of importing country (1-7)	2.29	6.2

POP	The population of importing countries (10,000)	32	130420
GDP	Per capita GDP of the importing country (\$)	476.553	102573.67

Model Test And Regression Analysis

Unit Root Test And Basic Regression

In this paper, the unit root test was carried out for each variable. The first-order difference results passed the LLC, ADF, PP and IPS tests, and the model was one-order integral (table 2 is the unit root test result of first-order difference). Therefore, the logarithm of all variables was taken for regression analysis.

Table 2: First Order Differential Unit Root Test Results

Variables	LLC	ADF	PP	IPS
P Values	0.0000	0.0000	0.0000	0.0000

According to Hausman test, $P=0.8574 > 0.05$, so the original hypothesis (the random effect model should be established) should not be rejected, and the establishment of the random effect model should be determined. Table 3 shows the basic regression results of the random effect model.

Table 3: The Basic Regression Results of The Stochastic Effect Model

Model	Coefficient	Standard Deviation	t Values	P Values
LnTBT	0.102223	0.022572	4.528652	0.0000
LnPOP	1.145972	0.580879	1.972825	0.0501
LnGDP	0.607583	0.085249	7.127124	0.0000
LnIPR	-0.640188	0.171316	-3.736885	0.0003
LnCI	0.602477	0.154928	3.888759	0.0001

Regression Analysis

Regression results show that the importer of TBT notification and the mechanical and electrical products exports were positively correlated, but has little effect, because the importer of import of mechanical and electronic products, technology, quality certification standards strictly controlled and constant attention, will promote the development of the high quality mechanical and electrical products industry transformation, and makes the overall cost, quality and price of mechanical and electronic products in China will increase to a certain extent, in the long run, the growth in exports of mechanical and electronic products in our country has some positive impact.

In view of that increase of state awareness of protection of intellectual property rights, the technical barrier to trade introduced in recent years were more or less relevant to the protection of intellectual property rights, and it can be seen from the result of the regression that the IPR indices of the importing countries, namely, the intellectual property protection index, were negatively correlated with the exports of electromechanical products in China. This means that the increase of TBT notification on intellectual property protection in the importing country will lead to a certain decline in China's exports of mechanical and electrical products.

THE REASON WHY MECHANICAL AND ELECTRICAL PRODUCTS IN CHINA SUFFER TECHNICAL BARRIER TO TRADE

Outdated Technology

Among the electromechanical products of TBT suffered by the importing country, some of them were eliminated by the international market due to their backward technology. The backward production technology of this part of electromechanical products makes it unable to adapt to the development trend and direction of electromechanical products in the modern international market, and cannot better meet the demands of consumers in the international market.

In addition, the testing technology, professional degree of testing personnel and authority of testing institutions involved in China's testing process have not met the requirements of international standards, and there is a big gap between China and developed countries. For example, in January 2018, the United States has issued a recall of light sets, cordless electric chainsaws and heaters, which were made in China. And a joint Canadian recall of Chinese camera power adapters has issued as well, due to the possible short circuits, the risk of electrical shock, the possible failure of protective devices, the possible fire or burns and the risk of electric shock by exposing live contacts. These are all because of the backward testing technology and the lack of testing level, which makes the test results not up to the international standards, so that the results of the final recall can be implemented.

China's Exports Of Mechanical And Electrical Products Are Too Concentrated

China's exports of mechanical and electrical products are too concentrated in the United States, Japan and South Korea. From 2010 to 2016, China's total exports of mechanical and electrical products to the United States, Japan and South Korea accounted for

28.93% of the total exports of mechanical and electrical products annually. However, the concentration of export areas is not conducive to risk aversion. According to the data of annual report on China's technical trade measures (2016), the direct loss of TBT suffered by Chinese mechanical and electrical enterprises in the United States, Japan and South Korea in 2015 reached \$ 6,560.487 million, accounting for 16.11% of the total direct loss of TBT, while the direct loss of TBT in 28 member states in the EU totaled 9574.163 million dollars, accounting for 23.51% of total losses, only 7% more higher than American, Japan, South Korea, which explains the excessive concentration of export region increases risk and the difficulty of the enterprise risk prevention management.

Differences in Product Standards between China and The Importing Countries

Compared with developed countries, China's product standard system still has a large gap. If China's mechanical and electrical products want to achieve successful export, they have to meet the relevant international standards and the standards set by the importing countries. In the United States, for example, there are 8 standards of conformity assessment for mechanical and electrical products in use (excluding international standards), including UL certification, energy star certification, ETL certification, FCC certification, QS9000 certification, ANSI certification, ANAB certification and CEC certification, while the standards in use in China (excluding international standards) only have one CCC certification. Just because of the difference in the certification standards, some electromechanical enterprises in China, when their production technology fails to meet the international standards, face the relevant technical regulations of the importing countries and suffer the blow of TBT, which brings huge losses to the enterprises.

Insufficient Attention to Relevant Technical Regulations of the Importing Country

The electromechanical enterprises in China do not have a deep understanding of the technical trade barriers, relevant technical standards and regulatory systems of the importing countries. Some small and medium-sized electromechanical enterprises are not merely backward in production technology and can barely reach the relevant standards of the importing countries, but lack the awareness of standards and certification as well. They fear that the high certification costs of the importing countries will increase the costs of the enterprises. Then they choose to escape certification, but rather suffered the blow of TBT, and have brought more serious loss for the enterprise.

Incomplete WTO TBT Agreement

Many import councils use the TBT exception to create a complex, exacting set of technical standards with operational freedom as a means of trade protection. For example, all WTO members have the "environmental protection exception right", but the WTO is not clear about the conditions for the exercise of this right, and the WTO fails to take into account the gap between developing countries and developed countries in environmental protection level and awareness. In addition, the WTO allows member states to take certain "necessary measures" within the "appropriate degree", while the criteria for "appropriate" and "necessary" are vague and difficult to measure. This, therefore, allows some countries to take technical trade measures against importing countries "reasonably" and unfetteredly.

CONCLUSION AND SUGGESTION

Today, the main exporting countries of Chinese mechanical and electrical products are the United States, Japan and South Korea. The total amount of new TBT in these three countries is generally on the rise. The export volume of Chinese mechanical and electrical products to these three countries is rising, but the rate of increase gradually slow down. And the direct loss of TBT in Chinese electromechanical products has shown an increasing trend in recent years.

The impact of TBT on Chinese exports of mechanical and electrical products has two sides. On the negative side, the technical trade barriers set up by importing countries have a certain inhibitory effect on the export in the short term, which will increase the production costs (including initial cost and continuous cost), and affect the export value of Chinese mechanical and electrical products. As a consequence, we cannot keep a balance between supply and demand in Chinese domestic electromechanical products market. And the most important is that the international image of export is impaired and the international competitiveness is weakened. On the positive side, TBT will improve the quality of Chinese electromechanical products in the long run, and accelerate the upgrading of industrial structure. Finally, according to the analysis of this paper, five causes of Chinese electromechanical products suffering from TBT of the importing country are obtained, namely (1) backward technology, (2) excessive concentration of Chinese electromechanical products in export areas, (3) differences in product standard system between China and the importing country, (4) lack of attention to international standards and relevant technical regulations of the importing country, (5) imperfection of WTO's TBT agreement, and the following countermeasures are proposed:

Accelerating Technological Innovation

The development concept of "Innovation, Coordination, Green, Openness and Sharing" is a new development concept, which was put forward by the Fifth Plenary Session of the 18th CPC Central Committee. The conference emphasized that "innovation is the first driving force for development". Joseph Schumpeter's "innovation theory" shows that the constant innovation of technology, the constant change of industry, and the emergence of "creative destruction" are the most important essence of modern economic

growth. Therefore, in the foreign trade of Chinese electromechanical products, technological progress and innovation cannot be delayed.

In terms of companies, technology investment should be increased. They should combine the product-centered "4P" theory and the customer-centered "4C" theory. And after that, they should use this connection as a starting point, and then increase the technological innovation and carry out research and development work. In addition, invest enough professional scientific research personnel resources, introduce advanced foreign testing technology and learn the excellent foreign testing institution management system. It's necessary to ensure sufficient and strong scientific research force to support the progress of testing technology in order to achieve the purpose of testing technology innovation.

In terms of the government, it is necessary to vigorously promote the progress of technological progress of enterprises, and support and encourage electromechanical enterprises to innovate their products and innovation in detection technology. The major enterprises that have technological innovation achievements will get some bonuses and honors. And we should support small and weak enterprises by providing financial support. Except these, we should also make relevant laws and regulations so that we can enable enterprises to innovate in technology.

Exploring a Wide Range of Electromechanical Products Market

In fact, Chinese electromechanical products are concentrated in the three countries, including United States, Japan and South Korea. Therefore, once a serious TBT strike is encountered, electromechanical enterprises in China will inevitably produce huge losses. In the meanwhile, it also has a certain negative impact on the international image of Chinese mechanical and electrical products. In order to spread the risk, companies should appropriately reduce the export volume of the products of the most important exporting countries, and export their products to more countries to open up a wider international market. The government can use the rules of the WTO to expand the development of emerging markets, such as holding trade fairs, conducting larger-scale advertising and other policy support, and giving certain major financial support to major electromechanical enterprises.

Accelerating the Improvement of Product Standard System

In order to make the export activities of electromechanical products go smoothly, the government should speed up the construction of the electromechanical product standard system, testing system and certification and accreditation system. In addition, the government should implement the integration of exporting enterprises with international standards, and reduce the loss because of shortages of product standard system.

Raising Standards Awareness and Certification Awareness

As we know, if we want to successfully resolve the problems about the technical barriers to trade, only relying on advanced testing techniques is not right. Enterprises should be deeply aware of standards and certifications, and should actively provide products and services in accordance with international standards and standards (Zneg *et al.*, 2016). When enterprisers try to improve product quality, they try to provide consumers with a pleasant shopping experience. Therefore, enterprises should increase the publicity of international standards and certification awareness, and regularly open relevant courses for relevant employees to let them know about the changes in relevant technical regulations. As a consequence, the most basic employees can understand the importance of international standards. In the meanwhile, the government should cooperate with the company's vigorous publicity, and make some relevant laws and regulations. Because of this, the electromechanical enterprises would be more likely to understand the importance of the state's technical standards and certification standards for electromechanical products. That means that the awareness of standards and certification will be strengthened.

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