

Doctoral (PhD) dissertation

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Sino–US Trade Imbalance

Doctoral (PhD) dissertation

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DECLARATION

Hereby I certify that the Ph.D. thesis entitled ‘Sino–US Trade Imbalance’ is solely my own work. It contains no material that has been previously written or /and published by any other academic degree or diploma. Any previously published materials that have been used in this thesis are for bibliographical reference.

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ABSTRACT

In general, the government of a country should try to maintain a basic balance between imports and exports, preferably maintaining a surplus of the latter, which contributes to the healthy development of the national economy. The issue of Sino–US trade imbalance arose with the establishment of Sino–US economic and trade relations and has been aggravated with the expansion of Sino–US trade. The long-term trade imbalance not only has led to a series of economic issues, but in recent years, the Sino–US trade imbalance has also gradually evolved from an economic to a political issue. Sino–US trade is a significant contributant to world economic progress and trade development. Accordingly, the adjustment of Sino–US trade imbalance is not only crucial to the economic balance of the two countries, but also has an important effect on the global economic rebalance. As such, this study aims to identify the principal factors and consequences of Sino–US trade imbalance and determine the measures to deal with it.

Quantitative empirical research method is adopted in this study. In this study, quantitative research methods are used for data collection and econometric models are used to analyse the factors, influences and trends of Sino–US trade imbalance by using analysis software of EViews and Excel. On the one hand, the use of quantitative empirical research is a more effective approach to the hypotheses of this research. On the other hand, the Sino–US trade imbalance is a complex problem. To explore the research problem, this study processed the second-hand data, including stationarity test, and used some inductions and calculations on the data according to the research indicators to form the database. It is important to test the robustness of the model. This n ensures the reliability of the research; however, also, because the method of replacing the data source is also adopted when the robustness test is performed. In this way, this study considers the differences in trade data between China and the US through the lenses of different statistical methods.

Notwithstanding the impact of exchange rate and savings on the Sino–US trade imbalance,

the research results show that the difference in the national savings ratio between China and the US has a more significant impact on the Sino–US trade imbalance. Foreign direct investment is an important reason for the Sino–US trade imbalance increasing. Despite some adjustment measures have been taken by the two countries, the study has found that the Sino–US trade imbalance will further enlarge in the short run. Despite the surplus status for China in Sino–US trade, China has been caught in the trap of comparative advantage, resulting in the widening of the economic gap between the two countries. While the US runs a trade deficit with China, trade between the US and China is still favourable to the growth of US economy. In addition to these, the study also discusses the issues of mercantilism, the history of Sino–US trade, including trade disputes, and other causes and effects of Sino–US trade imbalance.

Based on the findings, this study puts forward some recommendations for the government and industry associations relevant to Sino–US trade.

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LIST OF ABBREVIATIONS

ADF: Augmented Dickey–Fuller test

AMA: The American Medical Association

AIPAC: American Israel Public Affairs Committee

ASEAN: Association of Southeast Asian Nations

CIF: Cost, Insurance and Freight

DS: Dixit and Stiglitz

DSB: Dispute Settlement Body

DW: Durbin Watson Statistic

EX: China's volume of exports to the US

FAS: Free Alongside

FDI: Foreign Direct Investment

FOB: Free on Board

FPE: Factor price equalisation

GATT: General Agreement on Tariffs and Trade

GDP: Gross domestic product

ITC: International Trade Centre

IM: China's volume of imports to the US

IMF: International Monetary Fund

MFN: Most favoured nation

NAACP: National Association for the Advancement of Colored People

NAM: The National Association of Manufacturers

NFU: National Farmers Union

OLS: Ordinary least squares

PRC: People's Republic of China

PNTR: Permanent normal trade relations

QC: Difference in the national saving ratio between China and the US

R: Effective exchange rate of RMB against USD

RMB: Renminbi

SC: China's surplus volume to the US

SS: Stolper and Samuelson

TN: Total volume of imports and exports between China and the US

US: United States

USCC: United States–China Economic and Security Review Commission

WTO: World Trade Organization

1. INTRODUCTION

1.1. CHAPTER OVERVIEW

This chapter introduces the topicality of the issue, thesis outline, reasons for choosing the subject, research questions, research objective, research hypothesis, and contribution and significance of the study.

1.2. TOPICALITY OF THE ISSUE

The issue of Sino–US trade imbalance is not only the main point of contention between the two countries, but also a hot issue of common concern to the whole world. The adjustment of Sino–US trade imbalance is crucial both to the economic balance between the two countries and to the rebalance of the global economy. Trade between China and the US is a significant part of global economic development and trade development, and USD current account deficits account for 70% of the world’s total imbalance. China runs the largest trade deficit with the US. During the economic globalisation, the trade cooperation between China and the US has been persistently deepened. In 2004, the US surpassed Japan to become China’s second largest trading partner (after Canada). China surpassed Canada in 2015 and was the largest trading partner of the US for the following four years. The total volume of bilateral trade between China and the US hit a record high of USD659.8 billion in 2018, exceeding the previous record of USD658.1 billion set by Canada in 2014. The increasingly close economic and trade cooperation also gave prominence to the Sino–US trade imbalance, which consequently led to the Sino–US trade war. China was overtaken by Mexico and became the second largest trading partner of the US in 2019 on account of the escalating trade war between China and the US. Meanwhile,

the US was also surpassed by ASEAN and became the third largest trading partner of China. According to the data released by China's General Administration of Customs, China's imports and exports with ASEAN totalled 4.43 trillion Yuan, with an increase of 14.1%; while China's import and export with the US totalled 3.73 trillion Yuan, with a decline of 10.7%. Obviously, the issue of the Sino-US trade imbalance affects the import and export trade between China and the US. The Sino-US trade imbalance is a long-standing issue that arose with the establishment of the economic and trade ties between the two countries and is aggravated with the expansion of bilateral trade scale. Long-term trade imbalance has not only led to a series of economic issues, but also, in recent years, has gradually evolved from an economic issue into a political issue. Due to the severity and urgency of this practical issue, many scholars have also conducted relevant research on it, but they have not reached a complete agreement on the reasons for the Sino-US trade imbalance. On the one hand, they have analysed the root of the imbalance from the perspective of industrial transfer, and there is a consensus in academic circles that, with the continuous transfer of the international division of labour, industries in developed countries and regions conduct resource allocation in the world for cost reduction, and China has carried on international industrial transfer on account of the open trade policy and low labour cost, which led to the scale expansion of China's exports. On the other hand, there are still differences exist when analysing the reasons for the Sino-US trade imbalance from the perspective of exchange rate. Cline [1] deemed that the RMB exchange rate has a significant impact on the Sino-US trade balance. If the real exchange rate of RMB appreciates by 1%, China's surplus reduces by 0.3% to 0.4% of the GDP. If the real exchange rate of RMB appreciates by 10%, the Sino-US trade surplus reduces by 170 billion to 250 billion US dollars (USD), and accordingly the US deficit reduces by 22 billion to 63 billion USD [1]. David Hale and Lyric Hale considered that despite Washington had been pressuring RMB for appreciation to settle the trade deficit, RMB was not the reason for Sino-US trade imbalance, and what we should pay attention to was how to integrate China into the global economy [2]. Greenspan also refuted the argument that the RMB was undervalued, and he believed that its appreciation would not contribute to reversing the US trade deficit [3]. Based on the method of empirical analysis, this thesis

attempts to dissect the issues of Sino–US trade imbalance in a comprehensive and profound way.

1.3. THESIS OUTLINE

This thesis is divided into seven chapters. The first chapter introduces topicality of the issue, thesis outline, reasons for choosing the Subject, research questions, research objectives, research hypothesis, as well as the contribution and significance of the research.

The second chapter aims to study and analyse the history of international trade in the world economic history, especially the history of Sino–US trade, and to figure out the reasons and possible solutions for the existing Sino–US trade imbalance, and even of the Sino–US trade war, from the historical perspective. This chapter is mainly divided into three parts. International trade in the course of the world economy is introduced in the first part. First, the course of the world economy is divided into stages, then changes to the course of the world economy brought by international trade and the role that China plays in the course of world economy are introduced. Then, why China turns to a path of trade development which is different from that of European countries is explored from a historical perspective. Finally, the influence of international trade on scientific and technological breakthrough is analysed. In the second part, US foreign trade policy is presented. First, it analyses the academic research on US foreign trade policy and then divides the US foreign trade policy into three historical stages for analysis and research based on the landmark events. The history of Sino–US trade is shown in the third part. It systematically analyses the Sino–US trade from 1784 to 2017 and studies it in different periods based on major historical events such as World War II and the establishment of diplomatic relations between China and the US, as well as the changes in US administrations.

The third chapter focuses on critical reviews of previous studies and different theories

related to the Sino–US trade imbalance and trade war. In the first part, reviews of theories related to trade wars, and of the Sino–US trade war and Sino–US trade imbalance, are conducted. In reviewing theories of trade wars and the Sino–US trade war, the chapter mainly introduces the history of trade wars, reasons for initiating a trade war between countries and consequences brought by a trade war, as well as the Sino–US trade war at present and relevant studies. Meanwhile, it is stated in this chapter that trade war involves various systems and aspects such as economy, law, society and politics, and third-party arbitrament, especially World Trade Organisation (WTO), can play a greater role in dealing with modern trade war. While reviewing the theories of Sino–US trade imbalance, the chapter first gives a definition for the balance of payments according to the Balance of Payments and International Investment Position Manual formulated by the International Monetary Fund (IMF) and introduces the content of trade balance and trade imbalance. The relevant theories of trade imbalance mainly include mercantilism theory, neo-mercantilism theory, theories of absolute cost advantage and comparative advantage, factor endowment theory, free trade theory, free trade and environmental conservation, theory of trade protectionism, theory of reciprocal demand, elastic method, absorption approach and monetary analysis method.

The fourth chapter introduces the research design and methodology. First, this chapter introduces the research process and technical route in detail. To obtain accurate and meaningful results, the study mainly adopts Stopper a various quantitative analysis methods and a software analysis method. Second, this chapter discusses how the research is carried out, establishing an econometric model based on economic theory and verifying the model with a co-integration method. Processing the second-hand data and establishing the database of this research is an important step in verifying the hypothesis of this research. The stationarity test of the time series data, and the factors affecting the Sino–US trade imbalance, such as the proportion of import and export commodities, are converted into data that can reflect the research content through one or two calculations, which constitutes the preliminary work done in this research to verify the hypothesis. Third, this chapter also introduces the co-integration test method, the model established in this

research and the results of the robustness test in detail. Finally, the difficulties and limitations of the research are explained.

In the fifth chapter, an econometric model is established, and savings and exchange rate are included into the same model for comparison and study. It is assumed that FDI in China exacerbates the Sino–US trade imbalance. There are many academic studies on the influence that US direct investment in China has on Sino–US trade imbalance. With the in-depth development of economic globalisation, foreign investment in China from various countries will also aggravate Sino–US trade imbalance. This chapter first introduces that US direct investment in China aggravates the Sino–US trade imbalance, and by analysing the fact that the international industrial transfer has intensified the Sino–US trade imbalance, it verifies that the Sino-us trade imbalance is not just concerned with the two countries, but jointly aggravated by countries involved in global industrial division of labour, thus establishing an econometric model to examine the relationship between all FDI in China and the Sino–US trade imbalance. In this study, it is assumed that China and the US do not export to each other based on their comparative advantages, which is caused by the trade policies of the two countries. The chapter will conduct statistical analysis on the trade structure of China and the US to verify that the Sino–US trade is not conducted based on their own comparative advantages. Meanwhile, the chapter will analyse the choice of trade policy choice made by China and the US to verify that the trade policy is an important factor for the current situation of the bilateral trade structure.

Chapter 6 presents selective analysis and discussion on the impact that Sino–US trade imbalance brings to the respective economies of China and the US, as well as the impact of Sino–US trade imbalance on the trade friction between China and the US, are conducted. Meanwhile, it also explores and analyses the impact of Sino–US trade imbalance on the environment, income gap, industrial upgrading, scientific and technological advancement employment etc. This study assumes that China objectively widens the economic gap with the US while maintaining a surplus in Sino–US trade. Despite the US runs a trade deficit with China, the Sino–US trade has accelerated the development of the US economy. In this

chapter, an econometric model based on relevant economic theories will be established to verify this. China's foreign trade pattern mainly based on processing trade also explains why China is at a disadvantage in the distribution of trade benefits, and this reason will also be discussed in this chapter.

Chapter 7 summarises the findings of this study and draws conclusions and policy implications of these findings. This chapter consists of two parts. The first part is a summary, and the second part is policy recommendations. The first part shows the research conclusions drawn from the quantitative empirical research results and discussions. The second part is based on the conclusions of this research and combined with relevant theories and literature discussions and put forward policy recommendations to alleviate the Sino-US trade imbalance. Since the trade surplus in the Sino-US trade imbalance is increasing on the Chinese side, this chapter focuses on the policy recommendations that the Chinese side can use to alleviate the Sino-US trade imbalance.

1.4. REASONS FOR CHOOSING THE SUBJECT

The Sino-US trade imbalance is not only the point of focus for the two countries, but also a hot issue of common global concern. The adjustment of the Sino-US trade imbalance is vital to both the economic balance between the two countries and to the rebalance of the global economy. The following is a summary of the most important motives for choosing the subject:

From an academic point of view, despite the many discussions on the bilateral imbalance between China and the US in academia, there are few empirical studies on the Sino-US trade imbalance from the perspective of macro-economic factors and the coincident indicators of FDI, and few concerning the aspects of trade benefits and economic disparities. For instance, as the economic globalisation accelerates the economic and trade

relations among various countries have become increasingly close. The research on bilateral trade imbalance between China and the United State requires not only the bilateral perspective, but also consideration of the impact on the Sino–US trade imbalance brought by FDI of other countries. Does China’s persistent surplus in the Sino–US trade certainly narrow the economic disparity between China and the US? Does the persistent trade deficit of the US in the Sino–US trade necessarily speed up its economic growth reduction? Which has the greater impact on the bilateral trade imbalance, savings or exchange rate? These questions have received little attention in previous research.

From a practical point of view, the increasing rise in the Sino–US trade imbalance has led to frequent trade frictions between the two countries. Various anti-dumping lawsuits brought by the US against China have been on the rise, and the Sino–US trade imbalance has even become a crucial factor affecting the political stability of the two countries. Dealing with the bilateral trade imbalance properly is conducive to reducing bilateral trade frictions, which is of great practical significance to studding the global trade imbalance.

1.5. RESEARCH QUESTIONS

What are the factors for the Sino–US trade imbalance?

The factors for the Sino–US trade imbalance include economic factors and non-economic factors. Among economic factors, savings, exchange rate and FDI are the focus of this study. In non-economic fields, trade policies and statistical differences will also be involved.

What is the influence of the Sino–US trade imbalance on the two countries?

The direct influence of the Sino–US trade imbalance is the trade friction and trade war

between China and the US, which also objectively affects the speed of economic development and economic gap between the two countries. Influence on environment is also related to the scope of the study.

How do national economic policies affect balanced development?

The macroeconomic policies from China and the US play a significant role in improving the trade imbalance between the two countries.

1.6. RESEARCH OBJECTIVES

To find the main elements of Sino–US trade imbalance.

To find the consequences of Sino–US trade imbalance.

To find measures to deal with Sino–US trade imbalance.

1.7. RESEARCH HYPOTHESES

1st hypothesis: The high savings ratio in China is the main reason for Sino–US trade imbalance, which is exacerbated by FDI in China.

There are many factors affecting Sino–US trade imbalance. In this study, the high saving ratio in China is considered the main reason for Sino–US trade imbalance, and exchange rate is also one of the main factors affecting trade imbalance, which has been widely discussed in the academic circle. Savings and exchange rate are included into a same econometric model for research in this study, to verify that the high saving ratio in China is

the main reason for Sino–US trade imbalance. Previous studies on Sino–US trade imbalance focused on the impact that the US investment in China brings to Sino–US trade imbalance. In fact, with the in-depth development of globalisation and international division of labour, China has sustained industrial transfer from various developed countries. From the perspective of foreign investment in China, the study verifies that the increasing FDI in China brought by globalisation and international division of labour is the aggravating factor for Sino–US trade imbalance.

2nd hypothesis: While maintaining a surplus in Sino–US trade, China objectively enlarges the economic gap with the US. Notwithstanding that the US suffers from a trade deficit with China, the Sino–US trade has promoted the development of the US economy.

Despite China maintains a large trade surplus in Sino–US trade, as the two sides is going through different stages of economic development, China is at disadvantage in the distribution of trade benefits between China and the US, thus enlarging the economic gap between the two countries. Notwithstanding that the US keeps a trade deficit with China, China provides the US with daily consumer goods at low prices, and China’s trade surplus is applied to hold large USD reserves and US government bonds, and it objectively promotes the economic development of the US.

3rd hypothesis: The Sino–US trade between is not conducted based on its own comparative advantages, which is determined by the trade policies implemented by the two countries.

China’s export-oriented trade policies and US policies of restrictions on high-tech exports to China have both distorted the Sino–US trade structure and aggravated the Sino–US trade imbalance in an objective way.

1.8. CONTRIBUTION AND SIGNIFICANCE OF THE STUDY

Global economic imbalance has become one of the hot topics in academic research. As an important issue of global economic imbalance, the Sino–US trade imbalance is a prominent issue in the development of contemporary world economy and has become a major hidden danger affecting Sino–US political and economic relations. Comprehensive research on the Sino–US trade imbalance for deriving effective solutions to the Sino–US trade imbalance not only contributes to settling out the trade friction between China and the US, but also guarantees the healthy and stable development of bilateral economic and trade relations in the future. Despite the many discussions on the Sino–US bilateral imbalance in the academic circle, there are few empirical studies on the Sino–US trade imbalance from the perspective of macro-economic factors and the coincident indicators of FDI, and few empirical analyses considering the aspects of trade benefits and economic disparities. Thereby, more research in such directions occurs in the paper.

In practical terms, the research achievements and recommendations are available for decision makers at the top level in Chinese government and trade associations and organisations, which provide convenience to utilise these results and recommendations while making decisions, to facilitate the balanced development in bilateral trade and reduce Sino–US trade friction.

Theoretically, this thesis contributes to the already existing body of knowledge and present literature in the area of Sino–US trade imbalance. Hopefully, it will aid further academic research in the field in question.

1.9. SUMMARY OF CHAPTER ONE

In conclusion, the introduction presents an accurate and brief description of this research in

part, which includes the topicality of the issues, thesis outline, reasons for choosing the subject, research questions, research objectives, and research hypotheses, as well as discussing the contribution and significance of the research.

Global economic imbalance has become one of the hot topics in academic research. As an important issue of global economic imbalance, Sino-US trade imbalance is a prominent issue in the development of contemporary world economy and has become a major hidden danger affecting Sino-US political and economic relations. Comprehensive research of the Sino-US trade imbalance for figuring out effective solutions to the Sino-US trade imbalance not only contributes to settling out the trade friction between China and the US, but also guarantees the healthy and stable development of bilateral economic and trade relations in the future.

2. THE HISTORY OF SINO–US TRADE IN THE PROCESS OF WORLD ECONOMY

2.1. CHAPTER OVERVIEW

This chapter aims to study and analyse the history of international trade in the world economic history, especially the history of Sino–US trade, and to figure out the reasons and possible solutions for the existing Sino–US trade imbalance and even the Sino–US trade war from the historical perspective. This chapter is mainly divided into three parts. International trade in the course of the world economy is introduced in the first part. First, the course of the world economy is divided into stages, then changes to the course of the world economy brought by international trade and the role that China plays in the course of world economy are introduced. Why China turns to a path of trade development which is different from that of European countries is explored from a historical perspective. Finally, the influence of international trade on scientific and technological breakthrough is analysed. In the second part, US foreign trade policy is presented. First, it analyses the academic research on the US foreign trade policy, and then divides the US foreign trade policy into three historical stages for analysis and research based on the landmark events. The history of Sino–US trade is shown in the third part. It systematically analyses the Sino–US trade from 1784 to 2017 and studies the Sino–US trade in different periods based on major historical events such as World War II and the establishment of diplomatic relations between China and the US, as well as the changes of the US presidents. The exchanges between China and the US started from the trade in the late 18th century. The Qing government of China (1644–1912) and the American government officially recognised each other in 1844 [4].

2.2. INTERNATIONAL TRADE IN THE WORLD ECONOMIC PROCESS

2.2.1. Six stages in the world economic process

Szentes [5] divided the economic history of the mid-1970s into four principal stages and two stages of expansion. The first stage was mercantilism and early colonialism, which began around the 16th century and was characterised by the spread of exchange inequality and the sheer plunder of foreign countries. It was a vital part of the economic and historical transformation and evolution of Western Europe, which was also the beginning of the decline and distorted development of many countries in the world. Despite long distance trade existed during this period, mercantilism was playing a role in preparing for the later rise of the capitalist world economy, which not merely expand trade relations, but also restructured all economic relations in reality. It damaged the life patterns, production systems and sources of cohesion in the society, and it even transplanted institutions, religions, cultures and actual populations. Since then, almost no society in the world can move on as before and follow its own path of development. The second stage is the rise and gradual development of the first international division of labour. It started from the 18th century to early 19th century, when the ‘centre of gravity’ and power relations of international economic relations changed. It was characterised by the successful completion of the primitive accumulation of capital and the rise of the free working class, as well as the success of economic industrialisation, which were driven by large-scale productive commercial investment and colonial profits. The second driving force is the ‘Industrial Revolution’, which made Britain not only the ‘world-class industrial workshop’, but also the first hegemony in the emerging world economy. The third stage was the expansion of international capital flows in the late 19th century, which was the period of ‘Monopoly Capitalism’. It was the decisive turning point of the comprehensive development of the world economy as an organic system. The fourth stage lies in the first

international economic order. The increasing role of the state in the economy and the enhancement of certain ‘countervailing forces’ since the middle of the 20th century corrected some of the consequences which were socially harmful, such as the market excluded from unregulated operation. This period is often referred to as ‘state monopoly capitalism’. The fifth stage is the efforts to establish a new international economic order and the failure of national policies to break away from the world economy and develop a ‘non-capitalist’ system within a single country. It was mainly presented by the world economic crisis in the early 1970s, which was specifically embodied in the collapse of the monetary system called ‘Bretton Woods System’ in 1971, the end of the ‘golden decades’ of economic growth and stability in developed countries, the spread of ‘stagflation’ and the oil crisis, oil embargo and oil price spike in 1973. All these led to a general decline in world trade and massive instability in international monetary and financial relations. This crisis represented a new dimension in the history of the world economy, as well as the dominant economic policy at the centre of the world economy. The sixth stage is the acceleration of globalisation. The collapse of the socialist system in Eastern and Central Europe, the disintegration of the former Soviet Union’s ‘Second World’, the end of the Cold War and the disintegration of the military power relationship system in the bipolar world have brought fundamental changes to the world economy. As all national economies are integrated into institutional rules and management principles of the world economy while operating, a certain ‘homogenisation’ trend has occurred and extended into all countries in the world, and the international development gap between the ‘North’ and the ‘South’ has enlarged.

2.2.2. International Trade has changed the Landscape of World Economy

Most scholars equate globalisation with long-distance international trade across oceans, and they argue that economic globalisation should have started in Europe in the 15th century. British historian Toynbee said before, ‘the great discovery made by the voyage of

the century has prompted human footsteps across from one continent to another continent and then achieve the revolutionary change from the grassland to the ocean. Westerners have gained good luck, obtained more advanced development than its civilization, and forced the other civilizations to be united in a really single world society' [6]. Brock, a German scholar, considered that economic globalisation originated in the early 15th century, and there have been twice economic globalisation in human history. The first economic globalisation stands for the rapid economic development of various nations and regions based on the international division of labour, of which the core is standardised mass industrial production. The second economic globalisation appeared in the late 1960s, which led to the weakening of nations and states. The worldwide enterprises no longer depend on the combination of mass industrial production and various productive factors in the traditional sense but rely on the integration of various science and technology, information and knowledge [7].

In the old trading system before 1500, there were already extensive trade links between parts of the world. However, such link was often indirect, or partial, and there was no strong interdependence. Commodities in remote trade were basically primary products, including luxury goods such as precious metals, spices and ivory, as well as primary manufactured goods such as silk, cotton, wool and lacquer. The uneven geographical distribution of goods led to different positions of various regions in the world trading system. Asia, especially China and India, had long led the advance of world trade relying on the abundant natural and labour resources, as well as the advanced production techniques developed. Africa had become a fulcrum of the world system by providing precious metals and labour in exchange for necessities of copper and salt, etc. The middle and Near East were located in the middle of the entire trade chain, connecting the regions via extensive networks of commodity exchanges while developing their own production industries. In the previous world trading system, Europe was more of a consumer in the trade cycle due to the lack of exchangeable goods.

The great geographic discovery after the year 1500 has fundamentally changed the position

of various regions in the previous world trading system. Between the 16th and 17th centuries, the global trading network suddenly expanded, not only in geographical size, but also, more importantly, in the quantity and quality of goods for exchange. The worldwide exchange of species has completely changed the landscape of the previous world trading system. The worldwide transplantation of coffee, tobacco, sucrose, tea and other economic crops is playing an increasing role in the adjustment of the world trading system from the beginning of the century and has made these regions monopolising the resources lose the dominant position in the world trade competition. For instance, sucrose from Madeira replaced sucrose from the Mediterranean, which was later replaced by sucrose from Brazil and Jamaica, coffee transplanted by Europeans in Java and Brazil replaced Arabian coffee in the Ottoman Empire, and cotton from the Americas replaced cotton from India. Meanwhile, the change of trade demand also has promoted trade transformation. In North America, the original fur trade gradually gave way to tobacco and cotton farming. In Southeast Asian Archipelago like Java, the spice trade gradually gave way to coffee production, rice production, or the latter rubber production. In China, the dominant position of silk and porcelain was gradually replaced by tea. In meantime, changes have occurred in Europeans' trade composition in Asia.

Europeans were the first who have found their place in the transformation of world trade. With the exploration of the New World, the Atlantic region has undergone a transformation from a marginal region to quasi-central region to a central region, while the old centre of the Indian Ocean-East Asia, by 1800, still scraped by its leading position in the world trading system. Europeans also must join in the entrepot trade that already exists in the trade network. But to maintain the leading position in the trade, the cost has been enormous. Local interregional markets have been replaced by the global market, and the demand for goods in each region is increasing. Driven by market demand, China, India and Southeast Asia deliberately developed an export-oriented economic pattern that later dominated production in the rest of the world. The late century was the period in which commercial crop production was done for the core commodity in the world trade, requiring more investment of land and labour resources. Based on this, despite the rapid

development of primitive industrialisation in all parts of the world and the intensification of inter-regional communication has promoted the worldwide long-distance trade into a more prosperous situation, proto-industrialisation, as described by Pomeranz, may be only a dead end. The high-yield crops provided by the New World caused a worldwide population expansion but exacerbated ecological constraints during social development.

The industrial revolution of the 18th century can be regarded as a product of strong consumer demand as the previous world trading system developed to the extreme. By turning to fossil energy instead of organic resources, Europe, especially the United Kingdom, overcame the constraints from the old ecosystem and completed the transformation of production. But it now seems that this destruction must be achieved based on the availability of natural resources in more areas. The United Kingdom, for example, first the regions such as Ireland, then the New World, and then the rest of the world were gradually integrated into this production-market system. In addition, as this system went into a global expansion, the modern world system described by Wallerstein was born. With the advent of 'modernity' such as industrialisation and the modern world system, the early modern period also came to an end. However, it should be notable that the impact that the industrial revolution has brought to the world trade was far from that fast. Until the 19th century, the modern world system was still not entirely out from the shadow of the previous world trade system.

Making a general survey of the changes arising from the world trade system from the late Middle Ages to the early modern times, we can see that this is a process of a new system germinating from the old system, and then developing and forming. In the 14th century, the previous world trading system suffered from turmoil but not went into a decline. In the 15th century, the adjustment of the system led to the emergence of new economic factors and the great geographic discovery originated from it. In the 16th century, people living in both old and new worlds were surprised to find themselves located in a world that was suddenly expanded. In this world, an entire world trade network did not immediately occur with the establishment of direct geographical links between regions. In the Old World, the

newcomers were integrated into the old trade network, and the interlopers interrupted the process of social development and began to build an entirely new world. The two processes began almost in parallel and did not intertwine until the end of the century. In the second half of the 16th century, attributed in part to precious metals, mainly silver, a global trading system finally emerged. In the 17th century, the global trading system which was gradually generating effectively promoted the development of the world economy, and most parts of the world became more and more involved in this network. But the system failed to adapt to this pace of economic growth, and economic and political upheavals swept the world throughout the century. From the end of the 17th century to the 19th century, the system was further adjusted and the division of labour between regions became increasingly explicit, and this adjustment was accompanied by revolutions in economic and political fields. A totally new modern world system based on this was born, which changed the landscape of the world economy in a quite short time.

2.2.3. China's Role in the World Economic Process

From the late 15th century to the early 16th century, the discovery of new shipping line started the first stage of globalisation and lifted the curtain on the age of sea power. Whoever in control of the ocean controlled the marine traffic, controlled the seaborne trade, obtained the wealth of the world, and therefore controlled the whole world. From the mid-16th century to the fall of the Ming Dynasty (1644), the global trade was undergoing rapid development, which was closely associated with the sudden increase in precious metal production during this period. After the middle of the Ming Dynasty (1506), the dramatically increasing international demand for Chinese luxury goods such as silk and fancy porcelain and the development of China's commodity economy led to the increasing demand for silver replacing the Ming notes as a means of large payment, and it made China more involved in the world economic system than ever before. However, China did not turn to capitalist economy as it did not follow the same path as Western Europe.

Frequent Eurasian contacts in ancient China can date back to the Han Dynasty (202 BC–220 AD), when Asian luxury goods such as silk from China, spices from Indonesia, and textiles from India were transported to Europe passing through the Middle East and Mediterranean via a highly complicated network of land and sea trade. Geographically, this vast area can be divided into three parts: the Arabian Sea, the Bay of Bengal, and the South China Sea, with a great deal of intra-regional and inter-regional trade occurring. The longest trade route connects Aden at the mouth of the Red Sea with Guangzhou in China, which was run first by Persians, then by Arabs, and by the 12th century, Chinese were also involved in it. Until the Yuan Dynasty (1271–1368), the Chinese government held an open attitude and encouraged overseas trade, and based on this, China's maritime power reached its peak in the early 15th century.

The difference between the Ming Dynasty of China (1368–1644) and the European powers of that time, such as Portugal, Spain and the Netherlands, lies in the fact that these countries conduct overseas expansion while China implemented a ban on maritime trade or intercourse with foreign countries. The short-term goal for the ban on maritime trade implemented by Emperor Taizu of Ming (1368–1398) was to contend with insurgent cliques such as Fang Guozhen and Zhang Shicheng, as well as the invasion from Japanese pirates along the southeast coast, but when it goes deeper, the root lies in the traditional idea of valuing agriculture over commerce, as well as the prominent and urgent invasion on the northern border. Moreover, the ban policy on maritime trade or intercourse with foreign countries from Emperor Taizu of Ming became an unbreakable basic state policy in the Ming and Qing Dynasties (1368–1912), which had been followed for a long time.

Tributary trade was a trade activity under the circumstances of ban policy on maritime trade of intercourse with foreign countries. Goods in an urgent need can be obtained from foreign envoys that paid tribute to China, and Chinese people were prohibited from engaging in overseas trade and immigration, to avoid destabilising maritime territory and affecting the stability of political power. This China-centred tributary system was almost

entirely based on political purposes, which extended the relationship between the central and local governments in China, and the closely related ethnic minorities were in order by establishing hereditary headmen and native officers. In the early 15th century, Zheng He conducted westward voyages for seven times, thus making China's overseas expansion culminate. However, the policy of opening to the sea during this period was still limited. Private maritime trade was still prohibited, but the overseas trade belonged to the official monopoly. The motivation for Zheng He's voyages was mainly political, but little economic. When Emperor Chengzu of Ming (1360–1424) came to the throne, he sent envoys to various countries with trade interests as bait, expecting that they would come to China and pay tribute and recognise China's position of suzerain.

From 1405 to 1433, Zheng He was sent on mission for seven times to Asia and Africa, reaching as far as the east coast of Africa. At that time, China possessed the largest fleet and ship in the world. At each voyage, the fleet consists of 100 to 200 big and small ships, among which about 60 sea vessels were included, with a crew of more than 20,000 members. The large vessel appeared in about 152 meters long and 61 meters wide and the medium-sized vessel occurred in about 136 meters long and 51 meters wide. The tonnage for these medium and large vessels was between 1,500 and 2,500 tons.

The voyages conducted by Zheng He developed and enhanced the political and economic ties between China and countries in Southeast Asia, South Asia and East Africa, and expanded the sphere of influence for China. On the other hand, it suffered a great domestic criticism. When it came to the period of Cheng-Hua (1465–1487), Liu Daxia even burned the archives related to Zheng He's voyages. The overseas expansion in the Yuan and Ming dynasties was completely extinct after Zheng He's voyages. First, the huge expenditure led to an unbearable financial burden for the government. Second, the Ming Dynasty refocused its attention on the invasion at the northern frontier threatening China. Third, from the economic view of rare treasure acquisition, there were too small benefits derived from Zheng He's voyages.

The overseas expansion in the Ming Dynasty was led by the government, which required huge sums of capital. Mostly, it was politically motivated with the intention to establish a political order with China as the core, which had little economic interest. Therefore, when the national power was weak, it was hard to sustain voyages. On the contrary, in the late Middle Ages and early modern times, Europeans embarked on overseas expeditions and conquers for the sake of wealth and religious factors, which had a profound impact on the whole world, while Zheng He's voyage effect was a flash in the pan.

There was no difference in the maritime power between China and Western European countries in the Ming Dynasty, and even in the early Ming Dynasty, Zheng He's voyages showed that China was the only maritime power at that time. But due to a variety of reasons, the achievements of the great geographic discovery are irrelevant to the Chinese. From the end of the 15th century to the 19th century, the period was the era of maritime power, during which Western countries were the leading roles and dominated the sea. The apparent cause of China's suffering for more than 100 years after the Opium War (1840) lay in the weakness of maritime power, and the root could be traced back to the ban policy on maritime trade in the early Ming Dynasty.

2.2.4. The policy of encouraging agriculture and restraining commerce in ancient China and the policy of mercantilism in Europe causing two totally different trade development patterns

Encouraging agriculture and restraining commerce was an economic policy in ancient China, which placed emphasis on agricultural production and suppressed commercial development. The governor regarded agriculture as the primary industry and commerce as the end industry. Overall, the policy of encouraging agriculture and restraining commerce played a negative impact on the modernisation development of the Ming and Qing dynasties in China. It prompted merchants to invest in land, which was detrimental to the

accumulation of industrial and commercial capital. It emphasised the self-sufficient farming society of individual owners, which went against the further development of commodity economy, currency and market. Mercantilism, in general, refers to the economic policies and political and economic ideas adopted by European countries from the 16th century to the middle of the 18th century. Mercantilism played a key role in leading the Western Europe to capitalism. The mercantilism in European countries is not identical, and the common characteristics can be summarised as follows: first, precious metals of gold and silver were regarded as the source of wealth. Second, trade surplus was an important means to obtain gold and silver. Third, developing maritime power was necessary. Fourth, emphasising the national power was in need.

Profits brought by foreign trade were the core of mercantilism, which were the root of everything. In the early 17th century, Thomas, the representative of British mercantilism, once said that the true feature and value of foreign trade lay in the large amount of income for the king, the honour for the country, the noble profession for the merchants, our technical schools, the supply for our necessities, the job opportunities for the poor, the improvement of our land, the training for our seamen, the walls of our kingdom, the source of our wealth, the lifeblood of our war and who our enemies scared.

Since maritime merchants engaged in trade and earned profits and wealth, they were generally valued and enjoyed a high status. Wealthy Dutch businessmen, for instance, could marry important politicians. Furthermore, the integration of politics and business made businessmen in various European countries accessible to great help from their countries in terms of economic, diplomatic and military fields, so that they could expand foreign trade and earn considerable profits for themselves and their countries.

Finally, as massive quantities of precious metals were mined in Spanish America, metallic currency in Western Europe tripled during the century. Under the operation mechanism that currency generated trade and trade increased currency, the global trade network was gradually taking shape, the speed of commodity circulation was accelerated, and the value of trade was also arising. The prosperity of global trade drove the development of the

handicraft industry and promoted city prosperity, enhanced the accumulation of capital and laid a good foundation for the transformation of Western Europe to a capitalist society.

Economic globalisation and flourishing overseas trade did not exert much influence on China during the Ming Dynasty (1368–1644). This has been attributed to the ban policy on maritime trade was implemented in the Ming Dynasty; on the other hand, it was influenced by the traditional Chinese thought of encouraging agriculture and restraining commerce.

2.2.5. The impact of international trade on scientific and technological breakthroughs

Findlay and O' Rourke argued as follows: 1. If the Industrial Revolution were not operated within a global framework, namely acquiring raw materials from the world market and selling final products in the world market, the technological innovations in the Industrial Revolution might not have had such a lasting and far-reaching impact. 2. If there were not trade, the achievements obtained by inventors from the late 18th century to the early 19th century would not have been so significant, as the technological breakthroughs associated with the Industrial Revolution were not invented for the purpose of pure knowledge utilisation but were invented for economic men's pursuit of profits. 3. For the first 100 years or so in the Industrial Revolution, Britain gradually became the world's largest trading nation, with its exports constantly increasing in its total domestic output. By 1815, for instance, more than 60% of the increased output of the cotton industry was exported, while the raw materials require by the cotton industry for continuous expansion mostly came from overseas. It follows that the industrial expansion and technological innovation of Britain at that time strongly depended on overseas trade and overseas markets. In addition, in an era of believing in mercantilism and excluding competitors among nations to protect their own markets, maintaining a strong maritime power was necessary to sustain constantly expanding overseas trade. During this period, after several trade wars, Britain

defeated the Netherlands and became one of the strongest maritime hegemonies, on a par with France, thus protecting and expanding Britain's overseas trade and overseas market. In a manner of speaking, trade and naval prowess complemented each other, which brought power and abundance to Britain. As the French said at that time, 'It is trade that has produced wealth for Britain, and the success of trade owes to the strength of the British navy and the expansion of manufacturing.' It was this power and abundance that enabled Britain to pioneer the Industrial Revolution. If 'the importance of trade in the Industrial Revolution, and the significant role of military power in the expansion of trade markets are acknowledged, we can reasonably conclude that the overseas military success of Britain explains why it was Britain, not France, that first became a successful industrialized nation' [8].

International trade has driven the progress of the world economy, enlarged the economic gap between regions and promoted breakthroughs in science and technology. China was in a leading position in the early international trade process, but the thought of encouraging agriculture and restraining commerce, as well as the policy of prohibiting maritime trade, restrained the development of international trade. After the Age of Great Navigation came, China gradually took a subordinate position in international trade.

2.3. US FOREIGN TRADE POLICY

2.3.1. A Summary of Research on US Foreign Trade Policy

There are few systematic research findings on the history of US trade policy. Compared with the applied research on trade policy and the research on economic history, the systematic research on the development history of US trade policy from the American academic circle is relatively weak, and there are only a few relevant works. The definitive

books are F. W. Taussig's 'History of American Tariffs' and Sidney Leitner's 'Tariffs in the History of the United States'. 'History of American Tariffs' covers all tariff acts from the establishment of the US to the year 1930, elucidates the evolution of tariff acts in the US in detail, discusses the relationship between tariff and industrial development. Vast tariff data are analysed in the book, which is of great historical value [9]. 'Tariffs in the History of the US' straightens out the major tariff acts passed by the US from the establishment of the US to 1970 [10]. There are relatively many historical phasic research achievements in US trade policy. In the book of 'Prelude to a Trade War: US Customs Tariff Policy (1890–1922)', Edward Kaplan and Thomas Ryley analysed the influence of 'Payne Aldridge Tariff Act' in 1909 on international trade and considered that the 'Fordney–McCumber Tariff Act' was the prelude to a trade war between capitalist countries in the 1930s [11]. In 'Ideas, Interests and US Trade Policy', Goldstein analysed the concept of trade protection and the relationship between interest groups and administrative system and trade protectionism from 1870 to 1930. The 'Domestic Free Trade and Trade Protectionism in the US from 1822 to 1890' written by Lars Magnusson is an informative work on the study of US trade policy [12]. There are abundant research works on the transition period of trade policy around 1934 and the forming period of fair trade in the 1980s, such as 'Nationalism, New Mercantilism and Diplomacy: Rethink of Franklin's Mission' written from Doron Ben Atta and 'Opening the American Market: US Foreign Trade Policies since 1776' from Alfred Akers. 'Historiography of American Foreign Relations' edited by American scholar Warren I. Cohen is an excellent piece of writing, which takes the development of foreign relations as the main line of the book, but the development of US trade policies presented in the book, particularly the trade policy orientation of the American president, offers great help to the study of the history of US trade policy. According to Bradford Perkins, writer of the first volume of 'Historiography of American Foreign Relations', 'the foreign policy of the young republic is the product of material well-being, culture, and various national values.' Lafeber, writer of the second volume (*Americans' Pursuit of Opportunity*), explored the connection between the growth of America's economic power and expansionism. In the book of *International Trade and Political Conflict -- Commerce, Coalition and Mobility*, Australian scholar Hiscox proposed a new perspective of factor flow cost in the study of

trade political policies.

The above achievements mainly focus on the periodic characteristics of US trade policy, factors affecting policy selection and environmental analysis, and the general analysis of policy effect. Comparatively speaking, most studies on US trade policy from academia discuss the development of US free trade policy and the trend, causes and influencing factors of trade protection policy after World War II. The historical dialectic studies on the evolution of US trade policy are particularly rare. Except for a few monographs, a comprehensive comparison of many academic achievements on US trade policy shows that the studies conducted by scholars are largely identical but with minor differences, and the research methods do not change much. Generally, in these studies, there are many introductions, case analysis, empirical studies and studies on phasic policies.

2.3.2. US trade policies can be divided into three historical stages

The historical evolution of US trade policy orientation is divided into three stages: the period of trade protection, the period of free trade and the period of fair trade. During the three historical stages, the nature of trade policies, the means of trade policies, the background of trade policies and the policy effect are different. The enactment of ‘Reciprocal Agreements Act of 1934’ and the ‘Trade Reform Act of 1974’ was the iconic event in the historical division of US trade policies.

The first stage is characterised by trade protection (1789–1933), which is marked by the period from the introduction of the first customs tariff law of the US in 1790 to the ‘Reciprocal Agreements Act of 1934’. Tariff is the main means of US trade protection. In terms of tariff rates, this period can be divided into three stages: (1) From 1789 when the first customs tariff law of the US was enacted to 1815, the level of trade protection was relatively low, and the tariffs were mainly imposed to increase the government’s revenue,

and the tariff rates were relatively low. (2) From the introduction of the Tariff Act in 1816 to 1860, trade protection began to be built in the US, and the level of trade protection rose. The north advocating trade protection and the south claiming for free trade had a fierce fight regarding the issue of tariff, and the tariff rate fluctuated greatly. (3) From the enactment of the Morrill Tariff Act in 1861 to 1933, it was a period of high trade protection in the history of US trade protection, and the tariff rate was high. The first period of US trade policy was basically synchronous with the modern history of the US. From 1776 to 1789, there was no unified national foreign trade policy in the US. The first Tariff Act of the US in 1789 marked the first time that the US conducted foreign exchanges with a unified policy, providing historical significance in the history of trade policy. In the early days when America was established, the US was still in the economic situation dominated by agriculture and had not formed a relatively complete manufacturing system. The total industrial production was small, and the competitive strength was relatively weak. Faced with competition from European industrial powers and discriminatory policies against US goods, the US certainly pursued equality and reciprocity in trade. US trade policy during this period served the need independent of war and the mission to achieve and enlarge fiscal revenue. US trade policy in the context of infant industry protection theory showed the characteristics of trade protection, but this kind of trade protection was intended to obtain the equilibrium of competitive advantage when competing with European industrial powers, which was a specific form of mutual reciprocity. Its fundamental purpose was also to expand foreign trade, but such trade aimed to achieve the reciprocal state at American advantage, which played a certain potential prescriptive effect on the evolution of US trade policy in the later period.

During the process of modern industrialisation, US trade policies constantly enriched the connotation of reciprocity thought, increased the expression of reciprocity from the aspect of policy, and optimised the practice of reciprocity trade. Unlike the trade policies in the previous stage, those during this period were characterised by high tariffs in the fierce confrontation between the ideas and policies of free trade and trade protection. The occurrence of high tariffs during this period was not only the internal requirement of the

modern industrialisation development in the US, but also could not do without the influence derived from the international political and economic surroundings. During this period, the tariff rates of the major industrial countries were relatively high, and it is logical to explain the tariff protection of the US by virtue of reciprocity thought. An exception for this period was the Free Trade Movement led by the United Kingdom during the middle and late 19th century. In response, the US also significantly reduced its tariff rates during this period, which was a good illustration of the US persistency in reciprocity. The thought of reciprocity during this period had developed into a means of bargaining, of which the policies and measures had been gradually more flexible and diversified and became a tool in the game between the two parties and interest groups.

Trade policies from the American–Spanish War in 1898 to Roosevelt’s New Deal, were the inertial continuation of US trade policies for a long time, but also showed the transformation from free capitalism to the extreme trade protection in the monopoly stage. Notwithstanding that the industrialisation of the US was accomplished during the period between the Civil War to the First World War, the early industrial development of the US prepared for industrialisation, and the development of monopoly capitalism during the period from the First World War to Roosevelt’s New Deal can be regarded as the continuation and outcomes of industrialisation. From a historical view, taking trade policies with similarities during this period as a whole for research is conducive to straightening out the development track of US trade policies. The background of the evolution of US trade policy during this period is the course of US industrialisation development and the constantly expanded history of the US, during which it was the full development period of US free capitalism, and the period of gradually establishing the dominance of the industrial bourgeoisie and becoming the world’s industrial power second to none. Despite the trade policy during this period was inclined to free trade by reducing tariffs for several times, it fundamentally showed the policy characteristics of constant enhancement of trade protection. This period was also the stage of traditional trade policy with tariff policy as the main factor.

During the second period, the US promoted global free trade (1934–1973). In 1934, the US Congress passed the ‘Reciprocal Trade Agreements Act’, marking the beginning of the free trade policy in the US dominated for more than 40 years. The system formed by the Act in 1934 played an important effect on the decision-making of US trade policies. The enactment of Trade Reform Act of 1974 marked that the era of free trade in the US came to an end. During this period, the US vigorously promoted the establishment of global multilateral free trade system, and with the advocacy from the US, the General Agreement on Tariffs and Trade (GATT, later developed into the WTO in 1994), the World Bank (WB) and the IMF, regarded as the three major pillars for international economic and trade development, were successively established, and seven rounds of multilateral trade negotiations were conducted, and the level of liberalisation was significantly improved. It was also during this period that the US began to be involved in world political affairs from the economic level and began to explore the world economic order led by it. The background of free trade was the strong competitive advantage and unique comprehensive national strength owned by the US in the world economy, and the role of free trade in national security and international order also facilitated the US to promote global free trade. Besides, the establishment and development of the WTO greatly changed the traditional trade policy, and changed the way for coordination and trade dispute settlement. The free trade strategy adopted by the US based on the free trade agreement had made a historic change in trade policy, and trade had been more closely associated with international politics. Reciprocity thought after World War II was a kind of strategic reciprocity, which was a series of measures adopted to open foreign markets under the circumstances that the US owned a leading advantage, and its policy lay in promoting the strategy of free trade. During this period, the thought of reciprocal trade from the US and relevant policies and measures had been fully developed, and the means of trade protection had also transformed from tariff to non-tariff barriers in a new stage.

The third stage is the policy period under the banner of fair trade (from 1974 to present). Since 1974, the US trade policy went into a new stage of development, and the thought of reciprocity was implemented by the US in the name of policy of fair trade, thus giving rise

to a comprehensive historic change in trade policy. The 'Trade Reform Act' passed by the US Congress in 1974 marked that the US trade policy entered a policy period of fair trade. The US gradually shifts from the multilateral free trade policy to the multi-track policy of free trade, which shows the mistrust and helpless feelings of the global multilateral free trade system. Regarding its foreign trade policy, unilateral protectionism bilateral trade agreements and regional free trade organisations are extensively implemented, meanwhile, effort will not be abandoned to establish and maintain the global multilateral free trade system. During this period, the policy of fair trade implemented by the US is centred on US interests, of whom the core is to open markets of various countries to each other, and the purpose is to keep the basic balance of US international payments. In this process, from the composition of trade to the means of trade, from the balance of domestic interests to the interactive process of international trade; have been deeply endowed with the ideological connotation of reciprocity. In meantime, the thought of reciprocity has also been promoted as a basic principle of world trade, also becoming an important part of the US trade strategy and maintained the strategic advantages of the US. With the abuse of the policy of fair trade, the ongoing rise of protectionism caused by non-tariff barriers in the world may affect the comprehensive trade interests of the US, the relatively moderate thought of balanced trade came into being, which also shows the further adjustment and improvement of the reciprocity thought from the US. The formulation and implementation of the policy of fair trade has brought the trade policies of the US and the world into a new era of a rule-based economy. The policy of fair trade has profoundly influenced the foreign trade strategies and the relevant choices of institution for various countries and has played a deep impact on the orientation of world trade policies, which has also profoundly influenced the rules and architecture of the world order, and brought new content and new approaches to international disputes.

A general survey of the development process of US foreign trade policies indicates that the evolution of US trade policies is a comprehensive product of political and economic premises, objectives and realistic interests of various interest groups during different historical stages, arising from which the US trade policies also present its unique

characteristics. Changes in national competitive strategy and its status have influenced the evolution trend of US trade policies. After World War II, when the US owned the hegemony, the US actively implemented free trade policies and became a leader in the open multilateral trading system, to eliminate the harm of protectionist policies. However, when the great success of the system undermined US dominance, the US began to retreat from open multilateralism. To keep down the negative impact of free trade and investment, restore international competitiveness and correct trade imbalance, the US turned to fair trade. When the economy was in a dilemma and fair trade was poorly implemented, unilateralist policies were introduced. When the process of multilateral agreements slowed down and its control over multilateral agreements was weakened, the US vigorously promoted regional and bilateral free trade agreements for the sake of promotion and balance of multilateral agreements.

The demand in the US for developing the world economy and the domestic economy provides reasons for the evolution of US trade policies. In history, every major change in US trade policies is a strong response to the objective demand for economic development. With the increasing role that China plays in the world economic system, trade friction and even a trade war against China initiated by the US are inevitable.

2.4. HISTORY OF TRADE BETWEEN CHINA AND USA

2.4.1. The Sino–US trade from the Qing dynasty to the Second World War

The Sino–US trade from the Qing Dynasty to the Second World War can be roughly divided into four stages.

The first stage is the informal or non-treaty contact period from 1784 to 1844. The development of US shipping promoted the trade with China during this period. The Empress of China arrived in Guangzhou in 1784 ushered in a new era of Sino–US trade. The US Congress formulated the early customs duty clauses to encourage direct US import from China. After the outbreak of the French Revolution, the European wars accelerated the development of Sino–US trade. The US re-exported the imported Chinese tea to Europe and thus expanded the Chinese tea market. US furs, sandalwood and other products sold well in the Chinese market, which promoted the leaping development of the trade between the two countries. The end of the war between Britain and the US in 1812 stimulated the US trade with China. Cotton, opium, tea and silk were the main traded goods during this period [13]. At that time, since China adopted an attitude of rejecting foreign objects, it was unable to accept many foreign products and naturally had little demand for US products, which led to China’s long-term trade surplus with the US at that time. To compensate for this trade balance, the US first sold British cotton cloth and eventually even smuggled opium to China.

The second stage is the period of temporary expansion and continuous decline from 1845 to 1894. Affected by Taiping Heavenly Kingdom Movement, China’s national purchasing power was reduced. Meanwhile, affected by the civil war, the US shipping industry declined, and the US government raised tariffs to increase national revenues, which hindered the development of Sino–US trade. The reasons for the slow development of trade during this period include: (1) the recession of US shipping industry; (2) the establishment of restrictive trade tariff system in the US; (3) the depression of US business in China; (4) the competition from Japanese tea and silk products; (5) the fall of silver price; (6) the aversion between China and the US caused by China’s labour problems and the Chinese Exclusion Law [13].

The third stage is the period of turbulence and fierce competition, from 1895 to 1913. The Treaty of Shimonoseki signed after the Sino-Japanese War led to a greater degree of opening up in the Chinese market. In the absence of tariff protection, the open Chinese

market brought a devastating blow to the domestic industry and commerce. The competition of Western powers for the priority of trade in China gave rise to the chaos in China's foreign trade, and China's industrial development, loans and trade were controlled and restricted by various European countries. The US exports to China severely declined, but its imports from China increased steadily. During this period, cotton cloth, refined mineral oil, cigarettes and tobacco and steel machinery were the main exports from the US to China, and the main imports from China to the US were raw materials or semi-finished products supporting the US industrial production, including silk, tea, wool and poultry [13].

The fourth stage is the rapid expansion period from 1914 to 1922. The outbreak of the First World War cut off the material supply from Europe to China, and the US became the main trade partner of China. To supply war products, the US industry imported many Chinese raw materials. In 1913, the American Tariff Act reduced or exempted the import taxes on lots of raw materials and commodities; moreover, the rise of silver price stimulated the US to import Chinese goods. In 1913, the total amount of US imports from China was \$41.387 million, which increased to \$176.471 million in 1923, with the growth rate increased from 100% to 427%. Except for 1921, China had been in a surplus status in Sino-US trade. During this period, the main competitors of the US in China were Britain and Japan, and other European countries were eliminated from the Chinese market due to the outbreak of war [13].

2.4.2. Sino-US trade from the outbreak of Second World War to the establishment of People's Republic of China

In 1931, Japan began its invasion and unbridled plunder in China, the trade in the occupied areas was rapidly colonised, and the development of Sino-US trade was restricted. In 1932, the volume of Sino-US trade was less than one-third of that in 1929, and until the victory

of the Anti-Japanese War, the maximum volume of Sino–US trade only reached about half of that in 1929. After the victory of the Anti-Japanese War, the US replaced the position of Japan and attempted to turn China into its vassal, so it stepped up its political and economic penetration into China and made China the source of its raw materials and the dumping place of its products. Especially, the signing of the *Sino–US Friendship and Mutual Assistance Treaty* in 1946 provided favourable conditions for the US to control China’s foreign trade.

Table 1: Volume of Sino–US Trade from 1945 to 1949

Unit: Hundred million USD

Year	Trade Volume	Chinese Exports	Chinese Imports
1945	1.14	0.06	1.08
1946	5.58	0.93	4.65
1947	4.70	1.17	3.53
1948	3.93	1.20	2.73
1949	1.90	0.83	1.46

Source: [14]

It can be seen from Table 1 that after the victory of the Anti-Japanese War, the volume of Sino–US trade increased rapidly and reached the historical maximum value of \$558 million in 1946. After that, with the increasingly shrinking of the Kuomintang-controlled areas, the trade volume gradually declined. During this period, China’s trade with the US was in a deficit status and achieved import surplus every year.

2.4.3. Sino–US trade from the establishment of People’s Republic of China to the establishment of Sino–US diplomatic relations

This is a suspension period of Sino–US trade. From the founding of the People’s Republic of China in 1949 to 1970, the trade between China and the US was in a state of suspension.

The People’s Republic of China was established in 1949, but the US did not recognise it and required some Western countries to be on the side of it and not recognise the legal status of China. In 1950, the Korean War broke out, the military confrontation between China and the US extended from the battlefield to the field of economy and trade. The American government took a series of political and economic measures to sanction China, and implemented cargo embargo on China, which completely suspended Sino–US trade for more than 20 years. When the new China was just established in 1949, China and the US still maintained some trade contacts. In 1949 and 1950, the bilateral trade volume of the two countries was respectively \$199 million and \$238 million [15].

Then the trade relations between China and the US were suspended, according to the following chart, the value of Sino–US trade was just symbolic 7.99 million dollars in 1951, which decreased to 53 thousand dollars in 1952 and to 2 thousand dollars in 1953 even more. There was no direct commercial intercourse from 1954 to 1970.

Table 2: The value of Sino–US trade from 1950 to 1970

Year	Total volume of trade	Unit: 10 thousand USD	
		The export amount of China	The import amount of China
1950	23812	9549	14263
1951	799	8	791
1952	5.3	0.3	5
1953	0.2	0.2	0
1954-1970	0	0	0

Source: [15]

The restoration period of the Sino–US trade, in the early 1970s, there were huge changes of global political and economic situation, the strength of the US declined relatively, economically, the US was undergoing the economic crisis and stagflation, faced the aggressive attacking of the Soviet Union in politics and military science, the US flinched,

so that the diplomatic policy of the US, especially regarding China, changed obviously. Because the US needed to combine China to contend against the Soviet Union, so the hostile attitude to China was abandoned. The president Nixon issued a statement in 1971 that adopted practical measures to restore the Sino–US trade gradually and relieved the embargo of China. Though the value of Sino–US trade in that year was just 5 million dollars, it represented the trade relations between China and the US which had suspended 21 years started to restore and develop. Until Nixon visited China in 1972 and issued the China-US Joint communique, the Sino–US trade began to develop rapidly. According to the following chart, the value of Sino–US trade increased 76-fold, which increased to 992 million dollars in 1978 from 13 million dollars in 1972.

Table 3: The value of Sino–US trade from 1972 to 1979

100 million dollars				
Year	Total volume of trade	Chinese export	Chinese import	Balance of trade
1972	0.13	0.10	0.03	0.06
1973	2.60	0.40	2.21	-1.81
1974	4.76	1.03	3.73	-2.70
1975	4.71	1.29	3.42	-2.13
1976	3.17	1.56	1.61	-0.05
1977	2.94	1.80	1.15	0.65
1978	9.92	2.71	7.21	-4.50

Source: [16]

The Sino–US trade in this term can be generally divided into 3 stages. The first stage is from 1972 to 1974, which is the rapidly restoration and developing stage after the rebuilding of their trade relations. Though the trade base between China and the US in this term is small, it grows fast. As we can see from Table 3 the growth rates in these three years are 160%, 1900% and 83% respectively, the growth of trade exceeded 35 times. The rapid growth of Sino–US trade in this term is benefited by the rapid improvement of the

relations between China and the US. President Nixon took the improvement of the relations with China as the core of diplomatic policies; while China was isolated again after the Soviet broke with China and the diplomatic blunders in initial time of the Great Culture Revolution, to break that barrier and confront the threat of the Soviet Union, the improvement of Sino–US relations was also the important try of China. The second stage is from 1975 to 1977, in this stage, the development of the relations between China and the US was in trouble, because the Watergate scandal that led to the resignation of President Nixon and better relations between the US and the Soviet Union, the US attached less importance to the relations between China and the US; meanwhile, the wrong thought of left-leaning in China in this term broke the diplomatic policies and made the attitude of China to the US more cautious. With the stagnation of the development of the relations between China and the US, Sino–US trade was also affected, the value of trade constantly declined that the value of trade in 1977 was just equal to 62% of the value in 1974. China was in ‘import surplus’ state. The third stage is the establishment of Sino–US diplomatic relations in 1978. In the late 1970s, with the global expansion of the Soviet Union, the relations between the US and the Soviet Union became worse, the US pointed at China again; moreover, the trade agreement signed by China and Japan and the EC also stimulated the US. After the Great Cultural Revolution in October 1976, China had transferred the core of work to economic work; the normalisation of the relations with the US was also the intrinsic requirement of developing Chinese economy. Hence, the relations between China and the US began to improve rapidly and the trades also develop rapidly, the value of trade in 1978 reached 992 million dollars, which is more than 3 times of 1977.

According to the table, the main feature of Sino–US trade in this term is that China was in trade deficit, and it constantly enlarged as the time goes by. The main reasons are as follows: the first one is that China adopted fixed system before the reform and opening up, though it constantly adjusting the depreciation of USD, RMB was overrated seriously, and the huge domestic and foreign price difference suppressed the exports from China. The second one is that the competitiveness of Chinese product is low, meanwhile, the long-term reclusive state led to that the US market and trade policies were known not very well by

China, which blocked the export of China to the US. The third one is that in this term, China not only imported machinery equipment from the US to develop the industry, but also imported a good deal of agricultural products from the US to satisfied domestic consumption demand. Therefore, every year is the excess import year, except for 1977, the year when the relations between China and the US shrunk most.

2.4.4. The changes of trade development of the two countries after the establishment of Sino–US diplomatic relations

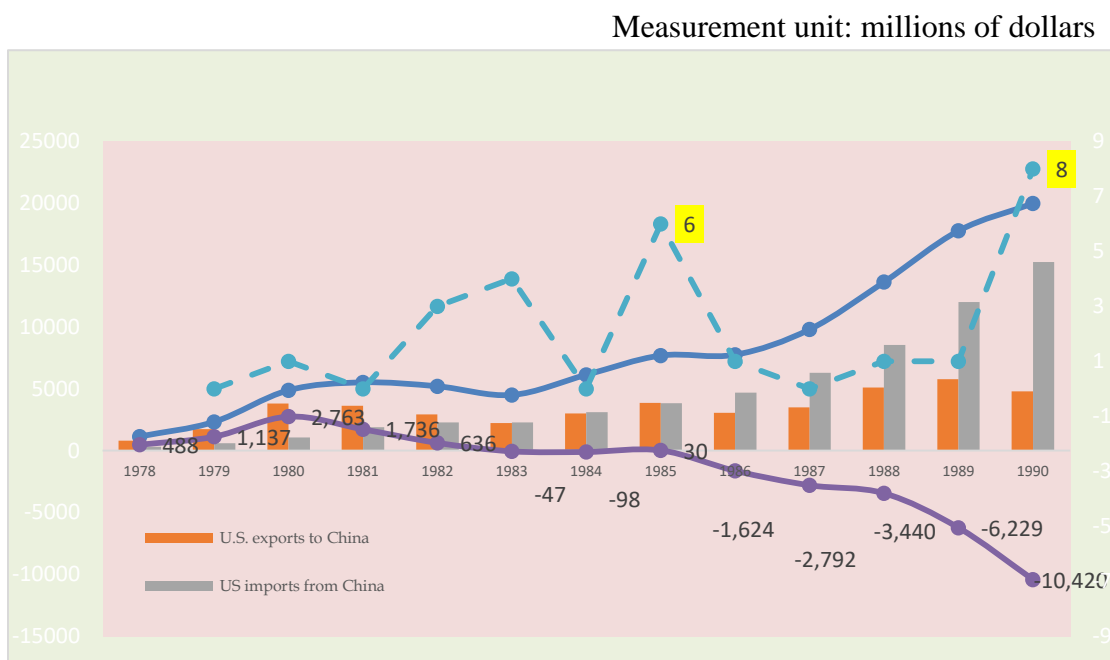
After the establishment of Sino–US diplomatic relations, the economies of the two countries spent 10 years’ ‘honeymoon’, the relations of economy and trade in this term reflected the developing situation of the political relations of the two countries, which are political tool. Frictions such as most-favoured-nation clause, market access and intellectual property appeared entered into 1990s, while the fluctuation and friction of the two countries’ political relations had not influenced the trade development of the two countries, no matter refer to the statistics of China or the US, the trade of the two countries from 1989 to 2000 has constantly growing, which the trade relations of the two countries gradually free from the constraint of the political relations of the two countries and entered into rapid developing stage. After China entered WTO in 2001, the Sino–US trade relations entered into mature development stage, then the export of China to the world and the US appeared explosive growth for ten years. Benefited from the sharp increasing of export, many surplus labours in rural China can go to coastal cities and work in export-oriented light industry enterprises, as many as 800 million people free from poverty because of that. Though the growth speed of export of China to the world and the US has slow down since 2012, supported by the US, the economic achievement acquired by China after entered WTO cannot be underestimated [4].

The Sino–US trade sped up recovery, and it entered normal developing stage. China and

the US formally established diplomatic relations on January 1st, 1979, soon after that, the state leaders of China Deng Xiaoping had visited the US on January 28th, 1979, they exchanged the views about international situation, property right and most-favoured-nation clause and signed consul, trade, scientific and cultural exchange agreements. Sino–US trade developed rapidly after Deng Xiaoping visited the US, the enterprises of the two countries contacts frequently, a series of agreements that promote Sino–US trade development were also be signed, include *the Agreement about Holding Trade Exhibition of the People’s Republic of China and the US of America* and *the Trade Relations Agreement of the People’s Republic of China and the US of America* [17]. The two countries signed the 3-year *Sino–US Trade Agreement* on July 7th, 1979, and decided the most-favoured-nation tariff was provided mutually from February 1st, 1980 that made normalisation for Sino–US trade. After Deng Xiaoping visited the US, the vice president of the US Walter f. Mondale visited China from August 25th, 1979 to September 1st, they signed cooperative agreements of enlarging cultural exchange and hydroelectric generation during that period, meanwhile, the US decided to set up consulate in Guangzhou and Shanghai to promote the trade cooperation and communication of China and the US.

2.4.4.1. The Development of Sino–US Trade from 1978 to 1990

Figure 1: China’s Merchandise Trade with the US and US Merchandise Trade with China, 1978-1990



Source: Figure is drawn basing on data from the US Department of Commerce.

Figure shows that during 10 years after the establishment of Sino–US diplomatic relations in 1979, both export from the US to China and import from China to the US have achieved significant increase and total bilateral trade amount also has gained large growth. After 1980, the amount achieved a huge leap. The amount of export from America to China increased to \$3.823 billion in 1980 from \$1.732 billion in 1979, while the amount of import from China to America raise up to \$1.06 billion in 1980 from \$0.6 billion in 1979. This increase could be partly attributed to America’s change in its import regulation policy about China. According to related rules in Export Control Act, America divided its trade partners into several classes, including Z, S, Y, W, Q, T and V. From left to right, each class embraced more relaxed regulation. China was in Y class, with strict regulation on technology export before 1980. As Sino–US diplomatic relations became better, the US moved China to Q class. In 1983, concerning more about political matters, Export Control Act Amendment provided more relaxed rules on Chinese technology transfer. In 1986, China became the biggest provider of software technology to America.

Figure shows that trade friction and conflict were unavoidable while glorious bilateral trade cooperation between China and the US was achieved. In the early days after the development of Sino–US diplomatic relations, United States trade with China was in surplus. But after 1983, trade surplus turned into deficit which grew from only \$47 million in 1983 to \$6.23 billion in 1989, an almost 132-fold increase. What is more, US foreign trade was in deficit as a whole. Under such a condition, America emerged domestic trade protectionism which led to disharmony between Sino–US trades. Statistics in figure presents that from 1980 to 1989, United States Department of Commerce and International Trade Commission have launched 17 anti-dumping investigations against China’s goods in various sectors, such as chemical engineering, steel, textile and the like. Among them, the textile industry was deeply damaged.

Apart from the economic reason of trade deficit, political factors also played an important role in bilateral trade and commercial relations. Due to the short time after establishment of China-US diplomatic relations, considering the differences of ideology and state character between two countries, the United State pursued a cautious and prudent attitude to China, and communist state, which was mainly presented in a special regulation aiming at ‘Communist states’, the 406th article in *US Trade Act of 1974*. This regulation stipulated that the president has privilege to take measures against such communist states, which means that when International Trade Commission conducts a survey according to the 201st Article, if exported goods disturb and threaten the US products of the same kind, president has right to take temporary emergency actions to restrict import of this kind of goods from most non-market-economy countries, even though ITC investigation does not finish.

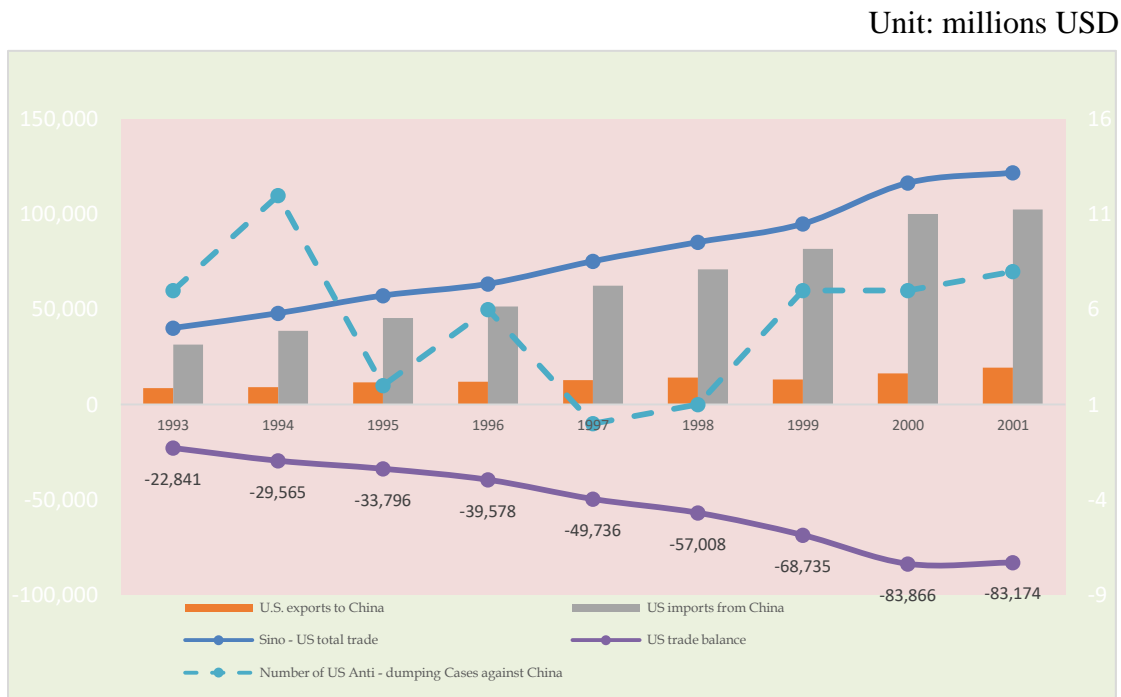
Because of a series of complicated international political affairs like Revolutions of 1989 and disintegration of the Soviet Union, America imposed five sanction measures on China, and political and economic cooperation between two states stopped, which did great harm to bilateral trade exchange. Figure 1 also shows that in 1990, US export to China declined by almost \$1billion.

2.4.4.2. The Development of Sino–US Trade in the William Jefferson Clinton period (1993.1–2001.1)

As China deepened open policy, like the development of Shanghai Pudong New Area in 1990s, and enhanced its international strength, China-US relations of trade transferred to an inter-permeated and interdependent cooperative partnership from simple China's relying on import from the US.

In order to adapt to the needs of foreign strategic transformation and industry upgrade, Clinton implemented the 'New Economy' package policy after his inauguration in 1993. Clinton changed the foreign economic principle from approving 'free trade' to pursuing 'fair trade', put forward 'National Export Strategy' for the first time in history, and reinforced interference in export and protection to domestic companies, striving for more export chances for them. What's more, Clinton also enhanced the implementation of Comprehensive Trade Act of 1988 and the 'Special 301 Article' in it, sanctioned countries having trade friction with the US, practiced trade policy of 'multi-track system' and advocated combination of trade cooperation and communication which specifically presented in promoting operation of North American Free Trade Area, the development of Asia-Pacific Economic Cooperation and multilateral and regional trade cooperation, such as GATT and the Uruguay round of negotiation [18].

Figure 2: China’s Merchandise Trade with the US and US Merchandise Trade with China, 1993-2001



Source: Figure is drawn based on data from the US Department of Commerce.

Figure 2 shows that Sino–US trade situation is good in the Clinton period and that exports to China, the imports from China, and the overall Sino–US trade volume all show a rapid growth trend. American exports to China increased from \$8.7 billion in 1993 to \$19.4 billion in 2001, an increase of 1.23 times in nine years. The US imports from China also increased significantly, from \$31.5 billion in 1993 to \$102.6 billion in 2001, an increase of up to 2.26 times, so we can see that with the deepening of Sino–US trade, the dependence of the US on China’s import has been more than China’s dependence on US imports, and it fully validates the increasingly permeable Sino–US economic and trade relations between them. In May 2000, based on the bright situation, China and the US reached a consensus that the trade relations between the two sides upgrade from the ‘MFN’ to ‘permanent trade partnership’, which can be described as icing on the cake.

Figure shows the deficiencies in Sino–US economic and trade cooperation can be found. Obviously, the US trade deficit with China has increased year by year, and it has been a tendency continues to expand, which soars from \$22.8 billion in 1993 to the \$82.3 billion

in 2001, increasing nearly two times. Under such a situation, the US has carried out up to 50 anti-dumping investigation cases on China in 9 years, with an average of more than five and 12 in a year at most. On the one hand, this is affected by the widening trade deficit; on the other hand, it is mainly due to the political sensitivity of both sides. Many factors such as President Bill Clinton, a leader of the Democratic Party, was often influenced by internal anti-China forces, the political interests and positions of the two sides are also different on the Taiwan issue, the US, as a powerful political power, has repeatedly intervened in China's internal affairs, etc. have worsen the political relation between China and the US. However, with the deepening of economic globalisation and the refinement of the international division of labour, the interference of political factors on economic cooperation tends to be weakened, and trade cooperation and exchanges tend to be rational and basically maintain a stable growth situation, which reflects that the US trade policy toward China was affected by the main interest of Sino-US trade cooperation and investment.

2.4.4.3. The Development of Sino - US Trade in the George Walker Bush Period (2001.1–2009.1)

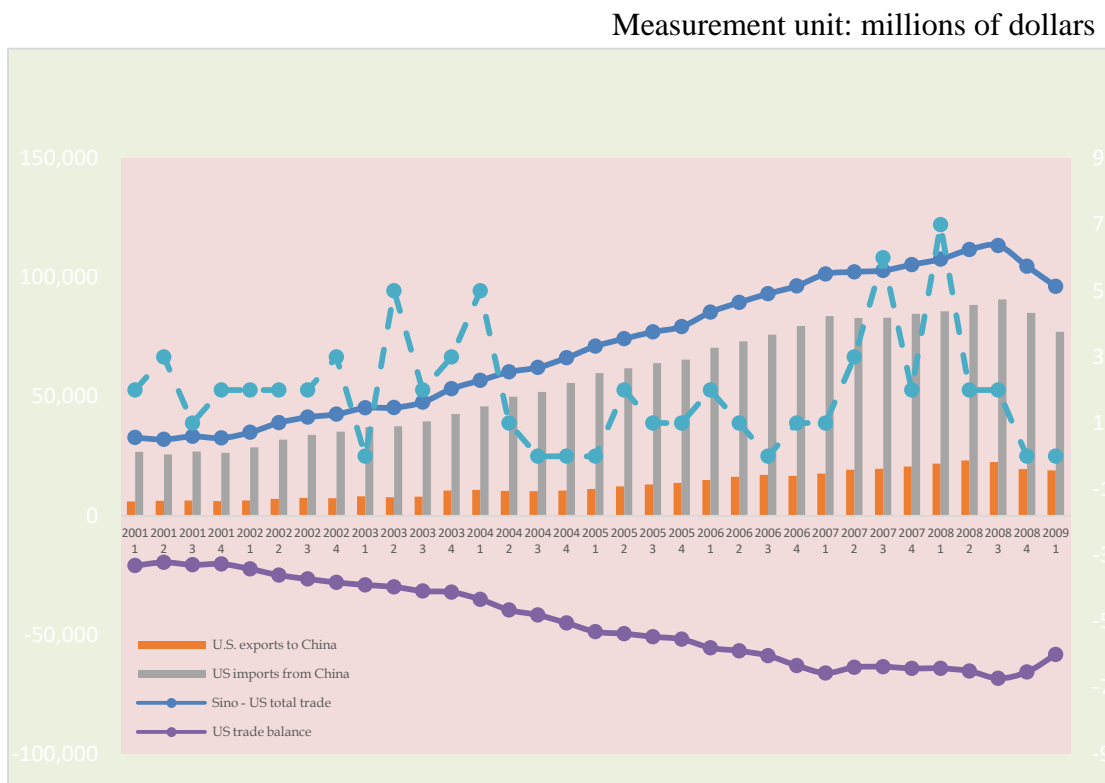
In 2001, George Walker Bush was elected as the new president and reappointed in four years later. During the eight-year term, he was affected by various emergencies. Therefore, the Sino-US relation had ups and downs and went through about three stages. It's a low tide of Sino-US relation in January to September of 2001. In the early days of George Walker Bush's entry into the White House, the US government adopted a tough policy on China between 'ring-fence' and 'contact', he rose that China and the US are 'strategic rivals' rather than 'strategic partners' in the Clinton period. In view of human rights issues, Hainan collision incident and the Taiwan issue, there are conflicts in different levels between China and the US, resulting tension between the two sides. Figure shows that US exports to China, imports from China, the trade balance and the total value of Sino-US trade was essentially flat in the first three quarters of 2001, and there are few fluctuations among the three quarters.

It is a recovery period of the Sino–US relation from October 2001 to February 2005. The ‘911’ incident compelled the US to adjust its foreign strategy, and Bush quickly regarded safeguard national security and combat terror as an important task in his political career while he was aware of that China is an important alliance of the anti-terrorism forces. At the APEC meeting in October 2001, George Walker Bush formally proposed that the two sides need to establish a ‘constructive cooperative relationship’ to strengthen cooperation and exchange in politics, economy, trade and military affairs. China became a member of the WTO in December 2001, and the US announced China’s permanent normal trade relation (PNTR) on December 17 in the same year, which can reflect the key role of the US in helping China to achieve a major breakthrough in the field of international trade. Figure 3 shows that there was a significant change of the trade volume compared with the previous three quarters of 2001. The US exports to China rose from \$6.2 billion in the fourth quarter of 2001 to \$11.2 billion in the first quarter of 2005, nearly doubling and breaking through \$10 billion in the fourth quarter of 2003. US imports from China also showed a rapid growth trend, which gradually increased from \$26.5 billion in the fourth quarter of 2001 to \$60 billion in the first quarter of 2005, an increase of 1.3 times. Corresponding to the increasing US trade deficit, there are eight or nine anti-dumping cases annually for obvious trade imbalance against China. However, the total trade between the two sides is also growing.

Sino–US relation developed steadily from March 2005 to December 2008. With the victory of the Iraq war, the US shifted its attention to the rise of China, the announcement on Taiwan issue and the policy of ‘encourage India and restrain China’ showed its defence awareness against China. There also appeared some disputes during their cooperation and development in economic and trade, including the US exerts pressure on the appreciation of China’s Yuan, protect intellectual property rights and punish infringement. Figure shows that the development trend of trade between China and the US is basically the same as that of the recovery period. However, the anti-dumping case of US against China in 2005 and 2006 decreased rapidly but increased to 12 cases in 2007, while countervailing

investigation cases developed from nothing, which may be because the increasing trade deficit and pendulous policy towards China.

Figure 3: China’s Merchandise Trade with the US and US Merchandise Trade with China, 2001-2008



Source: Figure is drawn basing on data from the US Department of Commerce.

2.4.4.4. The Development of Sino–US Trade in the Obama term (2009.1–2017.1)

In January 2009, Obama took the office, and it was a key period to prosper the economy after the outbreak of the financial crisis in 2008. The situation of internal and external difficulties makes the US must re-examine and adjust its foreign trade policy. As early as the presidential election campaign, to fight for votes, Obama, as a leader of the Democratic Party, adheres to implement a more stringent trade protection policy and criticise many shortcomings of the free trade, but he positively positioned that the Sino–US relation is ‘non-friend and non-enemy’ after he was elected, which can be seen in Figure.

According to the US-China quarterly trade volume data, the US exports to China, imports

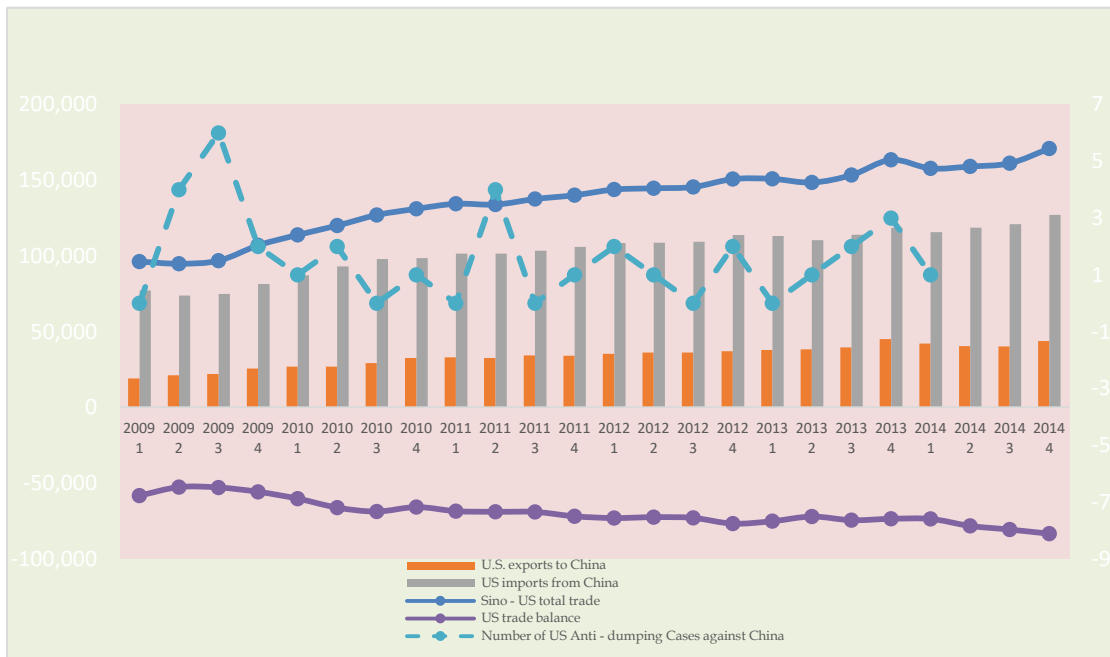
from China shows a growth trend besides few occasionally decline in the period, and the overall trade volume also grows rapidly which will not be repeated here. We can see a trend of increase and mutual-benefit in mutual-probe of Sino–US economic and trade relation.

However, due to the financial crisis in 2008, the unemployment of the US increased rapidly, and coupled with its decades of trade deficit with China. To transfer the increasingly serious national conflicts and correspond to its re-industrial policy, Obama had created more trade frictions with China and made prominent policies. First, Obama used administrative and judicial means to strengthen the supervision and investigation on infringement of intellectual property rights against China, urging the establishment and improvement of the relevant protection mechanism. Second, the US demanded for a more relaxed Chinese market, especially a more liberalised capital market to help their enterprises to settle in a broad area in China such as manufacturing, services and so on as soon as possible, and expand employment and reduce the Sino–US trade deficit. Moreover, call for China’s financial system reform; promote the mercerisation of exchange and interest rate to create a fair international market order. In addition, the US launched a more frequent anti-dumping and anti-subsidy investigations against China, mainly concentrated in manufacturing where holds a huge employment, such as tires, steel, etc., and tried to set up new trade barriers to limit the export of Chinese products, for example, the carbon tariff on hand. According to Figure, we can see some relevant data.

The increasingly deepened Sino–US relation makes China have chance to fully exert its comparative advantage. The US trade deficit against China continues to expand, and it has reached \$83.4 billion in the fourth quarter of 2014. Frequent anti-dumping lawsuit against China follows. From the figure a basic law can be found. The US trade deficit will be reduced accordingly when the anti-dumping cases are more than the average, in another words, anti-dumping investigations have a restrain effect on trade.

Figure 4: China’s Merchandise Trade with the US and US Merchandise Trade with China, 2009-2014

Measurement unit: millions of dollars



Source: Figure is drawn basing on data from the US Department of Commerce.

2.4.4.5. Sino–US trade relations under President Trump

Table 4: Exports and imports of goods and services from the US to China, bilateral trade surplus or deficit

Million dollars

Year	The US exports to China	The US imports from China	The US trade deficit
2015	164894	498189	333294
2016	170485	478574	308089
2017	187522	522889	335367

Source: [4]

On March 31, 2017, Trump signed two executive orders focusing on the US trade deficit [19].

On March 1, 2018, President Trump announced to levy 25% [20] ad valorem tariff on

imported steel products and 10% [20] ad valorem tariff on imported aluminium products. Although China is not the major direct exporter of steel and aluminium products to the US, it still filed an appeal against the tariff to the world trade organisation. The first round of the US tariff sanction against Chinese goods was implemented on July 6, 2018, with a tax rate of 25% and involving a variety of goods valuing 34 billion dollars, such as aero tires, water heaters, X-ray machine parts and various industrial parts. This tariff measure was soon retaliated by China's tariff on US goods worth of \$34 billion [21], and the tax rate was likewise 25%, these goods include electric cars, pork and soybeans. The second round of tariff sanction between the two countries was implemented on August 23, 2018, which was against imported products worth of \$16 billion, and the tax rate was still 25% [4].

Meanwhile, China filed a new appeal against the new tariff measure taken by the US to the world trade organisation. The third round of the US tariff sanction occurred on September 24, 2018, which was against \$200 billion [22] of goods from China, the initial tax rate was 10% and the tax rate increased to 25% since January 1, 2019. This round of tariff measures will increase the total value of Chinese goods affected by the new US tariff to \$250 billion, almost half of the annual total value of the US imports from China. The retaliatory measure taken by China was to impose new tariff rate of 5% to 25% on US goods worth of \$60 billion [23], which increased the total value of US goods affected by China's new tariff to \$110 billion. Moreover, President Trump threatened to raise tariffs on other \$267 billion Chinese goods if China retaliates against the new US tariff, which would make the total value of Chinese goods affected by the new US tariff to \$517 billion [4].

According to the US official statistics, the total value of the US imports from China in 2017 was \$505.6 billion [4]. Therefore, if the new round of tariff sanction is actually implemented, all the US imports from China will be affected by the new tariff. The impact of this Sino-US trade war on international trade and investment is not limited to China's and the US economy, but also concerns the global supply chain that has emerged and developed over the past decade. The trade war has brought great uncertainty to the consumption and investment decision-making of enterprises and residents all over the

world and may lead to permanent change in Sino–US relations.

2.5. SUMMARY OF CHAPTER TWO

In this chapter, it is explicated that while enlarging the economic gap between regions during world economic development, scientific and technological breakthroughs are promoted, and that international trade has accelerated the process of world economic development and changed the world economic pattern in a quite short time. Mercantilism played a key role in the development of Western Europe towards capitalism. By contrast, economic globalisation and prosperous overseas trade did not exert much influence on China during the Ming Dynasty (1368–1644). On the one hand, as a ban on maritime trade was implemented in the Ming Dynasty, on the other hand, there was the influence brought by the traditional Chinese mind of encouraging agriculture and restraining commerce. In this chapter, objective demand for developing the world economy and the domestic economy in the US is analysed, and reasons for the evolution of US trade policy are presented. Every important change to US trade policy for each period is a strong response to the objective demand for economic development. As China is playing an increasing important role in the world economy, even if there is no trade imbalance between China and the US, trade frictions and even trade war with China initiated by the US are inevitable. Sino–US trade imbalance is the uppermost obstacle to the development of Sino–US trade relations, which is also the focus of the conflict of interest on both sides. Differences in the reform of exchange rate and market opening-up conducted by the US and China is all related to this. Dealing with the issue of Sino–US trade imbalance is the key to the healthy development of Sino–US trade relations, which requires joint and long-term efforts from both sides.

3. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

3.1. CHAPTER OVERVIEW

This chapter focuses on critical reviews of previous studies and different theories related to Sino–US trade imbalance and trade war. In the first part, respectively reviews of theories related to trade wars, as well as Sino–US trade war and Sino–US trade imbalance, are conducted. In reviewing theories of trade wars and the Sino–US trade war, the chapter mainly introduces the history of trade wars, reasons for initiating a trade war between countries and consequences brought by a trade war, as well as the Sino–US trade war at present and relevant studies. Meanwhile, it is stated in this chapter that trade war involves various systems and aspects such as economy, law, society and politics, and third-party arbitrament, especially WTO, can play a greater role in dealing with modern trade war. While reviewing the theories of Sino–US trade imbalance, the chapter first gives a definition for the balance of payments according to the Balance of Payments and International Investment Position Manual formulated by the IMF and introduces the content of trade balance and trade imbalance. The relevant theories of trade imbalance mainly include mercantilism theory, neo-mercantilism theory, theories of absolute cost advantage and comparative advantage, factor endowment theory, free trade theory, free trade and environmental conservation, theory of trade protectionism, theory of reciprocal demand, elastic method, absorption approach and monetary analysis method, etc.

The second part of this chapter makes comments on the literature on Sino–US trade imbalance, mainly including statistical differences in Sino–US trade, China’s entrepôt trade, service trade, rule of origin, export control, exchange rate, FDI, international industrial transfer, imbalance of domestic economic structure and the study on trade policy from the aspect of political economy, etc.

This chapter aims to present a wide range of opinions in a fair and comprehensive manner, to summarise the achievements and significance of previous studies, and to figure out the gaps and methods.

3.2. THEORETICAL FRAMEWORK

3.2.1. Trade war and Sino-US trade war

3.2.1.1. Trade war

A trade war is essentially a competition for opportunities of development and living space, which is a conflict of trade interests between countries. Trade war, in the broad sense, contains a series of trade frictions, contests, retaliation and counterretaliation, including but not limited to tariff barriers, low-price dumping, exchange devaluation, economic blockade, unilateral sanctions, etc. Generally, a trade war is accompanied by fierce political and diplomatic rivalries. Moreover, a trade war also involves risks of war, and in extreme cases it may even directly lead to war.

In the field of economy, trade frictions, or trade wars, have a long history: in China, trade wars date back to the ‘Currency War’ initiated by Yingshen during the Spring and Autumn Period (770–476 BC). In the West, countries have been engaged in trade wars over spices since the 12th century. Despite the Classical Free Trade Theory once presented an ideal trade framework -- the market decides everything and there are no trade obstacles or barriers -- when we review the history of trade wars between the East and the West from scratch, we will conclude that such pure free trade will never exist in reality. In a sense, trade friction (trade war) is actually normal when developing trade, which is determined by its nature.

With the process of economic globalisation, the forms of trade war are constantly ‘enriched’ and evolving. At first, the form of trade war was relatively simple, which mainly aimed to

destroy the economic balance of opponents by means of price gouging and controlling the export of strategic resources. In addition, it was followed by increasing fighting for markets and supplies, which were often accompanied by military warfare. For instance, the trade war between the state of Song and the Liao Kingdom in Chinese history is a case in point. After human history moved from dispersive to whole, the international economic and trade links are increasingly close, indicating that some countries are increasingly dependent on foreign trade. Thereby, some states in the trade war turned to economic blockade to hit the opposed states and weaken their economic strength. There are plenty of examples related to this. For instance, Napoleon tried to strangle the British economy through blockades to establish his hegemony in Europe. During the American Civil War, the North adopted the way of trade blockade to weaken the South and accelerate the war. In recent times, the most common way of trade war is tariff barrier, and tariff wars have occurred many times in history. In 1893, a trade war broke out between France and Switzerland, in which the main way was to raise tariffs on each other. As a result, the goods exported from France to Switzerland decreased by 43%, and traffic the other way decreased by 27%. In 1893, there was also a tariff war between Russia and Germany, resulting in a surcharge of 50% imposed. As there was a huge loss on both sides, they had to bury the hatchet a year later. However, after World War II, in addition to tariff barrier, which is the traditional form of trade war, non-tariff barrier has also become a common way of trade war. Non-tariff barrier involves a wide range, which stands for all trade intervention measures except for tariffs. Common policy tools include import quota, export subsidy, voluntary export restriction, limit of self-production ratio, localisation requirements, anti-dumping, anti-subsidy, supporting measures, import licensing, technical barriers to trade, restrictions on government procurement and sanctions after investigation in accordance with domestic trade war provisions. We can see these more complex and hidden forms of trade war in the banana trade war (late 20th century) and steel trade war (late 2010s) between the US and EU.

There are only two consequences derived from trade friction. First, trade friction hurts the interests of all countries (including the players), particularly in a tariff war. Second, in a

particular situation (the price elasticity of import demand of a country is relatively high), a tariff war between countries of equal strength hurts both sides, and both sides are able to infringe on each other, while a tariff war between countries of unequal strength benefits the big country and hurts the small country. Nevertheless, accidental effects will occur. For instance, the US imposed high tariffs on European cars, to protect the domestic automobile industry. Indeed, the American automobile industry avoided foreign competition to a large extent, but ultimately chucked away the opportunity to quickly achieve modernisation transformation. As a result, after decades of decline, Chrysler and General Motors had to declare bankruptcy.

Trade war involves economic, legal, social, political systems and different levels, and the possible problems can be revealed from different levels of relevant systems. First, superficially, a trade war is an economic war in the field of trade, but it inevitably involves many issues such as finance, science and technology. Thus, a trade war is also a modern 'financial war' and 'science and technology war'. The game in the capital market and the foreign exchange market, as well as the rivalry in the field of science and technology in the special period, all give important expression to this. Second, a trade war is directly a 'tariff war'. As an important kind of foreign-related tax, tariff is based on law. Thus, a trade war is also a 'legal war'. In a real trade war, 'legal war' involves a wide range of aspects, not just tariffs. Third, a trade war affects the production and exchange, distribution and consumption of main market players and, thus, directly affects the public's cognition and psychology, triggers discussions among the public and the media and may even lead to a 'social war' involving different social forces. Fourth, a trade war is closely associated with the development path, pattern and political institution of each state, as well as the scope for political mobilisation and the level of legalisation, which will affect the political arrangements and tendency of relevant states. Thus, a trade war is also a 'political war'. It is difficult to solve the problems caused by a trade war through institutional adjustment of one state. It is necessary to enhance global economic governance, promote legal coordination at the international aspect, and effectively resolve relevant issues within the legal framework, rather than simply placing emphasis on the will or interests of one state.

Important international economic organisations established after World War II, such as GATT and later WTO, IMF and WB, have played a vital role in promoting global economic governance. Particularly, the relevant rules and institutional practices established by the WTO play a prominent role in global economic governance. Certainly, there is room for improvement in any rule, and rules of global governance from the WTO and other organisations need to keep pace with the times and be constantly improved. However, the multilateral mechanism and legal framework established are preferable. Thereby, all kinds of trade frictions should return to the multilateral legal framework and be solved by utilising existing governance rules or improving corresponding rules.

3.2.1.2. Sino-US trade war

The term ‘Sino–US trade dispute’ first appeared in Sino–US trade relations refers to the sanctions, consultations and negotiations led by unbalanced Sino–US trade in their international trade. The Sino–US trade war stands for a series of trade disputes against Chinese exports to the US initiated by US President Trump since he took office and corresponding countermeasures from China. On July 6, 2018, the Sino–US trade war officially began. The two sides imposed above-normal tariffs on each other’s \$34 billion worth of goods. After several rounds of tariffs, the Sino–US economic and trade consultations began on January 7, 2019. Superficially, the reason for the Sino–US trade war lies in the fact that the US suffers a huge trade deficit in goods trade with China. In essence, the Sino–US trade war is a conflict and competition between two systems, two patterns, two paths and two cultures. Thereby, currently, the outbreak of the Sino–US trade friction and the evolution into a trade war essentially attribute to the fact that the US, as the world’s first superpower (established power), takes measures of prevention and suppression on China’s rapid rise, which is the world’s second largest economy (peaceful rising major power). Thus, even if there is no trade imbalance between China and the US, there is also a strained relation between China and the US. As an emerging power, the Sino–US trade has a huge impact on China’s peaceful rising, which triggers risks in the fields of Chinese trade, industries and finance, plays a negative impact on various

industries, especially on the import and export and output of high-tech industry, and curbs China's economic growth and social welfare improvement to a certain extent. The Sino-US trade war is a confrontation between the world's two largest trading partners, which will not only affect the economic and social well-being of the two countries, but also produce a broader systematic impact on other countries in transition and the global trade framework [24]. It has been argued that the most effective way to avoid such adverse situation is to enhance multilateral trade commitments by completing WTO negotiations [25]. Whether WTO members can agree on reforms is the fundamental driving factor for resolving the trade war. Where to go for the trading system due to the trade war is largely a pedantic issue. Despite the US threats to exit from the WTO, the US is unlikely to do so. It is important to realise that the US advocates the WTO doing what it was mandated to do when it was established, rather than returning to the GATT system without constrained dispute settlement. Apparently, a decision to exit from the WTO would be a major blow and greatly diminish its relevance. Yet, the incentive to do it is arguably weak - as the US has demonstrated that it has wide discretion to impose protectionist measures. Ultimately, the trading system is intergovernmental and self-enforcing. The more important issue is whether WTO members can agree on reforms to make the organisation more effective and revitalise its negotiating function, to address the underlying driving factor for the trade war [26]. Meanwhile, third-party dispute settlement is feasible. In the area of security and economic issues, a high degree of legalisation, including the authorisation of third-party dispute settlement, is evident. According to the 'United Nations Convention on the Law of the Sea', disputes that cannot be amicably settled are submitted to the international tribunal for the law of the sea. The 'European Convention on Human Rights' established a court with many cases brought by individuals against their governments. As the economic regulations of the common market are performed by the court, regional integration has been deepened. When analysing foreign trade barriers to US exports, Davis indicates that the US gets better results in cases filed for formal dispute resolution than in cases settled by negotiations [27].

Trade wars have been in our history since the establishment of the first nation. In most

cases, at least during the trade war, both countries have worse situations. Third-party arbitrament, especially the WTO, can play a bigger role in dealing with modern trade wars. Meanwhile, the war between China and the US is a contest between the emerging power and the established power. Even if there is no trade imbalance between China and the US, there is also a strained relation between the two countries.

3.2.2. Trade imbalance correlation theories

3.2.2.1. Definition of trade imbalance

According to the Balance of Payments Manual formulated by the IMF, balance of payments refers to the international capital revenue and expenditure behaviour caused by international capital transfer between countries or regions in the world because of trade, non-trade and capital exchanges. The concept of trade balance and imbalance comes from balance of international payment. In the balance of international payments, the balance of payments is divided into two major items of current account and capital and financial account. Current account refers to the international economic transaction that occurs frequently within a certain period, including goods, services, income and current transfer. The capital account (recording the output and input of capital) reflects the flow of credit and debts represented by currency between countries. The financial account records all the transactions about the changes in the ownership of external assets and liabilities of economic entities and reflects the increase and decrease of investment and debts between residents and non-residents. Trade balance refers to that the total export-import volume of foreign trade in a particular year basically tends to balance. Trade imbalance refers to the inequality between total import and export volumes of a country in a particular year. A general survey of the foreign trade situations of governments all over the world shows that the phenomenon of trade balance is not common. Generally speaking, governments should try to maintain the basic balance between imports and exports in foreign trade with few surpluses, which is conducive to the healthy development of the national economy.

Trade imbalance is divided into trade surplus and trade deficit. Trade surplus refers to that a country's exports exceed imports and reflects the vantage ground of foreign trade in that year. The size of trade surplus to a great extent reflects the situation of a country's foreign trade activities in a specific year. Under normal conditions, a country should not have a large amount of foreign trade surplus for a long time, because it can easily cause conflict with the trade partners, overly high trade surplus is dangerous, which means that the growth of the domestic economy is overly dependent on the external market, and excessively high foreign-trade dependence makes a country's economy susceptible to other countries. A trade deficit means that a country's total imports are greater than its total exports and reflects a country's disadvantage in foreign trade. For a country, the government authorities should try to avoid long-term trade deficit, as a large amount of trade deficit can result in the outflow of domestic resources and the increase of external debts, which can exert an adverse effect on the normal operation of economy.

Trade imbalance is dynamic and frequent, while trade balance is a short-term phenomenon and relative. The trade between various countries in the world has always been incompletely balanced. Even if economic globalisation exerts some balanced effect on the distribution of trade flow between countries, it is impossible to form a completely balanced trade pattern [28].

Zheng, Shi and Wang argued that, in the long run, as long as a country's foreign trade imbalance can be made up by other items in the international payments account, and as long as this does not lead to the deterioration of the international payments, or bring the potential risk of deterioration or hidden danger to the country's economic development and financial security, the imbalance is acceptable (or, for example, a country's ability to cope with external negative impacts), that it can sufficiently maintain the surplus or deficit of trade balance in a relatively long period of time. In other words, the key to judging whether trade imbalance is dangerous is not the scale of imbalance, nor the length of the imbalance time, but the concrete analysis of a country's national conditions. Some countries can maintain the status of foreign trade imbalance for a long time and on a large scale, without

affecting national economic development and financial security, but for some other countries, short-term and minor trade imbalances are likely to cause financial and economic crisis [29].

3.2.2.2. Mercantilism and Neomercantilism

Mercantilism is a national economic policy aiming to maximising a country's exports while minimising its imports [30]. Mercantilism was dominant in modernised parts of Europe from the 16th to the 18th centuries, a period of proto-industrialisation [31], before falling into decline, although some commentators argue that it is still practiced in the economies of industrialising countries [32], in the form of economic interventionism [33]. It promotes government regulation of a nation's economy for the purpose of augmenting state power at the expense of rival national powers. High tariffs, especially on manufactured goods, were an almost universal feature of mercantilist policy [34]. Mercantilism can be divided into early mercantilism and late mercantilism. The early mercantilism proposed by W Stafford, John Hales, etc. centres on money balance theory, equates wealth with precious metals such as gold and silver, and stresses that the national interests lie in the increase of currency. It strictly prohibits the exports of gold and silver and pursues the absolute principle of buying less and selling more in foreign trade (i.e., to reduce imports and increase exports in order to reserve gold and silver currency). The late mercantilism was mainly proposed by Thomas Mun et al., who argued that the economic activities between countries dominated by the static view of world resources can be regarded as a kind of 'zero-sum game' (i.e., one country's economic income is at the cost of another country's economic loss). Precisely supported by this view, late mercantilism explicitly advocates to taking 'trade balance theory' as the core. In terms of policy suggestions, they proposed that countries should protect and reward exports and production, and take protectionist measures to restrict domestic imports, especially for those industries of strategic significance. Thomas Mun held that currency produces trade and trade increases currency. In his classic work of mercantilism, *England's Treasure by Foreign Trade*, he wrote that the means to increase England's treasure is to develop foreign trade,

but a principle must be observed (i.e., the total value of commodities sold to foreigners should be greater than that of commodities purchased from them); he stressed that a country should maintain its trade surplus, in order to achieve this purpose, a country should never hesitate to implement trade protectionism policies, such as giving subsidies to exports, implementing quotas and high tariffs on imports of consumer goods, etc. Such policies can encourage exports of domestic commodities and restrict imports of foreign commodities. To this end, he advocated increasing the exports of agricultural products and industrial manufactured goods, reducing the imports of foreign manufactured goods and opposing British residents to consume imported products that can be produced in Britain. The late mercantilism theory shows that, as early as the 14th to 15th Century, the theoretical research on the balance of trade attracted the attention of economists, but the theories in this period mainly focused on the importance and influence of the balance of trade.

Lin [35] believed that China's foreign trade policy has a mercantilist tendency, which has led to the low efficiency of foreign trade and the 'immiserising growth' of the macro economy. Hu [36], Xiao [37] and Cheng [38] agreed that since the reform and opening up in the 1970s, the 'import substitution' and 'export-oriented' implemented by China at the very start is one of the significant causes for the huge trade surplus in distinct 'export-oriented' economic development strategy after the reform in 1994. However, Li [39] etc. analysed China's import and export data from 1980 to 2004, and concluded that if China did implement mercantilism, it should have large-scale trade surplus against every trading partner country, but the surplus only came from a few big European and American countries. China's trade deficit against South Korea and Japan has been continuously expanding respectively since 1991 and 2002, which can hardly support the mercantilism of China's trade policy and system.

In December 1791, Alexander Hamilton, the first American finance minister, a representative of the requirement of independent development of the American economy, proposed a tariff that could be considered protectionist for the first time in the Report on Manufacturing Industry submitted to the US Congress. He believed that the infant

industries in the US should be protected to make the American economy independent. Later, Friedrich List, a scholar of German historical school, elaborated the famous trade theory of protecting infant industries in the book *The National System of Political Economics*, which was published in 1841, and stressed that ‘some industrial products can be prohibited from being imported, or the stipulated tax rate is actually equal to all or at least part of the banned imports’. Since then, the protectionist trade theory has been developing rapidly.

In ‘World Economics 2. The Political Economy of Development Globalization and System Transformation’, Tamás (2003) asserted that the existence of mercantilism at home is different from that abroad. Commercial capital played a decisive role in the external accumulation of capital and the process of starting primitive capital accumulation abroad, which also played a role in preparing and arranging for the first international division of labour, which was fully developed only during the second or third stages of world economic development. Thus, there were many typical phenomena of mercantilism, such as the activities of global commercial capital, activities carried out by various European trading companies and pirates, colonial attacks and conquest, and intercontinental slave trade. However, these phenomena not only provided huge profits for merchants, but also resulted in the introduction of primary products and services to the colonies [5].

Neomercantilism was adopted by economists Daniel, McKinnon, Krugman and Sargent to describe the export-oriented economic policy which was represented by foreign trade protectionism and economic nationalism during the period except for the 1970s, which is also applied to describe the government-led market economy established and the export-oriented policy implemented by East Asian countries after World War II to show the characteristics of economic nationalism and export-oriented policy with state intervention in the new era, thus differentiating it from mercantilism.

By analysing the similarities and differences between neomercantilism and liberalism, Robinson [40] believed that free trade requires a variety of hypotheses and preconditions,

while it is quite difficult for a state to establish a common market, and due to practical limitations, economists have wavered in their insistence on free trade on account of practical limitations. The neomercantilism satisfies the national need to gain wealth and value from other countries. When studying the role of neomercantilism in regional opening, Jayasuriya stated that the policy proposition for regional opening should consider the political and economic contexts and national interests, that is to say, the policy of regional opening should reconsider neomercantilism, and such policy proposition is determined by the combination of domestic and international trade [41]. Holslag [42], on the one hand, set forth the objectives and motivations for China's foreign trade policies since the 1990s, and on the other hand, evaluated the influence on the development of Africa, as well as China and other developing countries, brought by China's strategy of neomercantilism. He has determined that China has been carrying out a pragmatic policy of mercantilism that is the policy of neomercantilism, which combines a wide range of diplomatic and economic tools. Therefore, China has been going through slow but steady development.

Arva and Schlett put forward that in developing countries, the government plays a vital role in accelerating and maintaining economic growth. The government takes centralised control of the economy and markets and makes use of society as a tool to achieve goals. Measures of supporting local economy, developing and revitalising local business relationships have contributed to the reemployment of people who have been unemployed since the 1990s [43]. As China is a developing country, one of the main characteristics of China's pattern of neomercantilism lies in its export-oriented economic policy, which is one of the reasons for the expansion of China's trade surplus. Export-oriented policy is intended to drive the development of domestic economy by earning foreign exchange from export products. China has abundant labour resources and low costs, which are conducive to the export of products and labour services, thus forming a high trade surplus. Depending on cheap labour force to gain advantages in production for export expansion is mainly achieved by absorbing foreign capital. Implementing economic opening-up in China will inevitably lead to regional differences in the context of economic development. To promote exports and attract foreign investment, China has established a relatively favourable policy

environment to support the development of its eastern region. The geographical advantage of the eastern region is the sufficient and necessary condition for development. China is developing economy and promotes national rejuvenation in the mode of neomercantilism, which has objectively produced regional differences while developing the economy. The economy in the east is relatively developed, while the economy in the central and Western regions is relatively backward, which is inevitably derived from the lack of capital and labour outflow.

The specificities of the Chinese economy lies in the fact that China is a developmental state, where the government takes centralised control of the economy and markets, and the fact that the increase of trade surplus occurs when the government implements the export-oriented economic policy to make social resources fully mobilised, which is a manifestation of China's neomercantilism.

3.2.2.3. Theory of absolute cost advantage

Mercantilism regards currency as wealth and foreign trade as a kind of none mutually beneficial zero-sum game. This view was criticised by David Hume, a British ideologist. The most powerful weapon used by Hume to criticise mercantilism was his quantity theory of money, in which he mentioned that there is an automatic mechanism for a country's currency and total volume of commodities to achieve a balance, so it is not only stupid but also doomed to failure unilaterally pursuing trade surplus in international trade. Following Hume, Adam Smith modified the mercantilism theory. The concept of absolute advantage is generally attributed to Adam Smith for his 1776 publication *The Wealth of Nations*, in which he countered mercantilist ideas [44]. Adam Smith first described the principle of absolute advantage in the context of international trade, using labour as the only input. Since absolute advantage is determined by a simple comparison of labour productiveness, it is possible for a party to have no absolute advantage in anything [45]. Smith also stated that the wealth of nations depends upon the goods and services available to their citizens, rather than their gold reserves [46]. Adam Smith created the theory of international

division of labour and international trade. He put forward the theories of international division of labour and free trade. In terms of the theory of international division of labour, Adam first analysed the benefits of division of labour. He believed that division of labour is applicable to not only different occupations and categories within a country, but also different countries. Smith's theory of absolute cost advantage proposes that every country has its absolutely favourable production conditions suitable for the production of specific products, so that specialised production and exchange can be carried out, which is beneficial to all the countries engaged in the exchange. This is the theory of absolute advantage [47]. The theory of absolute cost starts from the principle of labour division to demonstrate the mutual advantages of trade for the first time in the history of economic development, and meanwhile criticises the mercantilists' one-sided view that international trade is only beneficial to countries with trade surplus. The influence of this win-win thought of trade division and mutual benefit still persists and is constantly verified by applied economics. In some sense, this win-win thought is the guiding thought for contemporary countries to open wider to the outside world and actively participate in international division of labour and trade.

3.2.2.4. Theory of comparative advantage

David Ricardo broke through the limitation of the Theory of Absolute Advantage proposed by Smith and put forward his Law of Comparative Advantage. By establishing a simplified classical model, he explained that even if there is no absolute advantage in production for a country, it is still available for the country to gain benefits through comparative advantage in international trade. The following hypotheses are included in this classic model: one factor, two kinds of commodity, constant returns to scale, constant labour productivity, and a difference in comparative labour productivity between the two countries. Based on this model, free trade is carried out in the institutional condition where prices guide resource allocation, and the cost ratio of different domestic products is compared with that of similar foreign products. As long as there is a difference in the cost ratio, different countries are inevitably willing to make exchanges and gain economic benefits from it. According to the

Law of Comparative Advantage from Ricardo, the comparative advantage arises from the difference in labour productivity between among countries and the resulting difference in labour cost, but there is still no explanation for the difference in labour cost [48]. Some scholars believe that if there is perfect liquidity in inter-industrial factors, the Theory of Comparative Costs is indeed invalid. Land and other natural resources, as well as human factors of production such as fixed capital, are locally and vocationally immovable. Much the same is true of labour, at least in the short run [49].

3.2.2.5. Theory of factor endowment

In 1919, Heckscher, a Swedish economist, discussed the important role of factor endowment difference in determining a country's comparative advantage and in international trade in his book titled *The Impact of Foreign Trade on Income Distribution*. Ohlin, a student of Heckscher, inherited and developed Heckscher's thought of factor endowment in his 1933 work *Regional Trade and International Trade*, and established the theory of factor endowment, which is also known as the H–O theorem (i.e., the 2x2x2 model).

The model starts from the idea of general equilibrium and focuses on the root of comparative advantage. Based on the hypotheses concerning identical commodity production functions and consumers' consumption preferences in different countries, constant returns on scale, complete competition between commodity market and factor market in different countries, completely free flow of products across borders and completely immobile factors, the following conclusions are obtained. First, production activities need not merely a factor of labour, but multiple equally important factors such as capital and land; second, the reason for different product costs in different countries is different combinations of production factors, as well as the differences in relative price ratio between the input production factors (i.e., the differences in production factor endowment between countries; third, every country uses the products with the most abundant domestic production factors in its division of labour, and all the countries get the

maximum benefits through international trade. Ohlin and Heckscher believed that the different factor endowment of different countries is the fundamental cause of international trade. A country should export products that intensively use the relatively abundant domestic factors and import those that intensively use factors it is relatively short of [50].

In 1941, American economists Stolper and Samuelson introduced Stolper-Samuelson theorem, which is called SS theorem for short. Stolper and Samuelson held that factor price will increase with the increase in the price of products which intensively use the factor, and vice versa. Furthermore, SS theorem predicts factor price equalisation (FPE): in the case of immobilised international capital and labour, the price of factors will be entirely equivalent among countries because of free trade [51].

In 1977, following the research conducted by Haberler and Tower, Dixit and Stiglitz introduced scale economy to analyse comparative advantage (i.e., the DS model). They argued that even if the initial conditions of two countries are identical, if the exogenous comparative advantage proposed by Ricardo did not exist and there is scale economy, the two countries can choose different divisions of labour based on specialisation, to generate endogenous absolute advantage [52]. In economics, Helpman and Krugman were the first to introduce scale economy into comparative advantage analysis. They believed that returns to scale and market size endogenously determine the diversity of product number [53].

In 1993, Dollar et al. introduced technological differences into comparative advantage analysis. They held that technological differences can more reasonably explain the continuous deepening of specialisation degree in developed countries [54]. Later, Davis pointed out that even under the market conditions of constant returns to scale and perfect competition, technological differences can cause trade between products of the same industry in two countries. Most of the above research studies are aimed at the differences in comparative advantages between developed countries caused by technological differences [55].

In 1990, Grossman and Helpman introduced knowledge capital into comparative advantage analysis to explain the difference in comparative advantage between two countries from the perspective of research and development. Based on a dynamic general equilibrium model of product innovation and international trade, they analysed the comparative advantages produced by research and development and the intertemporal evolution of world trade. In this model based on knowledge capital and differentiated products, it is assumed that knowledge can flow freely internationally, and enterprises will have cost when introducing new products, so forward-looking producers will research and develop products with profitable opportunities, the development capabilities of new products owned by enterprises in various countries determine the comparative advantages and trade pattern of the countries, and indirectly affect international trade pattern. Intra-industry trade is mainly determined by research and development, while inter-industry trade is determined by resource endowment [56].

When a number of scholars focus the research of comparative advantage on the factors of supply, Linder developed the theorem of comparative advantage from the factors affecting demand. In 1961, Linder proposed the similar demand hypothesis, who believed that domestic demand determines the range of potential imports and exports. When a country's product output exceeds the domestic demand, export capacity is generated; otherwise, import capacity is generated. Even if there is no difference in factor endowment and productions function between different countries or regions, as long as two countries have similar demand structures, there will be potential trade access between the two countries because of the difference in demand preferences. Meanwhile, he held that income level can affect the demand structure of a country. The closer the per capita income between countries, the more approximate the demand structure, the greater the potential trade possibility and the larger the actual trade volume. The theory also indicates that the more similar the income level, the more the intra-industry trades [57].

3.2.2.6. Free Trade Theory and Theory of Trade Protectionism

Under the guidance of free trade theory, the primary objective of foreign trade is to replace trade surplus with comparative advantage obtained from international trade. To meet the needs of constantly expanding foreign trade, the gold standard system emerged. For the trade balance and adjustment of international payments under the gold standard system, David Hume introduced the 'price-coin flow mechanism'. It refers to that under the gold standard system; a country's deficit in the international payments means the net output of the domestic gold. Due to gold outflow, the domestic gold stock decreases, and the money supply would decrease, thereby causing a fall in the domestic price level. After the price level falls, the competitive capacity of domestic commodities in the foreign market would be enhanced, and the competitive capacity of foreign competitive capacity in domestic market would decline, then exports would increase and imports decrease, and the deficit in the international payments would be reduced or eliminated. Similarly, the external surplus cannot be sustained, because the internal flow of gold would increase the domestic money supply, thereby resulting in the rise of price level, which is not conducive to exports but beneficial to imports, thus the surplus would tend to disappear. According to this mechanism, the price change caused by gold would exert a regulating effect, to automatically improve trade balance [58].

In the 1930s, Keynes [59] pointed out in his representative work *The General Theory of Employment, Interest and Currency* that, although the classical free trade theory has demonstrated that a country's foreign trade surplus and deficit tend to be balanced through automatic adjustment with the theory of automatic adjustment of international payments, these theories ignored that the adjustment of trade balance would affect a country's national income and employment. Therefore, Keynes held that the impact of trade balance on national income and employment should be carefully analysed. Through research, he found that trade surplus can increase national income and expand employment, while trade deficit can reduce national income and aggravate unemployment. Therefore, he highly praised the mercantilist idea of state intervention, advocated to strengthen the state's

intervention effect in foreign trade, favoured trade surplus and opposed trade deficit. In the book, Keynes also proposed the famous multiplier theory, and thereafter he constantly improved it into a new set of trade protection theory. The theory holds that, under the role of trade multiplier, national income can increase exponentially at a certain rate with the progressive increase of exports. That is to say, the more a country expands its exports and reduces its imports, the greater the trade surplus, and the greater the role on the domestic economic development. Therefore, the countermeasure for a country to increase effective domestic demand is to restrict imports and reward exports (i.e., create full employment and increase effective demand). The optimal policy for a country is to implement trade protectionism, maximise exports and reduce imports as far as possible.

Later, the followers of Keynesianism continued to improve the Keynesian trade protectionism theory. The scholars represented by Wynne Godley put forward the new protectionism trade theory. Through the analysis and expansion of the protectionist trade theoretical model, the theory verified the important role of the international payments on a country's national income and proposed that maintaining foreign trade surplus has the direct bearing on the improvement of a country's national income and the realisation of full employment. Hence, it is necessary for a country to restrict imports and reward exports to speed up the growth of its national income. A series of Keynesian trade protection theories have provided sufficient theoretical basis for Western developed capitalist countries to implement super-protection trade policy and pursue surplus income of foreign trade after World War II. Then various countries in succession implemented the trade theories to pursue trade surplus and expand their trade surplus. Meanwhile, Keynes and his followers further demonstrated the importance of trade surplus to a country's economic development. From this point of view, the Keynesian trade protection theory is of great practical significance for the economic development of capitalist countries. However, the theory did not investigate the possible impacts of trade surplus on the world economy, and especially lack an overall analysis of the positive and negative impacts of trade surplus on a country's economy.

Economists of all schools are convinced that free trade is better than trade protectionism [60]. Notwithstanding that there is a tendency of supporting free trade and market opening-up from economist, trade protection has never completely disappeared. We can even say that trade restrictions have been a common characteristic in the world economy for the past two centuries. As the economic historian Bairoch [61] stated that free trade is the exception, but protectionism is the common practice throughout history. We have considered unilateral liberalisation in a two-country world and preferential liberalisation in a three-country world. Despite in the short run, liberalised countries always benefit from favourable competition with increasing import competition, it turns out that these benefits were turned down in the 1990s [62].

Throughout modern history, trade has been regarded either as international public goods benefiting all, or as a battleground for winners and losers [63]. Even with strong arguments in favour of free trade, trade protectionism is constantly reappearing in a new guise [64]. In the mid-1970s, global stagflation, neo-protectionism and other slowdowns in development, as well as some other situations, changed the trend of liberalisation [65]. Since Adam Smith criticised mercantilism in the 'Wealth of Nations' (1776 edition), trade protectionism has been resisted by economists as it brings high cost to the economy of a country, and many empirical studies have strongly criticised trade barriers [66]. Economists generally argue that free trade is better than trade protection, but an important exception is protection for emerging industries. In 'The National System of Political Economy' (1841 edition), Liszt argued that every industrial country has (and indeed should) adopted policies of protectionism to protect the emerging industries [67]. Notwithstanding that Krueger et al., such as Rodrik [68], Haggard and Kaufman [69], as well as Bates and Krueger [70], attributed trade policy reforms to economic crisis and recession, some other literature on the macroeconomics of trade policy came to the opposite conclusion. Many scholars believe that the economic downturn is the prelude to the rising demand for protection and the increasing level of protection. Takacs [71], Gallarotti [72], Cassing et al. [73], Magee and Young [74], and Wallerstein [75] all found that, declines in economic growth or capacity utilisation and/or increases in unemployment and imports tend to increase the

demand for protection and supply of protection. In the earlier literature, policymakers have increasingly responded to the growing demand for protection from domestic groups during economic downturns. International factors have played a major role in the wave of trade liberalisation since the 1980s. The ‘General Agreement on Tariffs and Trade’ has allowed countries to design a comprehensive package plan of reciprocal trade concessions to promote extensive liberalisation. Moreover, the EU has assisted to promote liberalisation within the Europe which is constantly developing. For least developed countries, the IMF and the WB may have played a bigger role. Economic dilemma has forced countries to seek help from these organisations, in part at the cost of the prescription of trade liberalisation. While for some leaders, such prescription is consistent with the new trade reciprocity, for others it is a bitter pill that they would never take without external pressure [76].

3.2.2.7. Free Trade and Environment

The primary responsibility for excessive deforestation owes to national governments, but environmentalists have taken the WTO as a scapegoat for this and many other issues. Moreover, even when environmental issues do relate to international trade (such as offshore oil spills and endangered species trade), the WTO has neither the right nor the ability to tackle these issues. These urgent issues could be effectively addressed in other ways, such as conducting discussions at international conferences, and such approach has indeed been adopted in international agreements on safety regulations of genetically modified food. The impact of trade liberalisation on the environment lies in the fact that, based on trade liberalisation, resources in each country can be fully utilised through the free flow of resources, products, technologies and services between countries or regions, to improve the life quality in each country. There is no doubt that liberalised trade contributes to improving economic development, but whether trade liberalisation is inconsistent with the concept of sustainability emphasised in the field of modern environmental conservation is still a controversial issue. Only the impact of trade liberalisation on the environment is prominent, and world merchandise trade will usually make the natural resources in

developing countries exhausted. The more commodities for export mean the more natural resources which are wasted. The direct impact of trade liberalisation on the environment lies in the fact that, by means of export trade, unrestricted overfishing for some species is carried out for high profits, thus leading to the extinction of the species and a damage to the ecological environment. The indirect impact of trade liberalisation on the environment is as follows: 1. The market fails to make a correct judgment in the evaluation and allocation of resources, resulting in an inaccurate reflection of production costs by prices of goods and services (including environmental costs), as well as a failure to conduct effective allocation of resources. 2. When market failure occurs, they turn to the intervention from the government. However, due to the internal problems of institutional system, the adjustment of government policies leads to the result that policies and management process ultimately fail to alleviate market failures or even exacerbate the damage. Trade liberalisation is a significant concept to promote international economic progress, which is always the goal that international countries committed to achieve. From the signing of business bilateral amicable and reciprocal agreements and multilateral reciprocal agreements to the establishment of the regional economic organisations and the WTO, the importance of abolishing trade barriers has been highlighted, and trade liberalisation has logically become the mainstream in international economy. When the international economy is thriving, people are perceived that the living environment for humans is gradually deteriorating. It is concluded that the prosper trade is consuming the environmental quality while bringing a convenient life for humans. The sense of environmental crisis from humans is gradually awakening and rising, and environmental conservation has become a high-profile issue in modern international society. Trade liberalisation was once regarded as the original sin of environmental damage.

Among environmental policies, trade measures are regarded as an immediate and effective administrative tool, which are aimed at reducing environmental damage, alleviating ecological burdens and resolving environmental problems by means of restrictions on trade activities. Regardless of whether there is suspicion of trade protectionism, in terms of the main reasons for environmental problems, the influence of trade measures on pollution in

production process, specific consumer behaviour and wastes seems to be palliative.

3.2.2.8. Reciprocal demand theory

In 1848, the British economist Mueller published the book named *The Principle of Political Economy and Its Application in Social Philosophy*. In the book, he proposed the theory of reciprocal demand and made an important supplement and explanation to the theory of comparative cost. Mueller believed that the term of trade and its changes are mainly determined by the intensity of reciprocal demand of two countries for commodities from the trade partner. Within the upper and lower limits of the proportion of international commodity exchange, the stronger the demand of one country for the export commodities from its trade partner, and the weaker the demand of its trade partner for its export commodities, then the more unfavourable the terms of trade are to the country, the less benefits the country can obtain from foreign trade, and vice versa. The closer the international exchange rate is to the domestic exchange rate, the more unfavourable it is to a country, the less trade benefits the country can obtain, and vice versa. Marshall, a British economist, developed the theory of reciprocal demand proposed by Mueller. He used the reciprocal demand and supply curve to explain how commodity supply and demand co-determine the terms of trade and its changes (i.e., to further investigate demand and supply and combine them together. Marshall's analysis of the terms of trade and trade benefits is based on the full exertion of the role of market mechanism. Therefore, Marshall also advocated free trade. In the theories proposed by Ricardo and Marshall, it is assumed that there are differences in the production of specific products between countries. Different countries are adept at producing different products because they have different resource endowments.

3.2.2.9. Elasticity approach

The elasticity approach to adjust the international payments refers to the adjustment of current account imbalance by changing exchange rate and price under the condition of

constant income. Because this regulatory mechanism is closely related to the elasticity relation between supply and demand of import and export commodities, it is called elasticity theory. This theory was first proposed by Marshall, a British economist, and later developed into one of the important components of the international payments theory through the joint efforts made by Robinson, Meckler and Harper. Currency devaluation exerts price effect and trade volume effect on current account balance. The combination of these two effects can change the balance on current account. Under a series of assumed conditions, British economists Marshall and Lerner concluded that when the sum of import and export demand elasticity is greater than 1, the currency depreciation of a country can improve its trade balance. The elasticity approach has been widely applied in the analysis of the impact of exchange rate movement on the international payments. Since the Marshall-Lerner condition has become the premise for currency devaluation to improve trade balance, the demand elasticity of import and export commodities of a country becomes the most important theoretical standard for judging whether depreciation is beneficial or harmful.

Some econometricians made a statistical analysis on the price elasticity of international trade commodities as early as the 1930s. The analysis results showed that the demand elasticity of import and export commodities was quite low and insufficient to make depreciation play its due role. Therefore, the theory of elastic pessimism prevailed for a time until the depreciation of pound in 1949, which achieved unexpected effects. In the 1950s and 1960s, the theory of elastic optimism gained the upper hand. It was found that with the increasing proportion of industrial manufactured products with higher elasticity and decreasing proportion of primary products with lower elasticity in international trade, the sum of demand elasticity of import and export commodities can reach 1 in most cases, so the Marshall-Lerner condition can be met [77].

The elasticity approach assumes that the depreciation of domestic currency only changes the relative price of both sides of the trade, rather than the domestic prices, but this assumption is apparently unreasonable. The actual situation is that the depreciation of

domestic currency will inevitably lead to the rise in domestic prices, thereby increasing the domestic production costs, while the effective exchange rate and export competitiveness will decline, as a result, the international payments cannot be improved as desired. Given this, people have always been doubtful about elasticity theory.

3.2.2.10. Absorption analysis approach

The absorption analysis theory of international payments adjustment was put forward by Sydney Alexander when he served in IMF in 1952. Based on Keynesian expenditure analysis method, this theory starts from Keynesian national income equilibrium formula ($Y=C+I+G+X-M$) to investigate the adjustment process of international payments imbalance. The theory holds that only when the increase of a country's income from commodities and labour services (general income Y) exceeds its domestic absorption capacity ($C+I+G$), where C represents consumption, I represents investment, and G represents government expenditures, will the country's international payments be improved. Therefore, a country's international payments imbalance needs to be adjusted by changing its national income or domestic absorption. The concrete method is as follows: when there is a deficit in the international payments, it is necessary to increase national income or reduce domestic absorption to balance the payments, while in the case of a surplus, it is necessary to reduce national income or increase domestic absorption to achieve balance. Hence, this theory is called by the academic circles an organic synthesis of Keynes' multiplier theory and the elastic analysis theory of international payments adjustment.

3.2.2.11. Monetary analysis approach

Both elasticity approach and absorption approach stress the adjustment of trade balance, but they ignore capital and financial items. With the development of international economy, the importance of capital flow or financial assets trade is becoming increasingly significant in international payments, and even exceeds that of current account. It is precisely in this context that the monetary approach of international payments has become the mainstream

among the theories of international payments since the 1970s. Monetary approach adopts the simplest mathematical model to express its centre theory, i.e., $H=R+D$, where H represents money supply, R represents international reserves, and D represents domestic financial assets held by monetary authorities, i.e., domestic credits. It can be seen from the above formula that, the money supply of a country is divided into two parts, those are, the domestic creation part D and foreign part R. The change in domestic money supply can be caused by the change in domestic credits or international reserve assets. Suppose that money supply H is equal to money demand I in a long period of time, by changing the above formula a little, the following formula is obtained: balance of international payments = Money supply - Domestic credits = Money demand - Domestic credits.

Thus it can be seen that, the international payments are related to the supply and demand of currency. When a deficit occurs in international payments, there will be an increase in domestic credits or a decrease in monetary aggregates. In the short run, the difference between money supply and demand is reflected in the change of reserved items of international payments. Under fixed exchange rate system, balanced international payments means that the reserved items remain unchanged. Under the freely floating exchange rate system, with corresponding changes in money supply and demand, the international payments can achieve balance automatically.

The monetary approach holds that international payments are essentially a monetary phenomenon, so the imbalance of international payments can only be corrected by monetary policy. Various adjustment methods, such as depreciation, tariff, import quotas, foreign exchange control and absorption policy of reducing expenditure, can only correct the deficit in international payments when they reduce money supply relative to money demand or increase money demand relative to money supply. For example, depreciation can only temporarily improve the balance of international payments by changing the domestic price level and increasing the actual domestic money demand or reducing the domestic money supply. Therefore, controlling the growth rate of domestic currency is the most effective way to ensure the balance of international payments. The money approach

not only analyses the reserve items that fully reflect the international payments, but also contributes to the analysis of current account items and capital account items. Compared with absorption approach, money approach not only extends the research scope from current account to the entire international payments, but also demonstrates the inner link between a country's domestic money supply and demand status and international payments, which is its major contribution. But the method has some defects, for example, it focuses on long-run analysis, but in fact, the money demand is unstable in the short term, in addition, it neglects the role of important non-monetary assets factors.

3.3. LITERATURE REVIEW

3.3.1. General study of Sino–US trade imbalance

Fung and Lau [93] argued that there is a huge difference in the estimation of bilateral trade balance between China and the US, which is mainly caused by their different treatments of entrepot trade, entrepot gross margin and service trade in Hong Kong. On the one hand, there is a transfer of trade deficit among China, Hong Kong and Taiwan; on the other hand, the direct investment of Taiwan and Hong Kong in Chinese mainland is partly responsible for the growth of US-China trade deficit.

Only 10% of the US imports from China directly compete with the products produced in the US. Hence, even if the US cuts down its imports from China, its trade deficit would not be reduced [78].

Yang [79] believed that although the Sino–US trade is unbalanced, the economic benefits are shared. The increase of China's surplus with the US has aggravated the cycle of 'the poor helping the rich'. Du and Peng [80] believed that the Sino–US trade balance will tend to decline in the medium and long term, which is on the one hand a response to the political pressure in the US, and on the other hand an inevitable requirement of China's

internal economic adjustment. China needs to strive for more extensive and longer-term interests in the adjustment of internal and external balance [80].

3.3.2. Trade statistical discrepancies and the problem of Sino–US trade imbalance

3.3.2.1. Different statistical calibres enlarging the amount of Sino–US trade imbalance

Unlike the export pricing method adopted by most countries, the American statistics on the export data is conducted according to free alongside (FAS), while China's export data is calculated based on free on board (FOB). The statistics on both the American and Chinese import data are based on CIF [81–84]. As the pricing basis for imports and exports is different for the two countries, it is necessary to convert the imports and exports of both countries into a unified FOB to compare the differences in the statistical data of bilateral trade, and then calculate the degree of trade imbalance between the two countries.

According to the internationally universal conversion method, it is necessary to add 1% cost to the American FAS export value and convert it into FOB [85]. The research conducted by Shen [86] showed that the difference in import and export pricing between China and the US and transportation delay have led to the difference of bilateral trade statistical data, which is one of the important causes of the dispute in amount of Sino–US trade balance. Yuan [87] argued that, in terms of the statistical scope, the US adopts the general trade system, takes the national territory as the statistical boundary, and includes the goods stored in the American free trade zones and bonded warehouses, while China adopts the special trade system, takes customs territory as the statistical boundary, and excludes the goods stored in the bonded warehouses, as a result, the statistical scope of the US is slightly larger than that of China, which can aggravate the US deficit.

3.3.2.2. Entrepot trade and entrepot added value aggravating the unbalance of Sino–US trade

Xue, Jia and Zhao [88] and Fung and Lau [89–91] held that the American statistics overestimated the imports from China and underestimated the exports to China. In terms of exports, the US counts the goods transited to China via Hong Kong as exports to Hong Kong; in terms of imports, it counts Chinese goods transited via Hong Kong as imports from China. For China, in terms of exports, since the destination of goods transited to Hong Kong cannot be determined, it is impossible to count all the products that arrive the US through Hong Kong as exports to the US, resulting in an underestimation of China's exports to the US. Huang and Broadbent [85] believed that there are relatively large differences between China and the US in compiling bilateral data, including the differences in pricing basis and transportation delay, especially China's entrepot trade via Hong Kong and the practical difficulties for correctly pricing these trade flows.

Shen [92] concluded by calculation that, from the perspective of entrepot trade via Hong Kong and referring to the estimated values of Sino–US trade, the US statistics overestimates the imports from China and underestimates the exports to China, resulting in the overestimation of US-China trade deficit, while China's statistics underestimates the exports to the US and properly estimates the imports from the US, leading to an underestimation of the Sino–US trade surplus. Referring to the new estimated value of Sino–US trade after the removal of Hong Kong's entrepot gross margin, China still underestimated its exports to the US. Specifically speaking, from 1995 to 2003, the annual average US exports to China was underestimated by above 24% [92] in the American statistics, and the average annual imports from China was overestimated by above 35% [92]. As to China's statistics, the annual average exports to the US was underestimated by over 20% [92], and the statistical value of imports from the US remained unchanged. Accordingly, the annual average US-China trade deficit was overestimated by over 65% [92] from 1995 to 2003 in the American statistics, while the average annual trade surplus with the United States was underestimated by over 33% [92] in China's statistics.

3.3.2.3. *Service trade*

Some scholars attributed the statistical difference in Sino–US trade to the fact that the amount of service trade was not included when calculating trade balance between the two countries, thereby exaggerating the trade imbalance between the two countries [93,94] The estimated results obtained by Shen [92] showed that the Sino–US service trade developed rapidly from 1995 to 2002. It increases from 2.5[92] billion dollars in 1995 to 6.1 [92] billion dollars in 2002. Yin [95] further indicates that there will be huge error and omission for the service trade is hard to count. For example, because of the difficulties in statistics, finance, insurance, consulting and engineering technical service, which are important in service trade and the US has fairly advantages, are not calculated respectively as independent main classes. So he believes that the surplus of the US service trade was underestimated.

3.3.3. Rule of origin and the Sino–US trade imbalance

The current pattern of the system of national accounts originates from 1940s. In that situation, the trade of FDI and intermediate products was not important. Cross-border trade is the main way to transport goods and services to other countries. The amount of international investment is small and the commodity exchange relationship between countries is relatively simple. Statistics of original country can reflect the division of labour, trade relations and the corresponding pattern of interests among countries.

However, due to the rapid development of economic and trade relations among countries in the world and the increasing cross-border investment, international trade is no longer exchanged for products produced in a single country, but for ‘world products’ produced across national boundaries. It is obvious that the current method of counting import and export trade in terms of origin cannot accurately reflect this major trend in world economic development and even distort the trade balance between countries. The United Nations Conference on Trade and Development indicated that balance of payments accounts were designed to record transactions between residents of different countries, traditionally; these accounts recorded the sales and purchases of all foreign branches of their countries.

However, with the trend of integration in the world economy, the balance on the existing accounting structure does not fully reflect the activities of the multinational companies, goods and services in international market were transferred through the local-established foreign branches, rather than the trading of resident units and very live unit with the traditional meaning.

The definition of rules of origin for entrepot trade is not very clear. Countries take whether the goods were processed substantially as the main evidence to judge the country of origin, but there is no detailed statistics enforcement regulation to predicate ‘whether the goods changed substantially’, countries always combine their actual situation, but the standard and severity are different, it is optional when judge the country of origin, the standard needs to be completed. The third country or region that is engaged in transit trade just earns a certain profit between producing country and consuming country through the method of selling at a low price and buying at a high price. It does not process the commodities; (i.e., it does not substantially change the characteristics of the commodities. Thus, the relevant provisions of the product origin are still a producer country, the entrepot trade part was calculated to the producer country’s export. The difficulty in knowing the country of origin and the final destination of export after the products have been re-exported through multiple countries is an important factor that leads to the error of trade data. In addition, there is no clear and unified amendment method for the value-added part of transit trade, mainly based on the declaration of importers, resulting in inaccurate statistical data. Just as the standpoint of Xue and Jia [96], due to the inherent difficulties in the three criteria of rules of origin, rules of origin distort the real situation of China’s foreign trade development. The three criteria lead to the false increase of mechanical and electrical products and textiles in China’s import and export categories. International trade statistics should not only be conducive to international trade comparison, but also truthfully record and reflect the trade status of a country, reflecting the trade relationship between countries. However, the globalisation of production makes it more and more difficult to determine the actual origin of products of multiple countries, especially the development of processing trade, which adds the complexity to this issue. Processing trade refers to a trade mode in

which a country imports major raw materials and spare parts from abroad and re-exports them after processing and assembling. Because the goods changed substantially in the country, so statistics to the country of origin, the country was classified as the country of origin. But because the country imports most of its raw materials and components, the real gains are often modest.

Moreover, in the case of the massive increase in intra-transnational trade, the origin statistics greatly mask the true trade between countries. As FDI makes international business activities more and more borderless, the internal trade of transnational corporations is manifested as trade between countries. The current system of trade statistics does not reflect the impact of these changes in the collection of relevant trade statistics. Because under the ‘cross-border principle’, the data and collection methods of ‘customs clearance registration’ not only gather local sales data of foreign affiliates in the host country, but also record the intra-company transactions of ‘cross-border’ sales of foreign affiliates back to their home countries as exports of the host country where the transnational corporation invests [97]. The direct investment of the parent company in the host country replaces the direct export of the parent company’s commodities to the host country to some extent, thus entering the domestic market of the host country in disguise. Therefore, the investment of the parent company in the host country and the sales revenue of commodities and services belong to the home country but are included in the account of the host country in the trade statistics [98]. As a result, he indicates that under the current system of trade statistics, China’s exports are inflated and the US exports are reduced by the economic activities of overseas affiliates, thus distorting the true balance of Sino–US trade.

3.3.4. The US export control to China and the Sino–US trade imbalance

According to Harding [99], it is hard to say which side will account for the trade deficit between China and the US if the US lifts export control on China? It is true that the US has obvious export control on high-tech products trade with China, which directly impedes the

export of high-tech products to China and aggravates the trade imbalance between China and the US. So the US trade deficit with China is the inevitable result of discriminatory US export control policies towards China; there are several scholars support this opinion: Lin [100] indicates that, under the pretext of national security, some developed countries have imposed various restrictions on the export of high-tech products and capital-intensive products to China, which have greatly limited the scale of China's imports and thus expanded China's trade surplus; Zhou [101] believes that China's trade surplus with the US is actually the result of the actions of the US. Easing the embargo on high-tech exports to China is the only way to ease the US trade deficit with China.

3.3.5. RMB exchange rate and Sino-US trade imbalance

In special column of New York Times, Krugman requires the Treasury Department of United States define China as 'Currency Manipulator', he believes that the US has lost 1.4m to 1.5m jobs because of the undervalued RMB, he even believes that if China deregulated its currency, global growth would be 1.5 percentage points higher. His opinion was approved by many people in the US political circles. Some overseas scholars, represented by Goldstein and Lardy [102], believe that the artificially low level of the RMB makes Chinese goods exports more competitive and that is the main reason for China's foreign trade surplus; while some mainstream media outlets in the US or American companies doing business with China are not impressed, in response to Krugman's argument, Stephen roach, President of Morgan Stanley Asia, said rudely that Krugman should be hit in the head. 'His suggestion is totally wrong. We always blame China and ignore our own business.' Whether the trade gap is due to the Yuan's exchange rate is debatable, he said, and encouraging Chinese consumers to spend would be a more effective way.

Chinese scholars have also conducted a series of scientific studies on such differences: when analysing the relationship between Sino-US trade and the RMB exchange rate, Chou [103] found that fluctuations in the real exchange rate of the RMB against the dollar

(conditional variances) have a negative effect on China's exports to the US. That is, when the real exchange rate of RMB against the USD fluctuates greatly, China's exports to the US will decrease. However, the analysis does not mention the effect of the real exchange rate of RMB against the USD and the exchange rate of nominal exchange rate itself on the trade pattern between China and the US, but only analyses the volatility of the real exchange rate. Artificially inflating exchange rate volatility to balance trade surpluses is obviously highly inappropriate, the articles of Zhang [104] and Lu and Dai [105] are not point at the imbalance of Sino-US trade but are the analysis of China's overall foreign trade pattern. Take China to the world trade as the research object, Lu and Dai test the relations of the weighted real exchange rate fluctuations of RMB to the world's major currencies from 1994 to 2003 and long-term relationship between China's import and export with co integration vector auto regression method, the results show that RMB real exchange rate volatility has a significant influence on China's import and export trade, Marshall - Lerner condition was established, and J curve effect existed. Zhang [104] estimates the scale of the foreign investment, export volume, GDP and employment reduction caused by the exchange rate appreciation of different ranges by measuring the FDI function, the import and export function and the exchange rate elasticity of China. They concluded that exchange rate appreciation had a significant effect on imports and exports, but that the effect fell by more than half after three quarters and disappeared more recently after seven quarters, and that exchange rate appreciation had no effect on trade imbalances in the long run. Then Qu [106], Li [107] and Gao [108] used econometric analysis to show that the trade imbalance between China and the US has no direct relationship with the RMB exchange rate and came to the conclusion that the RMB appreciation can only alleviate the surplus to some extent in the short term, but has a weak effect in the long run. Yu [109] used a gravity model to study the impact of RMB appreciation on trade between China and the US. The results showed that the appreciation of RMB significantly reduced China's exports to the US. But it also points out that a continued appreciation of RMB could seriously hurt exporters and thus influence China's macroeconomic growth. The macroeconomic research centre of Xiamen University team uses model to analyse the appreciation of the RMB (6% a year) [110], they concluded that

such a rapid appreciation will cause a sharp decline in foreign trade surplus, but it will have seriously negative impact on China's GDP growth that may cause the economic crisis.

Theoretically, the exchange rate may be the main reason for the trade imbalance between China and the US, but from the empirical research, there is still no strong evidence that the exchange rate change between the RMB and the USD contributes to the trade balance between China and the US.

3.3.6. FDI in China and Sino-US trade imbalance

Blomstrom[111] believes that FDI promotes the export trade of the host country: On the one hand, the direct effect of FDI on trade (i.e., producing in the host country by foreign-invested enterprises and exporting their products abroad, which drives the export of the host country; On the other hand, FDI has an indirect effect on trade (i.e., FDI promotes its export through its influence on local enterprises and technology spill-over). Liu [112] indicates that to some extent, the direct investment by the US in China through multinational companies has aggravated the trade imbalance between China and the US. The US-based parent companies of these transnational corporations transport components and parts to their Chinese subsidiaries at above-average international prices, and then export them to other subsidiaries or parent companies at below-average international prices, for which China receives only a small processing fee. American multinationals convert the goods and services originally produced or exported by their own countries into the production and export of their subsidiaries in China, and correspondingly increase the import of the US parent company to the US from its subsidiaries in China, thus expanding the US trade deficit with China. Therefore, from the perspective of pure import and export statistics, the real economic relationship between China and the US will be masked and the trade imbalance between China and the US will be further aggravated. Xu and Hu [113] studied the correlation between the trade imbalance of China and the US and the US

investment in China. They found that the US companies investing in China are mainly engaged in processing and manufacturing, and the proportion of processing trade in total trade is increasing, the proportion of manufactured goods exports in total exports is increasing, and China's trade surplus with the US is also increasing. Therefore, the Granger causality test is used to analyse the above phenomena and the results show that the export of manufactured goods has a two-way causal relationship with the US direct investment in China and it is significant. The promotion effect of the US direct investment in China on the export of manufactured goods and the total export is greater than that of imports, and the export of manufactured goods is the cause of the trade surplus between China and the US. There is a long-standing complementarity between the US direct investment in China and Sino-US trade. If the more US FDI flows into Chinese manufacturing, the more China exports to the US and the larger the Sino-US trade surplus.

3.3.7. International industrial structure transfer and Sino-US trade imbalance

Lardy [114] indicated that over the past two decades, the division of production of manufactured goods has become more and more geographically subdivided, with each country having the strongest comparative advantage in processing only a portion of the product. Countries with high incomes and technological advantages became specialised in producing high-value-added components, while China, with its large unskilled labour force, gradually became the final assembly point for a range of products. Joint ventures and wholly foreign-owned enterprises are the main players in this process, and most of the investment comes from other Asian economies and used in processing and assembling such as: Hong Kong, Taiwan, Korea. Based on above inference, much of the increase in China's trade surplus with the US is a result of other East Asian countries shifting their trade surpluses to the US by shifting production to China. Gaulier [115] also indicated that China took advantage of the globalisation of production and became an assembly base for Asian companies that extended their product and trade networks to China. China's position in

product segmentation has stimulated trade in high-tech products, but the rapid technological upgrading of China's trade is closely related to its increasing dependence on foreign capital and technology. The emergence of China triggered a restructuring of production in Asia and a triangular trade pattern: Asia's relatively developed economies, which use China as an export base and export goods to the US and Europe instead, now export intermediates only through China-based subsidiaries. Yin and Wang [116] compared China's trade balance with the US, China's total trade balance and China's trade balance with East Asia from a statistical perspective. The study found that since 2000, China's trade surplus with the US has exceeded China's overall foreign trade surplus, which means that China's trade deficit with other countries is bound to grow larger and larger. The main source of this deficit is East Asia, and China's trade deficit with East Asia exceeds China's trade surplus with the US. To obtain further favourable evidence that the expansion of China's trade surplus with the US was transferred from some countries or regions in East Asia, they also examined the situation of the US' foreign trade deficit. Although the US trade deficit with China has been increasing, the proportion of this deficit in its total foreign trade deficit has not increased significantly. While the US trade deficit with Japan and other East Asian countries has risen in absolute terms, their share of the total US trade deficit has been declining, and if China and other East Asian economies are taken as a group, the US trade deficit with East Asia as a whole has actually declined. It follows that China's huge trade surplus with the US has largely been transferred from the rest of East Asia. Because other east Asia countries and regions constantly shift production to China, therefore, their exports to the US shall be transferred to mainland China exports to the US, if the comparative advantage between countries caused by economic globalisation does not change, the change tendency that Sino-US trade imbalance will not change, and sustainable. Cho and Koo [117] proposed that since the Asian financial crisis, there had been eight Asian economies of the substantial depreciation of currency to the dollar, the spill-over effects between these countries put great pressure on the RMB, but because of China shall practice a system of exchange rate peg to the dollar, the dollar and the Yuan move together, China kept its currency stability, and won the foreign investors huge credit. The appreciation of the USD against other Asian currencies is bound to cause the

appreciation of the RMB against these currencies. A stronger RMB gives China greater purchasing power in international commodity markets; this is bound to lead to increased imports from these East Asian countries and to increased exports of high-tech products to the US. Thus, changes in trade patterns between China and the US in high-tech manufactured goods are likely to depend on the relative exchange rates of the US and East Asian countries rather than the bilateral exchange rates. China's exports to the US in these three categories of goods were returned by trade openness, bilateral exchange rate between China and the US, weighted exchange rate between the US and east Asia and dummy variable of exchange rate regime after dividing trade goods into primary products, intermediate technical manufactured goods and high technology manufactured goods, the results showed that the US and east Asian countries exchange rate changes on China-US trade, especially the significant effects of high technology products, and have no influence on low technology products.

3.3.8. The imbalance of internal structure and trade between China and the US

Kang [118] believed that the fundamental reason is the imbalance between savings and investment in the domestic macroeconomic structures of China and the US. The US has a low savings rate for a long time, while China's domestic savings rate is too high due to demographic changes, lack of a sound social security system and lack of smooth financing channels. Therefore, the two countries should look inward to fundamentally improve China-US trade imbalance. Zhao and Feng [119] believe that the internal economic structure imbalance between China and the US is the internal cause of bilateral trade imbalance. The imbalance of the US savings/investment structure and the imbalance of government revenue and expenditure lead to the US trade deficit with China. China's high savings, high investment and its 'export-oriented' trade policies have led to a trade surplus with the US

3.3.9. The study of trade policy in political science

A consistent topic in the literature of political economy is that unless the political consequences of trade policies are considered, they could have unexpected effects. A paper on rent-seeking from Kruger [120] is certainly the most important source. The most recent one is from Sturzenegger [121], showing that if strategic trade policies lead to rent-seeking and thus competes with R&D activities for resources, then the benefits from rent-shifting of strategic trade policies can be completely eliminated. Krugman [122] took these factors into account to a large extent, and he argued that free trade is nevertheless a good empirical law, even if it is not the best policy in a world of incomplete competition. However, more work needs to be done in this aspect, particularly accounting for that free trade is a politically sustainable policy. All these considerations indicate that when advocating or designing a system, it is necessary to have a good understanding of the political and economic consequences. There is little literature related to this. In addition to the above documents, we can cite views from Richardson [123], Riezman and Wilson [124], as well as Panagariya and Rodrik [125]. Richardson [123] highlighted the different effects of a customs union and a free trade zone on trade transfers. In a model in which tariff levels are determined from inside out, he indicated that there is an advantage of declines from inside out in tariff levels in a free trade zone. Riezman and Wilson [124] discussed the effects of various political reforms on tariff levels, such as the upper limits on political contributions, and considered that these limits are easily offset by behavioural adjustments from politicians and lobbyists. Panagariya and Rodrik [125] considered whether it is advisable to adopt uniform tariff rules to reduce protection pressure from departments. The multilateral agreements under the 'General Agreements on Tariffs and Trade' limit the freedom of action on tariffs, but they do not limit free action on various non-tariff barriers, which is the consensus from all sides [126]. During the 1980s and 1990s, the continuous huge trade/balance of payments deficits of the US were largely due to the low saving ratio in the US. In the early 1990s, however, the Clinton administration wrongly owed the deficits to Japan, and aggressively attacked Japan as an unfair trader. Ways of international competition and trade are often derived from unique professionalisation based on

increasing profits rather than inherent differences in utilising national resources and factor endowments [127]. The WTO was established by a treaty initiated by President Reagan and signed by Presidents Bush and Clinton, which was approved by a two-thirds majority in the US Senate. Based on the US Constitution, international treaties that have been approved become part of national law, which are incorporated into an interpretation of US sovereignty. The US and other members have authorised the WTO to implement existing trade agreements. The organisation is not, as charged by critics, an international government that make new laws. The interpretation of trade laws from the panel of experts involved in dispute settlement can clearly have a significant impact on trade rules, but the WTO cannot force a country to do anything against its will. Moreover, it is stipulated in international law that a state is allowed to abolish treaties of no use for its national interests.

Gilpin [128] argued that for hegemonic countries, such as the US after World War II and the United Kingdom in the second half of the 19th century, adopting free trade policies is a means to induce other countries to accept and recognise their political leadership in the world. The main international political goal for the US in the early post-war years was to limit the propagation of communism by strengthening free world economy. These writers argued that the free trade and aid policies during the period were primarily motivated by this purpose. This would explain why the US (and the United Kingdom in the 19th century) neither utilised its economic strength to improve its conditions for trade nor prevented small industrial countries and developing countries from taking a free ride on its trade concessions and trade concessions from other powers. As stated in the Free Trade Agreements, considerations for national security still play an important role in making trade policies.

The issues of international and domestic income distribution may also influence the external economic policies adopted by various countries. For instance, the relatively mass unconditional aids and extensive duty-free treatment provided by some small industrial countries to developing countries seem difficult to explain on the ground of pure

self-interest [129]. Helleiner [130] suggested that government officials adopt an attitude of mercantilism in trade negotiations and try to obtain the largest reduction in protection from other countries in exchange for the smallest domestic reduction. Keeping down the problems of domestic adjustment associated with trade liberalisation may be a motivation for this attitude.

The empirical analysis on non-tariff barriers of the US from Trefler [131] provides a good example, giving expression to how political and economic analysis has enriched our understanding of the economic consequences derived from trade policies. Trefler argued that the level of non-tariff barriers to imports is both endogenous and interactive. A single equation framework returning to the volume of non-tariff barrier imports will be affected by the deviance from simultaneous equations, and import penetration in turn influences the level of non-tariff barriers as political forces play a role. In fact, he argues that the estimation for simultaneous equations of non-tariff barriers to US import restrictions is ten times greater than the estimation for a single equation. Thus, regarding non-tariff barriers as endogenous rather than exogenous corrects the findings from previous literature (i.e., trade restrictions have little effect on import quantity).

As international trade plays a significant role in economic activities, politicians may be concerned about trade policies while fighting for support from voters [132]. Generally speaking, studies of positions taken by political parties on trade policy show that there is party differentiation. The conclusion is based on the economic goals of both right-wing and left-wing parties, which are consistent with the interests of their respective voters and reveal their preferences [133]. In other words, left-wing parties generally gain support from people whose incomes depend on government and social welfare expenditures, and they tend to trade policy of protectionism, while right-wing parties represent owners of capital, and they tend to obtain support from owners of capital and the upper class, and squint towards policy of open trade. Thereby, researchers have demonstrated that right-wing parties support open trade, while left-wing parties support protectionism [134].

3.4. SUMMARY OF CHAPTER THREE

The theories and literature reviewed in this chapter give prominence to the complexity of Sino–US trade imbalance and trade wars. It is intended to summarise and explore the major theories and literature related to Sino–US trade imbalance and trade war. Trade wars have been undergoing in our history since the establishment of the first nation; In most cases, at least during a trade war, both countries are worse off, and the introduction of third-party arbitration, especially the WTO, is worth considering in dealing with the Sino–US trade war. Based on the research literature, this chapter argues that previous researchers failed to conduct a comprehensive analysis of the positive and negative impacts of Sino–US trade surplus on China’s economy, especially the negative impacts. Previous researchers made quantitative analysis on the impact of US direct investment in China on Sino–US import and export trade but did not conduct in-depth quantitative research on the impact of direct investment in China made by other countries on Sino–US import and export trade. Previous researchers have directly studied one or several reasons for the Sino–US trade imbalance, and few have explored possible factors such as economic and non-economic factors affecting the imbalance from the historical perspective of Sino–US trade imbalance. There are few previous researchers who place macroeconomic factors of savings and exchange rate affecting Sino–US trade imbalance in the same framework for quantitative empirical and comparative research.

4. RESEARCH DESIGN AND METHODOLOGY

4.1. CHAPTER OVERVIEW

This chapter introduces the research design and methodology. First, this chapter introduces the research process and technical route in detail. To obtain accurate and meaningful results, the researchers determined that this study mainly adopts the quantitative empirical method in the quantitative analysis method, adopts the quantitative analysis method and the software analysis method, and combines various quantitative methods. Second, this chapter discusses how the research is carried out, establishing an econometric model based on economic theory, and verifying the model with a co-integration method. Processing the second-hand data and establishing the database of this research is an important step toward verifying the hypothesis of this research. The stationarity test of the time series data, and the factors affecting the Sino–US trade imbalance, such as the proportion of import and export commodities, are converted into data that can reflect the research content through one or two calculations, which are the preliminary work done in this research to verify the hypothesis. Third, this chapter also introduces the co-integration test method, the model established in this research and the results of the robustness test in detail.

Finally, this chapter explains the difficulties and limitations of the research.

4.2. RESEARCH APPROACH

Quantitative analysis and the tradition of quantitative empirical research in humanities and social sciences have a long history. As a practical science, its research objects and content determine the empirical characteristics of economic disciplines to be more significant, and to have a deeper and broader impact. Many economists such as Keynes [135] and Friedman [136] have enriched its connotation, defined its extension, and logically sorted it out, laying an important academic position for empirical analysis, making it an important

guarantee for theoretical development and policy formulation. This research mainly uses quantitative research methods, using quantitative empirical methods, which are a series of empirical methods in the econometric system: this method is a quantitative analysis method based on economics and statistics and other disciplines, and uses computer and other tools to conduct research.

The research on the application of quantitative empirical analysis in economics has a long history—from Petty’s political arithmetic, Marx’s two major category models, Quesnay’s economic table to the mathematical analysis and econometric empirical analysis of modern economics [137], to today’s behavioural experiments and complexity scientific analysis, all reflect the intrinsic needs, cognitive methods, and research positions of human economic activities. In the analysis of the factors of Sino–US trade imbalance, this research mainly adopts the establishment of econometric models, which involves co-integration analysis, unit root test, Granger causality test and other econometric methods. In studying the impact of Sino–US trade imbalance, this study uses a variety of econometric methods such as single integration test, co-integration analysis and Johansen co-integration test based on constructing an econometric model based on economic theory. This study uses time series regression analysis to perform fitting and trend testing when predicting the development trend of Sino–US trade imbalances.

4.3. RESEARCH DESIGN AND RESEARCH STRATEGY

The core issue of this research is the factors and impacts of the Sino–US trade imbalance. The whole idea of this paper is to first review, summarise and summarise the existing literature. Then, based on historical data and documents, it analyses the history of Sino–US trade imbalance, the world economic process, and the US foreign economic policy. Then, it focuses on the analysis of the main reasons and impacts of the occurrence and exacerbation of the Sino–US trade imbalance, mainly from the perspective of macroeconomic factors. Subsequently, other factors and effects of Sino–US trade imbalance are analysed, and the trend of Sino–US trade imbalance is also predicted. Finally, policy recommendations are

made for the adjustment of the Sino–US trade imbalance. Specifically, it includes the following steps:

First of all, this research analyses the history of Sino–US trade imbalance and the development process of international trade, focusing on the development history of Sino–US trade imbalance, the history of Sino–US trade friction, the world economic process, the characteristics of the US foreign economic policy and their contributions to Sino–US trade imbalance in different stages. The history of Sino–US trade imbalance and the analysis of the development process of international trade provide intuitive clues for subsequent suggestions to alleviate Sino–US trade imbalance.

Second, based on a review of the existing empirical literature, this research carefully studies the main reasons and effects of the Sino–US trade imbalance, and the research is carried out from the level of macroeconomic factors. The structural feature of the Sino–US trade imbalance is that the increase in exports is much greater than the increase in imports, so the factors that can be used to explain the greater exports than imports can be used to explain the Sino–US trade imbalance. On the one hand, the exchange rate represents the relative prices of the two countries' commodities. If the RMB exchange rate is undervalued, it will inevitably make China's export commodity prices fall and make it internationally competitive, thereby promoting China's exports to the US. At the same time, the price of imported goods has been raised to inhibit China's imports from the US. As a result, China's exports to the US are greater than its imports. On the other hand, changes in demand will cause an imbalance in the trade between the two countries. The continuous expansion of US domestic demand will cause its imports from China to increase, resulting in a US trade deficit with China. The relationship between demand and savings is dual. Higher demand propensity means lower saving propensity, and vice versa. By studying the performance of the savings rate of China and the US, we can study the performance of demand in both countries. Therefore, this study believes that savings and exchange rates are important macroeconomic factors in the study of trade imbalances. In terms of empirical research, most of the empirical studies so far have not put the two factors of exchange rate and

demand (savings) together to study the Sino–US trade imbalance. Empirical analysis using multiple regression models can effectively solve the above problems. The above macroeconomic factors focus on the study of the impact of Sino–US bilateral macroeconomic conditions on the Sino–US trade imbalance. Economic globalisation has made the economic and trade relations between countries intricate and inseparable. Therefore, the Sino–US trade imbalance cannot be better explained only from the Sino–US bilateral perspective, and more consideration should be given to the influence of other countries. Many foreign businessmen, including the US, have made direct investment in China. In the process of many industrial and trade transfers from developed economies to China through the international division of labour, exports from other developed economies to the US have now become China’s exports to the US. As a result, China has undertaken most of the surpluses of other countries with the US. In the impact part, the Sino–US trade imbalance has increased the economic gap between the two countries, and the Sino–US trade imbalance has also promoted the economic development of the US. This research is to demonstrate and test the above problems from both theoretical and empirical aspects.

Third, the Sino–US trade imbalance not only has the aforementioned economic factors and influences, but is also affected by statistical calibres, politics and other non-economic factors, as well as economic factors such as trade structure, trade policy and trade pattern. This study also discusses these factors in detail, to achieve the purpose of comprehensively examining the Sino–US trade imbalance.

Finally, based on the above research conclusions, this research puts forward policy recommendations on how to adjust the Sino–US trade imbalance in a targeted manner.

4.4. REASONS FOR USING THE CO-INTEGRATION TEST TO VERIFY THE MODEL

One important research topic of this paper to explore the dynamic structure of Sino–US trade data, study their statistical properties and understand the characteristics and properties of the data generation process, to establish an effective econometric model for the factors and effects of Sino–US trade imbalance and the testing of research hypotheses. When conducting research on econometric models, the predecessors usually assumed that the variables were in a stable process, and on this basis, they carried out parameter estimation and hypothesis testing on the model. However, the process of generating many trade data between China and the US is not a stable process, and non-stationary data makes the traditional research methods of stationary series invalid. The unit root process is one of the most common non-stationary processes, and its first-order difference process is a stationary process. Before modelling, the unit root test of the time series can avoid the occurrence of false regression, which has become the first step of modern econometric analysis. The most classic methods of time series stationarity test are the Dickey–Fuller (DF) test and Augmented Dickey–Fuller (ADF) test. In 1976, Dickey [138] and Fuller [139] proposed statistics similar to Y_{μ} and Y_{η} to test unit negative roots. They also used the Monte Carlo method in 1979 to calculate the percentage points of the limited sample space, the percentage points of the t-test statistics, and the approximate distribution of the asymptotic statistics Y_{μ} , which constituted the DF unit root test method. The object of the DF test is a time series generated by the first-order autoregressive process AR (1), and the random interference term is white noise. But the objective reality is usually that the time series is not generated by a first-order but multi-order autoregressive process, and the random interference term is not stationary and is not white noise at all. Therefore, the asymptotic distribution of the t statistic estimated by the ordinary least square (OLS) method will be disturbed by irrelevant parameters, which will lead to the failure of the DF test. To ensure the white noise characteristics of random interference items in the DF test, two scholars Dickey and Fuller [140] revised and improved the DF test, forming the so-called ADF test (i.e., the augmented DF test). They also gave a table of critical values for the ADF distribution to test the three models. Since then, in 1981 and 1984, Evans and Savin [141,142] provided the analysis results of the accurate limited sample distribution of the coefficients to be estimated, while Diebold and Nerlove [143] modified the test

estimator in 1989, further developed and perfected this inspection method.

The purpose of unit root test for a single sequence is to obtain a stationary sequence to effectively establish an econometric model. Since the unit root process difference is a stationary process afterwards, if the difference sequence is simply modelled, some long-term information of the data will be lost. The proposal of the co-integration theory provides an effective research method to retain sample information for the study of non-stationary sequences. The co-integration relationship describes the long-term equilibrium relationship of the economic system. Although the moments of each sequence, such as the mean, variance, or covariance, vary with time, the moments of a certain linear combination of these sequences have consistent characteristics.

The research on panel co-integration test theory started in 1995. According to the basic idea of testing, panel co-integration tests can be divided into two categories: one is the widely used panel co-integration test based on estimated residuals. The basic idea comes from the Engle–Granger test of time series [144,145]; The other is the co-integration test based on the panel error correction model. The basic idea comes from the Johansen co-integration test in time series. The panel co-integration test can be divided into two types according to the different null hypotheses: the existence of co-integration relationship and the absence of co-integration relationship.

4.5. DATA COLLECTION

4.5.1. Data selection

One of the main sources of data used in this study is the statistical and administrative data provided by the government and other institutions. Many researchers believe that government data has strong authority, so it is widely used in research. Zhou [146] believes that the database itself may have certain errors, so when using these databases, the databases must be reviewed to ensure the internal validity of the research. When extracting

data from the database, it is necessary to screen the data to effectively control exogenous variation and ensure internal validity. When selecting Sino–US trade data in this study, not only is China’s statistical data is used, but also US data is used for research and testing; Since the Sino–US trade imbalance problem has gradually worsened after 1983, data from 1983 are mainly used in the selection of time series data. This is to control the interference of government statistical errors and reduce reporting errors. Since the second-hand information obtains data from a mature database, the external validity of the research can be well guaranteed. China Statistical Yearbook, China Customs Statistical Yearbook, US Department of Commerce website and US Bureau of Economic Analysis website contain some variables related to the characteristics of Sino–US trade and Sino–US trade imbalance, which are an important part of the data source of this research. To help this study better explore the causal relationship, the researcher processed the data used in the economic model into a form of lagging one period, so that the lagging effect of the independent variables can be well analysed.

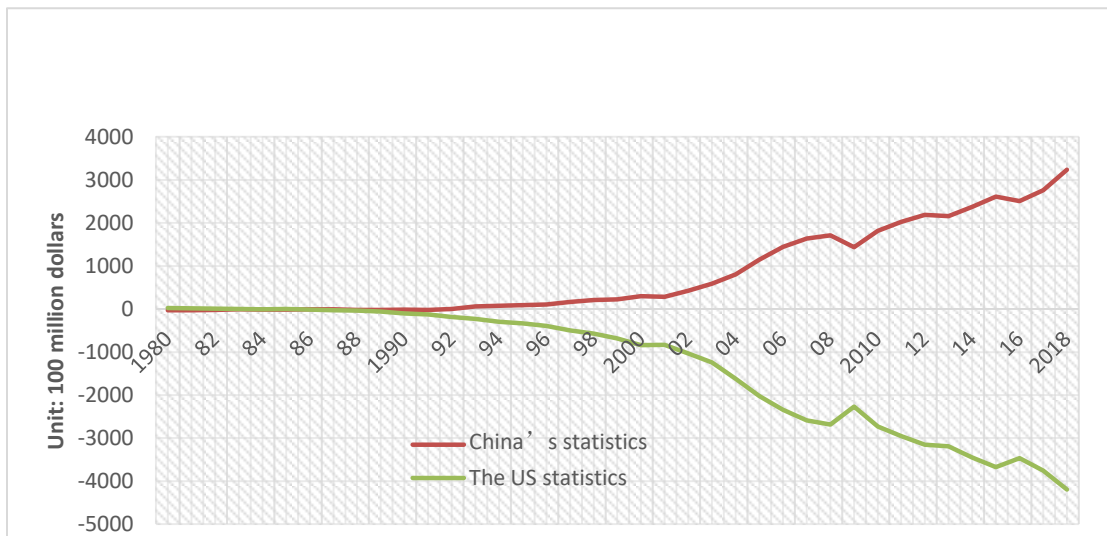
For quantitative second-hand data, certain conversions are required during use to ensure that the research constructs can be effectively measured. In this study, the Sino–US trade structure and the impact of Sino–US trade policies on trade imbalances cannot be directly obtained from secondary data. Data representing these two concepts are obtained after processing through certain calculation methods. When studying the impact of the Sino–US trade structure on the Sino–US trade imbalance, statistical methods are mainly used to measure the proportion of China’s exports to the US in China’s total exports to the US, so as to determine whether labour-intensive products that China has a comparative advantage are the main products of Sino–US trade. When studying the impact of Sino–US trade policies on Sino–US trade imbalances, we mainly use the ratio of high-tech products that the US has advantages exported to China by the US to the high-tech products exported by the US to foreign countries to study the impact of trade policies on the trade balance.

In a word, this research formed the database of this research based on second-hand data after screening and calculation according to research needs.

4.5.2. The statistical differences of the trade imbalance between China and United States

The trade statistics dispute between China and the US has a long history; statistical discrepancy is one of the causes of bilateral trade imbalance. According to China's national bureau of statistics, the first time that China has run a trade surplus with the US since issued the 1979 US-China trade agreement was 6.27 billion dollars in 1993 and 275.8 billion dollars in 2017; According to the US department of commerce, the first US trade deficit with China was 320 million dollars in 1983 and reached 375.2 billion dollars in 2017. It can be seen that the statistical differences between the two sides are quite different.

Figure 5: Comparison of trade balance data between China and the US from 1980 to 2018
100 million dollars



Source: Chinese data comes from [147] and [148], and US data comes from [149]

There has long been a gap between the US trade deficit with China and China's trade surplus with the US. The gap has widened as trade between the two countries has increased. As can be seen from the above Figure, the Chinese and American statistics have been inconsistent since the beginning of bilateral trade, and the two sides have different views on the year when the trade balance reversed. According to the US official data, the US ran its first trade deficit with China in 1983 and has continued to do so ever since. China's first

surplus with the US was in 1993. In addition, with the expansion of bilateral trade, the statistical gap is getting bigger and bigger. In 1980, the gap between the two sides was only 260 million USD, but reached 102.9 billion USD in 2013.

Such a huge gap has attracted the attention of many Chinese and foreign scholars. Through research, it is found that although both countries follow the common United Nations commodity trade statistical standards, the irrationality of the statistical standards and different understandings of the standards determined the differences in trade statistics between the two countries and artificially exaggerated the trade imbalance between China and the US.

From this valuation, China uses FOB for goods export statistics, the US adopts FAS and CIF for goods import statistics. The value of goods imported from China to the US on a CIF basis includes the international freight and insurance costs incurred from China's ports to the US; Chinese exports to the US at FOB prices do not include these fees. Considering the huge volume of goods trade between China and the US and China's trade surplus, this price difference will not be offset by imports and exports between the two sides, but will widen the statistical difference between imports of US goods and exports of Chinese goods.

From the perspective of entrepot trade and trade tariffs, the statistics of import and export of goods between China and the US include the information of country (or region) of origin and country (or region) of final destination. The origin of goods is taken as the basis of import statistics, and the destination of exports as the basis of export statistics. However, in statistical practice, if there is an entrepot trade, especially the entrepot trades passing through Hong Kong, China, Singapore and other places, the export destination informed by the Chinese side is usually registered as Hong Kong, China, Singapore and so on. But when the middlemen export goods to the US again, the US counts them as imports from Chinese mainland under the rules of origin. There are two kinds of markup in transit trade. One is typically for processing trade goods, which are bought by middlemen after they

leave the Chinese border and then resold at higher prices to US buyers, adding to the price of Chinese exports to the US. The other is the markup behaviour that trans-ship to the US through China Hong Kong. This is due to the value added of the goods after they are processed more simply in Hong Kong, or to the increase in price as a result of the pursuit of profit. However, even if these goods are processed, the US still considers them as part of the Chinese mainland's exports to the US and counts the total value of imports of processed goods as long as the nature of the goods is not changed materially. This part of added value or increase in prices is not counted by China as exports of goods to the United States, but is counted by the US as imports from China, which is another important factor in the statistical discrepancy between China and the US in goods trade. The retail data decomposition refers to Yang's study [150] on Hong Kong statistical data. According to the Study on statistics differences between the goods trade of China and the US issued by the ministry of commerce of China and the US jointly, these two factors are major causes of goods trade statistics differences between China and the US. The two markups above that occur in transit trade driven up the value of US imports from China and widen the statistical discrepancy, but the added value acquired by companies outside mainland China. In addition, there are also behaviours of tax avoidance of the exported goods of the US to the mainland through Hong Kong, China, such as systematically lowered the total value of goods and changed the classification, resulting in China's total imports from the US being further underestimated.

Statistics of service trade, before 2008, bilateral trade in services was basically flat. After 2008, the US trade surplus in services with China grew rapidly [151], and China's contribution to the US trade surplus in services is increasing year by year. In 2017, the US trade surplus in services with China reached us \$38.5 billion, accounting for 15.9 percent of the US trade surplus in services. That is nearly 12 percent more than in 2008 [152]. The surplus of service trade between the US and China is mainly manifested in the surplus of travel items. In the balance of payments, travel is the main source of China's service trade deficit. It is worth nothing that Chinese spending in the US has been growing at a double-digit rate for years. Among them, the proportion of China's expenditure on

education in the US is high, and the growth is stable. In 2017, Chinese residents spent \$32.18 billion in the US [152]. In addition, with the improvement of the living standard of Chinese residents in recent years, many Chinese people travel to the US. Many of the American goods bought during this period were sent back to China by mail or other means and were not recorded as goods imported into China [153].

As this implies, services trade between China and the US covered a lot of goods that are supposed to be recorded in goods trade. The existence of these phenomena means that the volume of our imports of goods from the US is underestimated to a large extent. In addition, the service trade between China and the US is not counted in total trade volume between China and the US, the trade volume of China and the US that counted by customs only contains bilateral goods trade volume. If the Sino–US trade in service is included in the total trade volume between China and the US, the US trade deficit with China will be significantly reduced.

4.6. DATA ANALYSIS

4.6.1. Introduction to co-integration theory

To perform co-integration analysis on the time series, the stationarity of the time series must first be judged. The definition of stationarity is first given below.

We know that many economic time series in real life are non-stationary. The so-called ‘non-stationarity’ simply means that economic variables have no obvious tendency to return to a constant or linear trend, which is the opposite of ‘stationarity’.

Definition: Univariate stable process

Random process $\{X_t, t = 1, 2, \dots, L\}$, X_t is a random variable, and is a stationary process, if

(A) At each time t , the expectation of $t=1,2,L, X_t$ is a constant,

$$E(X_t) = \mu < \infty$$

(B) The covariance $\text{cov}(X_t, X_j)$ of $X_t (t=1,2L)$ is only related to the interval $t-j$ of the random variable $X_t X_j$ in the process, and has nothing to do with the specific positions of the starting point s and the ending point t , that is

$$\text{Cov}(X_t, X_j) = E\{(X_t - \mu)(X_j - \mu)\} = B(t-j) < \infty$$

DF test and ADF test are widely used to test the stability of time series. DF test is only applicable to AR (1) process, and the error term u_t is not autocorrelated. In the case that AR (p) process or error term u_t is autocorrelated, ADF test should be used, which is derived from Dickey and Fuller's expansion of DF test in 1979 and 1980.

The regression equation of the ADF test is as follows:

$$\Delta y_t = \rho y_{t-1} + \sum_{i=1}^k y_i \Delta y_t + v_t$$

This equation is called Model (1).

If the displacement term is included, it is Model (2):

$$\Delta y_t = \mu + \rho y_{t-1} + \sum_{i=1}^k y_i \Delta y_t + v_t$$

If the time trend item is added again, it is Model (3):

$$\Delta y_t = \mu + \alpha t + \rho y_{t-1} + \sum_{i=1}^k y_i \Delta y_t + v_t$$

When the unit root test is carried out, it is first tested according to Model (3). When it is confirmed that there is no trend item in the test formula, the unit root test is continued with Model (2). When it is determined that there is no displacement term in the test formula, the test is continued with Model (1). In this process, as long as there is a conclusion that 'there

is no unit root', the test will end: if not, the test will continue until Model (1), and then the conclusion of the existence or non-existence of unit root will be given according to the discriminant rule.

In the 1980s, C.J. Grange proposed the concept of 'co-integration'. The co-integration theory provides a method to deal with non-stationary data. Its main research object is to find an equilibrium relationship in two (or more) non-stationary time series. This has been of great significance for establishing econometric models with non-stationary economic variables and testing the long-term equilibrium relationship between these variables. In many cases, economic theory tells us that two variables should be co-integrated, and the test of co-integration is also a test of whether the economic theory is correct. The concepts of single integration and co-integration of time series are given below.

Singularity: For a random process $\{X_t\}$, if it must be transformed into a stable and reversible ARMA process after d -th difference, but it is still a non-stationary process after $d-1$ -th difference, it is said that this process has d -th order singularity, recorded as $X_t : I(d)$.

For an d -th order singularity random process $X_t : I(d)$, it can be expressed as

$$\Phi(L)(I-L)^d x_t = \Theta(L)u_t ,$$

L is the lag operator, $\Phi(L)$ and $\Theta(L)$ are polynomials about L , which represent the stationary autoregressive operator and the reversible moving average operator respectively, and u_t is white noise sequence.

The characteristic equation $\Phi(L)(I-L)^d = 0$ obviously contains d roots equal to 1 (i.e., d unit roots). Therefore, we usually call the test of the single integral order and

non-stationarity of a time series as a unit root test.

Co-integration: X_t is used to represent the time series vector $(x_{1t}, x_{2t}, \dots, x_{Nt})'$ of order $N \times 1$. If (1) all the variables contained in X_t are order $I(d)$; (2) If there is a vector $\beta (\beta \neq 0)$ of order $N \times 1$, so that $\beta' X_t : I(d-b)$, each component of X_t is said to have a co-integration relationship of order d, b , denoted as $CI(d,b)$, β is called a co-integration vector.

From the definition of co-integration, it can be seen that the economic significance of co-integration is to reveal a long-term stable equilibrium relationship between economic variables. The economic variables that satisfy co-integration cannot be separated too far from each other. A shock can only make it deviate from the equilibrium position in a short time, and it will automatically return to the equilibrium position in the long term.

Co-integration test is to test whether there is a co-integration relationship between variables. The two-step method of Engle–Granger [144] is commonly used to test the co-integration relationship between two variables.

The two-step method of Engle–Granger:

For two non-stationary series $\{X_t\}$ and $\{Y_t\}$, if both are first-order difference stationary (denoted as $X_t : I(1)$, $Y_t : I(1)$), we have to test whether there is a co-integration relationship between $\{X_t\}$ and $\{Y_t\}$.

The specific method is as follows: Suppose the following relationship exists between the random process $\{X_t\}$ and $\{Y_t\} : Y_t = \alpha + \beta X_t + u_t$, α and β are the parameters, and u_t is the residual sequence. The OLS method can be used to estimate the parameters of the

regression equation to obtain the residual sequence. Then check the stationarity of the residual sequence. If the residual sequence is stationary, it indicates that $\{X_t\}$ and $\{Y_t\}$ has a co-integration relationship.

4.6.2. Introduction to Granger causality test

The basic idea of the Granger Causality Test Method is: if a change in X causes a change in Y , then X should help predict Y (i.e., in the regression of Y on the past value of Y , increasing the past value of X as an independent variable should significantly increase the explanatory power of the regression).

Specifically, the test of Granger causality is achieved through the following process. If the sequence X and Y are both stationary processes, the following four regression equations should be considered:

$$Y_t = \alpha + \sum_{i=1}^m \alpha_i Y_{t-i} + \sum_{j=1}^n \beta_j X_{t-j} + \varepsilon_t \quad (1)$$

The null hypothesis is: $H_{0x} : \beta_j = 0, j = 1, 2, \dots, n$, if the null hypothesis holds, it means that X is not the Granger cause of Y , and Equation (1) becomes Equation (2):

$$Y_t = \alpha + \sum_{i=1}^m \alpha_i Y_{t-i} + \varepsilon_t \quad (2)$$

At the same time,

$$X_t = \alpha + \sum_{j=1}^n \beta_j X_{t-j} + \sum_{i=1}^m \alpha_i Y_{t-i} + \mu_t \quad (3)$$

The null hypothesis is as follows: $H_{0y} : \alpha_i = 0, i = 1, 2, \dots, m$, if the null hypothesis holds, it means that Y is not the Granger cause of X , and Equation (3) becomes:

$$X_t = \alpha + \sum_{j=1}^n \beta_j X_{t-j} + \mu_t \quad (4)$$

Among them, X and Y respectively represent two different variables. The disturbance terms ε_t and μ_t are not related. In the first equation, it is assumed that Y is related to itself and the past value of X . If the estimation result shows that the coefficient β_j of term X is significantly different from zero, it means that variable X leads to variable Y . Similarly, in the third equation, if the estimation result shows that the coefficient α_i of term Y is significantly different from zero, it means that there is a one-way causal relationship of Y to X . If both are significantly different from zero, it means that variables X and Y have a bilateral causal relationship.

4.6.3. Model setting

(1) Macroeconomic factors of Sino–US trade imbalance

In order to analyse the impact of the exchange rate and the difference in the savings rate between China and the US on the Sino–US surplus, this study selected China’s surplus with the US (denoted as SC) in Sino–US trade from 2000 to 2018, and the actual exchange rate of RMB against the USD (denoted as R), the difference in savings rate between China and the US (denoted as QC), trying to use a multiple linear regression model, using EViews 8.0 software to analyse the relationship between China’s surplus with the US (SC), R, and the difference in savings rate between China and the US (QC), further using the model to empirically analyse whether the reduction of the difference in national savings rate between China and the US and the appreciation of RMB can reduce the Sino–US trade surplus.

The established model is:

$$LNSC = \beta_0 + \beta_1 LNR + \beta_2 LNQC + \varepsilon$$

Among them, β_0 is a constant term, β_1 is the influence coefficient of the exchange rate on the surplus between China and the US, β_2 is the influence coefficient of the difference in the saving rate of the Chinese and American people on the surplus between China and the US, and ε is the residual term.

(2) The FDI factors of the Sino–US trade imbalance

In order to use empirical analysis to test the relationship between FDI in China and Sino–US import and export trade from the perspective of time series, the main method used is the co-integration analysis method, using EViews 8.0 software to analyse the relationship between FDI in China and Sino–US import and export trade, through empirical tests, verifying the influence and extent of FDI in China on Sino–US trade. This study selects annual time series data from 1983 to 2019. The data used are mainly from the Wind database and statistics from the National Bureau of Statistics of China, which are obtained through the author's collation.

The established model is:

$$LNEX = \alpha_1 + \beta_1 LNFDI + \varepsilon_1$$

$$LNIM = \alpha_2 + \beta_2 LNFDI + \varepsilon_2$$

$$LNTN = \alpha_3 + \beta_3 LNFDI + \varepsilon_3$$

Among them, FDI means FDI in China, EX means China's export trade volume to the US, IM means China's import trade volume to the US, and TN means China-US import and export trade volume. To reduce the impact of heteroscedasticity fluctuations on the test, all variables are logarithmically transformed before the empirical test. It becomes LNFDI after FDI processing, LNEX after EX processing, LNIM after IM processing, and LNTN after

TN processing.

(2) The impact of the Sino–US trade imbalance on the Sino–US economic gap

In order to empirically test the correlation between China's exports to the US and the economic gap between the two countries, this study believes that if the regression coefficient between China's exports and the Sino–US economic gap is positive, it means that China's exports have widened the Sino–US economic gap, the distribution of trade benefits is not good for China, and vice versa. Here, the use of China's exports to the US instead of China's total imports and exports to the US takes into account that the exported goods contain domestic elements and resources, and the imported goods contain foreign elements and resources. This substitution can make the analysis more representative. At the same time, since the measurement method used in this paper is co-integration, and the co-integration relationship between two variables does not affect the co-integration relationship between other variables and these two variables, therefore, this substitution is also reasonable in measurement theory.

In addition, according to the formula for calculating national income by the expenditure method, $GDP=C+I+G+(NX)$ (i.e., in addition to trade, factors affecting a country's economic development include consumption, investment, and government purchases). The GDP difference between China and the US is given as follows:

$$GDP_B = GDP_A - GDP_C = (C_A - C_C) + (I_A - I_C) + (G_A - G_C) + (NX_A - NX_C)$$

If a regression model is established, consumption, investment, government purchases and net exports should all be included in the regression model. However, this chapter discusses the distribution of trade benefits, and the result of the distribution of benefits is reflected in the effect of exports on economic development. Moreover, during the analysis period from 1983 to 2019, the trade structure between China and the US did not change much, indicating that their respective consumption, investment, and government purchases have

not yet had sufficient impact on the trade structure. Therefore, when building the model, it is assumed that consumption, investment, and government purchases are constant, and only the relationship between exports and economic disparity is discussed.

Based on the above explanation, this paper intends to establish the following model and use EViews 8.0 software to test the relationship between China's exports to the US and the economic gap between the two countries:

$$GDPB = c + \alpha \times EX$$

Among them, GDPB represents the economic gap between the two countries, which is defined as the total GDP of the US minus the total GDP of China, EX represents China's exports to the US, and c is a constant term. EX is used as an explanatory variable to estimate regression parameters. If the coefficient α of China's exports to the US is significantly positive, it means that exports have widened the economic gap between the two countries (because $GDPB = US\ GDP - Chinese\ GDP$); If the coefficient of exports is significantly negative, it means that exports have reduced the economic gap between the two countries.

(4) The impact of the Sino-US trade imbalance on the US economy

In order to quantitatively study the impact of Sino-US trade imbalance on the US economy, this paper uses the two variables of US GDP and US imports from China and uses EViews 8.0 software to analyse and establish the model as follows:

$$\ln GDP = a + b * \ln IMP + e$$

Among them, $\ln GDP$ is the natural logarithm of US GDP, $\ln IMP$ is the natural logarithm of US imports from China, a is a constant term, B is the influence coefficient to be measured, and e is the residual.

(5) Prediction of the unbalanced development trend of Sino-US trade

Based on the data of Sino–US import and export trade from 1983 to 2019, this paper uses time series regression analysis method and uses EViews 8.0 software to establish an econometric model, which is to fit China’s exports to the US, China’s imports from the US, and the Sino–US trade balance and forecast trend.

The theoretical formula for trend forecast is as follows:

$$Y1 = \alpha + \beta X$$

$$Y2 = \alpha + \beta X$$

Among them, Y1 represents China’s exports to the US; X represents the time series in years; Y2 represents China’s imports from the US; α is the intercept; β is the coefficient of the time series, indicating the direction and amount of change, linear regression fitting was performed for Y1 and Y2 respectively.

4.6.4. Reliability and validity

The results analysed through models and statistical software also often have the advantages of reliability and validity. In addition, a causal relationship between the research question and the collected data is established. This study uses econometric models and analysis software such as EViews to increase the accuracy and repeatability of the study.

Triangulation. Different methods were used in this research. In each phase of research more than one method was used.

Peer review or debriefing. This research was supervised by two professors who were keen to check it and discuss its results with the researcher.

4.7. RESEARCH ETHICS

Adhering strictly to all the ethical guidelines ensures standards about the honesty and trustworthiness of the data collected and the accompanying data analysis.

4.8. ROBUSTNESS TEST

The results obtained from the empirical analysis are basically consistent with the theoretical expectations of this study, but are likely to be affected by the samples selected in this study. Therefore, multiple regressions on different samples, lagging variables of independent variables and new data sources into the model to test the robustness of the empirical results.

First, when verifying the causes and effects of Sino–US trade imbalances, most of the data used in this study are from 1983 to 2019, mainly considering that China and the US officially established diplomatic relations on January 1, 1979. At the beginning of the establishment of diplomatic relations between China and the US, the US had a trade surplus with China, but since 1983 it has had an uninterrupted trade deficit and continued to grow. Selecting data from 1983 to 2019 can better study the causes and effects of the Sino–US trade imbalance (i.e., the continued US deficit and China’s continued surplus). China joined the WTO in December 2001, and on December 17 of the same year, the US announced the granting of PNTR to China. In the robustness test of this study, the Sino–US trade data samples before China’s accession to the WTO were removed, and only the Sino–US trade data samples after China’s accession to the WTO were retained, and a new sample was formed, and re-regression was performed to test the robustness.

Second, the lagged variable method was added. The to be considered in this study is endogenous. Because the factors and influences of the Sino–US trade imbalance have a time lag in the impact of the Sino–US trade balance, this paper incorporates the one-period lagging explanatory variables into the model to solve the endogenous problem, to verify

the robustness of the model.

Finally, a new data source method was replaced. Due to the different statistical methods of trade volume between China and the US, there are also differences in the statistical data on trade volume between China and the US. To enhance the robustness of the research conclusions, after using the data from China for regression, this study re-estimated the main regression of this paper by using the data from the US.

Table 5: Different statistics on Sino–US trade data between China and the US

Unit: \$100 million

Year	China's exports to the US		China imports from the US		China–US total imports and exports		Trade balance between the two countries	
	Chinese statistics	US statistics	Chinese statistics	US statistics	Chinese statistics	US statistics	Chinese statistics	US statistics
2001	543	1023	262	192	805	1215	281	-831
2002	700	1252	272	221	972	1473	428	-1031
2003	925	1524	339	284	1264	1808	586	-1240
2004	1250	1967	447	344	1697	2311	803	-1623
2005	1629	2435	487	412	2116	2847	1142	-2023
2006	2035	2878	592	537	2627	3415	1443	-2341
2007	2328	3214	699	629	3027	3843	1629	-2585
2008	2523	3378	815	697	3338	4075	1708	-2681
2009	2207	2964	774	695	2981	3659	1433	-2269
2010	2832	3650	1013	919	3845	4569	1819	-2731
2011	3243	3994	1181	1041	4424	5035	2062	-2953
2012	3519	4256	1278	1105	4797	5361	2241	-3151
2013	3683	4404	1459	1217	5142	5621	2224	-3187

2014	3961	4685	1531	1237	5492	5922	2430	-3448
2015	4100	4832	1440	1159	5540	5991	2660	-3673
2016	3886	4626	1324	1156	5210	5782	2562	-3470
2017	4318	5055	1497	1299	5815	6354	2821	-3756
2018	4773	5397	1535	1201	6308	6598	3238	-4196

Source: World Trade Organization (WTO), United Nations Trade in Goods Statistics (COMTRADE) and Global Trade Information System (GTIS)

The robustness test results of this research have been given in each model, and the detailed verification process is also listed in the appendix of this research. In summary, this study has conducted multiple robustness analyses on samples, explanatory variables, and data sources. The results show that they are almost consistent with the original empirical results, providing further evidence support for the robustness of the original empirical results.

Descriptive statistical analysis. This study mainly uses Excel software to perform the part of descriptive statistical analysis. This research mainly conducted a descriptive statistical analysis of the factors of Sino–US trade imbalance in the following aspects, the structural factors of Sino–US trade imbalance, the policy factors of Sino–US trade imbalance, the trade mode factors of Sino–US trade imbalance, the international industry transfer factor of Sino–US trade imbalance and the statistical factor of Sino–US trade imbalance.

4.9. RESEARCH LIMITATIONS

However, some limitations should be noted. First, due to the lack of actual statistical data on the processing trade between China and the US and the US’s direct investment in China’s processing and assembly manufacturing industry, the paper cannot study in depth the relationship between US direct investment in China by processing and assembly industries in China and the US-China trade deficit caused by processing trade. Second, the Sino–US trade imbalance is a complex issue, which can also be investigated from the perspectives of industrial organisation theory and incomplete contracts.

4.10. SUMMARY OF CHAPTER FOUR

This chapter explains the methods used in carrying out this research, as well as the reasons for using quantitative empirical research and co-integration methods to verify the model. On the one hand, the use of quantitative empirical research is more efficacious for addressing the hypotheses of this research. On the other hand, the Sino–US trade imbalance is a complex problem. To complete the exploration of the research problem, this study processed the second-hand data, including stationarity test, and performed some inductions and calculations on the data according to the research indicators to form the database of this study. It is important to test the robustness of the model. Doing so not only ensures the reliability of the research, but also because the method of replacing the data source is adopted when the robustness test is performed.

5. FACTORS IN THE SINO–US TRADE IMBALANCE

5.1. CHAPTER OVERVIEW

The academic discussions on the Sino–US trade imbalance have mainly focused on which is the main reason for this imbalance: savings or the exchange rate. This research assumed that savings have a greater impact on the Sino–US trade imbalance than the exchange rate. In this chapter, an econometric model is established, and savings and the exchange rate are included into the same model for comparison and study. It is assumed that FDI in China exacerbates Sino–US trade imbalance. There are many academic studies on the influence that US direct investment in China has on the Sino–US trade imbalance. With the in-depth development of economic globalisation, foreign investment in China from various countries also aggravates the Sino–US trade imbalance. This chapter first shows that US direct investment in China aggravates the Sino–US trade imbalance, and by analysing the fact that international industrial transfer has intensified the Sino–US trade imbalance, it verifies that the Sino-US trade imbalance concerns not only the two countries but is jointly aggravated by countries involved in the global industrial division of labour. Thus, this chapter establishes an econometric model to examine the relationship between all FDIs in China and the Sino–US trade imbalance. In this study, it is assumed that China and the US do not export to each other based on their comparative advantages, which is caused by the trade policies set out by the two countries. The chapter will statistically analyse the trade structures of China and the US to verify that Sino–US trade is not conducted based on the countries' comparative advantages. The chapter will further analyse the trade policy choices made by China and the US to verify that trade policy is an important factor in the current situation of the bilateral trade structure.

5.2. SAVINGS AND EXCHANGE RATES FACTORS IN THE SINO–US TRADE IMBALANCE

At the macro level, economists commonly believe that savings and the exchange rate are closely related to trade balance. The underestimation of the RMB exchange rate can cause relatively low prices for products made in China, while booming domestic demand in the US can provide a massive external market for China. Hence, in this section, the Sino–US trade imbalance is mainly studied from two aspects of savings and the exchange rate.

5.2.1. Savings factor

Savings are the remaining part of output or income after subtracting consumption, and they are an important indicator of the macro economy. Savings are the counterpart to consumption. If the national income is simply broken up into two parts of consumption demand and saving, then the demand factor can be replaced by the savings factor. In other words, a high demand tendency means a low saving tendency, and the two have precisely opposite effects. Keynes' national income balance theory implies the relational expression that the balance between savings and investment is identically equal to the balance in trade; that is, if a country's savings are greater than its investments, then the balance of international trade would be favourable. Otherwise, it would be adverse. However, from the dynamic perspective, if investments remain unchanged, and the country's savings increase and consumption decreases due to some external factor, then the country will still usher in a trade surplus. If savings keeps increasing, then the country's trade surplus will continue to increase. The savings ratio is the ratio of savings to output or income, which can better reflect the level of savings compared to the absolute amount of savings. Therefore, more attention is paid to the changing situation of the savings ratio [154].

5.2.1.1. The national savings ratio of China

After the implementation of the reform and opening-up policy in 1978, China has been in a state of rapid economic development, which has promoted the sustaining and rapid expansion of the investment scale. However, the growth rate of domestic savings is far higher than that of investment, thereby generating a large amount of savings surplus in

China [155].

Table 6: National Aggregate Savings Ratio of China over the Years

Time	National Aggregate Savings Ratio of China %
2000	38.50
2001	38.39
2002	39.43
2003	42.51
2004	45.26
2005	46.38
2006	48.14
2007	49.86
2008	50.78
2009	50.63
2010	51.79
2011	49.80
2012	49.69
2013	48.79
2014	49.41
2015	47.70
2016	45.88
2017	46.20
2018	45.29

Source: [156]

After the reform and opening-up policy was implemented in 1978, China's national savings ratio has been continuously rising. As the 2000–2018 data in the table above shows, China's national savings ratio was 38.50% in 2000, but the ratio rose to 45.29% in 2018.

Whether for residents or enterprises in China, the investment channels are very limited after the gain of income, and what they can only do is to continuously improve their savings ratio, which can lead to a ceaseless increase in China's national savings ratio. Since the traditional ideas and consumption behaviours of Chinese residents can hardly change within a short period of time, after absorbing such vast sums, banks could definitely provide strong financial support to the country's infrastructure construction and production. In view of the different corporate properties, different types of Chinese enterprises have different abilities to obtain funds from banks. Non-state-owned enterprises are very worried about future financing; they tend to invest a large amount of accumulated undistributed profits to production or reserve them, leading to continuous improvement in China's export capacity. In terms of China's saving situation, Chinese people have been converting their income into savings, which has restrained domestic consumption and reduced the demand for imported goods. The reduction of imported goods can lead to the aggravation of the Sino-US trade imbalance.

It has been over 40 years since China's reform and opening up, and China has been making efforts to expand government investments and build infrastructure. China's high national savings provide fund guarantees to the government. According to data released by the National Bureau of Statistics of China, the aggregate investment of fixed assets of the whole of Chinese society in 2019 was 55.1 trillion Yuan, while the figure in 2000 was 3.3 trillion Yuan, demonstrating an increase of 16.69 times over 19 years [157]. The fast-growing investment scale will be inevitably transformed into massive infrastructure construction and manufacturing, which will undoubtedly increase the export volume of low-end trade goods and promote the continuous expansion of the Sino-US trade surplus. China is exerting its comparative advantage in international trade, increasing its infrastructure construction and gradually changing from a global product-manufacturing base to a more perfect industrial structure. Most banks and large-scale enterprises in China are state owned, and the ability of each resident is very limited. There is no mature financial market in China, so residents can only deposit their money in banks at a very low interest rate and endure a high inflation rate. This has resulted in a huge gap between

savings and investments in China. Although China’s rapid economic growth is supported by the high national savings ratio, the growth rate of savings is far higher than that of investment on the whole.

5.2.1.2. The US national savings ratio

Since the 1990s, given the excellent situation of the American economy, the gap between US savings and investments has been enlarged year by year. To cope with this adverse situation, the US took advantage of the status of USD, which is a global settlement currency and the major currency for foreign exchange reserves, and the mature American financial market to make up for the deficiency in domestic savings. After entering the 21st century, this trend has become more prominent. American economic development and improvements in science and technology require the support of lots of funds, but the US national savings ratio has been decreasing, which can hardly meet the needs of US economic development and domestic investments. Hence, the US needs continuous capital inflow from other countries to support its economic development.

Table 7: National Aggregate Savings Ratio of the US Over the Years

Time	National Aggregate Savings Ratios of the US%
2000	20.2
2001	18.9
2002	17.9
2003	17.3
2004	17.8
2005	18.3
2006	18.6
2007	16.9
2008	14.8

2009	14.0
2010	15.6
2011	16.8
2012	18.3
2013	18.9
2014	20.0
2015	19.4
2016	18.2
2017	18.3
2018	18.1

Sources: [156]

According to the 2000–2018 data in the above table, the national savings ratio of the US has shown a decreasing tendency. In 2000, the US national savings ratio was 20.2%, and the figure dropped to 18.1% in 2018.

The US has a developed financial market, and Americans have an excessive consumption habit. Household consumption expenditures have increased rapidly, but income has not increased synchronously. From the perspective of the whole market, the commodities produced in the US domestic market cannot meet the domestic consumption needs; hence, without goods imported from foreign markets, the US must bear a high inflation rate. There is a complementary relationship between a country's savings ratio and its demand for foreign capital. With a high savings ratio, the demand for foreign capital decreases; in the case of a low savings ratio, the demand for foreign capital increases. China's high domestic savings ratio has led to a large supply of foreign capital, while the low savings ratio in the US has continuously increased its demand for foreign capital. A large amount of capital flows from China to the US, which generally needs to be balanced by the current account trade deficit.

In view of the actual situation of China and the US, with the increase in China's national savings ratio, China's domestic investments will increase, and exports have been an effective way to boost China's economy and deal with its excess production capacity. A majority of the domestic investment will flow to the field of export production, thereby promoting the growth of the entire export production process and leading to the growth of China's trade surplus in Sino-US trade. Meanwhile, when national savings increase to the extent that they cannot be consumed by investment, the essence of capital-seeking profit will be fully demonstrated, and the excessive savings will cause capital account deficits in various forms. High national savings ratios can lead to reduced demand for imported goods. In addition, China already has an excess production capacity, and many Chinese products need to be digested through exports. For the US, because of its low national savings ratio and excessive consumption, the US must import a large amount of goods and capital from other countries, and thus, the US trade deficit in Sino-US trade will continue to increase.

5.2.1.3. Differences in the national savings ratio between China and the US and the Sino-US trade imbalance

At present, China's high national savings ratio is stimulating the increase in the gross volume of export, while the high consumption and low savings ratio of the US is stimulating the import of more commodities from China, which has led to the long-term Sino-US trade imbalance. In Sino-US trade, the national savings ratio affects the whole conductive process, where capital accounts and current accounts interact with and affect each other. The inflection point of difference in the national savings ratio between China and the US appeared around 1999. Since 2000, China's national savings ratio has been rising continuously at a high level, while the US national savings ratio has shown a decreasing tendency. According to the table above, the national savings ratio of the US fell to the lowest point of 14.0% in 2009 and then slowly rose again to 16.8% in 2011. The US needs a large amount of foreign capital inflow to support its financial market, and thus, a new capital supply can be generated to meet the active domestic consumption demand. This makes the US more inclined to directly import cheap and fine products from China,

thereby making the consumption demand of the US an engine for the economic growth of various countries in the world. From the perspective of the division of labour and the industrial structure of Sino-US trade, the two countries complement each other in trade and get what they need, and the huge savings gap of the US provides favourable terms of trade for China's commodity imports. For China, because it is in the economic transition period, the savings ratio in China has been the highest in the world. Since the reform and opening-up policy in 1978, China's domestic investment demand has increased very briskly. After 40 years of development, in contrast to the rapid growth of the national savings ratio, the predicament in which investments are playing an increasingly diminished role in promoting economic development is obvious in China. Furthermore, Chinese products can only promote domestic economic development through exports. With the huge capital and consumption gap in the US, China has the ability to provide a large amount of funds and products to the American market. Due to the huge difference in the savings ratio between China and the US, the US needs to constantly increase imports, while China needs to drive economic development through exports. Then, China's gross volume of exports would rise continuously. Under the combined action of the above factors, the Sino-US trade imbalance has been and will be further aggravated. In Sino-US trade, China's long-term, sustaining and huge trade surplus can hardly be changed within a short period of time and can even increase with the economic growth and trade development of China and the US.

At the current stage of economic development, the basic manufacturing industry in the US has been essentially transferred to foreign countries. The US needs to import a large number of goods that are attractive in price and quality from China, thereby meeting the needs of its domestic consumers in a low income growth environment, while the Sino-US trade deficit provides returns to the US from China in various forms to support economic development. Compared to other government bonds, the US treasuries are well received throughout the world because of the political stability of the US and the high reputation and stable income of the bonds. Many countries in the world, including China, take the US treasuries as their largest foreign exchange reserve assets. Sino-US trade is becoming more

frequent, as both countries regard each other as their most important trading partner. Sino–US trade is mainly settled in USD. If the scaled reserve assets are adjusted, fluctuations in the USD market can easily occur, which can increase the risk of the national foreign exchange market. The imbalance in the savings ratio between two countries often leads to a situation in which the surplus country invests or transfers its huge foreign exchange reserves to the deficit country in international trade, thereby promoting consumption in the deficit country. In this way, the mode of export trade stimulating the economy will not be interrupted, and the trade imbalance between the two countries will continuously intensify.

Superficially, the Sino–US trade seems to show China’s continuous accumulation of a trade surplus in the international trade. However, the US is the issuing country of the USD, an international currency. Thus, the foreign exchange reserves accumulated by China during trade and its excessive national savings can ultimately only flow back into the US. The US absorbs China’s foreign exchange reserves into the US economy in the form of US treasuries at a lower interest rate. As the largest developed country in the world, the US occupies an absolute dominant position in Sino–US trade, and various countries in the world have joined in the competition for exporting into the US. This makes the US the maker of trade rules and systems, and this damages China’s interests through various trade barriers and systems. Because the national savings ratios of China and the US are different, China is in an economic situation of a high savings ratio and a sustaining trade surplus in Sino–US trade. In this way, taking a broad view of all the countries in the world, the US treasuries have the highest investment superiority. Hence, China must convert the USD gained from trade into US treasuries, and the domestic USD foreign exchange market in China would thus be adequately supplied. The holding of huge foreign exchange reserves by the Chinese government is equivalent to the issuance of RMB of the same amount. The basic currency of RMB is oversupplied, and the inflationary pressure is prominent in China. If China fails to control the trend of the outside appreciation and inside depreciation of RMB, the trend will not only be unfavourable for China, but also encumber the rapid development of Sino–US trade.

In international trade, the difference in the national savings ratio between China and the US is a significant cause of the sustainable growth of China's trade surplus to the US. The economic development level, the characteristics of the industrial structure and the foreign trade policies of China and the US allow the determination that China's trade surplus to the US was not brought about by the export of the high-technology industry or the increase in national labour productivity but by the export of China's natural resources and products produced by cheap labour to the US. Under such a trade mode, it is costly for China to accumulate USD foreign exchange reserves, which can consume a great amount of domestic resources and sacrifice the labour welfare of the Chinese people. In Sino-US trade, Chinese products are cheap in the US market, and the added value is very low, which is prone to cause trade friction. The huge trade surplus China obtained through Sino-US trade has caused the continuous expansion of the scale of China's foreign exchange reserves. Because USD is the main settlement currency adopted by most countries in the world for international trade, the majority of China's foreign exchange reserves has become the US treasuries, which makes China's foreign exchange reserves obtained at a high price flow back into the US through the financial market. The US has made use of being the issuer of USD and adopted a quantitative easing policy to depreciate USD assets and acquire asset premium income by increasing the issue volume of US treasuries.

The big difference in the savings ratio between China and the US can be helpful for the development of Sino-US trade. China's national savings ratio far surpasses the domestic investment demand. China has a large savings balance, US national savings are far below the domestic investment demand, and a savings gap therefore exists. To meet the booming consumption demand of the US and make up for the savings gap, the US has borrowed savings from China. To this end, China has solved investment problems by obtaining foreign exchange reserves and acquiring a stable income at a low risk. Thus, it can be seen that the difference in the national savings ratio between China and the US causes the two countries to take what they need and is more conducive to their long-term stable economic development. China's capital flows into the US through the purchase of US treasuries,

while the US makes direct investments in China via transnational enterprises. When accepting the inflow of China's foreign exchange reserves, to protect its domestic industries, the US has introduced various policies to restrict China's capital investment in the construction and acquisition of American domestic enterprises, and it is more willing to see the inflow of China's capital through the monetary and capital markets via bonds or diversified investments. The direct investment of American transnational enterprises in China can help Chinese enterprises improve their management level, production efficiency and product performance, which can in turn serve the domestic consumption of the US. US enterprises control Chinese enterprises through new construction or M&A and transfer backward industries to realise the vision of the global division of labour. The demand of the US precisely coincides with the actual demand of China in the stage of economic transition. Hence, the difference in the savings ratio between China and the US can improve the capital flow and industrial distribution of the two countries and accelerate the transformation of China's economic industry. The economic growth of the US can mostly be attributed to its domestic market demand, while China mainly relies on export trade and investment to develop its economy. The influence of the US economy and market on the Sino-US trade imbalance is greater than that of China's economy. The economic development of the US requires the continuous inflow of foreign exchange reserves from other countries to its domestic financial market in the form of capital, while China is a typical country that provides the capital. In the absence of the inflow of a large amount of foreign capital into the US, first, the exchange rate of the USD will decrease. Then, the economy will develop slowly, and the American domestic market will shrink, which will reduce the US demand for imported goods. This is exactly the export economic growth model represented by China, which has provided a great deal of money in support of the US, thereby ensuring the rapid economic growth of the US, maintaining a low inflation rate, stimulating American domestic market demand and indirectly aggravating the Sino-US trade imbalance.

In conclusion, China's national savings ratio is excessively high with a large saving glut. Meanwhile, China has accumulated a huge trade surplus through Sino-US trade. Since

there are not any secure investment channels in the world, Chinese people can only convert the huge trade surplus into USD assets dominated by the US treasuries, which provides a large amount of capital to support the economic development of the US. In addition, the high consumption in the US can increase imports, while the high savings in China can increase exports, thereby resulting in the long-term Sino–US trade imbalance and the gradually increasing trade gap between the two countries.

5.2.2. Exchange rate factor

The nominal exchange rate can affect the real relative price in the two countries by affecting the effective exchange rate and thus ultimately affecting the trade balance between the two countries. Several scholars in China and abroad have conducted numerous studies on whether China manipulates the nominal or effective exchange rate and gains a trade surplus in this way, and the conclusions are highly inconsistent.

5.2.2.1. Historical changes to the RMB exchange rate system

a. 1949–1980, the Chinese government exerted relatively strict control over the exchange rate. Even the single floating exchange rate system implemented between 1949 and 1952 was strictly controlled by the central government. During this period, the RMB exchange rate saw little fluctuation and basically remained stable, which is closely related to China’s planned economic system and the then international environment.

b. From 1981 to 1993, China’s economy was in a transition period. The RMB exchange rate adopted in this period was a dual exchange rate; (i.e., the official exchange rate and the market-regulated exchange rate coexisted, which is also known as a double-track system). The market-regulated exchange rate was limited to foreign exchange settlements in import and export trade, while the official exchange rate was mainly applicable to foreign exchange settlements under service accounts, such as tourism, transportation and insurance, and current transfer accounts.

c. China's managed floating exchange rate system of a dollar peg from 1994 to 2005. In 1994, the RMB exchange rate system underwent a significant change. The official exchange rate was integrated with the foreign exchange regulated price, and a simplex RMB exchange rate system based on the market mechanism was implemented. The previous practice of intervening in the exchange rate via administrative means was changed, the fluctuation in the exchange rate was mainly based on market supply and demand and the market mechanism was fully exerted to regulate the foreign exchange market. [158].

d. China's implementation of basket-pegged managed floating system since 2005. The Chinese government further reformed the RMB exchange rate system in July 2005 and announced that it was abandoning single pegging to the USD and adopting the exchange rate policy of pegging a basket of currencies. Meanwhile, China would further expand the average daily floating range of the RMB and endow the currencies of the major trading partner countries with corresponding weights based on the market supply and demand and according to the relationship between China and its major trading partners. Furthermore, the RMB multilateral exchange rate index would be calculated by referring to a basket of currencies, and based on this, the RMB exchange rate would be managed and adjusted so that the RMB exchange rate can float within a more reasonable range.

5.2.2.2. The change in the exchange rate of RMB against USD

Table 8: Effective Exchange Rate of USD against RMB

Time	Effective Exchange Rate of USD against RMB
2000	8.2784
2001	8.277
2002	8.277
2003	8.277

2004	8.2768
2005	8.1917
2006	7.9718
2007	7.604
2008	6.9451
2009	6.831
2010	6.7695
2011	6.4588
2012	6.3125
2013	6.1932
2014	6.1428
2015	6.2284
2016	6.6423
2017	6.7518
2018	6.6174

Source: [159]

As shown in the table above, since the Chinese government implemented the exchange rate system of pegging a basket of currencies in July 2005, the exchange rate of RMB against USD slowly rose from approximately 8.1917 to 6.6174 in 2018 and increased by about 19%. Furthermore, the trade surplus of China to the US continued to increase. The continuous depreciation of the RMB did reverse the current situation of the Sino–US trade imbalance, and the US still accumulates huge trade deficits every year. According to the data released by the National Bureau of Statistics of China, China’s trade surplus to the US in 2005 was \$114.17 billion, while the figure in 2018 was \$323.32 billion. Thus, it can be seen that China’s trade surplus to the US did not decrease with the appreciation of the RMB. On the contrary, after the reform of China’s exchange rate, the RMB entered the appreciation stage, and the trade surplus of China to the US has been continuously enlarged.

The RMB exchange rate is one of the influencing factors of Sino–US trade imbalance, but it is not the most fundamental one. The restriction on RMB appreciation by political means within a short time only exerted an impact on import and export trade in the short run and did not change the basis for Sino–US trade. Based on the economic strength of the two countries and the industrial division into different stages, the present Sino–US trade imbalance in international trade will not fundamentally change due to exchange rate fluctuation.

5.2.3. A statistical analysis of the savings and exchange rate factors in the SINO–US trade imbalance

5.2.3.1. Statistical methods for analysing the savings and exchange rate factors in the Sino–US trade imbalance

Data selection

In this dissertation, the data on China’s surplus volume to the US (denoted as SC), the effective exchange rate of the RMB against USD (denoted as R) and the difference in the national savings ratio between China and the US (denoted as QC) in Sino–US trade from 2000 to 2018 were selected. The multiple linear regression models were used to obtain the relationship among SC, R and QC and further empirically analyse whether the decrease in QC and the appreciation in RMB can reduce SC.

The data on SC and R were from the China Statistical Yearbook (2000–2018). The data on the national savings ratios of China and the US were from the Federal Reserve Database [158]. The QC was calculated indirectly.

Table 9: The Data on SC, R and QC

YEAR	SC	R	QC	The US QC	China's QC	LNSC	LNR	LNQC
2000	297.3	8.2784	18.28	20.2	38.50	5.694742	2.11365	2.905534
2001	280.8	8.277	19.49	18.9	38.39	5.637659	2.113481	2.969902
2002	427.2	8.277	21.58	17.9	39.43	6.057263	2.113481	3.071767
2003	586.1	8.277	25.26	17.3	42.51	6.373539	2.113481	3.229222
2004	802.7	8.2768	27.51	17.8	45.26	6.68797	2.113456	3.31455
2005	1141.7	8.1917	28.13	18.3	46.38	7.040302	2.103121	3.336837
2006	1442.6	7.9718	29.57	18.6	48.14	7.274226	2.07591	3.386591
2007	1633.3	7.604	32.94	16.9	49.86	7.398329	2.028674	3.494536
2008	1708.6	6.9451	35.96	14.8	50.78	7.443412	1.938036	3.582268
2009	1433.7	6.831	36.63	14.0	50.63	7.268031	1.921471	3.600868
2010	1812.7	6.7695	36.24	15.6	51.79	7.502551	1.912427	3.590163
2011	2023.4	6.4588	33.03	16.8	49.80	7.612528	1.865444	3.497265
2012	2189.1	6.3125	31.42	18.3	49.69	7.691245	1.842532	3.447285
2013	2158.5	6.1932	29.87	18.9	48.79	7.677175	1.823452	3.396687
2014	2370.5	6.1428	29.46	20.0	49.41	7.77084	1.815281	3.383033
2015	2608.0	6.2284	28.35	19.4	47.70	7.866345	1.829119	3.344627
2016	2506.8	6.6423	27.73	18.2	45.88	7.826772	1.893458	3.322515
2017	2758.1	6.7518	27.88	18.3	46.20	7.922303	1.909809	3.32773
2018	3233.3	6.6174	27.17	18.1	45.29	8.081249	1.889703	3.301929

Analysis indexes

In Sino–US trade, China's surplus volume to the US is denoted as SC, the effective exchange rate of RMB against USD is denoted as R, and the difference in the national savings ratio between China and the US is denoted as QC.

Modelling

To eliminate the possible influence of heteroscedasticity, the natural logarithms of the above variables were calculated to respectively get LN_{SC}, LN_R and LN_{QC}. Based on this, the influence factor model for the Sino–US trade imbalance was obtained as follows:

$$LN_{SC} = \beta_0 + \beta_1 LN_R + \beta_2 LN_{QC} + \varepsilon$$

where β_0 is a constant term, β_1 is the influence coefficient in the exchange rate on China’s surplus to the US, β_2 is the influence coefficient of the difference in the national savings ratio between China and the US on China’s surplus to the US and ε is the residual term. Next, this paper uses the 2000–2018 sample data on various variables to analyse the influence of the exchange rate and the difference in the national savings ratio between China and the US on China’s surplus to the US.

5.2.3.2. Descriptive statistics

Descriptive statistical analyses of China’s surplus to the US, the exchange rate and the difference in the national savings ratio between China and the US from 2000 and 2018 were conducted, and the trend charts were respectively drawn. The results obtained are as follows:

Table 10: Descriptive Statistics

	N	Mean	Maximum	Minimum	Std. Dev.
SC	19	1653.39	3233.27	280.80	882.60
R	19	7.21	8.28	6.14	0.86
QC	19	28.76	36.63	18.28	5.17

Figure 6: The trend in SC.

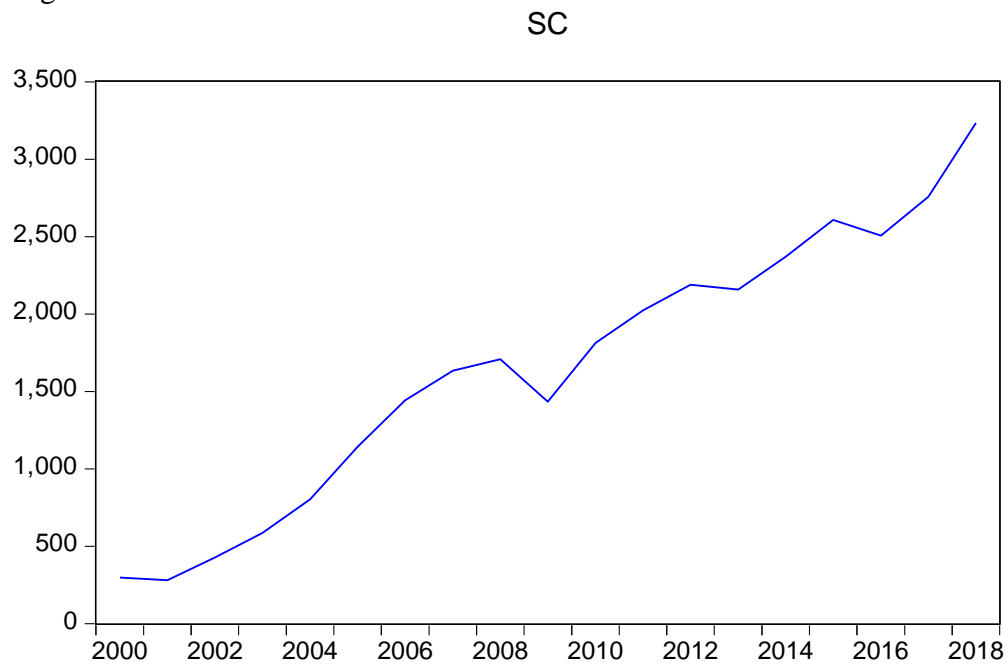


Figure 7: The trend in the exchange rate.

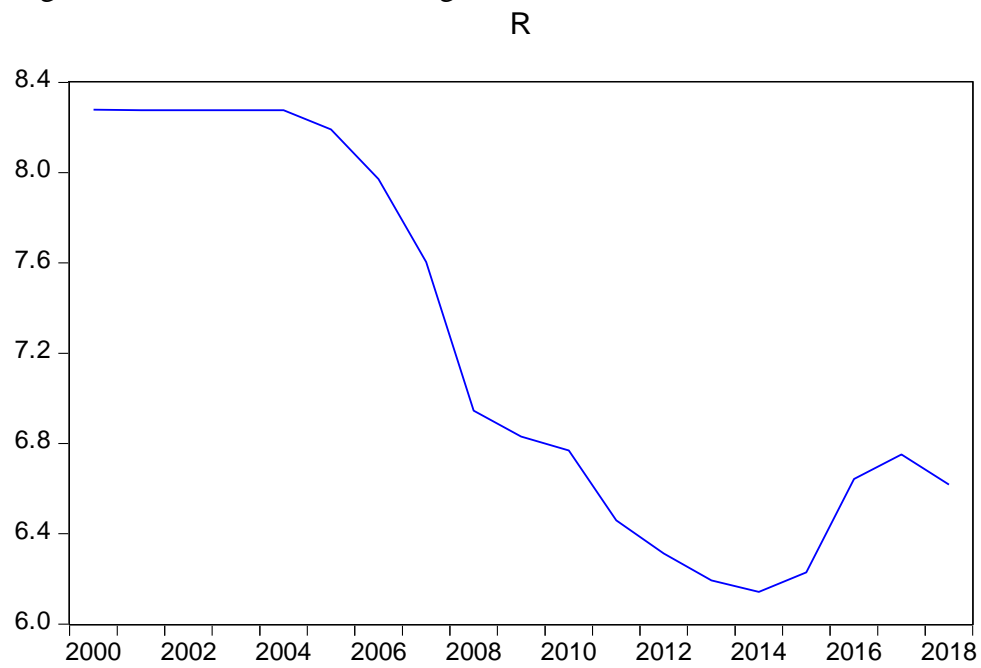
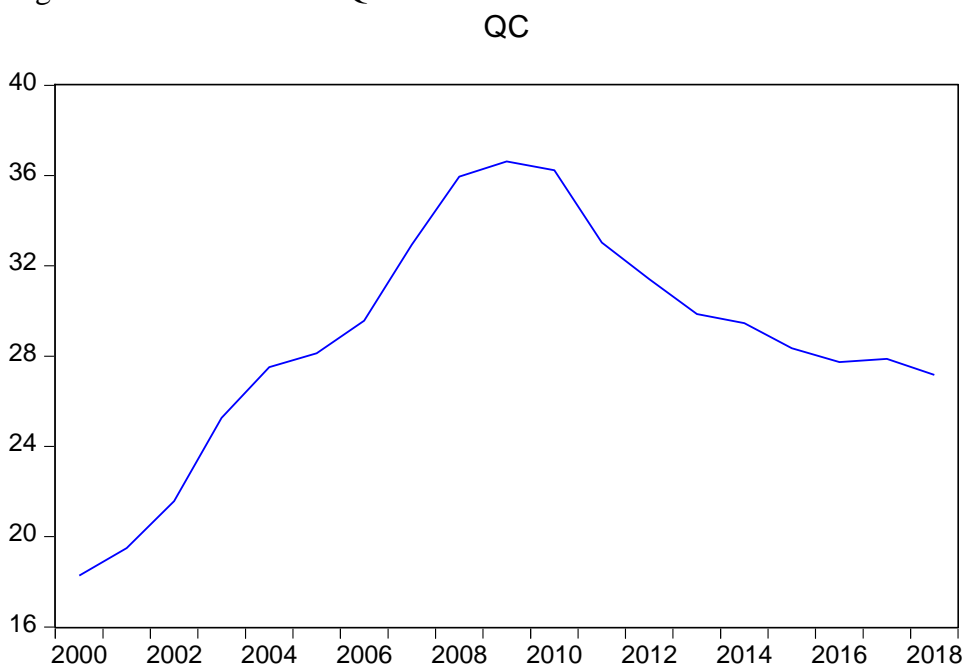


Figure 8: The trend in the QC.



According to the above statistical table and trend charts, the trade surplus in China to the US from 2000 to 2018 was continuously enlarged, and the fluctuation was large, from \$29.73 billion in 2000 to \$32.33 billion in 2018. The effective exchange rate presented a rough downtrend. The RMB appreciated to some extent, and the RMB appreciation level reached the peak in 2014. Furthermore, the difference in the national savings ratio between China and the US also presented an inverted V-shaped feature over time; it showed a continuously increasing trend from 2000 to 2009 and then gradually decreased from 2010 to 2018.

5.2.3.3. Stationary test

Since the data used in this paper were time series data, to avoid spurious regression, the stability of each variable needed to be judged first. By using EVIEWS and the commonly used ADF unit root test, the stability of LN_{NSC}, LN_R and LN_{QC} was tested. The results are summarised as follows:

Table 11: Stationary Test Results of Variables

Variables	ADF Statistics	P Value	1% Critical Value	5% Critical Value	10% Critical Value	Conclusion
LNSC	-1.353342	0.8392	-4.571559	-3.690814	-3.286909	Non-stationary
LNR	-0.534767	0.9706	-4.571559	-3.690814	-3.286909	Non-stationary
LNQC	-1.940899	0.5874	-4.667883	-3.733200	-3.310349	Non-stationary
Δ LNSC	-1.974949	0.2935	-3.920350	-3.065585	-2.673459	Non-stationary
Δ LNR	-2.257401	0.1953	-3.886751	-3.052169	-2.666593	Non-stationary
Δ LNQC	-1.407711	0.5538	-3.886751	-3.052169	-2.666593	Non-stationary
$\Delta\Delta$ LNSC	-7.040349	0.0000	-2.717511	-1.964418	-1.605603	Stationary
$\Delta\Delta$ LNR	-4.134039	0.0004	-2.717511	-1.964418	-1.605603	Stationary
$\Delta\Delta$ LNQC	-3.699487	0.0011	-2.717511	-1.964418	-1.605603	Stationary

The analysis of the above test results showed that, supposing LNSC has a unit root, the P value of the test was 0.8392 and greater than 0.05, so the null hypothesis was accepted. This indicates that LNSC has a unit root and is non-stationary; similarly, LNR and LNQC also have a unit root and are non-stationary. Then, their first difference sequences Δ LNSC, Δ LNR and Δ LNQC were tested, and the results showed that the corresponding P values were still greater than 0.05, so the first three difference sequences are non-stationary. The results of their second difference sequences $\Delta\Delta$ LNSC, $\Delta\Delta$ LNR and $\Delta\Delta$ LNQC showed that the corresponding P values were lower than 0.05, so the hypothesis that the second difference sequences have no unit root at the confidence level of 5% was rejected. This suggests that all the above second difference sequences have no unit root and are stationary.

Because LNSC, LNR, LNQC and their first difference sequences are all non-stationary, while their second difference sequences are stationary, the three variables are all second-order single-integrated time series and belong to the case of single integration in the same order. In the following, the results of the co-integration test are shown.

5.2.3.4. Co-integration test

The co-integration test for LNSC, LNR and LNQC was carried out using the EG two-step method. The idea is to first carry out the regression analysis on the model and then conduct an ADF unit root test on the regression residual. If the residual is stationary, then there is a co-integration relationship between the variables, and the estimated results of the model are reliable.

First, by using the EViews software and the OLS method, a regression analysis of the model was conducted, and the estimated results are as follows:

Table 12: Estimated Results of Model Regression

Variable	Coefficient	Std. Error	t-statistic	Prob.
LNR	-3.944094	0.863097	-4.569700	0.0003
LNQC	1.525821	0.527994	2.889842	0.0107
C	9.868632	3.075472	3.208819	0.0055
R-squared		0.805707		
Adjusted R-squared		0.781421		
F-statistic		33.17498		
Prob. (F-statistic)		0.000002		

It can be observed from the above table that the R-square estimated by the model was 0.805707, and the goodness of fit was relatively high; the corresponding P-value of the F statistic was 0.000002 and less than 0.05, indicating that the linear relationship between LNSC and LNR and LNQC is significant. Therefore, the regression results of the model are ideal.

Then, the ADF unit root test was conducted on the residual obtained above. The results are as follows:

Table 13: Stationary Test Results of the Residual

Variables	ADF statistic	P value	1%	5%	10%	Conclusion
			Critical Value	Critical Value	Critical Value	
Residual	-2.711161	0.0099	-2.708094	-1.962813	-1.606129	Stationary

It can be seen that the P value was 0.0099 and less than 0.05, so the null hypothesis was rejected at the confidence level of 5%. This indicates that the residual has no unit root and is stationary. Therefore, there is a long-term co-integration relationship between LNSC and LNR and LNQC, and the development trend is stable. The relation equation between the variables is as follows:

$$\text{LNSC} = 9.868632 - 3.944094 * \text{LNR} + 1.525821 * \text{LNQC}$$

The regression results showed that the P values of the significance test on the estimated coefficients of LNR and LNQC were 0.0003 and 0.0107, respectively, and less than 0.05, so the estimated coefficients passed the significance test. Hence, the exchange rate and the difference in the national savings ratio between China and the US have a significant impact on the trade surplus of China to the US. The exchange rate exerts a negative impact on the trade surplus, and the difference in the national savings ratio between China and the US exerts a positive impact on the trade surplus.

5.2.3.5. Analysis of results

According to the analysis of the above results, there is a long-term co-integration relationship between the trade surplus of China to the US and the exchange rate as well as the difference in the national savings ratio between China and the US with a stable development trend. Specifically, the effective exchange rate of RMB against USD exerts a significantly negative impact on the trade surplus of China to the US. This shows that the trade surplus did not decline with the relative appreciation of RMB, and the scale of Sino-US trade imbalance is quickly expanding. The difference in the national savings ratio

between China and the US exerts a significantly positive impact on the trade surplus of China to the US; (i.e., the greater the difference in the national savings ratio, the larger the trade surplus).

5.2.3.6. Robustness analysis of the savings and exchange rates factor model of the Sino-US trade imbalance

To test the robustness of the model analysis results, the method of lagging the explanatory variables by one period, shortening the sample period and replacing the data source was used for the robustness test. Among them, the sample period was shortened by using the sample data from 2001 to 2019. At the same time, China’s statistical trade volume was replaced by the US statistical trade volume. The estimated results obtained are as follows.

Table 14: Robustness Test Results

Variable	Lagging the explanatory variables by one period	Shortening the sample period	Replacing variable data
LNR	-2.900276***	-3.966613***	-2.815976***
LNQC	1.646733***	1.250834*	0.735051*
C	7.501789**	10.85359***	10.83315***

Note: ***, ** and * indicate that the coefficient was significant at the level of 1%, 5% and 10%.

Source: EViews measurement analysis collation

According to the above test results, it can be seen that whether it is using explanatory variables with one period lagging, shortening the sample period or replacing variable data, the estimated LNR coefficients were all negative, and the estimated coefficients of LNQC were all positive. Furthermore, all passed the significance test, indicating that both the exchange rate and the difference in the savings rate between the Chinese and the US have a significant impact on the Sino-US trade surplus. Additionally, the exchange rate has a negative impact on the Sino-US trade surplus, and the difference in the savings rate between China and the US has a positive impact on the Sino-US trade surplus. This is

consistent with the previous conclusion, indicating that the model estimation result is robust.

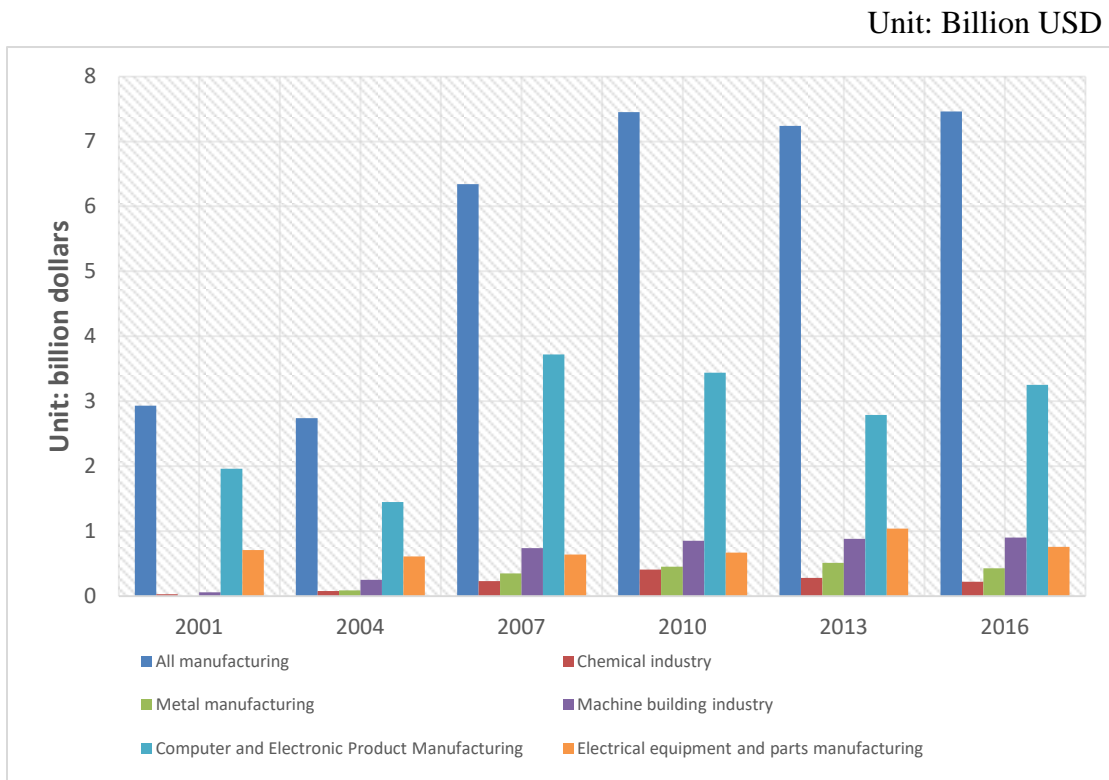
5.3. FDI IN CHINA AND FACTORS OF THE TRADE IMBALANCE BETWEEN CHINA AND THE US

5.3.1. Factors affecting United States direct investment in China and the trade imbalance between China and the US

In the international division of labour, transnational corporations from developed countries invest and set up factories in developing countries for production and processing via cheap labour or abundant resources through FDI. Then, the products are exported back to their home countries or other countries and regions. Direct investments made by transnational corporations objectively promote the increase in the commodity exports of a host country and produce the effect of trade creation.

The trade creation effect of FDI mainly occurs in the international vertical division of labour. It is generally believed that in the process of economic globalisation, a country carries out the direct investment in the vertical international division of labour and places different production links in multiple countries or regions to seek high profits brought by cost differences. US direct investment in China produces products and sells intermediate or finished products back to the US or other countries and regions, which drives the growth of China's exports and produces the trade creation effect of FDI.

Figure 9: The number of products sold back to the US by American enterprises with direct investments in China.



Source: [160]

As shown in the above figure, from 2001 to 2016, the number of products resulting from American direct investments in enterprises in China sold back to the US showed an overall growth trend, but the number was far less than the sales made by American direct investments enterprises in China. To some extent, this shows that American direct investment companies in China do not mainly consider China as an overseas ‘manufacturing plant’ to sell back to the US but more as a production–sales market, thus allowing enterprises to make more profits despite trade barriers.

From the point of view of specific representative industries, from 2001 to 2016, the number of products resulting from US direct investment enterprises in China sold back to the US gradually increased. In 2004, the total amount of back sales from the chemical industry, metal manufacturing, machinery manufacturing, computer and electronic products manufacturing and electrical equipment and parts manufacturing was low at 0.8

billion USD, 0.9 billion USD, 250 million USD, 1.45 billion USD and 610 million USD, respectively. In 2015, the amount of reselling in each representative industry increased to 260 million USD, 650 million USD, 1.07 billion USD, 3.59 billion USD and 800 million USD, all of which have increased significantly. In 2016, with the influence of American multinational companies moving back to the US and to developing countries and regions outside China, the amount of products sold back to the us by American direct investment enterprises in China declined slightly.

It can be seen that from 2001 to 2016, influenced by the creation effect of direct investments and trade between the US and China, the amount of products sold back to the US by its enterprises in China continued to increase, which greatly increased China's exports to the US. Affected by this effect, the US trade deficit with China further widened.

US direct investments in China have not only increased US imports from China but also reduced exports to China. The business activities of US multinationals in China are not reflected in Sino-US trade statistics. American multinationals produce and sell products in China instead of China importing them from the US. Most American investment enterprises in China are import substitution enterprises, which focus on the vast potential market of China. American multinational companies not only transfer many goods and services to enterprises in China but also implement the principle of local production and local sales in China, improving their competitive advantage in their products and market share in China. Furthermore, this has reduced China's imports of goods and services from the US. In export statistics, the trade between the parent company of an American multinational corporation and its Chinese subsidiary is internal trade, but this is recorded as China's exports to the US. The internal trade of American transnational corporations is an important part of the bilateral trade between China and the US, and the proportion of the trade volume between China and the US keeps increasing.

According to statistics from relevant departments, in 1993, the import volume of US multinationals from their subsidiaries in China was 3.311 billion USD, and the export

volume was 508 million USD. The internal trade deficit was 2.803 billion USD, accounting for 14.5% of the surplus between China and the US in that year. It was more than 40% of the trade surplus in 2010.

Then, the investment projects and products of US multinational companies in China have mostly lost their monopoly advantage in the US, and the technology has overflowed abroad. American companies in China have acquired rich resources and cheap labour costs, and investments and production in China have lowered production costs and improved the competitiveness of the products of US companies in China, which has reduced US exports and imports from China.

Although US investments in China can promote China's imports from the US—for example, US direct investment in China has driven the development of China's manufacturing industry—this has been restricted by China's resources, management and production level, forcing China to import corresponding raw materials, major parts, machinery and equipment, technologies and services from the US. However, the latter plays a more important role in China–US bilateral trade than the substitution and promoting effects of US direct investments in China.

The emergence of this result is mainly affected by economic globalisation and global industrial transfer. At present, China is at the middle and low end of the global industrial chain, and it is an important 'export processing plant' in the world. As China continues to open its doors to the outside world, middle- and low-end manufacturing will gradually shift to China. As the most developed country, the US not only has many powerful multinational companies but also needs to eliminate or transfer backward sectors in the process of industrial optimisation and upgrading. China is the best choice for US direct investment. By investing in factories in China, the US can combine its technological advantages with China's relatively cheap labour to produce and export goods to the world, from which the US stands to reap huge profits. In the process, some of the domestic demand for US products can be met by companies investing in China, which to some extent, increases the

Sino–US trade imbalance. It can be seen that the US is not only the creator of the bilateral trade imbalance but also the main beneficiary of Sino–US trade.

5.3.2. International industrial transfer and the East Asian factors of the trade imbalance between China and the US

From the perspective of the developmental history of countries in the 20th century, the upgrading of the global industrial structure is mainly a process in which the leading industries of individually developed countries are successively replaced and gradually transferred to overseas countries, thus continuously moving forward the industrial structure of countries around the world. Since the 1960s, there have been three summits of global industrial structure transfer. The first global industrial structure transfer was initiated in the US in the 1960s. Under the impetus of the technological revolution, the US strove to develop the steel, chemical, automobile and other capital-intensive industries. Furthermore, it developed some high-value-added technologies, such as robotics, the electronics industry and the aerospace industry. The country also transferred the labour-intensive textile industry and part of the heavy chemical industry with high energy consumption and pollution to the east Asian region. In the 1970s, the US further adjusted its economic structure. It began to develop knowledge-intensive and technology-intensive industries that consume fewer resources and energy. Its main focus was on microelectronics technology, and it transferred capital-intensive industries, such as automobile and steel manufacturing and shipbuilding to newly industrialised countries to improve the industrial structure. At this time, newly industrialised countries began to undertake capital-intensive industries from developed countries such as the US and transferred labour-intensive industries that had lost their comparative advantages to developing countries, such as the ASEAN countries, to upgrade their industrial structures. The second adjustment in the industrial structure has two characteristics: First, the regional division of labour between developed and developing countries advanced in great depth. The US, Japan and other developed countries promoted the upgrading of the industrial structure by transferring the focus of the

industrial structure to high technologies, informatisation and servitisation. On the one hand, they strove to develop the information industry centred on microelectronics technology and the high-tech industry centred on biotechnology, new materials and new energy and transform the traditional industries with new and high technologies. On the other hand, they transferred traditional industries that had lost their comparative advantage and some low-value-added technology-intensive industries, including automobiles and electronics, to other countries, especially the Four Asian tigers and ASEAN countries. Since the middle of 1980s, the Four Asian tigers have begun fierce competition with the US states and Japan in the iron, steel, automobile, petrochemical and other fields and have begun to absorb the high technologies and investments from the microelectronics sectors of the US and Japan. At the same time, labour-intensive industries and some capital- and technology-intensive industries were transferred to ASEAN and China, which promoted the economic development and industrial structure upgrading of these countries. Second, the vertical division of labour between industries began developing into vertical division of labour within industries. The third world industrial structure shift occurred in the 1990s. The US, Japan and other developed countries shifted from an industrial economy to an information economy with a focus on the industrial structure adjustment to the development of high and new technology industries, especially the information technology industry. Furthermore, they transferred mature industries to developing countries. Even the information industry was gradually transferred to developing countries. At this time, following the pattern of the international division of labour, there appeared new characteristics in the deepening of the development of ‘product differential division of labour’ and ‘production process-type division of labour’. Overall, the US is positioned at the top in the international division of labour. It is mainly engaged in the production of high-value-added products. Japan, Western Europe and other developed countries are exerting their advantages in the field of applied technology development and are mainly engaged in general high-value-added products. The technical levels of other developing countries are low, so these countries are mainly engaged in general industrial production of lower-value-added goods.

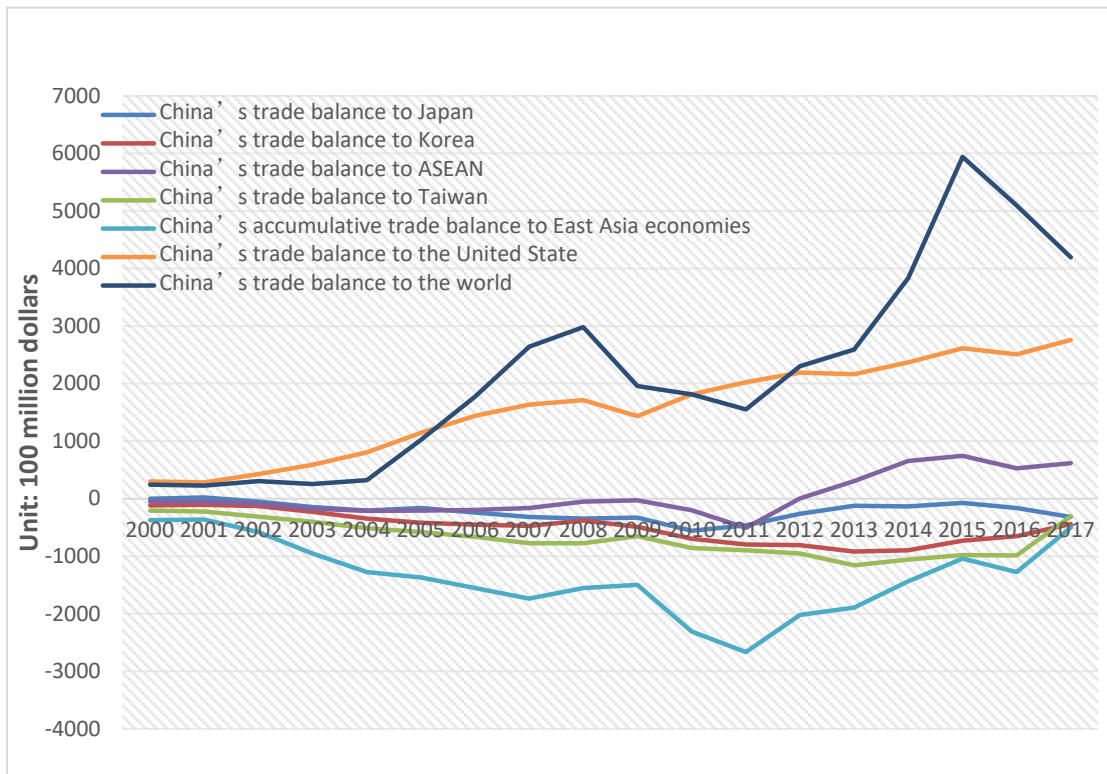
The emergence of the international product division of labour and economic globalisation has made the economic and trade relations among countries closer and more complex. Therefore, in the context of economic globalisation, the study of the trade imbalance between China and the US should not only consider bilateral factors but also consider the influence of other countries.

In my analysis of the trade structure between China and the US, I found that China has an export advantage over the US in terms of Chinese technology and high-tech products, leading to a substantial increase in the trade surplus of these two types of products. In particular, the rapid increase in the trade surplus of high-tech products in recent years has played a crucial role in exacerbating the trade imbalance between the two countries. The above phenomenon cannot be reasonably explained using the traditional theory of comparative advantage between the two countries. Thus, this work has attempted to explain it from the perspective of global product division, and I have gradually realised that China's trade surplus transfer from a large part of East Asian economies to the US is an important factor leading to the trade imbalance.

While China has a long-term trade surplus with the US, it also has a long-term bilateral trade deficit with East Asian economies. There should be some correlation between China's trade surplus with the US and China's trade deficit with East Asian economies.

Figure 10: China’s trade balance with East Asian economies from 2000 to 2017.

Unit: 100 million USD



Source: [161]

The trend lines for China’s trade balance with the US and with East Asian economies are on the upper and lower sides of the coordinate axis, respectively, showing certain symmetry and a ‘scissor–mouth’ development trend.

While China has maintained a long-term pattern of unilateral trade surplus with the US since 2000, the bilateral trade between China and East Asian economies has also shown an obvious trend of persistent and huge deficits.

The symmetrically deviating trend in China’s trade surplus with the US and China’s cumulative trade deficit with East Asian economies on both sides of the axis moved faster and became more obvious from 2000 to 2011. Among them, while China’s cumulative trade deficit with East Asian economies reached a peak of 266.467 billion USD in 2011, the trade surplus with the US also increased rapidly to 202.32 billion USD. At this stage, the Chinese trade surplus with the US and the trade deficit with east Asian economies not

only increased in the same amount between the frontal and each year, but the balance of trade in terms of the absolute value also remained in a close state, so the two offset each other. The overall surplus of China's foreign trade never showed leap-type rapid growth within this phase.

Since 2012, China's cumulative trade deficit with East Asian economies has shown a significant trend of decline, among which China's trade surplus with ASEAN countries even appeared for the first time and continued for six years. At the same time, although the overall trade surplus between China and the US is still on the rise, the absolute value of China's trade surplus with the US has shown a trend of increasing and decreasing fluctuations, and the speed of increase is obviously slowing down.

From the point of exports, on the one hand, many products exported by China are actually exported from other countries or regions in East Asia that are transferred to China for shipping. On the other hand, from the perspective of the market, the market size of other East Asian countries or regions is generally smaller than that of Europe and the US, and compared to European countries and the US, these countries and regions have stricter regulations and restrictions on import products. Therefore, several Chinese export products are mainly sold to Europe and the US instead of East Asia. Thus, the trade imbalance between China and the US is not a problem between China and the US but one among China, the US and other East Asian economies. It is also the result of industrial restructuring and transfer in East Asia. To some extent, the US trade deficit with China is the result of the US trade deficit with Japan, South Korea, ASEAN countries and other countries transferring to China, which is a kind of transfer deficit.

Therefore, in the context of economic globalisation and international industrial transfer, the examination of the bilateral trade balance is not complete. While China has a large surplus with the US, its deficit with East Asia has increased.

5.3.3. Correlation test for FDI in China and Sino–US trade imbalance

Trade and FDI

A substitution relationship lies between trade and direct investment, which is reflected in the fact that international capital flow originates from the obstacles in international trade, while international trade arises from obstacles in capital flow. Mundell was the first to study the substitution relationship between the two. Based on the analytical framework of trade theory H-0, he studied the substitution relationship between international trade and FDI by means of a standard model. Through research, Mundell found that if there are factors hindering free trade, such as international trade barriers, and assuming that corporations can always make transnational investments along the track of the Rybczynski line, such investments can allow for cost conversion at a relatively low factor or completely replace the transnational commodity trade in an efficient way that is relatively optimal [162]. Such an alternative theory adequately explains the international FDI phenomenon represented by American investment in Japan and Europe before the Second World War. However, in the 1960s, the alternative theory of investment and trade encountered great challenges. With the development of global economic integration, new vicissitudes have occurred in the relationship between trade and investment. Substitution is no longer an inevitable relationship between the two, and the relationship between investment and trade has shown obvious complementary or simulative relationships. Professor Kiyoshi Kojima from Hitotsubashi University in Japan put forward the theory that there is mutual promotion between trade and investment [163] to explain the new phenomenon. By studying aggregate, industry and enterprise data, Lipsey and Weiss found that the export volume of a country has a significantly positive correlation with the sales volume of the subsidiary of its multinational corporation; (i.e., international direct investment and international trade are complementary) [164,165]. Based on empirical analysis, Blonigen demonstrated that there are both complementary and alternative relationships between outward FDI and international trade from the aspect of products [166]. Wang and Xu [167] tested the relationship in trade and investment between China

and Japan via causality tests, which signified that there is a long-term complementary relationship between Japan's direct investments in China and Sino-Japan trade. Furthermore, they demonstrated a two-way causal relationship between FDI and the export of finished products, but FDI only has a one-way causal relationship for the import level. Moreover, it was found that FDI and import trade have a short-term substitution effect [167]. By studying the export shares of American multinational corporations in different industries in the Canadian market, the production status of local subsidiaries and tariff levels of different industries, Hurst in 1974 found that there is a substitution relationship between investment and trade. He further argued that tariff-led investments replace trade, and the degree of substitution has a positive correlation with the tariff level of industries in this country [168].

Sino-US Trade Imbalance and FDI

Zhu analysed the general situation of and obstacles involved in bilateral direct investment and argued that expanding bilateral direct investment is of great significance, as it is one of the most effective ways to solve economic imbalance. Furthermore, bilateral direct investment can not only solve the structural imbalance encountered in the development of the domestic economy in both countries but also correct the imbalance in payments between China and the US via the two effective ways of capital flow and trade flow [169]. Fu and Zhu, by means of the co-integration test and error correction model, analysed US direct investments in China and the Sino-US trade data. They believed that the Sino-US trade imbalance is largely caused and expanded by US direct investments in China, which mainly occur from the process of trade and the reselling of manufactured products to America. Meanwhile, they considered that US direct investments in China not only affect Sino-US trade, specifically the total volume, but also the trade structure of China [170]. Chen along with Fu and Zhu argued that the Sino-US trade imbalance is, to a large extent, caused and expanded by US direct investments in China [171,172]. From the perspective of trade and investment integration, Zhao proved that there is a two-way causal relationship between US direct investment in China and China's exports to the US.

Furthermore, these factors mutually influence each other [173]. Based on the co-integration theory, Tian studied the long- and short-term equilibrium relationship between US direct investments in China and Sino–US import and export trade, and it follows from this that incremental US investments in China would promote the rapid advancement of Sino–US trade [174]. Bruker confirmed that the rapidly growing trade surplus between China and the US is directly related to the growth in investment and the operation of multinational corporations in China [175]. Lim and Moon proved that when developed countries invest in underdeveloped countries and the investment is newly established or it is a sunset industry in the home country, there is a positive correlation between outward FDI and trade [176]. Liu, Wang and Wei adopted the panel data from 19 countries and China and investigated the causal relationship between FDI, which flows into China, and trade. They revealed that import triggers FDI, while FDI triggers export, and there lies a complementary relationship [177].

This chapter used empirical analysis to determine the relationship between FDI in China and Sino–US import and export trade from the perspective of time series. The main method adopted was co-integration analysis, and EViews 8.0 was used to analyse the relationship between FDI in China and Sino–US import and export trade. Empirical tests were conducted to verify the impact of FDI in China on Sino–US trade and the degree of the impact.

5.3.3.1. Data and variables

Considering the availability of data, this thesis selected the annual time series data from 1983 to 2019, and the data were mainly from the Wind database [178] and the National Bureau of Statistics of China [179] obtained through sorting.

The variables involved in the test were as follows: FDI represents FDI in China, EX represents China's volume of exports to the US, IM represents China's volume of imports to the US, and TN represents the total volume of imports and exports between China and

the US. To reduce the impact of heteroscedasticity fluctuations on the test, logarithmic transformation was performed on all the variables before the empirical test, and FDI, EX, IM and TN were respectively transformed into LNFDI, LNEX, LNIM and LNTN.

Table 15: Amount of FDI in China and Sino–US Trade Volume from 1983 to 2019

Unit: USD 100 million

Year	Amount of FDI in China	China export volume to the US	China's import volume from the US	Total Sino–US trade volume
1983	9.16	17.10	23.20	40.30
1984	14.19	23.00	36.60	59.60
1985	19.56	26.50	43.70	70.20
1986	22.44	24.70	35.30	60.00
1987	23.14	29.60	38.10	67.70
1988	31.94	33.80	66.30	100.10
1989	33.92	43.90	78.60	122.50
1990	34.87	51.90	65.80	117.70
1991	43.66	61.90	80.10	142.00
1992	110.08	85.04	89.01	174.05
1993	275.15	169.64	106.88	276.52
1994	337.67	214.61	138.94	353.55
1995	375.21	247.29	161.23	408.52
1996	417.26	267.08	161.79	428.87
1997	452.57	327.18	162.90	490.08
1998	454.63	379.65	169.97	549.62
1999	403.19	420.18	194.86	615.04
2000	407.15	521.42	223.65	745.07

2001	468.78	543.19	262.04	805.23
2002	527.43	699.59	272.28	971.87
2003	535.05	925.10	338.83	1263.93
2004	606.30	1249.73	446.53	1696.26
2005	603.25	1629.39	487.35	2116.74
2006	658.21	2035.16	592.23	2627.39
2007	747.68	2327.61	698.61	3026.22
2008	923.95	2523.27	814.97	3338.24
2009	900.33	2209.05	774.60	2983.65
2010	1057.35	2833.75	1020.60	3854.35
2011	1160.11	3245.65	1221.44	4467.09
2012	1117.16	3520.00	1328.78	4848.78
2013	1175.86	3684.81	1525.52	5210.33
2014	1195.62	3961.47	1591.87	5553.35
2015	1262.67	4101.45	1497.81	5599.26
2016	1260.01	3891.13	1351.24	5242.37
2017	1310.35	4331.46	1551.77	5883.24
2018	1349.66	4798.12	1553.66	6351.77
2019	1381.35	4179.36	1223.39	5402.75

Note: The data is from [178,179].

Table 16: Logarithmic Values of the Figures in Table 15

Year	LNFDI	LNEX	LNIM	LNTN
1983	2.2148025	2.8390785	3.1441523	3.6963515
1984	2.6524318	3.1354942	3.6000482	4.0876556
1985	2.9734867	3.2771447	3.7773481	4.2513483
1986	3.1108451	3.2068032	3.563883	4.0943446
1987	3.1415627	3.3877744	3.6402143	4.2150862
1988	3.4638591	3.5204608	4.1941899	4.6061697
1989	3.5240048	3.7819143	4.3643717	4.808111

1990	3.5516269	3.9493188	4.1866198	4.768139
1991	3.7764324	4.1255202	4.3832759	4.9558271
1992	4.7012074	4.4431217	4.4887487	5.1593426
1993	5.6173164	5.1336785	4.6717067	5.6222832
1994	5.8220691	5.3688224	4.9340422	5.8680249
1995	5.9274859	5.5105513	5.0828298	6.0125337
1996	6.0337095	5.5875515	5.0862776	6.0611477
1997	6.1149424	5.7905221	5.0931113	6.194568
1998	6.1194839	5.9392491	5.1356187	6.3092256
1999	5.9994079	6.040685	5.2722976	6.4216937
2000	6.0091817	6.2565559	5.4100647	6.6134729
2001	6.1501336	6.2974575	5.5684816	6.6911218
2002	6.2680162	6.5505002	5.6068273	6.8792252
2003	6.2823602	6.8299034	5.8254974	7.1419821
2004	6.4073749	7.1306864	6.101499	7.4361818
2005	6.4023317	7.3959593	6.1889821	7.657631
2006	6.489524	7.6183311	6.3838926	7.8737468
2007	6.6169751	7.7525987	6.5490866	8.0150693
2008	6.828658	7.833312	6.7031479	8.113199
2009	6.8027614	7.700317	6.652351	8.0009031
2010	6.9635211	7.9493557	6.9281504	8.2569585
2011	7.0562701	8.0850701	7.107789	8.4044927
2012	7.018545	8.1662159	7.1920187	8.4864828
2013	7.0697551	8.2119733	7.3300922	8.5583983
2014	7.0864202	8.2843715	7.3726666	8.6221561
2015	7.1409838	8.3190963	7.3117589	8.6303899
2016	7.1388749	8.2664537	7.2087801	8.5645286
2017	7.1780496	8.373661	7.3471533	8.6798625
2018	7.207608	8.4759787	7.3483678	8.7564896

2019	7.2308138	8.3379127	7.1093802	8.5946627
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Note: The values were calculated by Excel, where LNFDI is the logarithm of FDI in China; LNEX is the logarithm of China's export volume to the US; LNIM is the logarithm of China's import volume from the US and LNTN is the logarithm of the total Sino-US trade volume.

5.3.3.2. Empirical model

The test method used in this chapter was the Engle-Granger (E-G) two-step test. The specific steps are as follows: First, an ADF test was used to determine the single integer order of variables. If the tested ADF absolute value was smaller than the absolute value of the critical value, then the variable was considered unstable; (i.e., there is a unit root). If the tested ADF absolute value was greater than the absolute value of the critical value, then the variable was considered stationary; (i.e., there is no unit root). If a group of time series has a long-term co-integration relationship, then the single-order integers of all the variables should be identical. Then, the OLS method was used to carry out the co-integration regression of the variables. In the co-integration regression, it is necessary to test the error term of the model using a graphical method or via the observation of the DW value to determine whether there is auto-correlation. If there is auto-correlation, it should be corrected. Finally, the stationary of the residual terms was tested, and ADF test method was still used. If the residual sequence passed the ADF test, then there is a long-term stable relationship between the variables; if not, there is no long-term stable relationship between the variables.

All tests involved in this chapter were carried out in EViews 8.0.

Stationary test of variables

The unit root test is generally used to test whether the sequence is stationary or not. There are three main test methods: the ADF test, DF test with GLS test and Phillips-Perron test. The purpose of the stationary test is to avoid spurious regression. The ADF unit root test was used to test the stationary of each variable. The test principle is as follows:

In general, the following estimation regression equation is used to test whether the random sequence $\{y\}$ is stationary:

$$\Delta y_t = \alpha_0 + \gamma_t + (\beta - 1)y_{t-1} + \sum_{i=1}^k \beta_i \Delta y_{t-i} + \mu_t \quad (1)$$

When estimating using the specified equation, if the test results of the constant term and trend term Y are not significant, they can be deleted; then, the lag order can be determined by using the residual of the equation to meet the white-noise process, and the specific length of the lag order can be determined by the AIC standard and SC standard. In general, the lag order of the length in the optimal estimation equation should make the AIC and SC values minimum, and whether the random sequence $\{yt\}$ is stationary is judged by the hypothesis test. The hypotheses are $H_0: \beta=1$, $H_1: \beta<1$. The ADF value is the t-test value of β in Equation 1. If the ADF value of β is greater than the critical value, hypothesis H_0 is rejected, indicating that the sequence does not have a unit root; (i.e., the original sequence is stationary). On the contrary, if the ADF value of β is smaller than the critical value, H_1 is rejected; (i.e., the sequence has a unit root and is non-stationary). The ADF test results of the variables are shown in Table 17.

Table 17: Unit Root Test Results of Variables

Variables	ADF Test Statistic	Test critical values			Type Test
		1%	5%	10%	
LNFDI	-1.670437	-4.243644	-3.544284	-3.204699	(c,t,1)
Δ LNFDI	-3.253053	-3.632900	-2.948404	-2.612874	(c,0,0)
LNEX	0.432015	-4.234972	-3.540328	-3.202445	(c,t,0)
Δ LNEX	-3.823355	-3.632900	-2.948404	-2.612874	(c,0,0)
LNIM	-1.300880	-4.234972	-3.540328	-3.202445	(c,t,0)
Δ LNIM	-5.217963	-3.632900	-2.948404	-2.612874	(c,0,0)
LNTN	0.063250	-4.234972	-3.540328	-3.202445	(c,t,0)
Δ LNTN	-4.384112	-3.632900	-2.948404	-2.612874	(c,0,0)

Note: The test form (c, t, k) represents the constant term, trend term and lag order in the ADF test.

According to the test results in Table 17, the ADF test values of LNFDI for FDI in China, LNEX for China's export volume to the US, LNIM for China's import volume from the US and LNTN for the total Sino-US volume of imports and exports were respectively greater than 10%, 5% and 1%. Hence, the four variables are non-stationary and have a unit root. The ADF test values of the first-order difference sequence Δ LNFDI of the variables were less than 10% and 5%, and the ADF test values of Δ LNEX, Δ LNIM and Δ LNTN were respectively less than 10%, 5% and 1%, indicating that the four variables are first-order difference stationary and have no unit root. Hence, the conditions for the co-integration test were met, and the co-integration test could be carried out.

5.3.3.3. *Co-integration analysis*

According to the ADF test above, LNFDI and LNEX, LNFDI and LNIM as well as LNFDI and LNTN are all single integer series of the same order, so the OLS method was used to estimate the correlation between LNFDI and LNEX, between LNFDI and LNIM and between LNFDI and LNTN to obtain the residual terms. Then, the unit root test (ADF) was carried out on the residual terms, respectively. If the residual term is stationary, there is a co-integration relationship between FDI in China and Sino-US trade; (i.e., there is a long-term relationship between LNFDI and LNEX, between LNFDI and LNIM as well as between LNFDI and LNTN; if the residuals are non-stationary, there is no long-term co-integration relationship among the variables investigated.

First, the model adopted in this thesis is determined as follows:

$$LNEX = \alpha_1 + \beta_1 LNFDI + \varepsilon_1 \quad (2)$$

$$LNIM = \alpha_2 + \beta_2 LNFDI + \varepsilon_2 \quad (3)$$

$$LNTN = \alpha_3 + \beta_3 LNFDI + \varepsilon_3 \quad (4)$$

Second, the equation of each model was estimated. The estimated results of LNFDI and LNEX, LNFDI and LNIM as well as LNFDI and LNTN by OLS method are as below:

$$LNEX = -0.439076 + 1.166719 LNFDI \quad (5)$$

$$(-1.337441) \quad (20.90729)$$

$$R^2 = 0.925866 \quad F = 437.1149 \quad D.W = 0.153323$$

$$LNIM = 1.136860 + 0.789179 LNFDI \quad (6)$$

$$(3.661053) \quad (14.95104)$$

$$R^2 = 0.864621 \quad F = 223.5335 \quad D.W = 0.153630$$

$$LNTN = 0.966869 + 1.005911 LNFDI \quad (7)$$

$$(2.939528) \quad (17.99144)$$

$$R^2 = 0.902423 \quad F = 323.6919 \quad D.W = 0.132052$$

When the OLS method was used to estimate the long-term relationship of the three groups of variables, the frequency of the residual variance curves of the three groups of variables passing through the zero curve was small, and the DW value was relatively low. Hence, it can be determined that the above models all have autocorrelation. In this chapter, the Cochrane–Orcutt iterative method is used to correct the positive autocorrelation, and the new estimating equation obtained after the correction is as follows:

$$LNEX = 9.535277 + 0.370906 LNFDI + 0.981622 AR(1) \quad (8)$$

$$(2.074618) \quad (3.66628) \quad (61.92663)$$

$$R^2 = 0.996092 \quad F = 4205.346 \quad D.W = 1.642485$$

$$LNIM = 6.887365 + 0.187364 LNFDI + 0.964490 AR(1) \quad (9)$$

$$(3.465971) \quad (1.428336) \quad (38.50376)$$

$$R^2 = 0.986546 \quad F = 1209.938 \quad D.W = 1.670853$$

$$LNTN = 9.304115 + 0.293007 LNFDI + 0.978004 AR(1) \quad (10)$$

(2.735174) (2.843704) (55.75281)

$R^2=0.994676$ $F=3082.929$ $D.W=1.542044$

After model correction, the frequency of the residual variance curves passing through the zero curves was greatly increased, the DW value came close to the reasonable range and the autocorrelation was eliminated.

On this basis, a stationary test was conducted on the residual terms of the equation, including ε_1 , ε_2 and ε_3 . If the residual terms are stationary, then there is a co-integration relationship between the amount of FDI in China and China's import and export value with the US; (i.e., the estimation of the above equation exists). If the residual term has a unit root and is non-stationary, then there is no long-term co-integration relationship between FDI in China and China's import and export trade with the US. In other words, the estimation of the above equation is wrong. The test results of the residual terms are shown in Table 18.

Table 18: Stationary Tests of Residuals of the Equation

Variables	ADF Test Statistic	Test critical values			Stationarity	Type Test
		1%	5%	10%		
ε_1	-4.783978	-2.632688	-1.950687	-1.611059	Stationary	(0,0,0)
ε_2	-5.231943	-2.632688	-1.950687	-1.611059	Stationary	(0,0,0)
ε_3	-4.674098	-2.632688	-1.950687	-1.611059	Stationary	(0,0,0)

It can be seen from Table 18 that at the significance level of 1%, the residual terms of the three models passed the stationary test. Therefore, it can be considered that the residual terms of the three models are stationary, and there are co-integration relations among the three groups of variables; (i.e., there is a long-term stationary equilibrium relationship between FDI in China and the Sino-US volume of imports and exports). Models (8), (9) and (10) respectively represent the equilibrium relationship between FDI in China and

China's export trade to the US, import trade and total volume of imports and exports between China and the US.

5.3.3.4. Granger causality test

The above test process shows that there is a long-term equilibrium relationship between FDI in China and China's export volume to the US, and between China's import volume to the US and China's total volume of imports and exports to the US; however, it remains unclear whether this relationship can be called causality. Hence, Granger causality test is carried out on FDI in China, on China's export volume to the US and on China's total volume of imports and exports to the US, to test the existence of causality between the variables.

The following two regressions need to be carried out to do the Granger causality test:

$$Y_t = \sum_{i=1}^m \alpha_i X_{t-i} + \sum_{i=1}^m \beta_i Y_{t-i} + \mu_{2t} \quad (11)$$

$$X_t = \sum_{i=1}^m \lambda_i Y_{t-i} + \sum_{i=1}^m \delta_i X_{t-i} + \mu_{1t} \quad (12)$$

The above two regressions are classified and discussed below:

- (1) If the coefficient set with Y lagged term in (12) is statistically different from 0, and the coefficient set with X lagged term in (11) is statistically 0, then there is a one-way causal relationship from Y to X;
- (2) If the coefficient set with X lagged term in (11) is statistically different from 0, and the coefficient set with Y lagged term in (12) is statistically 0, then there is a one-way causal relationship from X to Y;
- (3) If the lagged coefficients of X and Y are statistically different from 0 in both regressions, then there is a two-way causal relationship between X and Y;
- (4) If the lagged coefficients of X and Y are statistically 0 in both regressions, then there is

no causal relationship between X and Y.

The specific practice of Granger causality test is to carry out constrained regression and unconstrained regression first, and then use the quadratic sum of the two residuals obtained to calculate the F-test statistic. The Granger causality test among FDI in China, Sino–US import and export volume and total trade volume is also conducted in EViews 8.0. The test results are shown in Table.

Table 19: Granger Causality Test Results

<i>Null hypothesis</i>	<i>F test statistic</i>	<i>P value</i>	<i>Conclusion</i>
LNFDI does not Granger Cause LNEX	2.88537	0.0540	Rejected
LNEX does not Granger Cause LNFDI	0.21584	0.8845	Received
LNFDI does not Granger Cause LNIM	0.47702	0.7009	Received
LNIM does not Granger Cause LNFDI	1.17754	0.3367	Received
LNFDI does not Granger Cause LNTN	1.01617	0.4009	Received
LNTN does not Granger Cause LNFDI	0.45758	0.7142	Received

It can be concluded from the test results in Table that, First, there is a one-way Granger causality between FDI in China and China’s export trade with the US at the significance level of 10% (i.e., the increase of FDI in China expands China’s export volume to the US), but the growth of China’s export trade to the US is not the Granger cause of FDI in China. Second, there is no Granger causality between FDI in China and China’s import trade with the US (i.e., the increase of China’s import trade is not caused by the increase of FDI in China), and the increase of FDI in China is not the cause of the expansion of Sino–US import trade. Finally, there is no Granger causality between FDI in China and total volume of import and export Sino–US trade.

Of course, Granger causality test is not to test the causality in real sense, but the statistical causality. Therefore, the results of Granger causality test can only support the real causality

but cannot be the most fundamental basis for affirming or negating the causality among variables.

Analysis of test results

Through the above test and analysis, it can be concluded that there is a long-term equilibrium relationship between FDI in China and Sino-US import and export trade. Equations (8), (9) and (10) are the co-integration equations which can respectively represent the relationship among FDI in China, Sino-US import and export trade and total trade volume.

Co-integration Equation (8) presents the regression results between FDI in China and China's export trade with the US. The R² of the equation is 0.996092, and the coefficient of FDI in China is positive and passes the significance test at 1%, indicating that the increase of FDI in China promotes the growth of China's export trade to the US. The coefficient of FDI in China is 0.370906, which means that every 1% increase in FDI in China entails a 0.370906% increase in China's export trade to the US. The equation also shows that there is a complementary relationship between FDI in China and China's export trade to the US.

Co-integration Equation (9) shows the regression results between FDI in China and China's import trade to the US. The R² of the equation is 0.986546, the coefficient of FDI in China is positive, but the coefficient did not pass the significance test, suggesting that the increase of FDI in China has no obvious impact on China's import trade with the US. The analysis of Equations (8) and (9) shows that FDI in China exerts a significantly positive impact on China's export trade to the US but has a limited impact on China's import trade with the US, thereby increasing the trade surplus.

Co-integration Equation (10) presents the regression results between FDI in China and total import and export volume between China and the US. The R² of the equation is

0.994676; the coefficient of FDI in China is positive and passes the significance test at 1%, indicating that the increase of FDI in China promotes the development of Sino–US trade. The coefficient of FDI in China is 0.293007, indicating that for every 1% increase in FDI in China, the import and export volume between China and the US will increase by 0.293007% (i.e., the development of FDI in China exerts a role in promoting the development of Sino–US trade).

The Granger causality test shows that there is a one-way Granger causality between the amount of FDI in China and China’s export volume to the US at the significance level of 10%. This indicates that the increase of FDI in China promotes the development of China’s export trade to the US, thereby increasing China’s trade surplus to the US.

Robust analysis of the FDI factor model of Sino–US trade imbalance

To test the robustness of the model analysis results, the methods of lagging the explanatory variables by one period, shortening the sample period, and replacing variable data are used. The sample period is shortened by using the sample data from 2001 to 2019. At the same time, China’s statistical trade volume is replaced by the US statistical trade volume. The estimated results obtained are given in Table 20.

Table 20: Robustness test results

Variable	Lagging the explanatory variables by one period			Shortening the sample period			Replacing variable data		
	LNEX	LNIM	LNTN	LNEX	LNIM	LNTN	LNEX	LNIM	LNTN
LNFDI	1.131198***	0.756788***	0.972023***	1.692787***	1.645228***	1.677662***	1.306345***	1.716849***	0.735346***
C	-0.095638	1.422136***	1.284049***	-3.756008***	-4.471377***	-3.348611***	-0.824676	-5.126803***	3.577231***

Note: *** means that the coefficient is significant at the 1% level.

Source: EViews measurement analysis collation

According to the above test results, it can be seen that whether it is to use explanatory

variables with one period of lag, shorten the sample period or replace variable data, the estimated coefficients of LNFDI in each model are positive, and all have passed the 1% level of significance test, indicating that FDI in China has a significant positive impact on China's export trade to the US, China's import trade to the US, and the total volume of Sino-US import and export trade, which is consistent with the previous conclusion, indicating that the model estimation result is robust.

5.4. THE STRUCTURAL AND TRADE POLICY FACTORS OF THE TRADE IMBALANCE BETWEEN CHINA AND THE US

5.4.1. The structural of the trade imbalance between China and United States

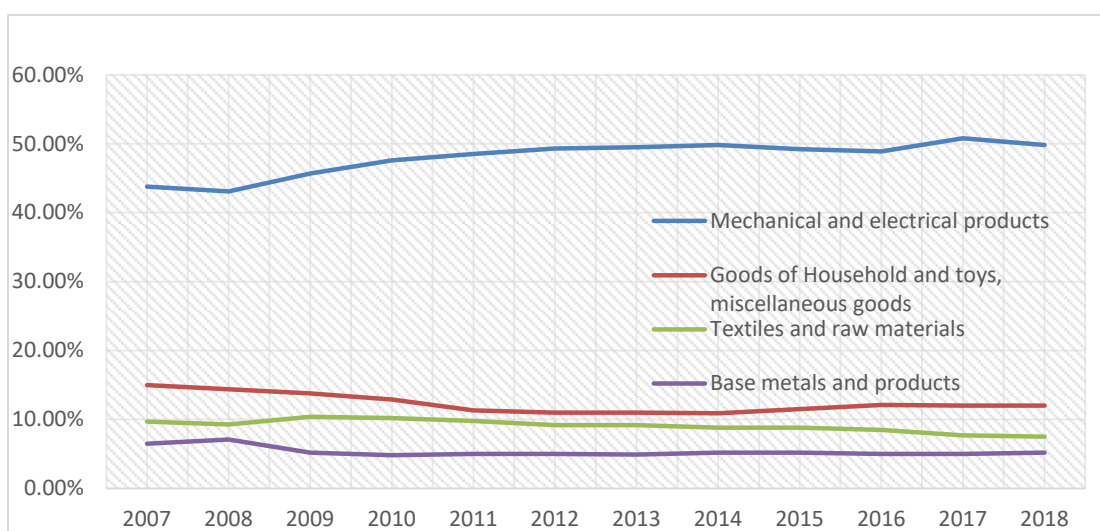
The respective factor endowment structures of the China and the US determines their division of labour and trade structure. This is the conclusion of trade theory [180]. As is well-known, the fundamental realities of the two countries are that China is the world's largest developing country, and the US is the largest developed country in the world. Moreover, the US has entered a 'post-industrial society,' with abundant capital and technology; however, the labour cost is high. Consequently, traditional labour-intensive and resource-intensive manufacturing are transferring to Latin America and Asia. Therefore, the demand for daily necessities of the citizen of the US only can rely on massive import. Meanwhile, China's comparative advantage lies in the low price of labour and land, but it relatively lacks capital and technology. According to the resource endowment, China should export labour and resource-intensive products to the US, which in turn should export capital and technology-intensive products to China.

The structure of goods traded between China and the US

China's exports to the US are mainly mechanical and electrical products. Household

appliances, toys, textiles, base metals, and the products are also the major components of China's exports to the US. As shown in Figure 1, the export of mechanical and electrical products has always accounted for the largest proportion of China's total exports to the US from 2007 to 2018, with an average value of 48.1%. The overall trend is one of slow increase. China's second-largest export to the US was home toys, with an average share of 12.1%. Moreover, exports of textiles and raw materials accounted for an average of 9.1% of total exports of China to the US. Meanwhile, exports of base metals and products accounted for an average of 5.4%.

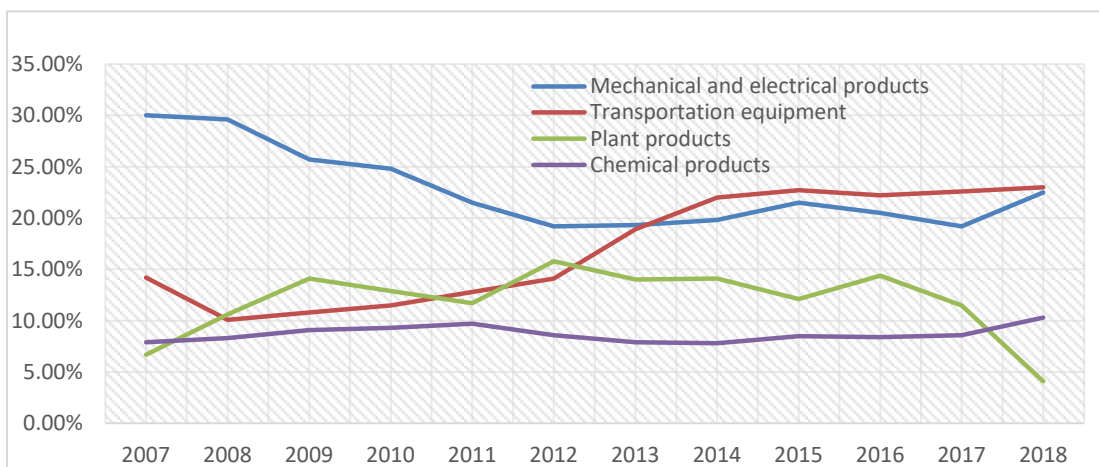
Figure11: China's exports of major commodities to the US from 2007 to 2018 (%)



Source: Author draws on the data from the National Report of the Ministry of Commerce of China

Mechanical and electrical products, transportation equipment, and plant and chemical products are China's main imports from the US. Figure 2 shows the percentage of China's total imports of major commodities from the US from 2007 to 2018. Among them, the average proportion accounted for by mechanical and electrical products is 2.8%, and those of transportation equipment, plant products, and chemical products are 17.1%, 11.8%, and 8.7%, respectively.

Figure 12: The proportion of China's total imports of major goods from the US from 2007 to 2018 (%)



Source: Author draws on the data from the National Report of the Ministry of Commerce of China

As shown in Figure 2, China's mechanical and electrical products purchased from the US showed a decreasing trend first and then increasing from 2007 to 2018. The import of transportation equipment decreased first and then increased, plant products fluctuated continuously, and the import of chemical products changed relatively slightly.

From the perspective of the structural characteristics of the goods traded between China and the US, technology and capital-intensive products HS84-85 (mechanical and electrical products) were the main products exported from the former to the latter from 2007 to 2018, accounting for an average of 48.1%. The proportion accounted for by mechanical and electrical products in China's imports from the US is only 22.8%, on average, showing a significant trend of decline. It reflects the structural imbalance in goods traded.

According to the factor endowment theory of Huckster-Ohlin, under the premise of free trade, the trade of goods among countries is determined by their relative factor endowment. Moreover, countries or regions participating in international trade tend to produce and export (import) their relatively abundant (scarce) factor-intensive commodities [181]. Therefore, based on the premise of free trade and different factor endowments, economic

development, and technological level between China and the US, China should use its comparative advantages of low cost of labour, land, and other resources to produce and export traditional labour-intensive products. Meanwhile, the US should produce and export capital or technology-intensive products. However, according to the above data of actual trade statistics, the result is the opposite because of the following.

First, the US is free to import China's labour-intensive products; however, it has placed many restrictions on its domestic enterprises' export of technology-intensive products to China, which has led to a decline in its export to China and contributed to the trade imbalance [182,183]. Second, due to the huge gap in the level of economic development between China and the US, the demand structure of the two countries' residents is also greatly different. People's consumption choices are closely related to their income level. When the income level is low, most people's expenditure will be concentrated on necessities, such as food. When people's income level is relatively high, they can buy high-end products, in addition to necessities, to improve their welfare level. The reality is that most of the labour-intensive goods made in China are necessities of life, whereas the high-tech products made in the US are high-end products. As we all know, people must buy daily necessities, regardless of their income level. As a result, the US is bound to import many labour-intensive products produced in China, resulting in a huge trade gap between the two countries [184].

5.4.2. The trade policy factors of the trade imbalance between china and the US

Considering the subjective factors that affect the trade imbalance between China and the US, trade policies adopted by these countries, based on their own economic development, speed up and deepen the trade imbalance between China and the US, In the absence of effective international economic rules and systems, the trade imbalance between China and the US is a political and economic behaviour aimed at the rapid development of their own

economy and the maximisation of their economic interests.

5.4.2.1. The foreign trade policy choice of the US and trade imbalance between China and the US

United States policy on export control of high-tech products

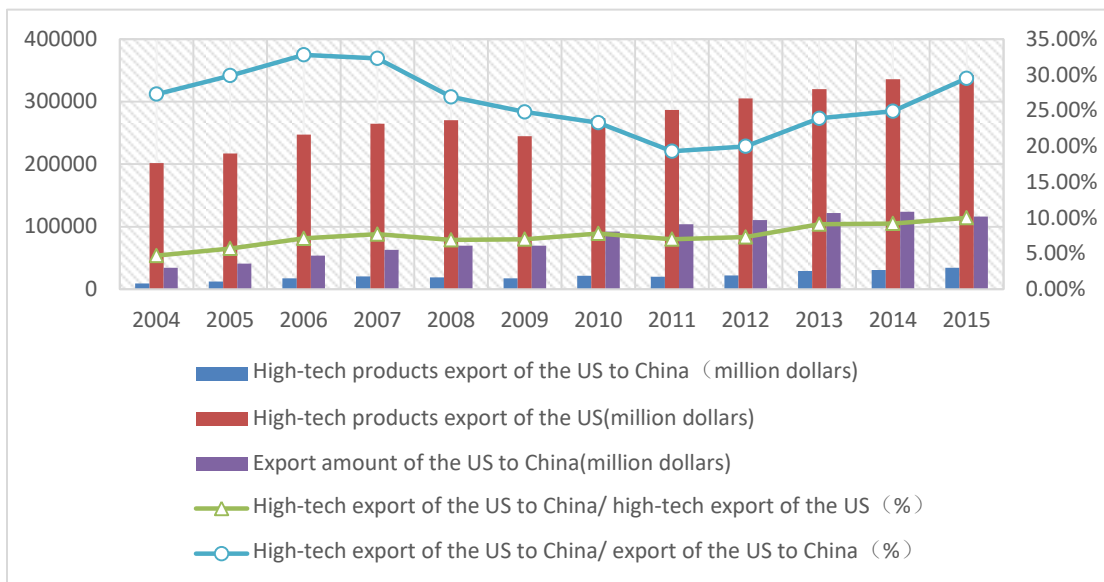
The export control policy of the US began in the 18th century, during World War II. Because of the national security concerns in the US, the US implemented export controls of military and supplies to fascist states. After World War II, the US adopted a policy of export control, economic sanctions, and anti-dumping to the socialist camp headed by the Soviet Union.

From the situation of export control of the US to China, at the beginning of the People's Republic of China founding, the US exercised comprehensive control over China's exports. After World War II, the export administration act of the US Department of Commerce divided export control over foreign countries into eight levels: the strictest control is Z, then S, Y, W, Q, T, P, and V in proper order. In the 1970s, the US imposed a long-standing trade embargo and a total embargo on China, placing China in the Y category of export controls. In the 1980s, China and the US eased their relations, and the two countries signed the Shanghai joint communique, which reduced the level of trade control of the US against China to the V level. After the 1990s, the rapid development of China strengthens the United States' awareness of the crisis. Hence, the US government began blocking preferential policies for technology export to China and imposed export restrictions on the high-tech fields to China. On the choice of policy, the US has always prioritised national security and political interests over economic interests, despite China's growing trade surplus with United States. To ensure that the overlord of the world economic status will not be transcended and replaced, the US control the export of high and new technology, which has absolute advantages. It is willing to face the foreign trade deficit increased year

by year.

The export of high-tech products from the US to China can be divided into three levels. First, green goods (i.e., that do not threaten United States national security) can be exported to China after being examined and approved by the US Department of Commerce. Second, the yellow goods (of dual-use technologies) must be examined by the US Department of Defence before they can be exported. Third, red commodities, representing sensitive strategic technologies, are strictly prohibited for export to China.

Figure 13: High-tech product export of the US to China from 2004 to 2015 (million dollars, %)



Source: [179]

Figure 13 shows that the US high-tech exports to China have been around 20 to 30%, which is still low compared with the proportion of the US economy accounted for by high-tech industry. Undeniably, China is the largest trading partner of the US; however, the most competitive high-technology exports of the US to China accounted for only 4.7% in 2004. This proportion rose gradually and reached 10% in 2015. However, this is still small compared with China's demand for imports from the US high-tech industry and its ability to export. Fortunately, the proportion of high-tech exports from the US to China has

increased, indicating that the restrictions on high-tech exports from the United are gradually easing.

From the foreign trade theory, high-tech fields are the comparative advantage industry of the US foreign trade. However, the export restrictions of high-tech products at different levels imposed by the US on most countries, especially on China, have greatly reduced the export of US high-tech products to all countries or through other countries' detour. When the US imports many labour-intensive products from China and other developing countries, and oil resources from oil exporters, the division of labour among international industries is broken. This inevitably leads to the trade deficit of the US and the trade surplus of China. The policy choice of the US is an important factor causing the current trade imbalance between China and the US.

Interest groups and the US export control policies for high-tech products

Interest groups are important forces in the political and economic pattern of the US. Although they are not in the centre of power, they can influence foreign trade policy by exerting pressure on congress, the government, the President, and relevant agencies.

As early as during the US Revolution, a group of agitators for United States independence had emerged: 'The US is the country where interest groups flourish most.' In the 1880s and 1890s, as industrialisation accelerated, the number of United States enterprise associations exploded. The 1920s were a golden age for interest groups, and influential organisations, such as the USCC, NAM, AMA, NAACP, NUL, NFU and AIPAC, were founded during this period. Since the 1960s and 1970s, under the background of accelerated economic globalisation and the passing of the most intense period of the 'cold war,' United States interest groups have ushered in another period of great development. In 1993, the number of interest groups increased by 50% compared with that of 1980 to about 23,000 or five times that of 1955 [185].

Every major issue in the China–United States trade relationship is a bone of contention among American interest groups, who engage in many public relations and lobbying to defend their interests. For example, export control has always been a critical issue in the China–United States trade relations. Two kinds of opinions in the US support and oppose export control. Especially since the end of the ‘cold war,’ different factions have been fiercely debating over the reform of export control system; they are divided into ‘national security’ and ‘economic security.’ ‘National security’ believes that the national security must be placed in the core position. This would undermine the US security if the cutting-edge technology is exported to the countries that may be hostile to the US. Moreover, if this technology is sold to the unstable regime, these techniques can be used against the US or its Allies in the future. Relaxation of export controls for short-term commercial gain must not bring disaster to national security. Meanwhile, ‘economic security’ argues that although some equipment and technology exports may be harmful to national security and foreign policy, the current export control measures in the US are too strict. This may cause declining competitiveness and losing market share. Moreover, some of the US key industries will suffer because of the stringent restriction on export overseas jobs. Therefore, to strengthen the economic security while defending national security, the export controls must be relaxed.

The US business circles represent supporters of the economic security theory. Their criticism of the US export control policy toward China mainly focuses on the following five aspects: (1) the broad range of regulated products harms United States businesses by limiting the export of many products or technologies that have no military application value. (2) Unclear regulatory rules and uncertain approval processes have discouraged Chinese companies to do business with United States companies, thereby increasing the uncertainty of the normal China–United States trading environment. (3) They fail to take full account of the foreign availability of United States technology, and thus, United States companies lost the Chinese market. (4) The overly conservative export control policies of the US limit the further development of United States multinationals in China, which may cause United States companies to lose their competitive advantage. (5) Current United

States export control policies are damaging the US industrial base and will ultimately undermine the US national security interests.

Therefore, the business community actively promotes the liberalisation of the US government's export control to China, and its efforts effectively balanced the political influence of the 'national security faction.' In 2000, the Rand Corporation made the following proposal to the US President: America's substantial export control interests should be promoted openly, rather than being unstoppable or uncontrollable. In May 2005, the American chamber of commerce in China sent representatives from Beijing and Shanghai to attend the Washington government meeting and jointly appeal to 43 influential officials about timely updating of unnecessary export restrictions for China.

United States foreign trade policy has a remarkable decision-making system, and interest groups play an important role in the decision-making and implementation. The interest groups that play an important role in the decision-making and implementation of China's trade policy are mainly industrial and commercial interest groups, labour organisations, and ideological interest groups. With the deepening development of Sino-US economic and trade relations, the interest groups concerned with China issues are becoming diversified. They conduct lobbying activities, political donations, elections, and public opinion-making according to their own positions. Moreover, they strive to realise their own interests and those of their members. The complexity of China-related interest groups determines that the US trade policy toward China is periodic and volatile.

5.4.4.2. The choice of China's foreign trade policy and trade imbalance between China and the US

China's import substitution and export-oriented foreign trade policy

During the founding of the People's Republic of China and the implementation of the

reform and opening-up policy in 1978, China was in a relatively closed stage of self-development. After the reform and opening up, China implemented import substitution and export-oriented foreign trade policies to promote the development of the domestic economy and the increase in foreign exports.

From the perspective of the policy tool of import substitution policy, in the early 1980s, China implemented high tariffs and an import quota and license system to guarantee China's foreign exchange reserves by restricting imports. Since the 1990s, with the implementation of export-oriented policies and the increase in the scale of foreign exports, the types of commodities subject to import license administration in China have been continuously reduced. Moreover, since the beginning of the 21st century, China has lifted the import restrictions imposed by license.

The export-oriented policies tools are mainly composed of export subsidies, export rebates, and export credits. At the beginning of the reform and opening up, Chinese enterprises export competitiveness is weak; hence, some export enterprises are in the red. To improve the production technology of domestic enterprises and the management ability and lead the enterprises to learn from developed countries and those with strong competitive strength, China's national finance subsidises trade losses, which played an important role in the early stage of China's foreign trade. Simultaneously, the product tax, value-added tax, and consumption tax paid by export enterprises shall be subject to a tax refund administration to reduce the tax burden on export enterprises, guide domestic enterprises to develop export business, and participate in international competition. Later in the 1990s, China's export situation takes a turn for better. In particular, to help enterprises realise self-sustaining, China reduced and eventually eliminated the export subsidy policy to foreign trade enterprises. Moreover, the export tax rebate rates were cut; however, after the Asian financial crisis in 1997 and the subprime crisis in 2008, the export tax rebates were reimplemented. Nonetheless, the overall trend is that the export-oriented policy gradually weakening.

From the perspective of China's own situation, the choice of import substitution and export-oriented policy is based on its own interests and economic development. First, China's import substitution and export-oriented policies are the result of foreign experience. From the 1950s to the 1980s, Japan had transferred the import substitution model to the implementation of an export-oriented model, and it realised the rapid development of the economy. Then, four Asian tigers also followed the experience of Japan, expanded their scale of export, and became a moderately developed country (region). Thus, export-oriented policy succeeded in many Asian countries (regions), which followed the templates and referred to China's development. Second, China's import substitution and export-oriented policy are the direct choice to solve the problem of foreign exchange shortage. In the early days of reform and opening-up, China's foreign exchange reserves were relatively small. Before 1980, China's foreign exchange reserves were less than \$1 billion. In 1980, they were -\$1.3 billion; this serious shortage of foreign exchange reserves poses a threat to the national security. At that time, China learned from the experience and lessons of Latin American countries that experienced debt crisis caused by excessive external debt. Moreover, one of China's important goals at that time was to increase foreign exchange reserves by exporting.

The implementation of China's export-oriented foreign trade policy plays an important role in the development of China's economy for three main reasons. First, export-oriented policies have driven China's economic growth. Export-oriented policies strongly supported the growth of China's exports and promoted the rapid development of other domestic sectors through the export sector. Thus, China's economy has achieved rapid development since the end of the war and has undergone earth-shaking changes in just a few decades. Second, export-oriented policies have eased China's tight job market and insufficient consumption demand. With China's large population, backward economic development, and insufficient consumer demand, the development of export enabled China's human resources and resource advantage to play. The foreign consumer demand pulled the development of the supply side of the domestic industry, alleviated the employment difficult situation at the time, increased the residents' income, and boosted the growth of

China's own spending power. Third, export-oriented policies have increased China's foreign exchange reserves and prevented China from suffering a major financial crisis. With the expansion of exports, China's foreign exchange reserves gradually increased. In 1997, China's official foreign exchange reserves reached \$139.89 billion, which is 837 times the level at the beginning of the reform and opening up in 1978. By the end of 2015, China's foreign exchange reserves reached \$3,330.36 billion, 23.8 times the level in 1997, accounting for 30.5% of the global total foreign exchange reserves. Because of its abundant foreign exchange reserves, China did not experience a major financial crisis during the Asian financial crisis in 1997 and the rapid development of international hot money, thus creating a favourable external environment for China's economic and financial development [159].

Additionally, under the export-oriented foreign trade policy, the rapid development of China's export will inevitably bring some negative effects on China. These negative effects are mainly reflected in the formation of China's relatively extensive economic growth mode, high dependence on foreign trade, slow development of domestic demand, especially consumer demand, serious energy consumption and environmental pollution, and low monetary policy independence.

China's foreign investment policy of encouraging exports

To acquire capital, more high-quality technology, and management level by foreign investment, China has implemented more preferential encouragement policies for foreign investment than for Chinese enterprises. An example of these encouraging policies is foreign exchange loans from foreign Banks in China that may be converted into Yuan. Another example is the preferential policies in taxation, environmental protection, and access to credit to attract foreign capital provided by all local governments. For local governments, foreign investment is a relatively low-cost way to boost local economic growth; it can also maximise the political utility of the local government during its term of office. Moreover, because of China's capital controls, the import substitution policy

adopted by China to prevent payment crisis makes it difficult for domestic economic organisations and individuals to meet their import needs. Even if China had the money, the cost is high for local governments, and realising these needs is difficult. The way of foreign investment avoids the problem of exchange and meets the import demand of foreign equipment.

When China was short of funds, technology, and equipment, the encouraging policies of foreign investment increased China's export scale. Moreover, the technological level and management ability of Chinese enterprises were significantly improved, and the growth rate of China's economy was accelerated. However, the number of foreign exchange funds and the destruction of resources and environment are notable.

The choice of national trade policies of China and the US has an important influence on the direction and degree of the trade imbalance between the two countries. However, both the United States' export control policies of high-tech products and China's export-oriented policies are the policy choices based on their own economic interests and national security at that time. These policies are more beneficial than harmful to the country itself, but the effect of these policies on major trading partners is to increase imbalances in their trade and the global economy. Do these policies do more good for them than they do harm for the world economy as a whole? In the absence of an international policy coordination mechanism, the global economic imbalance is the political and economic behaviour of each country aiming at the rapid development of its own economy and the maximisation of its economic interests, which objectively produces the synthetic fallacy of global economic development.

5.5. SUMMERY OF CHAPTER FIVE

This chapter shows that there is a long-term co-integration relationship among Sino-US trade surplus, exchange rate, and the difference in national saving ratio between China and the US, which shows a stable development trend. Specifically, the real exchange rate of

RMB against USD plays a significant negative impact on Sino-US trade surplus, indicating that the Sino-US trade surplus does not decrease with the relative appreciation of RMB and the scale of Sino-US trade imbalance accelerates. The difference in national saving ratio between China and the US plays a significantly positive impact on the Sino-US trade surplus (i.e., the greater the difference in national saving ratio between China and the US, the greater China's trade surplus with the US). The difference in national saving ratio between China and the US is an important reason for the continuous growth of China's trade surplus with the US in international trade. There is a unidirectional Granger causality relationship between FDI in China and the value of China's exports to the US below a significant level of 10%, showing that the increase of FDI in China promotes the development of China's exports to the US and thus enlarges China's trade surplus with the US. The result shows that the issue of Sino-US trade balance is not only essentially an issue of Sino-US trade, but it has also become the issue of trade deficit transfer led by enterprises which do FDI in China. In a manner of speaking, foreign-invested enterprises in China are the producer of China's foreign trade imbalance. On the one hand, the growing Sino-US trade surplus is essentially the result derived from the trade surplus of East Asian countries and regions with the US. Foreign-invested enterprises has not only directly produced a huge trade surplus, but also converted the goods that China would have had to import into the goods that are produced and processed in China. These two factors have increased the scale of the Sino-US trade imbalance. With the expansion of US direct investment in China, the trend of Sino-US trade imbalance may also increase further.

China's export-oriented trade policy has made the Sino-US trade imbalance long exists. Choice of national trade policies by China and the US plays an important role in influencing the direction and degree of Sino-US trade imbalance. However, both export control over high-tech product export by the US and China's export-oriented policy are determined based on their own interests, such as economic interests and national security, and such choice shows advantages which outweigh disadvantages for their own, but the effect of these policies on major trading partners lies in the increase of imbalance in both their trade and the global economy.

6. THE IMPACT OF SINO–US TRADE IMBALANCE

6.1. CHAPTER OVERVIEW

In this chapter, selective analysis and discussion on the impact that Sino–US trade imbalance brings to the respective economies of China and the US, as well as the impact of Sino–US trade imbalance on the trade friction between China and the US, are conducted. Meanwhile, it also explores and analyses the impact of Sino–US trade imbalance on the environment, income gap, industrial upgrading, scientific and technological advancement, and employment, etc.

This study assumes that China objectively widens the economic gap with the US while maintaining a surplus in Sino–US trade. Despite the US runs a trade deficit with China, the Sino–US trade has accelerated the development of the US economy. In this chapter, an econometric model based on relevant economic theories will be established to verify this. China’s foreign trade pattern mainly based on processing trade also explains why China is at a disadvantage in the distribution of trade benefits, and this reason will also be discussed in this chapter.

6.2. THE IMPACT OF SINO–US TRADE IMBALANCE ON THE ECONOMY OF CHINA AND US

6.2.1. Empirical study on the impact of Sino–US trade imbalance on China’s economic interests

At present, the international trade is dominated by transnational corporations, with production factors flowing among countries. International division of labour and industry transfer make it impossible for traditional trade theories to accurately reflect the real gains

and losses of a country's foreign trade, and the surplus and deficit of foreign trade are no longer the criteria to define the gains or losses of a country's foreign trade. China's economy is export-oriented. High investment rate has created many jobs and promoted the development of China's dual economy. However, the excessive dependence of economic growth on export-oriented economy and the US market increases the operational risk of China's economic development. Affected by diminishing marginal effects, the impetus of export to China's economy is gradually weakening.

Imbalance of Sino-US Trade Benefits Distribution

The issue of benefits distribution in international trade has always been the focus in international trade. From the perspective of trade effect, trade benefits include static trade benefits and dynamic benefits [186]. Static trade benefits refer to the direct economic benefits obtained by both trading parties when the total amount of resources and technology remain unchanged. Dynamic trade benefits refer to the indirect positive influence on the economic and social development for both sides after the trade starts by means of international division of labour and exchange.

Heckscher [186] preliminarily established an analytical framework for the impact of trade on factor prices. The trade benefits change the income of different factor owners through the change of factor prices, and non-trade participants can also attend the distribution of trade benefits through the change of factor prices [187]. Lewis [187] further expanded the sources of trade benefits. The trade benefits are not only limited to the fields of production and consumption but should also contain value concepts and other aspects. Trade stimulates people's desire for more production or labour efficiency promotion by introducing new commodities to the society for demand stimulation [188]. Kahn stated that, according to the report from Morgan Stanley, Sino-US trade saved nearly 100 billion USD for American consumers and created 4 million new jobs for the US in 2004 alone [189]. A joint study was conducted by the Centre for Strategic and International Studies and Institute for International Economics, Bergsten, Bates, Lardy and Perck concluded that

Sino–US trade increased nearly 70 billion USD wealth for the US [190]. Based on the Oxford Macroeconomic Forecasting Model, a report of Oxford Economics and the Signal Group showed that Sino–US trade could increase 0.7% in GDP for the US and reduce 0.8% in the inflation rate by 2010 [191]. Despite China has gained a large surplus from its trade with the US in Sino–US trade, it turned out to be China’s foreign exchange reserves and flowed into the capital market of the US. Thus, Elwell believed that it was the inflow of Chinese capital that effectively reduced the long-term interest rate of the US and supported the economic development of the US [192]. Zhang and Dai argued that the US not only occupies the high value-added links in the global value chain to monopolise the huge interests in the value chain, but also gains benefits through FDI. The trade gap between China and the US cannot prove that the US becomes the loser while China becomes the gainer [193]. Wang combined the development of productivity, the change of labour value and the comparative benefits of trade and established the theoretical framework of dynamic comparative cost based on the theory of labour value. He deemed that when developing countries take advantage of their comparative advantages to participate in the division of international trade, they must bear the trade national value loss [194]. Samuelson adopted the traditional free trade model and analysed the distribution of Sino–US trade benefits. He asserted that under the premise of demand inelasticity, China’s technological innovation would not only lead to deterioration of trade conditions and GDP deduction, but also shake the leading economic status of the US, resulting in that the US could not profit from China’s expanded product export [195].

Above all, trade benefits are the core issue of foreign trade, and economists have long focused on it and made the corresponding studies. Subject to the characteristics in era and their own interests of tendency, the conclusions reached also are different. Hence, constructing a model that can reflect the Sino–US trade and Sino–US economic gap to measure the Sino–US trade benefits is of great significance in figuring out and further alleviating the imbalance and trade frictions between the two.

6.2.1.1. Model description

This chapter attempts to judge the distribution of trade benefits (i.e., to investigate the results of benefit distribution from the general impact of benefit distribution on a country's economy and on the macro level. The logic of this chapter is as follows: if the benefit distribution of Sino-US trade is unbalanced, then the trade will definitely exert different degrees of impacts on the economic development of the two countries—that is, the advantageous party in the distribution will benefit more and thus the trade will promote its economy more than the disadvantageous party. In short, if the benefit distribution is uneven, the trade expansion and economic gap will be inevitable, the former is the cause, and the latter is the result. Conversely, if trade expansion and economic gap occur, then unbalanced distribution of trade benefits, the only reason, exists.

The specific empirical analysis is to test the correlation between China's exports to the US and the Sino-US economic gap. If the regression coefficients of China's exports and the Sino-US economic gap are positive, then China's exports have widened the Sino-US economic gap, and the distribution of trade benefits is adverse for China, and vice versa. In this thesis, considering that the export commodities contain domestic elements and resources, and the imported commodities contain foreign elements and resources, China's exports to the US are used to replace China's total import-export volume to the US. Such replacement can endow the analysis with more representativeness and practical significance. At the same time, because the econometric method used in this thesis is co-integration, and because the co-integration relationship between two variables does not affect the co-integration relationship between other variables and the two variables, the above replacement is reasonable in measurement theory.

In addition, the calculating equation of national income by expenditure approach, $GDP=C+I+G+(NX)$, shows that in addition to trade, the factors affecting a country's economic development include consumption, investment and government purchase. The difference between the GDP of China and the US is given as follows:

$$GDPB = GDP_A - GDP_C = (C_A - C_C) + (I_A - I_C) + (G_A - G_C) + (NX_A - NX_C)$$

To establish a regression model, the consumption, investment, government purchase and net export should be included in the model. However, this chapter discusses the distribution of trade benefits, and the distribution result is embodied as the effect of exports on economic development. In addition, during the analysis period from 1983 to 2019, the trade structures of China and the US did not change greatly, indicating that the consumption, investment and government purchases of China and the US did not exert enough impacts on the trade structure. Hence, when establishing the model, it is assumed that consumption, investment and government purchases are unchanged, and only the relationship between exports and economic gap is discussed.

Based on the above explanation, this thesis intends to establish the following model to test the relationship between China's exports to the US and the Sino-US economic gap:

$$GDPB = c + \alpha \times EX \quad (1)$$

where GDPB represents the Sino-US economic gap, which is defined as the total GDP of the US subtracting the total GDP of China, EX represents China's exports to the US, and c is a constant term. The regression parameters are estimated with EX as the explanatory variable. If the coefficient α of China's exports to the US is significantly positive, then the exports have widened the Sino-US economic gap (because $GDPB = US \text{ GDP} - \text{China's GDP}$); if the coefficient of exports is significantly negative, then the exports have narrowed the Sino-US economic gap.

6.2.1.2 .Econometric test

Because general economic indicators have a certain trend, if they are directly regressed, they can basically show a certain correlation. Therefore, to confirm the long-term equilibrium relationship between China and the US, it is necessary to conduct a co-integration test. The economic significance of co-integration test lies in that although

two variables have their respective long-term fluctuation law, as long as they are co-integrated, there is a long-term stationary proportional relationship between them. This is because if two sequences can be linearly combined into a new and stationary sequence, then there is a certain long-term stationary relationship between the two sequences, and the residual term produced by regression analysis of the two sequences can be regarded as the linear combination thereof. In this way, it is only required to prove that the residual term is integrated, and the integration order is smaller than that of the original sequences. In this thesis, the E–G two-step method is used to conduct the co-integration test.

6.2.1.3. Data source

Table 21: The Difference in GDP between China and the US and China’s Exports to the US

Year	The US GDP	China’s GDP	GDPB	China’s exports EX
1983	36300	2307	33993	17.10
1984	40400	2599	37801	23.00
1985	43400	3095	40305	26.50
1986	45800	3008	42792	24.70
1987	48600	2730	45870	29.60
1988	52400	3124	49276	33.80
1989	56400	3478	52922	43.90
1990	59600	3609	55991	51.90
1991	66100	3834	62266	61.90
1992	65200	4269	60931	85.04
1993	68600	4447	64153	169.64
1994	72900	5643	67257	214.61
1995	76400	7345	69055	247.29
1996	80700	8637	72063	267.08
1997	85800	9616	76184	327.18
1998	90600	10300	80300	379.65
1999	96300	10900	85400	420.18
2000	102500	12100	90400	521.42
2001	105800	13400	92400	543.19
2002	109400	14700	94700	699.59
2003	114600	16600	98000	925.10
2004	122100	19600	102500	1249.73
2005	130400	22900	107500	1629.39
2006	138100	27500	110600	2035.16

2007	144500	35500	109000	2327.61
2008	147100	45900	101200	2523.27
2009	144500	51000	93500	2209.05
2010	149900	60900	89000	2833.75
2011	155400	75500	79900	3245.65
2012	162000	85300	76700	3520.00
2013	167800	95700	72100	3684.81
2014	175200	104800	70400	3961.47
2015	182200	110600	71600	4101.45
2016	187100	112300	74800	3891.13
2017	194900	123100	71800	4331.46
2018	205300	138900	66400	4798.12
2019	213700	143400	70300	4179.36

Data sources: [178,179]

In Table 21, the second and third columns respectively represent the GDP of the two countries; the fourth column GDPB represents the difference between the GDP of the US and China, and the fifth column EX represents China's exports to the US. EViews 8.0 is used in this thesis for econometric analysis.

6.2.1.4. Integration test

First, integration test is conducted on GDPBt. The appropriate model for ADF test is:

$$\Delta^3GDPB_t = -1.271207 \times \Delta^2GDPB_{t-1} \quad (2)$$

(-6.656506)

Table 22: Model estimation results of GDPB in ADF test

Dependent Variable: D(GDPB,3)

Method: Least squares

Date: 04/11/21 Time: 22:53

Sample (adjusted): 1986 2019

Included Observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPB(-1),2)	-1.271207	0.190972	-6.656506	0.0000
R-squared	0.571500	Mean dependent var.	311.8474	

Adjusted R-squared	0.571500	S.D. dependent var.	5103.590
S.E. of regression	3340.806	AIC	19.09478
Sum squared resid.	3.68E+08	SC	19.13968
Log likelihood	-323.6113	Hannan–Quinn criter.	19.11009
Durbin–Watson stat.	1.884687		

In the bracket is the t-test value. $t=-6.656506 < -1.95100$ (critical value at 5%), the ADF test value is smaller than the critical value, and the hypothesis that there is unit root in the sequence is rejected. Therefore, the sequence GDPB is stationary after two differences (ie., it is second-order integrated).

The model for ADF test on is as follows:

$$\Delta^3 EX_t = -1.422411 \times \Delta^2 EX_{t-1} \quad (3)$$

(-6.783775)

Table 23: Model estimation results of ADF test by EX

Dependent Variable: D(EX,3)

Method: Least squares

Date: 04/11/21 Time: 22:53

Sample (adjusted): 1986 2019

Included Observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EX(-1),2)	-1.422411	0.209678	-6.783775	0.0000
R-squared	0.580155	Mean dependent var.	-31.85326	
Adjusted R-squared	0.580155	S.D. dependent var.	442.7736	
S.E. of regression	286.8970	AIC	14.18509	
Sum squared resid.	2716227.	SC	14.22999	
Log likelihood	-240.1466	Hannan–Quinn criter.	14.20040	
Durbin–Watson stat.	1.943289			

In the bracket is the t-test value. $t=-6.783775 < -1.95100$ (critical value at 5%), the ADF test value is smaller than the critical value, and the hypothesis that the sequence has unit root is rejected. Hence, the sequence EX is also second-order integrated. As the two sequences are

second-order integrated and meet the conditions of same order integration, the co-integration test can be done on the two sequences.

6.2.1.5. Co-integration test

First, the regression models of $GDPB_t$ and EX_t are established:

$$GDPB_t = 67931.77 + 4.060189 \times EX_t \quad (4)$$

(15.57747) (2.048007)

$$R^2 = 0.101818 \quad D.W. = 0.052469 \quad F = 3.967612$$

Table 24: Estimated results of GDPB and EX regression models

Dependent Variable: GDPB

Method: Least squares

Date: 11/03/20 Time: 23:11

Sample: 1983 2019

Included Observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	4.060189	1.982507	2.048007	0.0481
C	67931.77	4360.900	15.57747	0.0000
R-squared	0.101818	Mean dependent var.	74036.74	
Adjusted R-squared	0.076156	S.D. dependent var.	20711.21	
S.E. of regression	19906.95	AIC	22.68806	
Sum squared resid.	1.39E+10	SC	22.77514	
Log likelihood	-417.7292	Hannan–Quinn criter.	22.71876	
F-statistic	3.967612	Durbin–Watson stat.	0.052469	
Prob (F-statistic)	0.054231			

Residual term $E = GDPB - 67931.77 - 4.060189EX$

Test the residuals

Table 25: Results of ADF test for residuals 1

Null Hypothesis: E has a unit root

Exogenous: None

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
ADF test statistic	-1.805351	0.0679
Test critical values: 1% level	-2.632688	
5% level	-1.950687	
10% level	-1.611059	

*MacKinnon one-sided p-values.

Second, stationary test is conducted on the regression residual term. The test value $t=-1.805351 < -1.611059$ (critical value at 10%), indicating that $GDPB_t$ and EX_t are (2, 2) co-integrated.

In the above model, t-test value is in the bracket. The t-test value, F-test value and coefficient of determination show that, the fitting degree of the model is general. At the same time, the DW value suggests that the residual term in the model has strong autocorrelation, so appropriate lag term can be added to eliminate the auto-correlation. The distributed lag models $GDPB_t$ of EX_t are as follows:

$$GDPB_t = 3149.659 - 4.556012 \times EX_t + 4.187052 \times EX_{t-1} + 1.516470 \times GDPB_{t-1} - 0.538202 \times GDPB_{t-2} \quad (5)$$

$$(1.629745) \quad (-2.082037) \quad (1.880320) \quad (9.960671) \quad (-3.570797)$$

$$\bar{R}^2 = 0.976514 \quad D.W. = 1.975344 \quad F = 354.4142$$

Table 26: Estimation results of GDPB and EX distributed lag models

Dependent Variable: GDPB

Method: Least squares

Date: 11/03/20 Time: 23:11

Sample (adjusted): 1985 2019

Included Observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3149.659	1932.609	1.629745	0.1136
EX	-4.556012	2.188247	-2.082037	0.0460
EX(-1)	4.187052	2.226777	1.880320	0.0698
GDPB(-1)	1.516470	0.152246	9.960671	0.0000
GDPB(-2)	-0.538202	0.150723	-3.570797	0.0012
R-squared	0.979277	Mean dependent var		76216.16
Adjusted R-squared	0.976514	S.D. dependent var		19066.10
S.E. of regression	2921.921	AIC		18.92943
Sum squared resid.	2.56E+08	SC		19.15163
Log likelihood	-326.2651	Hannan–Quinn criter.		19.00613

F-statistic	354.4142	Durbin–Watson stat.	1.975344
Prob (F-statistic)	0.000000		

Here, DW approaches 2 and the autocorrelation are eliminated. ADF test is carried out on the residual term e_t .

$$\Delta e_t = -1.028180 \times \Delta e_{t-1} \quad (6)$$

(-5.754769)

Table 27: Results of ADF test for residuals 2

Null Hypothesis: E has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
ADF test statistic	-5.754769	0.0000
Test critical values: 1% level	-2.634731	
5% level	-1.951000	
10% level	-1.610907	

*MacKinnon one-sided p-values.

ADF Test Equation

Dependent Variable: D(E)

Method: Least Squares

Date: 11/03/20 Time: 23:03

Sample (adjusted): 1986 2019

Included Observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
E(-1)	-1.028180	0.178666	-5.754769	0.0000
R-squared	0.499876	Mean dependent var		173.5054
Adjusted R-squared	0.499876	S.D. dependent var		3911.594
S.E. of regression	2766.258	AIC		18.71735
Sum squared resid	2.53E+08	SC		18.76224
Log likelihood	-317.1949	Hannan–Quinn criter.		18.73266
Durbin–Watson stat	1.942253			

The test value $t = -5.754769 < -1.95100$ (critical value at 5%), the residual term has no unit

root under the significance level of 5%, and it is stationary. Equation (5) presents their long-term stationary equilibrium relationship. The long-term variable proportion of EX_t and $GDPB_t$ is: $(-4.556012+4.187052) / (1-1.516470) =0.7144$.

The parameter estimation of the above regression model and co-integration test results show that China’s exports to the US have indeed widened the Sino–US economic gap. Every 1 unit increase of exports can lead to 0.7144 units’ expansion of economic gap.

6.2.1.6. Robustness analysis of the model of the impact of Sino–US trade imbalance on the Sino–US economic gap

The method of shortening the sample period and replacing variable data is used to conduct the robustness test. Among them, the sample data from 2001 to 2019 is used to shorten the sample period, and the results obtained after estimating the distribution lag models of $GDPB_t$ and EX_t are as follows.

Table 28: Robustness Test Results

Variable	shortening the sample period	replacing variable data
EX	-4.668183*	-2.134455
EX(-1)	3.042125	-1.001222
GDPB(-1)	1.421110***	1.388830***
GDPB(-2)	-0.590831***	-0.625920***
C	19567.79**	31481.93**

Note: ***, **, * indicate significance at the levels of 1%, 5%, and 10%, respectively.

Source: EViews measurement analysis collation

According to the above results, the estimated coefficients of EX and EX(-1) did not pass the significance test when the substitution variable data method was used; when the shortened sample period method was used, the long-term change ratio of EX_t and

$GDPB_t$ was: $(-4.668183 + 3.042125)/(1-1.421110)=3.861362$, indicating that China's exports to the US have widened the economic gap between the two countries. It is consistent with the previous conclusions and the model estimation results can be considered robust.

6.2.2. Empirical Study on the Impact of Sino–US Trade Imbalance on the US Economy

While a country's trade deficit continues to expand, its domestic economy can also develop rapidly. The continuous expansion of the Sino–US trade imbalance has promoted the growth of the US economy. The rapid development of the US economy benefits from the advanced structure of its industry. Since the 1950s, the US began to transfer industries abroad, keeping its industrial structure at the top of the world's industrial structure, which effectively promoted the economic development of the US. Under the background of economic globalisation, the transfer of US industries to China has boosted the growth of the US economy and its direct investment in China, but at the same time, it has aggravated the scale of Sino–US trade imbalance. There are significant differences in factor endowments between China and the US. For this reason, China produces labour-intensive products while the US produces capital-intensive and technology-intensive products. There are obvious complementary advantages between China and the US. The goods the US imports from China are mainly resource-intensive and labour-intensive products, most of which are cheap daily consumer goods. According to the theory of supply and demand, when total demand is greater than total supply, commodity prices will rise. Inflation will occur when the price of many goods in the US rises. The US imports several high-quality and low-cost commodities from China to make up for the shortage and gap in the supply of related industries in the US, thereby increasing the total effective domestic supply in the US, making up for the consumption gap, curbing price increases, and eliminating inflation. The US commodity trade with China has promoted the development of its related industries, injected impetus into the upgrading of US domestic industries, which indirectly

promoted US economic growth. China is not the sole owner of the benefits of the Sino–US trade imbalance. A large part of these benefits is gained by US-owned enterprises in China. Moreover, the proportion of processing trade in exports to the US is as high as 50%, and the main feature of processing trade is the import of a large number of raw materials and parts. After being processed into products and then exported, most of the proceeds from processing trade are owned by foreign-funded enterprises, while China only gets meagre processing fees. For example, to assemble a computer, China’s assembly fee is only 30%, while 70% is owned by foreign-funded enterprises. Based on this factor, it can be said that the real beneficiaries of the Sino–US trade imbalance are US-owned enterprises and US consumers.

6.2.2.1. Model Construction

To conduct a quantitative study on the impact of Sino–US trade imbalance on the US economy, this chapter adopts the variables of US GDP and US import volume from China, and establish the model as follows:

$$\text{LnGDP}=\text{a}+\text{b}*\text{LnIMP}+\text{e}$$

In which, LnGDP is the natural logarithm of US GDP, LnIMP is the natural logarithm of US import volume from China, a is a constant term, B is the influence coefficient to be estimated, and e is the residual.

6.2.2.2. Data source and description

This chapter selects the annual data, as well as the data of US GDP and US imports from China of 37 years from 1983 to 2019. All the data are valued in billions of dollars.

Table 29: US GDP data

Unit: trillion USD	
Year	US GDP
1983	3.63
1984	4.04

1985	4.34
1986	4.58
1987	4.86
1988	5.24
1989	5.64
1990	5.96
1991	6.61
1992	6.52
1993	6.86
1994	7.29
1995	7.64
1996	8.07
1997	8.58
1998	9.06
1999	9.63
2000	10.25
2001	10.58
2002	10.94
2003	11.46
2004	12.21
2005	13.04
2006	13.81
2007	14.45
2008	14.71
2009	14.45
2010	14.99
2011	15.54
2012	16.2
2013	16.78
2014	17.52
2015	18.22
2016	18.71
2017	19.49
2018	20.53
2019	21.37

Source: [179]

Table 30: Data of Sino-US import and export trade

Unit: 10,000 USD

Year	China exports to the US	China imports from the US
1983	171,000	232,000

1984	230,000	366,000
1985	265,000	437,000
1986	247,000	353,000
1987	296,000	381,000
1988	338,000	663,000
1989	439,000	786,000
1990	519,000	658,000
1991	619,000	801,000
1992	850,400	890,100
1993	169,640,0	106,880,0
1994	214,6100	138,940,0
1995	2,472,874.30	1,612,296.60
1996	2,670,808.60	1,617,865.10
1997	3,271,837.90	1,628,958.90
1998	3,796,497.30	1,699,694.50
1999	4,201,807.70	1,948,631.70
2000	5,214,200.20	2,236,460.60
2001	5,431,891.20	2,620,359.20
2002	6,995,940.20	2,722,790.00
2003	9,251,014.70	3,388,296.30
2004	12,497,345.10	4,465,266.00
2005	16,293,872.20	4,873,497.70
2006	20,351,628.70	5,922,285.60
2007	23,276,133.10	6,986,058.10
2008	25,232,726.60	8,149,672.50
2009	22,090,481.00	7,746,032.50
2010	28,337,485.60	10,206,045.30
2011	32,456,473.50	12,214,439.00
2012	35,199,988.30	13,287,829.70
2013	36,848,066.30	15,255,224.60
2014	39,614,740.47	15,918,730.80
2015	41,014,516.94	14,978,093.13
2016	38,911,253.57	13,512,428.36
2017	43,314,647.73	15,517,727.48
2018	47,981,164.16	15,536,585.43
2019	41,793,571.80	12,233,890.90

Source: [179]

6.2.2.3. Data adjustment

Since the data of US GDP and US imports from China are both current prices, the price

indices need to be adjusted to make the annual data comparable. The base period of the adjustment is 1983 and set to be 100. Then, to avoid large difference between the values of the variables, the natural logarithms of all the adjusted data are obtained.

6.2.2.4. Empirical test and results

The annual data of China's imports and US economic growth from 1983 to 2019 are tested, the two variables are treated equally as endogenous variables, the CE model with intercept under Johansen co-integration test is selected, and EViews 8.0 is used to obtain the following test results:

Table 31: Johansen Co-integration Test between US GDP and US-China Trade

	Eigenvalue	Trace statistic	5% critical value	Assumed CE number
Trace test	0.575894	33.20364	20.26184	None *
	0.086895	3.181651	9.164546	At most 1
	Eigenvalue	Max-eigen statistic	5% critical value	Assumed CE number
Maximised	0.575894	30.02199	15.89210	None *
eigenvalue test	0.086895	3.181651	9.164546	At most 1

Note: The lag interval is 1-1, * denotes that the null hypothesis is rejected at 5% significance level. Conclusion: Trace test and maximum eigenvalue test indicate that there is a co-integration equation at the 5% level.

According to the test results in Table, the two variables are treated equally as endogenous variables. The trace test and maximum eigenvalue test show that there is a co-integration equation at the 5% level. The standardised co-integration relational expression is as follows:

$$\text{LnGDP} = 0.462082 \times \text{LnIMP} + 7.252718$$

(8.773154) (15.45038)

The T statistic is in the bracket under the coefficient of the co-integration variable. Since the T statistic is large, the variable is significant in the co-integration relational expression. As the estimated coefficient of LnIMP is 0.462082, which indicates that the US import volume from China has a significant positive impact on the US GDP. If the US import volume from China accelerates by **1%**, the US GDP gains a synchronous growth of **0.462082%**. Unit root test is conducted on the EC sequence:

Table 32: Unit Root Test of EC Sequence

Variable definition	AADF statistic	10% critical value	Test form (C,T,P)
LnGDP and LnIMP EC sequence	-1.930898	-1.611059	(0, 0, 1)

It can be seen from the above table that the EC sequence is stationary at 10% level and fluctuates around 0. The following conclusion can be drawn: there is a bidirectional long-term relationship between the changing trend of US-China trade deficit and US GDP. Meanwhile, the coefficient of LnIMP in the co-integration relational expression is positive, so the Sino-US trade contributes to the American economic growth in the current period.

6.2.2.5. Robustness analysis of the model of the impact of Sino-US trade imbalance on the US economy

To test the robustness of the analysis results of the model, the method of lagging the explanatory variables by one period, shortening the sample period and replacing variable data is used for the robustness test. Among them, the sample data from 2001 to 2019 are used to shorten the sample period, the estimated results obtained are as follows.

Table 33: Robustness test results

Variable	Lagging the explanatory variables by one period	Shortening the sample period	Replacing the variable data
LNIMP	0.260065***	0.305107***	0.380998***
C	9.939449***	9.562612***	8.851405***

Note: *** means that the coefficient is significant at the 1% level.

Source: EViews measurement analysis collation

According to the above test results, it can be seen that whether it is using explanatory variables with a one-period lag, shortening the sample period, or replacing variable data, the LNIMP estimation coefficients are all positive, and all have passed the 1% level of significance test, indicating that Sino–US trade contributes to the growth of the US economy, which is consistent with the previous conclusions, indicating that the model estimation results are robust.

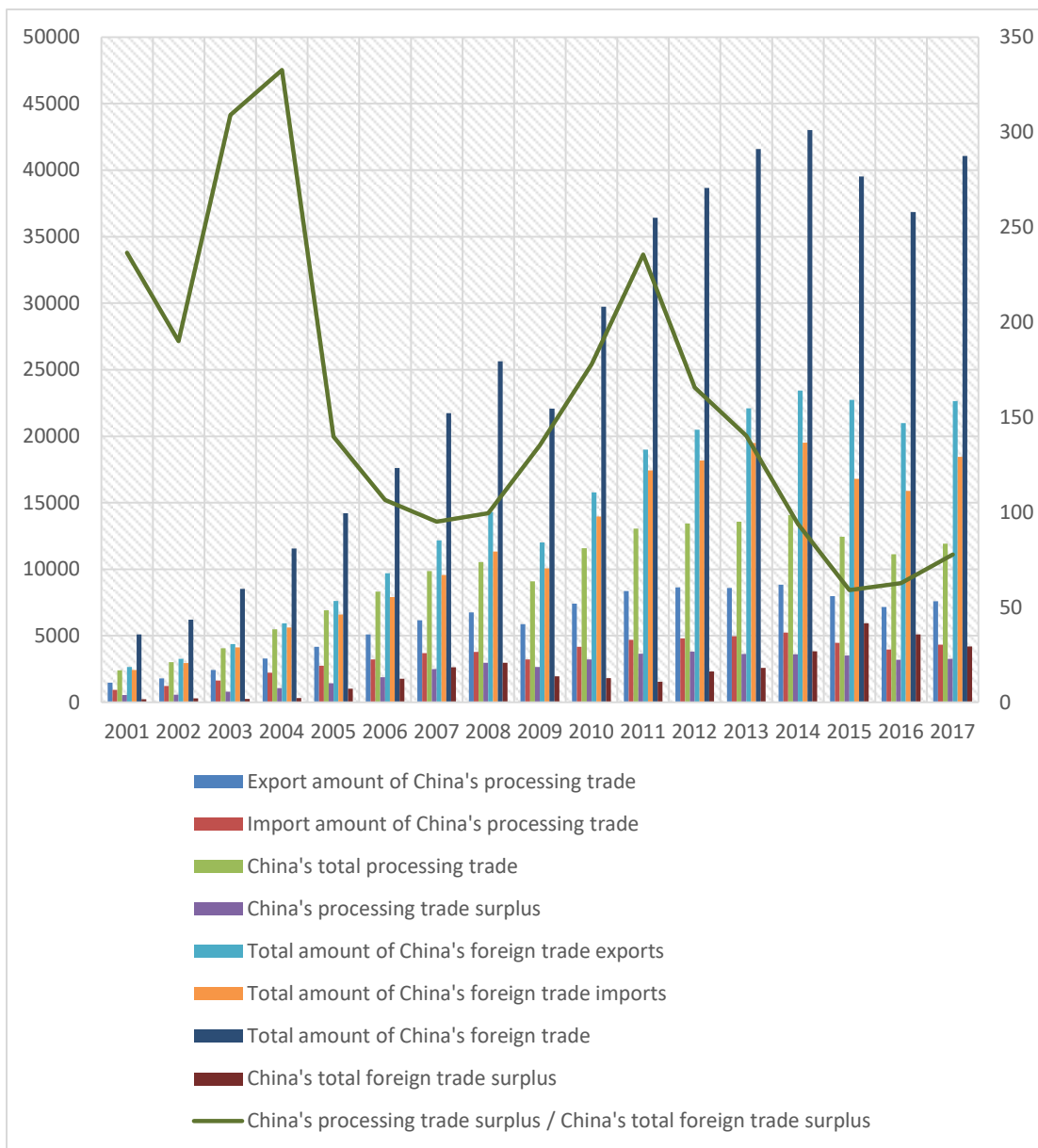
6.2.3. The factors of the trade pattern of the trade imbalance between China and the US

Processing trade is the result of the adjustment of global industrial structure and a form of industrial transmission. With the further development of knowledge economy in the US, a V-shaped production organisation structure similar to the ‘smile curve’ has gradually formed. That is, Japan and South Korea engage in capital- and technology-intensive production activities such as R&D, producing and exporting key parts; Asian and Taiwan produce and export parts system; China engages in labour-intensive assembly and supplies a small number of parts; Hong Kong mainly provides marketing services to overseas markets such as the US and Europe; and the US is an export market for products. Becoming the world’s processing and manufacturing base, China has formed a trade structure dominated by processing trade on the whole. The raw materials and parts of the

processing trade mainly come from South Korea, Taiwan, Singapore, and other Asian countries. Meanwhile, processed products are reexported to the US and European markets through Hong Kong. According to the statistics of the origin principle, the exporting countries of processed products also transfer to China from these East Asian countries and regions [96].

Figure 14: Processing trade mode and surplus ratio of China from 2001 to 2017

Unit: 100 million dollars



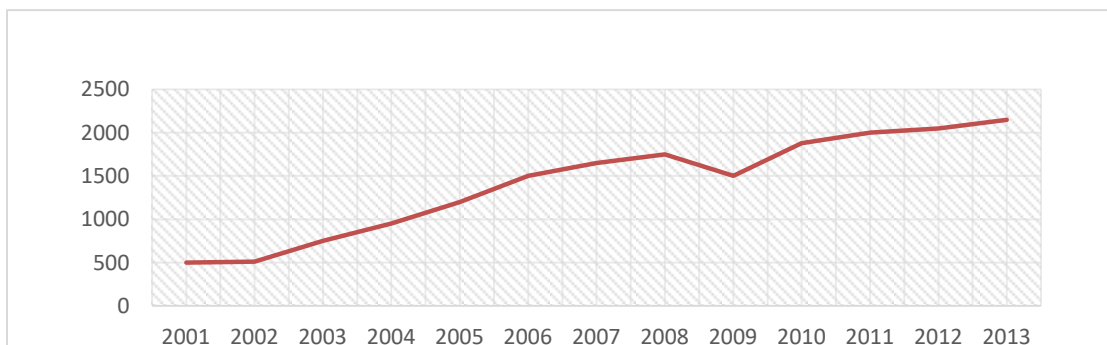
Source: [159]

As shown in Figure 9, first, from the change in the amount of growth, the total import and export volume of processing trade in China increased from USD241.4 billion in 2001 to USD119.13 billion in 2017, with an average annual growth rate of 10.49%. Among them, the export volume of processing trade in China increased from USD147.43 billion in 2001 to USD758.83 billion in 2017, with an average annual growth rate of 10.78%. The import volume of processing trade in China increased from USD93.97 billion in 2001 to USD

432.3 billion in 2017, with an average annual growth rate of 10.01%. The processing trade surplus in China increased from USD53.46 billion in 2001 to US \$326.53 billion in 2017, with an average annual growth rate of 11.97%. Second, from the 2001–2017 perspective, China’s processing trade surplus in 17 years accounted for over 50% of the overall trade surplus. Among them, three years of processing trade surplus accounted for nearly 100%; even in the processing trade surplus in 2004, the share is as high as 332.6%. This means that the year of processing trade in China’s foreign trade surplus is more than three times the overall trade surplus. Although the share of processing trade surplus has been declining since 2015, with the expansion of general trade export growth, it still accounts for more than 50% of the total trade surplus. Therefore, we have sufficient evidence to believe that processing trade is the main source of China’s foreign trade surplus.

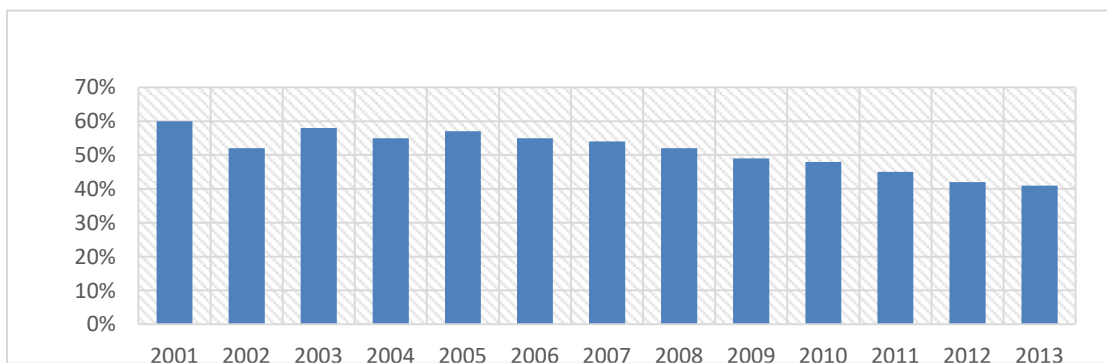
Figure 15: The total amount of processing trade between China and the US

Unit: 100 million dollars



Source: China customs database.

Figure 16: The proportion of the amount of processing trade between China and the US



Source: China customs database

In China's export trade with the US, the proportion of trade pattern is seriously unbalanced, and the processing trade pattern has always been dominant.

The processing trade volume between China and the US has been increasing year by year (Figure 11): the import and export volume of processing trade rose from \$50.24 billion in 2001 to \$215.7 billion in 2013. A small decline was observed only in 2009, when the financial crisis was recovering. However, in 2010, the processing trade returned to the level before the crisis, but the growth rate declined year by year. Figure 5 shows that in 2001, processing trade between China and the US accounted for 59% of the total trade between the two sides. By 2013, that share had dropped to 41%. According to Chinese customs statistics, from January to July 2014, China's import and export volume to the US through processing trade reached \$117.687 billion, accounting for 38.54% of China's total import and export volume to the US in the same period. In general trade, imports and exports to the US reached \$152.639 billion, accounting for 49.993% of China's total imports and exports to the US in the same period. Therefore, China's trade with the US has gradually changed the trade mode dominated by processing trade. The traditional processing trade is shrinking, whereas the general trade mode has maintained a good growth trend and become the main trade mode between China and the US.

The US, with its advanced production technology and sufficient capital elements, is at the highest end of the world's industrial chain. By contrast, China, with its abundant labour resources and vast market, lacks advanced technology and capital; it is at the lower end of the world's industrial chain. Consequently, China only gains a small amount of profit through processing trade, whereas the US gains the design and R&D link of real high profit. Although processing trade solves the problems of employment and foreign exchange reserve in China, it leads to resource waste and eventually affects the adjustment of China's industrial structure. Therefore, China makes great efforts to develop general trade by using export tax rebates. Moreover, it changes the dominant pattern of processing trade and gradually changes the imbalance of trade patterns.

6.3. THE IMPACT OF US TRADE DEFICIT WITH CHINA ON THEIR TRADE FRICTION

In an essay by Hu and Peng, trade friction is defined as a trade dispute that is initiated when one country suffers losses due to another country's gains in their bilateral trade activities [196]. China, with which the US trade deficit is largest, has always been targeted when US develops its policies to reverse that situation. That will ultimately lead to bilateral trade friction. At the state level, the interdependence between China and the US is asymmetric and thus US has the ability and willingness to provoke the trade friction because its opportunity cost is smaller. On one hand, United States imposes import restrictions on China. On the other, it pushes the Chinese government to open markets to more American companies. Besides, interest groups that affected by China's imports will also use the trade deficit as an excuse to press the government to attack China, triggering US-China disputes. In a manner of speaking, the trade imbalance between China and the US contributes most to their trade friction. Since the Agreement on Trade Relations Between the People's Republic of China and the US of America was signed on May 14, 1979, the US-China trade has witnessed rapid development during more than 40 years, and the two sides have built a mutually beneficial and win-win trade pattern under an interdependence relationship. During each stage of the bilateral trade development, however, trade friction has always accompanied and become intensively severe. Trade friction gradually escalated.

6.3.1. Trade friction before China's entrance to WTO

The trade volume involved in friction of that period was relatively small. China's exports to the US were mostly low value-added and labour-intensive commodities such as chemical materials, textiles and light industrial products. The US trade policy towards China was also relatively looser. On July 2, 1980, the US initiated its first anti-dumping investigation against China's menthol and that represented the start of US-China trade

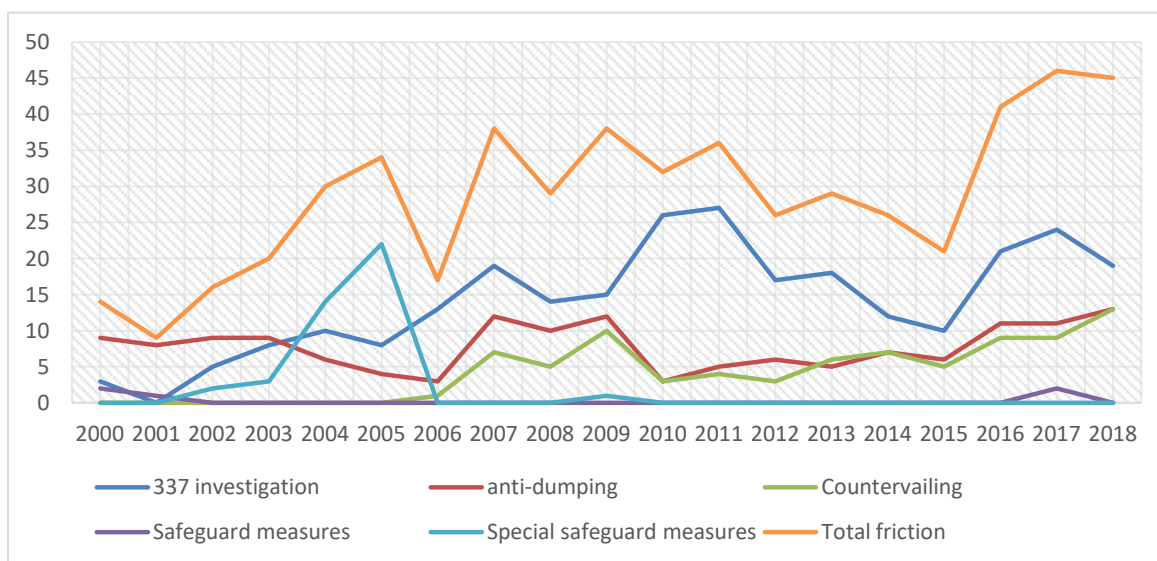
friction. At this stage, the US launched 18 anti-dumping investigations for Chinese goods in total, of which 6 were light industrial products, 7 were chemical products, and 3 were textiles. The number of cases and involved amount were small, and the friction was only for individual commodities.

6.3.2. Trade friction after China’s entrance to the WTO

The trade value between the two sides increased continuously during this period. China’s widening trade surplus with the US had led to various forms of trade frictions, including the ‘Section 337 investigations’, anti-dumping investigations, countervailing duty investigations, safeguard measures, and special safeguard measures, etc.

Figure 17: US trade investigation on China

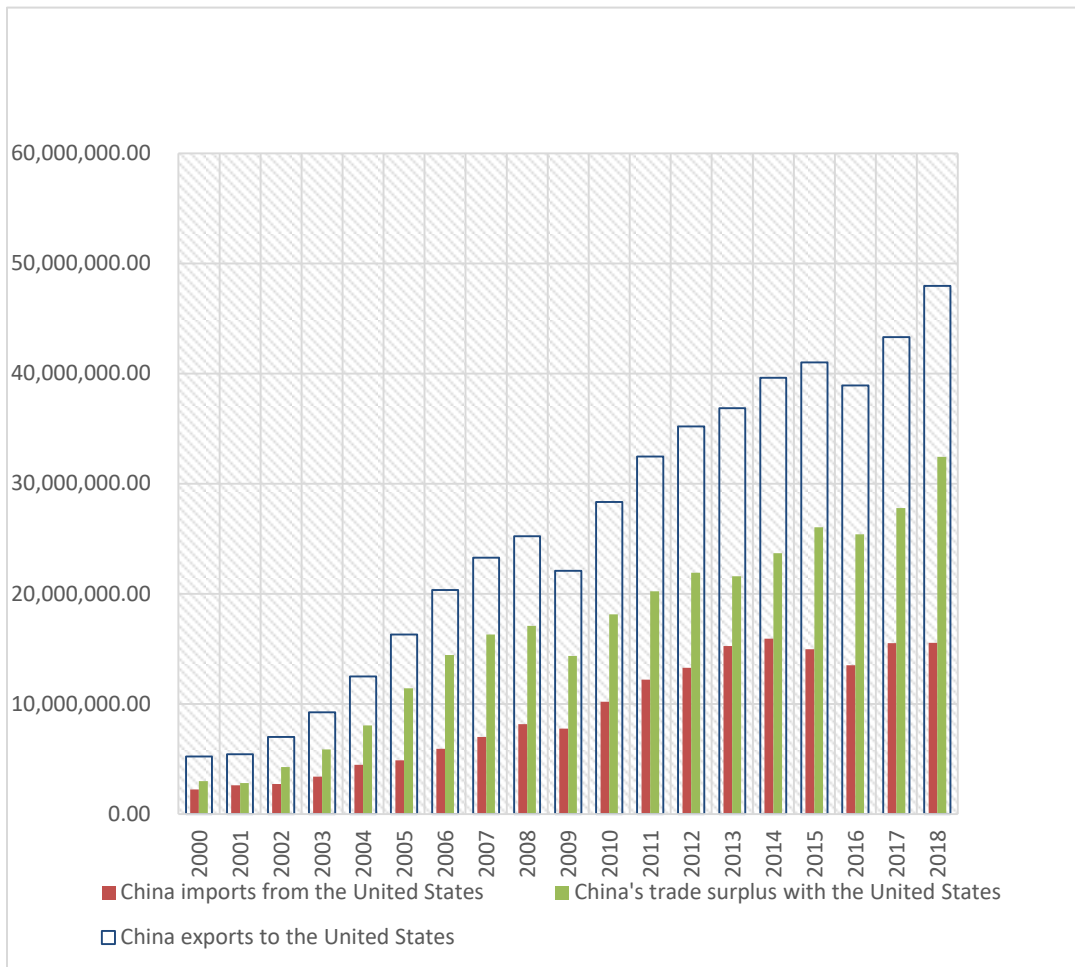
Unit: Number of times



Source: [197]

Figure 18: China’s trade surplus with the US

Unit: 1000 USD



Source: [178]

The ‘Section 337 Investigation’ was legally based on ‘Section 337’, an act to protect domestic intellectual property rights of US against unfair foreign trade practices. That law was designed to regulate trade activities regarding to intellectual property rights. From the perspective of trade protection, ‘Section 337’ was a technical barrier to trade. It was to protect American companies from the damages caused by the theft of intellectual property rights. Since its inception, ‘Section 337’ has been revised many times and has now become an integral part of many intellectual property protection laws in the US. The number of ‘Section 337 investigations’ initiated by the US against China peaked between 2010 and 2011, and then fell slightly. In recent three years, the number of investigations has remained at a high level. Among the 55 ‘Section 337 investigations’ in 2018, 19 cases

targeted at China.

Anti-dumping is a concept versus dumping. It refers to the countermeasures that one country imposes when other country dumping products in the international trade. The main methods include levying anti-dumping duties, etc. Anti-dumping is a trade remedy that has been frequently applied under the WTO framework and is an important meaning for maintaining a fair-trade environment. But it is undeniable that as protectionism rises, this policy is sometimes abused. From 2000 to 2018, the US totally initiated 149 anti-dumping cases to China, accounting for 53.6% of remedy incidents during the same period. In 2007, the US trade deficit with China rose 10.4% to US\$258.51 billion over 2006 and for the first time the US-China deficit exceeded 30% of the total of US trade deficit. That was also a year that the number of US anti-dumping investigations against China increase to 12 from 4 in 2005, a growth of more than 200%. After the 2008 crisis, the US-China trade was hit by the financial downturn and growth was sluggish and even recorded a minus 10.2% in 2009. Correspondingly, the growth of the US trade deficit with China also decelerated or even went down. The figure was US\$268.04 billion in 2008, an increase of 3.7% over 2007, while it reached US\$226.87 billion in 2009, a drop of 15.4% over 2008. Despite the sharp fall in the amount of deficit, the US trade deficit with China as a proportion of the total US trade deficit was still rising. In 2008, this proportion was 32.1%, and in 2009 it reached 44.8%. That period thus recognised the most frequent and violent US remedies against China. After 2010, the growth of US anti-dumping investigations against China began to surge in 2016 after a steady period and, in 2018, it reached the highest point of nearly two decades.

According to WTO, subsidies are the acts of the governments or public institutions of member states benefit enterprises through direct or indirect cash payments or tax reduction, reduction or exemption of taxes and government purchases. As for the US government, subsidies are referred as the government's actions to finance enterprises through investments, loan guarantees, purchases at irregular prices, etc., to lower business costs or increase their benefits. Similarity can be found between above two definitions. The US one

is more specific in judging whether there are subsidies for imported goods. That is, the subsidy needs to be granted only to specific industries or companies that meet certain criteria and locate in certain regions. The industry or enterprise receiving the subsidy enjoys more preferential treatment than other general enterprises. From this point, the US definition is more detailed and comprehensive. During 2000-2018, the US launched 82 countervailing cases against China, accounting for 29.5% of trade remedy incidents during the same period. Overall, the number of those anti-subsidy cases indicated two obvious upward trends in time. From 2005 to 2009, the number of countervailing investigations by the US against China went up significantly and peaked in 2009. In 2010, the number of declined sharply. It is possibly because that the outbreak of the US subprime mortgage crisis in 2008 imposed significantly impact on the global economy. Meantime, China, with its strong productivity, became the driving force of world's economic recovery. To alleviate the impact of the economic crisis and satisfy the domestic production and living demands, the US had to temporarily loose its trade policy with China. After 2012, the countervailing investigations, after a period of steady rise, began to show rapid growth in 2015, and reached its peak in nearly two decades in 2018.

The legal basis of the safeguard measures was provided in the General Agreement on Tariffs and Trade 1994 ('1994 GATT'): when the member states in the agreement was severely harmed by the rapid increase in imports in a short period, they can take necessary restricts on those imports according to law. That provided flexibility to the member states' obligations such that they were exempted from obligations of WTO agreement under special situations. That can help the members not having to bear serious damage that could have been avoided. The objects of the special safeguard were the member states of WTO. The safeguard allowed member states to use the transitional safeguard mechanism for specific product protection to take restrictive safeguard measures against certain types of imported products from specific member states to protect their own industries. From 2001 to 2018, the US in total used 5 times of that safeguard measures against China, accounting for 1.8%, and 42 special safeguard measures, accounting for 15.11%.

Looking at the US-China trade friction, that confrontation has been increasingly intense with the Chinese economic boom of China the scaling up of their trade imbalance, especially after China's accession to the WTO. It seriously affects the normal development of the bilateral trade and has restricted the development of Chinese enterprises. Due to the pressure by its interest groups, citing the trade imbalance, the US government uses various tariff and non-tariff barriers such as anti-dumping and countervailing duties to restrict Chinese goods from entering the US market.

6.4. THE OTHER IMPACT OF SINO-US TRADE IMBALANCE

6.4.1. The Impact of Sino-US Trade Imbalance on China's Employment

Economic theory believes that the development of foreign trade and the expansion of exports can promote domestic employment, while expanding imports is to maintain foreign employment. China's foreign trade surplus with the US has continued, and the role of exports in promoting employment is greater than the impact of imports on employment. This is conducive to increasing employment and promoting domestic economic growth, maintaining political and social stability, and promoting harmonious social development. For a long time, foreign trade enterprises have a strong ability to absorb employment, and foreign trade has played a huge role in promoting labour employment. Trade in goods is the export of labour services without going abroad, which can alleviate the employment pressure in China to a certain extent. China's exports to the US totalled \$429.7 billion in 2017. According to Zhao's [198] calculations, China's export trade to the US covers a total of 11.751 million jobs, accounting for 1.5% of China's total employment. Among them, the primary industry accounts for 5%, the secondary industry accounts for 88%, and the tertiary industry accounts for 7%.

6.4.2. The Impact of Sino–US Trade Imbalance on China’s Industrial Structure Upgrading and Technological Advancement

China is in a critical period of accelerating the adjustment of economic structure and transforming the mode of growth. Importing raw materials and introducing advanced foreign technology and equipment require huge amounts of foreign exchange. The trade surplus between China and the US allows China to have sufficient foreign exchange reserves that can be used to import advanced international technologies and processes, and purchase capital goods, raw materials, machinery and equipment necessary for production, thus giving full play to the advantage of backwardness of developing countries. The US has promoted the adjustment of China’s industrial structure in the process of industrial transfer to China. Multinational corporations in the US not only have advanced production technology and management experience, but most of their direct investment in China is through cooperation with local Chinese companies. Chinese enterprises can learn advanced technology and management experience in cooperation with multinational corporations in the US, thus improving their own competitiveness. As China’s exports to the US are mainly labour-intensive products and the US has a large trade deficit, the US will often use non-tariff barriers to restrict imports from China. Under pressure, China needs to transform the structure of export products and increase the scientific and technological content of export products. Therefore, Sino–US trade imbalance provides an opportunity for China to improve its industrial structure and export product structure.

6.4.3. Other Adverse Effects of Sino–US Trade Imbalance on China

China’s large surplus leads to uncertainty to economic growth. The rising large trade surplus reflects the high dependence of China’s economy on the US market. China’s economic growth has shown an obvious characteristic of driving by external demand, and excessive reliance on external demand has increased China’s dependence on foreign trade and brought uncertainty to economic growth. In particular, part of China’s surplus is the

trade surplus brought about by the export of some resource-based products, and this means that the continuous development of domestic resources will bring hidden dangers to future economic development. In addition, the large-scale surplus in the balance of payments has led to excessive growth of the money supply and abundant liquidity, which can easily lead to credit expansion. Excess funds will flow to profiteering industries and sectors, which will lead to bubbles and will not be conducive to the sustainable development of the economy. Trade imbalances tend to shrink China's foreign exchange assets. China's large trade surplus from the US has rapidly increased China's foreign exchange reserves, and China's foreign exchange reserves are mainly held in dollars. The huge trade deficit, huge government deficit and household asset deficit of the US continuously devalues the dollar. Under this circumstance, China's USD-based foreign exchange reserve assets and long-term bond assets held by the US government will shrink, leading to a lot of losses on foreign assets.

6.4.4. The Impact of Sino–US Trade Imbalance on the Ecological Environment of the US

Most of the products that the US exports to China are not produced in the US. They are produced by multinational companies in the US using global resources. This will reduce the consumption of domestic resources by the US. In such a trade pattern, China's trade surplus comes at the expense of consuming its domestic resources and destroying the environment, and this will also provide welfare for the US consumers and promote the operation of US economy. The larger China's trade surplus is, the more negative externalities such as resource consumption and environmental pollution generated by US domestic production will be transferred to China. This will speed up China's resource depletion rate and aggravate environmental pollution, thus slowing down the resource depletion rate of the US and maintaining its good ecological environment. Therefore, the US has obtained huge social benefits in addition to economic benefits when importing products from China.

6.4.5. The Impact of Sino–US Trade Imbalance on the Domestic Income Gap in the US

In commodities exported by the US to China, the production factors used are mainly capital and high-tech labour, while the production factors used in commodities imported from China are mainly low-tech labour. Therefore, the result of Sino–US trade is to increase the income of capital owners and high-tech workers but reduce the income of low-tech workers. This will further widen the gap between the incomes of high-income earners and low-income earners in the US. At present, China’s exports to the US are mainly daily groceries such as clothing, footwear, and luggage. These are mainly labour-intensive products, promoting the employment of many people. As a result, the interest groups of the US manufacturing industry use this as an excuse to oppose the expansion of China’s export to the US. It must be noted that this kind of unemployment in the manufacturing industry in the US is mainly due to structural unemployment brought about by the upgrading of the US domestic industrial structure under the background of economic globalisation.

6.4.6. Other Adverse Effects of Sino–US Trade Imbalance on the US

The growing trade surplus between China and the US has increased the current account deficit of the US and raised the risks in the operation of the US economy. The rapid growth of the scale of Sino–US trade imbalances threatens the hegemony of the USD in the international monetary system and increases the pressure on the devaluation of the USD, thus affecting the flow of foreign capital into the US financial market and increasing the uncertainty of its economic development.

6.5. PREDICTION OF DEVELOPMENT TREND OF SINO–US TRADE IMBALANCE

Based on the data of Sino–US import and export trade from 1983 to 2019, this thesis uses time series regression analysis method and EViews 8.0 to build the econometric model (i.e., China’s export to the US, China’s import from the US and the Sino–US trade balance are fitted and predicted.

The theoretical equations of trend prediction are as follows:

$$Y1 = \alpha + \beta X \quad (1)$$

$$Y2 = \alpha + \beta X \quad (2)$$

Where Y1 represents China’s exports to the US; X represents the time series in unit of year; Y2 represents China’s imports from the US; α is the intercept; β is the coefficient of the time series and represents the direction and quantity of changes. Y1 and Y2 are respectively fitted by linear regression, and the results are as below:

Table 34: Regression Estimation Results of Y1 and X

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	140.4126	9.096843	15.43531	0.0000
C	-279462.0	18203.04	-15.35249	0.0000
R-squared	0.871912	Mean dependent var.		1503.616
Adjusted R-squared	0.868252	S.D. dependent var.		1627.691
S.E. of regression	590.8048	AIC		15.65339
Sum squared resid.	12216760	SC		15.74046
Log likelihood	-287.5877	Hannan–Quinn criter.		15.68409
F-statistic	238.2488	Durbin–Watson stat.		0.153923
Prob (F-statistic)	0.000000			

Table 35: Regression Estimation Results of Y2 and X

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	47.53396	3.488098	13.62747	0.0000
C	-94563.29	6979.784	-13.54817	0.0000
R-squared	0.841419	Mean dependent var.		552.1742

Adjusted R-squared	0.836889	S.D. dependent var.	560.9185
S.E. of regression	226.5385	AIC	13.73625
Sum squared resid.	1796189.	SC	13.82332
Log likelihood	-252.1205	Hannan–Quinn criter.	13.76694
F-statistic	185.7080	Durbin–Watson stat.	0.202736
Prob (F-statistic)	0.000000		

The analysis of the above regression results shows that the determination coefficient R-square of Y1 and X, Y2 and X are 0.871912 and 0.841419, respectively, and the goodness of fit is relatively high; the F statistics is 238.2488, and the corresponding P values are 0 and less than 0.05, indicating that the linear relationship among Y1, Y2 and X is significant. Further analysis of the estimation coefficient of X in the two models shows that in the regression of Y1 to X, the estimation coefficient is 140.4126, the P value of significance test is 0 and less than 0.05, suggesting that X exerts a significantly positive impact on Y1; in the regression of Y2 to X, the estimation coefficient is 47.53396, and the P value of significance test is 0 and less than 0.05, indicating that X exerts a significantly positive impact on Y2. Because the values of the two regression models are positive, Sino–US trade will continue to develop in the future, and the estimation equations of the model are as below:

$$Y1 = -279462 + 140.4126 \times X \quad (3)$$

$$Y2 = -94563.29 + 47.53396 \times X \quad (4)$$

According to the above two regression models, this thesis predicts the trend of Sino–US trade, and on this basis, the variation trend of Sino–US trade balance is calculated (see Table 36). From 2020 to 2026, Sino–US trade will continue to grow, and China’s trade surplus with the US will continue to exist and expand, and the volume will increase from 271.62 billion dollars in 2020 to 327.34 billion dollars in 2026.

Table 36: Prediction of 2020-2026 Sino–US Trade Balance

			Unit: Billion dollars
Year	Amount of exports	Amount of imports	China’s trade surplus

2020	4171.5	1455.3	2716.2
2021	4311.9	1502.9	2809.0
2022	4452.3	1550.4	2901.9
2023	4592.7	1597.9	2994.8
2024	4733.1	1645.5	3087.6
2025	4873.5	1693.0	3180.5
2026	5013.9	1740.5	3273.4

Note: Calculated according to Equation 3 and 4.

In conclusion, the Sino–US bilateral trade volume will continue to increase for some time to come and benign interaction is still the mainstream of bilateral economic and trade relations between the two countries. However, with the continuous expansion of total Sino–US trade volume, the Sino–US trade balance will tend to decline in the medium and long term, which is mainly a response to the domestic political pressure in the US as well as an inevitable requirement for China’s internal economic adjustment. China needs to strive for long-term interests in the adjustment of internal and external balance. Of course, such adjustment is a dynamic equilibrium and a gradual process guided by policies and based on market mechanism, rather than arbitrarily taking radical measures to restrict normal trade contacts.

Robustness analysis of the forecast model for the development trend of Sino–US trade imbalance

To test the robustness of the model analysis results, the method of shortening the sample period and replacing variable data is used to conduct the robustness test. The sample data from 2001 to 2019 are used to shorten the sample period. The estimated results are as follows.

Table 37: Robustness test results

Variable	Shortening the sample period		Replacing variable data	
	Y1	Y2	Y1	Y2

X	232.2349***	80.40014***	249.6594***	71.66667***
C	-464019.0***	-160627.8***	-498272.1***	-143217.2***

Note: *** means that the coefficient is significant at the 1% level. Source: EViews measurement analysis collation

According to the above test results, whether it is to shorten the sample period or replace the variable data, the X estimation coefficient is positive, and both have passed the 1% level of significance test, indicating that X has a significant positive effect on Y1 and Y2 (i.e., in the future, Sino–US trade will continue to develop, which is consistent with the previous analysis and conclusions, indicating that the estimated results are robust.

6.6. SUMMARY OF CHAPTER SIX

The analysis results of this chapter have shown that China’s export to the US does enlarge the economic gap between China and the US. When the export increases by 1 unit, the economic gap expands by 0.7144 units. Hence, despite China’s surplus is increasing, the economic gap between China and the US is also enlarging. Results from this chapter show that there is a bidirectional long-term relationship between the variation trend of Sino–US trade deficit and the GDP of the US. In the cointegration equation, the coefficient of LnIMP is positive, indicating that Sino–US trade contributes to the current economic growth of the US. Processing trade exists as one of the main sources of China’s foreign trade surplus, and in China’s exports to the US, there is a sever unbalanced ratio of composition in trade modes, the mode of processing trade has always been dominant. Influenced by economic globalisation and global industrial transfer, China is at the mid-low end in the global industrial chain, which is the world’s important export processing plant, and China’s position in the global value chain places it at an obvious disadvantage in the distribution of Sino–US trade benefits.

While enlarging the trade deficit with China, the US has slowed down resource depletion in the US and maintained its good ecological environment. In meantime, in the huge trade

deficit with China, the domestic income gap in the US has enlarged. To a certain extent, China's trade surplus with the US has alleviated the domestic employment pressure in China and provides China with sufficient foreign exchange reserves to introduce international advanced technologies and techniques, thus offering an opportunity for China to improve its industrial structure and export product structure.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. CHAPTER OVERVIEW

The purpose of this chapter is to summarise the findings of this study and draw conclusions and policy implications of these findings. This chapter consists of two parts. The first part is a summary, and the second part is policy recommendations. The first part shows the research conclusions drawn from the quantitative empirical research results and discussions. The second part is based on the conclusions of this research and combined with relevant theories and literature discussions and put forward policy recommendations to alleviate the Sino–US trade imbalance. Since the trade surplus in the Sino–US trade imbalance is increasing on the Chinese side, this chapter focuses on the policy recommendations that the Chinese side can use to alleviate the Sino–US trade imbalance.

7.2. CONCLUSIONS

7.2.1. The Sino–US trade imbalance exists throughout all historical stages of Sino–US trade, which has become a prominent obstacle to Sino–US trade and political relations at the present stage.

In the early stages of Sino–US trade, despite the Sino–US trade relations was inevitably influenced by politics, generally it was completed based on mutual benefit. Since the trade between the US and China was generally carried out based on mutual benefit; the direct trade between both countries developed rapidly, though it started relatively late. Despite fluctuations during this period, the Sino–US trade generally maintained an upward trend. According to the above research results, the US trade volume with China also increased by six times in the 50 years from 1791 to 1841. Although China’s overall foreign trade changed from surplus to deficit as the US exported more and more opium to China, during this stage of Sino–US trade, China still ran surplus in most years. In the following periods,

the situation of Sino–US trade differed with the change of Sino–US relations.

Since the normalisation of Sino–US trade, the balance of payments of Sino–US trade has gone through two distinct stages. At the first stage from 1979 to 1992, deficit existed in all years. The second stage has been in surplus since 1993, and the volume of favourable balance has been still increasing. From the establishment of diplomatic relations between China and the US in 1979 to 1992, China ran a consecutive deficit for 14 years. It was mainly attributed to the trade policy of import-substitution trend during this period, and the restriction of import was actually the inhibition of export. On the other hand, China just implemented open-door to the outside world and was not familiar with the international market, and the international competitiveness of domestic enterprises was also weak, thus there remained a slight deficit during this period. However, the absolute volume of trade between China and the US was relatively small during this period, so the deficit accounted for a large proportion of the trade volume, and it showed that the deficit reached a peak of 59% in 1980 according to the above research results. With the deepening of China’s reform and opening up, especially when the goal of building a socialist market economy was established in 1992, China’s foreign trade operation system has been gradually deregulated, stimulating the vitality of foreign trade. Meanwhile, the international competitiveness of Chinese products has been increasing, especially the competitive advantage of labour-intensive products, which has led to the rapid growth of China’s exports to the US. Since 1993, the balance of payments in Sino–US trade has reversed, and China has become a surplus country with the US, and this trend is still enhancing. Based on the above research results, since 1993, the proportion that China’s surplus with the US accounted for in the trade volume has been gradually increasing, especially after China’s accession to the WTO in 2001, the proportion exceeded 40%, it even exceeded 50% during the period from 2005 to 2007. Due to the impact of the financial turmoil, China’s exports suffered a heavy blow after 2008. In addition as the labour cost rose with the appreciation of RMB and the increase of wages, which made the export of China’s labour-intensive products worse, thus the growth rate of China’s surplus with the US began to decline. Nevertheless, China’s trade surplus with the US reached \$335.3 billion in 2017, making President Trump sign

two executive orders on trade. Focus on the US trade deficit, it also directly led to the Sino–US trade war that began in 2018.

The trade imbalance between China and the US is the most important obstacle to the development of Sino–US trade relations and the focus of interest conflicts between the two sides, which is related to the differences between the two sides in exchange rate reform and market opening, etc. The trade imbalance is not only attributed to the US industrial transfer and economic development pattern, but also related to China’s long-term development strategy of driving economic growth by investment and export. Properly dealing with the trade imbalance is the key to the normal development of Sino–US trade relations, which requires both sides to make joint and long-term efforts. The Sino–US trade imbalance has established a hidden danger for the trade war and confrontation in other fields, which directly led to the trade friction between the US and China. The Sino–US trade friction has been heating up since China’s accession to the WTO in 2001, and it has escalated into a trade war in 2018, which has brought uncertainties to the Chinese and US economies as well as the world economy. According to the prediction in this paper, the Sino–US trade imbalance will continue to enlarge in the short run, which lays a hidden danger for the trade war and economic friction between China and the US and even confrontation in broader fields.

7.2.2. The high domestic national saving ratio in China is an important reason for the Sino–US trade imbalance.

The analysis results indicate that there is a co-integration relationship between the Sino–US trade surplus and the differences in exchange rate and national saving ratio between China and the US in the long run, which has a stable development trend. Specifically, the real exchange rate of RMB against USD has a significant negative impact on Sino–US trade surplus, indicating that Sino–US trade surplus has not decreased with the relative appreciation of RMB and the scale of Sino–US trade imbalance has been enlarging.

The difference in national saving ratio between China and the US plays a significant positive impact on the Sino–US trade surplus. That is to say, the larger the difference in national saving ratio between China and the US, the larger China’s trade surplus with the US will be. The difference in saving ratio between China and the US remains an important reason for the consecutive growth of China’s trade surplus with the US. Domestic national saving ratio in China remains too high, leading to massive savings surplus; China has accumulated a huge trade surplus during the Sino–US international trade, and in the absence of safer investment channels in the international market, China can only convert its huge trade surplus into USD assets mainly based on US Treasury bonds. In the meantime, high consumption in the US can lead to import increase, while high savings in China can augment exports, thus resulting in a long-term trade imbalance between China and the US, as well as the widening trade gap year by year between both countries.

7.2.3. FDI in China aggravates the Sino–US trade imbalance.

The analysis results show that there is a one-way Granger causality between FDI in China and the volume of China’s export to the US when it remains below a significant level of 10%, indicating that the increase of FDI in China promotes the development of China’s export trade to the US, thus enlarging China’s trade surplus with the US. Such result indicates that the trade balance between China and the US is substantially not only the problem of Sino–US trade; it has become the problem of trade deficit transfer incurred by FDI in China. It can be said that foreign-invested enterprises in China have produced the imbalance of China’s foreign trade. On the one hand, the increasingly expanding Sino–US trade surplus is actually the result of the trade surplus transfer of east Asian countries and regions with the US. Foreign-owned enterprises have not only directly given rise to large trade surplus but have also turned goods that China would otherwise have imported into goods that are produced and processed in China. Such two factors have contributed to the scale increase of the Sino–US trade imbalance. As the US direct investment in China enlarges, the trend of Sino–US trade imbalance is also likely to expand further. In the long term, with the further opening up in the Chinese market, as well as the expectation for the

Chinese market from American enterprises and the copy effect of foreign investment, American multinational companies will increase direct investment in China, and make the investment in the Chinese market continuously develop in depth. Thereby, the indirect exports to China from American subsidiaries in China can be enlarged, and the direct exports to China from the US can be decreased, leading to the further expansion of Sino–US trade imbalance.

7.2.4. Summary of other reasons for Sino–US trade imbalance

China’s export-oriented trade policy has given rise to the long-standing Sino–US trade imbalance. Choice of national trade policy for both countries plays a significant effect on the direction and degree of Sino–US trade imbalance.

However, no matter the regulatory policy of US high-tech product export or China’s export-oriented policy, they are both policies based on the interests of economic interests and national security, and such choice do advantages which outweigh disadvantages for their own, while for the principal trading partners, these policies promote the imbalance of trade between both sides and global economy. According to the factor endowment theory from Heckscher-Ohlin, under the premise of free trade, the trade of commodities among countries is determined by their relative factor endowment, and a country or region participating in international trade tends to produce and export its relatively abundant-factor-intensive goods and import its relatively scarce-factor-intensive goods.

Thereby, under the premise of free trade and the different factor endowment, economic development and technological level in both countries, China should make use of its comparative advantage of low cost, including labour force and land, etc., and do specialised production and export of traditional labour-intensive products, while the US should produce and export capital or technology-intensive products. In fact, based on the real trade statistics above, this is not the case. From 2007 to 2018, China’s exports to the US have been dominated by technology and capital-intensive products HS84-85

(mechanical and electrical products), accounting for an average of 48.1%. While the proportion of mechanical and electrical products in China's imports from the US only reached 22.8% on average, showing a significant downward trend.

There are statistical differences in Sino-US trade.

The dispute over Sino-US trade statistics has been existed for a long time, and the discrepancy in statistics is one of the reasons for the aggravation of bilateral trade imbalance. There are statistical differences in pricing manner, transit trade, price raise in trade and service trade when both countries conduct trade statistics.

China adopts the mode of trade mainly focused on processing trade.

Processing trade is one of the main sources of China's foreign trade surplus. In China's export to the US, the proportion of trading type is seriously unbalanced, and the mode of processing trade has always been dominant. Affected by economic globalisation and global industrial transfer, China stays at the low and middle end of the global industrial chain, which is an important processing plant for export in the world. With China's enlarging opening up, the low and middle-end of manufacturing industries in the world are gradually transferring to China. As the most developed country, the US not only has many strong multinational companies, but also needs to eliminate or transfer backward sectors during industrial optimisation and upgrading, thus China has become the appropriate choice for the US direct investment. By investing and establishing factories in China, the US combines its technological advantages with cheap labour force in China, and produces and exports commodities to the world, thus it gains huge profits. During this process, part of the domestic demand for products in the US was met by companies established in China, leading to an increase in the Sino-US trade imbalance to a certain extent.

Every important change to the US trade policy for each time in the history is a strong response to the objective demand for economic development. As China is playing an

increasing important role in the world economy, even if there is no trade imbalance between China and the US, trade frictions and even trade war with China initiated by the US are inevitable.

Trade wars have been undergoing in our history since the establishment of the first nation; In most cases, at least during a trade war, both countries are worse off, and the introduction of third-party arbitrament, especially the WTO, is worth considering in dealing with the Sino–US trade war.

The specificities of the Chinese economy lies in the fact that China is a developmental state, where the government takes centralised control of the economy and markets, and the increase of trade surplus occurs when the government implements the export-oriented economic policy to make social resources fully mobilised, which is a manifestation of China’s neomercantilism.

7.2.5. Sino–US trade imbalance plays a certain impact on the trade development and economic relations between the two countries.

Most of the profits from China’s growing trade surplus have actually been obtained by foreign businessmen.

China only applies labour force to simple assembly processing with supplied materials, but does not have core products and patented technologies, such as computer chips and chips for cell phone, which are in the control of developed countries like the US. In the segmentation of product value, developed countries can gain most of the profits by means of authorisation fees from intellectual property transfer, the expense of core product purchase, software expense for chip upgrade, etc., while China can only gain little value, including the employment income, rental income for land, tax revenue from foreign investment. Thus, from the perspective of export from foreign-funded enterprises, it is

quite unfair for China's trade gains.

The analysis results indicate that China's export to the US does enlarge the economic gap between both countries. When the export increases by 1 unit, the economic gap expands by 0.7144 units. Sino-US trade is a typical complementary trade, and China has an absolute advantage in labour-intensive products. Despite the bilateral trade is based on the absolute advantage, the absolute advantage is only a particular case of comparative advantage, thus there is a pattern of profit distribution between both countries (i.e., the United States, with an overall advantage, gains more in bilateral trade. Although China gains a surplus, the profit distribution between both countries cannot be reflected only in the volume of surplus. The surplus represents only an increase in the money stock, but it fails to fully represent an increase in the material benefits or wealth of the two countries. Focusing only on increases and decreases in currency amount would be a reverse to the view of mercantilism. The transfer of resources and factors hidden behind commodity exchange and the transfer of labour consumption cannot be completely reflected in commodity exchange and its profit distribution, and the effect of profit distribution on the overall economic development of a country cannot be measured only from the money stock. There is excessively abundant labour in China, which leads to regressive competition, thus wages have been at a low level, and there is still a long way from the average wages in the US after calculated at par by exchange rate and purchasing power. The US occupies much cheap labour by importing China's primary commodities. Thus, despite China's growing surplus, the economic gap between the two countries is also enlarging.

China's trade surplus with the US, to a certain extent, alleviates the pressure of domestic employment in China, which makes China enabled to bring in international progressive technologies and processes with sufficient foreign exchange reserves, and provides an opportunity for China to improve its industrial structure and export product structure. Meanwhile, the sustainable exploitation of domestic resources in China has brought hidden dangers to the subsequent economic development. China's foreign exchange reserves are dominated by USD, and the shrinkage of China's assets will occur due to the deficit

expansion of the US.

The US has maintained sustained economic growth and restrained inflation under the circumstances that the trade deficit with China is enlarging and has slowed the resource depletion in the US and kept its favourable ecological environment. In the meantime, during its huge trade deficit with China, the domestic income gap in the US is enlarging, the pressure of dollar depreciation is increasing and the risks in economic operation of the US are also increasing.

7.3. RECOMMENDATIONS

7.3.1. Learn from Japan's Experience

In the 1980s, Japan also had a huge trade surplus with the US, and the trade imbalance between the two countries had a huge impact on the trade relations between the two countries. At the end of the 1980s, the world-famous 'US–Japan Auto Trade War' was the epitome of the trade relations between the two countries at that time. Finally, with the sharp appreciation of the Yen and the collapse of Japan's domestic economic bubble, Japan's subsequent economy has stagnated for a long time, and the US–Japan trade imbalance has slowly faded out of people's sight. Today, China has replaced Japan as the largest source of the US trade deficit. The imbalance of Sino–US trade has also become a hot issue of concern to the world. The adjustment of the trade imbalance between the two countries is also extremely urgent. Although the facts show that Japan has failed to adjust the US–Japan trade imbalance, China can reasonably learn from Japan's experience, check erroneous ideas at the outset, and find a more suitable path for the adjustment of the Sino–US trade imbalance. Japan's main measures to alleviate the US–Japan trade imbalance include the sharp appreciation of the Yen against the US dollar, voluntary export restrictions and the strategy of FDI. The sharp appreciation of the Yen did not reduce Japan's trade surplus with the US, but the surplus continued to increase. The latter two measures are implemented mainly by Japanese domestic enterprises, the main body of

Japanese export enterprises to the US is domestic enterprises, and Japan's domestic FDI is relatively low. The most important enlightenment from Japan's experience for China is that the appreciation of RMB against the US dollar does not help to improve the Sino-US trade imbalance, and efforts should be made to adjust the economic structure of the two countries. In addition, the prerequisite for using the FDI strategy to improve the Sino-US trade imbalance is that Chinese domestic enterprises must have advantages in trade. However, the main body of China's foreign trade is not domestic enterprises, but three foreign-funded enterprises. Therefore, the implementation of the 'going global' strategy must be based on China's economic structure adjustment, rather than blind foreign investment regardless of China's situation.

7.3.2. Improve the social security system, adjust the income distribution structure and promote China's domestic consumption

China's high domestic savings rate is reflected in its residents' high savings rate. Therefore, it is necessary to reduce China's domestic savings rate from the following aspects. In terms of reducing the savings rate of Chinese residents, first, the preventive savings demand of Chinese residents is generally high, especially that of rural residents. The Chinese government also needs to reform and improve the endowment insurance and medical insurance system, ensure that all kinds of security cover not only urban residents, but also rural residents, and finally all Chinese residents, gradually realising the goal that 'the old are well cared for and the sick are well treated' for all residents. Only when the worries of the future are resolved, can Chinese residents feel confident in their consumption. Second, since China's reform and opening up, China has implemented an export-oriented economic strategy, mainly considering external demand in domestic production that is, providing products for foreign consumers, without too much research and consideration of the consumption tendency of Chinese residents. Therefore, the Chinese government should conduct adequate market research on the Chinese consumer market when promoting residents' consumption, rationally and effectively guide the improvement of residents'

consumption structure and ensure the healthy and upward development of residents' consumption. Third, while China has made great achievements in the commodity market in the market economy, it lags behind in the financial market. The underdeveloped financial market and the lack of financial tools greatly restrict the liquidity of funds, which not only limits residents' consumption, but also inhibits the effective transformation from savings to investment. Therefore, the Chinese government needs to further open the financial market, encourage financial innovations such as housing mortgage loans and consumer credit, and provide more effective financial support to increase residents' consumption.

7.3.3. Industrial Upgrading in China

At present, the industrial structure of China and the US is still mainly complementary (i.e., the US is at the high end of the global industrial chain, while China is at the middle and low end of the global industrial chain. With China's technological progress and economic development, industrial structure upgrading and industrial competitiveness is an inevitable trend. Therefore, the US is bound to believe that its position in the global industrial chain is being challenged. In the face of industrial adjustments between the major powers of China and the US, China should follow the laws of global industrial development and do well the following three aspects:

First, for traditional competitive industries, such as the textile industry, metal manufacturing, plastics and rubber industries, etc., supply-side reforms should be adopted to upgrade the industry and reduce excess capacity. For a long time, China's traditional competitive industries, especially labour-intensive industries, have made important contributions to China's economic development. At the same time, they have been condemned by many foreign countries for their large exports. China should take the upgrading of its industrial structure as an opportunity to phase out labour-intensive industries with high pollution, low added value and low technological content, thereby avoiding the cost increase caused by the gradual disappearance of China's demographic dividend. The specific implementation path is to introduce foreign advanced equipment or

self-technological innovation, improve product quality and technological content, and gradually eliminate high pollution and high energy consumption industries; transfer production through the global industrial chain, improve China's position in the global value chain, and reduce trade friction caused by the export of many cheap products.

Second, China should promote the development of its domestic high-tech industries through independent research and development and the mastery of core knowledge and technology, and gradually reduce its dependence on the high-tech industries of the US. In recent years, China's high-end equipment manufacturing industry has achieved rapid development and gradually mastered the manufacturing process of some core components. However, these advances have not freed China from its dependence on core technologies from abroad. Currently, the key capabilities of Chinese high-tech products, such as conceptual design, detailed design, testing and standard setting, remain in the hands of foreign suppliers, and China is still constrained in these capabilities. Therefore, to achieve real industrial upgrading, China needs to master the design concept and knowledge of core components through independent innovation, enhance the ability to integrate the global innovation chain, and finally get rid of the situation that the technology of core industries is controlled by others.

Third, China should take the 'Belt and Road' initiative as an opportunity to build a new platform for regional economic cooperation, and complete industrial transfer and industrial sharing. With the deepening of the 'Belt and Road' cooperation, China has continued to deepen its industrial cooperation with countries along the route, which to a large extent alleviated the negative impact of the US trade war on China's economy. Next, China should continue to deepen cooperation with countries and regions along the 'Belt and Road'. Countries and regions should give full play to their respective comparative advantages based on their own development level and resource endowment and form an industrial cooperation mode with complementary advantages and mutual benefits and an industrial chain of high, middle and low-end cooperation.

7.3.4. China should Seek an International Trade Environment with Reasonable Distribution of Benefits

China is in a weak position in the distribution of benefits in Sino–US trade. To obtain a reasonable distribution of benefits in international trade, China can look for countries with similar development levels but different economic structures and different demand preferences for cooperation. In international trade when the factor return rate gap is not large, inequality will be much smaller. Alternatively, an economic integration organisation can be established, and the unreasonable distribution of benefits can be resolved with integrated institutional constraints. As long as transactions are not equivalent, inequality will arise, whether within or between countries. If countries are integrated into a perfect economic integration, the inherent requirements of economy and politics must be to eliminate the gap and ensure fairness through a complete system. The EU has done quite well in this regard. The current EU member states include Bulgaria and other developing countries. For these developing countries, other member states have promised to provide economic support to them and provide assistance when necessary, which is prominently reflected in the EU cohesion policy. This will ensure that relatively backward countries get equal opportunities for development within the EU.

7.3.5. The US Should Make Full Use of Its Comparative Advantages to Expand Exports to China to a Certain Extent

The continuous expansion of the scope of anti-dumping against Chinese goods by the US will not fundamentally help the US reduce imports, and it will even harm the interests of consumers in the US. It is better for the US to find ways to increase exports to China to reduce its trade deficit. Second, based on the theory of comparative advantage, China tends to import high-tech products and technology patents. The US should appropriately relax its control in this regard and appropriately increase the export of such products without endangering national security. Due to the huge value gap between such products and

labour-intensive products such as electromechanical products, clothing and toys, the increase of such products is bound to effectively alleviate the trade deficit.

7.3.6. The US Should Increase Savings Appropriately

If the US implements a more stringent credit policy, it should be able to curb some irrational consumption and excessive consumption to a large extent. Moreover, raising interest rates is also an effective means of stimulating household savings.

7.3.7. Sino–US trade Frictions should be Resolved More through WTO

The multilateral dispute settlement mechanism has been continuously developed from GATT to WTO. Under the GATT system, if one party raises an objection, the report can be prevented from passing, and it is difficult for the expert group report to be adopted. The establishment of WTO has improved the deficiency of GATT in many aspects, mainly manifested in the strict time limit of the dispute settlement mechanism, the protection of the due power of the expert group and the legalisation of retaliatory actions, as well as the specially established Dispute Settlement Body (DSB). Since the WTO's clear dispute settlement mechanism, unbiased panel decision and clear timetable for dispute settlement have brought benefits to dispute settlement, WTO has effectively improved the effect of dispute settlement [199]. The WTO dispute settlement mechanism has changed the unanimous principle of GATT into the reverse unanimous principle (i.e., only the unanimous opposition of all members can prevent the adoption of the expert group report, and to prevent errors in the application of law in the panel's decision, an arbitration procedure has been established. WTO has become the most extensive mechanism for resolving trade disputes among governments, including the vast number of developing countries [200]. However, there are also many deficiencies of the WTO dispute settlement mechanism in the actual operation. The WTO dispute settlement mechanism has changed the settlement of international affairs from a power-based approach to a rule-oriented approach. However, in practice, the dispute settlement does not surpass the state

relationship of power. Instead, there is a pattern where both rule-oriented and power-oriented settlement methods are emphasised. Compared with GATT, the efficiency of WTO dispute settlement mechanism has improved overall, but its lack of implementation capacity and reforms that have not achieved the expected results have not been overcome, so that the efficiency improvement has not been enjoyed by all WTO members. The WTO reform failed to prevent the illegal use of trade measures by powerful countries [201]. Therefore, it is necessary to continuously reform the WTO dispute settlement mechanism. Perdakis, Kerr and Hobbs [202] require that the principle of consumer preference be incorporated into the WTO dispute settlement mechanism. Ethier [203] believes that developing countries can make up for the lack of retaliatory capacity through the obligation of intellectual property protection.

Semiconductor is an important product exported by the US, and its exports to China in particular have developed rapidly. China is the third largest market for semiconductor exports of the US, and the value of semiconductors exported to the Chinese market is as high as US \$2 billion. The US believes that China imposes a 17% value-added tax on semiconductors imported from the US and implements a 17% value-added tax reduction on domestically produced semiconductors, which discriminates against semiconductor exports from the US. WTO rules allow member states to give certain preferential treatment to domestic production but prohibit supportive policies that discriminate against foreign products. The US further believes that China discriminates against the export of Foreign Service industries. On March 18, 2004, the US requested to consult with China under the WTO framework, and then with China's consent, the European Union, Japan, Mexico and others joined the consultation. This was the first time the US sued China after China's accession to WTO. The two parties negotiated under the WTO framework, and the two parties reached a mutual agreement through consultation. China agreed to abolish the value-added tax imposed on semiconductors imported from the US, and the dispute was finally resolved through WTO negotiations. The case revealed that semiconductor is an important high-tech industry of the US, with important strategic and economic significance. China is an important export market for semiconductors of the US. In addition,

semiconductor is also a strategic emerging industry in China that needs continuous support. Therefore, in the bilateral consultations, the two sides had a tough position, and it was difficult to solve the dispute. The US directly appealed to WTO, and the significant economic interests were one of the reasons for resorting to WTO. For China, it is a good choice to face disputes with significant economic interests submitted to WTO.

In the choice of dispute settlement mechanism and in the dispute with the US, China should resort to WTO dispute settlement mechanism more when its interests are damaged or when it is difficult to resolve disputes through bilateral consultation.

7.3.8. China Should Gradually Cultivate Its Own Multinational Companies to Avoid a Series of Trade Problems Caused by Single Export

Given that the distribution of benefits in the internal trade of multinational companies is mainly completed internally, the huge trade surplus brought by the internal trade of multinational corporations in China has not generated many benefits. China's own multinational companies have not developed ideally, and they have relatively single exports. The relatively single export mode has not only greatly increased the trade volume, but also exacerbated the trade friction, bringing many economic and political problems. Therefore, cultivating and owning powerful multinational companies, improving and upgrading trade development methods, optimising the trade structure, and continuously increasing the interest income and proportion in international trade are important issues that must be faced and solved at present. This is also a key measure for China to adapt to the wave of economic globalisation. To cultivate and develop domestic multinational companies, China should take its current comparative advantage - labour resources as the basis, refer to the path of gradual upgrading of industrial chain in process division, gradually and steadily improve the quality of China's production factors, and give birth to multinational companies with Chinese characteristics by improving the development level of endogenous economic variables, thereby constantly promoting China's shift to high

value-added processes in the international industrial chain or value chain. Do not be too ambitious, blindly pursue success in one step or build castles in the air. To cultivate its own multinational companies, China should introduce corresponding policies and measures, establish a fair and equitable competition environment, encourage and urge enterprises to develop products with characteristics and competitiveness, and encourage enterprises to take the path of international production and operation, attach importance to science and technology and education investment, learn the advanced management experience and marketing skills of multinational corporations in developed countries, and select talents with strong business ability and high comprehensive quality to be responsible for the operation and management of overseas subsidiaries, and continuously develop and improve the internationalisation process of the company.

7.3.9. Necessity of international tax coordination and cooperation to reduce improper transfer pricing behaviour of multinational corporations

It is generally believed that the existence of transfer pricing leads to the transfer of costs and profits among countries, and then the international flow of tax revenue, resulting in the redistribution of tax revenue and related resources. From the perspective of sovereign countries, this has caused a lot of tax losses. For example, Hirshlerfer [204], Kopits [205], etc. all analysed the tax effect. In addition, some scholars have discovered through research that the existence of transfer pricing will bring other effects. For example, Bond [206] believed that transfer pricing would distort the effective allocation of resources, and Diaw [207] studied the impact of transfer pricing on shareholders' equity in the host country.

One of the characteristics of transfer pricing of transnational corporations is transnational; the internal trade activities of multinational corporations are conducted in countries with different tax jurisdictions. There are great differences in tax rates, tax policies and market development among these independent countries, which provides conditions for

multinational corporations to use transfer pricing to avoid tax. In addition the principle of 'state tax sovereignty' in international tax law makes the existence of these differences inevitable. Another characteristic of transfer pricing behaviour of multinational corporations is concealment. Since transfer pricing is a price setting mechanism within a multinational company, its information disclosure is very limited. Information asymmetry severely restricts the effectiveness of transfer pricing tax regulation. International tax coordination and cooperation are the most effective means to overcome the above-mentioned obstacles. For example, by strengthening international tax coordination and cooperation, signing more tax agreements, strengthening information exchange and increasing information exchange methods, governments can reduce the possibility of tax avoidance caused by information asymmetry. For another example, in terms of system the system, differences in taxation systems and policies should be minimised. The weakening of system differences will reduce the occurrence of transfer pricing tax avoidance from the root. The negative effects of transfer pricing have attracted the attention of governments all over the world. All countries have invested a lot of manpower and material resources in the tax regulation of transfer pricing to enhance the effect of regulation and reduce the impact of adverse aspects such as tax loss. However, in the process of regulation, the intensity and effect of regulation are also different for different countries due to differences in the economic development status and the degree of perfection of the legal system. Some countries, especially some developed countries, have relatively strong tax regulations. In other countries, especially some developing countries, due to the short period of reform and opening up, many of them are still in the stage of attracting foreign investment, so the intensity of regulation is relatively small. In this way, resources will flow again, from countries with weaker regulation to countries with stronger regulation. This redistribution of resources is inefficient. In addition, when formulating the transfer pricing system, some countries often start from their own interests and ignore the transfer pricing system of other countries and the international rule, and this will also lead to negative effects such as the unfair distribution of tax in the world. Through international tax coordination and cooperation, governments will follow more international transfer pricing rules and consider the provisions of transfer pricing systems in other countries, thereby reducing the negative

effects caused by tax regulation.

7.4. SUMMARY OF CHAPTER SEVEN

This chapter summarises and explains the important results obtained from the previous chapters. The results obtained are somewhat inconsistent with some previous studies. For example, this study believes that compared with exchange rate factors, savings factors have a greater impact on Sino–US trade imbalances, such as: Cline [1] deemed that the RMB exchange rate has a significant impact on the Sino–US trade balance. If the real exchange rate of RMB appreciates by 1%, China’s surplus reduces by 0.3% to 0.4% of the GDP. If the real exchange rate of RMB appreciates by 10%, the Sino–US trade surplus reduces by 170 billion to 250 billion US dollars, and accordingly the US deficit reduces by 22 billion to 63 billion US dollars [1]. However, the results obtained are also consistent with some previous studies, such as: David Hale and Lyric Hale considered that despite Washington had been pressuring RMB for appreciation so as to settle the trade deficit, RMB was not the reason for Sino–US trade imbalance, and what we should pay attention to was how to integrate China into the global economy [2].

This shows that the Sino–US trade imbalance is a complicated research issue. In addition, this chapter covers important suggestions for alleviating the Sino–US trade imbalance, including learning from Japan’s experience in handling Sino-Japanese trade imbalances, introducing third-party organisations such as WTO to resolve Sino–US trade disputes, and paying attention to the harm of transfer pricing to trade interests.

LIST OF NEW FINDINGS

1. Based on the trade volume and GDP between China and the US, according to the economic model in this study, it is proven that China participated in the trade with the US based on its comparative advantages. Although China can obtain certain trade benefits, the economic gap with the US cannot be narrowed.
2. It is shown that Sino–US trade has a tendency of mercantilism and is moving away from factor endowment theory. Through research and statistics on the trade structure between China and the US, it was shown here that technology-intensive and capital-intensive products in China’s exports to the US are increasing, and this is not in line with the factor endowment of China. The US has formulated a series of restrictive measures on the export of high-tech products with its own comparative advantages to China and has conducted frequent anti-dumping investigations against products from China (reflecting the aforementioned mercantilism).
3. Some limitations of mercantilism theory have been demonstrated here. Examination of China’s exports to the US and the gross domestic product of the United States established an economic model to prove that although the US has a huge trade deficit in Sino–US trade, it is still conducive to US economic growth.
4. A comparison is drawn between savings and exchange rates, two factors that have always been discussed in academic circles and affect the imbalance of Sino–US trade. Using the economic model, it is shown that compared with exchange rate factors, the difference in the national savings rate between China and the US has a significant positive impact on the Sino–US trade surplus.
5. It has been shown here that analysing the factors of Sino–US trade imbalance only by focusing on US direct investment in China is insufficient. By establishing an economic

model, I studied all the FDI in China, including the US, and found that the increase of FDI in China has promoted the development of China's export trade to the US, thus increasing China's trade surplus with the US.

6. An economic model to predict the trend of Sino-US trade imbalance in the short term was established, and it is found that the Sino-US trade imbalance will continue to expand in the short term.

7. By analysing the history of Sino-US trade, it is shown that Sino-US trade imbalance runs through all historical stages of Sino-US trade. At present, Sino-US trade imbalance has become a prominent obstacle in Sino-US trade and political relations.

8. By analysing the history of Sino-US trade disputes, it is shown that Sino-US trade imbalance is the direct cause of Sino-US trade disputes. The US side is the aggressor in trade disputes, and its trade protection measures are constantly escalating.

9. After analysing the ways in which different US presidents deal with Sino-US trade disputes, it is pointed out that there are great differences in the ways in which different US presidents handle trade disputes with China, and this is an uncertain factor for the stable development of Sino-US trade relations

10. Some suggestions to reduce the Sino-US trade imbalance are made, which will contribute to the development of trade relations between the two countries.

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APPENDICES

Appendix A: Robustness analysis results of savings and exchange rate models given by EViews 8.0

Dependent Variable: LNSC

Method: Least Squares

Date: 08/22/21 Time: 18:33

Sample (adjusted): 2001 2018

Included Observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNR(-1)	-2.900276	0.857736	-3.381315	0.0041
LNQC(-1)	1.646733	0.518334	3.176973	0.0063
C	7.501789	3.058092	2.453095	0.0269
R-squared	0.778472	Mean dependent var.	7.285097	
Adjusted R-squared	0.748935	S.D. dependent var.	0.681159	
S.E. of regression	0.341304	AIC	0.838927	
Sum squared resid	1.747329	SC	0.987322	
Log likelihood	-4.550343	Hannan–Quinn criter.	0.859389	
F-statistic	26.35576	Durbin–Watson stat	0.470216	
Prob (F-statistic)	0.000012			

Dependent Variable: LNSC

Method: Least Squares

Date: 08/22/21 Time: 18:33

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNR	-3.966613	0.866667	-4.576857	0.0004
LNQC	1.250834	0.605592	2.065473	0.0566
C	10.85359	3.260561	3.328750	0.0046
R-squared	0.760732	Mean dependent var.	7.285097	
Adjusted R-squared	0.728829	S.D. dependent var.	0.681159	
S.E. of regression	0.354707	AIC	0.915963	
Sum squared resid	1.887258	SC	1.064359	
Log likelihood	-5.243670	Hannan–Quinn criter.	0.936425	
F-statistic	23.84557	Durbin–Watson stat	0.374531	
Prob (F-statistic)	0.000022			

Dependent Variable: LNSC
Method: Least Squares
Date: 08/22/21 Time: 18:42
Sample: 2001 2018
Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNR	-2.815976	0.595499	-4.728767	0.0003
LNQC	0.735051	0.416047	1.766752	0.0976
C	10.83315	2.240268	4.835647	0.0002
R-squared	0.756167	Mean dependent var.	7.784974	
Adjusted R-squared	0.723656	S.D. dependent var.	0.463606	
S.E. of regression	0.243710	AIC	0.165339	
Sum squared resid.	0.890921	SC	0.313734	
Log likelihood	1.511951	Hannan–Quinn criter.	0.185800	
F-statistic	23.25880	Durbin–Watson stat.	0.375206	
Prob (F-statistic)	0.000025			

Appendix B: Robustness analysis results of foreign direct investment models given by EViews 8.0

Dependent Variable: LNEX
Method: Least Squares
Date: 08/22/21 Time: 18:38
Sample (adjusted): 1984 2019
Included Observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI(-1)	1.131198	0.053740	21.04949	0.0000
C	-0.095638	0.313900	-0.304676	0.7625
R-squared	0.928733	Mean dependent var.	6.278731	
Adjusted R-squared	0.926637	S.D. dependent var.	1.830531	
S.E. of regression	0.495810	AIC	1.488704	
Sum squared resid.	8.358128	SC	1.576677	
Log likelihood	-24.79667	Hannan–Quinn criter.	1.519409	
F-statistic	443.0809	Durbin–Watson stat.	0.210498	
Prob (F-statistic)	0.000000			

Dependent Variable: LNIM

Method: Least Squares
Date: 08/22/21 Time: 18:38
Sample (adjusted): 1984 2019
Included Observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI(-1)	0.756788	0.052768	14.34173	0.0000
C	1.422136	0.308224	4.613964	0.0001
R-squared	0.858147	Mean dependent var.	5.686685	
Adjusted R-squared	0.853975	S.D. dependent var.	1.274024	
S.E. of regression	0.486845	AIC	1.452211	
Sum squared resid.	8.058619	SC	1.540185	
Log likelihood	-24.13981	Hannan–Quinn criter.	1.482916	
F-statistic	205.6852	Durbin–Watson stat.	0.196638	
Prob (F-statistic)	0.000000			

Dependent Variable: LNTN
Method: Least Squares
Date: 08/22/21 Time: 18:39
Sample (adjusted): 1984 2019
Included Observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI(-1)	0.972023	0.054691	17.77296	0.0000
C	1.284049	0.319456	4.019488	0.0003
R-squared	0.902823	Mean dependent var.	6.761458	
Adjusted R-squared	0.899965	S.D. dependent var.	1.595361	
S.E. of regression	0.504585	AIC	1.523794	
Sum squared resid.	8.656620	SC	1.611767	
Log likelihood	-25.42829	Hannan–Quinn criter.	1.554499	
F-statistic	315.8781	Durbin–Watson stat.	0.186740	
Prob (F-statistic)	0.000000			

Dependent Variable: LNEX
Method: Least Squares
Date: 08/22/21 Time: 18:40
Sample: 2001 2019
Included Observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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LNFDI	1.692787	0.122470	13.82207	0.0000
C	-3.756008	0.834843	-4.499059	0.0003
R-squared	0.918289	Mean dependent var.	7.767324	
Adjusted R-squared	0.913482	S.D. dependent var.	0.649858	
S.E. of regression	0.191149	AIC	-0.372231	
Sum squared resid.	0.621142	SC	-0.272816	
Log likelihood	5.536191	Hannan–Quinn criter.	-0.355406	
F-statistic	191.0497	Durbin–Watson stat.	0.507703	
Prob (F-statistic)	0.000000			

Dependent Variable: LNIM

Method: Least Squares

Date: 08/22/21 Time: 18:40

Sample: 2001 2019

Included Observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	1.645228	0.088622	18.56457	0.0000
C	-4.471377	0.604111	-7.401576	0.0000
R-squared	0.952992	Mean dependent var.	6.728208	
Adjusted R-squared	0.950227	S.D. dependent var.	0.619994	
S.E. of regression	0.138319	AIC	-1.019200	
Sum squared resid.	0.325249	SC	-0.919786	
Log likelihood	11.68240	Hannan–Quinn criter.	-1.002376	
F-statistic	344.6431	Durbin–Watson stat.	0.803468	
Prob (F-statistic)	0.000000			

Dependent Variable: LNTN

Method: Least Squares

Date: 08/22/21 Time: 18:40

Sample: 2001 2019

Included Observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	1.677662	0.108193	15.50617	0.0000
C	-3.348611	0.737523	-4.540345	0.0003
R-squared	0.933966	Mean dependent var	8.071762	
Adjusted R-squared	0.930081	S.D. dependent var	0.638624	
S.E. of regression	0.168866	AIC	-0.620122	
Sum squared resid	0.484767	SC	-0.520708	

Log likelihood	7.891161	Hannan–Quinn criter.	-0.603297
F-statistic	240.4412	Durbin–Watson stat.	0.567578
Prob (F-statistic)	0.000000		

Dependent Variable: LNEEX

Method: Least Squares

Date: 08/22/21 Time: 18:44

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	1.306345	0.104361	12.51760	0.0000
C	-0.824676	0.708920	-1.163286	0.2618

R-squared	0.907349	Mean dependent var.	8.037289
Adjusted R-squared	0.901558	S.D. dependent var.	0.498564
S.E. of regression	0.156427	AIC	-0.768017
Sum squared resid.	0.391510	SC	-0.669087
Log likelihood	8.912156	Hannan–Quinn criter.	-0.754376
F-statistic	156.6904	Durbin–Watson stat.	0.458176
Prob (F-statistic)	0.000000		

Dependent Variable: LNIM

Method: Least Squares

Date: 08/22/21 Time: 18:44

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	1.716849	0.090379	18.99615	0.0000
C	-5.126803	0.613941	-8.350640	0.0000

R-squared	0.957543	Mean dependent var.	6.519935
Adjusted R-squared	0.954890	S.D. dependent var.	0.637827
S.E. of regression	0.135469	AIC	-1.055703
Sum squared resid.	0.293631	SC	-0.956773
Log likelihood	11.50133	Hannan–Quinn criter.	-1.042062
F-statistic	360.8537	Durbin–Watson stat.	0.814631
Prob (F-statistic)	0.000000		

Dependent Variable: LNTN

Method: Least Squares

Date: 08/22/21 Time: 18:44

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	0.735346	0.047172	15.58876	0.0000
C	3.577231	0.320435	11.16366	0.0000
R-squared	0.938226	Mean dependent var.	8.565662	
Adjusted R-squared	0.934365	S.D. dependent var.	0.275987	
S.E. of regression	0.070706	AIC	-2.356141	
Sum squared resid.	0.079989	SC	-2.257210	
Log likelihood	23.20527	Hannan–Quinn criter.	-2.342499	
F-statistic	243.0095	Durbin–Watson stat.	0.616456	
Prob (F-statistic)	0.000000			

Appendix C: Robustness analysis results of the Sino–US economic gap model given by EViews 8.0

Dependent Variable: GDPB

Method: Least Squares

Date: 08/22/21 Time: 18:37

Sample: 2001 2019

Included Observations: 19

No d.f. adjustment for standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	-4.668183	2.300867	-2.028881	0.0619
EX(-1)	3.042125	2.392643	1.271450	0.2243
GDPB(-1)	1.421110	0.187857	7.564864	0.0000
GDPB(-2)	-0.590831	0.167404	-3.529375	0.0033
C	19567.79	7806.223	2.506691	0.0251
R-squared	0.964313	Mean dependent var.	86968.42	
Adjusted R-squared	0.954117	S.D. dependent var.	15153.18	
S.E. of regression	3245.849	AIC	19.22908	
Sum squared resid.	1.47E+08	SC	19.47761	
Log likelihood	-177.6762	Hannan–Quinn criter.	19.27114	
F-statistic	94.57617	Durbin–Watson stat.	1.841603	
Prob (F-statistic)	0.000000			

Dependent Variable: GDPB

Method: Least Squares

Date: 08/22/21 Time: 18:43
Sample (adjusted): 2003 2018
Included Observations: 16 after adjustments
No d.f. adjustment for standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	-2.134455	2.500937	-0.853462	0.4116
EX(-1)	-1.001222	2.389793	-0.418958	0.6833
GDPB(-1)	1.388830	0.160029	8.678623	0.0000
GDPB(-2)	-0.625920	0.144705	-4.325500	0.0012
C	31481.93	8729.435	3.606410	0.0041
R-squared	0.976429	Mean dependent var.	87187.50	
Adjusted R-squared	0.967857	S.D. dependent var.	15843.52	
S.E. of regression	2840.479	AIC	18.99164	
Sum squared resid.	88751561	SC	19.23307	
Log likelihood	-146.9331	Hannan–Quinn criter.	19.00400	
F-statistic	113.9179	Durbin–Watson stat.	2.334926	
Prob (F-statistic)	0.000000			

Appendix D: The results of the robustness analysis of the US economic model given by EViews 8.0

Dependent Variable: LNGDP
Method: Least Squares
Date: 08/22/21 Time: 18:34
Sample (adjusted): 1984 2019
Included Observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMP(-1)	0.260065	0.005738	45.32137	0.0000
C	9.939449	0.036731	270.6047	0.0000
R-squared	0.983717	Mean dependent var.	11.53260	
Adjusted R-squared	0.983238	S.D. dependent var.	0.493601	
S.E. of regression	0.063906	AIC	-2.608851	
Sum squared resid.	0.138856	SC	-2.520877	
Log likelihood	48.95931	Hannan–Quinn criter.	-2.578146	
F-statistic	2054.026	Durbin–Watson stat.	0.363843	
Prob (F-statistic)	0.000000			

Dependent Variable: LNGDP
Method: Least Squares

Date: 08/22/21 Time: 18:29

Sample: 2001 2019

Included Observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMP	0.305107	0.024466	12.47053	0.0000
C	9.562612	0.190666	50.15373	0.0000

R-squared	0.901457	Mean dependent var.	11.93247	
Adjusted R-squared	0.895661	S.D. dependent var.	0.208832	
S.E. of regression	0.067456	AIC	-2.455378	
Sum squared resid.	0.077356	SC	-2.355964	
Log likelihood	25.32609	Hannan–Quinn criter.	-2.438553	
F-statistic	155.5141	Durbin–Watson stat.	0.229946	
Prob (F-statistic)	0.000000			

Dependent Variable: LNGDP

Method: Least Squares

Date: 08/22/21 Time: 18:40

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMP	0.380998	0.027110	14.05372	0.0000
C	8.851405	0.218287	40.54937	0.0000

R-squared	0.925061	Mean dependent var.	11.91359	
Adjusted R-squared	0.920377	S.D. dependent var.	0.197496	
S.E. of regression	0.055728	AIC	-2.832216	
Sum squared resid	0.049690	SC	-2.733286	
Log likelihood	27.48995	Hannan–Quinn criter.	-2.818575	
F-statistic	197.5071	Durbin–Watson stat	0.232506	
Prob (F-statistic)	0.000000			

Appendix E: Robustness analysis results of the Sino–US trade development trend model given by EViews 8.0

Dependent Variable: Y1

Method: Least Squares

Date: 08/22/21 Time: 18:35

Sample: 2001 2019

Included Observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
T	232.2349	11.34444	20.47126	0.0000
C	-464019.0	22802.40	-20.34957	0.0000
R-squared	0.961016	Mean dependent var.	2773.121	
Adjusted R-squared	0.958722	S.D. dependent var.	1333.102	
S.E. of regression	270.8447	AIC	14.14027	
Sum squared resid.	1247067.	SC	14.23968	
Log likelihood	-132.3326	Hannan–Quinn criter.	14.15709	
F-statistic	419.0724	Durbin–Watson stat.	1.275936	
Prob (F-statistic)	0.000000			

Dependent Variable: Y2

Method: Least Squares

Date: 08/22/21 Time: 18:35

Sample: 2001 2019

Included Observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
T	80.40014	7.490197	10.73405	0.0000
C	-160627.8	15055.35	-10.66915	0.0000
R-squared	0.871426	Mean dependent var.	976.5011	
Adjusted R-squared	0.863863	S.D. dependent var.	484.6661	
S.E. of regression	178.8260	AIC	13.31000	
Sum squared resid.	543638.5	SC	13.40942	
Log likelihood	-124.4450	Hannan–Quinn criter.	13.32683	
F-statistic	115.2198	Durbin–Watson stat.	0.647789	
Prob (F-statistic)	0.000000			

Dependent Variable: Y1

Method: Least Squares

Date: 08/22/21 Time: 18:41

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
T	249.6594	12.17364	20.50821	0.0000
C	-498272.1	24463.00	-20.36840	0.0000
R-squared	0.963352	Mean dependent var.	3418.556	
Adjusted R-squared	0.961062	S.D. dependent var.	1357.932	

S.E. of regression	267.9583	AIC	14.12398
Sum squared resid.	1148826.	SC	14.22291
Log likelihood	-125.1158	Hannan–Quinn criter.	14.13762
F-statistic	420.5866	Durbin–Watson stat.	0.912420
Prob (F-statistic)	0.000000		

Dependent Variable: Y2

Method: Least Squares

Date: 08/22/21 Time: 18:41

Sample: 2001 2018

Included Observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
T	71.66667	4.494796	15.94437	0.0000
C	-143217.2	9032.322	-15.85608	0.0000
R-squared	0.940790	Mean dependent var.	796.9444	
Adjusted R-squared	0.937089	S.D. dependent var.	394.4513	
S.E. of regression	98.93657	AIC	12.13127	
Sum squared resid.	156615.1	SC	12.23020	
Log likelihood	-107.1815	Hannan–Quinn criter.	12.14492	
F-statistic	254.2228	Durbin–Watson stat	0.655668	
Prob (F-statistic)	0.000000			

LIST OF PUBLICATIONS

- [1] Jiandong Shi. *The Sky Won't Fall – The China–US Trade War and Future Economic Relations*, In *Financial and Economic Review*, 2020, Vol. 19, Issue 1
- [2] Jiandong Shi. *The Correlation of Savings and Exchange Rate with China–US Trade Imbalance*, In *Economics & Working Capital*, 2020, Special issues
- [3] Jiandong Shi. *Sino–US Trade Imbalance and Sino–US Economic Gap*, In *Journal of Economy & Society*, 2021
- [4] Jiandong Shi. *Foreign Direct Investment in China and Sino–US Trade Imbalance*, In *Polgári Szemle*, 2021
- [5] Jiandong Shi. *Analysis on China–United States Trade Imbalance from Trade Structure, Mode of Trade, and Trade Policy*, In *Public Administration and Society*, 2021

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Education and Training

2017.09/ Present: University of Public Service, Hungary, Economics (PhD student)

2015.09/2017.07: Budapest Business School, Hungary, International Economy and Business (MA)

2011.09/2015.06: Ningxia Institute of Science and Technology, China, Accounting (BA)

2011.09/2015.06: Ningxia Institute of Science and Technology, China, Engineering Management (BA)

Professional Experience

2018 – 2019: Consular Protection Liaison, Embassy of the People's Republic of China in Hungary, Budapest

2019 – Present: Consul-assisted volunteers, Embassy of the People's Republic of China in Hungary, Budapest

2020 – Present: President, Chinese Students and Scholars Association in Hungary, Budapest

Language Skills

Chinese: Mother Tongue English: C1 French: B1

Conferences and Presentations

[1] 24 April, 2018, Trade Relations between the United States and China, the Conference

of Nation-Building and Minority rights in the Word, National University of Public Service.
Hungary

[2] 17-19th May, 2018, Trade friction between China and the United States, 7th Interdisciplinary Doctoral Conference, University of Pécs, Hungary

[3] 10th October, 2018, Sino-US Trade Imbalance, MSU-NUPS Academic Week on Public Governance, the Faculty of Science of Public Governance and Administration of National University of Public Service, Hungary

[4] 30th October, 2018, Trade friction between China and the United States, Gateway of Science Poster Exhibition, the Doctorates' Council of the National University of Public Service, Hungary

[5] 21st November, 2018, A study on the Causes of Sino-US Trade Conflicts, In Service of the Nation Conference, the Doctorates' Council of the National University of Public Service, Hungary

[6] 29-30th November, 2018, Trade Dependence and Complementarity of China and central and Eastern European countries, Economic Turmoil in Contemporary Europe III Conference, Lazarski University, Warsaw, Poland

[7] 6-7th December, 2018, Case Study on Sino-US Trade Friction-Sino-US Photovoltaic Dispute, The Smart Cities Conference-6th Edition, National University of Political Studies and Public Administration, Bucharest, Romania

[8] 18th February, 2019, China-Hungary Economic and Trade Cooperation Zone, The Conference of the Past and the Future of Hungary's Diplomatic and Trade Relations with East Asia, Oriental Business and Innovation Centre of Budapest Business School – University of Applied Sciences. Hungary

[9] 8th April, 2019, Analysis on Factors of Statistical Difference of Sino-US Trade Imbalance, International Scientific Conference on Sustainability 2019, Budapest Business School – University of Applied Sciences, Hungary

[10] 3-5th May, 2019, Analysis on Chinese factors of Sino-US Trade Imbalance, XII. Tavasz Szék Conference, National Association of Doctoral Students, University of Debrecen, Hungary

[11] 15th May, 2019, Research on factors behind China for China's trade surplus with the

United States, Critical Rethinking of Public Administration Conference 2019, National University of Public Service, Hungary

[12] 24–25th of May 2019, Sino–US Trade Imbalance, 8th Interdisciplinary Doctoral Conference, University of Pécs, Hungary