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An Analysis of Chinese Trade and FTA using Gravity Model

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An Analysis of Chinese Trade and FTA using Gravity Model

By

Minyu Liu

An Abstract of a Thesis
in
Applied Economics

Submitted in Partial Fulfillment
of the Requirements
For the Degree of

Master of Arts

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Buffalo State College
State University of New York
Department of Economics and Finance
ABSTRACT OF THESIS

An Analysis of Chinese Trade and FTA using Gravity Model

This paper assesses the impacts of the Free Trade Agreement on the volume of both the import and export of China and FTA countries or districts. We used a gravity model with dummy variables for China and each Chinese FTA partner country to account for the specificities of particular trade relations. By using the relevant theories and methods for the trade gravity model, we estimate a pooled cross-section model with data for 33 countries or districts over 15 years. The result indicates that the GDP, per capita GDP, distance, FTA, and language are the main factors that influence the volume of the import and export between China and FTA countries. In conclusion, FTAs will promote trade between China and FTA countries, increasing the amount of trade. China should build more FTAs with other countries to strengthen its communication and cooperation in the economic and trade areas, bringing China’s own comparative and competitive advantages into full play while removing obstacles to investment and trade to gain more economic benefits.

Keywords: China; FTA; Trade Gravity Model; Trade potential

Minyu Liu

Date

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Chapter 1

Introduction

1.1 Introduction

The FTA (Free Trade Agreement) is the establishment of a free trade zone. The member countries in the region eliminate product tariffs on goods and reduce non-tariff trade barriers. As the market has developed in recent years, the content included in the free trade zone has been continuously increasing and developed into a wide range of projects such as the service industry, foreign investment, procurement of goods, industrial standardization, independent property rights, etc. The FTA is also known as the Economic Partnership Agreement (EPA). In this paper, the FTA is the best kind of regional cooperation methods. The FTA has become one of the best measures to take to protect trade while the role of the WTO has been weakening.

Due to the weakening of the role played by the WTO, many countries have focused on close cooperation among regions. The primary measures taken to maximize the profits of a free trade area are actions like reducing protectionism, eliminating protectionism among nations, and promoting the interests of member states. Therefore, joining a FTA has become an important factor affecting the trade between two countries. In this paper, we use the trade gravity model to analyze the main factors that determined the bilateral trade between China and each FTA trading partner country from the empirical point of view: national GDP, per capita GDP, geographical distance, common languages, and whether or not to join the FTA. The test results proved that the FTA has a positive influence on the trade between China and other countries. China should continue to
encourage signing FTA agreements with other nations to seek greater economic benefits.
Chapter 2

Literature Review

2.1 Researches on FTA

There is much work that has been done on the national or international level to discuss the effect of the FTA and estimate the impact of the trade gravity model on the trade and relationships between trading countries.

In recent years, China has established free trade areas as a national strategy to protect its own trade. The development of the FTA is of great significance to the global trade industry and industrial structures. There have been 16 FTAs completed in China, but this is not enough. Economists who study trade between China and the FTA countries have gradually increased. But economists who analyze the trade between China and the FTA countries by using the trade gravity model are still represented by a small proportion of the world within a short period.

Falvey¹ (1998) pointed out the protective effect of the rules of origin on the intermediate product manufacturers within a free trade area. To obtain the corresponding tax deduction and exemption, the producers must try their best to purchase the intermediate commodities from the free trade zone. Even though the purchase price of the intermediate products in the region is higher than that of the imported products outside the region, producers tend to choose products in the free trade area to fulfill the rules of origin for the free trade area.

¹ Falvey, Rod and Reed, Geoff. Rules of Origin as Commercial Policy Instruments. The University of Nottingham, Acknowledges Financial Support from the Leverhulme Trust under Programmer Grant F114/BF, 2000: P34.
Estevadeordal’s\textsuperscript{2} (2003) study of the trade effects of preferential trade arrangements with the North American Free Trade Zones (NAFTA) arrived at three conclusions: (1) Strict rules of origin and sectoral preferences that give preferential treatment suppressed trade flows; (2) Strict rules of origin for the final product encourages international trade of products between the members. This means that the trade transfer brought in input elements; (3) The rules of origin in the system, such as the origin of the specific product rules can be flexibly applied, such as accrual, tax rebates, etc. It is helpful for encouraging trade flows between two countries.

Howard\textsuperscript{3} (2001) pointed out that the traditional trade area has undergone tremendous changes. First, large scale free trade areas have emerged. The most important regions are the North American Free Trade Area (NAFTA) and the EU Free Trade Area (EEA), which are successful examples for other countries.

Engman\textsuperscript{4} (2010) thought that companies suffer from delays at borders, lack of transparency and predictability, complicated documentation requirements, and other outdated customs procedures, which are estimated to exceed, in many cases, the costs of tariffs. Reducing and lowering these barriers should allow for the further liberalization of international trade.

\textsuperscript{3} Howard J. Wall. Be Japan Been Left Out in the Cold by Regional Integration? 2001.
Wilson⁵ (2010) figured out that the effects of the customs and administrative procedures are described as measures that “thicken” the borders between countries. Consequently, reducing the “thickness” of the borders should increase trade flows between countries.

Danping Li⁶ (2011) pointed out that due to the signing of a free trade agreement with foreign countries, almost every contracting party had to amend their intellectual property laws to meet the minimum intellectual property protection standards required by the FTA. In 2003, compared with the FTA signed by the United States and other countries, the U.S.-Chile Free Trade Agreement (FTA) was friendly and flexible with regards to intellectual property protection.

Dongbo Liu⁷ (2011) pointed out that the Trade Promotion Authority (TPA) has laid the national legal foundation and necessary conditions for the rapid negotiation of the U.S. government's trade agreement when President Bush signed the Trade Promotion Authorization Act in August 2002. It indicated that trade negotiations required the support of various domestic laws, agencies, and other parties. This is an important reason why the United States can negotiate so efficiently.

Shen Zhang⁸ (2016) argued that the U.S. attitude towards East Asian regional cooperation was based on the “9 + 3” meeting in December 1997 since the East Asian countries have started deliberations on East Asian regional cooperation in December

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⁶ Danping Li. The Impact of the TRIPS-PLUS Clauses on the Trademark Law of Chile in the US-Chile FTA. Journal of Law at Yunnan University No. 1., 2011.
1990. There were three stages of evolution: strangling the initial cooperation, developing sufficient rules, and intending to transform East Asia regional cooperation into Asia-Pacific regional cooperation.

Minghui Shen\textsuperscript{9} (2011) suggested that the "spaghetti bowl" effect emerged in East Asia with the signing of a large number of FTAs by the East Asian economies. In particular, ASEAN (Association of Southeast Asian Nations) proceeded to promote the establishment of the "ASEAN + 1" FTA network. This practice aggravated the "spaghetti bowl" effect. To cope with the "spaghetti bowl" effect, it was necessary to promote the establishment of a wide range of FTAs in East Asia. At present, it seems more feasible to enhance intra-ASEAN trade facilitation and capacity building.

Yajie Dong\textsuperscript{10} (2014) argued that the abuse of FTA in some countries has become a trade protection measure. He used the trade gravitation model to study the trade obstruction effect of the TPP agreement. Then, he measured the impact of the rules of the FTA on the intra-state trade between the internal and external countries. He figured out that the FTA regulations could promote trade among countries within the region to a certain extent, but it would also impede the export of FTA members outside the area. Meanwhile, countries with lower levels of export products would be more affected by the rules of origin than countries with higher levels of export products.

Gao Shan\textsuperscript{11} (2012) argued that the main features of global economic integration developed with the development of bilateral FTAs since the 1990s. With the development

\textsuperscript{9} Minghui Shen. Responding to the Spaghetti Bowl Effect - Also on the Role of ASEAN in East Asian Cooperation. Asia Pacific Economy Issue 2., 2011.
of regional economic integration, as a big country in the world, China should speed up the establishment of its bilateral free trade agreements with other countries. Bilateral free trade agreements can bring tremendous economic and political benefits to its member countries.

Yan Wang and He Gao\textsuperscript{12} (2012) suggested that the establishment of the FTA between China and New Zealand reduced trade barriers, boosted the trade effect, developed comparative advantages for China and New Zealand, and promoted expansion of the bilateral trade in goods. With the development of free trade between the two countries, the trade effect was more active.

Jingxia Wu\textsuperscript{13} (2013) said the development of the FTA results in the "spaghetti bowl" effect. The rules of the FTA will facilitate trade by building a free trade zone to a certain extent, mainly by: increasing the management cost; increasing the operating costs of enterprises and reducing the utilization rate of the FTA; and distorting the FDI in the region. This not only has a significant impact on the pattern of intra-East Asian trade, but eventually results in the normal operation of the productive networks in the East Asian economies. Therefore, governments are analyzing and studying the influence of the FTA on the production networks in East Asia, proposing the corresponding countermeasures and suggestions for countries in East Asia.

\textbf{2.2 Research on the Trade Gravity Model}

The trade gravity model has developed radically since the 1960s. Economists have

\textsuperscript{12} Yan Wang and He Gao. Comparison of bilateral trade of goods before and after the establishment of FTA between China and New Zealand. Business Research, No. 9., 2012.

enriched their development by adding new explanatory variables, which can mainly be divided into two new variables: one is the autogenous variable that affects the trade volume, such as the national GDP, per capita GDP, etc.; the other is the virtual variable such as the language, history, and preferential trade agreements. In recent years, Chinese economists have begun to use the gravity model to explain the effects of technical regulations and standards as well as technical barriers to trade.

Moeniust⁴¹ (1999) used this model to analyze the trade effect of spontaneous standards, with panel data covering the data for 471 industrial products from 1980 to 1995 in 12 European countries. He found that sharing standards can eliminate the potential cost differences and has a significant effect on the volume of trade. If the number of bilaterally mutual criteria increases by 1%, the corresponding trade volume increases by about 0.32%. He also found that a country's single standard reduces the imports of the non-manufacturing sectors such as agricultural products, promoting the trade of the manufacturing industry. This method was also applied in Gebrehiwet’s⁵¹ (2007) study on the export effect of the aflatoxin standards of America, Europe, and other developed countries on fruits, vegetables, and nuts to the countries in the Asia Pacific and Africa.

Shokair⁶¹ (1986) thought that economic cooperation is a main pillar of the developing world that empowers a group of countries with common features in a challenging environment. Economic cooperation aims at achieving the maximum and

possible economic efficiency in the production and exchange of goods, which can be achieved through the efficient distribution of inputs between the different countries.

Alshara\textsuperscript{17} (2011) cited economic integration as an advanced case of cooperation in which countries located in the same geographical area and looking for economic unity allow inputs to freely move from one place to another. Moreover, Aljouzy\textsuperscript{18} (2011) also pointed out in the geographical area extending from the Arab gulf in the east to the Atlantic ocean in the west, there is a surplus of capital available for financing the integration process.

Chen’s\textsuperscript{19} research (2008) on the effect of the maximum residue limits of ox tetracycline in the fish feed in China’s fish products and fresh fruit exports all came to the same conclusion: the maximum residual standard can restrict the export of developing countries, and the more restrictive the rule is, the more obvious the restriction effect is.

Xiumin Li and Shuyan Li\textsuperscript{20} used the trade gravitation model test and analyzed the main factors that decided bilateral trade in 2003: the trade partner's GDP, space distance, population, and system arrangement. They also estimated the volume of trade in Northeast Asia countries. They concluded that export had great potential from China to Korea and Russia, Japan to Russia, and Korea to Japan and Russia. Finally, they thought that China should expand the economic cooperation between China, Japan, and Korea.

\textsuperscript{17} Alshara, A. The Impact of cooperation and partnership agreements on the values of Arab inter-trade (Master Thesis), Institute of Economics and Commerce Sciences - Academic Center in Ghardaia – Algeria, 2010.
Zhaoxing Shi\textsuperscript{21} (2005) deduced the gravitational equation of trade flow from the new classic and new trade theories, conducting a macro analysis of the export flow of Chinese agricultural products.

Dongsheng Sun\textsuperscript{22} (2005) used the gravity model to analyze the impact of Japanese limits on chlorpyrifos residues in China's vegetable exports to Japan. Fengjie Pan\textsuperscript{23} et al. (2010) examined and verified the influences factors of the gravity model on China's vegetable exports. Also, Haiqing Xu\textsuperscript{24} (2008), Zijian Zhong\textsuperscript{25} (2010), Yinli Zhai\textsuperscript{26} (2011), and other researchers used the gravity model to conduct a quantitative analysis on the influence of technical barriers to trade of China's exported agricultural products.

Dan Wu\textsuperscript{27} (2007) applied the expanded trade gravity model to study the influencing factors and potentialities of bilateral export trade flows in East Asia. The data set is a panel for the years 1995-2004. The results showed that the development of intra-regional export in East Asia was mainly related to the following factors: economic scale, CEPA, ACFTA, economic institutions, economic development level, FDI, distance, and financial crisis.

\textsuperscript{23}Fengjie Pan, Cui, Y., Mu. The trends of China’s vegetable export trade and the influential factors. Chinese Agricultural Science Bulletin, 2010: P437-441.
\textsuperscript{24}Haiqing Xu. Empirical analysis of the effect of Green Trade Barriers on China’s exports of agricultural products — The vegetable trade between China and Japan as an example. Journal of Inner Mongolia College of Finance and Economics, 2008: P48-51.
Peng Wang\textsuperscript{28} (2007) also tested and measured the bilateral trade flows and potential between every province, autonomous region, or municipality directly under the Central Government’s control in mainland China and Taiwan by using the trade gravity model.

Ling Jiang\textsuperscript{29} (2013) figured out that the residue limits of the pesticides in vegetables as set by Japan, the US, and the EU had obvious negative impacts on Chinese vegetable exports. China’s vegetable exports decreased by 4.16% with the 10% increased strictness of the residue limits. On the other hand, raising the strictness of the residue limits for pesticide use in vegetables in China had some positive impacts on China’s vegetable exports.

Yu Zhang\textsuperscript{30} (2006) used the Beat coefficient test to indicate that regional economic cooperation is the most critical factor that influences China’s international trade. The trade potential analysis showed that the Chinese government should pay more attention to its domestic market and stick to the strategy of expanding its interior demand.

Chapter 3

Classification and Development of China’s Foreign Trade

3.1 The Development of China’s Trade

The rapid growth of import and export trade in goods has leads to the development of world trade in goods production. The primary target of trade is to balance the volume of exports and imports. The top ten countries China trades with are as follows: Japan, the United States, the European Union, Hong Kong, ASEAN, South Korea, Taiwan, Russia, Australia, and Canada—of which Japan, the United States, the European Union, and Hong Kong are declining.

China joined the WTO (World Trade Organization) after accepting all multilateral agreements, creating a "government procurement agreement". After China joined the WTO, its role and influence in WTO territory became increasingly evident. For example, China joined the “Greenhouse” meeting of the WTO, participated in the decision-making meetings between the key members of the WTO, and got to decide the core WTO rules. China also played an essential role in promoting the Doha negotiations. China sent delegations to attend the mini-ministerial meetings held by the WTO. For example, China coordinated its positions with those of other developing countries such as Brazil and India at the Fifth Ministerial Meeting in Hong Kong. They argued that the agricultural export subsidies in developed nations that severely distort trade should be canceled before 2013, the resolution was passed at the meeting. Special arrangements for the duty-free and quota-free treatment of the least developed countries adopted particular methods for cotton subsidies. The declaration of the Hong Kong Conference was finally passed because of
China's initiative in coordinating it and overcoming the obstacles to it.

At the WTO Cancun Conference, China stood together with a large number of developing members. Eventually, the developed countries such as the European Union conceded three issues: trade and investment, competition policy, and government purchases. On intellectual property and public health problems, China fought side by side with members of the African Group and other developing countries, criticizing the largest Western pharmaceutical companies for their large patent fees while ignoring the requirements of the toiling masses of thousands of Africans who are plagued by infectious diseases. Developed countries such as the United States compromised and agreed to amend the relevant provisions on intellectual property. China also provided strong support to the request of cotton producing African nations and the least developed countries for tax exempt and quota-free treatment. Also, China joined the G-20, which is a leading agricultural negotiator for developing countries led by Brazil, and joined the agriculturally led negotiator, the G45, which is a group of 45 extending members led by Indonesia. China accepted and participated in the policy review process. The WTO’s biannual trade policy review had been received, and the issues raised during the deliberations of the members were carefully answered. When accepting the policy, China also participated in the trade policy review of other members, especially the members that were developed countries like the United States, the European Union, and Japan, as well as the other members with economic and trade relations to China. As a large nation with a growing level of responsibility in the international arena, China has, to some extent, assumed a coordinating role. China’s political and economic system as well as its economic and trade status has created common and proximate interests for China and the WTO. The WTO members have
more languages in common with all categories of members, which has given China the role of handling various types of members during the negotiations.

In 2008, international trade became more difficult than ever before due to the outbreak of the global economic crisis. Meanwhile, trade frictions and disputes intensified. International trade protectionism developed, and the external environment for trade has been deteriorating. Faced with a complex situation, the Chinese government made policy decisions. China’s government adjusted the direction of its macroeconomic regulation and controlled its market in time to implement proactive fiscal and monetary policies, taking many measures to stabilize external demand. The development of China's foreign trade has undergone positive changes. In 2009, the total value of China's trade was 2.27272 trillion U.S. dollars, down 13.9 percent over the same period last year; of which, 1.20167 trillion U.S. dollars were exported, down 16 percent from the previous year, and 100.56 billion U.S. dollars were imported, down 11.2 percent. China surpassed Germany as the world's largest trade exporter, becoming second only to the United States and Germany in terms of imports as the third largest importer in the world. In September 2009, China's General Administration of Customs released the import and export figures for China's foreign trade in 2009. According to the published international trade data, China's foreign trade demonstrated new features:

(1) Compared with the same period in 2008, according to the statistics from Customs, from January to August 2009, China's foreign trade totaled 1,388.66 billion U.S. dollars, down 22.4% over the same period in the previous year. China’s import and export trade volume dropped significantly, while the trade surplus decreased significantly. Among them, the export volume reached 70.74 billion U.S. dollars, down 22.2 percent; the import
volume was 607.92 billion U.S. dollars, down 22.7 percent. China’s cumulative trade surplus was 122.82 billion U.S. dollars, which was a decrease of 19%. The Customs statistics showed that in the month of August, China's foreign trade volume totaled 191.7 billion U.S. dollars, of which the value of exports was 103.7 billion U.S. dollars. China’s export value during the two months of July and August continued to rise above 100 billion U.S. dollars. China’s import volume reached 88 billion U.S. dollars while the seasonally adjusted imports, exports, and imports increased by 2.3%, 3.4%, and 1% respectively in August.

(2) For the export commodities, the decline in the export of major labor-intensive products was lower than the overall level during the same period of time. The Customs statistics showed that during the first eight months of 2009, the year on year decreases in the export of major labor-intensive products in China were all less than the overall decline of 22.2%—of which exports of clothing and clothing accessories were 67.46 billion US dollars, down 10.4%; footwear exports were 18.33 billion US dollars, down 5.8%; furniture exports were 15.66 billion US dollars, down 9.4%; luggage exports were 80.3 billion US dollars, down 9.4%. Also, yarn and fabric textiles were 37.43 billion US dollars, down 14.9%; 4.55 billion US dollars for toys, which was down 12.2%. During the same period, the export of electromechanical products in China amounted to 428.85 billion U.S. dollars, down 20.6% over the same period last year.

In 2012, the international financial crisis entered its fifth year. Deep-seated effects of the crisis continued to emerge. In particular, due to the sovereign debt crisis in Europe, the world economic recovery was frustrated, as the growth rate of global economy slowed down. The problems in China's economic development increased. Conflicts between
China’s overcapacity and the downward pressure on its economy increased. The internal and external environments for the development of foreign trade has grown complicated and severe. The impact of the external demand downturn, rising costs, and increased friction have been superimposed upon each other. The growth rate for imports and exports have slipped down into the single digits. In response to these unfavorable changes in the situation, the Chinese government prompted for policies and measures to stabilize the growth of its foreign trade in order to relieve the difficulties of import and export enterprises, enhance the confidence of enterprises, promote the growth and recovery of China’s international trade, accelerate the pace of China’s structural adjustment, and further improve the quality of China’s development.

3.2 The Trade Effect of FTA

Countries can derive multiple benefits from establishing FTAs. The economic benefits gained by big powers include traditional trade gains, increased bargaining chips in multilateral trade negotiations, and expanded retaliatory trade capabilities. Non-economic benefits involve acquisition of regional ownership, promotion of the expansion of ideology and political system, consolidation of strategic security, and global hegemony; The economic benefits gained by small countries include traditional trade gains, expanded markets, investment attraction, and economic growth; non-economic benefits include enhancement of the ability to negotiate, reduction in the cost of multilateral negotiations, and securing a stable supply of regional public goods: security, energy, diplomacy, etc. The FTA trade effect is one of the economic benefits. There are three main trade effects for FTAs:

(1) Eliminates Trade Barriers.
The trade effect of free trade zones comes from the cancellation of trade barriers. On some high tariffs productions, the average tax rate for agricultural products is as high as 47.8%, with a severe tariff levied on animal and plant products, dairy products, grains, and other agricultural products. The average tariff rate for vegetables, fruits, and plant products is 57.8%, while the maximum tariff is 88.7%. The tariffs levied on textiles, clothing, leather, shoes, and hats are the highest in the manufacturing sector, with an average tariff rate of 12.6% for apparel products and 16% for leather footwear. Some trade countries use high tariffs, special safeguard measures for agricultural products, high subsidies, and anti-dumping actions to negatively affect trade. The export cost is significantly reduced after the establishment of the free trade zone and the possibility of gaining a trade effect also increases.

The FTA’s tariff reduction process creates opportunities for exports and imports. The more significant the tariff gap is between two countries, then the more commonly a significant amount of quality and cheap goods in the market will be shipped to the other, replacing high cost productions. This increase will further boost trade growth and create trade creation effects.

(2) Promotes Industrial Transfers.

International industrial transfer refers to the removal of an industry from one country to another so that another nation can establish a new industry or make significant changes to the production capabilities and technological base of the primary sector of another country. During the industry transfer, developed countries continue to transfer their industries that have lost their comparative advantages to developing countries or regions as well as shift and upgrade along the trajectory of the labor-intensive, capital-intensive,
and technology-intensive sectors. China has a complicated industrial structure with a large number of labor-intensive industries along with rapidly growing capital and technologically intensive industries, which have not only formed a complete primary technical department but also formed a specific foundation for some high technical fields. The transfer of the developed countries’ manufacturing industries has been developing most rapidly in the FTA.

(3) Strengthens the Trade Creation Effect.

The trade creation effect refers to the internal elimination of tariffs. After free trade is implemented, high cost products are replaced by low cost products of other member countries in the region and the products are imported from member countries to create new trade that had previously not been possible in the past. Due to the abolition of tariffs, each member country shifts from purchasing and consuming high cost and high-priced products to low cost and low-priced products from other member countries, thereby saving money for consumers, raising the level of benefits received, improving the production efficiency, and reducing the manufacturing cost. In FTAs, the higher the difference in production costs among the member states, the smaller the difference in production costs will be between member and non-member countries. Therefore, FTAs will lead to the creation of more trade profits around the world.

3.3 The Trade Status of China

China's foreign trade has experienced rapid growth since the reform and opening up policy was implemented. This policy has played an essential role in China's national economy.

China's foreign trade has maintained a relatively rapid growth since the reform and
opening up of China, which has played an important role in the rapid and steady growth of its national economy. In recent decades, China's foreign trade volume has continued to grow substantially. China's foreign trade has maintained a rapid growth of more than 20% for four consecutive years since 2002. China ranked third in the world in 2005. In 2006, China's foreign trade reached a value as high as 1.76 trillion U.S. dollars, which was a net increase of 0.34 trillion U.S. dollars over 2005 and an increase of 23.8 percent, had a trade surplus of 0.18 trillion U.S. dollars and a foreign trade export of 0.97 trillion U.S. dollars, which was an increase of 1.2 percentage points than the previous year. China’s import increased by 0.8 trillion U.S. dollars and an increase of 2.4 percentage points.

China is a giant in global trade, with import and exports equal to $3.87 trillion in 2012. This means that in 2012, China surpassed the United States as the most significant trading nation in the world in terms of trade volume in goods. Table 1 shows the status of China’s foreign trade between 1997 to 2016.

Table 1. The status of China’s foreign trade

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<td>2009</td>
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<td>2014</td>
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<td></td>
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<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

3.4 The problems of China’s Trade

(1) The Impact of Trade Protectionism.

China faces a serious problem in its trade with Europe, EU trade protectionism, which has intensified as the European debt crisis has deepened. When implementing a deflation policy to the benefit of all countries, the EU countries will regard increasing the suppression of import as their primary means of escaping the crisis when dealing with the debt crisis. In recent years, as China's foreign markets has grown, it has become the EU's main market competitor. Therefore, with the further influence of the European debt crisis, the EU will take measures to reduce the impact of Chinese products on the local industries. Potential trade protection measures will be indispensable. Since the beginning of 2011, the EU has mainly taken a series of trade protection measures. In May, anti-dumping duties of 8% to 35.1% and anti-subsidy duties of 4% to 12% were imposed on Chinese produced high grade coated paper. Such a move by the EU is bound to have an impact on China's trade.

(2) Effect of the World Crisis.

The emergence and spread of the sovereign debt crisis in Europe has caused the EU's demand for goods in China to plummet. As the EU's largest trading partner, China was also affected when the EU economy began facing severe challenges. The global crisis in the United States caused many regions and countries to reduce their demand for imported goods, leading to sluggish economies and a profound impact on the worldwide economy. At the same time, the overall trade situation of the world is not optimistic. Under such circumstances, the development of China's foreign trade has been significantly and negatively affected.
(3) Increase in Trade Disputes.

In recent years, the antidumping investigations into the protective measures China has encountered in its foreign trade have also been increasing with the continuous increase in the scale of Chinese exports. As of 2010, China has been the country that has suffered the most anti-dumping investigations in the world for 16 consecutive years, becoming the country with the most significant number of countervailing studies in the world for five straight years. In 2010, according to the data from the World Bank, 47% of newly launched trade-aid investigations and completed cases have targeted China. Against this background of increasing employment pressure and the sluggish economies in Europe and the United States, the comparative advantage of China's low wage of national labor force created by China's domestic trade will face stronger trade protection barriers and China may encounter more anti-dumping investigations.

(4) Intensification of RMB Appreciation Pressure.

Appreciation of the China Yuan especially in traditional labor-intensive industries, will have a more significant impact on trade. However, in recent years, due to the continuous trade surplus in China, China now has a large foreign exchange reserve. While increasing the creditability of the Renminbi, strengthening national solvency, and safeguarding national economic security, China’s vast foreign exchange reserves and the political and economic pressure China faces from all over the world has increased the pressure for RMB appreciation.

(5) Comparative Advantage of Focusing on Labor-Intensive Products.

In 1965, Barrasa, the American economist, first proposed the concept of the comparative advantage index (RCA index for short). The Comparative Advantage Index
can be a reliable analysis of which country's products or industries in the international market has a comparative advantage and which is the most competitive. Through the RCA index, we can determine what kind of industry is more export-oriented and what the comparative advantage of each country in the international trade market is.

The comparative advantage index refers to the ratio of the share the exports of certain commodities has in the total value of a country’s exports to the share of such exports in the world total exports. The formula is:

\[
RCA_{ij} = \frac{X_{ij}}{X_{itj}} \div \frac{X_{iw}}{X_{tW}}
\]

In the formula,

- \(X_{ij}\) represents the export value of the export product i of country j;
- \(X_{itj}\) represents the total export value of country j;
- \(X_{iw}\) represents the world’s export value of export product i;
- \(X_{tW}\) said the world's total export value.

As a whole, when the larger RCA value exceeds 1, this indicates that the export share of such goods in the entire country is larger than that of the world, thus proving that the country's products are more competitive in the international market. Conversely, the smaller the RCA value is, even lower than 1, this indicates that the country’s product does not have a comparative advantage in the international market and its international competitiveness is low.

As we know, the Standard International Trade Classification (SITC) is a classification of goods that is used to classify the exports and imports of a country to enable comparison of different countries and years. The comparative advantage China has in primary products (SITC0-SITC4) has been declining year by year. The comparative
advantage China has in industrial products (SITC5-SITC8) has shown a steady growth trend. Labor-intensive, capital-intensive, and technologically intensive products have obvious comparative benefits, so the comparative advantage index of category 8 products has reached more than 2, with intense competitiveness as exports.

Table 2 presents the comparative advantage index of China’s exports between 2000 to 2013. From 2000 to 2013, capital-intensive and technologically products have tended to increase. Among them, the index of the comparative advantage of SITC7 was the most obvious. After 2003, the comparative advantage index reached more than one while the SITC5 index was relatively stable at 0.5. Of the labor-intensive products traded from 2000 to 2013, the 8th category products were experiencing a downward trend. The RCA index of the 8th category in 2000 was the highest at 2.81, while the RCA index in 2009 was the lowest at 2.14. This shows that some labor-intensive products in China have gradually declined in comparative advantage while some products have steadily increased in comparative advantage. However, as a whole, the comparative advantage index of labor-intensive products is still above 1, even reaching 2. China’s labor-intensive products are still highly competitive.
<table>
<thead>
<tr>
<th>Year</th>
<th>SITC0</th>
<th>SITC1</th>
<th>SITC2</th>
<th>SITC3</th>
<th>SITC4</th>
<th>SITC5</th>
<th>SITC6</th>
<th>SITC7</th>
<th>SITC8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0.92</td>
<td>0.33</td>
<td>0.58</td>
<td>0.31</td>
<td>0.15</td>
<td>0.54</td>
<td>0.80</td>
<td>1.24</td>
<td>2.81</td>
</tr>
<tr>
<td>2001</td>
<td>0.73</td>
<td>0.30</td>
<td>0.46</td>
<td>0.29</td>
<td>0.12</td>
<td>0.46</td>
<td>0.77</td>
<td>1.05</td>
<td>2.29</td>
</tr>
<tr>
<td>2002</td>
<td>0.73</td>
<td>0.29</td>
<td>0.43</td>
<td>0.26</td>
<td>0.07</td>
<td>0.43</td>
<td>0.91</td>
<td>1.11</td>
<td>2.33</td>
</tr>
<tr>
<td>2003</td>
<td>0.68</td>
<td>0.24</td>
<td>0.37</td>
<td>0.25</td>
<td>0.06</td>
<td>0.41</td>
<td>1.05</td>
<td>1.11</td>
<td>2.27</td>
</tr>
<tr>
<td>2004</td>
<td>0.59</td>
<td>0.24</td>
<td>0.31</td>
<td>0.23</td>
<td>0.06</td>
<td>0.42</td>
<td>1.16</td>
<td>1.20</td>
<td>2.24</td>
</tr>
<tr>
<td>2005</td>
<td>0.57</td>
<td>0.19</td>
<td>0.31</td>
<td>0.18</td>
<td>0.09</td>
<td>0.45</td>
<td>1.21</td>
<td>1.21</td>
<td>2.22</td>
</tr>
<tr>
<td>2006</td>
<td>0.54</td>
<td>0.16</td>
<td>0.24</td>
<td>0.13</td>
<td>0.10</td>
<td>0.45</td>
<td>1.26</td>
<td>1.28</td>
<td>2.23</td>
</tr>
<tr>
<td>2007</td>
<td>0.49</td>
<td>0.14</td>
<td>0.21</td>
<td>0.13</td>
<td>0.06</td>
<td>0.47</td>
<td>1.28</td>
<td>1.24</td>
<td>2.22</td>
</tr>
<tr>
<td>2008</td>
<td>0.43</td>
<td>0.14</td>
<td>0.22</td>
<td>0.14</td>
<td>0.07</td>
<td>0.54</td>
<td>1.37</td>
<td>1.33</td>
<td>2.26</td>
</tr>
<tr>
<td>2009</td>
<td>0.43</td>
<td>0.15</td>
<td>0.20</td>
<td>0.13</td>
<td>0.05</td>
<td>0.46</td>
<td>1.44</td>
<td>1.21</td>
<td>2.14</td>
</tr>
<tr>
<td>2010</td>
<td>0.45</td>
<td>0.15</td>
<td>0.18</td>
<td>0.12</td>
<td>0.05</td>
<td>0.51</td>
<td>1.45</td>
<td>1.21</td>
<td>2.18</td>
</tr>
<tr>
<td>2011</td>
<td>0.46</td>
<td>0.16</td>
<td>0.18</td>
<td>0.11</td>
<td>0.05</td>
<td>0.57</td>
<td>1.46</td>
<td>1.28</td>
<td>2.26</td>
</tr>
<tr>
<td>2012</td>
<td>0.43</td>
<td>0.16</td>
<td>0.17</td>
<td>0.09</td>
<td>0.05</td>
<td>0.52</td>
<td>1.42</td>
<td>1.30</td>
<td>2.35</td>
</tr>
<tr>
<td>2013</td>
<td>0.41</td>
<td>0.15</td>
<td>0.16</td>
<td>0.09</td>
<td>0.05</td>
<td>0.51</td>
<td>1.42</td>
<td>1.33</td>
<td>2.32</td>
</tr>
</tbody>
</table>


Also, China's exports of products with comparative advantages have shifted from primary products to manufactured goods. Although the index of Capital-intensive (RAC) and technologically intensive products has been growing year by year and at an increasingly rapid pace, labor-intensive products are still the primary exports with the most competitiveness.
4.1 The definition of FTA

FTA (Free Trade Agreement) refers to a free trade area. A FTA is a legally binding contract between two or more countries, creating regional trading entities with the aim of promoting economic integration, eliminating trade barriers (such as tariffs, trade quotas, and priorities), and allowing the free flow of goods and services between countries. In general, the sections in the FTA will include, but are not limited to: general rules or definitions, trade in goods, rules of origin, customs formalities, sanitary and phytosanitary measures (SPS), technical barriers to trade (TBT), safeguards, telecommunications, financial services, investment, natural / business mobility, competition, government procurement, transparency, intellectual property, trade remedies, dispute resolution, exceptions, and final clauses. The remaining chapters differ according to the actual trade needs of the two countries, such as e-commerce, environment, education, labor, and so on.

The Free Trade Area is a type of economic integration. Economic integration is aimed at removing trading obstructions and constrictions on the movement of production factors between the two nations. As such, it triggers a process of integration in the market with commodities, service, and production elements so FTA is only the first step toward economic integration. Free trade areas can be divided into generalized and narrowly defined free trade areas according to the number of countries involved and the scope of
the area. The difference between a free trade area and customs union is that the free trade area internally limits tariff and non-tariff trade barriers among the member states. A customs union focuses on a standard tariff within a free trade zone. Sometimes, a FTA refers to a free trade agreement, which applies to the agreement reached by two or more countries to facilitate trade liberalization such as the elimination of tariffs and non-tariff barriers. All nations will set some rules that are suitable for their own countries whenever they participate in FTAs. The rules must be based on their technical advantages and production factors, while all involved nations will enjoy greater freedom due to the tariff-free promotion of trade activities made possible by the universal FTA rules. This shows that countries participating in the FTA have significant advantages compared with countries that have not joined the FTA.

4.2 The WTO and FTAs

In recent years, the development of regional trade arrangements as represented by the FTA has been ascendant. Many WTO members have joined this trend in order to win trade advantages. On the one hand, it is due to the progress made in the WTO Doha round of negotiations. On the other hand, they can choose their own political and economic priorities in the FTAs, as there is flexibility in the form and coverage of the area.

According to Table 3, we can conclude that there are four main differences between the WTO and FTAs.

First, only a few FTA member countries can negotiate their own choices when negotiating. There are more than 140 countries in the WTO, and the negotiations are for all member states.

Second, FTAs further open up markets on the basis of the WTO’s most favored
nation treatment (MFN), which enjoy a high degree of liberalization. The degree of liberalization of WTO trade is lower.

Third, FTAs have short negotiation times and are flexible. The WTO negotiations are long and inflexible.

Finally, FTAs involve investment and technical cooperation. The WTO does not involve investment and economic cooperation.

Table 3. The differences between FTA and WTO

<table>
<thead>
<tr>
<th>Difference</th>
<th>FTA</th>
<th>WTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of members</td>
<td>Few</td>
<td>More than 140 countries</td>
</tr>
<tr>
<td>Degree of trade freedom</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Negotiation time</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>Scope of negotiation</td>
<td>Wide</td>
<td>Narrow</td>
</tr>
</tbody>
</table>

4.3 China's FTA construction

Recently, with the increasing establishment of regional economic integration zones in the world, regional trade arrangements made with FTAs are becoming more and more large scale, with higher and higher degrees of liberalization and broader coverage. China pays more attention to its FTAs with other countries and districts. The establishment of FTAs is beneficial to promoting the free trade zone between the two countries involved. China has completed 16 FTAs covering 24 countries and regions. This shows that the construction of FTAs is of great significance to promoting the economic and international trade of China and the world.

China is following the trend for regional economic integration and strengthening its
strategy for the free trade area. At the end of 2016, there were 16 FTAs established by China, involving 24 countries and regions: Brunei, Burma, Cambodia, China Hong Kong, Indonesia, Laos, China Macau, Malaysia, Pakistan, Philippines, Singapore, Korea, Thailand, Vietnam, Iceland, Norway, Switzerland, Chile, Peru, Australia, Maldives, Costa Rica, New Zealand, Georgia, except for the FTA with Georgia, which has not yet been effectively implemented. There are six FTAs currently under negotiation, involving 22 countries. Also, China completed an RTA study with India. A feasibility study was conducted on FTAs in Colombia and other countries. China also joined the Asia-Pacific Trade Agreement. China has formed an FTA network around the world, including the Americas, Asia, and Europe. Table 4 indicates the volume of trade between China and its trading partner countries.
### Table 4. List of China's Free Trade Agreements

<table>
<thead>
<tr>
<th>Area</th>
<th>Completed FTA</th>
<th>Negotiation FTA</th>
<th>Studying FTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>China—Association of Southeast Asian Nations (ASEAN); China—Singapore; China—Association of Southeast Asian Nations (“10+1”); China—Korea; China—Pakistan; China—CEPA; China—Maldives; China—Georgia</td>
<td>China—Regional Comprehensive Economic Partnership (RCEP); China—GCC; China—Japan; China—Pakistan (second); China—Israel</td>
<td>China—India; China—Nepal</td>
</tr>
<tr>
<td>Europe</td>
<td>China—Switzerland; China—Iceland</td>
<td>China—Norway</td>
<td>China—Moldova</td>
</tr>
<tr>
<td>America</td>
<td>China—Chile; China—Per; China—Costa Rica</td>
<td></td>
<td>China—Colombia</td>
</tr>
<tr>
<td>Oceania</td>
<td>China—Australia; China—New Zealand</td>
<td></td>
<td>China—Fiji</td>
</tr>
<tr>
<td>Africa</td>
<td></td>
<td></td>
<td>China—Mauritius</td>
</tr>
</tbody>
</table>


According to the 2016 statistics for China's free trade area network, China currently has 16 signed FTAs involving 24 countries; there are 6 FTAs under negotiation and six countries under study. The specific nations involved are listed in Form 3 above.

In 2015, the bilateral trade volume between China and ASEAN members, 15 FTA partners including New Zealand, Pakistan, Chile, Peru, and Costa Rica was $475 billion,
which was an increase of 4% over the same period in the previous year. Market access between China and its FTA partners has further improved, as the trade and investment environments has become more standardized and transparent. Meanwhile, China’s FTAs will also open its trade in services, lower the investment threshold, and strengthen the protection of China’s intellectual property. Table 5 indicates the volume of trade between China and trading partner countries.

**Table 5. The volume of trade between China and trading partner countries**

*(unit: ten thousand dollars)*

![Graph showing the volume of trade between China and trading partner countries from 2000 to 2015.](http://data.stats.gov.cn/)

4.3.1 China already has FTA

Table 6 indicates the development of China's FTAs and future FTA agreements. This means much time is needed to complete the negotiations for each FTA.

<table>
<thead>
<tr>
<th>FTA</th>
<th>negotiate</th>
<th>sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>China—Maldives</td>
<td>2015</td>
<td>2017</td>
</tr>
<tr>
<td>China—Australia</td>
<td>2005</td>
<td>2015</td>
</tr>
<tr>
<td>China—Switzerland</td>
<td>2011</td>
<td>2014</td>
</tr>
<tr>
<td>China-Costa Rica</td>
<td>2008</td>
<td>2011</td>
</tr>
<tr>
<td>China—Singapore</td>
<td>2006</td>
<td>2008</td>
</tr>
<tr>
<td>China-Chile</td>
<td>2005</td>
<td>2005</td>
</tr>
<tr>
<td>China—Association of Southeast Asian Nations (ASEAN)</td>
<td>2002</td>
<td>2008</td>
</tr>
<tr>
<td>China—ASEAN (“10+1”)</td>
<td>2014</td>
<td>2005</td>
</tr>
<tr>
<td>China—Georgia</td>
<td>2015</td>
<td>2004</td>
</tr>
<tr>
<td>China—Korea</td>
<td>2012</td>
<td>2015</td>
</tr>
<tr>
<td>China—Iceland</td>
<td>2008</td>
<td>2013</td>
</tr>
<tr>
<td>China—Peru</td>
<td>2007</td>
<td>2009</td>
</tr>
<tr>
<td>China—New Zealand</td>
<td>2007</td>
<td>2008</td>
</tr>
<tr>
<td>China—Pakistan</td>
<td>2005</td>
<td>2009</td>
</tr>
<tr>
<td>China—CEPA</td>
<td>2004</td>
<td>2004</td>
</tr>
</tbody>
</table>


(1) China-ASEAN FTA. Negotiations were started in 2002 and completed in 2010. The bilateral trade between China and ASEAN increased from 54.8 billion U.S. dollars to 4 trillion U.S. dollars between 2002 and 2012. This meant a 7.3 percent increase in ten years. On October 9, 2013, Chinese Premier Li Keqiang attended the China-ASEAN Leaders' Meeting and initiated negotiations for an upgraded version of the China-ASEAN FTA.

(2) China-Chile FTA. In 2004, the negotiations were held in November and the FTA (goods trade and cooperation part) was signed in November 2005. The China-Chile FTA
Supplementary Agreement on Trade in Services was signed in April 2008 with the China-Chile FTA Investment Supplement Agreement.

(3) China-New Zealand FTA. This was the first high quality FTA signed by China and a developed country. The agreement was signed in April 2008 and implemented on October 1 of the same year. In 2012, the trade volume between China and New Zealand reached 9.67 billion U.S. dollars. China implemented a six steps tax reduction plan for the China-New Zealand FTA since January 1. China has imported fresh goods zero tariffs have been achieved on January 1, 2016. Also, China will cancel all tariffs on imported products from New Zealand on January 1, 2019.

(4) China-Pakistan FTA. Negotiations were started in April 2005. In November, the "China-Pakistan FTA" (trade in goods and investment) was signed. In January 2011, both sides conducted negotiations on the FTA tariff reduction for the second phase of the products under negotiations.

(5) China-Singapore FTA. Negotiations were launched in August 2006, and the Sino-Singaporean FTA was signed in October 2008, covering many areas such as trade in goods, trade in services, movement of personnel, and customs procedures. An exchange of notes was signed on July 6, 2012 to further open up the banking industry under the framework of the China-Singapore FTA.

(6) China-Peru FTA. They started the negotiations in September 2007 and signed the secret FTA in April 2009. It was the first FTA signed by China and a Latin American country with a broad level of coverage.

(7) China-Costa Rica FTA. Negotiations were launched in November 2008 and the "China-Costa Rica FTA" was signed in April 2010.
(8) China-Iceland FTA. Negotiations took place in 2012 on trade in goods, services in trade, investment, rules of origin, customs procedures, trade facilitation, sanitary and phytosanitary measures, technical barriers to trade, legal matters, intellectual property, competition policy, trade relief, government procurement, and other issues. Substantial progress in the negotiations was made in April 2013 that covered all aspects of trade in goods, trade in services, investment, customs procedures, trade facilitation, competition policy and intellectual property, as well as all major areas of bilateral economic and trade cooperation. Both parties are close to agreement with each other regarding tax items and implementation of the final zero-tariff products according to the trade volume of 100%. The agreement will take effect in 2014.

(9) China-Switzerland FTA. Negotiations were launched in January 2011 over the tariff reduction model for trade in goods, trade in services, rules of origin, customs cooperation and trade facilitation, sanitary and phytosanitary measures, technical barriers to trade, legal and institutional provisions, intellectual property, competition policy, trade relief, dispute settlement, and economic and technological cooperation as well as the negotiation of new rules. It is one of the highest and most comprehensive FTAs in China. According to the statistics on the tax items, the proportion of tax reduction items in Switzerland is 96.8%, while China is 94.2% in the area of trade in goods. Regarding trade in services, due to the WTO commitments under the General Agreement on Trade in Services, Sweden is also implementing stipulations on the processing time for accepting visas, work permits, and residency permits, while further opening up areas such as tourism and translation. China has promised to open up its securities and other service sectors. The Sino-Swiss FTA also agreed on issues that China has rarely touched upon in
past FTA negotiations such as government procurement, environment, labor, intellectual property rights, and competition. For example, for the first time, China agreed to set aside a separate chapter on environmental issues in the FTA, stipulated specific rights and obligations for intellectual property protection, and enhanced the transparency and convenience of its labor protection.

4.3.2 China’s FTA negotiations

(1) China and South Korea FTA. Ten rounds of negotiations have been held since May 2, 2012. The two parties have created 11 documents on the rules of origin, customs procedures, and competition policy.

(2) China, Japan, and South Korea FTA. Negotiations started on November 20, 2012, with four rounds of negotiations having been held so far. A tripartite consensus was reached on the basic framework for the tariff reduction model for trade in goods. The main differences include whether to deal with the duty reduction rate for workers and peasants separately, the mode of service, and investment negotiation.

(3) ASEAN 10 + 6 (RCEP). During a series of meetings between East Asian leaders, China jointly issued a statement with the leaders of Japan, South Korea, Australia, New Zealand, India, and 10 ASEAN countries to launch the "Regional Comprehensive Economic Partnership” on November 20, 2012. Four rounds of negotiations have been held, including many issues: the area of trade in goods, tariff concessions, non-tariff measures, trade remedies, rules of origin, customs procedures and trade facilitation, standards, technical regulations and conformity assessment procedures (STRACAP), Sanitation and Phytosanitary Measures (SPS), and other issues, and they have been making progress on the tax reduction model. Regarding trade in services, a full exchange of their
views on market access in specific sectors has led to the formation of amalgamated documents for each program. The fifth round of negotiations took place in Singapore in June 2014.
Chapter 5

The Trade Gravity model

5.1 The development of the trade gravity model

Several empirical studies including, but not limited to, Tinbergen\textsuperscript{31} (1962) and Linnemann\textsuperscript{32} (1966), have shown that trade flows follow the physical principles of gravity. In other words, two opposite forces determine the volume of the bilateral trade between countries or economic blocks—or even between a country and an economic block. The volume of bilateral trade is based on the level of economic activity, income, and the barriers to trade. The latter includes in particular the transportation costs, trade policies, level of uncertainty, cultural differences, geographical characteristics, limited overlap in consumer preference schemes, regulatory bottlenecks, and common borders (Anderson & van Wincoop\textsuperscript{33}, 2003). While trade potential is the result of matched export capacities and import demands at the microeconomic level, on a more aggregated level of analysis, the proximity in demand, in per capita income, in space, and in culture are the key macroeconomic determinants of export potential. Thus, various combinations of macroeconomic variables, such as the GDP and population with geographic distance, are powerful predictors of trade potential. Hence, gravity equations use these variables and have been used extensively in empirical literature on international trade (Bayoumi


Eichengreen\textsuperscript{34}, 1997).

The model has been widely used in empirical literature to evaluate the determinants of bilateral trade. It explains a trade related dependent variable with the combination of macroeconomic variables, such as the country size, income, exchange rates, prices, etc. for both countries. Moreover, indicators of the transportation costs between the two countries and more general market access variables are commonly added.

The model states that the bilateral trade flows are positively related to the economic size (GDP or GNI) of the countries i and j. It also states that the bilateral trade flows are negatively related to the distance between the two countries. The simplest form of the model looks like:

\[ T_{ij} = A \left( \frac{Y_i Y_j}{D_{ij}} \right) \] (1)

Where,

- \( T_{ij} \) is the bilateral trade flows (exports plus imports) between the countries i and j,
- \( Y_{i(j)} \) is the GDP or GNI of country i(j),
- \( D_{ij} \) is the distance between the countries i and j,
- \( A \) is the constant of proportionality.

The gravity model for international trade is a simple empirical model used for analyzing the trade flows between countries. The history of the model starts with Newton’s Law of Gravitation (Head\textsuperscript{35}, 2000). The gravity model of international trade is


similar to Newton’s gravity equation. In 1687, Newton proposed the “Law of Universal Gravitation." This law argues for the attractive force between two objects “i” and “j” which is given as follows:

\[ F_{ij} = G \frac{M_i M_j}{D_{ij}^2} \quad (2) \]

Where,

\( F_{ij} \) is an attractive force,

\( G \) is the gravitational constant,

\( M_i \) and \( M_j \) are the masses of the two objects,

\( D_{ij} \) is the distance between the two objects, \( i \) and \( j \).

Based on Newton’s gravity equation as given above, Jan Tinbergen (1962) proposed a similar functional relation to explain international trade flows. The proposed equation was:

\[ F_{ij} = G M_i^\alpha M_j^\beta / D_{ij}^\theta \quad (3) \]

Where,

\( F_{ij} \) is the volume of trade between two countries \( i \) and \( j \),

\( M_{i(j)} \) is the relevant economic size of country \( i(j) \),

\( D_{ij} \) is the distance between the countries \( i \) and \( j \).

Considering the logarithm, the equation takes on the following form:

\[ \ln(T_{ij}) = a_0 + a_1 \ln(Y_i Y_j) + a_2 \ln(D_{ij}) \quad (4) \]

5.2 The trade gravity model of China

The above equation is the basic equation for the gravity model. However, many adjustments to the model have been made by several researchers to include more
variables. In this paper, an adjusted model will be used. The GDP and distance will be used in addition to the per capita GDP, Free Trade Agreement (FTA), and the use of common languages. Hence, the model to be used in this paper can be identified as follows:

\[
\ln M_{ij} = \alpha_0 + \alpha_1 \ln gdp_i + \alpha_2 \ln gdp_j + \alpha_3 \ln avg\_gdp_i + \alpha_4 \ln avg\_gdp_j + \alpha_5 \ln distance_{ij} + \alpha_6 \text{language}_{ij} + \alpha_7 \text{FTA} + \varepsilon_{it} \quad (i \text{ country is China}) \quad (5)
\]

<table>
<thead>
<tr>
<th>Table 7. The Meaning of the Explanatory Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explanatory variables</strong></td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>( M_{ij} )</td>
</tr>
<tr>
<td>FTA</td>
</tr>
<tr>
<td>( \text{avg_gdp}_{ij} )</td>
</tr>
<tr>
<td>( \text{gdp}_{ij} )</td>
</tr>
<tr>
<td>distance</td>
</tr>
<tr>
<td>language</td>
</tr>
</tbody>
</table>

Table 7 explains the meaning of the explanatory variables. First, we compared the nominal and real GDPs; then, we selected the nominal GDP. Because the nominal GDP is suited for analyzing the trade. Second, the geographical distance influences the transportation costs while also indirectly influencing the trade costs because of differences in the countries’ trade policies, customs and habits, and consumer preferences. We chose the absolute distance instead of the relative distance because the relative distance focuses on the economic differences between the two countries. The absolute distance is the geographical distance between the political centers of the two countries. Third, we selected the per capita GDP, because it respected the development of
the national economy. Finally, we chose the two dummy variables: common languages and FTA. There are 33 countries or districts with more than one hundred languages in use. Thus, we added common languages into the model as it will be helpful for analyzing the relationship between China and its FTA partner countries.

5.3 The data

In this paper, we chose China’s 23 partner FTA countries or districts: Brunei, Burma, Cambodia, China Hong Kong, Indonesia, Laos, China Macau, Malaysia, Pakistan, Philippines, Singapore, Korea, Thailand, Vietnam, Iceland, Norway, Switzerland, Chile, Peru, Australia, Maldives, Costa Rica, and New Zealand. Meanwhile, ten countries were not China’s FTA partner countries: India, Japan, Israel, Nepal, Sri Lanka, Mauritius, Georgia, Moldova, Colombia, and Fiji.

The 2000-2015 series of data was used in the model. The source for the data on the volume of exports and imports, GDP, and per capita GDP was the National Bureau of Statistics of China, which was developed by the People's Republic of China. The data for distances between countries was obtained from a website on the distances between cities worldwide (www.distancefromto.net/countries.php). Data for joining the FTA was obtained from the China Free Trade Website (http://fta.mofcom.gov.cn). Data on common languages was obtained from Google (www.google.com). Table 8 describes the statistical analysis.
### Table 8. Descriptive statistical analysis

<table>
<thead>
<tr>
<th>variable</th>
<th>Mean (M)</th>
<th>Standard Deviation</th>
<th>Median</th>
<th>Max</th>
<th>Minimum</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>3.058e+0</td>
<td>6.456e+0</td>
<td>391639</td>
<td>4.010e+0</td>
<td>136</td>
<td>527</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTA</td>
<td>0.212</td>
<td>0.409</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>528</td>
</tr>
<tr>
<td>avg_gdp</td>
<td>16324</td>
<td>21363</td>
<td>4850</td>
<td>104860</td>
<td>120</td>
<td>528</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gdp</td>
<td>3.580e+1</td>
<td>8.840e+1</td>
<td>9.800e+1</td>
<td>6.200e+1</td>
<td>6.240e+0</td>
<td>528</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>distance</td>
<td>5842</td>
<td>4188</td>
<td>3916</td>
<td>17047</td>
<td>1743</td>
<td>528</td>
</tr>
<tr>
<td>language</td>
<td>0.364</td>
<td>0.482</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>528</td>
</tr>
</tbody>
</table>

5.4 The results of empirical

The research data came from the cross-sectional and panel data consisting of time series. The time span is 15 years. There are 33 countries (or districts). According to the data characteristics, the model resulted in an excellent analysis by using the panel's generalized two multiplications and using the software Stata 14.0. In Table 9, the absolute value of the correlation coefficient between lngdp and lnavg_gdp is greater than 0.4, while the absolute values of the correlation coefficients between the other explanatory and control variables are less than 0.4, so multiple problems may have occurred. Then, we continued the VIF test.
Table 9. Correlation coefficient matrix

<table>
<thead>
<tr>
<th>variables</th>
<th>lnM</th>
<th>FTA</th>
<th>lnavg_gdp</th>
<th>lngdp</th>
<th>lndistance</th>
<th>language</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnM</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTA</td>
<td>0.320</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnavg_gdp</td>
<td>0.357</td>
<td>0.197</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lngdp</td>
<td>0.899</td>
<td>0.149</td>
<td>0.431</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lndistance</td>
<td>-0.211</td>
<td>-0.0950</td>
<td>0.287</td>
<td>-0.00460</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>language</td>
<td>0.177</td>
<td>0.214</td>
<td>0.213</td>
<td>0.0669</td>
<td>-0.0994</td>
<td>1</td>
</tr>
</tbody>
</table>

In Table 10, we indicated that the variance expansion coefficients of the explanatory and control variables are less than 10, so there is no problem with multicollinearity.

Table 10. The result of VIF

<table>
<thead>
<tr>
<th>variables</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnavg_gdp</td>
<td>1.49</td>
<td>0.669870</td>
</tr>
<tr>
<td>lngdp</td>
<td>1.26</td>
<td>0.790968</td>
</tr>
<tr>
<td>lndistance</td>
<td>1.17</td>
<td>0.855581</td>
</tr>
<tr>
<td>language</td>
<td>1.11</td>
<td>0.900456</td>
</tr>
<tr>
<td>FTA</td>
<td>1.10</td>
<td>0.910145</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.23</td>
<td></td>
</tr>
</tbody>
</table>

In the gravity model, distance is a constant, so the distance value will be missing when the fixed effect model is adopted. Therefore, this paper uses the OLS mixed regression and random models to measure whether the FTA influences the volume of the import and export trade between China and other countries. The regression results are shown in Table 11. In the OLS mixed regression model, the coefficient of the FTA was significantly positive with a significance level of 1%; in the random model, the coefficient of the FTA was significantly positive with a 10% significance level. This means that the FTA will promote trade between China and the FTA countries as well as
increase the trade volume.

Table 11. The result of the model

<table>
<thead>
<tr>
<th></th>
<th>(1) OLS mixed regression model</th>
<th>(2) Random model</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTA</td>
<td>1.013***</td>
<td>0.121*</td>
</tr>
<tr>
<td></td>
<td>(4.571)</td>
<td>(1.872)</td>
</tr>
<tr>
<td>lnavg_gdp</td>
<td>-0.0238</td>
<td>0.407***</td>
</tr>
<tr>
<td></td>
<td>(-0.196)</td>
<td>(5.170)</td>
</tr>
<tr>
<td>lngdp</td>
<td>1.129***</td>
<td>1.303***</td>
</tr>
<tr>
<td></td>
<td>(14.24)</td>
<td>(19.40)</td>
</tr>
<tr>
<td>lndistance</td>
<td>-0.688***</td>
<td>-1.048***</td>
</tr>
<tr>
<td></td>
<td>(-3.597)</td>
<td>(-5.075)</td>
</tr>
<tr>
<td>language</td>
<td>0.370</td>
<td>0.113</td>
</tr>
<tr>
<td></td>
<td>(1.219)</td>
<td>(0.400)</td>
</tr>
<tr>
<td>constant</td>
<td>-9.739***</td>
<td>-14.48***</td>
</tr>
<tr>
<td></td>
<td>(-4.911)</td>
<td>(-6.342)</td>
</tr>
<tr>
<td>Cluster by country</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Observations</td>
<td>527</td>
<td>527</td>
</tr>
</tbody>
</table>

Note: ***, **, * indicates respectively at the significant level of 1%, 5%, 10%.

The ln_gdp variable was used as the tool variable to conduct a robust test of the model (5). In the OLS mixed regression model, the results showed that the coefficient sign of all variables was unchanged, with a constant significance level and similar coefficient values. This means that the effect of the OLS mixed regression model is robust. In the random model, we expected that the significance level of the FTA was significantly changed from a significance level of 10% to that of 5%, while the other explanatory variables were similar. Table 12 cited that the random effects model was also robust with the same level of significance.
Table 12. Robustness test

<table>
<thead>
<tr>
<th></th>
<th>(1) OLS mixed regression model</th>
<th>(2) Random model</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTA</td>
<td>0.972***</td>
<td>0.123**</td>
</tr>
<tr>
<td></td>
<td>(4.479)</td>
<td>(2.018)</td>
</tr>
<tr>
<td>lnavg_gdp</td>
<td>-0.0336</td>
<td>0.367***</td>
</tr>
<tr>
<td></td>
<td>(-0.281)</td>
<td>(4.443)</td>
</tr>
<tr>
<td>lngdp</td>
<td>1.125***</td>
<td>1.290***</td>
</tr>
<tr>
<td></td>
<td>(14.67)</td>
<td>(17.95)</td>
</tr>
<tr>
<td>Indistance</td>
<td>-0.661***</td>
<td>-1.002***</td>
</tr>
<tr>
<td></td>
<td>(-3.535)</td>
<td>(-4.847)</td>
</tr>
<tr>
<td>language</td>
<td>0.370</td>
<td>0.150</td>
</tr>
<tr>
<td></td>
<td>(1.252)</td>
<td>(0.529)</td>
</tr>
<tr>
<td>constant</td>
<td>-9.728***</td>
<td>-14.18***</td>
</tr>
<tr>
<td></td>
<td>(-5.068)</td>
<td>(-6.029)</td>
</tr>
<tr>
<td>Cluster by country</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Observations</td>
<td>495</td>
<td>495</td>
</tr>
</tbody>
</table>

Note: ***, **, * indicates respectively at the significant level of 1%, 5%, 10%.

According to the regression results, the symbol for each interpretation variable and the expected symbol was the same, as most higher significance level. The entire equation and every coefficient were tested by T test. The determination coefficient of the equation $R^2$ fit in the model. Specific analysis of the regression results is shown as follows:

First, the FTA has an apparent inhibitory effect on the trade between China and other countries. In the OLS mixed regression model, at a significance level of 1%, the regression coefficient of the FTA variable was 1.013, which means that the FTA promotes the trade between China and the FTA countries as well as increases the trade volume.

Next, the GDP has an apparent promotional effect on the trade between China and the FTA countries. In the OLS mixed regression model, at a significance level of 1%, the
regression coefficient of the GDP was 1.129, meaning that with every 10% increase of
China’s GDP China, the volume of China’s export and import increases by 11.29%. In
short, during a period of economic prosperity, the development of bilateral trade between
two parties will improve, while economic downturns are not conducive to trade growth.

Finally, the geographical distance between both sides has a negative effect on the
trade between China and FTA countries. In the OLS mixed regression and random
models, the coefficients for geographical distance are -0.688 and -1.048, showing that
shortening the geographic distance between both sides can reduce the trade cost and
promote bilateral trade.
Chapter 6

The Influence of FTA on the Trade and Policy Recommendations

6.1 The influence of FTAs on China and Its Trading Partners

The purpose of the FTA in the international system is to constrain and regulate the market. It is also called a special trading institution. Current FTAs provide convenience by supporting trading partners. In addition, FTAs have benefits for the national trade market. Therefore, the increasing use of FTAs must have an impact on the functions of China’s government.

6.2 Policy Recommendations

The above analysis shows that the economic scale, per capita GDP, FTA, common languages, and geographical distance between countries are the main influencing factors on bilateral trade flows. However, the main obstacle to trade flow is the GDP between the two countries. China needs to cultivate new positive influential factors by continuing to maintain its current positive factors. Based on the conclusions of this study, the following policy recommendations are:

(1) To expand the development of the final product market in FTA.

The GDP is the positive variable most critical to the growth of trade flows among FTA countries. However, rapid economic growth is mainly driven by supply rather than demand. In recent years, the growth of trade flows between FTA countries has mostly come from growth of the intermediate product market, while the final product markets are still mainly located outside the region. This situation has increased the vulnerability
of and dependence upon trade flows among FTA countries. Therefore, it is necessary to expand the development of the final product markets in FTA countries to ensure the stability and sustainability of the growth of trade flows. To promote the production of the last product market in FTA countries, we should lower taxes. From the perspectives of China and ASEAN, a lower level of economic growth is a significant factor that limits the consumption level. Therefore, the final product market in FTA countries should be expanded mainly by raising the economic development level. At the same time, China should address the challenges of international technical barriers to trade.

(2) To strengthen the development of the FTA.

The development of the regional trade cooperation organization is an essential contributor to the growth of trade flows among the FTA members. The FTA economies are highly complementary to each other, as the economic and trade relations grow closer. The foundation for the development of regional trade cooperation is strong, as the benefits are considerable. China should conduct all-round cooperation to promote the growth of trade flows among the member economies. At present, the key to the development of the FTA is to coordinate the relations between China and other countries as well as to facilitate trade as a good entry point for strengthening the regional trade cooperation.

(3) To strengthen institutional reforms and adjustments in the FTA.

The quality of the systems in FTA economies has obviously encouraged export trade flows. Institutional reforms in the FTA have effectively enhanced economy respective comparative and competitive advantages, driving the development of export trade. First, during the system reform and adjustment process, we should ensure the appropriateness
and efficiency of government intervention as well as complete the transformation of
government functions. Second, we should adjust the strategy of opening up to the outside
world by promoting a gradual and moderate opening up and paying attention to the
optimization and upgrade of the export structure. Finally, we should establish well written
laws to protect private property rights.

(4) To actively and reasonably introduce international direct investment.

There are many advantages to FDI, such as the ease of management and the
introduction of technology, talent, managerial experience, and market share while
introducing funds. However, if FDI accounts for too much of a country’s economy, it will
cause damage to the country's economic security. Therefore, while actively introducing
international direct investment, we must also strengthen management of FDI, including
guiding its compliance with the direction of the country’s industrial restructuring;
controlling the market share of transnational corporations through establishment of "anti-
monopoly laws"; regulating the ownership and management of transnational corporations
in the industries that are relevant to national economy and the people's livelihood through
a flexible investment ratio; encouraging them to make more excellent use of the raw
materials and spare parts they produce domestically so as to drive the development of
other industries in the country and increase the industrial linkage .

(5) To strengthen logistics construction and cooperation.

In addition to science and technology, strengthening logistics construction and
cooperation is the primary countermeasure to take to reduce the impending effect of
distance on international trade. Logistics here refers to modern logistics. Unlike
traditional logistics, which mainly includes transportation, storage, and handling, modern
logistics is an organic combination of essential functions such as transportation, storage, handling, packaging, distribution and processing, distribution and information processing.

In East Asia, at present, only Japan has higher levels of logistics, while other economies have lower levels of logistics. For example, China's logistics costs are much higher than those of developed countries. In general, the cost of logistics is included in the cost of production in China, which is three times higher than in developed countries. The proportion that logistics costs takes up in China’s GDP is nearly double that of developed countries. East Asian economies need to increase their logistics infrastructure and network construction, cooperate to strengthen information technology, standardize of logistics, and accelerate the development of third-party logistics.
Conclusion

In this paper, we presented a gravity model that shows the impacts of the Free Trade Area on the import and export flows between China and other trade countries. The model controls for the national GDP, per capita GDP, FTA, language, and distance effects between China and other countries. The symbols and significance of the gravity model variables produced the expected results. The effect of the FTA on trade between China and its trading partners was also positive. These results contradicted the expectation about improved trade flows between China and its trading partner countries. The FTA affected each country differently, benefiting some while harming others. This could be because the FTA members had different tariff reduction schedules, causing countries to divert trades towards those with early schedules and away from those with late schedules. However, it was hard to determine whether the overall impact of ACFTA on the bloc as a whole was positive or negative. If the negative coefficients were indeed caused by trade being diverted away from countries with late tariff reduction schedules, then an effective policy aimed at maximizing trade would be to join every possible trade agreement and to reduce tariffs quickly so that trade is not diverted away.
Reference


