SERVICES TRADE PERFORMANCE IN CHINA: AN EMPIRICAL ANALYSIS

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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SERVICES TRADE PERFORMANCE IN CHINA: AN EMPIRICAL ANALYSIS

ABSTRACT

Theoretical and empirical analyses have proved that the services industry plays a crucial role in China's economic growth and international trade. However, China exports far fewer services than its imports, which has led to weak competitiveness in its services exports. This situation has resulted in a lack of impetus for the sustained development of trade in services. This study has examined the competitiveness of the services trade by calculating the revealed comparative advantage of China's service sectors based on the value-added exports of the forward-linkage method from 2000 to 2014. The results showed that China's service sub-sectors showed a comparative disadvantage compared with other selected countries. Fortunately, the value of the revealed comparative advantage has gradually increased in recent years. This study used the augmented gravity model, using 42 trading partners, to examine the determinants of China's services trade from 2000 to 2014 by adopting the Poisson Pseudo Maximum Likelihood High-Dimensional Fixed Effect. The empirical results showed that the economic sizes of China and its trading partners, the sharing of common borders, China's fixed telephone subscriptions, the exchange rate, and the perception of lower corruption in partner countries positively contributed to the level of services trade between China and its counterparts. In contrast, trade restrictiveness and the distances between the capitals of China and its counterparts were negatively associated with China's services trade. The greater availability and adoption of information and communications technology in China's partner countries have negatively (positively) affected China's services exports (imports). Fortunately, the benchmark regression results were strongly robust when using alternative methods. Besides using qualitative analysis, this study analysed how China's services sector has contributed to China's overall trade performance and how government policies and the COVID-19 pandemic have influenced China's services. It was found that

China is gradually opening up its service sectors by relaxing some restrictions on market access. Additionally, knowledge-intensive services are gradually starting to play a critical role in China's economic growth. The COVID-19 pandemic has badly affected service-sector foreign direct investment, but the effect is only expected to last for a short while. Finally, this study has highlighted that China should actively develop more service trade cooperation with countries together with the "Belt and Road" Initiative. It also needs to liberalise the services trade further and relax restrictions on the movement of people, especially in the fields of technology, tourism, overseas study, business, and culture. Last, China should focus on scientific and technological research and development and increase investment in scientific and technological innovation.

Keywords: Services Trade, Revealed Comparative Advantage, Forward-linkage, Gravity Model, China

PRESTASI PERDAGANGAN PERKHIDMATAN DI NEGARA CHINA: ANALISIS EMPIRIKAL

ABSTRAK

Analisis teori dan empirikal telah membuktikan bahawa industri perkhidmatan memainkan peranan penting dalam pertumbuhan ekonomi dan perdagangan antarabangsa China. Walau bagaimanapun, perkhidmatan eksport di China jauh lebih kurang berbanding import, ini telah menyebabkan daya saing yang lemah dalam perkhidmatan eksport. Keadaan ini telah mengakibatkan kekurangan dorongan untuk pembangunan perdagangan berterusan dalam perkhidmatan. Kajian ini mengkaji daya saing perdagangan perkhidmatan dengan mengira kelebihan perbandingan yang didedahkan bagi sektor perkhidmatan China berdasarkan eksport nilai tambah kaedah pautan ke hadapan dari tahun 2000 hingga 2014. Hasil kajian menunjukkan bahawa subsektor perkhidmatan China menunjukkan perbandingan kelemahan berbanding dengan negara lain yang terpilih. Mujur, nilai kelebihan perbandingan yang didedahkan telah meningkat secara beransur-ansur dalam beberapa tahun kebelakangan ini. Kajian ini menggunakan model graviti tambahan, dan menggunakan 42 rakan dagangan untuk mengkaji penentu perdagangan perkhidmatan China dari 2000 hingga 2014 dengan mengguna pakai Kesan Tetap Dimensi Tinggi Kemungkinan Maksimum Poisson Pseudo. Keputusan empirikal menunjukkan bahawa saiz ekonomi China dan rakan perdagangannya, perkongsian sempadan bersama, langganan telefon tetap China, kadar pertukaran, dan persepsi rasuah yang lebih rendah di negara rakan kongsi menyumbang secara positif kepada tahap perdagangan perkhidmatan antara China dan rakan sejawatannya. Sebaliknya, sekatan perdagangan dan jarak antara ibu negara China dan negara sejawatnya dikaitkan secara negatif dengan perdagangan perkhidmatan China. Ketersediaan dan penggunaan teknologi maklumat dan komunikasi yang lebih besar di negara rakan kongsi China telah menjejaskan eksport (import) perkhidmatan China secara negatif (positif). Mujurlah,

keputusan regresi penanda aras sangat teguh apabila menggunakan kaedah alternatif. Selain menggunakan analisis kualitatif, kajian ini turut menganalisis cara sektor perkhidmatan China yang menyumbang kepada prestasi perdagangan keseluruhan China serta bagaimana dasar kerajaan dan wabak COVID-19 mempengaruhi perkhidmatan China. Kajian ini didapati bahawa China secara beransur-ansur membuka sektor perkhidmatannya dengan melonggarkan beberapa sekatan ke atas akses pasaran. Selain itu, perkhidmatan berintensif pengetahuan secara beransur-ansur mula memainkan peranan penting dalam pertumbuhan ekonomi China. Pandemik COVID-19 telah menjejaskan pelaburan langsung asing sektor perkhidmatan dengan teruk, tetapi dijangka kesannya hanya untuk seketika. Akhir sekali, kajian ini menekankan bahawa China harus secara aktif membangunkan lebih banyak kerjasama perdagangan perkhidmatan dengan negara-negara bersama-sama dengan Inisiatif "Belt and Road". Ia juga perlu meliberalisasikan lagi perdagangan perkhidmatan dan melonggarkan sekatan ke atas pergerakan orang, terutamanya dalam bidang teknologi, pelancongan, pengajian luar negara, perniagaan dan budaya. Akhir sekali, China harus memberi tumpuan kepada penyelidikan dan pembangunan saintifik dan teknologi serta meningkatkan pelaburan dalam inovasi saintifik dan teknologi.

Kata kunci: Perdagangan Perkhidmatan, Pendedahan Kelebihan Perbandiangan, Pautan ke hadapan, Model Graviti, China.

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Penning down this column to wrap up the thesis is indeed an emotional moment for me as this life experience is certainly a memorable one. Many have played an important role in my 4-year PhD journey and I would like to take this opportunity to record my sincere appreciation to them.

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LIST OF SYMBOLS AND ABBREVIATIONS

GATS	:	General Agreement on Trade in Services
WTO	:	World Trade Organization
UNCTAD	:	United Nations Conference on Trade and Development
OECD	:	Organization for Economic Cooperation and Development
UN	:	United Nations
EU	:	European Union
GDP	:	Gross Domestic Product
US	:	United States
UK	:	United Kingdom
USD	:	United States Dollar
RCA	:	Revealed Comparative Advantage
UN	:	United Nations
IMF	:	International Monetary Fund
PPMLHDFE	:	Poisson Pseudo-Maximum Likelihood with High-dimensional Fixed Effects
MRTs	:	Multilateral Resistance Terms
GATT	:	General Agreement on Tariffs and Trade
H-O	:	Heckscher-Ohlin
H-O-S	:	Heckscher-Ohlin-Samuelson
VS	:	Vertical Specialisation
HIY	:	Hummels, Ishii and Yi
TiVA	:	Trade in Value Added
IMS	:	International Market Share

RMA	:	Revealed Import Advantage
RTA	:	Relative Trade Advantage
EMS	:	Export Market Share
TCI	:	Trade Competitiveness Index
CAI	:	Comparative Advantage Index
ES	:	Export Similarity
DO	:	Degree of Openess
RTC	:	Relative Trade Competitiveness
SRCA	:	Symmetric Revealed Comparative Advantage
NRCA	:	Net Revealed Comparative Advantage
RRCA	:	Relative Revealed Comparative Advantage
MS	:	Market Share
TSC	:	Trade Specialization Competitiveness
R&D	:	Research and Development
TO	:	Trade Overlap
BRI	:	Belt and Road Initiative
GVC	:	Global Value Chain
WIOD	:	World Input-Output Database
GL	:	Grubel-Lloyd
GTAP	:	Global Trade Analysis Project
RTA	:	Regional Trade Agreement
FDI	:	Foreign Direct Investment
STRI	:	Service Trade Restrictiveness Index
OFDI	:	Outward Foreign Direct Investment
PPML	:	Poisson Pseudo-Maximum Likelihood
CES	:	Constant Elasticity Substitution

2SLS	:	Two-Stage Least Square
FGLS	:	Feasible Generalized Least Squares
IIT	:	Intra-Industry Trade
MRT	:	Multilateral Resistance Term
SITC	:	Standard International Trade Classification
FVA	:	Foreign Value Added
FDC	:	Foreign D
HOS	:	Heckscher Ohlin Samuelson
NLS	:	Nonlinear Least Squares
OLS	:	Ordinary Least Squares
ICT	:	Information and Communications Technology
TRI	:	Trade Restrictiveness Index
NPC	:	National People's Congress
GLS	:	Generalized Least Squares
LM	:	Lagrange Multiplier
RESET	:	Ramsey Regression Equation Specification Error Test
LLC	:	Levin-Lin-Chu
ADF	:	Augmented Dickey-Fuller
PP	:	Phillips Perron
CORRUPT	:	Corruption Perception Index
VAT	:	Value Added Tax
BT	:	Business Tax
RCEP	:	Regional Comprehensive Economic Partnership
ASEAN	:	Association of Southeast Asia Nations
TiSA	:	Trade In Services Agreement
SDGs	:	Sustainability Development Goals

S&T	:	Science and Technology
MIC	:	Made in China
OTA	:	Online Travel Agency
IPO	:	Information Technology Outsourcing
KPO	:	Knowledge Process Outsourcing
UNDP	:	United Nations Development Program

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The services trade or trading in services is defined as selling and delivering an intangible product between a producer and consumer (Fefer, 2016). Still, referring to the General Agreement on Trade in Services (GATS), the services trade includes trading in business, other services and industries, such as; occupations, communications, construction, distribution, education, energy, environment, health and social tourism, and transportation. At the same time, the trade in services is distinguished from the trade in goods in two aspects (Copeland & Mattoo, 2008; WTO, 2010). First, the goods trade involves shipping goods from one region to another. Thus, transportation matters, but cross-border trade is not the most important method of conducting transactions in the trade in services due to its intangible characteristics (Copeland & Mattoo, 2008; Lennon, 2009; Sáez, 2010). Services require the physical proximity of customers and clients for non-transportable services, trade is possible through a foreign affiliate or if the supplier or customer travels across borders. Second, services are highly regulated because of natural monopolies, while various barriers limit their potential to move. More than 40% of trade costs arise from regulation-related factors, resulting in the trade costs in services being two times higher than those for goods (Baiker et al*.,* 2021). According to the regulations of the GATS under the World Trade Organization (WTO) in 1995, the international services trade represents trade that provides services across national borders (Chang et al*.,* 1999). Services can be traded internationally in four ways (Rueda-Cantuche et al*.,* 2016): cross-border trade (i.e., distance education, e-learning, consulting and finance), consumption abroad (i.e., travel, education, health care, maintenance and air services), commercial presence (i.e., cross-border bank branches, construction and consulting companies) and the movement of people (i.e., artists, doctors or professors moving to another country on short term employment contracts).

Today, the services industry continues to grow at an unprecedented speed, while it has become the largest sector in many economies, constituting three-fourths of the GDP in advanced countries and a smaller but increasing share in developing countries (UNCTAD 2017; Buckley & Majumdar, 2018). The OECD's (2017) statistics also showed that many countries' contributions to the world's GDP from services had increased monotonically. The United Nations Conference on Trade and Development (UNCTAD) statistics indicated that international trade in services accounted for 6% of the world GDP in 2020. As countries develop, their service (tertiary) sectors expand at the expense of the primary and secondary sectors. The service sector is now dominating the world's economy (Ghani & Kharas, 2010; WTO, 2019).

As the WTO and UNCTAD reported, while the value-added of the world's services accounted for 65% of global production, it created only 22.6% of total world trade in goods and services in 2020. According to UNCTAD statistics, in 2020, the world's trade in services has gradually increased with an average growth rate of 47%, from US$5.30 trillion in 2005 to US$11.97 trillion in 2019. Additionally, the growth rate of the world's service exports has been faster than its imports, thus creating a service trade surplus within this period. However, in contrast to the world's service trade which has always maintained its surplus, China's services imports have been greater than its exports, and this situation worsened rapidly after 2010, resulting in a service trade deficit since 1995, as shown in Figure 1.1.

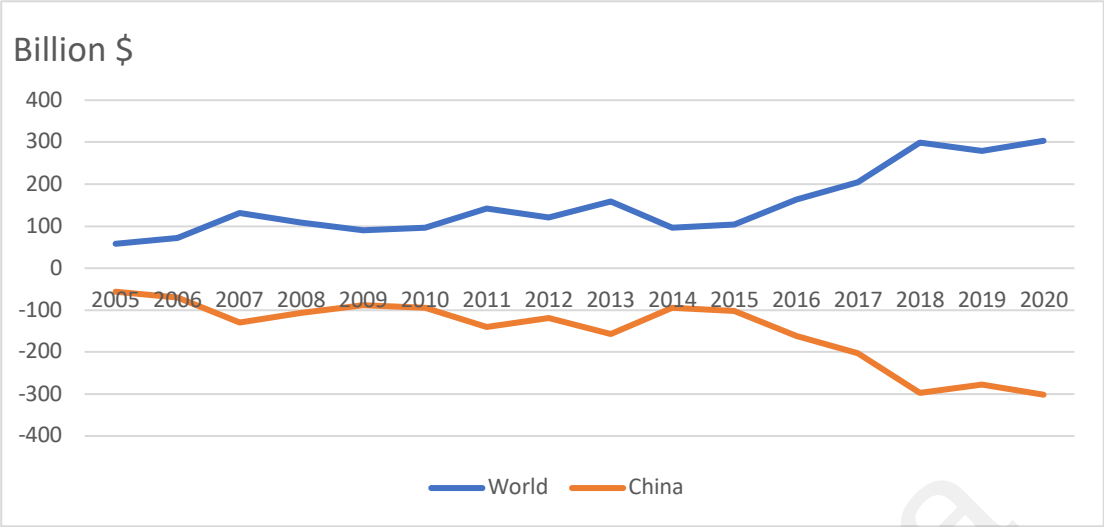

Figure 1.1: Service Trade Balance Between the World and China
Source: UNCTAD (2020)

The world's top services exporter in 2018 was the United States, with trade amounting to US$828 billion, equivalent to 14% of global services exports. The USA was followed by European countries, which jointly captured 17% of the world's services exports. Asian countries, such as; China, India, Singapore, Hong Kong SAR and the Republic of Korea, were the top five developing countries in services exports, making up 15% of the world's market share, equivalent to the total output of the other developing economies. Among them, China ranked fifth in the world, thus, dominating the services export market among developing economies.

Referring to the (WTO, 2019), the volume of world commercial services was relatively higher (8%) compared to merchandise trade (3%) in 2018. In addition, the UNCTAD statistics reported that the growth of the international trade in telecommunications, computer and information services expanded the fastest at almost 15% from 2017 to 2018 at the world level. Traditional service sectors, such as transport and travel, still dominated services exports in developing countries compared to; insurance, financial, intellectual property and other related business services in 2018. Most interestingly, finance, telecommunications and education have been gradually showing an internationalisation trend and have started offering services beyond domestic

markets, progressively increasing their proportion of services in world trade. Therefore, the economic structure is continuously changing worldwide in the age of globalisation. Recently, the tertiary sector has recorded faster growth than manufacturing and agriculture, which have declined. The growth rate of world trade in services now exceeds that of the trade in goods, rendering it the "new engine" leading global growth (WTO, 2019).

Service-oriented industries, with their rising importance in the global economy alongside manufacturing, are becoming more vital for economic growth in many countries. Nonetheless, the services sector could be regarded as an essential enabler in the process of a country's economic growth. First, service sectors significantly contribute to GDP growth (Lennon, 2008; Walsh, 2006; Thomas, 2015; Buckley & Majumdar, 2018; Murselzade & Cavusoglu, 2021). Shepherd & Marel (2010) indicated that increased openness to services trade flows could bring direct economic bonuses. Park & Noland (2013) held that the service sector has become the main contributor to economic growth in both developed (i.e., US, Japan and UK) and developing economies (i.e., China, Indonesia, Pakistan and India). Moreover, developed countries are inclined to have a higher share of services than developing countries (Salam et al*.,* 2018).

Furthermore, the services trade can generate about 32% value-added in total exports, and almost two-thirds of the growth of services value-added in exports is due to an increase in services embodied in exports of other sectors (Heuser & Mattoo, 2017). According to the World Bank database, excluding a few major developing economies, such as; Indonesia, China, and India, the service sectors created over 60% of total value-added in all major economies in 2020. In contrast, the developed countries accounted for a dominant share of value-added services compared to the developing countries as a whole in 2019, as shown in Figure 1.2. The US and Europe accounted for a larger share

of the value-added among the developed countries in 2019 at 77.3% and 65.2%, respectively. As for developing economies, East Asia dominated the share of value-added services, amounting to 58.8% in 2020. China had the largest share of value-added services at 54.5% in 2020 compared to 39.8% in 2000, as the World Bank reported.

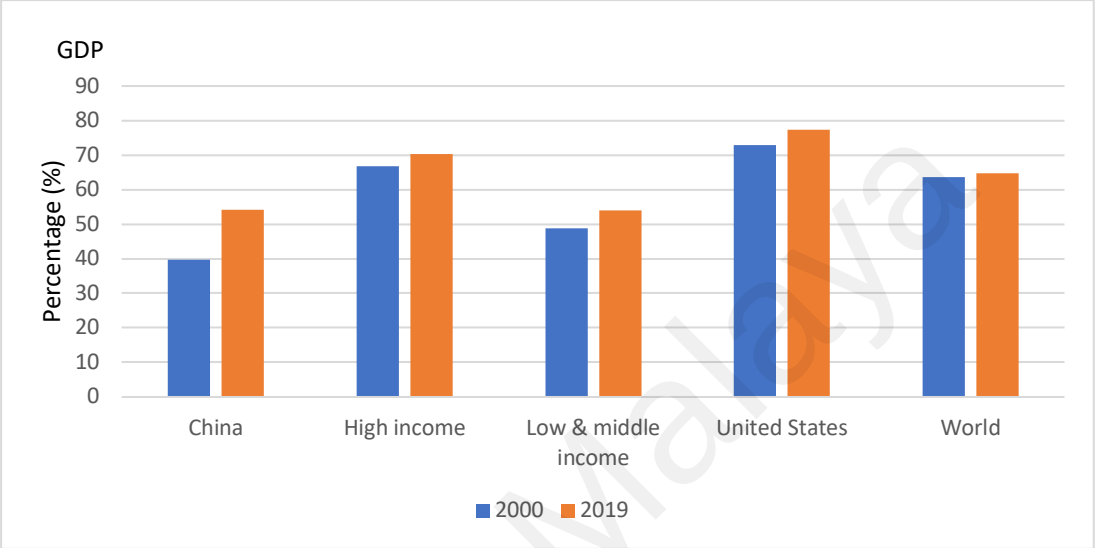

Figure 1.2: Percentage of Value-added Services (% of the GDP)
Source: World Bank database

Additionally, services play a significant role in China's job creation. Services currently accounted for over half of total employment in industrialised countries and 72%-76% in high-income countries (WTO, 2010). Eichengreen & Gupta (2013) found that high employment elasticities existed in modern tradable services, especially in the IT sector in the OECD countries. According to Karam & Zaki (2013), the services sectors attracted at least half of total employment in the MENA region countries.

Furthermore, a variety of services are exported by many developing countries to high-income countries and within their own regions. In most cases, the services trade requires face-to-face interaction between the buyers and sellers, making it less tradable than most other goods. However, since the costs of communication, travel and information are falling continuously, and access to the internet is rising, it has become

easier to create services in one place and consume them in another. This pattern has generated more opportunities to expand the scope of the service trade. One of the most important changes in the last quarter of the 20th century has been the high turnover in the tradability of services. This modification has been due to changes in regulatory reforms and technology. Currently, such services are used more as outsourcing and/or offshoring in the context of global value chains. As a part of the gross value chain of many final products, the quality of services that usually have high value-added has become essential.

As the world's top goods exporter, trade plays an extremely important role in China's economy. Since the early 1950s, the direction of China's foreign trade has experienced radical changes. Economic reforms and trade and investment liberalisation have helped China become a major trading powerhouse. Chinese merchandise exports have increased from US$14 billion in 1979 to US$2.5 trillion in 2018. In contrast, merchandise imports have increased from US$18 billion to US$2.1 trillion (Global Trade Atlas and China's Customs Administration). China's rapidly growing trade flows have made it an increasingly important and often other country's largest trading partner. Apart from merchandise trade, it is equally important to consider the value of China's trade in services. China's services trade volume has expanded with the development of the trade in goods since the 1980s. As China's economy has matured, the demand for services has grown, which has been met primarily by imports. As reported in the UNCTAD database[1], between 2005 and 2019, the value of services imported by China grew from US$84 billion to US$500 billion.

China's GDP contribution has come from three sectors or industries: primary industry (agriculture), secondary industry (construction, manufacturing, mining and

1 See: https://unctad.org/statistics

utilities) and tertiary industry (the service sector). As reported by the World Bank, the share of the tertiary sector in China's GDP has shown a steadily increasing trend from 1960 to 2021, and it has doubled in size over the last two decades, accounting for about 59.8% of China's GDP in 2021. On the other hand, the share of manufacturing in China's GDP showed an increasing trend in the early stages and a declining trend since 2011. As for agriculture, a downward trend was observed within this period. In 2013, the GDP contributed by services overtook China's secondary industries for the first time, underscoring the significant role played by the services sector in the Chinese economy.

Zooming into China's services trade, the export of services by China increased from US$2.67 billion in 1982 to US$280.63 billion in 2020, with an average annual increase rate of 14% (Figure 1.3). The value of services exported in 2020 was almost 106 times larger than that in 1982, making China the fifth largest exporter in the World (WTO, 2015). Additionally, China's services imports have also been growing since the introduction of China's reform and opening up policy. Services imports exceeded services exports for the first time in 1995, and the gap has widened since China joined the WTO. The average annual growth rate of China's services imports was 17%, greater than services exports at 14% (Figure 1.3).

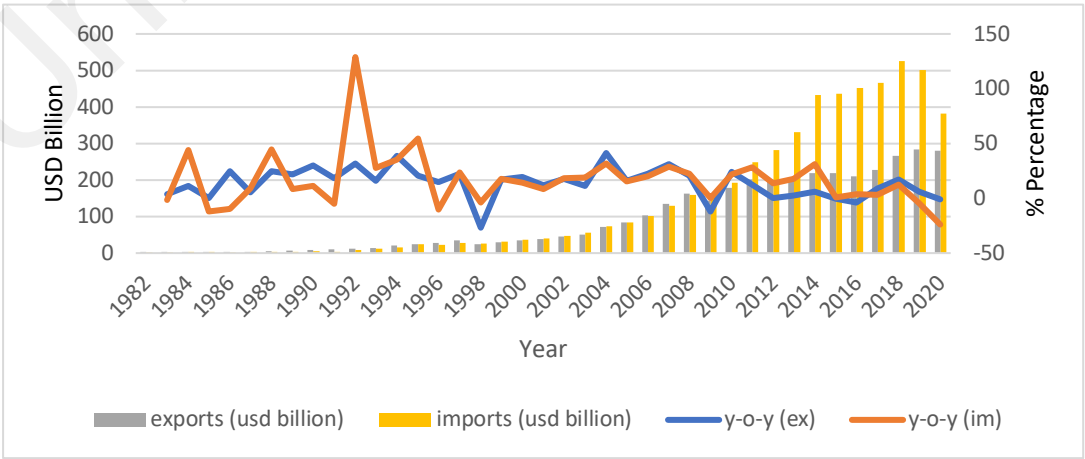

Figure 1.3: China's Services Exports and Imports and Growth Rates of Services 1982-2020
Source: China Statistics of Trade in Services 2021

Furthermore, the services sector plays an important role in China's economy and contributes significantly to economic growth. The tertiary (service) sector has been the biggest contributor to China's economy in recent years, and the GDP share of the service sector amounted to 47% in 2019, higher than the 28% share of the secondary sector, as indicated in Figure 1.4. Additionally, employment in services grew in recent years to 47% of total employment in 2019, as reported by UNCTAD (Figure 1.5).

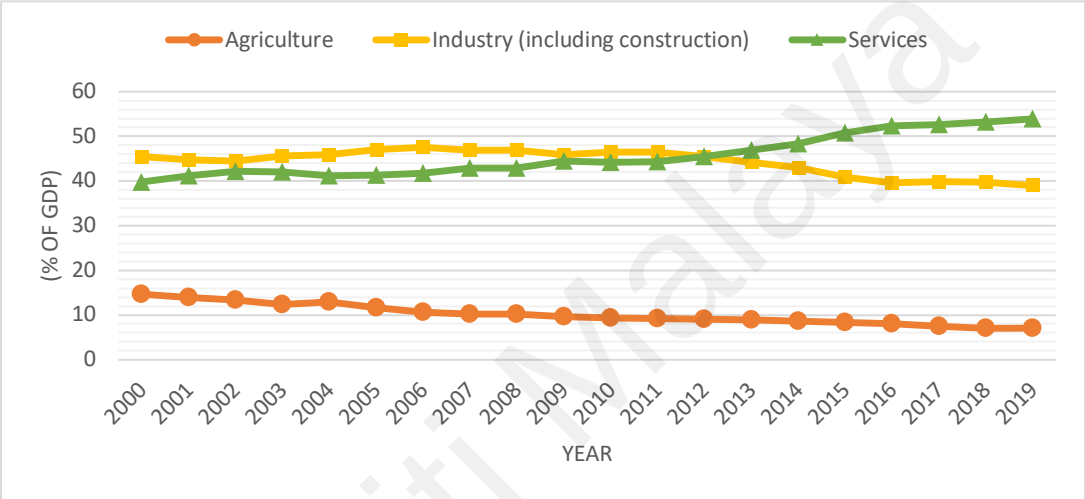

Figure 1.4: Contribution Rate of Three Industries to China's GDP Growth
Source: World Bank

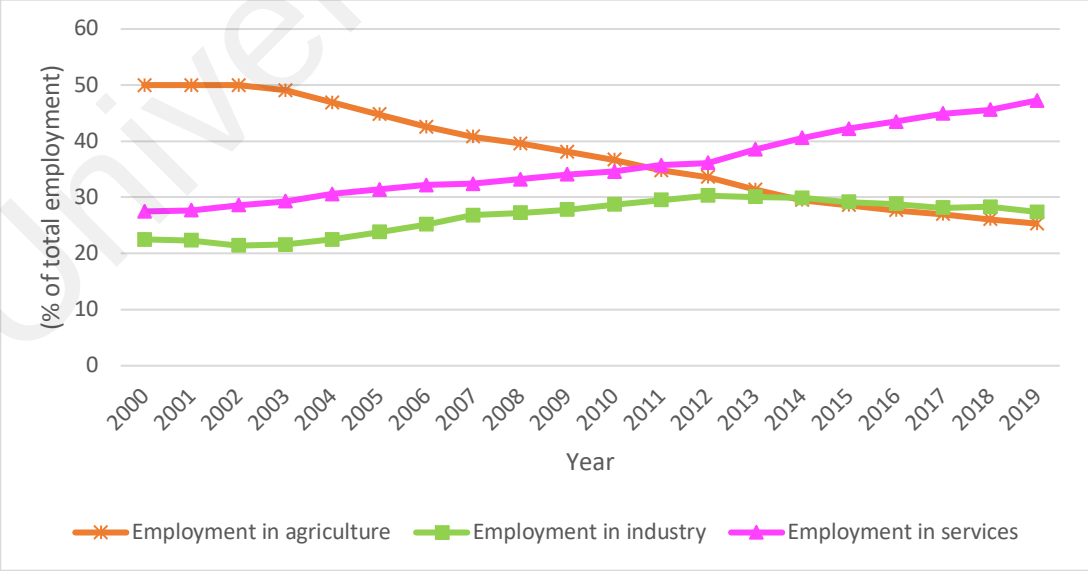

Figure 1.5: China's Employment Share by Sector, 2000-2019
Source: UNCTAD

In the wake of increasing globalisation in international economic and trade cooperation, the services trade has become increasingly important. Notably, China has been the world's second-largest country in the services trade for the past five years, with the total volume hitting 5.24 trillion yuan (US$759 billion) in 2018, up 11.5% year-on-year. In 2018 alone, China's service export figures witnessed double-digit growth in; transport, insurance, intellectual property royalties and in other businesses service sectors. Similarly, the service trade's share of overall foreign trade swelled by 3.6% between 2012 and 2018. According to data from the growing from the Ministry of Commerce, it grew from 11.1% to 14.7%. This trend indicates a steady expansion of China's services trade in the world economy.

Travel, transportation and other commercial services constitute the three main pillars of China's services trade, making up more than 65% of the total services trade. Specifically, China's services exports concentrates on; other commercial services, telecommunications, computer and information, and transportation, followed by; travel, transportation and other commercial activities. Other commercial services, telecommunications, computer and information, and transportation ranked as the top three in China's services exports in 2020, compared to travel, transportation and other commercial services as the top three service export components in 2012[2]. This situation demonstrates that China is rapidly transforming its export structure from traditional to modern services with the development of new technology.

China's services industry continues to play an increasingly vital role in its economic growth, which is an inevitable consequence of the country's upward shift in the value chain. China is the fifth-largest export and second-largest import country in services

[2] See: http://data.mofcom.gov.cn/fwmy/classificationannual.shtml

providing. China alone incurred a negative and increasing services trade balance among the top five such countries after the financial crisis. However, the services trade balance decreased due to the COVID-19 pandemic outbreak at the end of 2019, as shown in Figure 1.6.

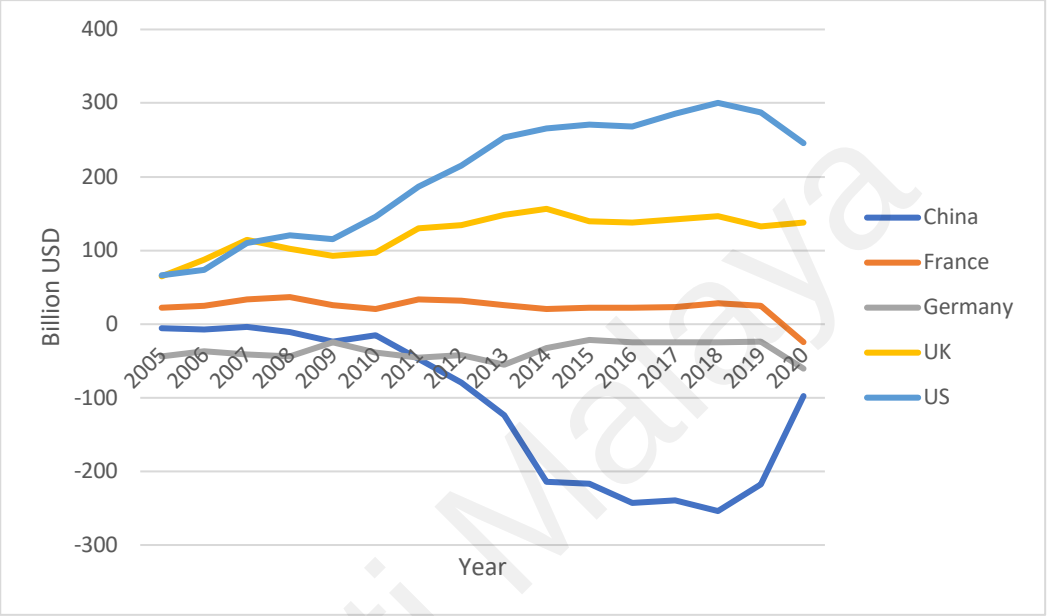

Figure 1.6: Services Trade Balance of Countries (US$ Billions)
Source: UNCTAD

1.2 Problem Statement

The prime problem for this research concerns the value of China's services imports. Since 1995 the value of China's services imports has overtaken the value of its exports. The differential between them has widened between 2009 to 2020. According to the Ministry of Commerce, the rise in imported services will continue for many more years to come as China's services imports have increased from US$36.16 billion to US$381 billion in 2020, around ten times larger than in 2000.

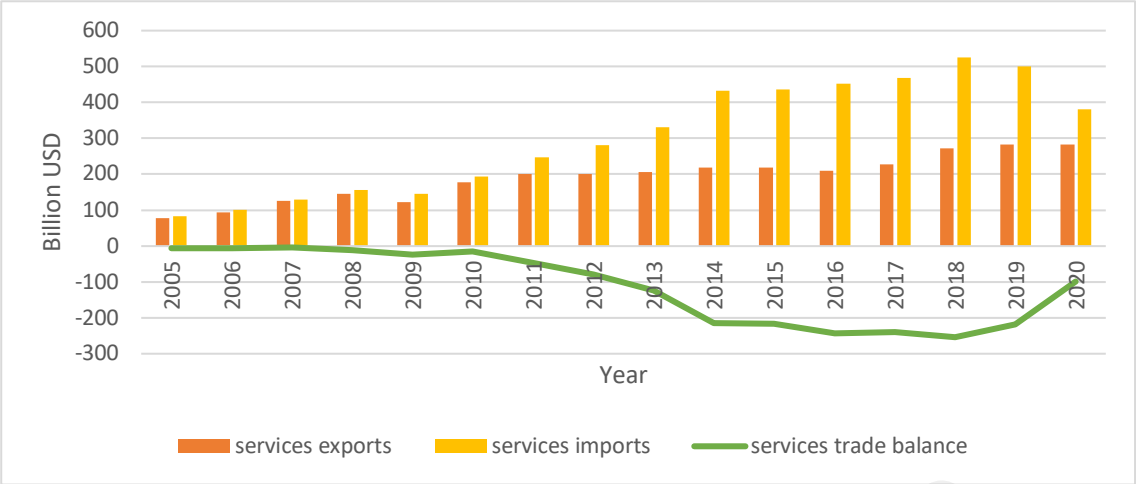

Figure 1.7: China's Services Trade Balance 2000-2020
Source: UNCTAD

Before 2007, the gap between China's services exports and imports was relatively stable, yet the service trade balance for the first time exceeded US$15 billion in 2009, reaching US$15.3 billion after the outbreak of the global financial crisis. Consequently, the import value of China's services exceeded that of exports which led to a large negative balance in services trade (Figure 1.7). From 2000 to 2010, import and export services rose steadily on par, but imports accelerated between 2010 to 2020, causing a large negative balance in the services trade during that decade (Figure 1.7). Exports rose less than imports with a wide difference while their respective year-on-year figures fluctuated erratically (Figure 1.8).

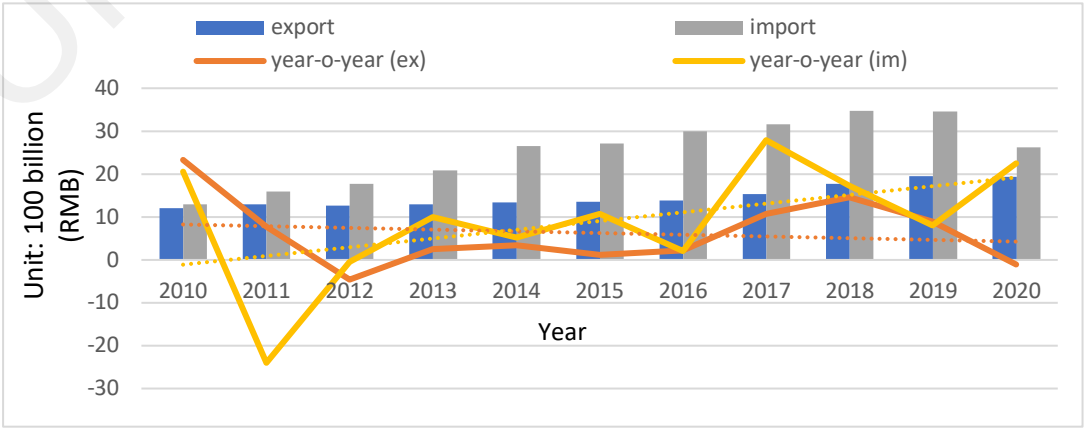

Figure 1.8: Export/Import Value, Export/Import Growth Rate
Source: Ministry of Commerce, People's Republic of China

Contrary to China's trade in services, China's merchandise trade has maintained its surplus. Additionally, the trade balance over the GDP decreased from 2005 to 2020 (Figure 1.9). Thus, the long-term increase in services imports over exports may trigger China's goods trade into deficit (Guan, 2019).

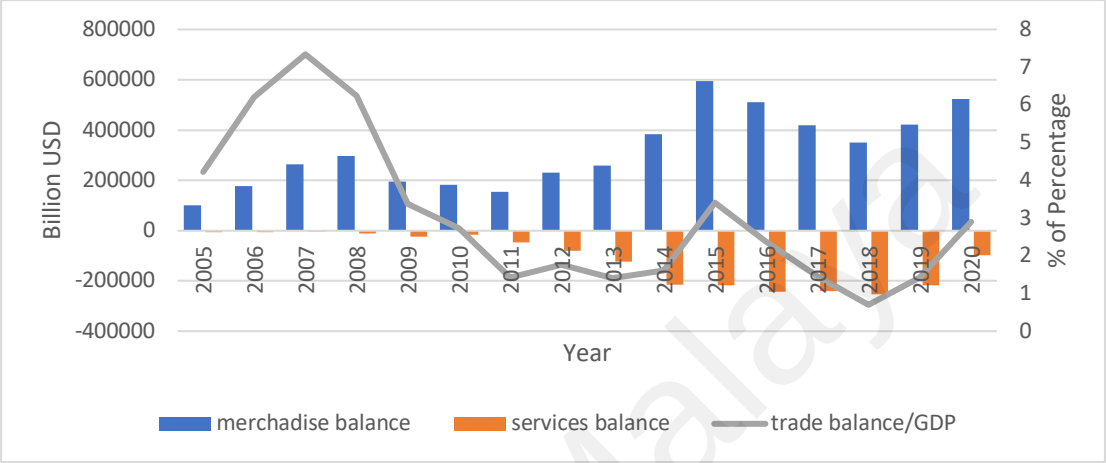

Figure 1.9: Trade Balance in China
Source: UNCTAD

Though the trade in services has grown rapidly, its share of total international trade (both goods and services) has changed very little, as indicated in the Figure 1.10, moving from 10.3% in 2005 to 14.7% in 2019. This figure is comparatively smaller than merchandise trade which accounted for more than 80% of China's total foreign trade, also illustrated in Figure 1.10. Additionally, China's average services trade share has been 12% in total international trade from 2005 to 2019, which has been below the world average of approximately 22%. Especially as China's service exports accounted for only 4% of world trade, which indicates a quite low share in the world market, this low figure is also due to the crucial restrictions on the trade in services.

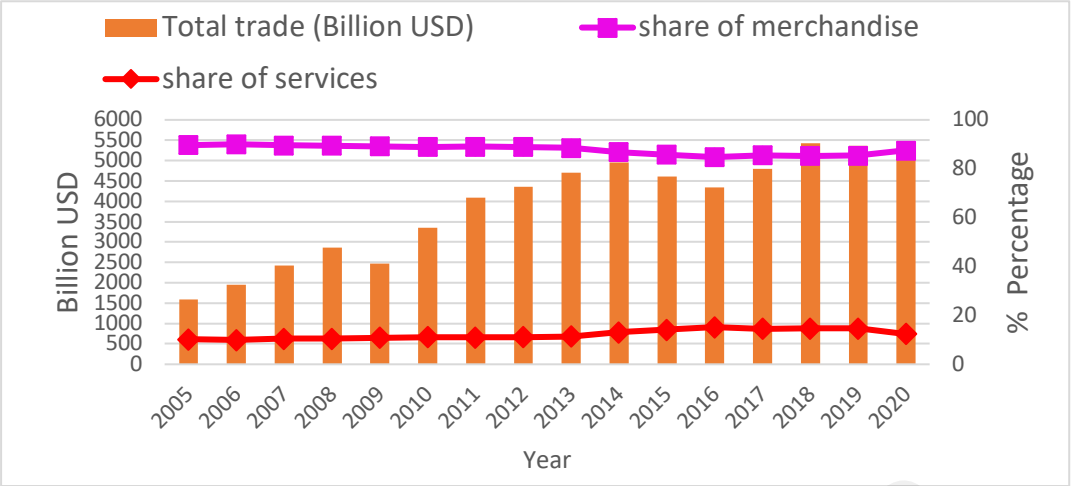

Figure 1.10: China's Services Trade Share in China's Total International Trade
Source: UNCTAD

All the above statements point to the fact that China's services trade lags far behind that of developed countries despite it playing a prominent role in China's economic growth. From a sectoral perspective, China's services trade deficit is mainly concentrated on; transport services, travelling and insurance services and the use of proprietary rights and royalties, and other fields. The surplus in services mainly comes from; telecommunications, computer and information services and construction. Moreover, tourism, transportation, other traditional industries, capital-intensive, and knowledge-intensive service industries have recorded large and consistent deficits in recent years.

These economic developments in China underpin the rationale for this research. It involves the fact that the services trade continues to lag even though it has rapidly grown over recent years (Woetzel et al., 2019). Under this broad research framework, the first question was what is causing this negative or services trade imbalance. Many authors have attempted to find the answer and have discovered some of the reasons for this phenomenon from different perspectives, such as; trade management systems, services industry self-development, and the lessons to be learned from foreign services trade (Liu & Mei, 2004; Ma, 2011; Li, 2015). In addition, most of these earlier studies have also

explained the rationale for export competitiveness and the driving factors of export competitiveness angles that would help to improve China's export competitiveness and reduce the deficit (Chen & Yin, 2008; Sang et al., 2014; Chen & Zhang, 2010; Zhang et al., 2010; Song & Wang, 2014; Jiang & Lin, 2020).

However, regarding this issue, only a limited number of existing studies have focused on improving China's regional services trade structure. Which are the potential countries for China to export its services trade? Which countries lacks the potential to import services from China? Which service sub-sectors in China have more potential or none to export? What factors drive China's services trade? All these questions beg to be answered.

Furthermore, some industries' services exports are still very low. The trade in services can facilitate economic growth and boost firms' and nations' competitiveness (Nordas & Kim, 2013; Hoekman & Shingal, 2021). Since a service trade imbalance is usually related to declining competitiveness (Howes & Singh, 2000; Boltho, 1996), the next question is why China's strong competitiveness in the export of goods has not been matched by its performance in the services trade? Services exports depend positively on foreign demand and price competitiveness (Bieru & Kuziemska-Pawlak, 2017). Thus, paying more attention to the competitiveness factor in service sectors can help increase services exports. Wang et al. (2013) stated that the traditional Revealed Comparative Advantage (RCA) ignored that a country's sectors' value-added may be exported indirectly via the country's exports in other sectors. Indirect exports of a sector's value-added should be included in a conceptually correct measure of a country's sector's comparative advantage. Second, it also ignored that a country-sector's gross exports partly reflect foreign contents (which will show up in both foreign value-added and a portion of pure double-counted terms).

A conceptually correct comparative advantage measurement needs to exclude foreign-originated value-added and pure double-counted terms in gross exports but should include indirect exports of a sector's value-added through other sectors of the exporting country. Thus, using the traditional trade statistics approach to compute a country's competitiveness is imperfect as it ignores the value of imported intermediate products. Thus, it cannot accurately reflect a country's division of labour status in the global value chain (Wang et al., 2013; Koopman et al., 2014). Meanwhile, value-added trade estimates eliminate the "double counting" element of trade statistics, thus accurately reflecting a country's production process, position and participation in the global value chain (Koopman et al., 2014). Therefore, for the above-mentioned reasons, this study used the statistical methods of value-added trade to re-calibrate the competitiveness of China's service trade and the competitiveness of sub-sectors in the service trade.

Services import values that exceed export values result in an outflow of domestic resources and increases external debt. In the long term, it will seriously affect the development of China's national economy (Wu & Wang, 2019). The long-term trade deficit and imbalance in the trade structure have inhibited the development of China's trade in services (Yuan, 2019; Xu & Li, 2020). Moreover, the continuous expansion of the services trade imbalance has seriously hindered the optimisation of China's service trade structure (Xu & Li, 2020). The rapid growth of a large-scale services trade imbalance shows that China's international trade in services remains in "debt" consumption status, and it is gradually devouring the export achievements of the manufacturing industry. It reflects the reality of China's weak creativity in its domestic value-added in gross exports and its weak international competitiveness (Xie & Li, 2020).

Extensive existing studies have focused on the trade in goods (Mavroidis, 2007; Bernard et al., 2012; Melitz & Redding, 2014; Redding, 2016; Cantore & Cheng, 2018;

Truong et al., 2019; Tovar- García & Carrasco, 2019; Hoang et al., 2020), but in more recent years, attention has been concentrated on the trade in services (Cole & Guillin, 2015), thanks to their increasing importance in the global economy. Due to data constraints, most of the existing studies have centered on OECD countries (Lennon, 2008; Shingal, 2010; Marel, 2012; Nordas & Rouzet, 2015); some developed countries, such as; Canada (Anderson et al., 2012), USA (Kaur, 2011; Ahmmad, 2015), Austria (Brandicourt et al., 2008), Poland (Matuszczak, 2019), the EU countries (Agostino et al., 2006), India (Eichengreen & Gupta, 2013; Thomas, 2015), some developing countries, such as; Vietnam (Dao et al., 2014) and the MENA region (Karam & Zaki, 2013; Goswami et al., 2011). However, most of the previous studies that analysed the services trade have not included China in their research datasets, and even if China was included in some of the studies, it did not represent the prime issue of the research objectives.

In addition, a large body of literature has focused predominantly on aggregate services trade flows either on services exports or imports separately (Head et al., 2009; Shepherd & Marel, 2010; Nayahoho, 2010; Sahoo et al., 2015; Nordas & Rouzet, 2015; Christen, 2017; Aijaz et al., 2022). Several other studies have been conducted on disaggregated services trade flows, such as; Walsh (2006), Shingal (2010), Kandilov & Grennes (2010) and Borchert et al. (2020), and their findings suggested that analysing the determinants of services trade at an aggregate level was not appropriate. Goswani et al. (2012) claimed that as different services have different modes of supply, regulations and market structures, their determinants may vary between different types of services. Therefore, there is a need for further investigation using disaggregated services trade data to identify the true effects of the factors on different service sub-sectors (Kaur, 2011).

Studies on the disaggregated services trade flow for exports and imports remain extremely scarce. The present study has addressed this gap by analysing the situation in

China. For this, it has performed a qualitative official document review to provide a holistic analysis of the contribution of services subsectors toward China's overall trade performance, and investigated the disaggregated services export, and import trade flows in China, subject to the limited data available from 2000 to 2014.

1.3 Research Questions

This study posed the following research questions in light of the above discussion.

1. What is the competitiveness level of China's service sub-sectors exports?
2. What main drivers contributed to China's trade in services in terms of exports and imports?
3. How do service sub-sectors influence China's overall trade performance?

1.4 Research Objectives

The following specific research objectives were formulated to examine the determinants of service trade flows between China and its major trading partners from 2000 to 2014:

1. To examine the level of competitiveness of China's service sub-sectors exports based on gross value and value-added statistical methods.
2. To investigate the main drivers contributing to China's trade in services in exports and imports.
3. To identify the contribution of the service subsector toward China's overall trade performance by conducting a qualitative official document review to provide a holistic analysis.

1.5 Significance of the study

China's services trade has been recording large deficits for many consecutive years. Nonetheless, scholarly works on the services trade have largely been centered around developed economies, especially the OECD and EU countries, given the ease of obtaining

the data from the OECD database. Therefore, there has been a lack of literature specifically on the determinants of China's service exports and imports that have offered policy solutions to alleviate the deficit. This study has contributed to the library of existing literature from different aspects and perspectives.

First, this study has identified and acknowledged China's challenges, which have been hidden from view because of the greater focus on China's strength in its goods trade. The present study has examined the level of service trade competitiveness in China to enable the Chinese government to identify the strengths and weaknesses of the nation's specific service sub-sectors to redress the missing gap. This outcome will motivate the commerce ministries to apply sectoral-specific strategies to increase exports, encourage fair trade and competition and boost the competitiveness level of the service sub-sectors economy.

Second, this research has made a huge country-specific contribution by applying the gravity model to evaluate service trade flows between China and its main trading partners. Identifying the main factors influencing China's services trade flows will enable the government to design the most appropriate strategies to address its worsening service trade deficit. Following the above, knowing the strengths of its service trade partners will help the Chinese government to profit from the lessons and examples learned from engaging with these partners while strengthening its service trade performance. Over time, what will emerge will be a more balanced trade sector than what is seen today.

Third, besides contributing to the scarce literature on China's services trade, this studies is also novel in terms of its methodology. Traditional export statistics do not consider the value of imported intermediate products, so they cannot fully reflect the true value of exports in the global value chain (Wang et al., 2013). Primarily, using value-added trade instead of gross export estimates eliminates the "double-counting" part of the

trade statistics, thus accurately reflecting a country's production process, position and participation in the global value chain(Koopman et al., 2014). Nowadays, trade is no longer purely trade in goods, but rather value-added trade (Koopman et al., 2012), where globalisation is deepening and the global production chain is re-decomposed between countries. Today, the global distribution of value-added in exports and the vertical participation of countries in the global division of labour are becoming more important. Thus, the United Nations (UN), International Monetary Fund (IMF), WTO, OECD and other international research institutions and the Ministry of Commerce of China have shown greater concern for value-added trade rather than gross export estimates. Gao (2015) stressed the significance of grasping the true value of a country's trade structure, the effectiveness of development of trade policy and the reduction of trade frictions. Accordingly, this thesis has investigated value-added trade using a statistical method to measure and assess the competitiveness of China's sub-sectors of the services trade. This method has been adopted in other studies by Koopman et al. (2012), Wang et al. (2013) and Borin & Mancini (2019), and it has proven to be superior to the traditional gross export estimates analysis.

Fourth, this studies has also contributed to the literature methodologically by applying the augmented gravity model with the most recent technique, the Poisson Pseudo-Maximum Likelihood with high-dimensional fixed effects (PPMLHDFE) approach, as suggested in Larch et al. (2019). This procedure was conducted by accounting for multilateral resistance terms (MRTs) to estimate China's service trade flows, given its merits in dealing with the zero trade flows and taking heteroskedasticity into account to avoid severe biases and inconsistencies resulting from OLS regression. Examining the impacts of; economic, political, and cultural factors on China's services trade with its trading partners at both the aggregate and sectoral levels will enable policymakers to strengthen and expand their mutual trade activities in future.

Last but not least, the empirical findings obtained in this study have expanded the literature resources concerning China's trade in services. The results have provided much-needed information regarding China's export and import services trade at both the aggregate and disaggregated levels since only a limited amount of past research has been conducted on this specific topic. Given the supply modes, regulations and market structures may differ across the principal service categories. Thus, discovering the main factors contributing to each service sector's export and import is essential for the government to implement appropriate policies to address China's service trade imbalance.

1.6 Outline of the Study

This study is organised into seven chapters. The introduction in Chapter One provided an initial overview and background regarding China's current services trade situation and a statement of the key issues that motivated this study. The following sub-sections then outline the research questions, the respective research objectives, and their contributions to this studies. Chapter Two provides an extensive review of the related academic literature, past studies, discussion of methodology and research gap issues that have been incorporated into this study. Chapter Three sets out the research methodology employed in this investigation, the existing theories, empirical model specifications, variables and their sources, and robustness tests that were conducted, all of which have provided answers to the three research questions. The empirical results for the three research questions are presented in Chapters Four, Five and Six, respectively. Finally. Chapter Seven concludes the studies by summarising the key findings obtained in the three research questions, policy implications, limitations of the study, and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter contains an extensive literature review of past and present studies concerning the trade in services worldwide. Section 2.2 begins with a discussion of the evolution of the theories of the services trade. The benefits of the trade in value-added statistics in international economies in recent years are provided in Section 2.3. Following this is a discussion regarding current literature on international competitiveness in the services trade, conducted in China and other economies. More specifically, a discussion concerning the literature on services trade competitiveness based on different measurements in Section 2.4, and empirical studies on the factors influencing service is offered in Section 2.5. Next, literature on the gravity model's theoretical framework is expounded in Section 2.6. This chapter concludes in Section 2.7 with a summary of the literature covered. The research gap filled by the present research is discussed in Section 2.8.

2.2 Theories concerning the Services Trade

The fundamental principle of the classical or traditional trade theory has evolved substantially since the era of Adam Smith in the 18th century and more recently after the General Agreement on Tariffs and Trade (GATT) was founded. Thus, it is important in this chapter to review some early economic trade theories and see how they have developed and where they stand today.

2.2.1 Absolute Advantage Theory

Traditional international trade theories includes Adam Smith's absolute advantage theory, David Ricardo's comparative advantage theory and Heckscher Ohlin's factor endowment theory (H-O theory).

Steered by the absolute advantage theory, Smith first emphasised the importance of international division of labour and specialisation in production to conduct international trade. Absolute advantage, also known as absolute cost, refers to the absolute superiority of labour productivity in production. More specifically, when a country exports its products with absolute superiority and imports products with absolute inferiority, it can improve its welfare. While, if all the countries produce absolute dominant products and import goods with absolute disadvantages, then they can all benefit from trade. Conclusively, Adam Smith's absolute advantage theory confirmed the importance of international trade and the division of labour that can improve the welfare of all countries. As time passed, this theory promoted the development of international trade and became the theoretical basis for carrying out international trade and the international division of labour for all countries (Smit, 2010). Trade can be regarded as an essential enabler in national welfare. Thus, Adam Smith viewed trade as a positive-sum game.

This outcome was in direct contrast to the viewpoint of the mercantilists of the 16th century before Adam Smith, that regarded trade as a zero-sum game. Proponents of mercantilists believed that if countries wanted to become rich and powerful, they must export more and restrict imports to a minimum. Such a policy would result in an inflow of gold and silver that would make the country wealthy. Because they viewed trade as a zero-sum game, they advocated strict government control and preached economic nationalism (Salvatore, 2002). However, the absolute advantage theory became a paradox

because a country with an absolute advantage in all products or services produced would not import anything because it could produce everything more efficiently. However, according to Krugman (2008), imports rather than exports mattered more for countries. Exports are important to pay for the imports a country needs. According to Adam Smith's hypothesis, some countries will be excluded from importing and, thus, from the gains from trade. The paradox that absolute cost advantage leads to specialisation, but that such specialisation may not necessarily lead to gains from trade, gave rise to Ricardo's theory of comparative advantage.

2.2.2 Comparative Advantage Theory

Ricardo's Law of comparative advantage resolved the limitations in Adam Smith's theory of absolute advantage: if a country had an absolute advantage in everything it produced, it would not need to trade. Thus, it will not benefit from trade. According to this law, a country must specialise in products it can produce relatively more efficiently than other countries (Krugman & Obstfeld, 2003). This result implies that despite absolute cost disadvantages in the producing goods and services, a country can still export those goods and services in which its absolute disadvantages are the smallest and import products with the largest absolute disadvantage. But how is it possible for a country less efficient in producing all products to export any of these products to another country that is more efficient in producing all these products? The answer lies in the self-equilibrating or self-fulfilling nature of the trade balance between countries (Krugman, 1993a). This outcome means that in equilibrium, if the input cost is sufficiently lower in one country than in another country, then the price of the product will be lower in the low input cost country, even if that country is less efficient in producing that product (Salvatore, 2002).

Ricardo's theory of comparative advantage was based on the labour theory of value (Salvatore, 2002). Labour was assumed to be the only production factor used in

fixed proportions. The theory also assumes that labour is homogeneous (Salvatore, 2002). The opportunity cost was included in explaining the theory of comparative advantage to compensate for these restrictive assumptions. This result means that a country will have a comparative advantage in producing goods and services if such goods and services can be produced at a lower opportunity cost than in other countries (Salvatore, 2002).

Despite its many restrictive assumptions, the theory's conclusion have been widely accepted. For instance, the foundations of the WTO were based on this theory. Relaxation of its assumptions did not affect the validity of its conclusions much, and many empirical studies have been able to confirm the findings. The power of this theory lies in the amount of information it contains. It shows, among other things, the conditions of production, the comparative advantage of each economy, degree of specialisation in production with trade, volume of trade, terms of trade, gains from trade, and share of these gains for each of the trading nations.

Most importantly, it shows the gains from trade convincingly. However, it does not explain the direction of trade: who exports and who imports. For this, another version of the theory was needed.

2.2.3 Heckscher-Ohlin Theory

Differently from Smith and Ricardo, who considered only labour as a "factor of production", Heckscher and Ohlin further developed the theory by considering several factors of production (i.e., land, labour, and capital). In the Heckscher-Ohlin theory, economists found the reasons or sources of comparative advantage differences between countries (Salvatore, 2002). According to this theory, countries differ concerning their factor intensities, namely the labour and capital utilised to produce goods and services. While there are many different explanations of comparative advantage, the H-O theory

has pointed to factor abundance or endowments as the basic determinant of comparative advantage.

Despite the logic, Leontief (1953) found this theory to be contradicted by facts on the ground. Contrary to the belief that the US was expected to be an exporter of capital-intensive products and an importer of labour-intensive products, the results confirmed the opposite. The paradox was later confirmed by Baldwin (1971), while similar results were reported in studies based on data for Japan, Germany, India and Canada (Baldwin, 1979).

The research for alternative explanations took the form of extensions to the existing theory where, additional variables, such as; human capital, technology gaps, time, and the product cycle, were incorporated. However, since the framework of the H-O was retained, these variables did not reduce the theory's validity.

However, the rise of inter-industry trade (trade within the same industry), in situations where production of a good takes place in different geographic locations – has rendered the theory of comparative advantage, which assumes perfect competition and constant returns in inter-industry trade, inapplicable. For intra-industry trade, new trade theories not requiring these assumptions have been devised.

2.2.4 New Trade Theory

Since the Second World War, large-scale trade has arisen not between industries but within the same industries, driven by economies of scale. This situation has rendered the assumption of constant returns to scale inapplicable. In addition, to explain economies of scale (internal and external), a new market structure was needed that was different from perfect competition (Krugman, 1986).

The breakthrough came during the late 1970s with the introduction of new monopolistic competition models that allowed trade theorists (Krugman, 1980, 1981,

1983; Lancaster, 1980; Helpman, 1981; Ethier, 1982) to model oligopolistic competition in a general equilibrium framework. The rationale for using monopolistic competition models was to focus on economies of scale in explaining trade rather than imperfect competition (Krugman, 1990).

The new and traditional trade theories have both differences and similarities. The difference between the conventional and the new trade theories is that comparative advantage continues to be the main explanation of trade flows for inter-industry trade under the traditional theory. In contrast, at the level of intra-industry trade, economies of scale have become the dominant explanation of trade flows in differentiated products. The similarity is the notion of specialisation in traditional and the new thinking about trade advantage. However, in the former, specialisation takes place because of country differences, while in the latter, the inherent advantage of specialisation is based on increasing returns of scale. The new trade theories are not specific regarding where production is located. However, where economies of scale exist, a firm is not likely to move, indicating where the firm is located. In any case, the new trade theories show that even under monopolistic competition, gains from trade exist.

However, today's global industries are characterised by oligopolistic rather than monopolistic competition (Yoffie, 1993), where a firm's economies of scale are sufficient to limit the number of competitors (Krugman, 1992). The trade literature, therefore, changed from focusing on economies of scale to imperfect competition (Krugman, 1990). The result was a set of trade models that assumed an oligopolistic market structure (Krugman & Obstfeld, 2003). However, these models opened the door for governments to affect comparative advantage by protecting local industry and shifting specialisation to protecting their country (Krugman, 1990). This situation opened up the argument that government policy (strategic trade policy) could change the terms of oligopolistic rivalry

in such a way as to shift excess returns from foreign to domestic firms (Krugman, 1987). By these means, they made the strategic trade policy argument attractive from a policy by giving governments a major role to play in shaping the competitive landscape.

The question, however, is the extent to which these models are a true reflection of the real world of international trade, how they fit the data, and whether they replace the conventional orthodox theory of comparative advantage. Another weakness of these kinds of models (Brander & Krugman, 1983; Brander & Spencer, 1985; Eaton & Grossman, 1986) is that they depend on the assumptions of the model because these models are all based on certain assumptions, whereby small variations in the assumptions can result in different conclusions. This situation has caused distrust and uncertainty in the strategic trade policy argument and questioned the validity of these models. Another problem with these models is their partial equilibrium nature which requires governments to pick winners effectively. Further, if a country persistently protects its industries, it might trigger retaliation by other countries, thereby incurring another round of protection. The empirical evidence supporting strategic trade policy has also been inconclusive, without any grounds for welfare gains from strategic trade policies. Given what has been found empirically, there has been no reason to reject the law of comparative advantage, especially since it is the only law able to explain the location of production.

2.2.5 National Advantage Theory

From the above discussion, it can be concluded that the comparative advantage theory applies to the services trade. In addition, the theory of competitive advantage (Porter, 1990) further expanded the comparative advantage theory, making it better in explaining the service trade. The competitive advantage theory refers to a dynamic analysis of the competitive advantage of a country or region. Porter believed that the competitive advantage of a particular sector in a country reflected the overall competitiveness of a

country. Suppose a particular sector gained a competitive advantage. In that case, it meant that it had gained a leading position in an industry in the international market which could gain more profits through international trade. Porter further asserted that; factor conditions, demand conditions, related and support industries, firm strategy, structure and rivalry were the six key factors determining a country's competitive advantage.

Additionally, government policies and opportunities affect a country's competitive advantage, as shown in Figure 2.1. The six factors are intertwined in a diamond shape, also known as the "diamond model" theory (Porter, 1990). The diamond model is essential in explaining the factors influencing trade competitiveness.

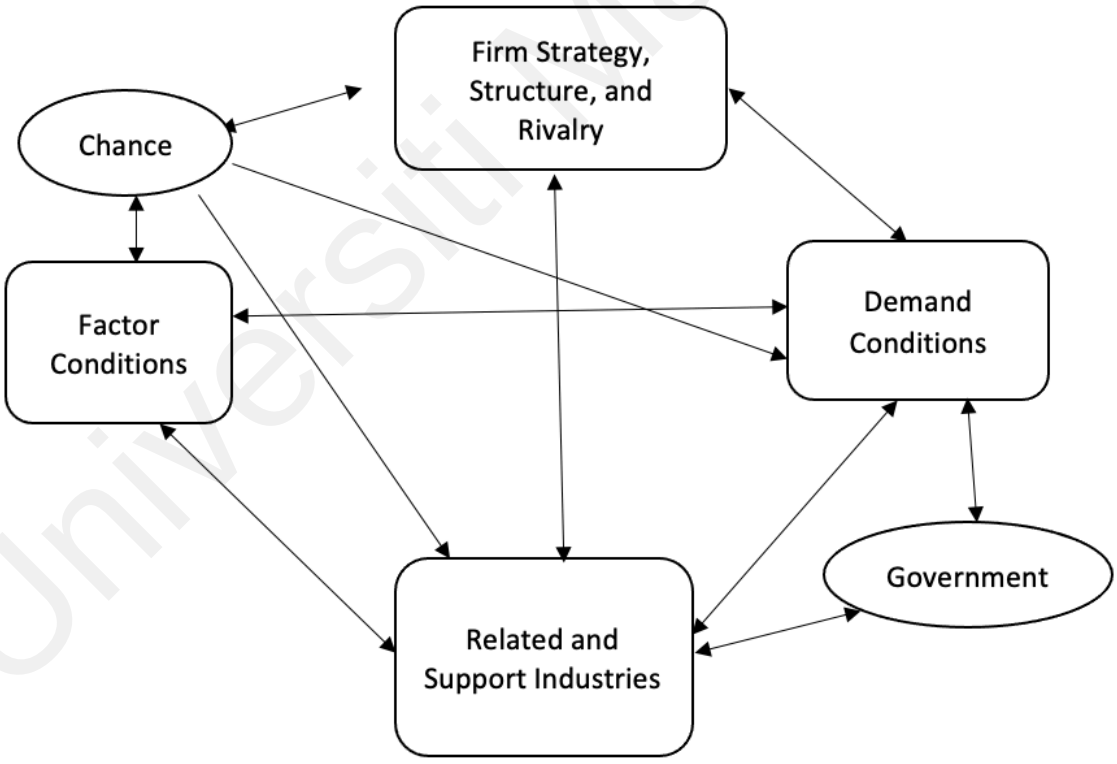

Figure 2.1: The Porter Diamond Model
Source: Porter,1990

2.2.6 Applicability of Trade Theories to the Services Trade

Traditional economic theories have assumed that goods are traded between countries, but that factors of production (i.e., labour, capital, and technology) and services are not traded from country to country. However, capital, technology, and services have recently been flowed increasingly and easily across national borders, and even labour is moving from country to country more frequently.

Some debate has existed on the applicability of the comparative advantage and factor endowments theories to service trade. Early economists such as Adam Smith and David Ricardo assumed that services were not tradable. Thus, trade in services was almost considered an oxymoron. In the early 1990s, Western economists, such as; Hindley & Smith (1984), Deardorff (1984), Melvin (1989), Jones & Ruane (1990) and Burgess (1990) discussed how to apply the comparative advantage principle to trade in services through the factor-intensive approach.

Feketekuty (1988) found that services had many different characteristics than goods. International trade in services refers to the exchange between intangible products (i.e., education, knowledge, travel and financial services) and money. Services cannot be stored, and services imports and exports are not reflected in the customs statistics of various countries. Hence, traditional theories do not apply to the services trade. Sampson & Snape (1985) agreed with the conclusion of Feketekuty (1988), they believed that the production and consumption of services were simultaneous, and producers were likely to have transnational movements which required the international movement of labour. One basic assumption of the Heckscher-Ohlin theory (H-O theory) was that "there was no international flow of factors." Since this assumption was untrue, the H-O theory was inappropriate for the trade in services. Since then, Dick & Diek (1979) also proved it

through empirical analysis that the "Heckscher-Ohlin Theory" was inapplicable to services trade.

However, Sapir & Lutz (1981) conducted empirical research on trade in services and concluded that since transportation was a sector with relatively abundant physical capital, countries with relatively abundant physical capital had comparative advantages in transportation services. On the other hand, insurance, patents and other services are endowed with abundant labour capital. Therefore, countries with abundant human capital had comparative advantages in insurance and patent services that reflected that traditional trade theory explains the pattern of trade in services quite well. Subsequently, Sapir (1982) concluded that comparative advantage determined world service trade patterns by conducting many empirical studies. He also proposed that the comparative advantage of the services trade was dynamic. If developing countries' material and human capital accumulated to a certain extent, they could also gain a comparative advantage in certain sectors of the services trade. Through empirical research on the engineering services trade, Sapir (1985) confirmed the comparative advantage dynamics. Hindley & Smith (1984) argued that although services had significant differences compared to commodities, the theory of comparative advantage could make up for these differences. Factor endowments played a decisive role in international trade. Therefore, the traditional trade theories represented by the comparative advantage theory could also apply to services trade (Hindley & Smith, 1984).

Other researchers have argued that the revised traditional trade theory could explain international services trade. Deardorff (1984) started with the limitations of comparative advantage and used the original H-O model of "two countries, two factors, one commodity and one service" to discuss the applicability of the comparative advantage theory to services trade. He successfully explained how the services trade follows the

rules of comparative advantage. He also proved that the goods trade and services trade are inseparable. Burgess (1990) pointed out that if the Heckscher-Ohlin-Samuelson (H-O-S) model was modified, a general model of the trade in services could be obtained. Bhagwati (1984) concluded that the common foundation for the services trade and goods trade was the price difference by establishing a model of international differences in services' prices. Considering imperfect competition and economies of scale, Markusen (1989) and Jones & Kierzkowski (1990) conducted a revised study of trade in services. Tucker & Sundberg (1988) and Burgess (1990) then made comprehensive amendments to the comparative advantage model, rendering it more in line with the basic characteristics of the international services trade. Thus, the adaptation became more suitable for theoretical research on services trade competitiveness.

Many scholars now believe that the comparative advantage theory is reliable for examining the commodity and services trade. They have started treating the comparative advantage theory as a foundation to study services trade. With some revision and reasonable explanation, the comparative advantage theory could be employed for exploring issues in the trade in services. Unsurprisingly, economic theory applied to the services trade is still being developed. In general, economists today assume that the basic theory of comparative advantage as it applies to goods applies equally well to cross-border trade in services.

2.3 Trade in Value-Added

In global value chains, since traditional trade statistics cannot truly reflect a country's benefit from trade, value-added trade statistics are one way of solving the "statistical fantasy" problem in traditional trade. In recent years, such "statistical fantasy" has given rise to much concern in international economics. The idea of value-added came from Hummels et al. (2001), who studied vertical specialisation. Koopman et al. (2012) relaxed

Hummels, Ishii and Yi's (HIY) assumption that "the degree of dependence on the import of intermediate goods was equal between domestic consumer goods and export products". Firstly, they separated the role of domestic and imported intermediate goods during the production process to construct a method to measure the value of exports in China after taking into account the impact of processing trade, and then they used this method to reveal the proportion of domestic added value in China's exports.

Many previous studies about trade in value-added have made more realistic investigations concerning the division of the global value chain than HIY's assumptions that "all imports of intermediate goods are entirely composed of foreign value-added". For example, Daulin et al. (2011) treated the items of vertical specialisation (VS) and VS1 in HIY as vertical trade in their concept proposal of "value-added trade" for the first time. Johnson & Noguera (2012) presented a formal concept of value-added exports and a calculation method based on Daulin et al. (2011), where the added value that one country produces is ultimately used by another country, although this method failed to analyse the relationship between the value-added exports and VS in HIY. Koopman et al. (2010) decomposed a country's total exports of through the content of value-added and formed a decomposition system framework of trade in value-added for the first time. Based on Koopman et al. (2010) and Johnson & Noguera (2012), Koopman et al. (2012, 2014) carried out a more detailed decomposition of the total exports of one country, analysed the specific sources of statistics of traditional trade statistics, and established the relationship between total exports and value-added exports, the domestic added value of exports and VS in HIY. Wang et al. (2013) extended the decomposition model of Koopman et al. (2014) to make it suitable for the value-added decomposition of exports at both bilateral and industrial sector levels. In addition, some databases were established for measuring value-added trade, such as the WIOD database published in 2012, the OECD-WTO TiVA database and the Eora MRIO database released in 2013, the

UNCTAD- Eora database, and the "Interconnected Economies" of the OECD (Stehrer, 2012; Timmer et al., 2013).

In the past two years, more domestic research publications concerning trade in China on value-added trade have emerged. This research has mainly focused on three aspects: First, re-measuring and adjusting China's unilateral and bilateral trade balance through value-added trade data. The results indicated that traditional trade statistics exaggerated or distorted China's export scale and trade imbalance (Li & Xu, 2013; Chen & Li, 2014; Wang & Sheng, 2014). Second, by analysing the origin and destination of China's value-added exports in a refinement and decomposition study of China's value-added trade (Deng, 2014). Subsequently, Li & Xiang (2014) measured the share of foreign value-added and the source country in the exports of China's manufacturing. Third, under the framework of value-added trade, re-measuring the international competitiveness of China's exports and the status of the international division of labour suggested that China's traditional low-tech manufacturing industry had certain competitiveness. However, its value in manufacturing exports has declined, especially in the high-tech manufacturing (Zhang, 2013; Luo & Zhang, 2014; Dai, 2015). Essentially, these industries are still in the downstream part of the global value chain, and the status of the international division of labour is still low. Very few studies that have raised the issue of value-added services in exports. Among them, Liao & Ning (2013) and Deng (2014) found that the proportion of various sectors of the services exports value increased in China, but compared with developed countries, China's exports, especially the export of manufacturing services, were significantly lower in the area of value-added services.

2.4 Services Trade Competitiveness Based on Different Measurements

2.4.1 Services Trade Competitiveness based on Trade in Gross Value Terms

In the early stages, western scholars used RCA and IMS (international market share) indicators in their studies to make recommendations to enhance competitiveness in the services trade. For example, Sapir (1982) and Sapir (1986) verified the applicability of comparative advantage in the service trade and concluded that the various services sectors had different advantages with different abundances among different countries. This viewpoint affirmed the dynamic nature of the comparative advantage. Since then, some scholars have begun using the RCA index to analyse the competitiveness of the services trade. For instance, Peterson & Barras (1987) explored the relationship between the export value of the services trade and the RCA index. Hoekman & Karsenty (1992) measured the services trade competitiveness at different income levels and found that small countries (with fewer than one million people) specialised in the exporting commercial services. Hoekman & Kostecki (1995) and Windrum & Tomlinson (1999) conducted comparative analyses of the competitiveness among different countries in the services trade.

According to Gorg (2000), services exports were less attractive to entering foreign markets. Unlike the trade in goods, most services required production and consumption simultaneously, implying that commercial presence (mode 3) in a foreign market was good for firms (Winsted & Patterson, 1998; Javalgi & White, 2002). Some specific service sectors could directly or indirectly promote goods producers more efficiently, such as transportation and financial services, which put some skills into the production of primary and secondary industries under the condition of goods, labour and free-flowing capital (Mildner, 2005).

Many empirical studies have focused on the competitiveness of services, and the majority have applied the RCA index to measure the competitiveness of services across countries. Hoekman & Karsenty (1992) adopted RCA to examine the comparative advantage of financial services in different countries with different incomes. The results indicated that the higher the country's income, the larger was the comparative advantage. Using the same method, Seyoum (2007) examined the competitiveness of service sub-sectors (i.e., financial, business, transport and travel services) within developing countries. The results demonstrated that comparative advantage mattered in transport and travel services in developing countries, while financial and business services still had some improvement capacities. In addition, Fourie & Fintel (2009) ranked the revealed comparative advantage of 10 services export sectors across 147 countries. The results indicated that; Greece, Egypt and Denmark had a comparative advantage in transport services while; Greece, Turkey, Egypt, Spain and New Zealand were more competitive in travel services compared to the rest of the countries. On the other hand, Egypt and Pakistan showed competitiveness in communication services and Ireland and Switzerland in insurance services.

While some authors have focused their studies on the competitiveness of services sectors in developed countries (Hiziroglu et al., 2012; Hisanaga, 2007; Deng, 2016; Bento, 2014). Hiziroglu et al. (2012) investigated the competitiveness of; transportation, finance and insurance, communication and computer-information, tourism, and construction between Turkey and the EU countries from 2000 to 2010. Their research was based on three different revealed comparative advantage indicators called RCA, RMA (Revealed Import Advantage) and RTA (Relative Trade Advantage). The findings showed a strong comparative advantage in Turkey's construction, tourism and transportation. This result meant that Turkey's competitiveness was mostly in labour-intensive and capital-intensive services. Before that, Hisanaga (2007) conducted a similar

study comparing international trade in the US with other countries comprising; the World, Greece, Turkey, Japan, France, Ireland, China, Russia, and the U.K. The findings showed a greater comparative advantage in knowledge-based services in the US. A study by Bento (2014) assessed the EU's trade structure in travel services. The results found that Southern and Eastern European countries had the strongest comparative advantage, which remained over time. In a study concerning insurance and pension, finance, intellectual property fees, telecommunication, computer and information and other businesses, Deng (2016) employed three different indices: EMS (Export Market Share), RCA and RTA to measure the competitiveness for Hong Kong and Singapore over the period 2005 to 2015. The various services sub-sectors generated different results; however, the overall conclusion was that both the Hong Kong and Singapore territories had a relative advantage in knowledge-intensive services.

Related studies have also been carried out in other developing countries (Kuznar, 2007; Mohammadi & Yaghoubi, 2008; Fourie & Fintel, 2009; Cunha & Forte, 2017). Kuznar (2007) evaluated the position of developing countries in the services trade, noting that countries with low and middle incomes were most competitive in labour-intensive industries, such as; tourism, transport and construction. Mohammadi & Yaghoubi (2008) studied finance, computer and information and travel and transportation, finding that a few developing countries excelled in travel and transport services. Cunha & Forte (2017) conducted a study covering the top ten developing countries that showed that India led in computer and information services, Korea in construction and transport services, and Singapore in finance and transport. In contrast, China, Hong Kong, and Taiwan scored higher in the other business sectors. Sáez & van der Marel (2019) measured the same phenomenon in Peru by including diversification and concentration dimensions. The results revealed that Peru still had room for services exports, and its export structure was dominated by classical or traditional services rather than modern services.

From the discussion of the various results above, it can be seen that most empirical studies have concentrated on the competitiveness of specific service sectors in developed and developing countries using different data analysis methods. However, not much information has been given regarding why competitiveness existed, its exact nature and suggestions for improvement.

Some empirical studies have focused on transnational and national factors to explain the origin of services trade competitiveness. For example, Windrum & Tomlinson (1999) found that the optimizing and adjusting domestic economic structure, and service innovation were effective ways to enhance service industry competitiveness across the UK, Germany, the Netherlands and Japan. Reddy & Gairola (2002) argued that for India, the government should increase education investment and reduce restrictions on personal movement to acquire international opportunities in the services industry. Eliminating land, products and labour market distortions and relaxing restrictions on FDI flows would greatly promote the international competitiveness of India's service trade.

Similarly, many studies have focused on the determinants of competitiveness in the services sectors (Popescu, 2006; Woerz, 2008; Algieri et al., 2018). Woerz (2008) found that high-skilled labour only significantly positively affected a sub-sample of new EU member states. High levels of labour productivity along with low unit labour costs had a positive effect on RCA. Algieri et al. (2018) examined the determinants influencing tourism services in the EU-28 countries from 2000 to 2013. Their findings indicated that specific factor-proportions variables and variables related to the new trade theory were the main drivers of competitive advantage in tourism.

Throughout the existing literature, it was that there has been no unified research framework for the study of competitiveness of the trade in services as the research directions of the subdivision were decentralised, and the empirical research methods were

study-specific. The most commonly used was the index, which was employed to measure strengths and weaknesses. Other indicators used were the Trade Competitiveness (TC) index, RCA index, IMS index, Comparative Advantage (CA) Index, Export Similarity (ES) index and Degree of Openness (DO) index. Other improved indices include; Relative Trade Competitiveness (RTC), Symmetric Revealed Comparative Advantage (SRCA), Net Revealed Comparative Advantage (NRCA), Relative Revealed Comparative Advantage (RRCA), and the Lafay Index.

Another strand of literature has come from Chinese authors. Yang (2006) found that global services trade saw higher growth than that of actual GDP when analyzed the services trade. Enhancing research and development (R&D) capabilities in the services sector can efficiently increase competitiveness in this industry (Huo & Xia, 2007; Xiao & Han, 2018). Zhao & Li (2005) used the CA index to analyse the international competitiveness of the top nine countries in the world in the tourism services trade from 1995 to 2004. The results showed that China has a weak comparative advantage in tourism services compared with other countries that is contrary to the findings in Wu (2008) and Cha & Chen (2009) believed that China has some comparative advantage in traditional services. Using RCA index, TC index, and trade overlap (TO) index, Yang (2009) and Zhang & Cui (2011) observed that among the BRIC (Brazil, Russia, India, and China) economies, India and Brazil were highly competitive in the emerging services trade, while China and Russia excelled in the traditional services trade. Yang (2009) compared the competitiveness of trade in services among "BRICs" using RCA index, TC index, Grubel-Lloyd (GL) index, and so forth, finding that China is highly competitive in transportation, tourism and architecture services.

Wu (2008) and Cha & Chen (2009) used the IMS, TC and RCA indicators for China and India throughout the period 1999 to 2008. Their key conclusion was that the

overall, China's competitiveness was relatively weak, except for some merits in the traditional services trade, such as tourism and transportation. Zhuang et al. (2009) used the RCA index and other analytical methods to estimate China's competitiveness in the service industry. They concluded that China's aggregate service industry was still competitively disadvantaged. Furthermore, Zhuang & Chen (2010) used the IMS index and other analytical tools to conduct an international comparative analysis to determine the status quo of China's trade in services. They concluded that China's overall competitiveness was relatively weak but gradually improving. China's services trade was not well-structured, with large exports of low-tech services like tourism and transportation and limited exports of high-tech services like financial services. Meanwhile, the competitiveness of China's trade in services was not consistent with the increase of the exports growth (Dong & Xia, 2010).

Subsequently, Huang & Wang (2010) and Zhang & Li (2017) analyzed and compared China against India by calculating RCA index and TC index and concluded that China had more advantages in labour-intensive services industries compared to India's advantage in capital and technology-intensive industries. Moreover, Zhang & Li (2017) also discovered that the overall competitiveness was higher in India than in China when using the RCA index and TC index from 2005 to 2015. Similarly, Ding & Xu (2007) calculated the competitiveness of services trade between China and India using RCA index and MS index. The findings revealed that the overall competitiveness of India's services trade is strong. China has some competitive advantage in travel services, whereas comparative disadvantage existed in telecommunication, computer and information, insurance, finance, and personal, cultural and entertainment service subsectors.

Yin (2010) and Cui (2013) used IMS, export contribution rate and RTA index to measure the trend and stability of displaying comparative advantage in China's service

trade. The findings concluded that the overall competitiveness of China's service trade is significantly weak and the trade level is specifically low which aligns with the findings in Wu (2008), Cha & Chen (2009) and Zhuang & Chen (2010). Chen & Zhang (2010) used IMS, TC and RCA indices to measure the services trade and compared it internationally. The results indicated that China's overall services trade competitiveness was relatively poor. Furthermore, for financial services in BRICS, the Market Share (MS), Trade Specialization Competitiveness (TSC) and RCA index proved that China was the weakest among the four economies cover Brazil, India, Russia and South Africa (Ou, 2013). In the same vein, Zhou & He (2011) applied the TC index to measure the services trade competitiveness between China, Britain and the United States. The results showed that China's construction and computer information services had a certain degree of comparative advantage and strong international capabilities since construction and travel are labour-intensive industries. Mou (2014) compared the competitiveness of services trade between China and EU using the TC index and CA index and also concluded that China's overall services trade competitiveness was generally weak, its strength being mainly reflected in construction, computer and information services, consistent with the findings of Zhou & He (2011). Similarly, Chen & Li (2014) studied the competitiveness of China's trade in services based on the different indicators (i.e., DO, IMS, RCA, TC) and all results demonstrated that China's competitiveness in the world was very weak.

Additionally, Chen (2014) applied the TC index, RCA index and normalized revealed comparative advantage (NRCA) index to analyse the development of China's service trade in terms of the evolution of market competitiveness. The results varied across the different countries. The German market followed a "U" type structure in the long term. In the Japanese market, it showed a slow decline, and in the US market, the rise was slow. The study also found that Japan and Germany had competitive advantage

in capital and technology-intensive services, while the patent license and the financial services in all the three major markets were obviously weak. The conclusion was that improving the proportion of technology-intensive service industry would greatly enhance China's international trade competitiveness with developed countries. Furthermore, Li & Qi (2013) compared the export competitiveness of the services industries in China and the US with the IMS index, TC index and RCA index. The results suggested that the United States had stronger export competitiveness in technology-intensive services, while China had a disadvantage in technology-intensive services (i.e., financial, insurance, computer and information services, and patent license services). The same study also found that China's construction service had a comparative advantage over other sectors. Likewise, Sang et al. (2014) used the same indicators mentioned in Li & Qi (2013) in combination with the domestic openness (DO) indicator. They compared and analysed the aggregate and disaggregate competitiveness of the service trade. Their results found that, except for construction, in particular, all the other service sectors had a comparative disadvantage. Sun & Sui (2015) used the TC, RCA and NRCA indicators to analyse China-EU trade competitiveness in services since 2000. Their observations pointed to a significant emerging service trade gap between China and Europe. Although the traditional services trade gap between China and Europe was small, it was expanding fast. Ji (2015) first calculated the dependency of services trade using the IMS, TC and RCA indices. This step was followed by an analysis of the opening level of the service industry between China and the major developed and developing countries from the international and domestic perspectives for gauging the relationship between the service industry and industrial competitiveness. Zhang et al. (2015) found that trade in goods improves the development of trade in services and then suggested some policies to promote coordinated development between them.

Among others, Xu et al. (2018) examined China's services trade competitiveness from the global value chain perspective and the impact of development from the perspectives of the international division of labour, service outsourcing, and trade in intermediate goods. Xia & Xiao (2018) looked at the international services trade among global trading powers, and they advocated for a long-term mechanism and policy to obtain a more sustainable and stable development for China's advancement. Recently, Wang (2019) conducted a study under the *Belt and Road Initiative* (BRI) which showed both trade export and comparative advantages were advancing gradually. At the same time, the RCA and IMS results in Zhang & Wang (2019) showed that overall, China's services trade competitiveness was weak, but finance, construction, telecommunication, and information and computer had performed well at the international level. Likewise, findings from the RCA, IMS and TC analyses in Jiang & Lin (2020) also confirmed that the overall international competitiveness of China's services trade lacked competitiveness, but it had also been climbing steadily in the past 20 years. Overall, China's comparative advantage came from construction and communications, but not in most capital and technology-intensive industries (i.e., finance, insurance, patents and royalties). Similarly to previous authors, Wang (2021) also conducted a similar study based on the MS, TC and RCA indicators. The results suggested that, on the whole, China's international trade in services level was generally weak and had fallen from 2010 to 2019.

2.4.2 Services Trade Competitiveness based on Value-Added Trade Method

In the case of the value-added algorithm, the relative measure of trade export volume is considered to be more accurate and reflects a country's true level of trade volume. Scholars' attention to this new method of analysis has gradually risen, and in recent years, more and more scholars have begun to use this algorithm to measure the international competitiveness of a country's trade in services. At the same time, the evolution of the

global value chain theory has provided a new theoretical basis and research method for examining the international division of labour. Therefore, studies everywhere have utilised value-added trade to analyse the global division of labour in trade in services.

The results of Grater's (2014) study, which was based on total export statistics, demonstrated that the portion of the modern trade value chain in the service sector in South Africa was grossly underestimated. This situation was because the government's driving force to increase the exports of manufactured goods and services did not consider the service industry's current state. Based on the newly modified analysis of the service sector in South Africa, the RCA index of the service sector was taken into account for calculating the two statistical algorithms of traditional total export and the global value chain. Lanz & Maurer (2015) also attempted to study the role of China's international service trade in the global value chain (GVC).

Gao (2015) used the world input-output table to measure the scale of China's value-added exports from 1995 to 2011. The results concluded that China should strengthen cooperation with the production value chain of emerging economies and attach greater importance to developing the service industry and trade in services exports. Additionally, China should improve the technological content of export products and enhance China's position in the global value chain. Ma & Duan (2015) based their study on the world input-output table and TiVA database, and found that China's domestic value-added had shown a recovering trend in recent years. The above two authors' works were not directly based on the value-added algorithm to gauge the comparative advantage in the services trade. Instead, they had based their studies on the value-added approach. According to both studies, the conclusion was that China should vigorously promote the development of its domestic service industry to enhance the division of labour in the global value chain.

China's research in this area started late, and since 2015 more Chinese scholars have begun using the statistical method of value-added in their analytical work to study the competitiveness of the services trade. For instance, Dai (2015) compiled the World Input-Output Database (WIOD) to measure the domestic value-added services exports in China's major service sectors from 1995 to 2011. By comparing the RCA measured by the value-added method with the traditional RCA method, Dai provided a more scientific basis for developing China's services industry to correct the real situation of the international competitiveness of China's services industry.

In addition, Pu & Ma (2015) employed IMS index, NRCA index and GL index to re-calibrate the international competitiveness of the "BRICs" service levels using the value-added trade data. The new algorithm results verified that the development potential of the services trade was larger than that of the past estimated figures using the traditional accounting method. Compared with developed countries, some subdivided industries in the BRIC countries still showed some considerable advantages (except for India). Hence, it was safe to conclude from this practice that the development structure of the services trade needed to be adjusted.

To accurately analyse the international competition of China's trade in services, Li & Zhang (2015) adopted the OECD-WTO value-added trade database to analyse the RCA of China's trade in services and compared it with the total export data. Guo & Liu (2015) also used the OECD database to analyse the export of China's services by taking a new perspective on the value-added trade. This step was done to reassess the real international competitiveness of China's service industry after considering the indirect export of services and the indirect export of materialise in the trade in goods.

Since the marketing services of intermediate products rendered across multiple borders are becoming more popular, the source value of these products requires scrutiny

as many of them are produced in numerous countries or regions. All these official trade statistics are not solely owned by the country or the region that ultimately exports these products. Given this, Timmer et al. (2013) pointed out that the sectoral comparative advantage index proposed by Balassa (1965) may potentially produce erroneous conclusions.

To overcome the drawbacks of the traditional comparative advantage index, Koopman et al. (2012) calculated the sectoral RCA from the perspective of value-added. This method removed the repeated statistics caused by foreign value-added and the cross-border intermediate products introduced by the imported foreign intermediate products. Using Koopman for reference, Brakman & Van Marrewijk (2017) then applied data of 35 departments in 40 economies over 15 years to systematically study the distribution characteristics of two comparative advantage indices based on total exports and value-added exports. The studies showed that the calculated value of value-added exports is more concentrated, and the two calculated comparative advantage indices are not the same among different countries. Accordingly, the Chinese scholar Dai (2015) first calculated the comparative advantage index of China's 35 sectors based on value-added exports and then used these results to analyse further and compare their comparative advantage based on gross value exports. However, Wang et al. (2013) held that international sectoral competition should be analysed from the perspective of departmental creation of value-added, for which they defined the sectoral forward value-added exports and the backward value-added exports from the perspective of the producer and user respectively. Forward linkages are defined as indirect domestic value added export (*DVA*), which measures the percentage of exports used by another country in the production of its exports to third countries. Forward linkage represent GVCs penetration from an export perspective. Unlike the domestic value added export. Which accounts for the value added generated by the domestic economy in the production of goods and

services for export both directly and indirectly, indirect value added export represents a better indicator of a country's involvement in the GVCs linkage as it accounts for the percentage of the domestic value added used as inputs by industries in other countries, which provides goods and services to third countries (dine, 2019). Backward linkages, also known as vertical specializations, refers to the foreign value added in export (FVA). This is the imported intermediates input content of export. It refers to GVCs penetration from the import prospective.

It can be seen from the above discussion that measuring the value-added export of forward-linkage requires the deduction of the value added created by other countries and the value added created by other domestic departments from the total export value of the sector, plus the value created by this sector and indirectly exported through other sectors. The fundamental difference between the two is that the former defines the competitiveness of the department from the perspective of the producer while the latter from the perspective of the user. In other words, Koopman et al. (2012) only considered the international division of labour and did not consider the division of labour in the domestic industry, thus, confusing the range of such values as the value-added of forward-linking and backwards-linking. Therefore, judging from the department's own creative ability, it is necessary to re-measure China's service export dominant comparative advantage index according to the method found in Wang et al. (2013). Based on the forward connection of value added exports, Wang et al. (2013) calculated the RCA_F index for electrical and optical equipment in mainland China and the United States and compared them with the RCA index. The results revealed that the RCA index, based on total exports, overestimated the comparative advantage of China's electricity and optical devices while it underestimated that of the comparative advantage of the US. Nevertheless, this particular study did not systematically analyse other specific sectors in China. Chen et al. (2017) re-evaluated exports in China's service trade based on the

forward decomposition method of value added in trade and re-estimated the international competitiveness of China's trade in services. The findings indicated that the overall and subdivisional sectors competitiveness of China's trade in services is not strong even though it has the second largest share of the world's service export market after the United States. It also conclude that China is only a big country in services trade rather than a powerful country.

2.5 Empirical Studies on the Factors Influencing the Service Trade

With the absence of existing literature on the trade in services, most researchers have focused on the difference between the goods trade and services trades. Hill (1977) demonstrated that the main distinction between the goods trade and services trades was related to their distinct characteristics, i.e., services had to be consumed and produced simultaneously and could not be stored. However, it did not mean that the theoretical framework for the two segments should be any different. Hindley & Smith (1984) found no evidence to show the inapplicability of comparative costs to service industries. Deardorff (1985) and Melvin (1989) believed that the features of services challenged the comparative advantage theory for the trade in services. However, a complementary relationship existed between goods trade and services trade (Lennon, 2008). Similarly, Breinlich & Criscuolo (2011) also found many similarities between goods and services trade and concluded that existing heterogeneous firm models for goods trade can apply for studying services trade.

Moreover, many studies have used the gravity model to analyse bilateral trade flows in an aggregate or disaggregate level. Most of these studies have focused on the bilateral trade in goods rather than services. So, does the gravity model apply to the services trade as well? Many empirical studies have focused on the determinants of services exports and imports using a gravity model (Freund & Wein, 2002; Kimura &

Lee, 2006; Head et al., 2009; Anderson et al., 2011). Some have argued that the gravity model is more suitable for the services trade than the goods trade due to the proximity between provider and consumer, which matters in some types of services trade (Kimura & Lee, 2006). The gravity model is significant both theoretically and analytically, thus it has increasingly been used to analyse the services trade (Shahriar et al., 2019).

Francois (2001) was the first author who applied the gravity model on service imports by taking the GDP per capita and the population of the recipient country as the independent variables. Services data were extracted from the Global Trade Analysis Project (GTAP) database. Using the same dataset, Park (2002) extended Francois's (2001) model by including price indices to capture price differences between countries and the impact of trade barriers on cross-border services. The findings indicated that the gravity model had great explanatory power not only in the goods trade but also in the services trade. Additionally, Freund & Wein (2002) used the exchange rate and the GDP as control variables to explore the impact of internet on services trade using US data. The findings shown that currency depreciation in exporting country would increase exports in the next period, while a currency depreciation in importing country would decrease exports in the next period. More recently, Yousefi (2018) found that growth in internet usage was significantly contributed to trade in services, that aligns with the findings of Freund & Wein (2002).

The availability of the OECD database on bilateral trade in services in 2012 facilitated many studies on the services trade and made it possible to quantify the effects of various factors on the services trade. Many researchers focused on the main factors influencing aggregate flows of the services trade via using the gravity model (Grünfeld & Moxnes, 2003; Lejour & Verheijden, 2004; Kox & Lejour, 2006; Lennon, 2009;

Kimura & Lee, 2006; Marchetti, 2009; Head et al., 2009; Guillin, 2010; Shepherd & Marel, 2010; Sandra & Pelin, 2012; Eichengreen & Gupta, 2013).

Grünfeld & Moxnes (2003) examined the factors influencing service exports in the OECD countries. They augmented the gravity model by including; trade agreements, trade barriers and institution quality variables. Firstly, they found that; distance, trade restrictiveness and corruption in importer countries exerted a negative and significant influence on service exports due to the increase in trade barriers that dampened service exports. Secondly, free trade agreement as a dummy variable was insignificant in services exports, which may have reflected that many of the free trade agreements have failed to include services, thus, contradicting the findings in Kimura & Lee (2006) and Sahoo & Dash (2014). Lejour & Verheijden (2004), on the other hand, compared the determinants of the trade in goods and services in Canada and the EU by adding; regulations, non-trade barriers, the EU as a dummy, and population density variables. The results showed that distance was less important for services than goods, contradicting Kimura & Lee (2006), who held that distance mattered more in the services trade than goods trade since the transport costs for tradable services might be higher than for goods trade.

Similarly to Lejour & Verheijden (2004), Lennon (2008) and Kimura & Lee (2006) also examined the effects of various factors on bilateral services trade relative to goods trade. Kimura & Lee (2006) used the standard gravity model for 10 OECD member countries between 1999-2000 and found that; geographical distance, common language, common border, regional trade agreement (RTA) and economic freedom were important for the services trade. Lennon (2008) contrasted the trade in goods with trade in services with a special focus on other commercial services covering travel, transportation, government services and other commercial services. Some new variables were added to the standard gravity model, such as; trust and contract enforcement, networks, labour

markets, technology and technology communication, and landlocked status. The results revealed that distance was relatively less significant for trade in services than for the trade in goods. Common language and regional trade agreements were more important for services trade which was consistent with the findings obtained in Portes & Rey (2005), Lennon (2008), Walsh (2006), Marchetti (2009) and Guillin (2010), who claimed that cultural distance mattered for services trade through lowering the transaction costs. Furthermore, trust and contract enforcement, networks, technology and technology communication, including R&D, were more important factors in explaining trade in other commercial services.

Further, Marchetti (2009) examined the determinants of the total services trade flow between two countries using the standard gravity model. The results indicated that distance was not the main factor. However, economic size, contiguity, common language, economic integration agreements, preferential trade agreements, and EC membership were positively related. Another study by Guillin (2010) estimated the determinants of bilateral trade in services focusing on RTAs and S-RTAs, and discovered that common RTA and S-RTAs significantly impacted on trade in services. This situation was because of the low tariff and non-tariff barriers, which was consistent with the findings observed in Kimura & Lee (2006).

In addition, Karam & Zaki (2013) investigated factors influencing the total trade flows in services in the MENA countries. They employed an augmented version of the gravity model covering 21 countries and ten sectors between 2000-2009. The findings indicated that being a WTO member promoted services trade due to the tariff-free rule. In addition, increasing the number of bound commitments boosted services trade imports and exports, reducing restrictions on international trade. Ahmmad (2015) developed an eclectic and extended gravity model method to examine the main drivers of the United

States' services exports and imports. The study demonstrated that distance had a reverse sign both in US real services exports and imports. The exchange rate was negatively associated with US service exports. US goods trade and outward FDI positively contributed to US real services exports but did not impact US real services imports. Trade liberalisation of the US and its partner countries significantly affected both US exports and imports. Trade barriers and the institutional variables of destination country negatively influenced US services export while the common border between the US and its partner countries increased US services trade.

In the same vein, Pham & Vu (2016) proceeded to estimate services trade flows between Vietnam and the EU in terms of services exports and imports by applying the gravity model. Observed in the results were some macroeconomic variables, such as the GDP per capita difference between Vietnam and EU countries, the market size of EU countries, the real exchange rate, and colonial relationships significantly associated with the services trade flows between Vietnam and EU countries. Iqbal et al. (2018) separately analysed the composite services value added growth for developed and developing countries. They found that some macroeconomic variables, such as the GDP per capita, foreign direct investment (FDI), and Trade Openness, showed opposite signs of services value-added growth. Fewer studies used services trade regarding firm level because of data restrictions. Matuszczak (2019) was one of the authors who explored the unique firm-level data to discover the determinants of Poland's services exports. The results showed that restrictions on services trade, firm size, the GDP in importing countries, distance and contiguity significantly influenced services exports. Recently, Liu & Chen (2020) used the gravity model to study the factors influencing current services trade between China and the Belt and Road countries. Their data indicated that the economic development level of a country and the development level of the services industry had a significant impact on services exports, while the openness of the services trade showed a

significant and positive effect on services imports. Additionally, distance displayed no significant impact on the trade in services since most of their trade in services was conducted through the internet, which is not restricted by distance.

On the other hand, differences in the rule of law played a significant and positive role in the services trade, thus, indicating that the favourable institutional environment of trading countries is conducive to China's services exports and imports. Subsequently, Li & Zhang (2021) examined the factors governing China's services exports using the augmented gravity model spanning the period 2003 to 2015. The results pointed to the economic development of the destination country, the application of information and telecommunications, and geographical distance having a significant influence on China's service exports. Using multiple regression, Wang et al. (2021) investigated what factors influenced China's services trade development and found that employment in the services industry did not promote services trade development due to the shortage of professionals in the Chinese services industry. Furthermore, services trade openness held an insignificant role in China's services trade development, which meant that China needed to improve its trade openness policy through less governmental interventions.

Another strand of the existing literature concentrated on the essential factors affecting China's services trade at a disaggregate level. Service sub-sectors are expected to behave differently subject to the different nature of each service. Hence, analysing the determinants of the trade in services at an aggregate level is inappropriate (Tharakan et al*.,* 2005; Walsh, 2006; Lennon, 2006; Kandilov & Grennes, 2010; Shingal, 2010; Nasir & Kalirajan, 2013; Sahoo & Dash, 2014). Besides, services have different supply modes that require different regulations, leading to different market structures. Thus, the same determinants may affect services differently (Goswani et al*.,* 2011). Walsh's (2006) empirical research focused on four main service subcategories: travel, transportation, and

other commercial services and government services. The study's findings indicated that the partner country's climate and temperature significantly and positively affected travel services since tourists and travellers were more attracted to warmer countries (Lise & Tol, 2002). Furthermore, Lennon (2008) conducted research similar to Walsh (2006) and discovered that geographical variables (i.e., distance, contiguity and being landlocked) had less effect on trade in other commercial services compared to travel and transportation. This situation was due to those services not requiring proximity between providers and consumers. More recently, Covaci & Moldovan (2015) researched the factors influencing Lithuania's aggregate services exports and seven service sub-sectors by applying the Poisson pseudo-maximum likelihood (PPML) estimation method. The findings indicated that the partner country's economic size and common language positively affected services trade. Heterogeneous effects were found within services subcategories, such as; time zone differences, the EU and relative labour endowments. Physical distance varied for the different types of services. Furthermore, the partner country's remoteness was irrelevant for most of the service sub-sectors compared to other services, such as transport, other businesses, and computers and information.

Trade in services is particularly sensitive to trade policies and institutional quality due to its intangible nature. Domestic regulations are often treated as serious barriers to cross-border trade in services (Crozet et al., 2016). Lacking of objectivity and transparency in rules and regulations concerning foreign investments, and rules against corruption can seriously inhibit trade (Carbonara & Parisi, 2007). Liberalization of trade in services has lagged behind goods (Barattieri, 2014). Nordas & Rouzet (2015) discovered the relationship between the trade restrictiveness index on bilateral services exports and imports. Using the traditional gravity model method, they examined 12 services sectors from newly released OECD data. The results indicated that a negative relationship existed between services trade barriers and imports and exports of services

owing to high restrictions on international trade, which corresponded with the findings of Grunfeld & Noxnes (2003). Crozet et al. (2016) evaluated the effect of French regulations on the professional services and concluded that a significant negative impact of domestic regulation on firm's exports. Gani & Clemes (2016) found that a positive relationship existed between the rule of law and regulation quality and trade in financial and insurance services for the high-income OECD and developing countries. Álvarez et al. (2018) examined the effects of domestic institutional quality on bilateral sectoral trade flows, found that institutional quality was a very important factor in determining trade in services. Using a standard gravity model and data on services trade restriction, Nordås & Rouzet (2017) observed that services trade restrictions significantly affected the competitiveness of services suppliers abroad and, thus, negatively impacted both services exports and imports. Andrenelli et al. (2018) suggested that countries with a high service trade restrictiveness index (STRI) would cause low productivity in their foreign branches. That is to say, policy restrictions will hinder outward foreign direct investment (OFDI) in services, and domestic service trade policies will also indirectly impact the development of service trade by affecting the efficiency of the implementation of free trade agreements between economies.

Recently, Guo (2019) investigated the main determinants of China's tourism by adopting the augmented gravity model. The results illustrated that the GDP per capita of both economies, free trade agreements, and China's relative trade freedom could significantly promote China's travel exports. Ding & Chen (2020) studied China's transportation services exports using the diamond model and found that goods exports and trade openness both showed a positive and significant influence on China's transportation service exports.

After reviewing the existing literature, it can be seen that extensive studies investigated the determinants of services trade based on quantitative perspective, only few studies focus on qualitative approach, such as Lu et al. (2012) conducted a semi-structured and in-depth interviews to investigate the antecedents of export success of PSFs, taking into account both firm characteristics and market characteristics. The findings indicated that management attitude, resource commitment, and international experience and reputation significantly enhanced their export performance. Furthermore, Kahveci & Okutmuş (2017) studied the determinants of medical tourism potential of Alanya by taking into account the strengths and weaknesses of the destination as well by conducting a face-to-face interview. The findings suggested that Alanya can benefit from job creation potential, decreasing foreign currency deficit because of service export and spillover effect to other sectors like in other destinations by using its potential to take part in medical tourism.

2.6 Literature on the Theoretical Framework of the Gravity Model

Newton's Law of Universal Gravitation presented the foundation for the gravity equation that says attractions between two particles in the universe with a force are directly proportional to the product of their masses and inversely proportional to the square of the distance between their capitals. Ravenstein (1885) opened up an area for applying a gravity model to migration patterns in the 19th century. Tinbergen (1962) first applied the gravity model to international trade, dealing with immigration and trade flows separately. Through a log-linear specification of the gravity model, they concluded that the GDP of trading partners had a positive influence on trade flows, whereas the geographical distance between two countries exerted a negative impact on bilateral trade volumes. The absence of theoretical foundations for the gravity model inspired economists to apply several international trade theories to the gravity model. So far, many researchers have provided a solid theoretical foundation for it. In this exploration, Anderson (1979)

developed the first theoretical foundation for the gravity model under the assumption of product differentiation by places of origin and no transaction cost, which came to be called the "Armington Assumption" and Constant Elasticity Substitution (CES) expenditures, respectively. Armington (1969) distinguished not only between different kinds of goods, such as machinery, chemicals, petroleum and wooden products but also between the places that produced them. Imperfect substitution appeared in goods of the same kind produced in different places considering the difference between production cost and trade cost. Bergstrand (1985) was another early contributor to the gravity model theory following the Heckscher-Ohlin framework.

Helpman & Krugman (1989) later contributed to the gravity equation under the assumption of differentiated goods with increasing returns to scale and monopolistic competition. Additionally, Deardorff (1998) derived a gravity model based on the international trade theory called the "Heckscher-Ohlin Theorem" under the assumption of "frictionless trade and trade with impediments". Imbued with such solid empirical performances and these theoretical developments, the gravity model of trade became influential during the 1990s and 2000s. Among those who had the most influence on gravity theories were Eaton & Kortum (2002), who explained the gravity model on the supply side by enveloping the Ricardian theory of "Comparative Advantage" with intermediate goods. The theory believed that under the assumption of two goods and two countries, even if one country was less efficient in producing the two goods compared with the other, each trading partner still could benefit from the bilateral trade flows. Salvatore (1998) mentioned that opportunity cost refers to "commodity cost is the amount of a second commodity that must be given up to produce one additional unit of the first commodity". Thus, Eaton & Kortum (2002) demonstrated that production heterogeneity between trade partners laid the foundation for the comparative advantage theory. Anderson & van Wincoop (2003) then introduced Anderson's (1979) Amington-CES

model, underling the importance of the general equilibrium effects of trade costs. Arkolakis et al. (2012) developed various theoretical accounts to generate the gravity models that maintained trade gains, thus, inspiring further academic interests in studying the gravity equation. From 2003 onwards, the most used standard equations have been derived from Anderson & van Wincoop (2003). Accordingly, the present studies has applied its standard model in its investigation.

2.7 Summary of the Existing Literature

This section has traced the evolution of the various trade theories and discusses what trade theories can and has been applied to the study of trade in services that have been conducted over the years by economists around the world. From the results of the empirical studies reviewed, some authors have claimed that trade theories, in general, can be used to explain the services trade, while others have protested that trade theories are not suitable because of their innate characteristics. However, most researchers have believed that trade theories fit the services trade after the contexts are revised. Followed by discussing the different methods to measure services trade competitiveness from the perspective of traditional gross value and value added methods. Subsequently, this section also reviewed the existing literature on the determinants of the services trade and the theoretical framework of the gravity model.

2.8 Research Gap

The above literature review permitted the identification of some research gaps that have not been covered in past research but that the present study has attempted to address and incorporate into its research.

Firstly, as the literature review has revealed, most empirical studies of service exports for China have used gross export values as the basis for estimating RCAs. As China participates in the global supply chains, in which the imported inputs of goods and

services are used in production, RCAs calculated from gross export values almost certainly misstates or misinterprets the actual RCAs of service exports. This situation describes the research gap the present study has attempted to fill.

Secondly, previous studies have focused largely on the trade in services overall to examine the determinants of China's services trade (Chen & Zhang, 2010; Zhao & Li, 2005; Thomas, 2015; Ahmad et al., 2017). There has been a need for further investigation using the disaggregate services trade data to identify the true effects of different factors on different service sub-sectors (Kaur, 2011; Morland et al., 2020). Subsequently, the GDP may be a good proxy in aggregated trade analysis. However, it may contain aggregate bias when analysing single service sectors (Anderson & Yotov, 2010; Anderson & Yotov, 2012; Morland et al., 2020). The services sector has been treated as the new engine of growth in most developing and developed countries (Young, 1995; Park & Shin, 2012; Noland et al., 2012; Salam et al., 2018). It has been considered an efficient services sector that plays an essential role in international trade and economic growth (Alege & Ogundipe, 2018). Thus, this sector as a whole merits further in-depth study. However, not all trade service sub-sectors have the same strengths and weaknesses. Therefore, it is important to identify which services sectors are less competitive through sub-sectoral analysis. It is also important to further investigate the elasticity of China's services sub-sector exports and imports for the purpose to implement relevant policies for each of these units.

Thirdly, most extant researchers have dealt separately with either services exports or imports on the implicit assumption that other parts of the services trade would remain unaffected (Covaci & Moldovan, 2015; Goswami et al., 2011; Kandilov & Grennes, 2010; Biewen et al., 2012). Very few studies have worked on both segments alongside each other as they have failed to see that services trade is the sum of services exports and

services imports, and both parts cause the services trade deficit. Imports matters more for a country than exports (Krugman, 2008). Thus, it is essential to study China's services exports and imports in tandem to picture the country's trade deficit performance.

Fourthly, most of the extensive existing literature employed the quantitative approach to study the determinants of the services trade, while few studies used the qualitative approach, with interviews being the most common method for analyzing the qualitative data. This study will adopt the document review method to conduct the analysis since it is very difficult to perform the interview amid the COVID pandemic. Through reviewing the government official documents, it can provide a holistic and comprehensive picture on the contribution of the service sub-sectors toward China's overall trade performance.

Lastly, to the extent that service trade can be affected by macroeconomic variables, it is also important to consider these in analysing service sub-sector exports and imports, which will cover the literature gap in China's services trade.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes the research methodology employed in the present study. The data were analysed in the quantitative and qualitative modes. The chapter introduces the theoretical framework based on the RCA value-added model and augmented gravity models. Ricardian's comparative advantage theory was used to explain the RCA value-added model. In addition, the gravity model is explained by; monopolistic competition, Heckscher-Ohlin, Ricardian, demand structure and incomplete specialisation. Based on these constructs, the various equations that were derived are presented. The next step was the justification for the selection of the variables. The qualitative method was conducted to answer research question three, which is discussed in detail. Included is a discussion of the econometric models that were applied in this study, such as; the Possion Pseudo-Maximun Likelihood with High-Dimensional Fixed Effects (PPMLHDFE), Two-Stage Least Square (2SLS) and Feasible Generalized Least Squares (FGLS). This regression used Stata to run the panel data. Lastly, several caveats of the study have been presented in the final section.

3.2 Theoretical framework

This section presents the theoretical framework related to revealed comparative advantage and the gravity model. Revealed comparative advantage is based on the Ricardian comparative advantage concept, while the gravity model is derived from numerous theories that will be discussed in the following sections.

3.2.1 Traditional Trade theory

Recall in Chapter 2 that Adam Smith's absolute theory that emphasised the importance of product specialisation and the division of labour. Smith claimed that the international division of labour played an important role in the development of international trade,

while the absolute advantage theory has been the foundation of the international division of labour. The theory assumed (1) two nations, two goods, (2) labour is the only production factor, and (3) free trade. Absolute advantage refers to the absolute advantage of labour productivity in production. As long as a country produces its products with absolute advantages and imports products with fewer absolute advantages, it could improve the welfare level of a country. The country produces its products with absolute advantage and imports products that do not have an absolute advantage. The absolute advantage theory can be summarised as four crucial aspects. First, the international division of labour could improve labour productivity. Second, the absolute advantage generates an international division of labour. Third, the international division of labour could promote international trade development; fourth, the absolute advantage comes from favourable natural endowments or conditions.

The absolute advantage theory first clarified the benefits of international trade: the international division of labour and trade transactions between countries could improve a nation's welfare level. Thus, Adam Smith's theory accelerated the improvement of international trade and provided the theoretical foundation for countries to launch international trade and the international division of labour. However, this theory did not consider transportation costs, limiting its practical value. Additionally, although this theory is applicable for trade between countries with different advantages, it has failed to explain how the trade will occur when all goods had an advantage in a country, or all goods had a disadvantage in another country.

Since some limitations existed in Adam Smith's theory, Ricardo (1817) put forward the comparative advantage theory developed from the original absolute advantage theory. This theory assumed (1) free trade between two countries, (2) zero transportation costs, (3) labour is the only production factor, and it is homogeneous, (4)

two countries in the worlds *i* and *j* and they only produced two goods A and B, (5) two countries' consumers have identical consumer preferences, (6) constant returns to scale, (7) labour is fully employed and have mobility within each country but no mobility between countries, (8) factor and product markets face perfect competition and (9) relative labour productivity differences in producing two products between two countries. The theory held that international trade depended on the two countries' relative labour productivity and costs. Each nation should produce and export goods with comparative advantages and import goods with comparative disadvantages. Both parties could conduct international trade as long as there was a comparative advantage to obtain trade benefits from transactions. The development of the comparative advantage theory was based on the absolute advantage theory. It provided a theoretical basis for countries to conduct international trade and undertake international trade liberalisation. It established the theoretical foundation for the international competitiveness of the services trade.

3.2.2 Armington- Constant Elasticity Substitute (CES)

Anderson (1979) derived the gravity equation based on the Armington assumption. It was worked on by Bergstrand in 1990 and developed with explicit theory derivation by Anderson and van Wincoop in 2003. Deardoff (1998) and Helpman (2006) further enriched the effectiveness of the gravity equation from derivations of the Heckscher-Ohlin model and enterprise production heterogeneity, respectively.

These theories not only introduced the gravity equation in the classical economic framework but also provided an important basis for understanding international trade theory. This chapter will explain the models used in this study and derived based on the various frameworks.

Anderson (1979) first released a simple theory of the gravity equation based on the assumption that (1) product differentiation comes from the country of origin, (2) consumer preference is identical and homothetic, (3) free trade t is frictionless, and (4) there are no trade costs. This situation means that the market share of a country's products in another country equals the share of the country's products in the world market, that is, the country's economic share in the world economy:

$$s_{ij} = E_{ij}/F_j = F_i/F^w$$

$$E_{ij} = \frac{F_i F_j}{F^w} \qquad (3-1)$$

Where E_{ij} is export from country i to country j, then F_i, F_j are the total economic output of country $i's$ and country $j's$, and F^w represents world economic output.

This formula represents the basic gravity equation, and it was derived from a frictionless world with no trade cost-related factors. It was derived under a complete specialisation assumption implying that certain products in the market of country *j* are only produced by country i, and there are no equivalent products like them. Thus, the product share equals the country's world share. This assumption is known as the Armington assumption, proposed by Armington in 1969. It claimed that products in each country were completely specialised and that there were no two identical countries.

The gravity equation derived from the assumption of the frictionless and complete division of labour seemed simple enough, and although it lacked practical validity, it still became the foundation of many subsequent models. Depicting the real-world trade pattern based on frictionless gravity (Eq. 3-1) requires including trade cost t_{ij} under the condition of preserving the assumption of the complete division of labour. Trade costs are the sum of all factors that hinder or deplete bilateral trade, including; transportation costs, tax,

language and cultural barriers. The friction t_{ij}≥1 can be interpreted as the product of unit t_{ij} unit shipped from country i to country j, and only one unit of product is left in country j. When trade costs exist, the right side of Eq. (3-1) will be reduced according to the trade cost:

$$E_{ij} = \frac{F_i F_j}{F^w t_{ij}} \qquad (3-2)$$

The expression of t_{ij} is usually proportional to transportation cost. Since transportation cost is positively related to the distance D_{ij} between two countries, trade costs will be inversely proportional to the distance D_{ij}. Similarly to transportation costs, tariffs also hinder trade. However, a common border and language and a Free Trade Agreement promote trade and can be seen as a negative trade cost. Thus, by adding different factors to the right of Eq. (3-2), the impact of different factors on trade can be comprehensively examined and estimate the actual trade potential of a country.

The above derivation seemed concise and direct. However, it still lacked connection with traditional economic theory. Structural analysis of supply and demand was also needed to explain the true characteristics of trade. The new theory pioneered by Krugman (1979) introduced the monopolistic competition model, which can explain why most international trade occurs between developed countries with similar endowments. It also provides an analytical framework for a structural gravity equation (see Helpman, 1987; Bergstrand, 1989). However, the monopolistic competition model was not the only model for successfully deriving the gravity equation. Deardoff (1998) derived a similar equation based on the H-O theoretical framework (Feenstra et al., 2001). Furthermore, Eaton & Kortum (2002) derived the gravity equation under the Ricardian model framework after considering productivity heterogeneity.

Anderson & Wincoop (2003) derived the equation from the assumptions of the consumer market structure and pointed out that bilateral trade was not only affected by

the trade costs between the two countries (such as bilateral distances and tariffs) but also the trade "friction" between the two countries and other countries which they called the "multilateral resistance" of trade. The following section will focus on the pioneering theoretical work.

3.2.3 Monopolistic Competition Framework

Based on the above derivation, an essential assumption is the complete specialisation of product production. The complete specialisation assumption suggests that each particular commodity is produced only by one country. There is more than one economic theory that can generate complete specialisation. The most suitable is the new trade theory based on monopolistic competition.

The new trade theory is the theoretical framework proposed by Helpman and Krugman in 1985. Traditional trade theory believed that trade came from the differences between countries. Thus, the industry will be allocated according to their respective resources. Trade took place between different inter-industry countries, which substantially reflected factor endowment differences between the two countries. The new trade theory is based on abundant intra-industry trade and believes that such intra-industry trade operations result from product differentiation.

The main assumption of the Helpman-Krugman model is monopolistic competition, differentiated products and increasing returns to scale. It claims that every country's products will be differentiated into different types according to different consumer preferences. The differentiated market allows the producers of each product to have certain monopoly powers and, thus, can develop; scale industries, generate incremental returns to scale and expand their product advantage. With the continuous specialisation and maturity of industries in various countries, most countries will focus

on producing certain products in the same industry. The demand for other products in the same industry will also increase. Thus, more trade will occur.

Assume that countries' specialisations in the production of different varieties of goods and the demand of different countries are identical and homothetic under free trade conditions (not considering tariffs or transportation costs). Under Helpman & Krugman (1985), assuming a multi-country framework, $i, j = 1, ...,$ C represents country and $k = 1, \dots, N$ represents the products. y_k^i is the output of product k in country i, since the price of all countries are the same, y_k^i represents the output value after standardising it in one unit. The total GDP of each country is calculated as $Y^i = \sum_{k=1}^{N} y_k^i$ and the world GDP is $Y^w = \sum_{i=1}^{C} y^i$. Let s^j denote the country j's GDP as a share of world GDP, that is $s^j = Y^j / Y^w$. Assuming all the countries produce different variety of goods, identical demand preferences, and homothetic, the export of product k from country i to country j can be identified as $X_k^{ij} = s^j y_k^i$, summing up all the product k, country i's export to j, and j's export to i, denoted by X^{ij} and X^{ji} separately, will be as follows:

$$X^{ij} = \sum_k X_k^{ij} = s^j \sum_k y_k^i = s^j Y^i = \frac{Y^j Y^i}{Y^w} = s^j s^i Y^w = X^{ji} \qquad (3-3)$$

The above equation represents the gravity model derived from the Helpman and Krugman model. The model suggests that both countries' demand for differentiated foreign products according to the level of their GDP is relative to the world GDP based on various preferences. Following that, Helpman (1987) established an intra-industry model based on the new trade theory. One important inference in the model is that intra-industry trade (IIT) increases with the increase in total income levels and increases with the similarities between trading partners. For countries that belong to the same group A (such as the OECD countries), Helpman constructed the following equation:

$$\frac{E^A}{F^A} = s^A \left[1 - \sum_{i \in a} \left(s^{iA}\right)^2\right] \qquad (3-4)$$

E^A is the total trade within group A, F^A is the total income in group A, s^A is the share of country j within group A, $\left[1 - \sum_{i \in a} \left(s^{iA}\right)^2\right]$ is a measure of dispersion in relative country size. It can be seen from the equation that the more similar the size of countries, the larger the intra-industry trade. Indeed, this provides a partial explanation of the fact that in the postwar period, the volume of trade has grown faster than income because, as shown in Helpman (1948b), this relative country size dispersion measure has increased for the industrial countries, which have dominated world trade. Furthermore, let region A represent any country pairs, that is $A = \{i, j\}$. Taking the logarithm of Eq. (3-4), the following can be derived:

$$\ln\left(\frac{X^{ij} + X^{ji}}{Y^i + Y^j}\right) = \ln\left(s^i + s^j\right) + \ln\left[1 - \left(\frac{Y^i}{Y^i + Y^j}\right) - \left(\frac{Y^j}{Y^i + Y^j}\right)^2\right] \qquad (3-5)$$

As discussed above, the services trade has unique properties that make the gravity model appealing. First, service products are often differentiated by quality, by location and also the fact that most of them are tailored to fulfil client firm needs. Second, and as mentioned by Jones & Kierzkowski (2005), Markusen (1989) and Markusen et al. (2000 & 2005), services must exhibit strong increasing returns to scale. Third, client firms improve their productivity more if more services are supplied ('love of variety'). Finally, this model type incorporates transaction costs from the services trade. Thus, Helpman and Krugman's model of monopolistic competition especially suits this research's purposes.

3.2.4 Heckscher-Ohlin Model

There are two basic assumptions for deriving a gravity equation with a microeconomic foundation. One of the assumptions is the structure of the demand market. Another is the structure of the supply market. This study first examined the supply market structure, equivalent to the natural endowment structure. Then it introduced the Heckscher-Ohlin model, one of the main theoretical frameworks. The Heckscher-Ohlin model can be identified as the resource endowment model, and it assumes that products are homogeneous, but the resource endowments between countries differ. Therefore, according to the principle of comparative advantage, different countries produce different products. The factor price differences between two countries will also determine a country's comparative advantage and type of products and trade.

Deardorff (1998) was the first to derive the gravity model based on the H-O theoretical framework. He contradicted many people's intuition that the H-O model was incompatible with the gravity equation. He discussed the derivation of the gravity equation in the H-O model in two very different ways. One was the "frictionless world". Deardorff pointed out that the traditional thinking under the H-O framework cannot be accepted because of the belief that a country always uses its resources to meet domestic demand before exporting. Products are similar in domestic or foreign countries in a frictionless world. Consumers will not differentiate between the countries when they choose products. Thus, total trade equals net trade, and market share depends on each country's output rather than each country's resource endowments.

The second one includes friction, and thus, it includes trade costs. In such a world, if two countries share the same factor price, it will lead to zero trade flow. In the case of identical product prices and trade costs, none of the exported products in one country can compete with domestic products in the other. Transactions occur when the product cost

gap exceeds the trade cost caused by the factor price difference. Under these circumstances, they can only export products to a third country when the trade costs are relatively constant between the two countries. Generally, a consumer can only consume one product from a foreign producer, similar to a complete division of labour. After that, the author further assumed that a complete division of labour necessarily exists. Similar results can be obtained from the assumption of the complete division of labour.

However, the gravity model is often considered as not having a theoretical foundation from the perspective of the H-O theory. Moreover, it has been suggested that the neoclassical international trade theory, represented by the H-O theory, contradicts the gravity model. To counter this argument, Deardorff (1998) obtained the simple gravity model from two different assumptions: trade resistance and non-trade resistance. He suggested that the simple gravity model for trade can be derived from basic trade theory. Under the assumption of non-trade resistance, he assumed that there was no trade barrier and transport cost, and there was no difference between products, consumers and producers between the two countries. After considering these assumptions, an equation was derived similarly to Eq. (3-1). However, consumers in different countries have the same assumption function, expressed by the substitution function's constant elasticity with the condition of trade resistance. Since producers in different countries have the same production function and countries specialise in producing different products, the gravity equation can be derived as:

$$E_{ij} = F_i F_j \left(1 + c_{ij}\right)^{1-\sigma} \left(1 + t_{ij}\right)^{1-\sigma} {P_j}^{-\sigma} {P_i}^{\sigma-1} \qquad (3-6)$$

E_{ij} represents the total exports from country i to country j, F_i and F_j are the national income of both countries, σ is the elasticity of substitution, c_{ij} is transportation costs, t_{ij} is tariffs, P_j is country j's domestic market price, and P_i is country i's consumer price index.

Similarly, the log-linear form of the trade gravity equation can also be derived from monopolistic competition and economies of scale. Deardorff (1998) suggested that a similar gravity model could be derived from almost all the trade models. Thus, the gravity model has characteristics of the various models.

3.2.5 Ricardian Model Framework

Another assumption concerns the supply efficiency structure. The analysis of the supply structure is based on the Ricardian model with the assumption of different technology and product efficiency between countries and industries. Productivity heterogeneity will result in a different share of the international market, from which the gravity equation is derived (Eaton & Kortum, 2002). Like Chaney (2008), Eaton & Kortum (2002) also assumed that the productivity distribution of heterogeneous industries and the industry productivity was a random number extracted from the Frechet distribution, namely:

$$F_i(M) = r[M_i \leq m] = e^{-T_i m^{-\theta}} \qquad (3-7)$$

Where m is the productivity of industry, and T_i and θ are the parameters that measure a country's absolute advantage and the distribution variance, respectively.

It is assumed that the final product is homogeneous and the market has perfect competition. Although the demand for intermediate products fits a constant elasticity of substitution (CES) demand function, its market distribution is determined by supply. In this situation, the complete division of labour is still valid, with each country being the only producer of its products. If it is assumed the product cost is C_i and the trade barrier is to increase the ex-factory price by a ratio d_{ij}The price in country j of a good produced by country i can be written as:

$$p_{ij} = (c_i/m_i)d_{ij} \qquad (3-8)$$

Under the condition of complete competition, it is the price country j is willing to pay for country $i's$ products. Since productivity m_i follows a Frechet random distribution; thus, the price in country j of country $i's$ products should also follow a random distribution:

$$L_{ij}(p) = \Pr\left[P_{ij} \leq p\right] = 1 - F_i(c_i d_{ij}/p) \qquad (3-9)$$

Based on the price distribution, the market share of country i's product in country j can be derived as:

$$s_{ij} = \frac{E_{ij}}{E_j} = \frac{T_i\left(c_i d_{ij}\right)}{\sum_{k=1}^{N} T_k\left(c_k d_{kj}\right)^{-\theta}} \qquad (3-10)$$

The expression of trade flows is then:

$$E_{ij} = \frac{\left(\frac{d_{ij}}{p_j}\right)^{-\theta} F_j}{\sum_{m=1}^{N}\left(\frac{d_{mi}}{p_m}\right)^{-\theta} F_m} F_i \qquad (3-11)$$

Note that the gravity Eq. (3-11) is derived from the Ricardian framework with the assumption that productivity follows the Frechet random distribution model. The numerator is related to the income of both countries, and the denominator represents the average trade costs for all countries in the world. θ is the diffusion coefficient in the Frechet distribution, which determines the weight of the weighted average.

3.2.6 Demand Structure Framework

After analysing the structural framework from the supply perspective, this section focuses on the structural gravity model from the demand side. Anderson & Wincoop (2003) were the representatives of the structural gravity model. They assumed that the demand

structure in the importing country market satisfied the Constant Elasticity of Substitution (CES) demand equation under the condition of complete competition and general equilibrium. Then based on the above assumption, one country's market share in another country and the gravity equation can be derived.

The CES demand equation is the most commonly used demand equation, explaining the relationship between the demand and price of different products. Consumers in country j consume according to their income. Assuming c_{ij} is the number of products in country i consumed by country j, consumers in country j should satisfy the following maximisation of utility functions on the budget constraint of $\sum_i p_{ij} c_{ij} = f_j$:

$$\left(\sum_i \beta_i^{(1-\sigma)/\sigma} c_{ij}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)}$$

Thus, it can derive the market share of country i's products in country j:

$$s_{ij} = E_{ij}/F_j = (\beta_i p_{ij} t_{ij}/P_j)^{1-\sigma} \qquad (3-12)$$

Where σ is the elasticity of substitution, β_i is the "distribution parameter" of a certain type of goods, p_{ij} is the import price and P_j is the CES price index. Anderson identified P_j as "multilateral resistance" because it is a weighted average of the import prices of all goods in country j and a combination of bilateral trade costs in other countries. This situation is expressed as:

$$P_j = (\sum_i (\beta_i p_{ij})^{1-\sigma})^{1/(1-\sigma)} \qquad (3-13)$$

It assumes that the import price of country j from country i's goods p_{ij} equals country i's producer price multiplied by trade costs, that is:

$$p_{ij} = p_i t_{ij} \qquad (3-14)$$

Country i's total GDP equals its total export, that is:

$$F_i = \sum_j E_{ij} \qquad (3-15)$$

Combining the above formula with Eq. (3-12) allow $(\beta_i p_i)^{1-\sigma}$ to be derived:

$$(\beta_i p_i)^{1-\sigma} = \frac{F_i}{\sum_j (t_{ij}/P_j)^{1-\sigma} F_j} \qquad (3-16)$$

Bringing denominator $\sum_j (t_{ij}/P_j)^{1-\sigma} F_j \equiv \Pi_i^{1-\sigma}$ into Equations (3-12) & (3-13), the structural gravity equation based on the CES demand function can be derived:

$$E_{ij} = \frac{F_i F_j}{F} \left(\frac{t_{ij}}{P_j \prod_i}\right)^{1-\sigma} \qquad (3-17)$$

Where

$$(\prod_i)^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \frac{F_j}{F} \qquad (3-18)$$

$$\left(P_j\right)^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\prod_i}\right)^{1-\sigma} \frac{F_i}{F} \qquad (3-19)$$

Equations (3-18) & (3-19) were first derived based on general equilibrium assumptions where P_j and $\prod_i$ are quite similar and are called the "Multilateral Resistance Term" (MRT) for country i and country j from other countries in the world.

The gravity Eq. (3-17) was first developed from the demand structure. It included not only bilateral information, such as GDP and trade costs, but also multilateral information, which reflects the impact on importing countries' markets of other countries in the world. From the above expression, multilateral resistance represents the index of inward and outward trade costs, which separately measures the trade cost of the producer and consumer. The appearance of the Multilateral Resistance Term (MRT) will have an impact on bilateral trade.

Anderson & Wincoop (2003) re-estimated MaCallum's (1995) famous “Border Puzzle”, that is, that trade within Canadian provinces was 22 times larger than trade between Canada and US states at the same distance. This puzzle confused many economists, and some tried to offer various explanations. However, Anderson & Wincoop (2003) pointed out that MaCallum (1995) ignored the multilateral resistance and failed to take into account the impact of other countries in the world on a country’s market. They re-evaluated the trade within Canada and trade with the US by applying the gravity equation derived from the CES demand function. The results subsequently showed that Canada's domestic trade was only 20-50% higher than the cross-country trade at the same distance, which was one of the most important contributions of the Anderson & Wincoop (2003) model.

The above Anderson & Wincoop (2003) model derivation was based on the assumption of the complete division of labour and CES demand function. It links the market share of one country's products in another country to its import price and, thus, to trade costs. Eventually, the gravity equation took into account an explicit micro foundation, becoming one of the standard models in gravity theory. After that, much work has been carried out based on the Anderson & Wincoop (2003) model, and its expansion constituted an important part of the research. It plays an essential role in the development of the theoretical study and is also the basic model for many empirical and measurement methods.

3.2.7 Incomplete Specialisation Framework

All the theoretical derivations mentioned above were based on the theoretical assumptions of complete specialisation. The following model was derived from incomplete specialisation under the H-O framework. Complete specialisation is reasonable because the products of different countries cannot be exactly the same, and

their respective trademarks and brands are means of differentiation. However, the assumption of complete specialisation has been questioned in its empirical application. Haveman & Hummels (2004) examined the 4-digit standard international trade classification (SITC) data and computed the number of exports of good *k* for each importing country and the total number of exporting countries for good *k*. If there was a complete division of labour, this ratio should be 1. However, the findings showed that the value for 27% of the countries was 0, and 58% of countries only imported all kinds of goods from 10% of the selected exporting countries. Thus, totally different results were found compared to the assumption of complete specialization.

In early 2002, Evenett and Keller developed two models based on incomplete specialisation under the H-O framework. One represented a situation where a country produced homogeneous products under constant returns to scale as in the H-O framework. Another country produced differentiated products under conditions of increasing returns to scale, as envisaged in the new trade theory. In this case, the trade flow between the two countries can be derived as:

$$E_{ij} = (1 - \gamma^i)\frac{F_i F_j}{F^w} \qquad (3-20)$$

Where γ^i is the market share of homogeneous products in country i.

The other represented another situation where two countries, two factors and two products with different capital-labour ratios produced different products equivalent to a 2 × 2 ×2 H-O model. The derived gravity equation related to not only the incomes of both countries but also the share of the two products in the total output:

$$E_{ij} = (\gamma^i - \gamma^j)\frac{F_i F_j}{F^w} \qquad (3-21)$$

Where γ^i and γ^j are the shares of these two different products in the total output. After that, the theoretical derivation of the gravity equation became roughly summarised. After 2003, the standard equations mostly used came from Anderson & Wincoop's (2003) model. However, some scholars tried to work from different perspectives, including the trade cost asymmetry model proposed by Bergstrand et al. (2013) or the gravity model of random variation coefficient developed by Tzouvelekas (2007).

From the above Eq. (3-21), it can be seen that the gravity equation is a formula which is consistent with various theoretical frameworks. The gravity model can be construed as combining trade costs with (1) a definite relationship between the exports of a country and its income and (2) the share of its products in the total expenditure of another country.

3.2.8 Framework of This Study

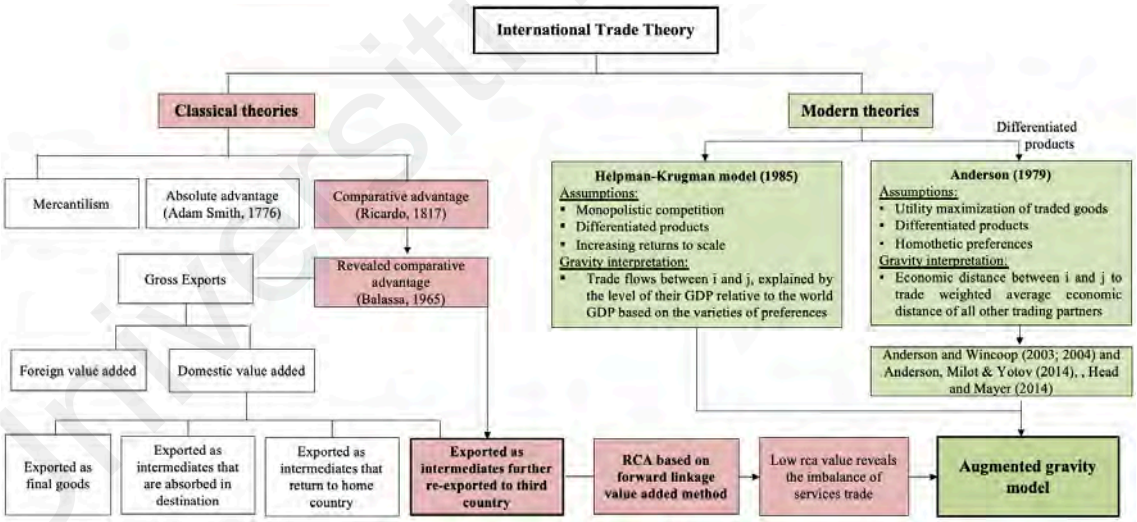

Figure 3.1: Theoretical Framework for This Study
Source: Author

Figure 3.1 presents the theoretical framework used in this study. More specifically, Ricardo's comparative advantage theory was the theory foundation for revealed comparative advantage that will form the research objective one. Subsequently, Helpman-Krugman model and CES demand equation are jointly answer research question two.

3.3 The Empirical Model

3.3.1 RCA Index Model

The measurement of comparative advantage in one country should be calculated on the basis of the "relative factor price" before the engagement in trade. However, the "relative factor price" does not exist in reality, and it also consumes huge costs and plenty of time to estimate. Therefore, the comparative advantage of one country can only be calculated based on the data after participation in trade. Thus, it can directly calculate a product's comparative advantage or disadvantage among the trade partners. After the Second World War, America and Western countries dominated the wave of international trade liberalisation and protectionism. Some authors, such as; Liesner, Michael Michaely, Bela Balassa and Lafay, put forward the measurement indices of comparative advantage that were primarily based on the availability of trade data.

This study used the RCA index to measure the comparative advantage of a sector. The RCA is an index used for calculating a country's relative advantage or disadvantage in a certain class of goods or services, as evidenced by trade flows. It is based on the Ricardian comparative advantage concept. It refers to the Balassa index, introduced by Balassa (1965). Balassa's (1965) RCA index is defined as the percentage share of a specific sector in national exports divided by the percentage share of that sector in world exports. Thus:

$$RCA_{ij} = \left(X_{ij}/X_j\right)/(X_{iw}/X_w) \qquad (3-22)$$

Where X_{ij} is the total export value of i sector in country j, X_j is the total export value in country j; X_{iw} represents the total export value of i sector in the world and X_w is the gross export value in the world.

The larger the RCA value, the stronger the international competitiveness of the

services trade. The reference standards and meanings of the RCA index used in this study refer to the standards established by the Japan Trade Promotion Council (JERTO):

Table 3.1: The Criteria for Competitiveness of the RCA Index

The value of RCA	Competitive judgment
$RCA < 0.8$	Very Strong competitive disadvantage
$0.8 \leq RCA < 1$	Strong competitive disadvantage
$RCA \geq 1$	Has a revealed comparative advantage
$1.25 \leq RCA < 2.5$	Strong competitive advantage
$RCA \geq 2.5$	Very Strong competitive advantage

Source: Balassa (1977).

The RCA index is important for measuring a country's comparative advantage in the world market (Jagdambe, 2019). However, the traditional RCA ignored both domestic production sharing and international production sharing. That is, it ignored that a country-sectors' added value may be exported indirectly via the country's exports in other sectors. In addition, it also failed to deal with the fact that the gross exports of a country's sector included parts of foreign value. Such parts include Foreign Value-added (FVA) and a portion of pure double-counted component (PDC) due to double counting of the previous terms in a country's exports (Wang et al., 2013). This method dealt with the problem of the added value measurement of the industry's indirect exports through other industries.

The following section presents the procedure for deriving the empirical model employed to address the first research objective in this study to resolve the double-counting issues in gross exports.

3.3.2 Decomposition of Value Added Export based on Forward Linkage Measurement

Following Wang et al. (2013), this study used the method of forward linkage added value exports to estimate the RCA accurately. The data for this estimation comes from the World Input-Output Database with continuous time series (2000-2014).

It was assumed that there are N countries and S sectors, and all countries and sectors employ their domestic factors (initial inputs) and intermediate inputs for production. The output of each sector can be used as an intermediate product or as a final product for domestic and international use and consumption. Thus, the input-output table has the following balance relationship on the row vector:

$Intermediate\ use + Final\ use = Gross\ Output$, which is denoted as:

$$\begin{bmatrix} \mathrm{Y^{ll}} + \mathrm{Y^{lm}} + \mathrm{Y^{ln}} \\ \mathrm{Y^{ml}} + \mathrm{Y^{mm}} + \mathrm{Y^{mn}} \\ \mathrm{Y^{nl}} + \mathrm{Y^{nm}} + \mathrm{Y^{nn}} \end{bmatrix} + \begin{bmatrix} \mathrm{F^{ll}} + \mathrm{F^{lm}} + \mathrm{F^{ln}} \\ \mathrm{F^{ml}} + \mathrm{F^{mm}} + \mathrm{F^{mn}} \\ \mathrm{F^{nl}} + \mathrm{F^{nm}} + \mathrm{F^{nn}} \end{bmatrix} = \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} \qquad (3-23)$$

By defining the input coefficient $B^{lm} \equiv Y^{lm}(T^m)^{-1}$, it can derive:

$$\begin{bmatrix} \mathrm{B^{ll}} & \mathrm{B^{lm}} & \mathrm{B^{ln}} \\ \mathrm{B^{ml}} & \mathrm{B^{mm}} & \mathrm{B^{mn}} \\ \mathrm{B^{nl}} & \mathrm{B^{nm}} & \mathrm{B^{nn}} \end{bmatrix} \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} + \begin{bmatrix} \mathrm{F^{ll}} + \mathrm{F^{lm}} + \mathrm{F^{ln}} \\ \mathrm{F^{ml}} + \mathrm{F^{mm}} + \mathrm{F^{mn}} \\ \mathrm{F^{nl}} + \mathrm{F^{nm}} + \mathrm{F^{nn}} \end{bmatrix} = \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} \qquad (3-24)$$

Where B represents country B, T represents the total output, the superscripts l, m and n stand for source country L, partner country M and third country N, respectively; Y^{lm} and $\mathrm{F^{lm}}$ respectively, denotes the intermediate input and final use parts absorbed by country M while produced by country L. For one country with n production sectors, Y is $(n \times n)$ matrix, T and F are $(n \times 1)$ column vectors.

After rearranging, it can derive the function of the gross output, that is classical Leontief

formula:

$$\begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} = \begin{bmatrix} \mathrm{C^{ll}} & \mathrm{C^{lm}} & \mathrm{C^{ln}} \\ \mathrm{C^{ml}} & \mathrm{C^{mm}} & \mathrm{C^{mn}} \\ \mathrm{C^{nl}} & \mathrm{C^{nm}} & \mathrm{C^{nn}} \end{bmatrix} \begin{bmatrix} \mathrm{F^{ll}} + \mathrm{F^{lm}} + \mathrm{F^{ln}} \\ \mathrm{F^{ml}} + \mathrm{F^{mm}} + \mathrm{F^{mn}} \\ \mathrm{F^{nl}} + \mathrm{F^{nm}} + \mathrm{F^{nn}} \end{bmatrix} \quad (3-25)$$

Where,

$$\begin{bmatrix} \mathrm{C^{ll}} & \mathrm{C^{lm}} & \mathrm{C^{ln}} \\ \mathrm{C^{ml}} & \mathrm{C^{mm}} & \mathrm{C^{mn}} \\ \mathrm{C^{nl}} & \mathrm{C^{nm}} & \mathrm{C^{nn}} \end{bmatrix} = \begin{bmatrix} 1 - \mathrm{B^{ll}} & -\mathrm{B^{lm}} & -\mathrm{B^{ln}} \\ -\mathrm{B^{ml}} & 1 - \mathrm{B^{mm}} & -\mathrm{B^{mn}} \\ -\mathrm{B^{nl}} & -\mathrm{B^{nm}} & 1 - \mathrm{B^{nn}} \end{bmatrix}^{-1}$$

denotes Leontief's classical inverse matrix. Since $total\ output = intermediate\ output + value\ added$, Eq. (3-25) can be re-ordered as:

$$\begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} = \begin{bmatrix} B^{ll} & 0 & 0 \\ 0 & B^{mm} & 0 \\ 0 & 0 & B^{nn} \end{bmatrix} \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} + \begin{bmatrix} F^{ll} + E^l \\ F^{mm} + E^m \\ F^{nn} + E^n \end{bmatrix} = \begin{bmatrix} B^{ll} & 0 & 0 \\ 0 & B^{mm} & 0 \\ 0 & 0 & B^{nn} \end{bmatrix} \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} + \begin{bmatrix} VA^l \\ VA^m \\ VA^n \end{bmatrix} \quad (3-26)$$

where VA^l is $(1 \times S)$ vector, if $\Phi = \hat{A}$ ($\hat{A}$ represents a diagonal matrix), Eq. (3-26) can be thus specified as follows:

$$\begin{bmatrix} VA^l \\ VA^m \\ VA^n \end{bmatrix} = \begin{bmatrix} 1 - \Phi^{ll} & 0 & 0 \\ 0 & 1 - \Phi^{mm} & 0 \\ 0 & 0 & 1 - \Phi^{nn} \end{bmatrix} \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} = \begin{bmatrix} V^{ll} & 0 & 0 \\ 0 & \mathrm{V^{mm}} & 0 \\ 0 & 0 & \mathrm{V^{nn}} \end{bmatrix} \begin{bmatrix} T^l \\ T^m \\ T^n \end{bmatrix} \quad (3-27)$$

Where $V^{ll} = 1 - \Phi^{ll}$, since Φ^{ll} represents the intermediate input rate of gross output, thus, $1 - \Phi^{ll}$ represents the value-added rate of total output. This study then derived the following equations by combining Eqs. (3-25) & (3-27):

$$\begin{bmatrix} VA^l \\ VA^m \\ VA^n \end{bmatrix} = \begin{bmatrix} V^l & 0 & 0 \\ 0 & \mathrm{V}^m & 0 \\ 0 & 0 & \mathrm{V}^n \end{bmatrix} \begin{bmatrix} \mathrm{C^{ll}} & \mathrm{C^{lm}} & \mathrm{C^{ln}} \\ \mathrm{C^{ml}} & \mathrm{C^{mm}} & \mathrm{C^{mn}} \\ \mathrm{C^{nl}} & \mathrm{C^{nm}} & \mathrm{C^{nn}} \end{bmatrix} \begin{bmatrix} \mathrm{F^{ll}} + \mathrm{F^{lm}} + \mathrm{F^{ln}} \\ \mathrm{F^{ml}} + \mathrm{F^{mm}} + \mathrm{F^{mn}} \\ \mathrm{F^{nl}} + \mathrm{F^{nm}} + \mathrm{F^{nn}} \end{bmatrix} \quad (3-28)$$

Where VC denotes the value-added rate of final use, by rewriting the right side of Eq. (3-28) to get $(n \times n)$ dimensional diagonal matrix, the following is obtained:

$$\begin{bmatrix} VA^l \\ VA^m \\ VA^n \end{bmatrix} = \begin{bmatrix} V^l C^{ll} F^l & V^l C^{lm} F^m & V^l C^{ln} F^n \\ V^m C^{ml} F^l & V^m C^{mm} F^m & V^m C^{mn} F^n \\ V^n C^{nl} F^l & V^n C^{nm} F^m & V^n C^{nn} F^n \end{bmatrix} \quad (3-29)$$

Re-ordering Eq. (3-29):

$$VA_1^l = V_1^l C^{ll} F^{lm} + V_1^l C^{lm} F^{ll} + V_1^l C^{ln} F^{nm}$$

$$= [v_1^l \ \ 0] \begin{bmatrix} c_{11}^{ll} & c_{12}^{ll} \\ c_{21}^{ll} & c_{22}^{ll} \end{bmatrix} \begin{bmatrix} f_1^{lm} \\ f_2^{lm} \end{bmatrix} + [v_1^l \ \ 0] \begin{bmatrix} c_{11}^{lm} & c_{12}^{lm} \\ c_{21}^{lm} & c_{22}^{lm} \end{bmatrix} \begin{bmatrix} f_1^{mm} \\ f_2^{mm} \end{bmatrix} + [v_1^l \ \ 0] \begin{bmatrix} c_{11}^{ln} & c_{12}^{ln} \\ c_{21}^{ln} & c_{22}^{ln} \end{bmatrix} \begin{bmatrix} f_1^{nm} \\ f_2^{nm} \end{bmatrix}$$

$$= v_1^l \sum_j^2 c_{1j}^{ll} f_j^{lm} + v_1^l \sum_j^2 c_{1j}^{lm} f_j^{mm} + v_1^l \sum_j^2 c_{1j}^{ln} f_j^{nm} \quad (3-30)$$

Koopman et al. (2014) defined the value added export for the country l and sector i as:

$$VAX_{F_i}{}^l + RDV_i^l =$$

$$\sum_{m \neq l}^{G} V_i^l \, C^{ll} F^{lm} + \sum_{m \neq l}^{G} V_i^l \, C^{ll} F^{mm} + \sum_{m \neq l}^{G} V_i^l \, B^{lm} \sum_{n \neq l,m}^{G} F^{ln} + \sum_{m \neq l}^{G} V_i^l \, C^{lm} F^{ml} \quad (3-31)$$

Where G means that there are G economies in the world, $VAX_{F_i^l} = \sum_{m \neq l}^{G} V_i^l \, C^{ll} F^{lm} + \sum_{m \neq l}^{G} V_i^l \, C^{ll} F^{mm} + \sum_{m \neq l}^{G} V_i^l \, B^{lm} \sum_{n \neq l,m}^{G} F^{ln}$ implies the value added production by sector i of country l and absorbed by foreign countries via the parts of final products or intermediate goods. $RDV\_F_i^l = \sum_{m \neq l}^{G} V_i^l \, C^{lm} F^{ml}$ denotes the value added produced by sector i of country l and exported through intermediate goods, while finally returning to the domestic country

However, the traditional RCA index ignored that the value added of a country's sector was embodied in the export of other parts of the country, thus achieving indirect exports. Furthermore, the traditional RCA index failed to deal with the fact that the gross export of a country's sector includes parts of foreign value (FVA and FDC). Thus, based on Eq.(3-31), a revised indicator was constructed for Eq. (3-22) to measure the Revealed

Comparative Advantage of a country (short for "New RCA index" or RCA_Value Added). That is defined as the share of a country-sector's forward linkage based measure of domestic value added in exports in the country's total domestic value added in exports relative to that sector's total forward linkage based domestic value added in exports from all countries as a share of global value added in exports, as proposed by Wang et al. (2013).The functions is as follows:

$$RCA_{Value\ Added_i^r} = \frac{(VAX\_F_i^r + RDV\_F_i^r)/\sum_i^n (VAX\_F_i^r + RDV\_F_i^r)}{\sum_r^G (VAX\_F_i^r + RDV\_F_i^r)/\sum_r^G \sum_i^n (VAX\_F_i^r + RDV\_F_i^r)} \quad (3-32)$$

Where i represents the sectors to export; r represents country; $VAX\_F_i^r$ is the value-added exports of sector i from country r based on forward-linkage; $RDV\_F_i^r$ represents the domestic value-added of i sector of country r first exported as intermediate products but finally returned is absorbed in the home country based on forward-linkages; $\sum_i^n (VAX\_F_i^r + RDV\_F_i^r)$ represents the sum of value-added exports (VAX) and returned domestic value-added (RDV) for country i's service industries export; $\sum_r^G (VAX\_F_i^r + RDV\_F_i^r)$ represents the sum of Value-Added Exports (VAX) and returned domestic value-added (RDV) for service industry i's export of the all countries; $\sum_r^G \sum_i^n (VAX\_F_i^r + RDV\_F_i^r)$ represents the sum of Value-Added Exports (VAX) and returned domestic value-added (RDV) for all service industries exports for all countries in the world.

3.3.3 Gravity Model

The gravity model is the most well-known and popular in analysing bilateral trade flows, based on the principle that economic masses and trade costs can explain bilateral trade. Tinbergen (1962) was the first to propose this model and emphasised that the economic sizes (measured by GDP) and the geographical distances between two countries were the two main determinants of the volume of bilateral trade flows. Tinbergen's gravity model

is considered lacking of theoretical framework at the early stage. However, current developments in the trade theory have strengthened its theoretical basis (Baldwin & Taglioni, 2006). The gravity equation has been very successful in explaining bilateral merchandise trade flows, and it is currently being used to explain service trade flows as well (Head et al., 2009; Kimura & Lee, 2006; Lennon, 2006; Shepherd & Marel, 2010; Kaur, 2011; Nordas & Rouzet, 2015; Grunfeld & Moxnes, 2003; Walsh, 2006; Dao et al., 2014; Covaci & Moldovan, 2015; Phạm & Vũ, 2016; Nordas & Rouzet, 2017). In Tinbergen's general formulation, the gravity equation follows the multiplicative form:

$$T_{ij} = \beta_0 GDP_i^{\beta_1} GDP_j^{\beta_2} D_{ij}^{\beta_3} \qquad (3-33)$$

where T_{ij} represents the trade flows from country i to country j, β_0 means the gravitational constant, GDP_i represents the economic size of country i, GDP_j represents the economic size of the country j, D_{ij} is the distance between country i and country j. This model has been widely applied to estimate international bilateral trade flows, and it has shown stable and robust results through various studies which covered different country samples, time series data and methodologies.

At the early stage, Baldwin (1994) and Leamer (1994) claimed that the gravity model was criticised for lacking a theoretical foundation even though it garnered some success in its empirical studies. However, in the late 1970s, some authors put forward several theoretical bases of the gravity model (Anderson, 1979; Bergstrand, 1985; Deardroff, 1998; Helpman, 1987; Bergstrand, 1989,1990; Eaton & Kortum, 1997), which followed two strands.

The Heckscher-Ohlin framework was the first strand, and Anderson (1979) was the first to provide an economic theory for the gravity model through by offering the

assumption of product differentiation by place of origin (the Armington assumption) and CES expenditures based on the Heckscher-Ohlin model. Anderson's model was not performed extensively as a result of its complexity. Subsequently, Bergstrand (1985) also applied CES preferences and extended its theoretical foundations by deriving the generalised gravity model, including prices. Under the assumption of frictionless trade and trade with impediments, Deardroff (1998) developed a gravity model based on the Heckscher-Ohlin Theorem. Deardroff (1998) suggested that a similar gravity model could be derived from almost all the trade models that have characteristics of the various models.

Another strand proposed by Helpman and Krugman in 1985 was based on monopolistic competition under the "new" trade theory. The gravity equation could also be obtained from the new trade theoretical framework. Helpman (1987) established an intra-industry model on the basis of a monopolistic competition framework, suggesting that the more similar the two countries, the more bilateral is the trade volume. The higher similarity between the two countries shows a higher degree of openness.

By combining the two strands that incorporated monopolistic competition into the Hechscher-Ohlin model, Bergstrand (1989) introduced the case of monopolistic competition and derived the gravity equation for a multi-industry world. Later, Bergstrand (1990) explained intra-industry trade in a gravity model by including the heckscher ohlin samuelson (HOS) model and the Linder hypothesis. The monopolistic competition model was not the only way to derive the gravity model (Hummels and Levinson, 1995). Evenett and Keller (2002) subsequently developed two other models based on incomplete specialisation under the H-O framework. Clearly, the gravity equation is a formula that is consistent with various theoretical frameworks, and both models were able to account for their empirical success.

Some other researches have tried to derive the gravity equation from economic frameworks, such as the Ricardian framework (Eaton & Kortum, 1997). With solid empirical performance and these theoretical developments, the gravity model of trade was very influential during the 1990s and 2000s. The most influential gravity theories came from Evenett & Keller (2002), who explained the gravity model on the supply side by enveloping the Ricardian theory of "Comparative Advantage" with intermediate goods. The theory believed that under the assumption of two goods and two countries, even if one country was less efficient in producing two goods compared with the other, each trading partner still could benefit from the bilateral trade flows. According to Salvatore (1998), opportunity cost theory or "commodity cost" is the amount of a second commodity that must be given up to produce one additional unit of the first commodity". Thus, Evenett & Keller (2002) demonstrated that production heterogeneity between trade partners was the foundation of comparative advantage.

Anderson & van Wincoop (2003) introduced Anderson's (1979) Amington-CES model and underlined the importance of the general equilibrium effects of trade costs. Arkolakis et.al. (2012) generated various other gravity models that maintained the gains from trade, inspiring further academic interest in studying the gravity equation. Since 2003, the most used standard equations were derived from Anderson & van Wincoop (2003), one of which is still considered the most fruitful variations by taking the effects of multilateral resistance terms into account. The gravity model can be written as:

$$lnT_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 lnY_j + \beta_3 lnD_{ij} + \beta_4 lnMRTs_{ij} + \varepsilon_{ij} \qquad (3-34)$$

The derivation procedure is discussed in detail in the next section. In the formula above T_{ij} represents the bilateral trade volumes. In this study, it represents services exports between China and its trading partners, Y_i, Y_j are the economic size of country i and its trading partners, respectively, D_{ij} is the geographical distance between country i

and country j. MRTs are the multilateral resistance terms, dummy is the dummy variables between country i and country j, and ε_{ij} is the random error term.

3.3.4 Structural Gravity Model

The structural gravity model included in this section considers a world with N countries, where each country produces goods and trades with the rest of the world. Q_i denotes the fixed supply of each good and p_i represents the factory-gate price for each item. Therefore, the domestic production value is defined as $Y_i = p_i Q_i$ which represents the sales of total services at destination prices from i to all destinations. E_j is the expenditure at destination j on services from all origins. Here trade surpluses and deficits are treated as exogenous. Furthermore, the structural gravity model derived from the demand side is shown below, where consumer preferences are assumed to be homothetic, identical across countries on the demand side, and given by a CES-utility function for country j:

$$U = \left\{ \sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}} \right\}^{\frac{\sigma}{\sigma-1}} \qquad (3-35)$$

Where c_{ij} represents the consumption of country j in services from country i and σ represents the elasticity of substitution.

The standard budget constraint is shown below for consumers to maximise Eq. (3-35) in country j:

$$\sum_i p_{ij} c_{ij} = E_j$$
$$\sum_i \frac{c_{ij}}{p_i t_{ij}} = E_j \qquad (3-36)$$

Eq. (3-36) denotes the aggregate expenditure in country j, $p_{ij} = p_i t_{ij}$ denotes the purchasing price of services from country i, p_i is the supply price which excludes trade costs and $t_{ij} \geq 1$ is the trade cost factor between trading partners i and j. E_j equals the expenditure at destination j on services from all origins. $p_{ij}c_{ij}$ stands for the cost for country j to import services from country i. It is assumed that the exporter pays for trade costs. Thus, trade costs are c.i.f. rather than FOB. Then the trade costs are eventually passed on to importer j. Hence, the nominal value of exports from country i to country j is:

$$X_{ij} = p_{ij}c_{ij} \qquad (3-37)$$

The total output for country i equals the sum of exports from i to all other countries and is called the market clearing condition

$$\sum_j X_{ij} = Y_i \qquad (3-38)$$

The demand of country j for services from country i needs to be determined by the utility function and the budget constraint to derive the gravity model. Then, the demand needs to be aggregated over all importing countries from exporting country i. Thus, demand is substituted in the market clearing condition to aggregate trade flows and estimate the equilibrium trade. Through maximising the CES utility function subject to the budget constraint, the following is obtained:

$$L = \left(\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}} + \lambda(E_j - \sum_i p_i t_{ij} c_{ij}) \qquad (3-39)$$

Deriving concerning c_{ij} to maximise utility and make the derivation equal to zero gives:

$$\frac{\partial L}{\partial c_{ij}} = \frac{\sigma}{\sigma-1}\left(\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}-1} \frac{\sigma-1}{\sigma}\alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}-1} - \lambda p_i t_{ij} = 0$$

$$\left(\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{1}{\sigma-1}} \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{-1}{\sigma}} = \lambda p_i t_{ij}$$

$$\left(\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{1}{\sigma-1}} \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{-1}{\sigma}} (p_i t_{ij})^{-1} = \lambda \qquad (3-40)$$

Multiply with c_{ij} for both right and left sides, and then summarise overall i is equal to:

$$\lambda p_i t_{ij} c_{ij} = (\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}})^{\frac{1}{\sigma-1}} \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{-1}{\sigma}+1}$$

$$\lambda \sum_i p_i t_{ij} c_{ij} = (\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}})^{\frac{1}{\sigma-1}} \sum_i c_{ij}^{\frac{\sigma-1}{\sigma}} \qquad (3-41)$$

Substituting λ into Eqs. (3-40) & (3-41), and substituting $\sum_i p_i t_{ij} c_{ij} = E_j$ function in Eq. (3-41), provides the results shown below:

$$\alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{-1}{\sigma}} (p_i t_{ij})^{-1} E_j = \sum_i c_{ij}^{\frac{\sigma-1}{\sigma}} \qquad (3-42)$$

Knowing $p_{ij} = p_i t_{ij}$, the following can be obtained:

$$\alpha^{\frac{\sigma-1}{\sigma}} p_i t_{ij} = \frac{c_{ij}^{\frac{-1}{\sigma}} E_j}{\sum_i c_{ij}^{\frac{\sigma-1}{\sigma}}} \qquad (3-43)$$

The first step is to multiply the right and left sides with the exponent $()^{-\sigma}$ to obtain:

$$\alpha^{1-\sigma}(p_i t_{ij})^{-\sigma} = \frac{c_{ij}{E_j}^{-\sigma}}{\sum_i c_{ij}{}^{(\frac{\sigma-1}{\sigma})-\sigma}} \qquad (3-44)$$

Then multiplying $p_i t_{ij}$ on both sides, the results will be:

$$(\alpha p_i t_{ij})^{1-\sigma} = \frac{p_i t_{ij} c_{ij}{E_j}^{-\sigma}}{\sum_i c_{ij}{}^{\left(\frac{\sigma-1}{\sigma}\right)^{-\sigma}}} \qquad (3-45)$$

Furthermore, the CES price index is needed to determine equilibrium prices later and indicate the price level. It is useful to sum over all i on the right and left sides and additionally replace $\sum_i {}_{p_i t_{ij}} c_{ij}$ with E_j to obtain a price structure that can be interpreted as a price index, then it will be:

$$\sum_i (\alpha p_i t_{ij})^{1-\sigma} = \frac{{E_j}^{1-\sigma}}{\sum_i c_{ij}{}^{\left(\frac{\sigma-1}{\sigma}\right)^{-\sigma}}} \qquad (3-46)$$

Anderson & van Wincoop (2003) defined Eq. (3-47) as the consumer price index for country j:

$$P_j = \left(\sum_i (\alpha p_i t_{ij})^{1-\sigma}\right)^{1/(1-\sigma)} \qquad (3-47)$$

and Eq. (3-46) can be rewritten as:

$$P_j^{1-\sigma} = \frac{{E_j}^{1-\sigma}}{\sum_i {c_{ij}}^{(\frac{\sigma-1}{\sigma})^{-\sigma}}}$$

$$\sum_i {c_{ij}}^{(\frac{\sigma-1}{\sigma})^{-\sigma}} = \frac{{E_j}^{1-\sigma}}{P_j^{1-\sigma}} \quad (3-48)$$

Substituting $\sum_i {c_{ij}}^{(\frac{\sigma-1}{\sigma})^{-\sigma}}$ into Eq. (3-45), it derives:

$$(\alpha p_i t_{ij})^{1-\sigma} = \frac{p_i t_{ij} c_{ij} {E_j}^{-\sigma}}{Y_j^{1-\sigma}} P_j^{1-\sigma} \quad (3-49)$$

Replace $p_i t_{ij} c_{ij}$ with X_{ij}, which yields:

$$(\alpha p_i t_{ij})^{1-\sigma} = \frac{X_{ij}}{E_j} P_j^{1-\sigma} \quad (3-50)$$

Finally, solving X_{ij} gives the demand of country j, for country $i's$ exports, rewritten as:

$$X_{ij} = \frac{(\alpha p_i t_{ij})^{1-\sigma}}{P_j^{1-\sigma}} E_j \quad (3-51)$$

The export demand of country j is determined. Since the goal is to obtain aggregated demand and general equilibrium trade flows, the market-clearing condition is useful to aggregate over all countries. Substituting Eq. (3-51) into the market clearing condition (Eq. (3-38)) derives the following:

$$Y_i = \sum_j \left(\frac{\alpha p_i t_{ij}}{P_j}\right)^{1-\sigma} E_j \qquad (3-52)$$

For solving the price, the equilibrium market price is given by:

$$p_i^{1-\sigma} = \frac{Y_i}{\sum_j \left(\frac{\alpha t_{ij}}{P_j}\right)^{1-\sigma} E_j} \qquad (3-53)$$

Substituting this price into the export demand Eq. (3-51), results in:

$$X_{ij} = (\frac{\alpha p_i t_{ij}}{P_j})^{1-\sigma} E_j = (\frac{\alpha t_{ij}}{P_j})^{1-\sigma} E_j Y_i (\sum_j (\frac{\alpha t_{ij}}{P_j})^{1-\sigma} E_j)^{-1}$$

$$X_{ij} = (\frac{t_{ij}}{P_j})^{1-\sigma} \frac{E_j Y_i}{Y_w} (\sum_j (\frac{t_{ij}}{P_j})^{1-\sigma} \frac{E_j}{Y_w})^{-1} \qquad (3-54)$$

Following Anderson & van Wincoop (2003) to simplify the equation, the last term within the brackets on the right-hand side of Eq. (3-54) can be defined as $(\Pi_i)^{1-\sigma} = \sum_j (\frac{t_{ij}}{P_j})^{1-\sigma} \frac{E_j}{Y_w}$ which represents the outward multilateral resistance. Then substituting $(\Pi_i)^{1-\sigma}$ into Eq. (3-54), Anderson & van Wincoop (2003) derived the final structural gravity model as:

$$X_{ij} = \frac{Y_i E_j}{Y_w} (\frac{t_{ij}}{\Pi_i P_j})^{1-\sigma} \qquad (3-55)$$

$$(\Pi_i)^{1-\sigma} = \sum_j (\frac{t_{ij}}{P_j})^{1-\sigma} \frac{E_j}{Y_w} \qquad (3-56)$$

$$(P_j)^{1-\sigma} = \sum_i (\frac{t_{ij}}{\Pi_i})^{1-\sigma} \frac{Y_i}{Y_w} \qquad (3-57)$$

Anderson & van Wincoop (2004) also provided the derivation for the structural gravity model at the sectoral level from the demand side, as shown below:

$$X_{ij}^{s} = \frac{Y_i^s E_j^s}{Y^s}\left(\frac{t_{ij}^s}{\Pi_i^s P_j^s}\right)^{1-\sigma} \qquad (3-58)$$

$$(\Pi_i^s)^{1-\sigma} = \sum_j \left(\frac{t_{ij}^s}{P_j^s}\right)^{1-\sigma} \frac{E_j^s}{Y^s} \qquad (3-59)$$

$$\left(\mathrm{P}_j^s\right)^{1-\sigma} = \sum_i \left(\frac{t_{ij}^s}{\Pi_i^s}\right)^{1-\sigma} \frac{Y_i^s}{Y^s} \qquad (3-60)$$

Here, s represents the services class; X_{ij}^s represents the value of shipments at destination prices from exporter i to importer j in services class s; Y_i^s represents export country $i's$ output in sector s; E_j^s is importing country $j's$ expenditure in sector s from all origins; Y^s is the world income in sector s; t_{ij}^s is the bilateral trade cost in sector s; $P_j^s \; and \; \Pi_i^s$ are the inward and outward multilateral resistance terms that summarise the average trade resistance between a country and its trading partners; σ is the elasticity of substitution.

Empirically, there are some ways to capture the multilateral resistance terms, such as the fixed-effect model employed by Hummels (1999). However, it cannot consistently conduct comparative statistics on this basis. Nonlinear Least Squares (NLS) programming is considered as one of the approach for estimating the unobserved multilateral resistance terms. Nevertheless, the NLS approach has been criticised for ignoring it in the presence of heteroscedasticity. Anderson & van Wincoop (2003) proposeusing individual fixed effects to estimate the multiplicative model by ordinary least square (OLS) estimation. However, this approach raises the problem of zero trade, and the estimation will possibly lead to biased results in the presence of heteroscedasticity. Baier & Bergstrand (2009) applied a reduced-form approach from

Anderson & van Wincoop (2003) and used remoteness indices to gauge multilateral resistance terms. However, this method was mentioned by Head & Mayer (2014) for its inconsistency with the theoretical counterpart of multilateral terms. In addition, Head & Ries (2001), Head et al. (2010) and Novy (2013) proposed a simpler way of accounting for multilateral terms by using appropriate ratios. Cheng & Wall (2005) suggested using country-pair fixed effects to control for heterogeneity after comparing and reconciling various specifications of the gravity model. Hummels (2001) and Feestra (2016) accounted for multilateral resistance terms by using exporter and importer fixed effects for cross-sectional estimations.

Additionally, according to Head & Mayer (2014), structural gravity can be put into the general form as shown below:

$$X_{nit} = \frac{Y_{it}}{\Omega_{jt}} \frac{X_{nt}}{\Phi_{nt}} \varphi_{nit} \qquad (3-61)$$

Here, Y_{it} represents gross production of traded goods, and X_{nt} is the consumption of goods. However, in practice GDP is often used as a proxy for both Y_{it} and X_{nt}. φ_{nit} represents bilateral accessibility describes time-invariant characteristics of a country pair such as distance or sharing the same language. Ω_{jt} and Φ_{nt} are multilateral resistance terms.

Derived from the specification suggested by Anderson & van Wincoop (2003), this study will applied an augmented gravity model to examine trade flows between China and its trading partners. The log-linear form is derived as follows:

$$\begin{gathered} lnT_{ijt} = \alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnGDP_{jt} + \alpha_3 lnDIST_{ij} + \\ \alpha_4 lnPCGDPDIFF_{ijt} + \alpha_5 lnRER_{ijt} + \alpha_6 CORRUPT_{it} + \alpha_7 CORRUPT_{jt} \\ \alpha_8 lnFIXEDPHONE_{it} + \alpha_9 lnFIXEDPHONE_{jt} + \\ \alpha_{10} CONTIG_{ij} + \alpha_{11} TRI_{jt} + \delta_{it} + \gamma_{jt} + \varepsilon_{ijt} \end{gathered} \qquad (3-62)$$

Where T_{ijt} Represents China's services exports and imports between China and its partner country at time t. GDP_{it} and GDP_{jt} are the economic size of China and partner country j at time t. $PCGDPDIFF_{ijt}$ is the difference between the GDP per capita of China and the GDP per capita of a partner country j at time t. RER_{ijt} represents the real exchange rate between China and partner countries at time t. $CORRUPT_{it}$ and $CORRUPT_{jt}$ are corruption perception indices for China and partner country j at time t. $FIXEDPHONE_{it}$ and $FIXEDPHONE_{jt}$ represent the fixed phone subscriptions of China and partner country j at time t. $CONTIG_{ij}$ is a dummy variable, indicating whether China and its partner country share a common border. TRI_{jt} is the trade restrictiveness of country j at time t. δ_{it} and γ_{jt} are the exporter-year and importer-year fixed effects. ε_{ijt} is the error term.

For services sub-sectors, the regression equation will be:

$$lnT_{ijt}^{1} = \alpha_1 + \sum_{m} {\beta_m}^{1} \, lnX_{i,jt}^{1} + \gamma^{1} lnMRTs_{ij} + \varepsilon_{ijt}^{1} \qquad (3-63)$$

$$lnT_{ijt}^{2} = \alpha_2 + \sum_{m} {\beta_m}^{2} \, lnX_{i,jt}^{2} + \gamma^{2} lnMRTs_{ij} + \varepsilon_{ijt}^{2} \qquad (3-64)$$

$$lnT_{ijt}^{3} = \alpha_3 + \sum_{m} {\beta_m}^{3} \, lnX_{i,jt}^{3} + \gamma^{3} lnMRTs_{ij} + \varepsilon_{ijt}^{3} \qquad (3-65)$$

Here T_{ijt} represents total services exports or imports between China and country j in year t and $X_{i,j\,t}$ is the set of explanatory variables for country i or j in year t (which includes sectoral gross domestic product for origin and destination country, the real exchange rate, distance, the GDP per capita difference, the corruption perception index of the exporter and importer, fixed phone subscriptions of the exporter and importer, trade restrictiveness index of the partner country). $MRTs_{ij}$ are the multilateral resistance terms represented by exporter-year and importer-year fixed effects, as suggested by Hummels (2001) and Feestra (2016), ε_{ijt} is the error term, and α_0, β_m and γ are the parameters to be estimated. The selected explanatory variables in this study are explained explicitly in the following section.

OLS is a common method used to estimate the gravity model on panel data. Bilateral services trade data involves many zero values, which may reflect either the actual trade value, exports or imports below the reporting value, or the existence of many missing values. Helpman et al. (2008) claimed that the coefficients obtained from the OLS estimation method are biased regarding a high frequency of zeros. Additionally, the method gained much controversy over its failure to control for heterogeneous trading relationships. Anderson & van Wincoop (2003) criticised the traditional gravity equation for its model misspecification that excluded multilateral resistance terms, which means that bilateral trade is also influenced by the trade between the exporter or the importer and all their respective trading countries.

More recently, many authors have proposed panel data analysis techniques due to their advantage in accounting for the relationship among variables over time and possible unobservable individual effects (Baldwin, 1994; Hummels & Levinson, 1995; Mátyás, 1997; Mátyás et al., 1997; Egger, 2000). Olivero & Yotov (2012) used exporter-time and importer-time fixed effects to account for multilateral resistance terms by applying the panel data estimation technique. Egger & Pfaffermayr (2003) stated that the appropriate specification of the gravity equation should embrace exporter, importer, and time and time-invariant mutual interaction effects to account for the important omitted variables. Baldwin & Taglioni (2006) suggested using time-varying country dummies and pair dummies.

Silva & Tenreyro (2006) proposed a new effective method (e.g., Poisson pseudo-maximum likelihood estimators) to estimate the gravity equation in a multiplicative form instead of the traditional log-linear form. This form avoided estimation bias regarding heteroscedasticity and the controlled fixed effects. Recommendations for using of the PPML estimator have been given for the following reasons. First, as demonstrated by

Silva & Tenreyro (2006), because gravity is estimated in a multiplicative form, the PPML estimator accounts for heteroscedasticity, which often plagues trade data. In addition, for the same reason, the PPML estimator takes advantage of the information contained in the zero trade flows. Third, Arvis & Shepherd (2013) and Fally (2015) demonstrated an additive property of the PPML estimator, which ensures that the gravity fixed effects are identical to their corresponding structural terms. Finally, Anderson et al. (2015) indicated how the PPML estimator could be used to estimate theory consistent general equilibrium effects. Moreover, Larch et al. (2019) recently developed a fast technique, the Poisson pseudo-maximum likelihood with high-dimensional fixed effects (PPMLHDFE) estimator, that accounts for the MRTs of the structural gravity model.

This study employed the estimator proposed by Larch et al. (2019) for panel data analysis and compared it with the traditional estimation technique that is OLS. The two-Stage Least Squares (2SLS) technique was used to correct for the endogeneity issues, and it can be a robustness check for PPMLHDFE. This technique is superior to traditional panel data techniques, such as OLS. First, PPMLHDFE consistently estimates the gravity equation for trade and is robust to counter different patterns of heteroscedasticity and measurement error. Second, it also considers zero trade flows (Kandilov & Grennes, 2010). Thirdly, Baldwinn & Taglioni (2006) emphasised the importance of multilateral resistance terms (MRTs), which are theoretical constructs resulting in a "Gold Medal Mistake" if the MRTs are not controlled in the estimation. Thus, to control for multilateral resistance terms properly, this study will applied exporter-year and importer-year fixed effect as suggested by Hummels (2001) and Feenstra (2016). Following Silva & Tenreyro (2006), this research also performed the Ramsey-reset test (so-called heteroscedasticity-robust reset test) to check the adequacy of the estimator.

The gravity model is commonly used for estimating bilateral trade flows (exports plus imports). However, in the presence of endogenous and intersection effects between the sub-components of trade, biased results based on the evidence from theoretical foundations and experiments will occur. Therefore, this study applied it separately to China's services trade exports and imports and the services sub-categories to resolve this issue.

3.4 Dependent and Key Variables

3.4.1 Dependent Variable

In the gravity equation, T_{ijt} is the bilateral service trade flows between home country i (China) and host country j (trading partners of China in the database) in year t in which the services trade will be separated as exports and imports at an aggregate level.

However, before performing the gravity model two main issues in the dependent variable needed to be addressed. The first issue was to transfer the nominal trade flows into real values. However, this would result in additional sources of biased estimation due to limited data related to relevant deflators when nominal trade flows are converted to real values. In addition, it is quite tough to observe adequate price indices for bilateral trade flows, even for aggregate exports or imports. Another issue was the effect of inclusion or removal of observations with 0 values from the estimation. This issue was resolved with the help of the PPMLHDFE estimator.

3.4.2 Gross Domestic Product (GDP)

$GDP_{i,t}$ and $GDP_{j,t}$ are the independent variables that measure China's gross domestic products and its trading partners separately. In general, a positive relationship exists between the size of the markets of the importing country and its demand for services, while an exporting country with a large size market will have a large supplied amount of

its services export and imports (Kandilov & Grennes, 2010; Karam & Zaki, 2013; Thomas, 2015). Thus, a positive sign was expected from this variable.

3.4.3 Geographical Variables

Since conventional transportation costs were proxied by physical distance (D_{ij}) and the existence of common borders ($Contiguity_{ij}$), the variable D_{ij} was measured as the distance between trading partners. As there is much controversy concerning the impact of this variable on trade in services in the current literature, this research supposed that the relationship between the distance and trade flows was negative. The common border variable was included in this paper as a dummy variable for country pairs that shared the same border.

3.4.4 GDP Per Capita Difference

The GDP per capita difference takes the absolute value of a partner country's GDP per capita after subtracting China's GDP per capita. Taking the absolute value of the GDP per capita ensured all values were positive and allowed it to take the logarithms accordingly. The coefficient of the GDP per capita difference was expected to be either positive or negative because the GDP per capita does not have a straightforward influence on the services trade (Dao et al., 2014). Unlike GDP per capita, where an increase in services trade flow will be influenced by the increase of the GDP per capita either in China or its partner countries, an increase in the GDP per capita difference would reflect that China's GDP per capita has a greater/lesser growth rate than its trading partners. If the gap is small, the increase in the GDP per capita difference will result in services trade flows. In contrast, if the gap was extremely large, that could lead to a decrease in the services trade.

3.4.5 Real Exchange Rate

The exchange rate measures the relative prices of services exported or imported. It is the ratio of domestic prices relative to foreign prices (Stockman, 1987). Bostan et al. (2018) concluded that the exchange rate is strongly associated with trade competitiveness. The real exchange rate is also a measure of actual competitiveness because it can reflect a country's relative price, cost and productivity relative to the rest of the world (UNCTAD, 2005). A fall in domestic relative prices due to an exchange rate depreciation means that foreign production costs for goods and services are cheaper and that export demand is consequently increased, and vice-versa. Such a variable is expected to be positive or negative.

3.4.6 Corruption Perception Index

The corruption perception index measures the institutional quality of a country and is expected to have an impact on trade in services because of the immaterial nature of services and the inability of customers to evaluate the quality of services before the service is provided (Goswami et al., 2012). Therefore, the presence of trustworthy regulators is essential for the trade in services as they provide customers with quality services (Goswami et al., 2012). Augmenting the gravity model with the corruption index, Lennon (2008) and Grünfeld & Moxnes (2003) concluded that higher values of the index reflected lower corruption, and monitoring institutional efficiency would have a positive and important effect on trade in services. Moreover, the corruption measure was found to be more important in services than in the goods due to increased personal involvement in the services trade (Melnikova & Jong, 2014). The corruption index would greatly impact other business services because this type of services is supplied under Mode 3 (commercial presence) and Mode 4 (temporary movement of natural persons), indicating relatively high contact between the individuals (Grünfeld & Moxnes, 2003). The present

study included the corruption perception index of China and its partner countries to analyse their effects on China's trade in services.

3.4.7 Telecommunication Infrastructure

Information and Communications Technology (ICT) was extremely important for trade in services because of its high dependence on well-developed infrastructure in both home and host countries (Nicolatti et al., 2003). In addition, modern ICT reduced the delivery cost of many cross-border services. Thus, electronic infrastructure will accelerate services trade. Fixed telephone subscriptions (per 100 people) of both the reporter and the partner countries are included because delivering services over electronic media requires both parties to access it.

3.4.8 Trade Restrictiveness Index

The trade restrictiveness index (TRI) is a measure of the barriers to the services trade, and it is used to measure market regulations and to protect a wide range of services and countries. The TRI is a pseudo-frequenct ration which covers the barriers affecting the current procedures and the establishment of the new activity. The TRI covers several services sub-sectors, such as; banking, telecommunication, maritime services, wholesale and retail, education and professional services (engineering, architectural and legal). In this study, the TRI will be calculated based on the average score of the listing services as suggested in Grünfeld & Moxnes (2003). A negative sign was expected for this variable since trade barriers increase the trade cost and therefore impede the services trade.

3.5 Qualitative Method

This study's adopted research approach, described in this chapter, was qualitative since no similar previous research existed, and primary data collection was obtained from reviewing the relevant policy documents. As will be seen later, data analysis is best dealt with qualitatively rather than answering why the methodology seeks to understand how

the linkage works. It is also interested in in-depth analysis, and finally, some of the relevant information, especially policy-related, was not quantifiable (Silverman, 2017; Yin, 2016).

The data collection process in a qualitative study can be conducted in several ways. For example, in-depth interviews of the key respondents, focus group discussions, observation, analysis of relevant documents, and so forth. As this study investigated a wide industrial spectrum, it would have been difficult to conduct face-to-face interviews or focus group discussions with key informants. However, it was relatively easy to access the official documents that offers policy guidelines for the service sector exports of China. Nevertheless, this study attempts analysed several documents systematically. In this study, 30 documents were reviewed, covering data sources from State Council, Ministry of Housing and Urban-Rural Development, Ministry of Commerce, National Development and Reform Commission, Central Committee of the Communist Party of China and the State Council, State Administration of Taxation, National People's Congress (NPC), and Standing Committee of the Tenth National People's Congress. The documents selected and the data analysed are given in Table 3.2. Figure 3.2 displays a flow chart of the search procedure. A total of 1,602 articles were retrieved, and after removing the duplicates, 1,510 were excluded after a full test assessment. A further 62 articles were omitted, comprising 30 providing insufficiently detailed information on service sub-sectors, 10 studies where the articles were published before 2010, and 22 articles written in Chinese. The researcher was personally engaged in the task from the beginning to the end in the data analysis process. The researcher perfectly understood the coherence of the data, which is important for analysing the influence of policies on China's services trade according to the situation of the study.

1. A review of the policy measures undertaken by the Chinese government relating to China's services trade was identified as presented in Chapter 6, subsections 6.2.1- 6.2.8.
2. Build up a coherent analysis of issues affecting China's trade situation in terms of challenges and prospects as presented in Chapter 6, sections 6.3 to 6.6.

Table 3.2: Sampling of Documents and Data Analysed

Documents Selected	Data analysed
Provisional Regulations on Promoting Industry Restructuring in 2005, 2011, 2013 and 2019	Industrial policies promote industrial development and encourage the development of services sectors.
China's taxation system	Tax on service sectors and some tax deductions and exemptions to support the development of service industries.
Foreign Trade Law	Trade agreements.
Foreign Investment Policy	Service sectors are encouraged by foreign investments.
Environmental services policies	The development of environmental services.
Services Trade Restrictiveness policy	Services Trade Restrictiveness Index (STRI) on service sectors
Modes of Supply in the Services Trade and Government Policy	Restrictions on modes of supply in services
Science and Technology (S&T) policy	Science and Technology (S&T) policy and service sectors

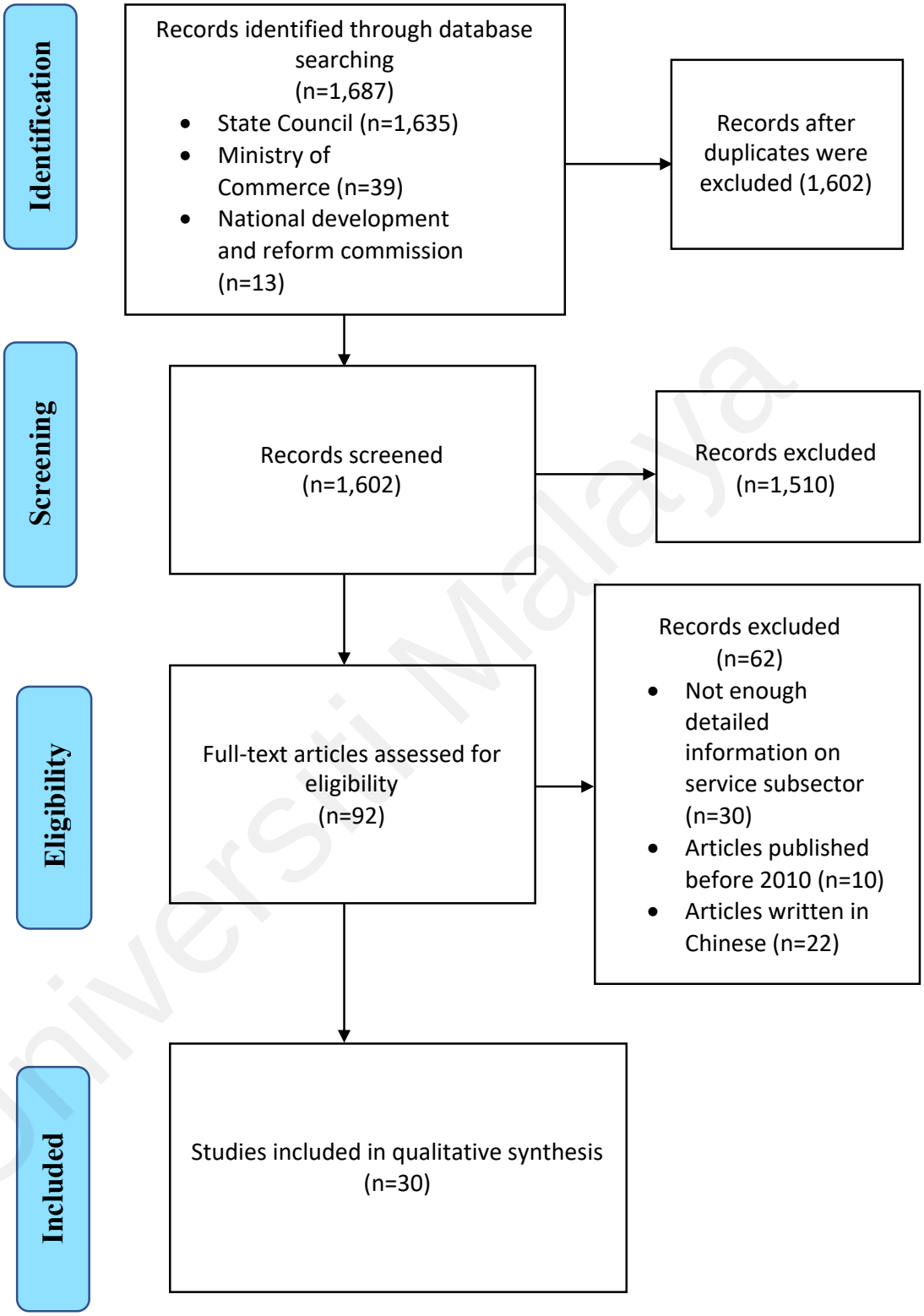

Figure 3.2: Flow Diagram Records (Prisma Flow Diagram)

3.6 Estimation Method and Data Sources

This section focuses on the explanation and justification for the estimation methods employed in this study. Further explanation is also given for achieving the objectives highlighted in Chapter one.

3.6.1 The Poission Pseudo-Maximum Likelihood with High-Dimensional Fixed Effects (PPMLHDFE) Estimation

At this point, the log issue under the gravity equation estimation has raised many concerns in recent studies. This situation is because log-linearisation of the gravity model changes the property of the error term, which will cause inefficient estimations due to the potential heteroscedasticity issue (Silva & Tenreyro, 2006). In general, trade data are heteroscedastic, meaning that the error term's variance and expected results of the error term are inconstant (the expected results of the error term are associated with the regressors). Changes in the conditional distribution of the dependent variables will lead to inconsistent estimation in OLS.

Silva & Tenreyro (2006) claimed that the logarithmic transformation of the gravity equation using OLS would lead to inconsistent estimates in the presence of heteroscedasticity as a result of the expected value of the logarithm of a random variable that is largely dependent on the covariate of the regression. Therefore, OLS will be biased even though the dependent variables are positive. Logarithmic transformation of the gravity model will alter the properties of the error term, which means that logarithmic transformation of the gravity model will generate estimates of $E(ln\varepsilon_{ij})$ instead of $lnE(\varepsilon_{ij})$. However, $E\left(ln\varepsilon_{ij}\right) \neq lnE(\varepsilon_{ij})$ which represents Jensen's inequality. Thus, Silva & Tenreyro (2006) argued that the logarithmic transformation of the gravity model and its OLS estimation method would lead to bias and inefficient estimates where the flaws have normally been overlooked in studies of bilateral trade.

Moreover, in essence, zero trade values are another issue that always occurs in bilateral trade flows, leading to theoretical and methodological problems when estimating the log-linear gravity model, especially when excessive zero values exist. So, pairs of countries with zero bilateral trade flows will be dropped automatically from the sample when conducting the logarithmic transformations, which will cause a 30% loss of the data points (Haveman & Hummels, 2004). Eichengreen & Irwin (1998) also mentioned that deleting these zero values caused a loss of information that will generate biased results as trade flows are not randomly distributed. Omitting zero trade values can also cause sample selection bias (Heckman, 1979; Helpman et al., 2008). Therefore, log-linearising the dependent variable will be problematic as the logarithm of zero is undefined.

Consequently, attention has been focused on the appropriateness of the estimation method when zero trade flows and logarithmic transformation of the gravity model are considered. Silva & Tenreyro (2006) argued that PPML outperformed OLS in terms of zero trade value and the logarithmic transformation of the gravity equation. In addition, PPML estimates the gravity equation in levels which will avoid some problems raised by using OLS under the logarithmic transformation of the gravity equation. According to Silva & Tenreyro (2006), PPML takes observed heterogeneity into account and due to its multiplicative form, it can deal with zero trade flows without log-linearising the dependent variable that will obtain consistent and lowest bias among other estimators. Therefore, they argued that PPML was an appropriate estimation technique in estimating the gravity model.

However, Silva & Tenreyro (2006, 2011) noted that maximum likelihood estimates for the Poisson regression might not exist for some data configurations. As a result, estimation algorithms may be unable to converge or may converge to incorrect estimates. This situation bears some resemblance to the well-known problem of

separation in the binary-choice model. In the case of Poisson regression, this happens if the log-likelihood increases monotonically as one or more coefficients tends to infinity. As shown by Silva & Tenreyro (2011), this may occur if there is multicollinearity among the regressors for the subsample of positive values of the dependent variable. To overcome this problem, they suggested identifying and dropping problematic regressors. However, which regressor(s) to drop is an ambiguous decision with implications for identifying the remaining parameters. Moreover, in Poisson models with multiple HDFEs, this strategy may not even be feasible as PPMLHDFE implements Poisson pseudo-maximum likelihood regressions (PPML) with multi-way fixed effects, as described by Correia et al. (2019). The estimator employed is robust to statistical separation and convergence issues due to the procedures developed in Correia et al. (2019).

Additionally, there are several advantages of this method. First, it allows any number and combination of fixed effects and individual slopes. Second, it correctly detects and drops separated observations (Correia et al., 2019). This issue would be otherwise particularly pernicious in regressions with many fixed effects and could lead to a lack of convergence or, even worse, incorrect estimates. Third, it allows two- and multi-way clustering, and can be used in combination with boot tests to derive wild bootstrap inference. Last, it includes several algorithmic shortcuts and accelerations to allow its use with large datasets.

In the following section, assume the PPML estimation procedure from Larch et al. (2019) to obtain estimates for many exporter-time and importer-time fixed effects. Let X_{ijt} represent trade flows from exporter i to importer j at time t. z_{ijt} is a vector of explanatory variables. With exporter-time (λ_{it}), importer-time (ψ_{jt}), the estimating equation is:

$$X_{ijt} = \exp\left(\lambda_{it} + \psi_{jt} + b'^{z_{ijt}}\right) + \varepsilon_{ijt} \qquad (3-66)$$

Where ε_{ijt} represents the remainder error term. Eq. (3-66) aligns with the best practices for the panel gravity equation recommended by Yotov et al. (2016) which deals with smaller samples. The purpose of this study was to obtain PPML estimates for coefficient vector b for large samples in the presence of these two high-dimensional fixed effects. Obtaining an expression for the corresponding estimate of b, denoted by $\hat{b}$, in the context of a generalised PPML first-order condition, gives:

$$\hat{b}: \sum_i \sum_j \sum_t \left[X_{ijt} - \exp\left(\widehat{\lambda_{it}} + \widehat{\psi_{jt}} + \hat{b}' z_{ijt}\right)\right] z_{ijt} = 0 \qquad (3-67)$$

It is obvious that the PPML first-order condition for a group fixed effect equates the sum of the dependent variable with the sum of the conditional mean for that group, the remaining first order-conditions associated with Eq. (3-66) may be written as:

$$\widehat{\lambda_{it}}: \; Y_{it} - e^{\widehat{\lambda_{it}}} \sum_j \exp\left(\widehat{\psi_{jt}} + \hat{b}' z_{ijt}\right) = 0 \qquad (3-68)$$

$$\widehat{\psi_{jt}}: \; X_{jt} - e^{\widehat{\psi_{jt}}} \sum_i \exp\left(\widehat{\lambda_{it}} + \hat{b}' z_{ijt}\right) = 0 \qquad (3-69)$$

Where $Y_{it} \equiv \sum_j X_{ijt}$ and $X_{jt} \equiv \sum_i X_{ijt}$ separately represent the sums of all flows associated with each exporter i and importer j at time t. However, to follow the actual methods and emphasise the tight connection linking estimation with theory more closely, it was useful to rewrite the system of equations in the form of a 'structural gravity' model based on Anderson & van Wincoop (2003). To do so, first define:

$$\Psi_{it} \equiv \frac{Y_{it}/\sqrt{X_{wt}}}{e^{\widehat{\lambda_{it}}}}, \qquad \Phi_{jt} \equiv \frac{X_{jt}/\sqrt{X_{wt}}}{e^{\widehat{\psi_{jt}}}} \tag{3-70}$$

Where $X_{wt} \equiv \sum_i \sum_j X_{ijt}$ denotes total world trade at time t, which was used as a scaling factor. These substitutions was made because, after plugging these definitions into Eq. (3-66), a new version of our estimating equation that closely resembles the famous "structural gravity" equation of Anderson & van Wincoop (2003) was derived:

$$X_{ijt} = \left(\frac{Y_{it}X_{jt}}{X_{wt}}\right)\left(\frac{e^{\hat{b}\prime z_{ijt}}}{\psi_{it}\Phi_{jt}}\right) + \varepsilon_{ijt} \tag{3-71}$$

Furthermore, the system of first-order conditions could be rewritten as follows:

$$0 = \sum_i \sum_j \sum_t \left[X_{ijt} - \left(\frac{Y_{it}X_{jt}}{X_{wt}}\right)\left(\frac{e^{\hat{b}\prime z_{ijt}}}{\Psi_{it}\Phi_{jt}}\right)\right] z_{ijt} \tag{3-72}$$

$$\psi_{it} = \sum_j \frac{X_{jt}/X_{wt}}{\Phi_{jt}} e^{\hat{b}\prime z_{ijt}} \tag{3-73}$$

$$\Phi_{jt} = \sum_i \frac{Y_{it}/X_{wt}}{\Psi_{it}} e^{\hat{b}\prime z_{ijt}} \tag{3-74}$$

In Eqs. (3-73) & (3-74), ψ_{it} and Φ_{jt} were analogues of the 'multilateral resistances' from structural gravity. As mentioned in Anderson & van Wincoop (2003), they capture the general equilibrium effects of trade with third countries. The form of these constraints is well-known, and Fally (2015) has previously shown that they naturally derive from the FOC's of PPML with two-way fixed effects.

With this system in place, the steps to follow are outlined in Eqs. (3-72) & (3-74). That is: (i) given initial guesses for $\{\psi_{it}, \Phi_{jt}\}$, compute a solution for $\hat{b}'$ using Eq. (3-72); (ii)–(iii) update ψ_{it} and Φ_{jt} using Eqs. (3-73) & (3-74); and (iv) return to step (i) with new values for $\{\psi_{it}, \Phi_{jt}\}$, iterating until convergence. Eqs. (3-62) & (3-63) & (3-64) & (3-65) for estimation under PPMLHDFE can be rewritten as follows:

$$T_{ijt} = \alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnGDP_{jt} + \alpha_3 lnDIST_{ij} + \alpha_4 lnPCGDPDIFF_{ijt} + \alpha_5 lnRER_{ijt} + \alpha_6 CPI_{it} + \alpha_7 CPI_{jt} \alpha_8 lnFIXEDPHONE_{it} + \alpha_9 lnFIXEDPHONE_{jt} + \alpha_{10} CONTIG_{ij} + \alpha_{11} TRI_{jt} + \delta_{it} + \gamma_{jt} + \varepsilon_{ijt} \quad (3-75)$$

$$T_{ijt}^1 = \alpha_1 + \sum_m {\beta_m}^1 \, lnX_{i,jt}^1 + \gamma^1 lnMRTs_{ij} + \varepsilon_{ijt}^1 \quad (3-76)$$

$$T_{ijt}^2 = \alpha_2 + \sum_m {\beta_m}^2 \, lnX_{i,jt}^2 + \gamma^2 lnMRTs_{ij} + \varepsilon_{ijt}^2 \quad (3-77)$$

$$T_{ijt}^3 = \alpha_3 + \sum_m {\beta_m}^3 \, lnX_{i,jt}^3 + \gamma^3 lnMRTs_{ij} + \varepsilon_{ijt}^3 \quad (3-78)$$

3.6.2 Two-Stage Least Squares (2SLS) Method

The two-stage least squares method deals with the endogeneity issues that occur when some regressors are correlated with the error term in a regression framework. In general, endogeneity can arise from (1) measurement error, (2) autocorrelation, (3) omitted variable bias and (4) simultaneity.

The principal of using the two-stage least squares method to deal with the endogeneity problem is to use the instrumental variables, which are not correlated with the error term to obtain consistent estimators. These instrument variables are correlated to the endogenous variables but not with the model's error term. In this study, through the Hausman Specification Test, the GDP per capita difference had the endogenous issues.

Inspired by Hausman & Taylor (1981), this study estimated gravity panel models by using a 2SLS error components approach. There are several important advantages of the 2SLS method: (1) It considers the possible correlations between some of the explanatory variables and the unobserved effects. Thus, it provides consistent parameter estimates compared to the traditional generalized least squares (GLS) method. (2) It can obtain parameter estimates for the time-invariant variables even if in the presence of the

time and bilateral effects when compared within the estimator. In addition, the 2SLS estimation technique outperforms the fixed effects approach. (3) It is more efficient when predicting trade potentials out of sample.

3.6.3 Feasible Generalized Least Squares (FGLS)

Heteroscedasticity and serial correlation are important problems in the error terms in the panel regression model. There are two methods to deal with the problem. The first approach is to use the OLS estimator but with a robust standard error that is robust in tackling heteroscedasticity (White, 1980; Driscoll & Kraay, 1998; Hansen, 2007; Vogelsang, 2012). Another approach is to use the generalized least squares (GLS) technique that directly considers heteroscedasticity and serial correlations in the estimation. Moreover, it is well known that GLS is more efficient than OLS.

In statistics, GLS is a technique for estimating the unknown parameters in a linear regression model. The feasible generalized least squares (FGLS) technique will be considered when the underlying covariance matrix involves many parameters. The steps for FGLS are listed as follows:

Starting with a linear model:

$$y_{it} = x_{it}'\beta + \mu_{it} \qquad (3-79)$$

Eq. (3-79) can be represented in full matrix notation as:

$$Y = X\beta + U \qquad (3-80)$$

Where $Y = (y_1', \dots, y_T')'$ represents the $NT * 1$ vector of y_{it} with each y_t being an $N * 1$ vector; $X = (x_1', \dots, x_T')'$ represents the $NT * d$ matrix of x_{it} being an $N * d$; and $U = (u_1', \dots, u_T')'$ represents the $NT * 1$ vector of u_{it} with each u_t being an $N * 1$ vector.

Let $\Phi = (Eu_t u_s')$ be an $NT * NT$ matrix, consisting of many blocks matrices. The (t, s)th block is an $N * N$ covariance matrix $Eu_t u_s'$. The following (infeasible) GLS estimator of β was considered:

$$\widetilde{\beta_{GLS}^{inf}} = (X'\Phi^{-1}X)^{-1}X'\Phi^{-1}Y \qquad (3-81)$$

Note that Φ is a high-dimensional conditional covariance matrix, which is very difficult to estimate. This research aimed to achieve the following: (i) obtain a "good" estimator of Φ^{-1}, allowing an arbitrary form of weak dependence in u_{it}, and (ii) show that the effect of replacing Φ^{-1} by $\widehat{\Phi^{-1}}$ was asymptotically negligible.

It started with a population approximation for Φ to gain the intuitions. Then, it suggests the estimator for Φ that considers both correlations problems.

The procedure of the FGLS method in this study is shown as follows. First, compute the residual $\hat{u}_i$ from the OLS of the initial regression model. Second, regress $\hat{u}_i^2$ against a constant term and all the explanatory variables from either the Breusch-Pagan test for heteroscedasticity (e.g. when k=2, $\hat{u}_i^2 = a_0 + a_1 X_{1i} + a_2 X_{2i} + v_i$). Third, estimate the original model by OLS using the weight $z_i = 1/\sigma_i$, where σ_i^2 are the predicted values of the dependent variable (the $\hat{u}_i^2$) in the Breusch-Pagan model. Such an OLS procedure is called WLS (weighted least squares). The estimation results are presented in Table 5.10.

3.6.4 Data Sources

This study's data constituted a set of 11 variables covering the period 2000 to 2014. The equation was estimated for China and its 42 partner countries (as presented in Table 3.3). Variables, descriptions, expected signs, sample periods and data sources are all listed in Table 3.4. The classification of services sectors is listed in Appendix A. It is noteworthy that all monetary variables were converted into the 2010 constant prices. All the GDPs were deflated using the price index (PI), which was retrieved from the World Bank database.

Table 3.3: List of Countries

Countries			
China	Denmark	Ireland	Poland
Australia	Spain	Italy	Portugal
Austria	Russian Federation	Japan	Romania
Belgium	Finland	Korea, Rep.	Estonia
Bulgaria	France	Lithuania	Greece
Brazil	United Kingdom	Luxembourg	Slovenia
Canada	Slovak Republic	Latvia	Sweden
Switzerland	Croatia	Mexico	Turkey
Cyprus	Hungary	Taiwan, China	Malta
Czech Republic	Indonesia	Netherlands	Norway
Germany	India	United States	

Table 3.4: Variables, Descriptions, Expected Signs, Sample periods and Data Sources

Variables	Description	Sample period	Sources
TSEX/IM	Total Service Export/Import	2000-2014	WIOD
TRVEL EX/IM	Travel Export/ Import	2000-2014	WIOD
TRANSPORTATION EX/IM	Transportation Export/Import	2000-2014	WIOD
OCEX/IM	Other commercial service Export/Import	2000-2014	WIOD
GDP	Gross domestic product	2000-2014	WIOD
DIST	Distance between China and trade partners	2000-2014	CEPII database
GDPPCDIFF	GDP per capita difference	2000-2014	Author
RER	Real exchange rate	2000-2014	IMF
Fixedphone	Fixed phone subscription	2000-2014	World Bank
CORRUPT	Corruption perception index	2000-2014	Transparency
TRI	Trade restrictiveness index	2000-2014	TRI database

3.7 Diagnostic Tests

The second research questions examine the relationship between the explanatory variables and service exports and imports. A series of robustness checks were performed to ensure reliable statistical inferences drawn from the gravity model.

3.7.1 Breusch-Pagan Test

The Breusch Pagan Test was introduced by Trevor Breusch and Adrian Pagan in 1979. It tests heteroscedasticity in a linear regression model, assuming that error terms are normally distributed. It tests whether the error variance from regression depends on the values of the independent variables.

In general, the assumption of homoscedasticity in OLS implies that:

$$Var(\varepsilon|x_1, x_2, \dots, x_k) = \sigma^2 \qquad (3-79)$$

If testing for heteroskedasticity, the maintained assumption is that the errors are homoscedastic. The null hypothesis is stated below:

$$H_0: Var(\varepsilon|x_1, x_2, \dots, x_k) = \sigma^2 \qquad (3-80)$$

Next, note that the expected values of the errors being zero in examining heteroskedasticity are still maintained. This situation means that:

$$Var(\varepsilon|x_1, x_2, \dots, x_k) = E(\varepsilon^2|x_1, x_2, \dots, x_k) = \sigma^2 \qquad (3-81)$$

Rewrite the hypothesis being tested as:

$$H_0: E(\varepsilon^2|x_1, x_2, \dots, x_k) = \sigma^2 \qquad (3-82)$$

Therefore, a hypothesis must be formulated if a linear relationship is suspected to exist between residuals (ε) and the dependent variables. Considering a general k variable regression where the dependent variable is ε^2 Let e be the error term in the linear relationship, and assume that it is normally distributed with 0 mean given the independent variables. That is:

$$\varepsilon^2 = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + \cdots + e \qquad (3-83)$$

If homoskedasticity holds, then the null hypothesis of homoskedasticity can be written as below:

$$H_0: \delta_1 = \delta_2 = \cdots \delta_k \qquad (3-84)$$

Then, derive the residuals $\widetilde{e^2}$ from the original OLS regression of y against $x_1, x_2, \dots, x_k$ to obtain:

$$\widetilde{e^2} = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + \cdots + e \qquad (3-85)$$

The Lagrange Multiplier (LM) statistic depends on the goodness of fit measure from the above regression. Let that be $R^2_{\widetilde{e^2}}$.This is known as the Breusch-Pagan Test based on the LM statistic for heteroskedasticity. The statistic is shown below:

$$LM = n * R^2_{\widetilde{e^2}} \qquad (3-86)$$

The LM statistic is distributed asymptotically as χ^2_k.

3.7.2 Sargan-Hansen Test (Overidentification test)

The Sargan–Hansen test or Sargan's J test is used to test over-identifying restrictions in a statistical model. John Denis Sargan developed it in 1958, and he derived several variants in 1975.

The Sargan test is based on the assumption that model parameters are identified via a priori restrictions on the coefficients, and it tests the validity of over-identifying restrictions. The test statistic can be computed from residuals from instrumental variable regression by constructing a quadratic form based on the cross-product of the residuals and exogenous variables. Under the null hypothesis that the over-identifying restrictions are valid, the statistic is asymptotically distributed as a chi-square variable with (m - k) degrees of freedom (where m is the number of instruments and k is the number of endogenous variables). In this study, the Sargen-Hansen Test is a validity test for the 2SLS method. The result of this test is shown in Table 5.10.

3.7.3 RESET Test

The Ramsey Regression Equation Specification Error Test (RESET) test is a general specification test for functional form misspecification. It tests whether non-linear combinations of the fitted values help explain the response variable. The intuition behind the test is that if non-linear combinations of the explanatory variables have any power in explaining the response variable, the model is misspecified because the data generating

process might be better approximated by a polynomial or another non-linear functional form.

The idea behind the RESET test is relatively simple. Suppose the original model is:

$$y = \alpha_0 + \alpha_1 x_1 + \cdots + \alpha_k x_k + u \qquad (3-87)$$

To implement the RESET test, one must decide how many functions of the fitted values to include in an augmented regression. Let $\hat{y}$ denote the OLS fitted values from estimating Eq. (3-87) and test in the augmented model

$$y = \alpha_0 + \alpha_1 x_1 + \cdots + \alpha_k x_k + \varphi_1 \hat{y}^2 + \varphi_2 \hat{y}^3 + e \qquad (3-88)$$

The null hypothesis is that Eq. (3-88) is correctly specified. Therefore, RESET is the F statistic for testing $H_0: \varphi_1 = 0, \varphi_2 = 0$ in the augmented model Eq. (3-88). A significant F statistic suggests some functional form problem. The distribution of the F statistics is approximately $F_{2,n-k-3}$ is large samples under the null hypothesis (and the Gauss-Markov assumptions). The df in the augmented Eq. (3-88) is n-k-1-2=n-k-3. An LM version is also available (and the chi-square distribution will have two df).

3.8 Caveats of the Study

It is worthy to acknowledge at this juncture that one of the caveats of this study is the data limitation. In this study, the data were obtained from the World Input-Output Database covering the period from 2000 to 2014. It should be noted that the latest data was released in 2016, with no further updates after that. The advantage of utilising this dataset includes (1) it provides a more detailed breakdown of the services trade, (2) it is strongly balanced panel data spanning a period of 15 years (2000-2014), and (3) it contains 42 trading partners of China compared to the OECD database which only covers 24 countries, and

(4) it also includes sectoral GDP which will effectively eliminate the aggregate bias from using the total GDP. This study also used the OECD dataset to verify the empirical results obtained in the World Input-Output Database to ensure data validity. The OECD dataset covering the period from 2010 to 2020 was released in 2021, and the two sets of results were consistent. The results are shown in Appendix B.

CHAPTER 4: THE EXPORT STRUCTURE OF CHINA'S SERVICES TRADE AND ANALYSIS OF SERVICE TRADE COMPETITIVENESS

4.1 Introduction

Value-added trade eliminates the role of intermediate products, removes double-counting trade values and more accurately reflects the real value of trade (Koopman et al., 2014). Therefore, this chapter applies the RCA index based on the value-added trade statistics to analyse the real situation of China's services industry trade. Furthermore, China's service trade competitiveness can be investigated by comparing the top ten export countries of services.

4.2 Analysis of the Results

4.2.1 The Discrepancy of the RCA Indices of China's Services based on Different Trade Statistics

Figure 4.1 shows the RCA indices of China's service industries based on the two different trade statistics. The RCA indices based on the gross value method underestimated the competitiveness of China's service industry when compared with RCA indices calculated using the forward linkage value-added method, which was consistent with the results of Cao (2016). Furthermore, no matter which method was applied, the overall RCA indices of China's service industry were less than 1 (Figure 4.1), indicating that the industry was in comparative advantage. The smaller the value, the greater the disadvantage. In the study of Guo & Liu (2015), two different statistical methods, the gross value method and the value-added method, were applied to measure the international competitiveness of China's services trade. All the results showed that the RCA indices were less than 1.

However, the RCA indices based on value-added have continuously increased over time, and the gap between the two statistical methods has been gradually growing.

This outcome demonstrates that the competitiveness of China's service industry has progressively improved. It can be seen that the RCA indices based on the gross value are greater than the indices based on the value-added method in 2000, while the RCA indices calculated by the value-added method exceeded those based on the gross value method after 2003. This situation means that the gross value method underestimated the real competitiveness of China's services industry in the following 11 years. Since the value-added method eliminates the double-counting of intermediate products, it can reflect the real competitiveness situation of China's services industry (Koopman et al., 2010; Shen & Silva, 2018). Additionally, the RCA indices based on the value-added method in the last four years have kept constant at around 0.8 but less than 1 (Figure 4.1), implying that China's service trade still has a competitiveness disadvantage even though this disadvantage is gradually reducing.

According to Figure 4.1, the RCA indices based on the value-added method have shown a slightly growing trend since 2003. However, the RCA indices based on gross exports have decreased over this period. Additionally, both methods confirm China's weak export competitiveness in its service industry. However, compared to RCA indices based on the gross export method, the competitiveness based on the value-added method is gradually becoming stronger.

Trade statistics of value-added focus on the production process and production line, and they are more accurate than the traditional gross trade statistics in measuring the scale of industrial trade. Therefore, applying the RCA indices to reflect the competitiveness level of China's service industry is acceptable based on the value-added trade statistics (Koopman et al., 2014; Aslam et al., 2017).

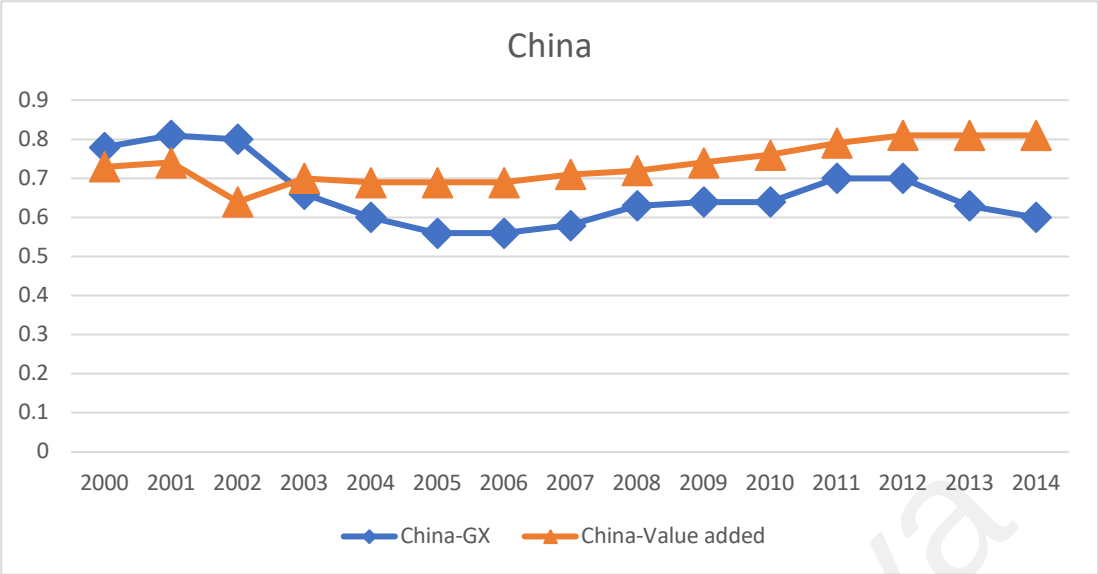

Figure 4.1: The RCA Indices of China's Service Industry based on Two Different Trade Statistics.

Note: chn-sgx represents calculating RCA index based on service gross export method
chn-value added represents calculating RCA index based on value added forward-linkage export method

4.2.2 RCA Indices of China's Major Service Sectors based on Two Different Trade Statistics

This section calculated the RCA indices of Chinese service categories based on gross and forward linkage value-added estimation methods, as shown in Tables 4.1 and 4.2.

Comparing the estimates from the two different statistical methods, the RCA indices of some sectors calculated by gross value overestimated the real competitiveness of the Chinese service industry, such as; construction, computer and information, other business services and personal, cultural and recreational services. However, the international competitiveness of most of the sub-sectors of the Chinese services industry appears to have been underestimated, including; transportation, travel, communication, insurance, financial and government services. In Dai's (2015) study, all sectors calculated based on the gross value statistical method overstated the value measured by the value-added statistical method, mainly because double counting issues exist in the gross value method.

In addition, as shown in Table 4.1, all the service subsectors suffered large comparative disadvantages, except the sectors of construction and other business services, and the competitiveness of the whole service industry showed a downward trend. However, the competitiveness of China's services industry had an upward trend, and the RCA value for each of the service sub-sectors is far greater than the value calculated by the gross export method. Thus, the results of the gross value method may mislead the real level of China's service industry.

After the analysis, it was realised that the gross value method fails to reflect the real competitiveness level of the Chinese service industry (Li & Zhang, 2015). The competitiveness of most sub-sectors of the Chinese service industry has been underestimated based on the gross value method. It indicates that the export competitiveness of the Chinese service industry calculated by the value-added method was stronger than the gross value method (Cao, 2016). From the perspective of the entire services industry, the international competitiveness of Chinese service trade exports has been gradually increasing when the forward-linkage value-added method is used.

Table 4.2 shows that the average RCA indices of most service sectors were less than 1, except for; travel, personal, cultural and recreational services. It means that the international competitiveness of most services sub-sectors was still at the level of competitive disadvantage. Cao (2016) stated that the comparative disadvantage of the sub-sectors has gradually reduced over time. From the table above, within this period, some sectors, such as financial services and other business services, have shown an increasing trend after the global financial crisis. The global financial crisis has pointed the way for China to vigorously develop tertiary industry, especially in services, since high-energy-consuming industries are mostly concentrated in secondary industries. The transition from industrialisation to the service industry would shift from a single growth

engine to dual growth engines driving domestic demand growth. The economic growth could reduce the country's reliance on external resources and trade (Lu, 2009).

Table 4.1：China's RCA Index of Service Sub-sectors based on Gross Value Method 2000-2014

Sectors	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
c24-c26 c31-c34	0.71	0.75	0.72	0.66	0.67	0.61	0.64	0.66	0.67	0.68	0.70	0.72	0.70	0.65	0.60
c36	0.95	0.93	0.96	0.83	0.85	0.83	0.78	0.82	0.77	0.67	0.55	0.47	0.40	0.38	0.35
c35-c39	0.60	0.57	0.48	0.38	0.35	0.28	0.26	0.29	0.27	0.23	0.22	0.25	0.22	0.20	0.17
c27	0.91	0.94	0.89	0.96	1.14	0.93	1.03	1.23	1.29	1.20	1.29	1.52	1.46	1.31	1.16
c42	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.13	0.13	0.16	0.21	0.21	0.20	0.32
c41-c43	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.06	0.05	0.05
c40	0.24	0.21	0.20	0.19	0.22	0.23	0.26	0.31	0.34	0.33	0.36	0.39	0.40	0.40	0.32
c37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c28-c30 c44-c50	0.94	0.95	0.99	0.82	0.73	0.70	0.70	0.73	0.84	0.89	0.85	0.95	0.97	0.85	0.85
c38 c54-c55	3.25	3.54	3.26	2.38	1.51	1.25	1.01	0.91	0.89	0.73	0.73	0.71	0.67	0.64	0.53
c51-c53	0.13	0.15	0.16	0.16	0.15	0.12	0.11	0.18	0.19	0.16	0.17	0.16	0.15	0.16	0.14

Note: c27 is construction, c28-c30, c44-c50 is other business services, c24-c26, c31-c34 is transportation, c35,c39 is communications services c36 is travel, c37 is royalties and license, c40 is computer and information, c41, c43 is financial services, c42 is insurance services, c38, c54-c55 is personal and recreational services, c51-c53 is government service.

Table 4.2: China's RCA Index of Service Sub-sectors based on Forward Linkage Value Added Exports 2000-2014

Sectors	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average
c24-c26 c31-c34	1.08	1.10	1.09	1.02	1.03	1.00	1.00	0.99	0.89	0.86	0.85	0.87	0.86	0.86	0.87	0.96
c36	1.16	1.16	1.22	1.19	1.23	1.27	1.28	1.25	1.25	1.16	1.05	0.98	0.97	0.94	0.93	1.14
c35-c39	0.82	0.83	0.84	0.82	0.87	0.87	0.89	0.88	0.79	0.68	0.63	0.63	0.64	0.66	0.67	0.77
c27	0.38	0.36	0.32	0.27	0.26	0.22	0.23	0.25	0.30	0.30	0.37	0.43	0.45	0.48	0.44	0.39
c42	0.59	0.55	0.51	0.38	0.31	0.28	0.31	0.34	0.35	0.35	0.34	0.36	0.37	0.38	0.39	0.39
c41-c43	0.77	0.69	0.67	0.62	0.58	0.58	0.65	0.77	0.85	0.85	0.89	0.94	0.97	1.01	1.04	0.79
c40	0.19	0.19	0.19	0.18	0.19	0.18	0.20	0.22	0.20	0.20	0.21	0.23	0.23	0.24	0.21	0.20
c37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c28-c30 c44-c50	0.60	0.61	0.64	0.60	0.58	0.59	0.59	0.60	0.66	0.74	0.79	0.83	0.87	0.85	0.86	0.69
c38 c54-c55	1.44	1.71	1.74	1.48	1.09	1.11	1.02	0.95	0.93	0.91	0.88	0.89	0.90	0.91	0.90	1.12
c51-c53	0.22	0.23	0.26	0.26	0.28	0.32	0.34	0.34	0.37	0.40	0.32	0.28	0.30	0.29	0.34	0.30

Note: c27 is construction, c28-c30, c44-c50 is other business services, c24-c26, c31-c34 is transportation, c35,c39 is communications services c36 is travel, c37 is royalties and license, c40 is computer and information, c41, c43 is financial services, c42 is insurance services, c38, c54-c55 is personal and recreational services, c51-c53 is government service.

The RCA indices of travel, personal, cultural and recreational services remained at around 1, which meant that the comparative advantage of these two sectors was in line with international standards. However, the RCA indices of; construction, computer and information, insurance and government services varied from around 0.2 to 0.5, showing a weak comparative advantage. This situation was especially true in the sector of royalties and license fees, whose competitiveness index was 0, which appeared to have no comparative advantage. This outcome meant that the technology-knowledge services needed in manufacturing still relied on imports. Hence one can see that the comparative advantage of the Chinese service industry is still concentrated on labour-intensive service products, while the country's comparative disadvantage still lies in capital and technology-intensive service products (Cao, 2016; Chen & Zhang, 2010).

Moreover, the reliability test for the forward linkage value-added method is through the variance method. Variance measures how far a data set is spread out. It is mathematically defined as the average squared differences from the mean. The smaller the variance, the lower data spread around the mean. Table 4.3 describes the different variances of indicators calculated using the gross value and value-added methods. Since the gross value method is not the net value, most service sectors' variance should be larger than the variance of indicators calculated by the value-added method. This situation is shown by; travel, communications, construction, computer and information, and personal and recreational services. Additionally, the average variance of the indicators based on the gross value method was also larger than the indicators calculated using the value-added method. This outcome means that the variation of the data based on the value-added method is more stable than those based on the gross value method.

Table 4.3: The Variance of RCA's Calculated using Two Different Statistical Methods between 2000-2014

Sectors	Variance- Gross Value Method	Variance-Value Added Method
c24-c26 c31-c34	0.002	0.008
c36	0.044	0.015
c35 c39	0.017	0.010
c27	0.038	0.002
42	0.006	0.008
c41 c43	0.000	0.023
c40	0.005	0.000
c37	0.000	0.000
c28-c30 c44-c50	0.009	0.012
c38 c54-c55	1.085	0.089
c51-c53	0.000	0.003
Average	0.110	0.015

Note: c27 is construction, c28-c30, c44-c50 is other business services, c24-c26, c31-c34 is transportation, c35,c39 is communications services, c36 is travel, c37 is royalties and license, c40 is computer and information, c41, c43 is financial services, c42 is insurance services, c38, c54-c55 is personal and recreational services, c51-c53 is government services.

According to Figure 4.2, the RCA indices of China's major service sub-sectors have seen different trends from the value-added perspective. The traditional service sectors, such as travel and transportation, showed a stronger comparative advantage than the high technology services, such as; royalties and license fees, computer and information, and other business services. A possible reason is that China currently is amid industrialisation. Labour-intensive and capital-intensive industries take up a large percentage of the industry structure, leading to high demand for transportation and travel and relatively less demand for high technology services.

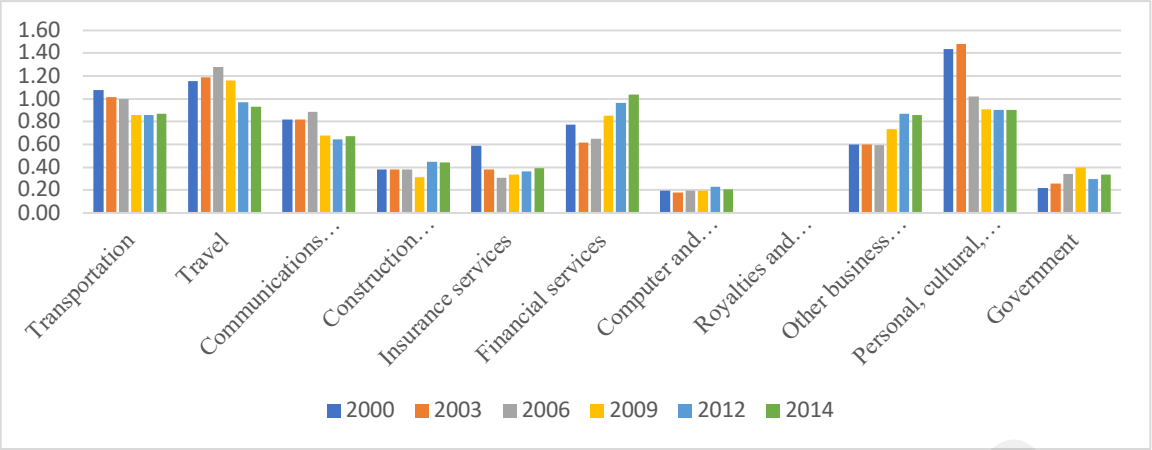

Figure 4.2: Value-added RCA Indices of China's Service Sub-sectors in Selected Years.

The RCA indices of personal, cultural and recreational services were greater than 1 in the first seven years but lost their comparative advantage after the global financial crisis, although the RCA values were still greater than other service sub-sectors. The same situation was found in travel and transportation, which gradually lost its competitiveness after the global financial crisis. A similar situation can be seen for; communication, personal, cultural and recreational, travel and transportation. The competitiveness of communication services was less than 1 and has kept decreasing for years, indicating weak competitiveness for this service subsector. Contrary to the situation above, the competitiveness of some service sub-sectors gradually increased within this period, especially for financial services over the last two years. Similarly, other business services also showed a steady upward trend during this period, with an RCA value of less than 1. It confirms that the competitiveness of these sectors has the potential to become stronger in the following years.

Figure 4.2 shows that although the RCA indices of computer and information, construction and government services had a significant comparative disadvantage, they displayed a slight increasing trend during this period. Competitiveness has gradually become stronger over time, meaning China is shifting to the technology and knowledge service industry

(Sheng & Ma, 2018;Luo & Sheng, 2019). Specifically, the competitiveness of the royalties and license fees services had the weakest comparative advantage among all the service subsectors. The RCA value remained at 0 over the entire period. For this service, China has no exports and imports from other countries. In general, China's services industry lacks comparative advantage, and much more attention needs to be paid to improving the competitiveness of the emerging service industries like internet-related services, leading to China's structure upgrading.

Table 4.4: RCA Indices of China's Service Sectors based on the Value-added Method in 2014

Very Strong Competitive advantage (RCA≥ 2.5)	Strong competitive advantage (1.25 ≤RCA < 2.5)	Has a revealed competitive advantage (1 ≤RCA < 1.25)	Strong competitive advantage (0.8 ≤RCA < 1)	Very strong competitive disadvantage RCA< 0.8
None	None	Financial services	Transportation Travel Other business services Personal and recreational	Communications Construction Royalties and license Insurance services Computer and information Government service.

Table 4.4 shows that most of China's service sectors fall between RCA< 0.8 and 0.8 ≤RCA< 1, except financial service, which had a revealed comparative advantage. This situation means that China's services trade remains at a significant global disadvantage, which still requires much work to gain a global competitive advantage (Dai, 2015).

4.3 International Comparison of Export Structure and Competitiveness of Service Exports

4.3.1 Introduction

This section focuses on the structure of services exports by comparing RCA indices between China and 16 countries selected from the World Input-Output Database, whose services exports take up nearly 63% of the world service exports based on the value-added method, as shown in Table 4.5. These selected countries included developed and developing countries (such as Russia, India, Brazil, Indonesia, Turkey, China, Mexico and Indonesia) to explain China's services trade competitiveness thoroughly.

Table 4.5: Gross Exports of the Service Trade of Selected Main Countries in 2014 (Unit: billions of US$)

Label	Country	Region	Gross Export	Percentage (%)
USA	United States	American	780181.9	13.7
GBR	United Kingdom	European	414584.5	7.3
CHN	China	Asia-Pacific	404108.0	7.1
DEU	Germany	European	341284.9	6.0
FRA	Frances	European	275283.3	4.8
NLD	Netherland	European	269953.3	4.7
CHE	Switzerland	European	170951.5	3.0
RUS	Russia	European	153366.8	2.7
BEL	Belgium	Asia-Pacific	150267.1	2.6
JPN	Japan	European	146241.2	2.6
IRL	Ireland	South-East Region	142091.6	2.5
CAN	Canada	North America	134901.4	2.4
IND	India	South Asia	114238.0	2.0
BRA	Brazil	South America	38225.6	0.7
TUR	Turkey	Asia	31164.0	0.5
MEX	Mexico	North-America	21279.9	0.4
IDN	Indonesia	Southeast Asia	12256.2	0.2

4.3.2 Comparison of Export Structure in terms of Value-Added Export between China and Selected Economies

According to the International Standard Industrial Classification (ISIC) Rev.4, services are divided into 32 categories. This study followed Fan & Huang (2014) to be more meaningful, who divided the services industry into four categories based on factor intensity (Table 4.6).

Table 4.6: Service Industry Classification by Factor Intensity

Category	Industry	CPA_Code	BOP code
Labour-Intensive	c36 travel	CPA_I	236
	c27 construction	CPA_F	249
	c28-c30 other business services	CPA_F	268
Capital-Intensive	c24-c26, c31-c34 transportation	CPA_D35 CPA_H; CPA_E	205 & 209
	c35, c39 communication;	CPA_H53; CPA_J61	245
Knowledge-Intensive	c37 royalties and license	CPA_J58	266
	c40 computer and information	CPA_J62_J63	262
	c41, c43 financial services	CPA_K64,K66	260
	c42 insurance services	CPA_K65	253
	c44-c50 other business services	CPA_L, M, N, except for N79	268
Human health, Education and public services	c38, c54-c55 personal cultural and recreational	CPA_J59_J60 CPA_S, R, T	287
	c51-c53 government services	CPA_O, P, Q	291

Note: c27 is construction, c28-c30, c44-c50 is other business services, c24-c26, c31-c34 is transportation, c35,c39 is communications services, c36 is travel, c37 is royalties and license, c40 is computer and information, c41, c43 is financial services, c42 is insurance services, c38, c54-c55 is personal and recreational services, c51-c53 is government services.

Labour-intensive services accounted for a large percentage of China's value-added exports in services. China exports more labour-intensive services and less knowledge-intensive, human health, education and public services compared to developed countries, as reported in Table 4.7. In addition, the competitiveness of China's knowledge-intensive services was lower than that of capital and labour-intensive services between 2000-2014 listed, as in Figure 4.3. It demonstrated that China's financial, insurance, computer and information, other business and royalties, and license services have weak competitiveness in the international market, and technical knowledge services for manufacturing rely more on imports. However, the revealed comparative advantage of knowledge-intensive services has gradually increased after the global financial crisis, implying that China is paying more attention to transforming its export structure by using more technology knowledge-based services (Zhang & Wang, 2019).

Value-added exports in knowledge-intensive services accounted for a large percentage of the total value-added export of services in developed countries (Table 4.7). Capital, labour and personal, education, and health-intensive services only took a small portion of the aggregate value-added exports. Notably, some developing countries, such as Brazil and India, had the same export structure as developed countries. Compared with six other developing countries, China's knowledge-intensive services exports ranked in the middle. However, the competitiveness of China's knowledge-intensive services has been increasing over time, while capital-intensive services have shown a downward trend since the global financial crisis. This has meant that China's export structure has gradually been upgrading from traditional to modern services, as shown in Figure 4.3.

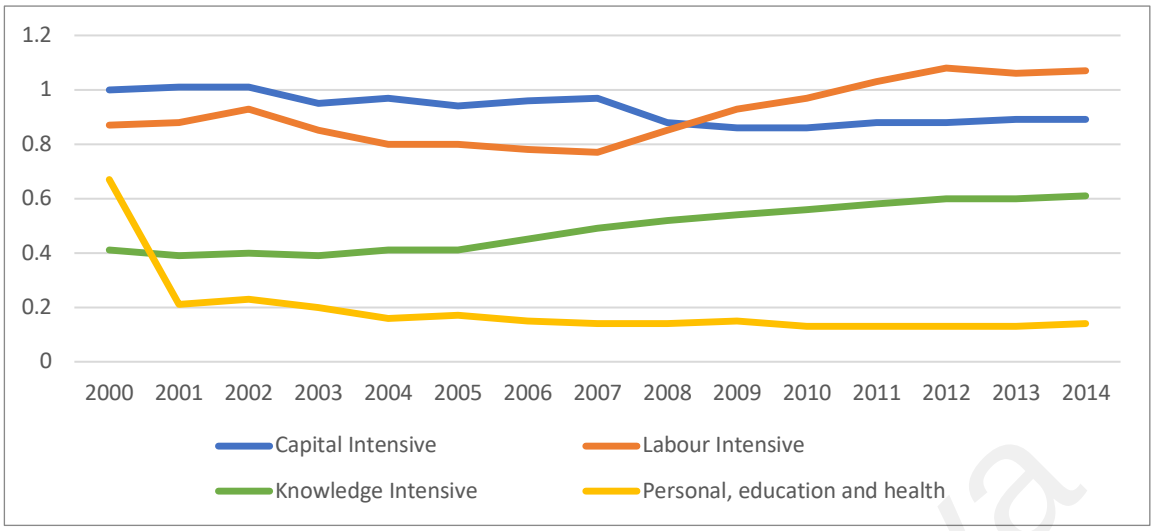

Figure 4.3: The RCA Indices of China's Services Industry in terms of Factor Intensity

Table 4.7: Value Added Export Structure of Primary Countries in 2014 (%)

Countries	Capital-Intensive	Labour-Intensive	Knowledge-Intensive	Personal, education and Health-intensive
CHN	27.76	39.67	27.76	4.81
USA	18.80	25.83	43.88	11.49
GBR	15.86	21.16	53.51	9.47
FRA	25.41	24.53	42.34	7.72
NLD	19.41	28.21	43.94	8.44
DEU	26.34	25.65	40.56	7.46
CHE	14.63	31.61	45.42	8.35
RUS	37.31	43.83	12.94	5.93
BEL	22.42	27.51	42.83	7.25
JPN	24.27	43.57	26.97	5.19
IRL	12.94	15.10	53.89	18.06
CAN	26.48	31.11	32.85	9.55
BRA	24.43	30.23	38.73	6.61
TUR	43.88	33.80	20.64	1.68
IDN	21.42	49.02	21.62	7.94
IND	17.71	29.48	45.09	7.72
MEX	16.75	49.04	33.73	0.48

According to Table 4.7, India's value-added service exports are similar to those of the developed countries, which export more knowledge-intensive services (45.09% of the total value-added service exports compared with 29% of labour-intensive and 16.75% of capital-intensive services). It contributed a large percentage of India's GDP, and the software industry plays a decisive role in its national economy. The rapid development of India's software

industry has benefited from the government's support. In contrast, good education, industrial agglomeration and the dedication of companies have also played significant parts. Also, as a developing country, China's knowledge-intensive industries only accounted for 27.76% of the total value-added service exports, almost 1.7 times less than the share of knowledge-intensive value-added exports in India. Thus, some experience must be obtained from other economies.

4.3.3 Comparison of RCA Indices Based on Value Added Method for Selected Countries

Comparing international competitiveness between developed and developing countries shows China's services' real position and potential worldwide. Generally, the RCA indices of services in developed countries are higher than in developing countries. In addition, the competitiveness index of developed countries has shown an upward trend over time, while for developing countries, it has shown shown a downward trend, as shown in Table 4.8. Specifically, the competitiveness level of Russia and India are higher among the developing countries. However, only India's competitiveness index of services has been greater than 1 over time. The relative competitiveness index of China and Brazil has shown an increasing trend, but with the RCA value still less than 1.

For developed economies, the revealed comparative advantage of some countries was always greater than 1 and has kept increasing over time, as shown in the United States, United Kingdom, France, Belgium, Netherlands, Switzerland and Ireland. The RCA indices of the UK started climbing steadily in 2000, at 1.11, peaking at 1.45 in 2014, which indicates that it had strong international service trade competitiveness. The same conclusion was reached by Guo & Liu (2015). Additionally, from a historical perspective, the RCA indices of the United States' services trade have maintained an obvious and stable comparative advantage, with its RCA

indices falling between 1 and 1.25, indicating that it has relatively strong international competitiveness. The RCA values of Germany, Japan and Canada have been around 1. However, both showed a rising and then falling trend. In the study of Zhang & Chen (2010), the results showed that all the RCA indices of the USA, UK and France were greater than 1 while the RCA indices of the UK kept increasing from 2000 to 2014, conclusions consistent with the above.

Furthermore, from the table above, China has weak competitiveness compared to developed and even developing countries. The RCA indices of China's services moved between 0.6 and 0.9 during 2000-2014, implying that China's services trade had a comparative disadvantage, and the entire trade in service fell behind selected economies except for Indonesia and Mexico. Chen & Yin (2008) also measured the index of RCA and concluded that the Chinese service trade has relative weak competitiveness in the world. However, the competitiveness level gradually increased after the global financial crisis.

Table 4.8: RCA Indices of the Selected Countries in Services based on the Forward-linkage Value Added Method (2000-2014)

Ctr	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA	1.13	1.15	1.23	1.16	1.17	1.20	1.19	1.19	1.19	1.16	1.19	1.20	1.21	1.20	1.19
GBR	1.11	1.13	1.13	1.21	1.25	1.28	1.30	1.32	1.29	1.34	1.38	1.41	1.42	1.45	1.45
CHN	0.73	0.74	0.64	0.70	0.69	0.69	0.69	0.71	0.72	0.74	0.76	0.79	0.81	0.81	0.81
FRA	1.17	1.16	1.14	1.18	1.20	1.22	1.24	1.23	1.26	1.21	1.28	1.32	1.31	1.30	1.30
NLD	1.21	1.11	1.12	1.13	1.15	1.15	1.13	1.13	1.15	1.19	1.27	1.29	1.28	1.38	1.38
DEU	0.97	0.96	0.90	0.97	0.99	1.01	1.01	1.00	1.04	1.03	1.01	1.03	1.02	1.02	1.00
CHE	1.32	1.25	1.21	1.23	1.23	1.26	1.26	1.26	1.25	1.24	1.28	1.30	1.32	1.32	1.30
RUS	1.17	1.20	1.14	1.21	1.04	0.99	1.01	0.99	1.08	1.02	1.03	1.01	0.97	0.96	0.96
BEL	1.12	1.13	1.07	1.13	1.15	1.16	1.18	1.18	1.24	1.24	1.34	1.40	1.39	1.38	1.39
JPN	0.93	0.94	0.95	0.93	0.94	0.93	0.95	0.95	1.03	1.01	1.00	1.02	1.02	0.95	0.91
IRL	1.02	0.97	0.86	1.07	1.11	1.19	1.24	1.25	1.29	1.19	1.26	1.22	1.28	1.32	1.32
CAN	0.90	0.91	0.97	0.94	0.95	0.98	1.01	1.02	1.01	0.97	0.98	0.97	0.98	0.96	0.91
BRA	0.88	0.80	0.77	0.71	0.69	0.79	0.84	0.85	0.85	0.82	0.84	0.83	0.86	0.84	0.83
TUR	1.13	1.15	1.21	1.09	1.12	1.11	1.10	1.12	1.14	1.07	1.05	1.01	1.01	0.95	0.92
IDN	0.51	0.48	0.48	0.56	0.53	0.50	0.47	0.44	0.43	0.42	0.46	0.46	0.46	0.44	0.44
IND	1.11	1.08	0.97	1.13	1.16	1.19	1.22	1.29	1.30	1.21	1.29	1.32	1.23	1.15	1.17
MEX	0.67	0.67	0.68	0.65	0.60	0.61	0.58	0.58	0.58	0.59	0.59	0.55	0.55	0.60	0.60

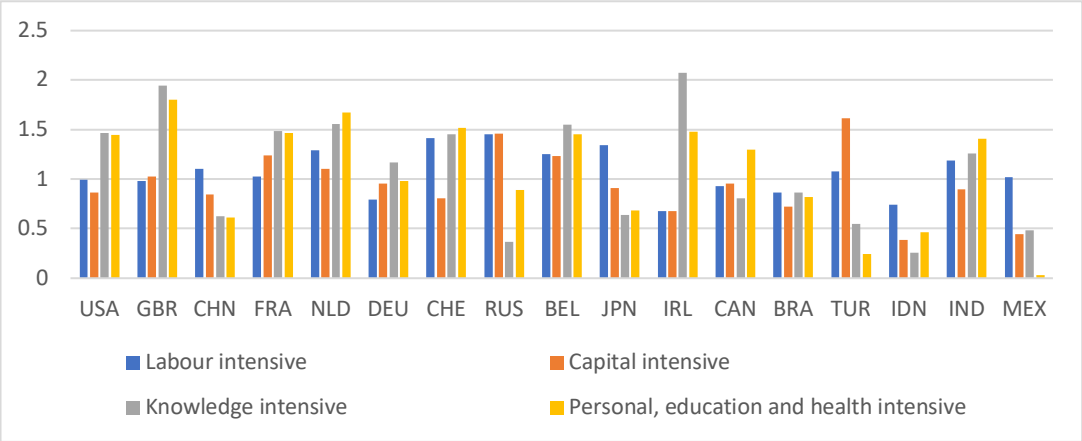

Figure 4.4 : The RCA Indices of Major Economies' Service Industry in terms of Factor Intensity

In general, as shown in Figure 4.4, the competitiveness of; knowledge-intensive, capital-intensive, personal, education and health-intensive services in developed countries are higher than in developing countries due to the high endowments in capital and innovations. Surprisingly, the competitiveness level of India's knowledge-intensive services was similar to developed countries, and it had the highest value among developing countries. According to Figure 4.4, China's knowledge-intensive, personal, education, and health-intensive services fell behind those of developed and even some developing countries, such as Brazil and India, while China has high level of endowments in labour.

Table 4.9 compared the RCA indices of service subsectors in selected economies based on the forward linkage value-added method. It indicated that high value-added service sectors, such as the financial service sector, shows a revealed comparative advantage compared to its other service sub-sectors, which mostly have a significant revealed comparative disadvantage. China has the highest revealed comparative advantage value among the selected developing countries, and its competitiveness level is stronger compared to some developed countries, such as; Germany, France, Japan and Canada.

In addition, the competitiveness of China's traditional service sector was higher than in some developing countries, such as; Indonesia, Brazil, Mexico and India and even some developed countries, such as; the United States, United Kingdom, Switzerland, and Ireland, in its transportation sector. Furthermore, the competitiveness of China's travel sector was also higher than those of; the United States, Germany, France, Netherlands, Belgium, Indonesia, Brazil, Turkey and Mexico. The communication, construction, computer and information, royalties and license, insurance, and government service subsectors had quite weak international competitiveness compared to developed countries. It indicated that China's knowledge-intensive services still lacked international competitiveness in its exports, likely related to its insufficient openness and weak innovation (Zhang & Wang, 2019).

Table 4.9: The RCA Indices of the Service Sub-sectors of the Selected Economies based on the Forward-linkage Value Added Method in 2014

Sectors	USA	GBR	CHN	DEU	FRA	NLD	CHE	RUS	BEL	JPN	IRL	CAN	IND	BRA	TUR	MEX	IDN
c24-c26 c31-c34	0.76	0.85	0.87	0.97	1.23	1.10	0.77	1.55	1.17	0.90	0.60	0.92	0.86	0.77	1.74	0.46	0.32
c36	0.55	1.24	0.93	0.41	0.84	0.39	1.03	0.14	0.84	1.28	1.07	1.96	0.44	0.81	0.45	0.25	1.02
c35 c39	1.57	2.24	0.67	0.86	1.32	1.16	1.04	0.83	1.72	1.03	1.24	0.92	0.86	0.77	0.72	0.46	0.32
c27	0.38	1.73	0.44	1.15	0.49	3.36	0.97	0.54	2.51	0.79	0.41	1.15	1.07	0.89	0.57	0.14	0.83
c42	1.76	2.98	0.39	0.71	0.53	0.84	5.26	0.00	0.96	0.51	4.47	1.35	1.21	0.00	0.29	0.22	0.66
c41 c43	1.35	2.52	1.04	0.61	0.92	1.19	2.65	0.28	1.21	0.73	2.43	0.79	0.84	0.75	0.63	0.20	0.42
c40	0.92	1.78	0.21	1.50	0.92	1.49	1.50	0.00	1.13	0.61	3.80	0.80	7.61	0.33	0.06	0.01	0.13
c37	3.51	1.75	0.00	0.92	0.54	0.80	0.93	0.00	0.62	0.47	11.60	0.31	0.00	0.20	0.00	0.08	0.43
c28-c30 c44-c50	1.30	1.31	0.86	1.09	1.50	1.50	1.20	1.07	1.51	1.00	0.90	0.83	0.84	0.96	0.90	0.94	0.45
c38 c54-c55	1.38	1.93	0.90	0.88	1.25	0.75	0.81	0.30	0.98	0.73	0.75	0.82	2.62	0.58	0.24	0.05	0.54
c51-c53	1.51	1.67	0.34	1.08	1.67	2.55	2.19	1.45	1.90	0.65	2.17	1.75	0.26	1.04	0.25	0.01	0.39

4.4 Conclusions

This chapter has focused on calculating China's competitiveness based on two different estimation methods, undertook a systematic analysis of China's service export structure and compared its international competitiveness with selected economies.

Estimating RCAs from forward linkage value-added exports using WIOD data from 2000 to 2014, this study concluded that China's service exports had a weak comparative advantage, no matter which definition was used. However, estimates based on gross values of exports undervalued China's services exports' competitiveness. Further, these RCA indices have been increasing in recent years, suggesting that this comparative disadvantage has gradually diminished and should reach parity in the near future.

Additionally, the RCA indices based on forward-linkage value-added for major services export sectors showed that only the sectors for other business and financial services were less disadvantaged, but as indicated earlier, their competitiveness has been improving over time. The sectors that have Done relatively well belong to the more traditional service sectors, while others that require human capital depth, technology and capital suffered a greater comparative disadvantage. Since ICT and other "knowledge-based" sectors have low RCAs and low value-added exports, this means that China, in addition to efforts to strengthen RCA, also needs to move up the value chain in the production of such goods and services.

Furthermore, from 2000 to 2014, the value-added export structure of China's services has undergone major changes. It means that the share of exports of knowledge-intensive and labour-intensive services has risen, while the export share of capital-intensive and health, education and public-intensive services have declined. China is

dominated by labour and resource-intensive service exports, while developed countries rely heavily on knowledge-intensive service exports.

China’s services' international competitiveness has gradually improved in recent years. However, it still falls behind developed and even some developing countries, such as Brazil and India. From the value-added perspective, China’s comparative advantage lies in the sectors of; personal and recreational, travel and financial services. China’s services exports have a long way to go before it can catch up with competitiveness with its trading partners in services. However, a positive development has been the rising share of China’s knowledge-intensive service exports as a clear indicator of catching up to access higher global value chains.

This study provides important policy implications for China’s industrial upgrading by the service industry's development and services exports. Understanding the comparative advantage of China’s service industry will help promote the service industry and its exports. This situation will involve firstly changing the direction of exports from labour-intensive to knowledge-intensive. Second, it is important to realise that individual service sectors are not functioning in parallel but rather are self-reinforcing. For example, strengthening investment in higher education would upgrade service quality and other capabilities. Third, expanding the open strategies of “going out” and “bringing in” will promote knowledge-intensive industries' competitiveness while expanding capital-intensive service exports. Meanwhile, “bringing in” refers to the relaxation of foreign investment in China’s service industry under a sound supervision mechanism.

As a final footnote, the current era is the era of the services economy, and the development of the services trade is an important indicator of a country’s economic development level. Vigorously developing the services trade is an important task for expanding opening up, which is conducive to; increasing employment, adjusting

economic structure, and improving development quality and efficiency. Since 2000, China's services trade has developed rapidly, the value-added export structure has been gradually optimised, and international competitiveness has been continuously enhanced. However, the results of international comparisons show that the overall development level of China's services trade is still low.

The government needs to pay attention to the following issues to optimise the export structure and improve the international competitiveness of the services trade. First, it must develop knowledge and technology-intensive service industries and constantly improve the services trade policy support system. Second, emphasis on education and training should be continued. The stock and quality of human capital largely determine the international competitiveness of the services trade. Third, consideration should be given to further opening up China's services market. This outcome can be achieved by introducing foreign capital, advanced technology and management experience. Forcing the services sector to change its operating mechanisms and strengthening management to improve operational efficiency and market competitiveness through the introduced competition mechanism is recommended. However, at the same time, China must be alert to the threat of trade liberalisation of sensitive sectors for national economic security.

CHAPTER 5: DRIVING FACTORS OF CHINA'S TRADE IN SERVICES

5.1 Introduction

This chapter reports and interprets the empirical results of the determinants of China's services exports and imports (at aggregate and disaggregate levels respectively). Section 5.2 presents scatter plots of the key variables in this analysis, namely total service exports, total service imports, GDP of the exporting and importing countries and the distance between them. Descriptive statistics of all variables used to answer the second research question are also given in this section. The following two sections: Sections 5.3 & 5.4, then discuss and compare the different estimation results and key findings of the main contributions to China's total service exports and imports. Section 5.5 compares how factors influence China's services exports and imports under the same estimation method. Robustness testing for the model validity was conducted in Section 5.6. Section 5.7 discusses the regression results and key findings of the factors which drive China's service subsector's exports and imports. Section 5.5 reports the results of the robustness checks for the baseline model. Lastly, Section 5.8 summarises the empirical results for the second research question as a conclusion.

5.2 Estimation of Total Services Exports and Imports

5.2.1 Scatter plots of the Key Variables

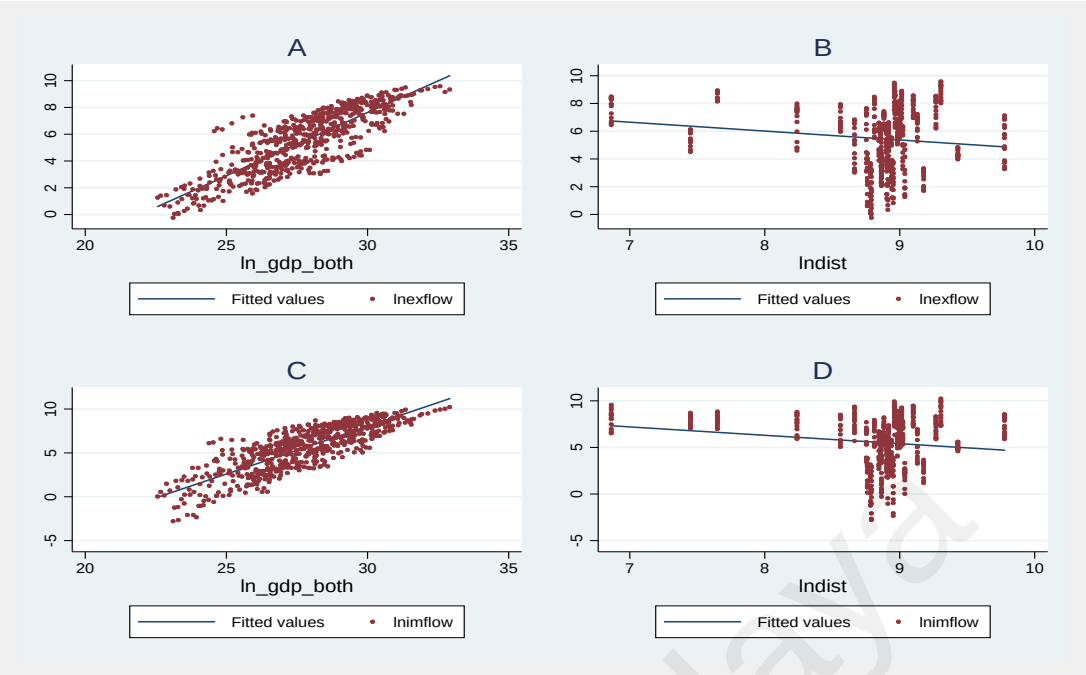

Figure 5.1: Scatter Plot between the Variables (2000-2014)

Panel A in Figure 5.1 shows the relationship between total services exports and the combined economic mass (the GDP of importing and exporting countries). The scatter plot indicates a significant positive relationship between the two variables. Moreover, the line of the best fit shows a strong upward trend, indicating that the GDP had a positive and significant effect on China's services export.

Figure 5.1 (see Panel B) shows a negative relationship between service exports and distance which justifies the relationship described in the gravity model. The relationship between the two variables can be further reinforced based on the line of best fit, which indicates a downward trend. Therefore, the graph confirmed the assumption that trade between two countries was inversely proportional to the distance, reflecting that countries far away tend to trade less.

The scatter plot in Figure 5.1 (see Panel C) represents the relationship between the GDP (combined of importing and exporting countries) and services imports. The graph shows that services imports were positively associated with the combined

economic mass of the country pairs. In addition, the line of the fitted value was confirmed by showing an upward trend. Therefore, the scatter plot indicated that larger country pairs normally trade more.

Figure 1 (see Panel D) shows the relationship between services imports and country distance. A negative correlation with the distance was proved with the trend line falling with services import value which was shown as expected and predicted by theory. It clarifies that the country pairs far apart tend to trade less compared to country pairs located nearby.

5.2.2 Descriptive Statistics

Table 5.1 summarises the descriptive statistics of the variables employed in the regression analysis for the sample of 630 observations from 2000 to 2014. On average, China's services export and imports accounted for US$1280.621 million and US$1761.496 million, respectively. In Table 5.1, the highest mean and lowest mean are 1280.621 and 0.047619, respectively, which correspond to total service exports and contiguity. The import model's highest mean is 1761.496, and the smallest mean is 0.04761, associated with total service imports and contiguity. The maximum values for both the export and import models are 14558.8 and 27870.07, corresponding to total export and total import separately. The minimum value is -7.259094, which is associated with the logarithm of the exchange rate for the export and import models.

Table 5.1: Descriptive Statistics- Baseline Model (full sample N=630)

Variable	Median	Mean	Std. Dev.	Min	Max
EXi	296.7060	1280.6210	2210.6620	0.7892	14558.800
IMi	363.1342	1761.4960	3250.1160	0.0620	27870.070
lnGDPi	15.1000	15.0685	0.7594	13.9572	16.2190
lnGDPj	12.7596	12.6586	1.6612	8.6056	16.6922
lnPCGDPDIFFij	9.9232	9.6621	1.2478	5.5051	12.7054
lnDISTij	8.9179	8.8346	0.4874	6.8624	9.7765
lnRERij	1.9174	1.0744	1.5958	-7.2591	2.7804
CORRUPTi	3.5000	3.5133	0.2249	3.1000	4.0000
CORRUPTj	6.1000	6.0915	2.0925	1.7000	10.0000
lnFIXEDPHONEi	3.0308	3.0121	0.2443	2.4179	3.3134
lnFIXEDPHONEj	3.7533	3.5817	0.6021	0.7343	4.3173
Contigij	0.0000	0.0476	0.2131	0.0000	1.0000
TRIj	0.3100	0.3679	0.1904	0.1200	0.9300

Note: Exi is the aggregate services exports in China. Imi is the aggregate service imports in China. lnGDPi is the logarithm of the Gross Domestic Product in country I (China). lnGDPj is the logarithm of the Gross Domestic Product in country j (China's trading partners). lnDISTij is the logarithm of geographical distance between country i and country j. lnRERij is the logarithm of the bilateral real exchange rate. lnFixedphonei is fixed telephone subscriptions (100 people) in country i. lnFixedphonej is fixed telephone subscriptions (100 people) in country j. CORRUPTi is the corruption perception index of country i. CORRUPTj is the corruption perception index of country j. Contig is a dummy variable that identifies whether two countries share the same common borders TRIj is the trade restrictiveness of country j.

The results of the correlation matrix of the determinants of China's total services exports and imports are exhibited in Tables 5.3 and 5.4. The correlation coefficient ranges from -1 to +1. The larger the absolute value of the coefficient, the stronger the relationship between the variables. Pearson's product-moment correlation coefficient method was used to estimate the correlation between the variables to answer the research questions stated in Chapter 5. According to Hinkle et al. (2003), the strength of the correlation is listed in Table 5.2.

The correlation coefficients were tested through Pearson's product-moment correlation, and the significance level for all correlation coefficients was set at the 0.05 level (two-tailed) and the 0.01 level (two-tailed). Tables 5.3 and 5.4 show that the correlation between the independent and dependent variables was not very high (correlation coefficient less than 0.700). Tables 5.3 and 5.4 show that only single variables

(such as lnDISTij) had a weak relationship with the total service export and import. A negative neglectable correlation (with r equals -.098 and -.1 respectively at a 0.05 level) between lnDISTij and total service exports. Meanwhile, the VIF value of each variable shown in Table 5.5 was less than 10, far below the standard value (Hair et al., 2006). Therefore, multicollinearity was not a serious issue in this context.

Table 5.2: Interpreting the Strength of Correlation

Correlation coefficient (r)	Strength of correlation
r=0.90 to 1.00 or r=-0.90 to 1.00	Very high positive (negative) correlation
r=0.70 to 0.90 or r=-0.70 to -0.90	High positive (negative) correlation
r=0.50 to 0.70 or r=-0.50 to -0.70	Moderate positive (negative) correlation
r=0.30 to 0.50 or r=-0.30 to -0.50	Low positive (negative) correlation
r=0.00 to 0.30 or r= 0.00 to -0.30	Negligible correlation

Source: Hinkle et al. (2003)

Table 5.3: Summary of the Coefficient of Correlation and VIF – Total Service Export

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	VIF
1	export	1												
2	lnGDPi	.276**	1											2.98
3	lnGDPj	.654**	.218**	1										1.67
4	lnPCGDPdif	.348**	.214**	.276**	1									5.53
5	lnDISTij	-.098*	0	-0.038	.083*	1								1.11
6	lnRERij	0.035	-0.012	-.097*	.423**	.348**	1							1.59
7	CORRUPTi	.197**	.740**	.143**	.127**	0	-0.022	1						2.36
8	CORRUPTj	.336**	0.033	.232**	.831**	.104**	.343**	0.021	1					4.42
9	lnFixedphoni	.106**	.331**	.141**	.200**	0	0.066	.092*	0.026	1				1.27
10	lnFixedphonj	.202**	-.106**	0.069	.676**	0.023	.413**	-.083*	.613**	-0.01	1			2.93
11	CONTIGij	-0.049	0	.132**	-.344**	-.176**	-.414**	0	-.351**	0	-.501**	1		1.56
12	TRIj	-.326**	0	-.523**	-.472**	-0.029	-.144**	0	-.579**	0	-.249**	.131**	1	2.19

**.Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.4: Summary of the Coefficient of Correlation and VIF – Total Service Import

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	VIF
1	import	1												
2	lnGDPi	.358**	1											2.98
3	lnGDPj	.580**	.218**	1										1.67
4	lnPCGDPdif	.205**	.214**	.276**	1									5.53
5	lnDISTij	-.100*	0	-0.04	.083*	1								1.11
6	lnRERij	-0.01	-0.01	-.097*	.423**	.348**	1							1.59
7	CORRUPTi	.274**	.740**	.143**	.127**	0	-0.022	1						2.36
8	CORRUPTj	.169**	0.033	.232**	.831**	.104**	.343**	0.02	1					4.42
9	lnFixedphoni	0.071	.331**	.141**	.200**	0	0.066	.092*	0.026	1				1.27
10	lnFixedphonj	.115**	-.106**	0.069	.676**	0.023	.413**	-.083*	.613**	-0	1			2.93
11	CONTIGij	.140**	0	.132**	-.344**	-.176**	-.414**	0	-.351**	0	-.501**	1		1.56
12	TRIj	-.236**	0	-.523**	-.472**	-0.029	-.144**	0	-.579**	0	-.249**	.131**	1	2.19

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

5.2.3 Panel Unit Root Test

This study conducts panel data stationary testing to refrain from spurious regression. More specifically, Levin-Lin-Chu (LLC) (Levin et al., 2002) panel unit root test, Fisher-type ADF (Augmented Dickey-Fuller) and PP (Phillips Perron) panel unit root tests proposed by Maddala & Wu (1999) were adopted to confirm the stationarity of each of the selected variables. Table 5.5 reports the results of the panel unit root tests for the variables in levels. The findings were statistically significant and rejected the null hypothesis that all panels containing a unit root (non-stationary) could be rejected at the 1% significance level, indicating that all listed variables are stationary in level. Thus, it was rational to carry out panel data regression.

Table 5.5: Unit Root Test Results

Variable	LLC Test	Fisher-PP Test	Fisher-ADF Test	Final Result
lnexflow	-7.9731*** (0.0000)	25.8116*** (0.0000)	10.7131*** (0.0000)	I (0)
lnimflow	-5.4320*** (0.0000)	26.7836*** (0.0000)	13.9764*** (0.0000)	I (0)
lngdpi	-7.2682*** (0.0000)	3.6045*** (0.0002)	5.3854*** (0.0000)	I (0)
lngdpj	-12.6383*** (0.0000)	10.1721*** (0.0000)	17.9071*** (0.0000)	I (0)
lnpcgdpdiff	-7.7633*** (0.0000)	7.0355*** (0.0000)	17.8042*** (0.0000)	I (0)
lnrerij	-1.3153* (0.0942)	19.7439 *** (0.0000)	11.7311*** (0.0000)	I (0)
corrupti	-6.7281*** (0.0000)	25.7305*** (0.0000)	13.2426*** (0.0000)	I (0)
corruptj	-3.3114*** (0.0005)	27.9906*** (0.0000)	10.3105*** (0.0000)	I (0)
lnfixedphonei	-3.3216*** (0.0004)	20.6784*** (0.0000)	19.9510*** (0.0000)	I (0)
lnfixedphonej	-4.4184*** (0.0000)	26.5211*** (0.0000)	5.2245*** (0.0000)	I (0)

*Significance at 10%; ** significance at 5%; ***significance at 1%

5.3 Discussion of Results (Export Model)

Before performing the regression analysis, some diagnostic tests were used to check how well the model fitted the data. The Breusch-Pagan Test and its p-values reject the null hypothesis of homoscedasticity and accept the alternative of heteroscedasticity being present

under the OLS estimation method. Subsequently, the p-value results of the Ramsey Reset test under the PPML estimation method were 10.84%. Therefore, at the 5% significance level, the Ramsey RESET test failed to reject the null hypothesis of the correct specification. This outcome indicated that the functional form was correct and that the model did not suffer from omitted variables.

For comparison, two different estimation techniques were used to effectively achieve the objectives reported in Table 5.6 based on Equation (3-62). However, for the reasons outlined in the previous section, this research focused on the results from PPML for this section and the analysis in this paper. 2SLS was used to correct for endogenous issues.

Consequently, these two methods tended to give similar sets of variables which were significant at the 10%, 5% and 1% levels, respectively. Looking at the overall measures of fit for the three estimation models, PPML provided the highest levels of fit (0.85) compared to OLS (0.84). Additionally, the PPML estimation method had a lower standard error than OLS, implying that the observations were closer to the fitted line. The outcomes of the robustness testing (RESET test) confirmed that PPML performed better than OLS.

Concerning the size of the economy, the coefficients of the reporters' GDP and partners' GDP for the three estimation models showed positive and statistically significant relationships at the 1% level in the gravity specification. This outcome suggested that economic growth in China and its trading partners could positively impact China’s services exports. China’s service exports increased by 4.9% and 3.2%, respectively, in the two different models when GDPi increased by 10%. The associated elasticities of economic mass were 0.49 for the exporter and 0.99 for the importer (see Column PPML of Tables 5.6 and 5.7). Therefore, a 10% increase in the GDP of the exporter would,

ceteris paribus and on average, lead to a 4.9% increase in China's services exports and a 10% increase in the importer's GDP would increase China's services imports by 9.9%, ceteris paribus and on average. Interestingly, the coefficients of the GDP of the importer were almost twice the value of the GDP of the exporter, meaning that a high income level in the importing country should incur a higher level of demand for services (Walsh, 2006). In this study, the elasticity of the exporter and importers' GDP was quite important. The significant positive results were consistent with the expected results of gravity models, which were in line with the existing literature in this area, such as those of Park (2002), Kox & Lejour (2005), Guillin (2010), and Karam & Zaki (2013).

As expected, the estimated coefficient of the geographical distance variable showed a negative sign and was statistically significant in these two different estimation techniques. This result was in line with the foundations of the gravity model and consisted of the same number of authors (Grunfeld & Moxnes, 2003; Walsh, 2006; Lennon, 2008; Kimura & Lee, 2004; Kox & Lejour, 2005; Brandicour et al., 2008; Marchetti, 2009), indicating that distance increases would lead to more increase in transportation costs. The results implied that a 10% increase in distance between country i and country j would likely bring down services exports by 6.2% under the benchmark estimation, *ceteris paribus, and on average*. However, this result contradicted the findings from Walsh (2006) and Lennon (2008), who stated that distance proved to be an essential determinant of the goods trade and the coefficient level of distance is larger for the goods trade compared to the services trade (Walsh, 2006; Lennon, 2008; Kimura & Lee, 2004). Since the characteristics of certain services do not require the physical proximity of the providers and the receivers, distance would not be an important element for such services, which corresponds to the services trade theory. It is true for services delivered through cross-border trade, which encompasses 41% of international trade in services (Karsenty, 2000).

The estimated coefficient of the income per person variable (lnPCGDP differences) was negative and significant at the 10% significance level under the PPML estimation method, which exhibited an opposite relationship with OLS. It implied that countries would trade more intensively with each other because consumers with similar incomes are likely to have similar tastes, which leads to production and trade in similar but differentiated products. Therefore, the lesser the difference between two countries' per capita income, the higher the share of the trade that would occur between them and *vice-versa,* which aligns with Kabir & Salim (2010); Tronignon (2010); Dao et al. (2014).

The estimation results of the real exchange rate were in line with other studies, such as; Thomas (2015) and Ahmad et al. (2017). Surprisingly, the variable was found to have an inconsistent sign with the two different estimation methods. Since the devaluation of the domestic currency would promote China's services exports, in this context, the depreciation of the domestic currency would mean the appreciation of the foreign currency. Thus, a positive relationship would be expected for this variable. By comparing these two different estimation techniques, only the PPML technique showed results consistent with the expectation, which aligns with previous studies by Barcenilla & Moleros (2003), and Sahoo et al. (2015). It indicated that a one-unit increase in the exchange rate would lead to a 0.13% increase in export under the PPML estimation.

Table 5.6: Estimation Results for Aggregate Services Exports based on Two Different Estimation Methods

Variables (EX)	PPML	OLS
lngdpi	0.489***	0.320***
	(0.064)	(0.082)
lngdpj	0.748***	0.962***
	(0.015)	(0.028)
lndist	-0.616***	-0.773***
	(0.032)	(0.074)
lnpcgdpdiff	-0.066	0.267***
	(0.049)	(0.074)
lnrerij	0.131***	-0.126***
	(0.018)	(0.029)
CORRUPTi	-0.009	0.0002
	(0.199)	(0.254)
CORRUPTj	0.314***	0.323***
	(0.024)	(0.032)
lnfixedphonei	0.343***	0.168
	(0.118)	(0.168)
lnfixedphonej	-0.182***	-0.538***
	(0.049)	(0.108)
contig	0.280**	-0.613***
	(0.141)	(0.194)
TRIj	-0.270*	0.496**
	(0.139)	(0.255)
constant	-7.017***	-7.794***
	(0.644)	(1.246)
Adjusted R2	0.85	0.84
observations	582	582
Breusch-Pagan Test		0.0038
Reset test	0.1081	0.0008

Notes: This table reports the PPML and OLS panel gravity estimates for services trade, 2000-2014, based on specification (3-62). Dependent variable: service exports. Poisson PML estimation with Std. Err (in parentheses) clustered at the country-pair level. Full sets of exporter-year and importer-year fixed effects were included but not reported. ***, **, and * represent 1, 5, and 10% significance levels, respectively.

The quality of institutions was measured by the degree of corruption in this study. Lennon (2008) claimed that the; degree of corruption, the complexity of export procedures, and rigidity in employment law positively influence trade in services which conformed with Kimura & Lee (2004), who used the economic freedom index as a proxy for institutions. As shown in Column (1) of Table 5.6, the corruption perception index of China was statistically insignificant for China's services exports, while the coefficient of corruption perception index of partner countries showed a positive sign on total service exports, which aligned with Grünfeld & Moxnes (2003), finding that corruption in the importing country tended to impede services trade. Lennon's (2008) study included the

quality of institutions in both exporter and importer countries and found that both positively affected other commercial service exports.

Fixed telephone subscriptions were included as a proxy for the quality of electronic infrastructure for service distribution which was used to assess the availability and use of information and communication technology (ICT) in a country and whether the innovation of ICT had a significant impact on service exports. Column (1) of Table 5.6 shows that fixed telephone subscriptions significantly affected China's total services exports, either in the exporter or importer country. This variable was positive and significant only under the PPML estimation method. The coefficients of China's fixed phone subscriptions were positive for exporting countries, which aligned with the findings of Nasir & Kalirajan (2013) and Lennon (2008), stating that the coefficient of internet users in exporting countries was more significant for service exports. An increase in fixed telephone subscriptions in the exporter country by 100 persons increased total services exports by 34%. Surprisingly, importing countries' fixed telephone subscriptions showed a significant negative sign in the two estimation methods. However, this result contradicted Goswami et al. (2012) and Shingal (2010) who claimed that internet penetration in the importing country positively and significantly affected services exports, whereas that in the exporting country was insignificant in influencing services exports. This difference perhaps reflected that China mostly exports services to developing countries with low internet penetration rates.

Contiguity was a dummy variable representing whether two countries shared a common border. This variable was found to be positive and significant under the estimation of PPML. Common borders positively affected China's total service exports, which aligned with the traditional results of gravity models. Under the benchmark estimation (PPML estimation), a positive and significant relationship was found between

contiguity and total services exports, meaning that countries that share the same border will trade by 1.29% more on average than those not sharing a common border. The result is in line with the study of Kimura & Lee (2004), Lejour & Verheijden (2004), Marchetti (2009) and Guillin (2010). However, it contradicted the findings of Walsh (2006), who found that adjacency was not a significant determinant of any disaggregated services exports, except transportation.

The service trade barriers (TRI) of country j significantly negatively affected China's service exports, suggesting that higher trade barriers in partner countries would discourage bilateral trade. From Column (1) in Table 5.6, this coefficient was the largest compared to other independent variables, which indicated that trade barriers played an extremely important role in services exports. The conclusion was aligned with Grünfeld & Moxnes (2003) and Nasir & Kalirajan (2013), who claimed that the trade barriers of importing countries decreased the country's services exports.

5.4 Discussion of Results (Import Model)

The results in Table 5.7 below depict two different estimation techniques to evaluate the determinants of China's services imports. This study chose the PPML estimation method as the benchmark model. The PPML estimator fitted well by performing the reset test, and the results were consistent even with heteroskedasticity (Silva & Tenreyro, 2006).

In Table 5.7, the estimation coefficients for GDPi and GDPj were found to be statistically significant at the 1% level under the PPML estimation method, which indicated that a 1% increase in country i and j's economic growth would boost China's services imports by about 0.99% and 0.71% respectively. The coefficient for GDPi was larger than the coefficient of GDPj, which indicated a clear home market effect. This outcome was consistent with Grünfeld & Moxnes (2003) and Kimura & Lee (2004) and in line with the highly heterogeneous nature of services. By analysing the services exports

and services imports model, the economic size of both the exporting and importing country was associated with services exports and imports.

The coefficient of geographical distance was statistically significant at the 1% level under the two estimation methods. The model specified that distance exerted a negative influence on bilateral trade flows. Geographical distance was incorporated into the model to measure transportation costs. In the current study, the distance variable was found to negatively impact China's services imports, where increasing the distance between China and its trading partners by 1% would reduce China's services imports by 0.43%. The findings were supported by several authors (Grünfeld & Moxnes, 2003; Lejour & Verheijden, 2014; Kimura & Lee, 2004; Kox & Lejour, 2006). By comparing export and import models, distance mattered more for China's services exports than its services imports.

The coefficient of the GDP per capita difference in the import model indicated a negative and significant sign under the two estimation methods. As discussed in the export model, the large GDP per capita gap between exporting and importing countries reflected the different growth rates between China and a partner country. The negative sign suggests that a large GDP per capita gap would decrease the services trade flows.

The exchange rate variable was included to estimate a country's price competitiveness (Pugel, 2004). An increase in the real exchange rate would make China's goods and services cheaper relative to those of foreign partners, which would encourage more exports of China's services and reduce China's services imports. Thus, the real exchange rate coefficient was expected to have a positive sign on exports and a negative sign on imports. Interestingly, the coefficient of the exchange rate had a positive effect on services exports and imports. In addition, the exchange rate was found to have a greater impact on services exports than imports. Since China mostly exports services of Mode I

and II, such as the trade in goods, an increase in the exchange rate will make services of China relatively cheaper than those of foreign partners, and exports of services will increase as a result. China imports mostly Mode III services, mainly focusing on foreign direct investment (FDI). Therefore, an increase in the exchange rate will encourage investors to invest more in China or services imports will increase. This finding aligned with Dao et al. (2014).

The corruption perception index (CORRUPT) was used as a proxy for institutional quality and was expected to affect service trade because of the intangibility of services and the incapability of consumers to evaluate the service quality before service delivery (Goswami et al., 2012). Therefore, Goswami et al. (2012) suggested having reliable regulations in the services trade to provide better service quality for consumers. Some previous studies have augmented the gravity model by including the corruption index, where higher values represent lower corruption for the institutional quality, and a positive and significant impact was found on the trade in services (Lennon, 2008; Grünfeld & Moxnes, 2003). As shown in Table 5.7, the coefficient of the CORRUPT of country j was found to positively impact China's services imports, which aligned with the above previous studies. It is worth noting that the CORRUPT coefficient in country j had a greater impact on China's exports than its imports. This situation means that China will tend to export its services to countries with lower corruption rates and import services from countries with lower corruption rates.

Fixed telephone subscriptions were a proxy for the general level of infrastructure development (telecommunication density), which allows one to estimate whether information and communication technology (ICT) significantly influences service imports. Since ICT is a tool for promoting productivity and improving trade competitiveness through lowering delivery costs (Nipo et al., 2018), this variable is

expected to positively affect service exports and imports. Column (2) of Table 5.7 indicates that fixed telephone penetration significantly affected China's services imports which showed that a 1% increase in fixed telephone subscriptions per 100 people in countries *i* and *j* would increase China's services imports by 0.38% and 0.44% respectively. The estimation result was in line with the study of Nath & Liu (2017).

Table 5.7: Estimation Results for Aggregate Services Imports based on Two Different Estimation Methods

Variables (IM)	PPML	OLS
lngdpi	0.986*** (0.047)	0.655*** (0.108)
lngdpj	0.714*** (0.019)	1.035*** (0.037)
lndist	-0.426*** (0.041)	-0.357*** (0.114)
lnpcgdpdiff	-0.497*** (0.088)	-0.267*** (0.084)
lnrerij	0.220*** (0.024)	-0.129*** (0.035)
corrupti	0.0005 (0.087)	0.080 (0.337)
corruptj	0.264*** (0.023)	0.259*** (0.035)
lnfixedphonei	0.382*** (0.098)	0.224 (0.230)
lnfixedphonej	0.444*** (0.061)	0.202** (0.099)
contig	2.225*** (0.096)	1.503*** (0.194)
trij	-1.747*** (0.247)	-1.487** (0.363)
constant	-13.136*** (0.571)	-14.304*** (1.635)
Pseudo R2	0.82	0.78
observations	582	582
Breusch-Pagan Test		0.0011
Reset test	0.4894	0.0008

Notes: This table reports PPML and OLS panel gravity estimates for services trade, 2000-2014, based on specification (39). Dependent variable: service imports. Poisson PML estimation with Std. Err (in parentheses) clustered at the country-pair level. Full sets of exporter-year and importer-year fixed effects were included but not reported. ***, **, and * represent the 1, 5, and 10% significance levels, respectively.

Regarding telecommunication infrastructure, the coefficient of fixed phone subscriptions in the exporter and importer countries showed a positive and statistically significant sign for China's services, which suggests that a 1% increase in the fixed phone

subscription of exporter and importer countries will promote China's imports by 0.38% and 0.44% respectively. The results suggested that a more developed telecommunication density in China and its partners would accelerate China's services imports by reducing information costs, and firms exporting services need access to high-quality electronic infrastructure (Goswami et al., 2012).

Contiguity was found to have a positive and significant effect on China's services imports. Gravity literature has demonstrated that countries close to each other would trade more. Thus a positive effect on services imports was anticipated. However, Lejour & Verheijden (2004) stated that adjacency among Canadian provinces reduced their trade in services. Similarly, Kimura & Lee (2004) indicated that contiguity was less important for trade in services than the trade in goods, which was insignificant for services imports (Walsh, 2006).

Walsh (2006) also reported that a common border between two countries only mattered for transport services. Contrary to the previous findings, the PPML estimation of the coefficient of a common border showed a statistically positive sign in the services export and import models, and the coefficient was more significant in the services import model compared to the services export model. This finding was supported by Ahmmad (2015), implying that sharing a common border could reduce trade costs and hence promote services trade between countries.

Trade restrictiveness index measures of the services trade had large negative effects on services exports with elasticities of -1.75 compared to services imports with elasticities of -0.27. It meant that a 1% increase in trade barriers of country j would discourage China's services imports by 1.75%, which was higher than the value in the export model. This result aligned with Grünfeld & Moxnes's (2003) and Shingal's (2010) findings, indicating that higher trade barriers may impede the flow of services.

5.5 Comparison of the Services Exports and Imports based on PPML Method

It should be emphasised that the PPML estimation method was the main focus of this paper to study China's services trade, while OLS was used as a comparative tool. Therefore, Table 5.8 presents a summary of the estimated coefficients based on the PPML estimation method of the key variables for services exports and imports, adjusted R^2 and reset test, drawn from Tables 5.6-5.7.

Table 5.8: Summary of the Estimated Coefficients Based on the PPML Estimation Method

Variables	EX	IM
lngdpi	0.489*** (0.064)	0.986*** (0.047)
lngdpj	0.748*** (0.015)	0.714*** (0.019)
lndist	-0.616*** (0.032)	-0.426*** (0.041)
lnpcgdpdiff	-0.066 (0.049)	-0.497*** (0.088)
lnrerij	0.131*** (0.018)	0.220*** (0.024)
CORRUPTi	-0.009 (0.199)	0.0005 (0.087)
CORRUPTj	0.314*** (0.024)	0.264*** (0.023)
lnfixedphonei	0.343*** (0.118)	0.382*** (0.098)
lnfixedphonej	-0.182*** (0.049)	0.444*** (0.061)
contig	0.280** (0.141)	2.225*** (0.096)
TRIj	-0.270* (0.139)	-1.747*** (0.247)
constant	-7.017*** (0.644)	-13.136*** (0.571)
Pseudo R2/ Adjusted R2	0.85	0.82
observations	582	582
Reset test	0.1081	0.4894

Notes: This table reports PPML panel gravity estimates for services trade (exports and imports separately), 2000-2014, based on specification (39). Dependent variable: service exports and services imports. Poisson PML estimation with std.err (in parentheses) clustered at country-pair level. Full sets of exporter-year and importer-year fixed effects included but not reported. ***, **, and * represent one, five, and ten percent significant level respectively.

There were several differences between services exports and imports in terms of the elasticities of the independent variables. First, when comparing the results for services exports (Column 1 of Table 5.8) with the services imports results (Column 2 of Table 5.8), it was seen that the home country's GDP impacted China's services imports more than its services exports. In addition, the estimated coefficient of the GDP of partner country j was larger for China's services exports than its imports, indicating a strong home market effect in the trade in services. Thus, this study concluded that countries with larger economic sizes tend to import a lot, and such countries tended to export to other countries with large economic sizes, which also had high demands.

Geographical distance was correlated with not only transport costs but with communication costs. It showed a consistent significant sign for services exports or imports at the one per cent significance level. This finding indicated that distance dampens services trade, which aligns with the common perception that physical proximity is crucial for the services trade between producers and consumers. However, it should be mentioned that the services data referred to comprises tradable services, such as travel, transportation, etc. This result may imply that transportation costs for tradable services are also. However, it should be borne in mind that some services, such as; finance and insurance, information and communication, and business services, are more likely to involve low transportation costs. Therefore, further investigation for disaggregated services data is needed to determine how distance behaves among different services.

The per capita GDP difference between China and partner countries had an insignificant impact on China's exports, whereas it significantly negatively affected China's services imports. It is worth noting that a higher per capita GDP difference gap between China and partner countries would decrease China's services imports while not influencing China's services exports.

The real exchange rate between China and its partner countries significantly positively impacted services exports and imports. A positive sign was expected in the export model, while a negative one was expected for the import model, contradicting the findings. This situation denoted that even with the depreciation of the Chinese currency, China's services imports still grew. This outcome was because China imports mostly FDI services. Therefore, an increase in the exchange rate will encourage investors to invest more in China or services imports will increase.

The corruption perception index of partner countries had a significant effect on both services exports and imports, while that of the home country did not affect both services exports and imports. It indicates that the the level of government corruption of partner countries plays an essential role in either China's services exports or imports. The service export model's coefficient was greater than its import model, which denotes that good governance and regulatory management will facilitate services exports more than services imports.

Also shown in Table 5.8 is the telecommunication infrastructure of the home country and partner country, which significantly affected services exports and imports. Fixed phone subscriptions of the home country were found to positively and significantly influence services exports and imports. This outcome was supported by Lennon (2008). It indicates that exporting firms with high-quality telecommunication infrastructure will facilitate services exports and imports, and the effect is greater for services imports than exports. However, this finding was at odds with Shingal (2010) and Goswami et al. (2012).They found no relationship between fixed phone subscriptions of the home country and services exports and claimed that this might reflect the high-quality electronic infrastructure of exporting firms and may not necessarily cover the general population of the home country.

Surprisingly, fixed phone subscriptions of partner countries were found to have a negative and significant impact on services exports, whereas it had a positive and significant effect on services imports. It indicates that China's services exports mainly have focused on developing countries, which have low fixed phone subscription rates, while its services imports come from developed countries, which have access to high-quality telecommunication infrastructure. Comparing Column (2) with Column (1) in Table 5.8 also suggests that fixed phone subscriptions in trading partners matter more than that in the home country. This study's findings differed from previous studies because of the main study objectives of different countries.

A common border as a dummy variable was also correlated with communication costs and distance. Therefore, a significant positive relationship was expected between common border and services exports and imports. It suggests that countries with a common border can reduce communication costs and facilitate greater services exports and imports. Table 5.8 shows that the coefficient of contiguity in the import model is much larger than in the export model, indicating that a common border matters more for China's services import model than its export model.

Finally, the trade restrictiveness index (TRI) was used to measure market regulation (domestic index) and protection (foreign index). The trade restrictiveness index of partner countries significantly impacted services exports and imports. This situation implies that protection from partner countries will decrease China's services exports and imports. Comparing Column (1) with Column (2), trade barriers in partner countries (TRIj) had a greater impact on services imports than exports. This outcome indicates that China's services imports were more easily affected by trade barriers of partner countries than services exports.

5.6 Robustness Checking (Ramsey Reset Test) and Robustness Tests

This study employed the Regression Equation Specification Error Test (RESET) for robustness checking (Ramsey, 1969). The RESET test allows verification of whether the functional form of the estimated equations is correctly specified. More explicitly, the model is misspecified if the functional form between the dependent and explanatory variables shows a non-linear relationship. Thus, by regressing the equation, testing the statistical significance of an additional explanatory variable constructed as $(x'b)^2$, where b represents the vector of predicted coefficients, can verify the appropriateness of the estimated equations (Silva & Tenreyro, 2006).

Table 5.9 shows the p-value of the Reset test for the PPML and OLS methods in total services exports and imports, respectively. When estimating the equation with the Ordinary Least Squares (OLS) method, the correct model specification null hypothesis was rejected, suggesting that estimating the regression equation with the logarithmic form was invalid. Contrary to the OLS estimation method, the PPML technique performed appropriately under the RESET test. The p-values from Table 5.9 under the PPML technique indicated that the null hypothesis of the correct specification could not be rejected for total services exports and imports. In summary, strong evidence has been given by the PPML estimator, which suggested that the PPML technique did not suffer from misspecification errors based on the RESET test. Therefore, it can be concluded that the estimated results based on the PPML regression are reliable.

Table 5.9: Reset Test P-value for Total Services Exports: OLS and PPML

	Total Service Exports		Total Service Imports	
	PPML	OLS	PPML	OLS
P value	0.1081	0.0008	0.4894	0.0008

Note: *P<0.10, **p<0.05, ***p<0.01

Table 5.10: Robustness Tests

	lnexflow 2SLS	lnexflow GLS	lnimflow 2SLS	lnimflow GLS
lngdpi	.327*** (.086)	.320*** (.082)	.694*** (.111)	.655*** (.108)
lngdpj	.962*** (.029)	.962*** (.028)	1.030*** (.038)	1.035*** (.037)
lndist	-.770*** (.086)	-.773*** (.083)	-.371*** (.111)	-.357*** (.110)
lnpcgdpdiff	.209*** (.070)	.267*** (.065)	-.313*** (.089)	-.267*** (.086)
lnrerij	-.119*** (.029)	-.126*** (.028)	-.113*** (.028)	-.129*** (.038)
corrupti	0.102 (.304)	0.000 (.245)	-.029 (.397)	.080 (.323)
corruptj	.344*** (.037)	.323*** (.035)	.276*** (.048)	.259*** (.046)
lnfixedphonei	.300 (.244)	.168 (.166)	.144** (.318)	.224 (.22)
lnfixedphonej	-.473*** (.104)	-.538*** (.100)	.275** (.135)	.202 (.132)
contig	-.539** (.209)	-.613*** (.202)	1.634* (.272)	1.503*** (.267)
trij	0.501* (.289)	.496* (.282)	-1.499*** (0.378)	-1.487*** (.373)
_cons	-8.513*** (1.397)	-7.794*** (1.14)	-14.009** (1.819)	14.304*** (1.507)
Observations	544	582	544	582
Pseudo R^2	.84		.79	
Sargan test	0.4079		0.1267	
Hausman Specification test	0.0001		0.0001	
F-statistics	7640.45		7905.49	

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

This study applied the two-stage least square (2SLS) and feasible generalized least squares (FGLS) techniques for robustness testing to avoid heteroskedasticity and endogeneity issues, as shown in Table 5.10. The result of the Sargen tests could not reject the null hypothesis that the model was not overidentified, implying that the instrument set was valid and the model was correctly specified. The endogenous variable lnpcgdpdiff was identified through the Hausman specification test. The p-value for the Hausman test

was less than the 1% significance level, which rejected the null hypothesis that variables were exogeneous, indicating that lnpcgdpdiff was an endogenous variable. This study included lagged endogenous variables as the instrumental variables, and the F-statistics proved the validity of the instrumental variable. Table 5.10 validates the results in Tables 5.7 and 5.8.

5.7 Estimation of Service Sub-sectors

To test whether the explanatory variables affected the aggregate and disaggregate services trades differently. This section describes the scatter plots of the key variables of the service subsectors. Descriptive statistics are given in the following section. The econometric results and discussion are presented in the last section.

5.7.1 Scatter Plot of the Key Variables for the Services Sub-sectors

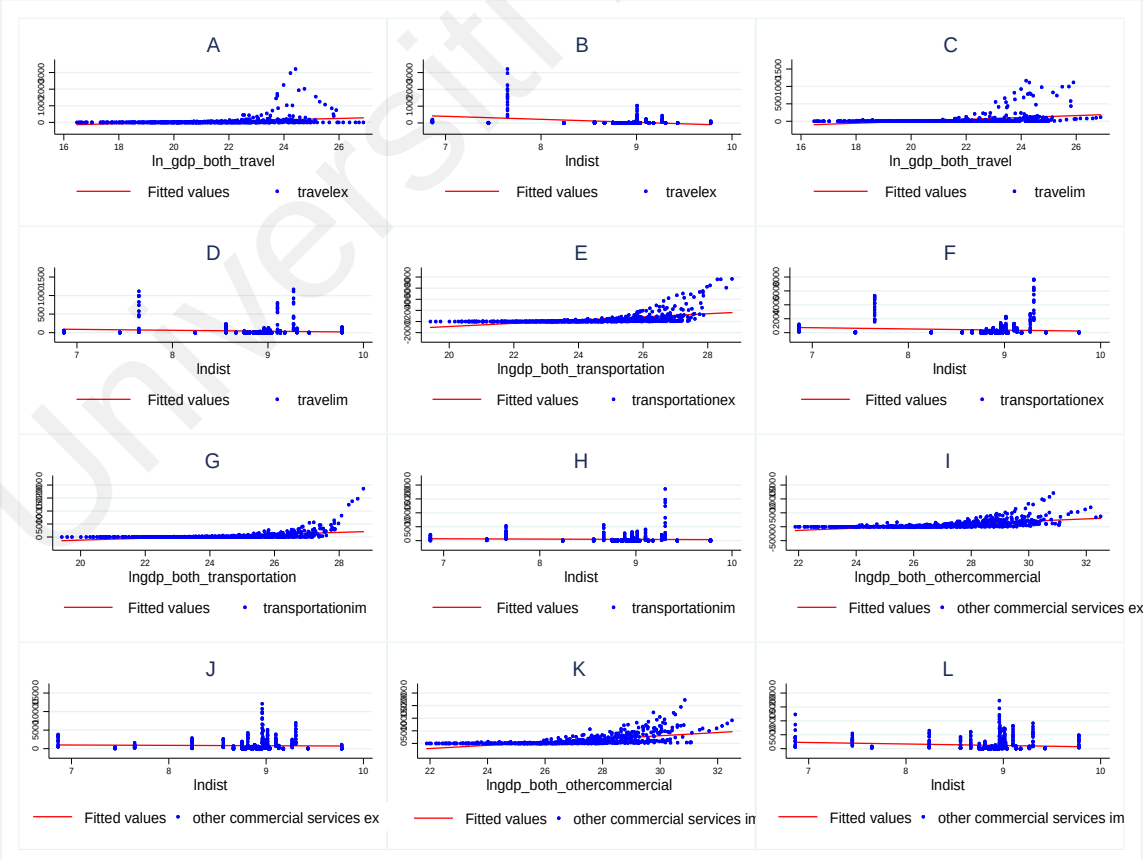

Figure 5.2: Scatter Plot between the Variables in the Services Sub-sectors

Figure 5.2 (see Panels A-L) shows the relationship between the services sub-sectors exports (imports) and combined economic mass (the Gross Domestic Product of importing and exporting countries for the specific service sub-sectors) and the distance. All scatter plots indicate that both service sub-sectors exports and imports were positively associated with the combined economic mass of exporting and importing countries which suggest that larger country pairs were inclined to trade more, whereas a statistically significant negative relationship occurred between service sub-sectors exports (imports) and the geographical distance, representing that those countries located far away tend to trade less which corresponding to the service trade theory.

5.7.2 Descriptive Statistics

This section provides descriptive statistics and the correlation coefficient of the variables used in the analysis. Table 5.11 reports the summary statistics of all the variables used in this study.

The maximum and minimum values in Table 5.11 are US$18601.5629 million and -7.2591, which were associated with transportation, import and exchange rates separately. Overall, China's travel exports and imports registered means of 67.6711 and 43.2634, respectively, which denotes that more than US$67 million and US$43 million in services were exported and imported from 2000-2014. The same explanation also applies to transportation and other commercial services. The mean and median values of the independent variables were similar and will normally be distributed and have a symmetrical distribution. For all dependent variables, such as; travel exports, travel imports, transportation exports, transportation imports, other commercial services exports and imports, whose mean value exceeds the median value, which is right-skewed. The standard deviation of most independent variables was less than 3. With normal data, most observations are spread within three standard deviations on each side of the mean.

Table 5.11: Descriptive Statistics of Services Sub-sectors variables (full sample N=627)

Variables	Median	Mean	Minimum	Maximum	Std. Deviation
Travel ex	1.3492	67.6711	0.0000	3212.8453	281.8841
Travel im	0.6132	43.2634	0.0000	1165.9601	153.6540
Transportation ex	44.1884	396.0713	0.1433	7664.7021	1008.3632
Transportation im	51.7104	483.5521	0.0089	18601.5629	1481.4968
Othercommercial ex	209.2518	816.8791	0.2117	12114.7434	1454.3706
Othercommercial im	282.1439	1235.7906	0.0457	17267.3420	2187.3403
lntravelgdpi	12.1764	12.1714	11.1832	13.1850	0.6830
lntravelgdpj	9.6063	9.4526	5.2937	13.7020	1.7784
lntransportationlgdpi	13.8011	13.6093	12.5420	14.5518	0.6376
lntransportationlgdpj	11.0212	10.8814	6.8767	14.1996	1.5397
lnothercommergdpi	14.7047	14.7237	13.5929	15.9486	0.8059
lnothercommergdpj	12.5049	12.4029	8.2917	16.5495	1.6989
lntravelpcgdpdiff	6.8646	6.2620	-2.1826	8.1842	1.5871
lntransportationpcgdpdiff	8.1275	7.8610	3.2452	9.7226	1.0749
lnothercommerpcgdpdiff	9.6534	9.4040	4.9304	12.6530	1.3158
lndist	8.9179	8.8346	6.8624	9.7765	0.4874
lnrerij	1.9174	1.0744	-7.2591	2.7804	1.5958
corrupti	3.5000	3.5130	3.1000	4.000	0.2249
corruptj	6.1000	6.0915	1.7000	10.000	2.0925
lnfixedphonei	3.0308	3.0121	2.4179	3.3134	0.2443
lnfixedphonej	3.7533	3.5817	0.7343	4.3173	0.6021
contig	0.0000	0.0480	0.0000	1.0000	0.2131

Note: lntravelgdpi represents natural logarithm of GDP of travel services in country i (China), lntravelgdpj represents natural logarithm of GDP of travel services in country j (China's trading partner), lntransportationlgdpi represents natural logarithm of GDP of transportation services in country i (China), lntransportationlgdpj represents natural logarithm of GDP of transportation services in country i (China's trading partner), lnothercommergdpi represents natural logarithm of GDP of other commercial services in country i (China), lnothercommergdpj represents natural logarithm of GDP of other commercial services in country j (China's trading partner), lntravelpcgdpdiff represents natural logarithm of GDP per capita difference between China and its trading partners in travel services, lntransportationpcgdpdiff represents natural logarithm of GDP per capita difference between China and its trading partners in transportation services, lnothercommerpcgdpdiff represents natural logarithm of GDP per capita difference between China and its trading partners in other commercial services.

Tables 5.12-5.17 report the results of the correlation matrix of the determinants of China's services sub-sectors. The correlation between the independent variables and different dependent variables was found to have a low correlation relationship (correlation coefficient less than 0.5). Additionally, most of the independent variables were associated with dependent variables at the 1% significance level, as shown in Tables 5.12-5.17, which indicates that the independent variables could well explain the dependent variables. A weak correlation relationship was found within the independent variables, implying that autocorrelation was not a big issue in this analysis. Furthermore, the VIF value of each variable shown in Tables 5.12-5.17 was less than five, far below the standard value of 10. Thus, multicollinearity was not a serious issue in this context.

Table 5.12: Summary of the Coefficient of Correlation and VIF- Exports for Travel Services

	Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1	travelex	1											
2	lntravelgdpi	-0.04	1										2.68
3	lntravelgdpj	.335**	.186**	1									1.32
4	lntravelpcgdpdiff	.187**	.138**	.373**	1								3.17
5	lndist	-.309**	0	-0.054	0.037	1							1.18
6	lnrerij	-.233**	-0.011	-.097*	.340**	.348**	1						1.53
7	corrupti	-0.051	.730**	.122**	.079*	0	-0.022	1					2.30
8	corruptj	.149**	0.033	.189**	.734**	.104**	.343**	0.021	1				2.42
9	lnfixedphonei	0.059	.348**	.113**	.128**	0	0.066	.092*	0.026	1			1.23
10	lnfixedphonej	.109**	-.105**	0.068	.640**	0.023	.413**	-.083*	.613**	-.009	1		2.40
11	contig	-0.053	0	.084*	-.299**	-.176**	-.414**	0	-.351**	0	-.501**	1	1.49

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.13: Summary of the Coefficient of Correlation and VIF- Imports for Travel Services

	Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1	travelim	1											
2	lntravelgdpi	.205**	1										2.68
3	lntravelgdpj	.329**	.186**	1									1.32
4	lntravelpcgdpdiff	.194**	.138**	.373**	1								3.17
5	lndist	-.079*	0	-0.054	0.037	1							1.18
6	lnrerij	-.106**	-0.011	-.097*	.340**	.348**	1						1.53
7	corrupti	.164**	.730**	.122**	.079*	0	-0.022	1					2.30
8	corruptj	.210**	0.033	.189**	.734**	.104**	.343**	0.021	1				2.42
9	lnfixedphonei	0.068	.348**	.113**	.128**	0	0.066	.092*	0.026	1			1.23
10	lnfixedphonej	.098*	-.105**	0.068	.640**	0.023	.413**	-.083*	.613**	-.009	1		2.40
11	contig	-0.062	0	.084*	-.299**	-.176**	-.414**	0	-.351**	0	-.501**	1	1.49

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.14: Summary of the Coefficient of Correlation and VIF – Exports for Transportation Services

	Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1	transex	1											
2	lntransgdpi	.180**	1										3.11
3	lntransgdpj	.528**	.247**	1									1.20
4	lntransgdpdiff	.173**	.275**	.086*	1								4.06
5	lndist	-.083*	0	-0.065	0.019	1							1.23
6	lnrerij	-.055	-0.004	-.143**	.426**	.348**	1						1.63
7	corrupti	.127**	.703**	.161**	.163**	0	-0.022	1					2.24
8	corruptj	.239**	0.035	.141**	.785**	.104**	.343**	0.021	1				3.37
9	lnfixedphonei	.081*	.441**	.149**	.214**	0	0.066	.092*	0.026	1			1.44
10	lnfixedphonej	.190**	-.103**	-0.016	.601**	0.023	.413**	-.083*	.613**	-.009	1		1.20
11	contig	-0.073	0	.190**	-.320**	-.176**	-.414**	0	-.351**	0	-.501**	1	1.54

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.15: Summary of the Coefficient of Correlation and VIF - Imports for Transportation Services

	variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1	transim	1											
2	lntransgdpi	.246**	1										3.11
3	lntransgdpj	.430**	.247**	1									1.20
4	lntranspcgdpdiff	.100*	.275**	.086*	1								4.06
5	lndist	-0.035	0	-0.065	0.019	1							1.23
6	lnrerij	-0.059	-0.004	-.143**	.426**	.348**	1						1.63
7	corrupti	.202**	.703**	.161**	.163**	0	-0.022	1					2.24
8	corruptj	.113**	0.035	.141**	.785**	.104**	.343**	0.021	1				3.37
9	lnfixedphonei	0.033	.441**	.149**	.214**	0	0.066	.092*	0.026	1			1.44
10	lnfixedphonej	.116**	-.103**	-0.016	.601**	0.023	.413**	-.083*	.613**	-.009	1		1.20
11	contig	.112**	0	.190**	-.320**	-.176**	-.414**	0	-.351**	0	-.501**	1	1.54

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.16: Summary of the Coefficient of Correlation and VIF – Exports for Other Commercial Services

	Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1	commlex	1											
2	lncommgdpi	.304**	1										2.82
3	lncommgdpj	.542**	.211**	1									1.25
4	lncommgdppcdiff	.319**	.193**	.316**	1								5.19
5	lndist	-0.032	0	-0.032	.092*	1							1.18
6	lnrerij	.137**	-0.015	-.090*	.409**	.348**	1						1.57
7	corrupti	.222**	.748**	.139**	.114**	0	-0.022	1					2.39
8	corruptj	.316**	0.032	.251**	.827**	.104**	.343**	0.021	1				3.54
9	lnfixedphonei	.093*	.300**	.141**	.196**	0	0.066	.092*	0.026	1			1.23
10	lnfixedphonej	.153**	-.106**	.085*	.682**	0.023	.413**	-.083*	.613**	-.009	1		2.61
11	contig	-0.013	0	.122**	-.335**	-.176**	-.414**	0	-.351**	0	-.501**	1	1.54

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.17: Summary of the Coefficient of Correlation and VIF- Imports for Other Commercial Services

	Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
1	commeim	1											
2	lncommegdpi	.346**	1										2.82
3	lncommegdpj	.536**	.211**	1									1.25
4	lncommegdppcdiff	.193**	.193**	.316**	1								5.19
5	lndist	-.120**	0	-0.032	.092*	1							1.18
6	lnrerij	0.04	-0.015	-.090*	.409**	.348**	1						1.57
7	corrupti	.259**	.748**	.139**	.114**	0	-0.022	1					2.39
8	corruptj	.160**	0.032	.251**	.827**	.104**	.343**	0.021	1				3.54
9	lnfixedphonei	0.078	.300**	.141**	.196**	0	0.066	.092*	0.026	1			1.23
10	lnfixedphonej	.085*	-.106**	.085*	.682**	0.023	.413**	-.083*	.613**	-.009	1		2.61
11	contig	.136**	0	.122**	-.335**	-.176**	-.414**	0	-.351**	0	-.501**	1	1.54

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

5.7.3 Panel Unit Root Test

The Levin-Lin-Chu (LLC), Fisher-ADF and Fisher-PP panel unit root tests were applied to verify the order of the selected variables for the services sub-sectors. The Fisher-PP and Fisher-ADF panel unit root tests were served for robustness checking. Table 5.18's results stipulate that the p-value was less than the 1% significance level. Thus, the results rejected the null hypothesis that variables were nonstationary and accepted the alternatives, indicating that all the selected variables were stationary at level.

Table 5.18: Unit Root Test Results-Service Sub-sectors

Variable	LLC	Fisher-PP	Fisher-ADF	Final Result
Travel exports	-2.3948*** (0.0083)	13.9503*** (0.0000)	10.9563*** (0.0000)	I (0)
Travel imports	-4.9520*** (0.0000)	14.7684*** (0.0000)	7.8087*** (0.0000)	I (0)
LnGDP_traveli	-5.9945*** (0.0000)	12.8438*** (0.0000)	4.1268*** (0.0000)	I (0)
LnGDP_travelj	-11.8778*** (0.0000)	14.2296*** (0.0000)	16.2905*** (0.0000)	I (0)
LnGDP_transportationi	-7.1126*** (0.0000)	6.7493*** (0.0000)	6.3774*** (0.0000)	I (0)
LnGDP_transportationj	-13.5550*** (0.0000)	15.2340*** (0.0000)	12.4544*** (0.0000)	I (0)
LnGDP_othercommerciali	-8.0618*** (0.0000)	1.4506* (0.0734)	6.6898*** (0.0000)	I (0)
LnGDP_othercommercialj	-12.3893*** (0.0000)	9.4080*** (0.0000)	17.9587*** (0.0000)	I (0)
Lngdppcdiff_travel	-9.6028*** (0.0000)	13.1975*** (0.0000)	17.7128*** (0.0000)	I (0)
Lngdppcdiff_transportation	-11.0878*** (0.0000)	14.8486*** (0.0000)	18.0908*** (0.0000)	I (0)
Lngdppcdiff_othercommecial	-8.2013*** (0.0000)	5.8131*** (0.0000)	17.4982*** (0.0000)	I (0)
Transportation exports	-5.5887*** (0.0000)	25.0499*** (0.0000)	9.1705*** (0.0000)	I (0)
Transportation imports	-2.8360** (0.0023)	23.4122*** (0.0000)	2.8206** (0.0024)	I (0)
Other commercial exports	-3.6246*** (0.0001)	25.8358*** (0.0000)	5.0450*** (0.0000)	I (0)
Other commercial imports	-3.0673** (0.0011)	21.1510*** (0.0000)	3.2929*** (0.0005)	I (0)
lnrerij	-1.3153* (0.0942)	19.7439*** (0.0000)	11.7311*** (0.0000)	I (0)
corrupti	-6.7281*** (0.0000)	25.7305*** (0.0000)	13.2426*** (0.0000)	I (0)
corruptj	-3.3114*** (0.0005)	27.9906*** (0.0000)	10.3105*** (0.0000)	I (0)
lnfixedphonei	-3.3216*** (0.0004)	20.6784*** (0.0000)	19.9510*** (0.0000)	I (0)
lnfixedphonej	-4.4184*** (0.0000)	26.5211*** (0.0000)	5.2245*** (0.0000)	I (0)

5.7.4 Discussion of Results- Travel Exports and Imports

Table 5.19 provides the regression results of the determinants of China's travel exports and imports simultaneously. The robustness check for being well-specified passed the non-hypothesis at the 1% level for the export model and the 5% level for the import model. This outcome indicated that the functional forms of the two models were correctly specified.

Since the nature of services sub-sectors, such as 'Travel' and 'Other commercial services', should differ from total services trade, thus, their determinants should also differ from those of services trade. This section will focus on the determinants of China's services subsectors. Table 5.19 provides the estimated results for China's travel exports and imports separately based on the PPML estimation method.

Economic size (GDP) measures the trading capacity of a country. As reported in Table 5.19, the estimated coefficient of China's GDP in travel was found to have a different sign to China's travel exports and imports, where a 1% increase in China's GDP in travel will decrease China's travel export by 0.78%, whereas a 1% increase in China's GDP in travel will increase China's travel imports. This situation implies that high-income people are more likely to travel abroad. The economic size of a partner country in travel is positive and significantly affects both China's travel exports and imports. Comparing the export model to the import model in Table 5.19 indicates that the foreign market effect dominates China's travel exports, whereas home market effects matter for China's travel imports.

The coefficient of geographical distance had a negative and significant effect on China's travel exports. However, it indicates a positive and significant relationship with China's travel imports which was contrary to what should have been the case following earlier studies. This result could be attributed to a strong consumer base in China. Chinese

residents prefer to travel or study abroad in developed countries far from China, such as the United States, Australia, the United Kingdom, and Canada, due to the good educational resources and cultural customs that are relatively free to follow.

Coming to the impact of the per capita GDP difference, surprisingly, it was found to have different signs on the services export and import model. Column (1) of Table 5.19 shows a positive and significant effect of the per capita GDP on China's travel exports. It indicates that a larger per capita GDP gap between China and its partner countries would increase China's travel exports, implying that countries usually trade more with countries with different factors of endowments. For the import model, China will trade more with countries with similar incomes, tastes and cultures but differentiated products, consistent with the findings in Tham et al. (2018).

The variable representing price competitiveness (exchange rate) was found to have the expected positive sign, and it was statistically significant for the import model (Column 2 in Table 5.19), whereas it showed an insignificant sign on China's travel exports. This outcome indicates that Chinese currency depreciation will reduce Chinese citizens travelling abroad and, hence, decrease China's travel imports.

The coefficient of the corruption perception index of partner countries had a positive and significant sign on China's travel exports and imports. This situation means that China prefers to export and import travel services from countries with low corruption levels. As reported in Table 5.19, the estimated coefficient of the partner country's corruption index was higher for the import model compared to the export model. This result implies that corruption matters more for China's imports than its exports.

Table 5.19: Estimated Results of Travel Services based on the PPML Estimation Method

Variables	EX	IM
lntravelgdpi	-0.783***	1.232***
	(0.069)	(0.172)
lntravelgdpj	0.831***	0.766***
	(0.025)	(0.042)
lndist	-1.140***	0.167***
	(0.126)	(0.090)
lntravelpcgdpdiff	0.245***	-0.287***
	(0.083)	(0.086)
lnrerij	-0.052	-0.254***
	(0.032)	(0.015)
CORRUPTi	-0.168	0.520
	(0.260)	(0.395)
CORRUPTj	0.483***	0.695***
	(0.064)	(0.064)
lnfixedphonei	1.015***	2.433***
	(0.232)	(0.454)
lnfixedphonej	-1.092***	-0.514**
	(0.180)	(0.237)
contig	-4.124***	-3.531***
	(0.252)	(0.451)
constant	11.12***	-31.289***
	(1.674)	(2.916)
Pseudo R^2	0.78	0.61
observations	627	627
Reset test	0.0159	0.6652

Notes: This table reports PPML panel gravity estimates for travel services trade (exports and imports separately), 2000-2014. Dependent variable: travel service exports and services imports. Poisson PML estimation with std.err (in parentheses) clustered at country-pair level. Full sets of exporter-year and importer-year fixed effects included but not reported. ***, **, and * represent one, five, and ten percent significant level respectively.

Fixed phone subscriptions were used to test whether the innovation of ICT had a significant impact on China's travel exports and imports. As shown in Table 5.19, the estimated coefficient of fixed phone subscriptions in China played an essential role in China's travel exports and imports, which were consistent with previous literature. The result implies that a well-developed telecommunication infrastructure in China will promote more travel imports (exports) in China. However, partner countries' fixed phone subscriptions coefficient had a negative and statistically significant sign on China's travel exports and imports. The reason is that a countries with poor telecommunication

infrastructure travel less to China. Additionally, Chinese citizens prefer to travel to countries equipped with good telecommunication infrastructure.

Moving to the common border dummy variable, interestingly, it had negative and significant effects on both models (Table 5.19). This result was consistent with several previous findings (Shepherd & Marel, 2010; Lejour & Verheijden, 2004). However, it was inconsistent with other previous works (Walsh, 2006; Marchetti, 2009; Guillin, 2010). The finding suggests that China trades significantly less with neighbouring countries than you might expect based on distance and market size in terms of travel services. It also indicates that people in China travel more to countries with whom it does not share borders, and China attracts more overseas tourists from non-neighbouring countries.

5.7.5 Discussion of Results-Transportation Exports and Imports

Table 5.20 presents the estimated results of China's transportation exports and imports by applying the PPML estimation method. The Reset test suggest that we can not reject the null hypothesis that the model is well specified, thus it proved that the two models in Table 5.20 were well specified.

The variables representing economies of scale in China and partner countries were all positively and significantly associated with the level of trade in transportation services. Market size and the home market effect were both shown to be critical factors in determining the level of trade in transportation services. As shown in Table 5.20, the result indicates that the home market effect matters more for China's transportation imports than its exports, whereas market size in partner countries plays an essential role for China's transportation exports compared to its imports which was in line with the findings of Walsh (2006) and Lejour & Verheijden (2004). The finding was also

consistent with the model's specification for aggregate export and import volumes and with the prediction of gravity literature.

The estimated coefficient of the variable distance was found to have a negative sign in both transport exports and imports, which aligns with the results of Walsh (2006) and Lejour & Verheijden (2004), who demonstrated that there was significant elasticity in transportation services imports and exports with respect to distance. The finding implies that the longer the distance between China and partner countries, the less transportation services were traded.

Moving to the impact of the per capita GDP difference gap between countries on China's transport services, opposite signs were found in the export and import models. For the export model, as reported in Table 5.20, differences in the per capita GDP were positive and statistically significantly associated with China's transport exports, whereas it was found to have a negative and significant sign on China's transport imports. A positive relationship may imply that China will export transport services more to those countries which have a different factor of endowments. On the other hand, the negative sign indicates that China will import extensively transport from countries that have similar income levels. Moreover, the elasticity of the per capita GDP difference in the import model was stronger compared to the value in the export model, suggesting that a strong income effect was exhibited in China's transport imports.

The estimated coefficient for the real exchange rate had an unexpected negative sign and was statistically significant in the export model, as shown in Table 5.20. Theoretically, undervaluation of the currency was expected to boost export competitiveness and, hence, improve exports (Biggs, 2007). As expected, the results indicated that the real exchange rate exerted a significant impact on services exports. This finding was in line with Chowdhury (1993) and Ahmad et al. (2017). The real sense of

such an increase is that if the services become more expensive due to the exchange rate, the demand may decrease due to customer's inability to pay for such services. A higher exchange rate means that the receiver would be paying more for receiving the same service than had been received before.

Table 5.20:Estimated Results of Transportation Services based on PPML Estimation Method

Variables	EX	IM
lntransportlgdpi	0.359***	1.256***
	(0.092)	(0.095)
lntransportgdpj	1.224***	1.062***
	(0.017)	(0.047)
lndist	-0.208***	-0.134**
	(0.052)	(0.090)
lntransportationpcgdpdiff	0.050***	-0.299***
	(0.055)	(0.095)
lnrerij	-0.070***	-0.006
	(0.007)	(0.013)
CORRUPTi	0.084	0.214
	(0.200)	(0.198)
CORRUPTj	0.261***	0.302***
	(0.027)	(0.025)
lnfixedphonei	0.380***	-0.051
	(0.119)	(0.139)
lnfixedphonej	0.065***	0.986***
	(0.074)	(0.119)
contig	-1.360***	2.339***
	(0.112)	(0.095)
constant	-15.71***	-26.95***
	(0.871)	(1.025)
Pseudo R^2	0.89	0.84
observations	627	627
Reset test	0.4568	0.1513

Notes: This table reports PPML panel gravity estimates for transportation services trade (exports and imports separately), 2000-2014. Dependent variable: transportation service exports and services imports. Poisson PML estimation with std.err (in parentheses) clustered at country-pair level. Full sets of exporter-year and importer-year fixed effects included but not reported. ***, **, and * represent one, five, and ten percent significant level respectively.

Institutional quality measured by the corruption perception index in destination markets (CORRUPTj) hadd a positive and significant influence on transport exports and imports. The impact of the variable was consistent with the expected results and proved the importance of institutional quality in services trade due to the intangible nature of services provision.

The estimated coefficient of telecommunication infrastructure, which was proxied by fixed phone subscriptions, was found to have a significant effect on China's transport exports and imports, as reported in Table 5.20. Fixed phone subscriptions in the domestic market had a significant and positive impact on China's transport exports, whereas it was insignificant on China's services imports. However, fixed phone subscriptions in foreign markets exhibited a positive and statistically significant impact on both China's transport exports and imports. The result was consistent with the results of Shingal (2010) and Sahoo et al. (2014), which demonstrated that well-developed infrastructure in domestic countries would decrease delivery costs and, thus, increase exports. Additionally, the relevance of the importing country's infrastructure could result from the mode of provision of transport services, which requires commercial presence in a foreign country.

Sharing a common border was statistically significant and exhibited negative effects on China's transport exports and imports, consistent with Shepherd & Marel (2010) and Nordas & Rouzet (2015). The findings indicated that China's transport services preferred to trade with countries which did not directly neighbour China.

5.7.6 Discussion of Results- Other Commercial Exports and Imports

Table 5.21 (Columns 1 and 2) presents the results of the determinants of China's other commercial services exports and imports. In statistics, the RESET test is a general specification test for linear regression models. More specifically, it tests whether non-linear combinations of the fitted values help explain the response variable. The p-value of the Reset test could not reject the non-hypothesis, which suggested that these two models were well specified.

The estimated coefficient of the exporting and importing country's GDP in other commercial services revealed a positive and statistically significant effect on both China's other commercial services exports and imports which aligned with the findings of Lejour

& Verheijden (2004). The results in Table 5.21 show that China's other commercial services GDP mattered more for its commercial services imports compared to its exports, whereas foreign country's GDP mattered more for China's exports. This situation implies that the domestic market effect dominated China's other commercial services imports, and the foreign market effect dominated China's exports with regard to its commercial services, which was consistent with the results in transport services.

The variable regarding distance (lndist) had the expected negative sign on both other commercial services exports and imports, which was consistent with the results of Lejour & Verheijden (2004), Walsh (2006) and Brandicourt et al. (2008). Additionally, the effect of the distance coefficient was relatively low for trade in other commercial services compared to transport services due to non-necessary personal contacts between providers and customers, which incurs less cost related to distance. It is often thought that a characteristic of services is the need for proximity between producers and consumers; therefore, distance is important for the services trade.

Looking at the income per person variable (lnothercommercialpcgdpdiff), a negative and significant coefficient for the variable can be seen as denoting a development gap among the countries, which greatly affects the flow of exports and imports. It may imply that China will trade more with countries where consumers have similar income levels with similar tastes and preferences, which will lead to production and trade in similar but differentiated products.

The real exchange rate variable was taken as a measure of relative price and had a significant positive impact on trade in other commercial services in exports and imports. As shown in Table 5.20 (Column 1), Chinese currency depreciation would lead to cheaper domestic products than foreign products and increase services exports. However, the estimated coefficient of the exchange rate in the import model was found to have a

significant positive impact on China's other commercial services, which was contrary to the expected results, whereas the finding was consistent with the aggregate service exports and imports estimation. The results may imply that China's import of other commercial services was mostly foreign direct investment. Thus, an increase in the exchange rate will encourage investors to invest more in China or services imports will increase.

Table 5.21: Estimated Results of Other Commercial Services based on PPML Estimation Method

Variables	EX	IM
lnothercommercialgdpi	0.655***	0.811***
	(0.065)	(0.024)
lnothercommercialgdpj	0.625***	0.624***
	(0.019)	(0.011)
lndist	-0.643***	-0.581**
	(0.027)	(0.044)
lnothercommercialpcgdpdiff	-0.228***	-0.437***
	(0.047)	(0.100)
lnrerij	0.335***	0.292***
	(0.007)	(0.019)
CORRUPTi	-0.043	-0.073
	(0.210)	(0.052)
CORRUPTj	0.404***	0.290***
	(0.020)	(0.036)
lnfixedphonei	0.340***	0.384***
	(0.129)	(0.110)
lnfixedphonej	-0.201***	0.270***
	(0.040)	(0.046)
contig	1.237***	1.946***
	(0.141)	(0.126)
constant	-6.874***	-8.255***
	(0.741)	(0.484)
Pseudo R^2	0.73	0.68
observations	627	627
Reset test	0.9273	0.2538

Notes: This table reports PPML panel gravity estimates for other commercial services trade (exports and imports separately), 2000-2014. Dependent variable: other commercial service exports and services imports. Poisson PML estimation with std.err (in parentheses) clustered at country-pair level. Full sets of exporter-year and importer-year fixed effects included but not reported. ***, **, and * represent one, five, and ten percent significant level respectively.

The institutional quality variable of partner countries (CORRUPTj) had the expected sign for all the services sub-sectors and aggregate services. As reported in Table 5.19, the estimated coefficient mattered more for China's other commercial services

exports than its imports. The corruption perception index's significance suggested that partner countries' institutional quality mattered in providing other commercial services due to their intangible nature and reliance on interpersonal interaction. Moreover, it confirmed that good institutions would decrease trade costs and, hence, increase the services trade, which was in line with the results of Lennon (2008).

A positive and statistically significant sign was found for electricity infrastructure (fixed phone subscriptions) associated with the export (import) of most services sub-sectors, except for the fixed phone subscriptions coefficient in column (1) of Table 5.20. The positive sign and significance of fixed phone subscriptions demonstrated that better infrastructure in ICT will decrease the transportation cost and boost the services trade. On the other hand, the negative sign and significance of fixed phone subscriptions in partner countries implied that China's other commercial services might export to some developing countries with low telecommunication levels.

Sharing a common border (contig) exerted a positive and statistically significant effect on trade in other commercial services, consisting of aggregate services exports and imports estimations. This outcome confirmed that China would trade more intensively with neighbouring countries in the case of other commercial services (one obvious case is the establishment of the Belt and Road Initiative).

5.8 Conclusion

This study has focused on analysing the determinants of China's services exports and imports from the aggregate and disaggregate perspectives. A structural gravity model was employed using panel data to run regressions on China's exports and imports separately with its 42 trading partners, covering a period of fifteen years from 2000 to 2014. The estimated results on total service exports and imports indicated that bilateral services trade flows between China and its trading partner countries have been mainly affected by; the

economic size of China and partner countries, geographical distance, the GDP per capita gap between China and its partner countries, the exchange rate, the institutional quality of partner countries, electronic infrastructure, contiguity and the trade restrictiveness of partner countries.

The key findings are summarised below. . Firstly, the adjusted R^2 values obtained from the service exports and imports model under the PPML estimation method were greater than those from the OLS estimation method. These results implied that the PPML technique performed better than the OLS method as it was robust under heteroskedasticity. A robustness check for the two estimation methods indicated that the PPML model was well specified. However, the OLS method failed to pass the test. Furthermore, the robustness test also validated the PPML model's results.

There were some differences between services exports and imports concerning the elasticities of the explanatory variables. Economic growth in China mattered a lot for China's services imports compared to its services exports. Moreover, the economic size of partner countries contributed more to China's services exports than its imports. This situation implied that countries would import a lot of services if they had a large economic size and would export more services to the countries with large economic sizes.

Geographical distance was found to be highly significant and had an expected effect on China's total services exports and imports. Moreover, the estimated results implied that it was more crucial for China's services exports than for its imports. The result may indicate that transportation costs for China's services exports were higher than that for its services imports, which may reflect the restrictions in its partner countries.

The GDP per capita gap was highly significant in China's services imports and statistically insignificant for China's services exports. This result implied that a large

GDP per capita gap between China and its trading partners would decrease China's services imports, while it did not affect China's services exports.

The real exchange rate was highly significant and positively affected China's services exports and imports. The coefficient of the real exchange rate for the import model was larger than its export model, which implied that China's services imports were more sensitive to real exchange rate volatility than its services exports.

Lastly, it was found that the common border dummy variable exerted a significant positive impact on bilateral services exports and imports, whereas the effect on services imports was greater than for China's services exports. The trade restrictiveness index of foreign partner countries exerted a statistically negative effect on China's services exports and imports, whereas the effects on China's services imports were much greater than on its exports.

China's disaggregated service exports and imports with its 42 global trading partners were estimated separately using the structural gravity equation for three service subcategories to distinguish the significance of the factors across service categories. To be more robust, the PPML estimation method proposed by Santos Silva & Tenreyro (2006) was also robust for heteroskedasticity and zero trade flows and, hence, avoided biased results from the OLS method. In addition, the RESET test confirmed the justification by using the Poisson regression.

The economic size of China and its trading partners greatly impacted the trade of all services subcategories, except travel. The geographical distance was found to have statistically significant and negative signs on transport services and other commercial services, whereas it revealed a significant positive sign on China's travel imports, and it seemed that the effects of this were significantly lower when explaining trade in other

commercial services. The impact of GDP per capita difference indicated a mixed sign for this variable. The significant positive sign suggested that China preferred to import travel, transport and other commercial services from countries with similar income levels. The real exchange rate was also a significant determinant of travel, transport and other commercial services to a different degree.

The corruption perception index, which reflects the quality of institutions in China's trading partners, exerted a positive and significant impact on all three service subcategories. The finding suggests that China traded more services with countries with low corruption rates. Telecommunication infrastructure measured by fixed phone subscription proved to be a significant determinant of trade in travel, transport and other commercial services. Sharing a common border significantly impacted three service subcategories but with a mixed sign.

Overall, this paper's results indicate that service subcategories behave differently from the variables because of the different natures of services. Therefore, an inference that can be drawn from the results for examining policy reforms in that sector-specific characteristics has to be considered.

CHAPTER 6: SERVICES SECTORS CONTRIBUTE TO CHINA'S OVERALL TRADE PERFORMANCE

6.1 Introduction

This chapter presents the findings of the qualitative approach by providing key policies and future guidelines for the services sector to improve its exports globally. More specifically, this study is organised from several aspects. First, after reviewing the existing official documents, policies related to services were identified (industrial policy, fiscal and taxation policy, foreign trade policy, foreign investment policy, environmental services policies, service trade restrictiveness, government policy for modes of supply, and science and technology policy). The following section conducts a coherent analysis to identify the challenges and prospects for China's services sectors. It focuses on the contribution of China's services industry toward; economic growth, the import and export structure of China's services and inward FDI to China's services sectors. On the other hand, it discovers to what extent the COVID-19 pandemic has affected China's services sectors. Finally, the chapter is summarised and concluded.

6.2 China's Policies towards the Development of the Services Sectors

China's economic growth has been mostly driven by the manufacturing sector, which has benefited from a vast low-cost labour pool as the country has opened up to export markets over the last four decades. China has been moving from a manufacturing-heavy economic model to a services-led one as labour and land prices have risen, and its workforce gets more educated. According to government figures in 2013, the primary sector in China accounted for 10% of the GDP, the secondary industry 44%, and the tertiary industry 46%. Services now account for 54% of the GDP and 60% of China's total economic growth, according to the same sectors in 2020. The 14th Five-Year Plan (2021–2025) has encouraged expansion and access to China's services sector, which is good news for international investors. China will continue prioritising the service industry as a source of

innovation and growth in 2021. Breakthroughs in this field can provide insight into potential investment opportunities.

The existing government policies influence China's services industries and trade volume. This section focuses on the principal policies and their effects on the services industry and trade.

6.2.1 Industrial Policy

Industrial policy is crucial for the government to promote industrial development and economic growth (Chen & Xie, 2019). To encourage industry restructuring and optimisation, the State Council of the People's Republic of China issued the Provisional Regulations on Promoting Industry Restructuring in 2005, revised in 2011 and 2013, respectively. Since 2013, historic achievements have been made in China's industrial development with the continuous expansion of scale, structure optimisation and significant enhancement of competitiveness. However, in the context of the strategic transformation of China's economic structure, the Provisional Regulations on Promoting Industry Restructuring (2013 revision) have failed to adapt to China's new economic situation and cannot meet the requirements and, thus, need further amendments (2019 version). Subsequently, the existing industrial policy has been aimed at the manufacturing sector and has had limited policies on the service sector. The latest edition released in 2019 set out the following goals for developing services sectors:

- Increasing the share of the services industry contributed to the national economy, optimising and upgrading its structure and improving its complete and rapid development.
- Implementing the most stringent ecological and environmental protection system and strengthening the protection of; water resources, land, forests, grasslands,

oceans and so on, with an emphasis on controlling the unreasonable exploitation of resources.

- Vigorously developing the modern services industry, improving services efficiency and services quality. It aims to establish a new service industry system and focus on promoting the scale and standardisation of emerging services industries which contribute to remedying the shortcomings of the public services sectors. Human resources and human capital services, elderly care, nursery services, and housekeeping services are encouraged to be added in the new edition. Additionally, education, culture, health and sports services are to be set up separately and independently.
- Focusing on cost reduction in critical sectors, such as logistics, stimulating the development of modern supply chains, and actively developing smart logistics.

The revision and implementation of the "Catalog (2019)" will help the government to strengthen and improve state macro-control and guide the direction of social investment. It is conducive to continuing the development of emerging industries and transforming traditional industries. It is conducive to optimising the allocation of stock resources and expanding high-quality incremental supply. It promotes China's industries to move towards the middle and high end of the global value chain. In the 2019 edition, the service industries encouraged for investment cover; modern services, financial services, science and technology services, business services and commercial trade services, tourism services, postal services and educational, cultural, health and sporting services. Compared with the 2005 catalogue, the latest one lists 72 more service sectors to be encouraged. Furthermore, four new industry categories were added under the encouragement category, including human resources and the human capital service industry, artificial intelligence, elderly care and childcare services and housekeeping.

Additionally, China has gradually intensified the opening up of its services industry. The government has formulated and adjusted many regulations and policies to expand the opening up of the services industry since the 18th Central Committee of the Communist Party of China. A negative list of market access has been launched since 2015. The negative list of service industry market access has been reduced annually, as shown in Table 6.6 (Appendix C), listing some essential measures issued since the 18th Central Committee of the Communist Party of China to relax market access in the services industry. It can be seen that the financial industry, transportation, water conservancy, environment and public facilities management, culture, sports and entertainment, leasing and business services, health and social work sectors have significantly relaxed foreign market access and operating restrictions by relaxing restrictions on foreign equity ratios, industry restrictions, and foreign technical personnel ration restrictions.

6.2.2 Fiscal and Taxation Policy

China's taxation system includes a wide range of taxes on businesses and individuals, including; income taxes (corporate income tax and individual income tax), turnover taxes (value-added tax, business tax and consumption tax), taxes on property (land appreciation tax and real estate tax), and taxes, such as stamp tax, customs duties, motor vehicle acquisition tax, vehicle and vessel tax, and urban construction and maintenance tax. Among these taxes, turnover tax has contributed the most to China's tax revenue at 58.8%, compared to income tax and other taxes, which account for 26% and 15.2%, respectively.

Value-added tax (VAT) and business tax (BT) are levied on goods and services at rates ranging from 3 to 20%. However, to avoid double taxation and support its modern services industry, China launched a pilot program in 2012, replacing BT with a VAT for selected industries, expanding nationwide in mid-2013.

By May 1, 2016, the VAT reform had been completed, with Caishui [2016] No.36 coming into effect, although BT is still being phased out in certain industries. The Value-added tax rates for the sales of services in 2020 are shown in Table 6.1.

Table 6.1:Value-Added Tax Rates of the Sales of Services in 2020

Category	Items taxed	Tax rate (%)
Leasing tangible personal property	Leasing tangible personal property	13%
Real estate leasing services	Real estate leasing services	9%
Construction services	Construction services	9%
Transportation services	Transportation services	9%
Postal services	Mail delivery, postal remittance, confidential communication, stamp issuance, newspaper distribution, other business activities relating to postal items and agents	9%
Telecommunication services	Voice call services, SMS, MMS and transmission of other electronic information using fixed network resources, internet services, and other business activities (e.g., renting or selling bandwidth and wavelengths)	9%
	Value-added telecommunication services	6%
Modern services	R&D, IT services, cultural and creative services, logistics and ancillary services, certification and consulting services, business support services, radio, film and television services, and other modern services except for leasing services	6%
Financial services	Financial services	6%
Life services	Catering and accommodation, education and healthcare, travel and entertainment, culture and sports activities, resident daily services and other life services	6%
Cross-border services	Cross-border services	6%

Source: State Administration of Taxation (2020)

The Chinese government also provides some tax deductions and exemptions to support the development of the services industries. For example, some services are potentially exempt from VAT covering; international transportation (typically provided by foreign airlines or carriers), voyage charter services, other unlicensed aerospace transportation services, broadcast of radio for overseas entities, technology advisory services, engineering and exploration services with related projects or mineral resources located outside of China, certification, verification and consulting services provided to

overseas entities, telecommunications services provided by Chinese providers overseas, trademark and copyright transfer services provided to overseas entities.

6.2.3 Foreign Trade Policy

In 1994, the Chinese government promulgated the Foreign Trade Law that laid out the legal foundation for the modern Chinese trade policy regime and was revised and Promulgated by Order No.15 of the President of the People's Republic of China on April 6, 2004. The law imposed restrictions and prohibitions on international trade in some services for safeguarding; state security, public interests and morals, protecting human health or security and maintaining the balance of international payments of the state.

A call for less reliance on foreign technology and trade and a greater focus on domestic consumption has been central to China's 14th Five Year Plan for 2021-2025. It emphasised shifting growth momentum to; domestic demand, domesticated supply chains, and indigenous innovation. However, the net impact on China's trade balance has been unclear. The import-substitution elements in the strategy do not auger well for reform. Import substitution in key technologies and critical supply chains will likely lead to measures protecting domestic manufacturer market shares and restricting foreign players.

Thus, Beijing continues to encourage trade openness in less technology-intensive sectors. President Xi announced a new "Negative List" on cross-border services trade to improve market access during the Shanghai Import Expo. He also said China would accelerate free trade agreement negotiations. On November 15, 2020, China signed the Regional Comprehensive Economic Partnership (RCEP) with 14 other countries, including; Japan, South Korea, Australia, New Zealand, and the 10 Association of Southeast Asia Nations (ASEAN) member states.

To date, China has concluded 18 FTAs with 26 countries or regions (including; Australia, Cambodia, Chile, Costa Rica, Georgia, Hong Kong, Iceland, Macau, Mauritius, Maldives, New Zealand, Pakistan, Peru, Singapore, South Korea, Switzerland and the Association of Southeast Asian Nations (ASEAN). As a WTO member, China is bound by the General Agreement on Trade in Services (GATS). China does not take part in the negotiations of the Trade in Services Agreements (TiSA). All 18 FTAs concluded by China contain provisions relating to trade in services.

Additionally, the Services Trade Restrictiveness Index (STRI) provides information on services trade policy measures and has been used to evaluate the degree of China's services liberalisation developed by the OECD. The index takes a value from 0 to 1, where 0 is completely open and 1 is completely closed. As reported by the OECD statistics, China's service trade restrictiveness is higher than the global average in all sectors, which indicates that most of China's services sectors are restricted. The least restricted sectors covered by the STRI in China are architecture, engineering and computer services. Courier, broadcasting, air transport, telecoms, and legal services are the most protected.

The restricted services sectors and restrictive measures reflect numerous remaining challenges for China. China has to continue to dismantle discriminatory regulatory measures, informal bans on entry and expansion, various restrictions on the cross-border supply of services, overly burdensome licensing and operating requirements, and other means used to frustrate foreign service suppliers of; banking, insurance, telecommunications, Internet-related, audiovisual, express delivery, legal and other services to achieve their full market potential in China.

6.2.4 Foreign Investment Policy

On 27 December 2020, the National Development and Reform Commission and the Ministry of Commerce issued the Foreign Investment Policy to be implemented from 27 January 2021, replacing its 2019 version. The revision of the 2020 Foreign Investment policy catalogue mainly covers three main areas: Advanced manufacturing industries, Production-oriented service industries and Regional advanced industries in the central, western, and northeastern regions. Additionally, production-oriented services include; R&D and design, commercial services, modern logistics and information services.

Compared with the 2019 Edition, the 2020 Catalogue has increased 127 items and modified 88 others, further expanding the scope of encouraging foreign investment. The catalogue encouraging services for foreign investment includes nine sectors and 84 sub-sectors, two times more than the 2007 catalogue, which only constituted 41 sub-sectors. Furthermore, the catalogue has introduced several preferential policies regarding tariff exemption, enterprise income tax reduction, preferential land supply, etc. The catalogue of service sub-sectors that encourage foreign investment is listed in Appendix D.

More service industries in China are encouraging foreign investment from the catalogue of industries encouraging foreign investment. Improving foreign investment policies in services sectors can attract the FDI required to develop ICT infrastructure, bridge the digital divide and meet the UN's sustainable development goals (SDGs) (Roy, 2016).

6.2.5 Environmental Services Policies

The environmental services industry is defined as service trade activities related to the environment. It is an important branch of the modern services industry and part of China's emerging industries. The environmental services industry is a comprehensive services industry that includes environmental engineering design, construction and operation,

environmental assessment, planning, decision-making, management and other consulting, environmental technology research and development, environmental monitoring and testing, environmental trade, financial services, environmental information, education and training and other service activities related to the environment. The category of China's environmental services industry covers six aspects, as shown in Table 6.2.

Table 6.2: Category of China's Environmental Services Industry

Category	Contents
Environmental technology services	Environmental technology and product development, environmental engineering design and construction, environmental monitoring and analysis
Environmental consulting services	Environmental consulting services, Environmental impact assessment, environmental engineering consulting, environmental technology assessment, environmental management systems, environmental labelling product certification, organic food certification, cleaner production audit and training, environmental information services
Pollution facility operation management	Management, operation and maintenance of various pollution (such as water and air pollution) treatment facilities, noise control facilities
Recycling and disposal of waste resources	Recycling and disposal of waste plastics, waste metals and products, waste papermaking materials, waste chemical products, waste packaging
Environmental trade and financial services	Marketing of environmental-related products, import and export trade, environmental financial services, etc.
Environmental function services	Eco-tourism, artificial ecological environment design

Source: China Environmental Protection Industry Association (2002)

The environmental services industry is policy-oriented. Since the 12th Five-Year Plan, China has issued regulations and policies covering fiscal and taxation, finance, pricing and trade conducive to developing environmental services, promoting sustainable development and environmental health.

First, funds continue to support energy conservation and environmental protection and play a guiding role in financial funds. The budget for energy conservation and environmental protection expenditure in central capital construction expenditure has been reduced, and the budget for energy conservation and environmental protection expenditure in 2019 was 36.268 billion yuan, which was 84.9% of the implementation of energy conservation and environmental protection expenditure in 2018. The budget for natural ecological protection, pollution reduction and other energy conservation and environmental protection expenditures increased in the 2019 energy conservation and environmental protection budget, and the budgets for environmental protection management affairs, environmental monitoring and supervision, pollution prevention, natural forest protection, returning farmland to forests, returning grazing land to grassland, energy conservation and utilisation, renewable energy, circular economy, and energy management affairs have been reduced. In 2019, the scale of special environmental protection funds arranged by the central government reached 55.684 billion yuan, an increase of 2.2% over 2018, mainly focusing on water pollution prevention, air pollution prevention, soil pollution prevention, rural environmental remediation and ecological protection and restoration. While to strengthen the management of funds and improve the utilisation efficiency of the funds, the Ministry of Finance issued special funds for water pollution prevention and control, soil pollution prevention and control, rural environmental remediation, service industry development funds, renewable resources development funds, urban pipe networks and sewage treatment subsidy funds and other fund management methods. It also promoted the issuance of special bonds by local governments and supported major public welfare projects with certain benefits that are difficult to commercialise and comply with financing. Finally, it improved the government's green procurement policy, implemented item list management for government procurement of energy-saving products and

environmental labelling products, and no longer launched the "Government Procurement List of Energy-saving Products" and "Government Procurement List of Environmental Labeling Products".

Second, implementing preferential tax policies to reduce business operating costs. Enterprise income tax is levied at a reduced rate of 15% on qualified third-party enterprises engaged in pollution prevention and control. Additionally, the professionalisation and large-scale development of pollution prevention and control enterprises are encouraged. Revise the catalogue of major technical equipment and products and the catalogue of imported key components and raw materials, and exempt major technical equipment and products from customs duties and value-added import tax. Seven large-scale environmental protection and comprehensive utilisation equipment are involved, including two air pollution control equipment and five comprehensive resource utilisation equipment. Implement inclusive tax relief policies for small and micro enterprises to support the development of small and micro-enterprises. Promote the substantial reduction of value-added tax, the value-added tax rate of manufacturing energy industries will be reduced from 16% to 13%, and the value-added tax rate of transportation and construction industries will be reduced from 10% to 9%.

Third, vigorously develop green finance and strengthen financial support. Issue the Catalogue for the Guidance of Green Industries (2019 Edition) (No. 293 [2019] of the Development and Reform Of Environmental Protection) to define green industries and projects and further clarify industrial boundaries. Promote the work of green financial reform and innovation pilot zones, carry out green financial innovation, and launch innovative green financial products and tools, such as; innovative carbon emission offset financing, green municipal special bonds, and “one village and ten thousand trees” green options. Special bonds can be used as capital for eligible major projects to support

ecological and environmental protection projects. The China Development Bank has increased green financial support to promote industrial energy conservation and green development.

6.2.6 Services Trade Restrictiveness Index

The STRI takes a value between 0 – 1. 0 represents completely open, and 1 represents completely restricted or not open. The estimation index is based on the STRI regulatory database that contains country-specific policy information, which includes 35 OECD members and the economies of; Brazil, China, Colombia, Costa Rica, India, Indonesia, Lithuania, Russia, and South Africa. The OECD Services Trade Restrictiveness Index (STRI) provides information on regulations affecting the services trade in 22 service sub-sectors. It covers computer services, construction, professional services (i.e., legal, accounting, engineering and architecture), telecommunications, distribution, audiovisual services (i.e., broadcasting, motion pictures, sound recording), transport (i.e., air, maritime, road freight and rail freight), courier, financial services (i.e., commercial banking, insurance), logistics services (i.e., cargo-handling, storage and warehousing, freight forwarding, customs brokerage).

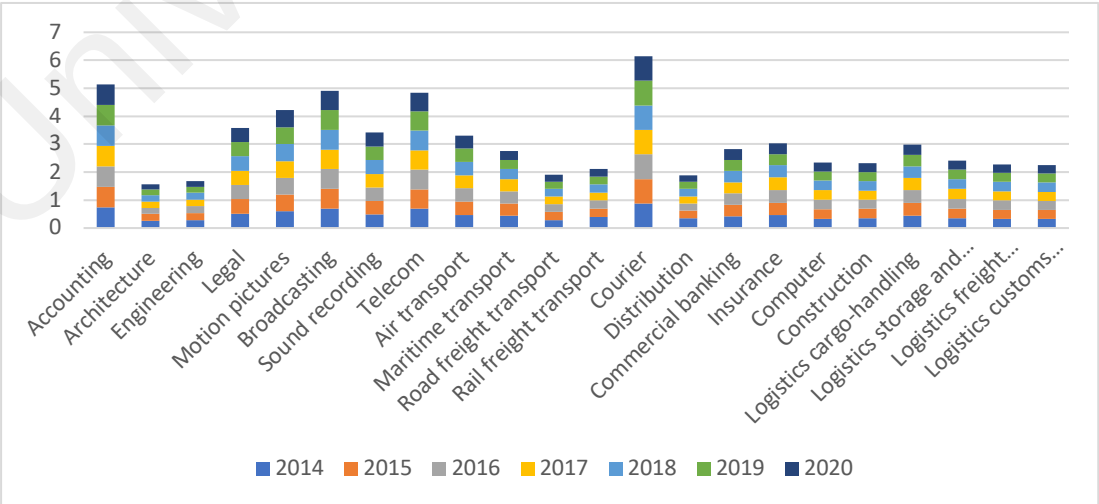

Figure 6.1: China's Sectoral Services Trade Restrictiveness Index from 2014-2020
Source: OECD Services Trade Restrictiveness Index

Figure 6.1 presents the restrictiveness values of China's 22 service sub-sectors. China has high restrictions on courier, broadcasting, accounting and telecommunications. Courier and broadcasting are banned sectors when involving foreign investment. They are facing high trade barriers. However, the courier service and broadcasting industries are not entirely exclusive to international trade. Foreign courier companies can participate in cross-border trade and provide courier services from overseas to China. The broadcasting industry allows contractual joint ventures between foreign and local companies to produce television programmes.

Low STRI index values in construction, rail freight transport, engineering services, and road freight transport mean low restrictions in these services subsectors. Many computer services and engineering activities are encouraged to engage in FDI. Compared with well-performing countries, such as Asia and other countries, construction services are China's least restricted services industry. However, the construction industry is highly regulated due to workers' high likelihood of exposure to hazards. There are no restrictions on foreign ownership in the construction industry, and foreigners can set up construction companies and hire registered architects.

6.2.7 Modes of Supply in Services Trade and Government Policy

According to the IMF's definition of the services trade, which outlines four modes of services provision, as shown in Appendix E. The Chinese government has placed certain restrictions on all four. These restrictions are notably through constraints on foreign investment in sensitive sectors, the visa system (which limits the number of service professionals that can work in China) and its regulation of cross-border payments (which creates administrative burdens for service providers based overseas). As a result, China's imports of services have been relatively low. According to the Economist Intelligence Unit estimates, imports of services reached US$505.5bn in 2019, accounting for 3.5% of

China's nominal GDP that year. This result compares to an average of US$2trn or 4.9% of GDP for the G7 economies and US$1.6trn or 5.3% for Asia and Australia.

6.2.8 Science and Technology Policies

The definition of Science and Technology (S&T) policy in China means an innovation of the national economy and the rapid achievement of that good. It is mainly dedicated to accelerating technology commercialisation, enhancing innovative capacity, prompting sustainable development, improving People's living and health standards and expanding international S&T cooperation. The national S&T strategy priority research areas cover new energy, new materials, environmental protection and modern agriculture technologies. The country's main S&T policy pillars include a 15-year Medium- to Long-Term Plan for the Development of Science and Technology (2006–2020); a Five-year S&T Development Plan or the 13th Five-year Plan; Internet Plus and Made in China (MIC) 2025. The following paragraphs describe the major pillars related to the services trade.

The *Five-year S&T Development Plan* (also called the 13th Five-year Plan) was initiated in 2016, aiming to create innovation-driven development models and conduct an innovation-driven development strategy (Newsletter, 2016). The Plan focuses on increasing the contribution of *S&T* to economic growth (from 55.3% to 60%). It also promotes the proportion of knowledge-intensive services to GDP growth (from 15.6% to 20%).

The Internet Plus action plan, officially unveiled in the 2015 'Government Work Report' (SESEC III, 2015), aims to design China with an innovation-driven economy and enhance its performance (Frietsch, 2020) by integrating all industries, including traditional industries. This integration adopts Internet and Information and Communication Technologies (ICT) by integrating; mobile Internet, big data, cloud

computing and the Internet of things with modern industrial sectors. Internet Plus is mainly dedicated to the service industry – including finance - and services within the manufacturing sector. It aims to make processes 'smarter' and develop new business models. The strategy is designed to merge the capabilities of the Internet with different parts of the economic system, such as; production, finance, or public services. More concrete, 11 action points are mentioned: entrepreneurship, intelligent production, modern agriculture, intelligent energy, financial services, public services, logistics, e-commerce, transport, marine economy, and artificial intelligence. In total, the strategy is rather broad and addresses different topics, not only but mainly in the service industry or at least building on smart services. This outcome means that the strategy is still technology-centred but focuses on services and new business models, i.e., it does not only address mastering technologies but, beyond that, also other parts of value chains.

6.3 China's Services Industry and Trade

This section presents how the Chinese economy has evolved from a primary sector to a tertiary industry economy. It also summarises historical facts about Chinese trade in services.

6.3.1 Services Industry

China's services exports currently suffer in two ways. First, its services export share is lower than other emerging and developed economies (Table 6.3). That is despite China having a larger trade sector relative to its GDP than other countries. And second, although the services trade has grown, its share in China's total trade has hardly shifted from its low base of 10.3% in 2005 only to 14.6% in 2019 (see also Fig 1.15). China's services imports increased faster than its exports from 2009 to 2019. China's average services trade share was 12% of its total international trade from 2005 to 2019, well below the world average of 22%, including both developed and developing countries. As a result, China's

services exports account for 4% of the world trade in services despite its merchandise trade accounting for 13%.

Table 6.3: China's Services Exports Compared to Selected Countries, 2017-19

Country	Trade as % of GDP			Service Trade as % of Total Trade		
	2017	2018	2019	2017	2018	2019
China	1.88	1.99	1.99	14.5	14.7	14.6
US	4.23	4.17	4.07	25.8	25.0	25.8
Germany	8.68	8.69	8.92	20.2	20.0	20.6
Japan	3.38	3.21	3.34	21.7	21.0	22.3
Emerging Economy 1-India	7.06	7.37	7.01	31.2	31.2	32.7
Emerging Economy 2-Indonesia	2.49	2.99	2.78	15.1	15.7	17.3

Source: World Bank Database

China's services trade deficit has alarmed academics, scholars, and policymakers, despite the sector's growing contribution to the country's economic development process. This concern has been due to China's services trade imbalance mostly being focused on transportation, travel, and insurance services, the use of property rights and royalties, and some other areas. Telecommunications, computer and information services, and the construction sector account for the majority of the surplus in services. Furthermore, tourism, transportation, other traditional industries, and capital-intensive and knowledge-intensive services industries have all experienced huge and consistent deficits in recent years.

The service trade is becoming increasingly important to world economic growth (Buckley & Majumdar, 2018). This situation is because many businesses are increasingly profiting from delivering services. Many manufacturers are increasingly incorporating technology into their products. Installation, operation, maintenance, and repairs are all required. Based on a growing reliance on the internet, cloud computing has enabled information and related services to travel across boundaries. This situation poses some concerns as China's deteriorating services trade deficit will stifle the country's services

trade growth (Yuan, 2019; Xu & Li, 2020). It is also believed that the country's services trade deficiencies will undermine any remaining competitiveness in its merchandise exports.

Furthermore, the contribution of the services sector and, as a result, the services trade is a key measure of a country's economic development. Increased employment, increased productivity, and improved development quality are benefits of expanding the services trade (Buckley & Majumdar, 2018). Since 2000, China's services trade has developed rapidly, the value-added export structure has been gradually strengthened, and international competitiveness has been continuously enhanced. However, international comparisons show that the overall development level of China's services trade is still low. While China's economy has been strong, services imports have increased rapidly in recent years, resulting in a large services trade deficit. China's tertiary industry has grown rapidly since the start of reform and opening up. Table 6.4 shows that the annual average growth rate of the tertiary industry's value-added increased by 15.9% from 2000 to 2019, which is higher than China's agriculture and manufacturing industry. Currently, as labour and land costs increase and its workforce becomes increasingly well-educated, with the continuing appreciation of the Chinese currency, the Chinese economy is at a crossroads, transitioning from a manufacturing-heavy economic model to a services-led one. As a result, the tertiary industry's share of the GDP grew to 53.3% in 2021 compared to 39.8% in 2000. Thus, the tertiary industry is becoming vital to national overall economic development.

Table 6.4: GDP and Value-Added of the Tertiary Industry

		Tertiary industry	
Year	GDP (US Billion)	Value added (US Billion)	Share of GDP (%)
2000	1211.35	481.97	39.8
2001	1339.40	552.14	41.2
2002	1470.55	621.28	42.2
2003	1660.29	697.79	42.0
2004	1955.35	805.27	41.2
2005	2285.97	944.93	41.3
2006	2752.13	1150.85	41.8
2007	3550.34	1522.02	42.9
2008	4594.31	1969.11	42.9
2009	5101.70	2265.50	44.4
2010	6087.16	2689.13	44.2
2011	7551.50	3344.79	44.3
2012	8532.23	3879.03	45.5
2013	9570.41	4486.64	46.9
2014	10475.68	5056.71	48.3
2015	11061.55	5616.13	50.8
2016	11233.28	5881.98	52.4
2017	12310.41	6485.71	52.7
2018	13894.82	7401.76	53.3
2019	14279.94	7749.57	54.3
2020	14687.67	7998.69	54.5
2021	17734.06	9543.869	53.3

Source: World Bank

Labour force distribution in the tertiary industry also kept growing and overtook agriculture since 2012, taking the largest percentage of the total employment as shown in Figure 6.2. The number of employees in the services industry keep increasing, and 47.7% of people were employed by the end of 2020, a 20 percentage point increase over 2000, as indicated in Table 6.5.

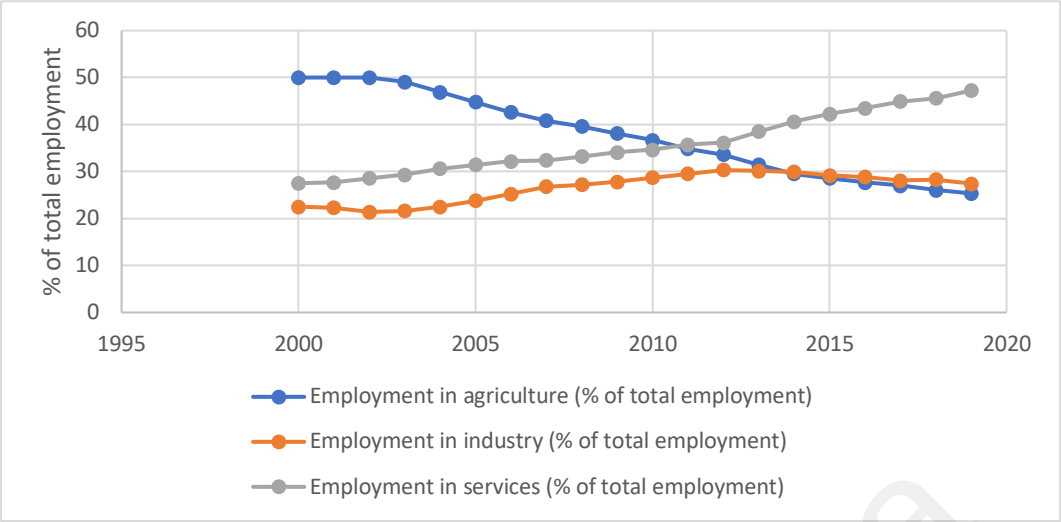

Figure 6.2: Employment Rate of Three Different Sectors
Source: UNCTAD

Table 6.5: China's Total, Tertiary Industry Employment and the Share of the Total Employment.

Year	Overall number of employed people (in millions)	Tertiary Industry	
		Number of employed people (millions)	Share of total (%)
2009	758.28	258.57	34.1
2010	761.05	263.32	34.6
2011	761.96	271.85	35.7
2012	762.54	274.93	36.1
2013	763.01	293.21	38.5
2014	763.49	309.20	40.6
2015	763.20	322.58	42.4
2016	762.45	330.42	43.5
2017	760.58	340.01	44.9
2018	757.82	349.11	46.3
2019	754.47	355.61	47.4
2020	750.64	358.06	47.7

Source: National Bureau of Statistics of China

Figure 6.2 demonstrates the contribution of employment to the agriculture, industry and service sectors. The above graph shows that from 2000 to 2020, employment in the agricultural sector has fallen sharply from 50% to around 20%. However, the employment percentage in the industrial sector has remained flat over the same period. Surprisingly, the services sector has witnessed a significant regular rise in employment

over the years. It seems that the service sector of China is gradually taking over the employment of the agricultural sector. Services is now the only sector in China with positive net job growth. This trend should remain for a long time. It is determined by the increasing demand for services in the economy (Ding & Xu, 2015). It is also due to the difference in labour productivity across the three economic sectors (as shown in Figure 6.3). It is apparent that, due to higher labour productivity, the industrial and services sectors are still attractive to rural migrant workers. Thus, part of the employment growth in services is efficiency-driven, as rural migrant workers move from the low-efficiency farming sector to high-productivity services (Qin, 2006; Wu, 2016).

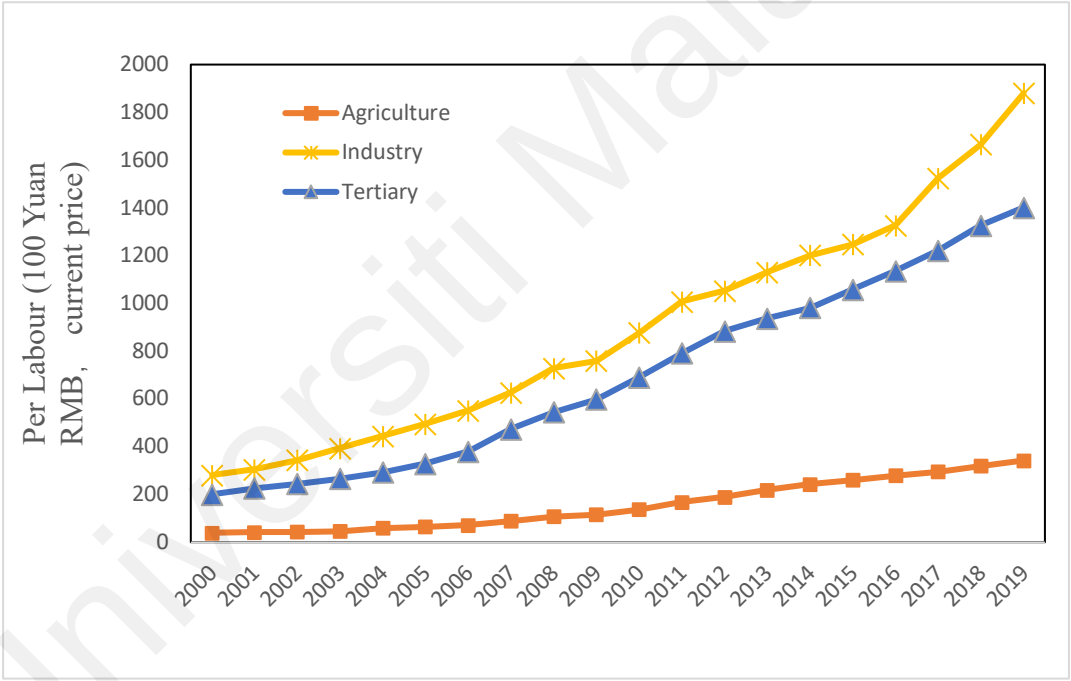

Figure 6.3: Sectoral Labour Productivity in China
Source: Author's calculation using data from NBS (2019)

The wholesale and retail trades and financial intermediation ranked among the top two in the tertiary sector representing 9.5% and 8.0% of GDP respectively in 2017, as shown in Table 6.6. However, before 2009, the wholesale and retail trade and transport, storage and postal dominated China's GDP growth. It shows that knowledge-intensive services are gradually playing a critical role in China's economic growth with the fast

development of technology, reflecting that China is transforming its structure from labour-intensive to knowledge-intensive services.

Table 6.6: Value-added by Sector and Contribution to the GDP (2017)

Sectors	Value-added (billion yuan)	Share of the GDP (%)
Tertiary industry	40774.9	49.7
Wholesale and retail trades	7765.8	9.5
Financial intermediation	6539.5	8.0
Real estate	5396.5	6.6
Transport, storage and postal	3717.3	4.5
Public management and social organisations	3402.4	4.1
Education	2991.8	3.6
Information transmission, computer services and software	2640.1	3.2
Leasing and business services	2188.8	2.7
Health, social security and social welfare	1902.7	2.3
Scientific research, technical services and geological prospecting	1619.9	2.0
Hotels and catering services	1469	1.8
Culture, sports and entertainment	664.8	0.8
Management of water conservancy, the environment and public facilities	476.3	0.6

Source: China Statistical Yearbook 2019, National Bureau of Statistics of China

Since knowledge has become a source of productivity improvement and economic growth, the knowledge economy is an important feature of advanced economies reported by the OECD in 1996. The knowledge-intensive service industry is an important direction for future service industry development. The two sectors are driving China's exports due to its fast development. By comparison, the industries that are strongly linked to social and environmental growth, including health, social care, science testing, technology and geological development; culture, sport and entertainment; and water conservation

management, the environment and public infrastructure fell behind, accounting for just 5.7% of the GDP in terms of their cumulative added value.

6.3.2 The Structure of China's Services Exports and Imports

6.3.2.1 Export Structure of China's Services Trade

The export of traditional services, such as travel, transportation and construction, takes a large percentage of China's services exports. Tourism, transportation and other commercial services are the three pillars of China's services trade exports, accounting for 70% of total service exports in 2018, as shown in Table 6.7. However, it is worth noting that the total proportion of tourism and transportation shows a downward trend. Although the export shares of these two sectors have decreased, they are still the main exporters of China's services trade. It indicates that China still has certain comparative advantages in labour and resource-intensive services sectors.

Table 6.7: Export Share of China's Services Sectors in Year 2010, 2018 (%)

Industry	2010	2018
Transportation	22.34	20
Travel	29.92	18
Construction	9.47	7
Insurance services	1.13	2
Finance	0.87	2
Telecommunication, computer and information	6.84	15
Royalties and license fees	0.54	3
Other commercial services	28.19	32
Personal, cultural, and recreational services	0.08	0
Government services	0.62	1

Source: Uncomtrade database

They were followed by other commercial services, which have increased rapidly since 2010 and accounted for 32% in 2018, contributing to the largest among the service sectors. Since 2009, the stimulating effect of trade in goods on trade in services has weakened, and the proportion of exports of goods-related services has gradually declined. After the subprime mortgage crisis in 2008, China's services trade export structure has

gradually optimised, and high-value-added services exports have grown rapidly, which has become an important driving force for the structural adjustment of the services trade. The fast development of capital and technology-intensive services trade (such as telecommunication, computer information and construction) indicates that China's services export structure is transforming from labour and resource-intensive to capital-technology-intensive industries. The capital-intensive services trade, such as insurance and finance, has significantly improved compared with the export structure in 2010. During the economic crisis, the growth rate increased instead of dropping, indicating the huge potential of these industries. China's trade in services is developing diversification. However, its overall scale is small.

The export share of China's traditional trade in services is decreasing while emerging industries are increasing, as listed in Figure 6.4. Although the three traditional industries of tourism, transportation, and construction account for a large portion of services trade exports, their share is declining. However, services exports from emerging industries are growing rapidly, particularly telecommunications, computer and information services, and personal culture and entertainment services.

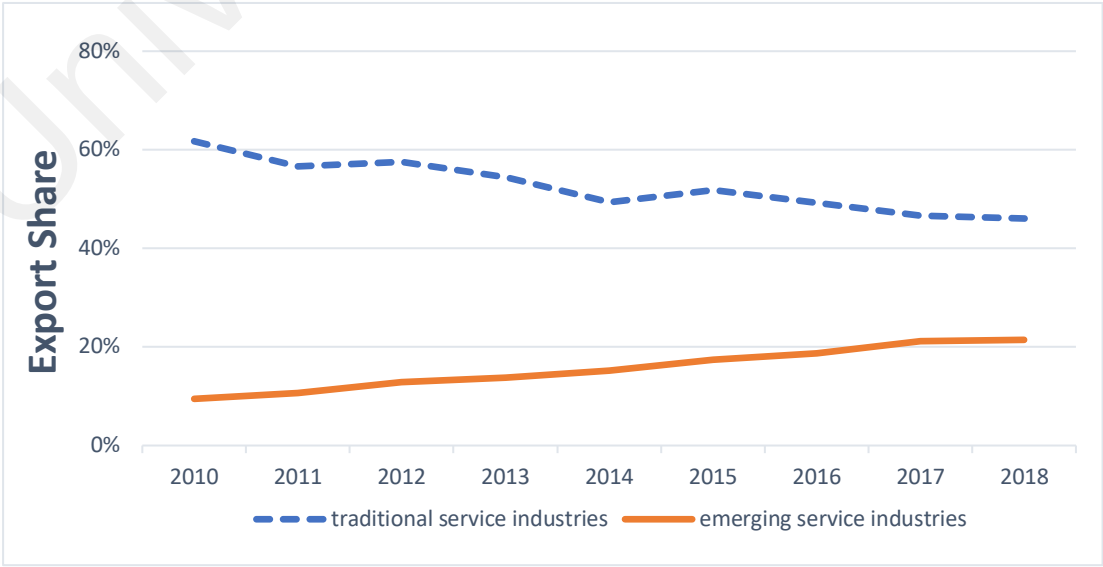

Figure 6.4: Export Share of China's Traditional Services Industries and Emerging Service Industries
Source: UNComtrade database

6.3.2.2 Import Structure of China's Services Trade

In 1990, China's services trade import volume was only US$4.1 billion. As of 2018, the import trade volume had reached US$55.816 billion, with an average annual growth rate of 22.95%. The proportion of the world's total services trade imports was 0. 5%, which increased to 8%. After joining the WTO, China gradually opened up to many important services, such as; construction, financial services, telecommunications, computers and information services, and other commercial and public social services. Similarly, service trade exports, transportation, tourism, and other commercial services are also the main sectors of China's services trade imports, as shown in Table 6.8.

Furthermore, it should be realised that the proportion of tourism services imports has increased substantially and has exceeded half of the overall services imports. It has indicated that more people prefer to travel abroad as income increases. The proportion of imports of transportation, insurance and pension services has dropped significantly. In contrast, the proportion of emerging services trade has not changed significantly, especially for the import of knowledge and technology-intensive services. Thus, China's services trade import structure needs to be improved to present a polarised and unbalanced development trend, as there is a huge gap for developing emerging services trades, such as finance, insurance, and telecommunications.

Table 6.8: Import Share of China's Services Sectors in Year 2010, 2018 (%)

Industry	2010	2018
Transportation	33	20
Travel	28	55
Construction	3	2
Insurance services	8	2
Finance	1	0
Telecommunication, computer and information	2	4
Royalties and license fees	7	6
Other commercial services	18	9
Personal, cultural, and recreational services	0	1
Government services	0	1

Source: UNcomtrade database

China’s main trading partners in services are the European Union, the United States and Hong Kong. Hong Kong was China's largest services trading partner before 2014. In 2014, the EU took the place of Hong Kong to become China's largest services trading partner for the first time. The U.S. has always been China’s largest source of services trade deficit, and the deficit gap is increasing yearly.

The “Belt and Road” initiative has significantly promoted the development of China’s services trade. China’s services trade with countries along the route continues to deepen. In 2017, the total services trade between China and the countries along the “Belt and Road” reached 60.34 billion yuan, a year-on-year increase of 18.4%, accounting for 14.1% of foreign services trade. The export value of the services trade in B&R countries was 20.865 billion yuan, a year-on-year increase of 6.2%, accounting for 13.5% of total services trade exports. Services imports amounted to 4.51.69 billion yuan, an increase of 25.1% year-on-year, accounting for 14.3% of total services trade imports. However, at the same time, China's services trade deficit with countries along the route has continued to expand. In 2017, the deficit reached 2.43.04 billion yuan, an increase of 78.49 billion yuan compared with 2016. The proportion of China's total foreign services trade deficit has also increased. From 10.0% in 2016 to 15.0%. The services trade between China and the countries along the “Belt and Road” is expanding, and the countries along the route have become China's important services trade import and export markets.

Based on the above analysis of the imports and exports of the service trade, it can be seen that the three traditional sectors of tourism, transportation and construction account for a considerable proportion of the import and export structure. However, rapid development has been seen in capital and technology-intensive industries, such as; insurance, finance, telecommunications, computer and information services. The

traditional service trade has generally shown a downward trend. China's services trade import and export structure is gradually optimising and becoming diversified.

The development trend is obvious. Additionally, China's total services trade imports are still greater than the total exports at this stage. The services trade deficit still exists, and the services trade balance with developed countries, such as Europe and the United States, is expanding yearly. With the "Belt and Road" initiative, China's services trade relationships with countries along the route have deepened. Cooperation in high value-added services trade fields, such as finance and information, has achieved remarkable outcomes, which has promoted China's capital, technology and knowledge-intensive industries. The cooperation has promoted the continuous optimisation of China's services trade import and export structure.

6.3.3 China's Inward FDI to Service Industry

Inward FDI plays an essential role in China's economic development, contributing on average 50% of China's foreign trade, 25% of its industrial production, 15% of urban jobs, and 20% of its tax income. The total FDI flow may impact the country's economic structure and domestic economy.

According to the Ministry of Commerce, China, foreign investment in manufacturing has been declining, while the actual use of foreign capital in services shows an increasing trend. Moreover, utilising foreign investment in services overtook manufacturing for the first time in 2011, and the trend continues, as shown in Figure 6.5. Using foreign capital in the services industry will continuously expand, accelerating China's economic transformation and upgrading.

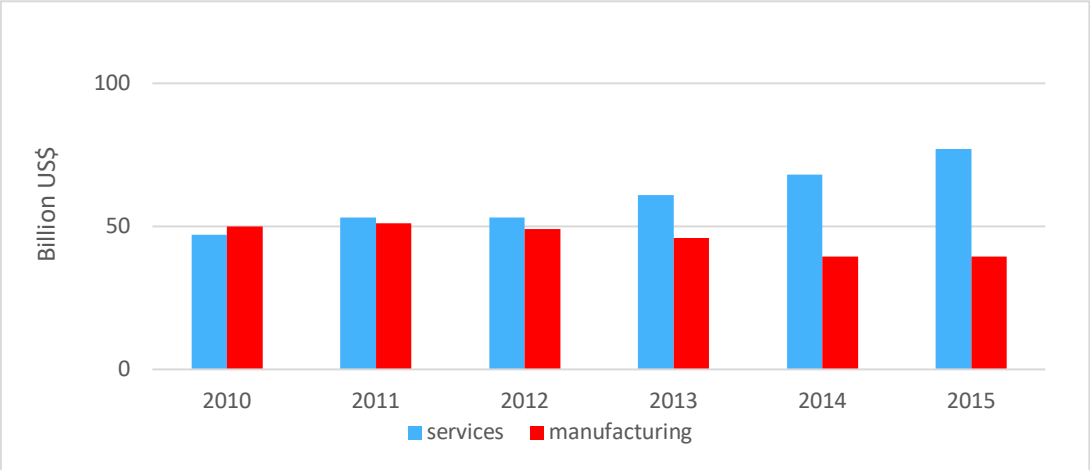

Figure 6.5:Inward FDI in the Services and Manufacturing Sectors in China 2010-2015
Source: Ministry of Commerce, China

Furthermore, foreign investment in; manufacturing, agriculture, forestry, and fisheries have decreased. In 2019, foreign capital was used in manufacturing to account for over a quarter of total domestic output, while agriculture, forestry, and fishing accounted for only 0.4%. Two basic factors can explain the tendency. First, developed countries have devised several measures in recent years to encourage the return of manufacturing businesses to increase employment. Second, as local factor prices have risen, foreign money that had previously flowed into labour-intensive industries has begun to move out to neighbouring nations, such as; Vietnam, India, and other Southeast and South Asian countries. Furthermore, foreign capital to China's services industry is gradually increasing with the increase in China's attractiveness to foreign investment. This situation will improve China's per capita disposable income and potential demand and, thus, increase potential demand and the level of foreign investment flows into China.

Table 6.9:Utilisation of Foreign Capital by the Services Industry

Year	2006		2019	
Sector	Value (US$ 100 million)	Ratio (%)	Value (US$ 100 million)	Ratio (%)
Construction	15.9	1.1	12.2	0.9
Transport, Storage and Post	137.6	9.7	45.3	3.3
Information Transmission, Software and Information Technology	2.2	0.2	146.8	10.6
Wholesale and Retail Trades	158.9	11.2	90.5	6.6
Hotels and Catering Services	14.6	1	9.7	0.7
Financial Intermediation	0	0	71.3	5.2
Real Estate	293	20.7	234.7	17
Leasing and Business Services	4.4	0.3	220.7	16
Scientific Research and Technical Services	6.1	0.4	111.7	8.1
Management of Water Conservancy, Environment and Public Facilities	0	0	5.2	0.4
Service to households, Repair and Other Services	5.5	0.4	5.4	0.4
Education	-	-	2.2	0.2
Health and Social Service	-	-	2.7	0.2
Culture, Sports and Entertainment	-	-	6.3	0.5

Source: China Statistic Yearbook, 2020

As shown in Table 6.9, the information transmission, computer service and software industry, leasing and business services industry, scientific research, technical services and geological prospecting industry, and the financial industry grew rapidly in 2019 compared to 2006. The share of foreign capital in national output increased by more than 5%. Additionally, management of water conservancy, environment and public facilities, culture, sports and entertainment maintained steady growth, whereas the proportion of real estate showed a slightly decreasing trend as a result of the regulation adjustment of the real estate market by the government in recent years. Therefore, the utilisation of foreign capital in the services industry has kept increasing in recent years, and the sectors are gradually strengthening due to foreign capital inflows.

Currently, the services sectors migrated to China due to foreign direct investment still do not meet China's requirements for expanding its services sector and trade in services. With the increasing internationalisation of services, one of the primary objectives of China's foreign investment policy is to expand its worldwide outsourcing industry through the use of foreign capital.

6.4 COVID-19 Pandemic and China's Services Trade

6.4.1 Introduction

Trade in goods and services globally has been severely affected by the outbreak of the Coronavirus (COVID-19). This section aims to discover how the COVID-19 pandemic influenced China's trade in services and goods by using the current data from December 2019 to September 2021.

The World Health Organization announced that the COVID-19 pandemic was an international public emergency from the onset of the pandemic at the end of 2019 till today. China has controlled the epidemic well. However, it has continued to spread to more than 90 countries and regions by July 18, 2021, increasing uncertainty risk and leading to global economic recession. The United Nations Conference on Trade and Development (UNCTAD) reported that the coronavirus pandemic cut global trade values by 3% in the first quarter of 2020. In addition, the downturn is expected to accelerate in the second quarter. Global trade is projected to record a quarter-on-quarter decline of 27%, according to the Committee for the Coordination of Statistical Activities (CCSA) report. According to a UNCTAD report, by 2020, the trade contraction caused by the COVID-19 pandemic will be deeper than the one observed during the financial crisis of 2008–2009.

6.4.2 Services Trade Reacts to COVID-19

Borchet & Mattoo (2009) found that the resilience of the services trade was better than that of the goods trade in response to the crisis. According to Ariu (2016), trade in services was far less affected by the global financial crisis in 2008-09 than merchandise trade. He explained that services represent essential inputs for the production process, that their flow must be continuous, and that they cannot be stored, nor can they easily be modified in reaction to fluctuations in output. Therefore, even during the crisis, firms continued importing services that provided fundamental production inputs.

Figure 6.6 shows China's export and import trade in goods and services from December 2019 to September 2021. The export of goods trade declined from US$232.48 billion to US$184.18 billion by March 2020, which contributed to the decrease rate by 20.7; then it started to recover slowly in April 2020 and maintained a stable increase until January 2021, after which it showed an increasing trend as a result of the rapid recovery of the Chinese economy. Meanwhile, services exported decreased from US$26.08 billion in December 2019 to US$18.34 billion in May and began to rise, reaching US$32.08 billion by September 2021. Figure 6.6 indicates that the growth rate of China's trade in goods and services showed a downward trend during the pandemic. However, the fluctuation in the goods trade was larger than that in the services trade.

Additionally, the imports of China's trade in goods and services both decreased slightly within the same period. However, the fluctuation of the services trade was smaller. It confirms the previous statement that the services trade is more resilient than merchandise trade.

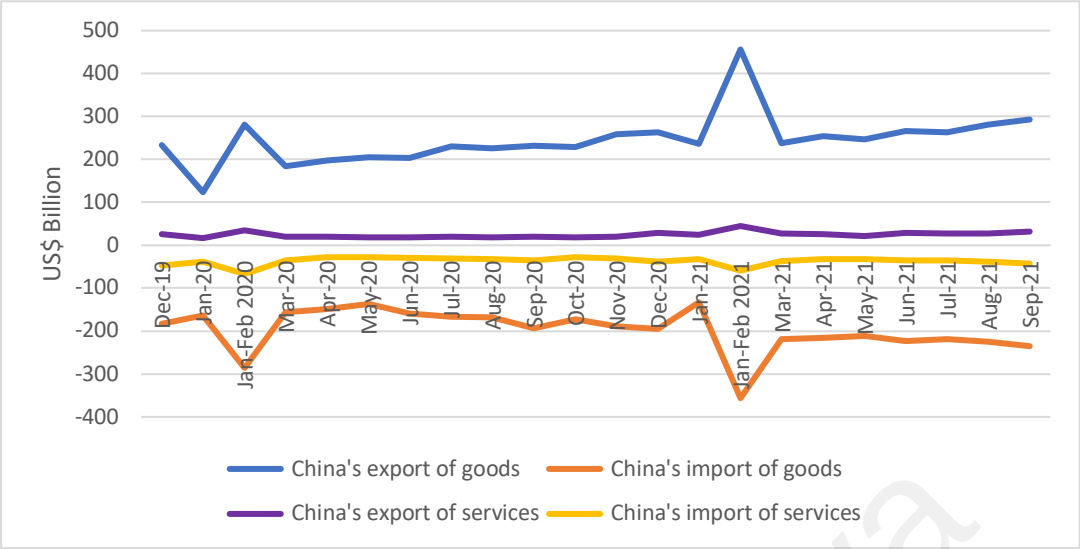

Figure 6.6: International Trade in Goods and Services of China
Source: State Administration of Foreign Exchange: International trade in goods and services of China (updated to September 2021).

6.4.3 Travel and Transportation Services Trade Deficit Declined

According to the classification of the WTO, the services trade field can be divided into 12 major categories and nearly 160 sub-categories. There are a large number of services sectors. However, the outbreak of the novel coronavirus has caused different degrees of impact on various services sectors. The COVID-19 pandemic has caused severe damage to services, such as tourism and transportation services, due to strict regulations at borders, the implementation of blockades and constraints on tourism and trade. Tourism has been one of the fastest and hardest-hit sectors of the economy. Evidence shows that sectors such as; airlines, hotels, cruises and tour operations experienced devastating damage (Gössling et al., 2020; Uğur & Akbıyık, 2020; Yang et al., 2020). The travel and tourism industry contributed US$1.6 trillion to China's GDP in 2019. However, the sector took a major hit in 2020 due to the coronavirus pandemic. According to ministry data, the total number of domestic tourists in 2020 was 2.879 billion, a decrease of 52.1% over the same period in 2019. Domestic tourism revenue was 2.23 trillion yuan, a year-on-year fall of 61.1%, as shown in Table 6.10. In the first half of 2021, the number of domestic trips fell 40% to 1.871 billion, and total domestic tourism spending plummeted by about

40% to 1.63 trillion yuan, compared with the same period in 2019, according to the Ministry of Culture and Tourism. China has made significant achievements in containing COVID-19 and mitigating its effects on the tourism and hospitality sectors.

Table 6.10: China's Domestic Tourism (2011-2020)

Year	Total Trips (billion)	Revenue (trillion yuan)
2011	2.64	1.93
2012	2.95	2.27
2013	3.26	2.63
2014	3.61	3.03
2015	4.00	3.42
2016	4.44	3.94
2017	5.00	4.56
2018	5.54	5.13
2019	6.01	5.73
2020	2.88	2.23

Source: Ministry of Culture and Tourism, China

The fluctuation of tourism services is the largest compared to other service sectors in China, followed by transportation services based on China's services export data from December 2019 to September 2021. The export of tourism services accounted for 14.76%, and that of transportation services accounted for 19.02% in 2019. On the contrary, the import of tourism services accounted for 50.74%, and that of transport services accounted for 20.96%. Furthermore, tourism exports show a serious downward trend from US$3.00 billion in December 2019 to US$0.9 billion in September 2021. Over the same period, tourism imports fell from US$21.80 billion in December 2019 to US$7.6 billion. After that, it shows an up and down trend. Then it reached US$10.6 billion in September 2021, as indicated in Table 6.11.

Table 6.11: International Trade in Travel and Transport Services of China (billions of US$)

Item	Transport			Travel		
	Balance	Exports	Imports	Balance	Exports	Imports
Dec-19	-5.20	4.60	-9.90	-18.80	3.00	-21.80
Jan-20	-4.60	3.30	-7.90	-18.30	2.40	-20.70
Jan-Feb 2020	-7.60	6.70	-14.30	-30.00	3.40	-33.40
Mar-20	-4.10	3.60	-7.70	-11.50	1.20	-12.70
Apr-20	-2.70	4.40	-7.10	-7.20	1.20	-8.40
May-20	-1.70	5.00	-6.70	-6.20	1.40	-7.60
Jun-20	-3.10	4.70	-7.70	-6.80	1.60	-8.40
Jul-20	-3.90	4.90	-8.90	-8.00	1.80	-9.80
Aug-20	-3.50	4.50	-7.90	-8.80	1.80	-10.60
Sep-20	-4.00	4.90	-8.90	-10.00	1.00	-11.00
Oct-20	-3.20	4.60	-7.80	-8.10	0.90	-9.00
Nov-20	-3.20	5.50	-8.70	-7.80	1.00	-8.80
Dec-20	-1.20	7.80	-9.00	-10.30	1.20	-11.50
Jan-21	-1.80	7.10	-8.90	-10.50	1.00	-11.40
Jan-Feb 2021	-2.20	14.00	-16.20	-16.40	1.70	-18.10
Mar-21	-1.30	8.80	-10.10	-7.70	1.00	-8.70
Apr-21	-1.80	8.10	-9.90	-6.60	1.00	-7.70
May-21	-1.60	8.10	-9.70	-7.00	1.10	-8.10
Jun-21	-0.70	9.90	-10.50	-6.80	1.00	-7.80
Jul-21	-0.10	11.00	-11.10	-8.30	1.00	-9.30
Aug-21	-1.40	11.30	-12.80	-10.00	0.90	-10.90
Sep-21	-0.10	13.30	-13.30	-9.70	0.90	-10.60

Source: State Administration of Foreign Exchange: International trade in goods and services of China (updated to September 2021)

Concerning the trade balance, the tourism services deficit is falling (see Table 6.11). The explanation is that many foreign countries have imposed restrictive measures on the outbound travel of Chinese tourists since February 2020. For example, from 5 p. m. on February 2, the United States temporarily banned foreigners who had visited China in the past 14 days (except for immediate relatives of citizens and permanent residents of the United States) from entering the country. Similar regulations included over 100 countries or regions, such as; Singapore, Australia, Japan and Korea, have temporarily suspended direct flights between countries and mainland China. On the other hand, with

the spread of the novel coronavirus in foreign countries and after the implementation of blockade measures in China, the epidemic situation has been better controlled, and meanwhile, the demand of Chinese citizens for outbound travel has also reduced. Hence, the import demand for tourism services is decreasing continuously. In the same period, the trade balance of China's transport services reached minus US$5.20 billion in December 2019 and minus US$0.10 billion in May 2020.

Since China's tourism industry was hit hard during the COVID-19 pandemic, it is urgent to take some measures at the early stage of recovery through rebuilding demand and increasing volume, such as via discounts and presales. As demand grows and confidence increases, indicators such as hotel occupancy and the number of domestic air travel passengers might approach pre-pandemic levels. Companies could explore opportunities to bundle products (thereby offering to upsell and cross-sell opportunities), diversify their revenue stream, and enhance premium products and pricing. Travel companies could also innovate by augmenting their online touchpoints and online experiences. This outcome is already starting to happen: some museums have launched video tours with staff and contemporary artists, and cruise lines have launched live-streaming channels to highlight cultural experiences.

Additionally, transfer the focus to the domestic travel market since foreign countries are still in different stages of lockdowns. Lastly, The pandemic has accelerated the adoption of mobile and digital tools. Building digital touchpoints and experiences will, therefore, be essential. In China, according to the Travel Sentiment Survey of Chinese tourists, social media and new media are now major sources of inspiration and information for travel decisions. Online Travel agencies (OTA) and hotel players are adopting live streaming to boost travel packages' sales. Some attractions have been exploring "cloud travel" to increase broad digital engagement and diversify revenue

streams by selling themed products online. Strategic collaborations, such as OTAs providing ticket-booking services via instant messaging and through social media platforms—could also offer an opportunity for increased market penetration.

In China's services trade industry, transportation service is a section with a large trade deficit (Chauhan et al., 2019). Under the epidemic, the reduction in China's goods trade directly led to the decline of transport services. In addition, due to the blockade measures adopted by other countries, flights were suspended, and orders for ocean shipping were reduced sharply; in addition, the export of China's transport services decreased from US$4.633 billion in December 2019 to US$3.251 billion in January 2020. From February, transport services showed a slow upward trend and increased to $4.955 billion in May, which caused China's trade deficit in transport services to decline.

Even though the outbreak of the COVID-19 pandemic has negatively impacted China's traditional services industries, such as; tourism, catering, hotel, transportation, culture and entertainment, it also has brought some opportunities to accelerate structural adjustment and improve the quality of services. Transferring the focus to the digital economy can enhance companies' competitiveness in the global market.

6.4.4 Cultural Industries Suffer huge losses

The outbreak of coronavirus has caused different degrees of impacts on various service sectors. Reported by the Ministry of Commerce, the total trade volume of China's cultural products reached $111.45 billion in 2019, with a year-on-year growth of 8.9%; and the trade surplus reached $88.32 billion, expanding by 6.8% in scale. From the perspective of countries and regions, ASEAN countries, EU countries and countries along the "Belt and Road" account for the larger proportion.

Furthermore, the epidemic has badly affected cultural industries that cover film and performing arts. In 2019, the box office of the Spring Festival hit 5.9 billion, accounting for nearly 10% of the annual box office value reported by the national film box office data. However, the box office value for 2020 was only 23.57 million, lagging far behind the target value of 10 billion. The National Bureau of Statistics announced on July 31st 2020, according to a survey of 59,000 culture-related industries and companies, all companies had achieved a revenue of 16, 889 billion yuan in the first quarter of 2020. This result was 13.9% lower than the same period in the previous year on a comparable basis. However, "Internet plus culture" showed an upward growth against the trend. Online consumption continued to grow rapidly. The 16 sub-categories of the industry with obvious business characteristics have achieved a business revenue of 523.6 billion yuan, increasing by 15.5%.

6.4.5 China's Foreign Direct Investment during the COVID-19 Pandemic

The COVID-19 crisis has devastated the world economy, including foreign direct investment (FDI). China's inward FDI (IFDI) and outward FDI (OFDI) are also facing unprecedented risks and challenges amid the COVID-19 pandemic.

In early 2020, as COVID-19 was first discovered and started to spread in China, total IFDI contracted sharply by 25.6% and 14.1% in February and March, respectively, due to the nationwide lockdown. However, rapid containment of the disease meant that the Chinese economy and its ability to attract IFDI recovered relatively quickly. From April to November, China's IFDI grew positively for eight consecutive months (Table 6.11), largely making up for the losses occurring in February and March. Measured in RMB, the amount of IFDI in the first eleven months rose 6.3% (by 4.1% in US$), as reported by the National Bureau of Statistics of China on December 17.

Table 6.12: China's monthly FDI inflows and year-on-year Growth Rate (US$billion, %), 2010-2020

	2010		2013		2016		2019		2020	
	$bil.	%	$bil.	%	$bil.	%	$bil.	%	$bil.	%
Jan	8.13	7.8	9.27	-7.3	14.07	1.1	12.41	2.8	12.68	4.0
Feb	5.90	1.1	8.21	6.3	8.45	-1.3	9.28	3.3	6.74	-25.6
Mar	9.42	12.1	12.42	5.6	12.90	4.0	14.12	4.9	11.78	-14.1
Apr	7.35	24.7	8.43	0.4	9.89	2.9	9.34	2.8	10.14	8.6
May	8.13	27.5	9.25	0.3	8.89	-4.8	9.47	4.6	9.87	4.2
Jun	12.51	39.6	14.39	20.1	15.23	4.4	16.13	3.0	16.72	3.7
Jul	6.92	29.2	9.41	24.1	7.71	-6.2	8.07	4.1	9.05	15.8
Aug	7.60	1.4	8.38	0.6	8.76	0.5	10.46	0.3	12.23	15.0
Sep	8.38	6.1	8.84	4.9	9.21	-3.6	11.52	0.5	14.55	23.7
Oct	7.66	7.9	8.42	1.3	8.81	0.4	9.99	3.1	11.83	18.4
Nov	9.70	38.2	8.48	2.3	9.89	-4.6	13.62	0.1	14.38	5.6
Dec	14.03	15.6	12.08	3.3	12.21	-0.2	13.75	2.4	-	-

Sources: National Bureau of Statistics

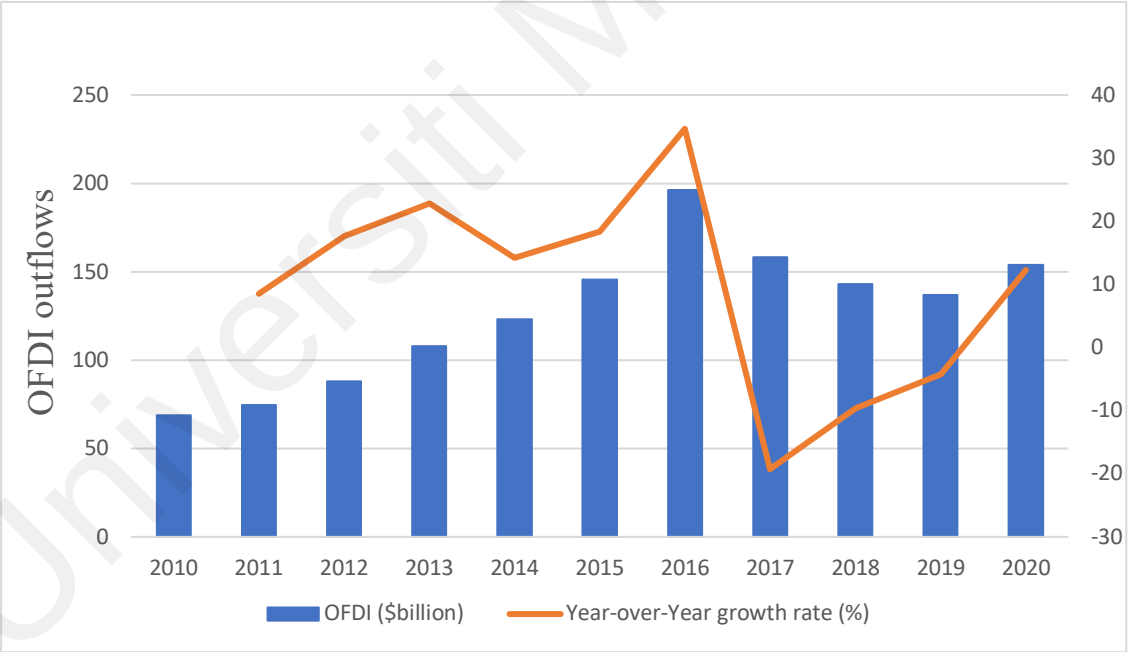

Figure 6.7: Annual Outflows and year-over-year Growth Rates (US$billion, %) of China's OFDI, 2010-2020.
Source: China's Ministry of Commerce, the National Bureau of Statistics and the State Administration of Foreign Exchange, Statista data, https://www.statista.com

As the global COVID-19 pandemic intensified, China's OFDI activities have inevitably been disrupted. The Ministry of Commerce of China reported that Chinese domestic investors made non-financial direct investments in 2,538 foreign companies in

153 countries and regions. Additionally, the turnover of foreign contracted projects dropped 12.4% year on year. China's OFDI hit US$153.71 billion, increasing 12.3% year-on-year and ranking first worldwide for the first time (Fig. 6.4).

Regarding OFDI, China's most severe challenge has been the shrinking investment arising from technology, market blockades, and restrictions in developed countries. Under this circumstance, China might take some steps to expand OFDI in neighbouring countries to accelerate regional prosperity while resisting counter-globalisation. Due to the close geographical distance, these movements will promote deeper investment cooperation with Belt &Road countries, increasing trade and investment with China.

6.4.6 Opportunities under the COVID-19 Pandemic

The outbreak and spread of the Coronavirus brought severe uncertainty to the global economy. Thus, it has been urgent to promote the integration of the digital economy with the real economy with the development of information and communication technology launched by China's 14 five-year plan. According to the China Digital Economy White Paper 2020, China's digital economy contributed 36.3% of the GDP, of which social media and search engines fostered the expansion of foreign markets. Additionally, cloud services have become a new growth engine. The size and strength of public cloud service providers rank second only to the US globally.

During the epidemic, telecommunications, computer and information services, intellectual property usage fees, and knowledge-intensive services trade, such as financial and insurance services, continued to grow. Projects related to Information technology outsourcing (IPO) and knowledge process outsourcing (KPO) involving cloud computing, biomedicine, and other fields have increased significantly. Meanwhile, digital technology has brought the demand for a "home economy" and "contactless economy",

which promotes cross-border e-commerce, telemedicine, online education, and remote offices. The rapid development and application of digital technologies, such as; 5G, big data, blockchain, cloud computing and artificial intelligence, expand the international space and provide technical conditions for services trade innovation and development.

More and more companies have shifted to digitalisation or implemented digital strategies to enhance their competitiveness after the resumption of work and production in China. Cross-border e-commerce is developing rapidly for Chinese trading companies. The revenue of cross-border e-commerce increased by 25% year on year, ranking number one in global cross-border e-commerce. These ongoing transformations have been influenced and complicated by the functional convergence of; digital museums, libraries, and archives and museum visitors' changing information needs and expectations. Some museums have access to digital museum resources through the official website and official WeChat. The digital economy played an essential role, especially during the epidemic stage.

Furthermore, the coronavirus lockdown has also brought opportunities for distance education due to social distancing. Thus, many companies and institutions switched to working at home, and students have started to take online classes. Under such circumstances, the demand for distance learning applications is also growing. According to UNCTAD (2020), Microsoft's online office software users increased by nearly 40% in one week. The China Novel Coronavirus Pneumonia Impact on Chinese Enterprises issued by the United Nations Development Program (UNDP) China report in April 2020 claimed that the index of online offices, online education and online games had increased vastly, contributing to 537%, 169% and 124% respectively.

China’s knowledge-intensive services trade developed significantly during the first eight months of 2020, although its overall services declined amid the COVID-19

pandemic. According to the statistics of the Ministry of Commerce of China, the knowledge-intensive services trade reached 1.32 trillion yuan, accounting for 44.1% of the total services trade from January – August, with an increase of 10.1%. The export of knowledge-intensive services reached 0.693 trillion yuan, with an increase of 8.5%, and it accounted for 56% of the total export of services, with an increase of 5.5%. The faster growth services subsectors contained; telecommunications, computer and information services, insurance services and intellectual property use fees, which accounted for 29.9%, 15.8% and 13.4%, respectively. The import of knowledge-intensive services reached 624.5 billion yuan, an increase of 8.5%, accounting for 35.6% of the total import of services, with an increase of 10.7%. The fields that showed faster growth in imports covered; financial services, telecommunications, computer and information services and insurance services, which reached 26.7%, 25.3% and 20.1%, respectively. The reporting above shows that the knowledge-intensive services trade has better resilience and strong impact resistance. Besides, it can better optimise the existing services trade structure of China, enhance the competitiveness of China's services trade and promote the high-quality development of China's services trade.

Furthermore, China’s services trade cooperation with countries (regions) along the “Belt and Road (BR)” mainly covers tourism, transportation and construction. Before the COVID-19 pandemic, more than 25 million Chinese tourists visited countries (regions) along the “Belt and Road” route each year. However, amid the pandemic, the traditional service sector was severely impacted. The services trade cooperation with BR countries has shifted online. Knowledge-intensive services trade, such as cross-border telemedicine and information technology services, has grown rapidly, and the services trade structure has improved. China will continue cooperating with countries (regions) along the “Belt and Road” in areas, such as; new infrastructure, engineering services, and e-commerce. It will carry out close cooperation to promote the "Healthy Silk Road",

"Digital Silk Road", and "Green Silk Road". In addition, China will encourage services trade companies to go global and build the “Belt and Road” with high quality.

Lastly, services outsourcing has also grown fast during the pandemic. From January to August 2020, the amount of services outsourcing contracts undertaken by Chinese companies amounted to US$123 billion, with US$84.97 billion executed, up by 5.3% and 9.7%, respectively, on a year-on-year basis. In detail, offshore services outsourcing was worth US$73.25 billion, with US$51.65 billion executed, up 3.4% and 10.7%, respectively. In the first half of 2021, services outsourcing amounted to $131.3 billion in the year's first half, with $84.3 billion executed, up 33.3% and 29.0%, respectively. Offshore services outsourcing was worth US$74.1 billion, with US$49 billion executed, up 26.7% and 25.9% year-on-year, respectively. Moreover, with the advancement of “The Belt and Road” Initiative, the implementation value of Russian services outsourcing undertaken by China has risen by 56.9% yearly. Services outsourcing is the main part of China’s services trade, which is essential in easing China’s services trade deficit and improving the structure of the services trade.

6.5 China’s Challenges in the Services Industry

Despite the growth in China’s services exports, China must confront several challenges. These were enumerated in Zhang and Evenett (2010). First, the tertiary sector in China leaves much room for improvement in quantity and quality. Jian and Pei (2004) noted that China's services supply does not match demand in terms of quality, and prices are high. Underdevelopment of the tertiary sector naturally leads to underdevelopment of the services trade. Second, China’s services trade needs further liberalisation. Zhang and Evenett (2010) estimated that the liberalisation of producer services, such as transport, communications and business, had been relatively low. Third, the international competitiveness of China’s services trade was still low. This situation has been discussed

in previous chapters. Fourth, China's FDI into the service industry flowed mainly into the domestic market. Little has gone into the services trade. Last, offshoring and outsourcing could be improved.

Since these commitments were made, China has been moving forward with its new growth engine. Early in 2017, an RMB30 billion fund was allocated to promote high-valued services exports. This plan reinforced China's services sector reform, focussing largely on non-traditional sectors, such as e-commerce and technology (Hsu and Chiang, 2017). The fund was to contribute 16.7% and non-government investors the remaining 83.3%. The fund was available to state- and non-state enterprises and the first fund focused on services export promotion in China. In this arena, China is taking a leaf from India, which has been able to drive growth through services. This fund was said to extend policies targeted at 15 pilot programs across China.

These efforts have shown early promise. The following paragraph provides an update on China's services trade since 2014. In 2019, the services sector was labelled a new economic growth engine. In 2018 the services sector accounted for 52% of the GDP, 11.5% larger than the secondary industry, making it the largest sector.

Since the launch of the Fund, China has made concerted efforts to strengthen its services exports. By mid-2018, the China Daily was able to report record services exports and imports. Despite the difficult economic environment, domestic consumption saw China's international trade in services grow 17% year on year to US$397.31 billion in the first half of 2018. The source of growth was China's rapidly growing services sector, including; computing, industrial solutions and retail businesses, and increasing exports of emerging services, such as telecommunications and insurance.

After Zhang and Evenett, China has significantly expanded its services sector, overtaking the secondary sector. Despite the negative narrative up to 2014, China's share of global services exports reached 5%, tying with France, 4th in the world. Similarly, despite the services trade deficit, China's services exports have grown at 8% per annum since 2010. With telecommunications, computer and information services the fastest growing sectors since 2005, China, with its planned propagation of 5G and the use of technology in its manufacturing processes, and South East Asia more dependent on Chinese inputs for its exports, China should see its service sector play a leading role in its economy in the years ahead.

6.6 Prospects

First, the scale of China's services trade is expected to hit its peak. In recent years, China's economic servicing rate has shown a growing development trend. The foundation is strengthening, and China's services trade deficit is expected to shrink further. With the improvement and openness in the domestic service trade market environment, more foreign business people in the service industry will enter the Chinese market. Thus, forming a global services trade network is conducive to further expansion of the services trade scale.

Second, the structure of the services trade will continue to be optimised and upgraded. In China's total services trade, the proportion of the emerging services trade continues to rise. It is estimated that by 2020, the proportion of the emerging services trade will reach or even exceed that of traditional service trade, which will continue to drive the optimisation of China's service trade structure. For example, China's cultural and entertainment industry and some emerging service industries, such as IT and Internet industries, have ushered in huge development opportunities. Additionally, big data and

cloud computing are also leading the world that has laid a solid foundation for China's development of digital service trade and the emerging services trade.

Third, the strategic position of the services trade will become more prominent. At a certain time in the future, the status of the services trade in China's economy and trade will be further enhanced, and the country will issue a series of policies to increase the degree of openness of the service industry. In the future, more services trade companies in China will enter the international market and the ranks of the top 500 multinational companies. The nationalisation of the services trade will increase, and the market environment will be optimised. China will have a greater voice and power in formulating international service trade rules and standards.

Lastly, China's development has shifted gears in recent years. Emerging sectors, such as services and high technology, have taken the lead as the primary engines of growth; consumption has become the primary driver of growth, and outbound investment has become the primary vehicle for growth. China has been gradually transforming into an economic model defined by services, emerging industry, consumption and capital exports, illustrating a national shift towards the middle to the high end of the value chain. Throughout this process, however, China must overcome challenges related to its relatively outdated technology, traditional business models, and lack of experience in investing overseas. This situation creates many opportunities for collaboration between Chinese and foreign companies.

6.7 Conclusions

This chapter has described China's services sectors and industry's current situation. The potential contribution of the services sector to China's economic development and overall trade performance. In the first section, some related services trade policies were reviewed. From these policies, it can be seen that China is gradually opening up its services sectors

by relaxing market access restrictions. The subsequent section focus on the influence of COVID-19 on China's services trade. The final part focused on the challenges and prospects of China's services sectors.

CHAPTER 7: CONCLUSION

7.1 Introduction

Chapter 1 began by reviewing the growing importance of the services sector for an economy in terms of generating income and employment. Despite this, China's services trade has been anything but spectacular. Statistics show that China's services trade deficit is mainly concentrated in transport services, travelling and insurance services and the use of proprietary rights and royalties and other fields. The surplus in services mainly has come from telecommunication, computer and information services and construction. Moreover, tourism, transportation, other traditional industries, capital-intensive, and knowledge-intensive services industries recorded large and consistent deficits in recent years.

The central research problem is why, despite China's impressive performance in its exports of goods, it has performed so poorly in its export of services. Indeed, between 2000 and 2018, China's services trade deficit increased, making its deficit the largest in the world. The only good news is that the deficit is narrowing. Determining the factors that cause this has been the overarching objective of this research.

This studies was motivated by the lack of research on the determinants of China's trade in services, the large services trade deficit and the weak competitiveness of China's services trade. This studies have addressed three research questions related to China's trade in services. These research questions were answered in Chapter 4, Chapter 5 and Chapter 6 of this studies. The structure of this concluding chapter is as follows. Section 7.1 is the introduction part. Followed by Section 7.2 discusses the key findings for all three research questions, summarised in Table 7.1. Section 7.3 outlines the implications of the findings and relevant policy recommendations for services operators, government

and policymakers. Section 7.4 outlines the limitations of suggestions for future research. Finally, Section 7.5 presenting conclusions.

7.2 Summary of the Key Findings

This section summarises the key empirical findings for all three research questions outlined in Chapter 1, as summarised in Table 7.1, and further discussed in the following three subsections.

Table 7.1: Summary of the Key Findings in the Studies

	Research Questions	Research Objectives	Key Research Findings
1.	What is the competitiveness level of China's service sub-sectors exports?	To examine the level of competitiveness of China's service sub-sectors exports based on gross value and value-added statistical methods.	The overall competitiveness of China's services trade and services sub-sectors was weak no matter which estimation method is applied.
2.	What main drivers contributed to China's trade in services in terms of exports and imports?	To investigate the main drivers contributing to China's trade in services in exports and imports.	China's trade in services at the aggregated/disaggregated levels is significantly explained by economic scale, telecommunication infrastructure, real exchange rate, distance, GDP per capita difference, institutional quality and trade restrictiveness index.
3.	How do service sub-sectors influence China's overall trade performance?	To identify the contribution of the service subsector toward China's overall trade performance by conducting a qualitative official document review to provide a holistic analysis.	A range of existing government policies bear upon the Chinese services sector and the amount of trade conducted. The outbreak of the COVID-19 pandemic had caused a huge impact on China's trade in goods and services. It was found that China's services trade was more resilient to the impact of the pandemic than the trade in goods, and the fluctuation of the services trade was smaller. Travel and transportation services were seriously affected.

7.2.1 Services Sector Competitiveness based on the Value-Added Method

The first empirical chapter of this studies investigated China's services trade competitiveness by applying the relative comparative advantage (RCA) index based on the gross value and value-added trade statistic methods. Furthermore, China's services trade competitiveness was investigated by comparing the top ten services export countries. Several features were salient.

1. For China, the RCA indices based on the gross value method underestimated the competitiveness of China's service industry compared to indices calculated using the forward linkage value-added method.
2. No matter which method was applied, the overall RCA indices of China's service industry were less than 1, which means that the competitiveness of China's service trade was relatively weak.
3. However, the RCA indices based on value-added continuously increased over time, and the gap between the two statistical methods gradually fell. It demonstrates that the competitiveness of China's service industry has progressively improved.

Comparing estimates from the two statistical methods, the RCA indices of some sectors calculated by gross value overestimated the real competitiveness of the Chinese services industry, such as construction, computer and information, other business services and personal, cultural and recreational services. However, the international competitiveness of most of the sub-sectors of the Chinese service industry appears to have been underestimated, including; transportation, travel, communication, insurance, financial and government services.

The global financial crisis has led China to vigorously develop its tertiary industry, especially in services, since high-energy-consuming industries are mostly concentrated

in secondary industries. The transition from industrialisation to the service industry has seen a shift from a single growth engine to dual growth engines driving domestic demand growth. New economic growth can reduce the country's reliance on external resources and trade (Lu, 2009).

The RCA indices of construction, computer and information, insurance and government services vary from around 0.2 to 0.5, showing a weak comparative advantage. This outcome is hardly an advantage at all. This situation means that technology-knowledge services needed in manufacturing are still reliant on imports. Hence it can be seen that the comparative advantage in the sector of royalties and license fees, whose competitiveness index is 0, which appears to have no comparative advantage over the Chinese services industry, is still concentrated on labour-intensive service products. In contrast, the country's comparative disadvantage lies in capital and technology-intensive service products (Cao, 2016; Chen & Zhang, 2010).

Labour-intensive services comprise the main components of China's value-added exports in services. China's financial, insurance, computer and information, other business and royalties and license services have weak competitiveness in the international market, and technical knowledge services for manufacturing rely mostly on imports. However, knowledge-intensive services' revealed comparative advantage gradually increased after the financial crisis. It shows China is paying more attention to transforming its export structure by using more technology and knowledge-based services.

China's RCA was compared to a group of developed countries led by the US . The findings were as follows:

1. Compared with the other six developing countries, China's knowledge-intensive services exports had a middling rank among them. However, the competitiveness of China's knowledge-intensive services has been increasing over time, while capital-intensive services showed a downward trend after the global financial crisis. Thus, China's export structure is gradually upgrading from traditional services to modern ones.
2. Generally, based on value-added, the RCA indices of services in developed countries were higher than in developing countries. In addition, the competitiveness index of developed countries showed an upward trend over time, while developing countries showed a downward trend.
3. For developed economies, the revealed comparative advantage of some countries was always greater than 1 and kept increasing over time, as shown in the United States, United Kingdom, France, Belgium, Netherlands, Switzerland and Ireland.
4. China has weak competitiveness when compared to developed and even developing countries. The RCA indices of China's services moved between 0.6 and 0.9 during 2000-2014, which indicated that China's services trade had a comparative disadvantage and the whole trade in services fell behind selected economies, except for Indonesia and Mexico.
5. The high value-added services sector, such as the financial services sector, showed a revealed comparative advantage compared to its other service sub-sectors. China had the highest revealed comparative advantage value among the selected developing countries, and its competitiveness level was stronger than some developed countries, such as; Germany, France, Japan and Canada.
6. The competitiveness of China's traditional services sector was higher than some developing countries, such as; Indonesia, Brazil, Mexico and India and even some

developed countries, such as; the United States, United Kingdom, Switzerland, and Ireland, in its transportation sector.

7. Even though the RCA indices of some of China's service subsectors were higher than among its total services subsectors, such as other business services and personal and recreational services, it still lacked international competitiveness compared with most developed countries.

7.2.2 Driving Factors of China's Trade in Services Either at Aggregate and Disaggregate Levels

Chapter 5 interpreted the empirical results of the determinants of China's services exports and imports. The scatter diagrams in Chapter 5 showed (Figures 5.1):

1. A significant positive relationship between the GDP and services exports.
2. A negative relationship between services exports and distance showed a downward trend. Country pairs far apart tend to trade less. Services imports were positively associated with the combined economic mass of the country pairs.

The descriptive statistics showed the median, mean, standard deviation, and minimum and maximum values. Therefore, multicollinearity was not a serious issue in this context. For estimating the model, the PPML technique was the best fit. The estimated results for the export model were:

1. The GDP of the importer country played an extremely important role in China's service exports compared to the GDP of the exporter country.
2. The estimated coefficient of geographical distance had a negative sign.
3. The estimated coefficient on the geographical distance variable showed a negative sign.
4. The lesser the difference between two countries' per capita income, the higher the share of the trade between them and *vice-versa.*

For the aggregate export model, the results were:

1. The real exchange rate variable estimates were in line with some other studies, but only the PPML estimator had a sign consistent with expectations.
2. The corruption perception index of China was statistically insignificant for China's services exports, while the coefficient of the corruption perception index of partner countries showed a positive sign on total service exports.
3. Fixed telephone subscriptions in either the exporter or importer country significantly affected China's total services exports.
4. Contiguity was a dummy variable representing whether two countries shared a common border. This variable was found to be positive and significant only under the estimation of PPML. A common border positively affected China's total services exports.
5. The services trade barriers (TRI) of country j significantly and negatively affected China's services exports, suggesting that higher trade barriers in partner countries would impede bilateral trade.

For the import model, the results from the PPML estimation were:

1. The estimation coefficient for GDPi and GDPj were statistically significant at 1%.
2. The coefficient of geographical distance was statistically significant at the 1% level.
3. The coefficient of GDP per capita difference in the import model indicated a negative and significant sign under three estimation methods.
4. The coefficient of the real exchange rate was expected to have a positive sign on exports and the opposite sign on imports. Interestingly, the coefficient of the exchange rate had a positive effect on both services exports and services imports. In addition, the exchange rate was found to have a greater impact on services

exports than services imports. Since China mostly exports services of Mode I and II, like trade in goods, an increase in the exchange rate would make China's services relatively cheaper than those of foreign partners, and exports of services would increase as a result. China imports mostly Mode III services, mainly foreign direct investment (FDI). Thus, an increase in the exchange rate would encourage investors to invest more in China or services imports would increase.

5. The coefficient of the corruption perception index (CORRUPT) of country j was found to positively impact China's services imports.
6. Fixed telephone penetration significantly affected China's services imports.
7. For telecommunication infrastructure, the coefficient of fixed phone subscriptions in exporter and importer countries showed a positive and statistically significant sign for China's services
8. A 1% increase in trade barriers of country j would hinder China's services imports by 1.7.

A comparison between services exports and service imports revealed the following:

1. The home country's GDP greatly impacted China's services imports more than its exports.
2. Geographical distance showed a consistent significant sign for services exports or imports at the 1% significance level. This finding indicated that distance had a dampening effect on the services trade.
3. The per capita GDP difference between China and partner countries had an insignificant impact on China's exports, whereas it significantly negatively affected China's services imports.
4. The real exchange rate between China and partner countries significantly positively impacted services exports and imports.

5. The corruption perception index of partner countries significantly affected services exports and imports, while that of the home country did not affect services exports and imports.

6. The telecommunication infrastructure of the home country and partner country significantly affected services exports and imports.

7. Surprisingly, the fixed phone subscriptions of partner countries had a negative and significant impact on services exports, whereas it had a significant positive effect on services imports. China's services exports mainly focus on developing countries, which have low fixed phone subscription rates, while its services imports come from developed countries, which have access to high-quality telecommunication infrastructure.

8. Countries sharing a common border can reduce communication costs, thus, facilitating services exports and imports. The coefficient of contiguity in the import model was much larger than in the export model, which indicated that a common border mattered more for China's services import model than the import model.

9. The partner country's trade restrictiveness index significantly impacted services exports and imports.

For estimation of services subsectors, scatter plots were drawn for key variables. These plots showed the relationship between subsector exports and imports and combined economic mass (the GDP of exporting and importing countries). The plots showed a positive relationship between service exports and imports and economic mass. Descriptive statistics were also shown.

The correlation coefficients of the explanatory and dependent variables are also low, so autocorrelation was not a problem.

From the subsector estimates, the travel subsector had the following results:

1. People in an economically fast-growing country were more likely to travel abroad.
2. The economic size of a partner country in travel was positive and significantly affected China's travel exports and imports. The foreign market effect dominated.
3. China's travel exports, whereas home market effects mattered for China's travel imports.
4. Geographical distance had a negative and significant effect on China's travel exports.
5. The per capita GDP difference positively and significantly affected China's travel exports.
6. Countries usually trade more with countries which have different factors.

The variable representing price competitiveness (exchange rate) was found to have the expected positive sign and was statistically significant for the import model (Column 2 in Table 5.17), showing an insignificant sign on China's travel exports. It indicates that Chinese currency depreciation would reduce Chinese citizens travelling abroad and decrease China's travel imports.

The coefficient of corruption perception index of a partner country had a positive and significant sign on China's travel exports and imports. It means China prefers to export and import travel services from countries with low corruption. The estimated coefficient of fixed phone subscriptions in China played an essential role in China's travel exports and imports. Table 7.2 below summarises the results for the other two subsectors covered.

Table 7.2: Summary of Transport and Other Commercial Services

Explanatory Variable	Transport Services	Other Commercial Services
Market size	+v for China's transport services exports & imports	+v for the exporting & importing country
Distance	-v for China's transport services exports & imports	-v for China's exports & import
Exchange rate	-v for China's transport services exports	As expected for exports but not for imports
Corruption Perception	+v (partner country) for China's transport services exports & imports	+v (partner country) for China's other commercial services exports & imports
Telecom infrastructure	+v (China) for China's transport services exports +v (patner country) for China's transport services exports & imports	+v (China) for China's other commercial services exports & imports -v (partner country) for China's other commercial services exports +v (partner country) for China's other commercial services imports
Common border	-v for China's transport services exports & imports	-v for China's other commercial services exports +v for China's other commercial services import
Per capita difference	+v for transport services exports	-v for other commercial services exports and imports

	-v for transport services imports	

Looking at the chapter overall, its findings are:

1. The superiority of the PPML method
2. Although the same variables were used to explain exports and imports, there were differences in impact.
3. Services subcategories behaved differently from the variables because of the different nature of the services. Therefore, an inference that can be drawn from the results for examining policy reforms in that sector-specific characteristics has to be considered.

7.2.3 Services Sectors Contribute to China's Overall Trade Performance

Chapter 6 deals with the final research question: China has been a powerhouse in merchandise exports, but as discussed, its service exports lag far behind its service imports, at least up to 2014. Another objective of this chapter is to update China's services trade situation since 2014. The analysis is necessarily qualitative.

There is no question the sector has grown both in its share of GDP and employment when looking at the service sector.

China also signed agreements to liberalise its services trade. In 2002, China and ASEAN signed the "China-ASEAN Comprehensive Economic Cooperation Framework Agreement" with a total of 16 main agreements. China and ASEAN signed the "China-ASEAN Comprehensive Economic Cooperation Framework Agreement" with a total of

16 main agreements. Before that, in 2003, China further signed the Closer Economic Partnership Arrangement with the Hong Kong Special Administrative Region to liberalise the services trade. Many mainland services sectors have been opened to Hong Kong. Besides, China and ASEAN signed a services trade agreement in January 2007. Furthermore, the Regional Comprehensive Economic Partnership (RCEP) was signed on 15 November 2020, which is the world's largest trade agreement, encompassing 30% of global GDP and 27% of global merchandise trade.

The use of foreign capital in the services industry will also continuously expand with the accelerating of China's economic transformation and upgrading. Foreign capital in the services industry has kept increasing in recent years, and the sectors are gradually strengthening due to foreign capital inflows.

Despite the foreign capital inflows, the Chinese government feels there is still room for improvement. Policies have been implemented, including; industrial, finance and taxation, foreign trade, investment, and environmental services.

These policies notwithstanding, China's services sector still faces challenges. These include the high prices of services leading to the underdevelopment of the service sector. Hence, the services trade needs further liberalisation to upgrade its poor competitiveness and increase the FDI flowing into the domestic market.

However, China has not been standing still. With its reforms, China has launched an RMB30 billion fund to promote high-value services. These efforts have shown promise.

Despite its history, the prospects for China's services trade look good. The services trade will likely expand with the services deficit-reducing. The structure of the

services trade will be upgraded. The strategic position will be enhanced. And finally, the services sector and high technology will be China's new engines of growth.

7.3 Policy Implications

The empirical results of this study demonstrate that despite the relatively higher share of services in output and employment, the productivity of this sector is still behind the manufacturing sector. The relatively lower productivity of the services sector is due to relatively less innovative activities practised in this sector. The services sector has remained deprived of innovative practices because of traditional views, which consider the services sector not innovative.

However, the reality differs. Although innovations in services may have some hurdles, services activities are more heterogeneous, where some of the services categories are not innovative. However, most services categories are knowledge-intensive, which can be made more productive by services innovation. The services sector can perform an important role, particularly in developing countries whose structure of output and employment has been shifted from agricultural and industrial goods to the production of knowledge-intensive services. The productivity of this sector can be enhanced by product innovations (introducing new goods or services), process innovations (introducing new production techniques) and marketing innovations (the implementation of new marketing strategies for goods and services). Technology development and integration with the digital economy can promote innovations in services. Hence, there is a need to give proper attention to service innovations by designing an appropriate innovation framework that focuses mainly on innovations in knowledge-intensive service sectors.

Additionally, there are two ways to speed up the development of the domestic services industry, enhance the competitiveness of China's services trade and reduce the size of the service deficit.

First, focus on scientific and technological research and development and increase investment in scientific and technological innovation. Promote the opening up of service sectors with a high degree of domestic monopoly, introduce external competition mechanisms, attract more competitive and innovative foreign-funded enterprises to enter the country, enhance China's technological innovation capabilities through spillover effects, and foster more innovations in the service sector, and thus enhance the international competitiveness of the services trade and promote the overall development of the services trade. Second, focus on human capital accumulation. Human capital is the most important factor of production in the services sector. Increasing investment in personnel training guarantees the services trade's steady and sustainable development. Services industry opening policies and industry support policies have created a good market environment for services industry competition and the development of the services trade.

With the development of the global knowledge economy, new sectors, such as; royalties and royalties services, computer information services, and financial services, have rapidly emerged in the services trade and have shown a huge development potential. In the long run, the knowledge and technology-intensive services sector is the foundation to support the development of service trade, and it is also a key factor in enhancing the international competitiveness of China's service trade. It suggests that China should apply the historical experience of developed countries in developing the services trade, attach importance to protecting intellectual property rights, encourage technological innovation and develop new services trade. Meanwhile, consolidate and strengthen China's traditional services trade with international competitiveness advantages and actively develop the international market. In the process of integrating into the global value chain, China will gradually promote the opening up of the service industry at multiple levels.

Efforts to enhance the competitiveness of various industries in China's services trade are the key to vigorously developing the services trade. Establishing a sound services trade legal system, fully integrating with the international service trade standardisation system and creating a good external environment. Cultivate various services market entities with innovative spirits and enhance the international competitiveness of various sectors in the services trade. Establish leading industries in the services trade, highlight the focus of policy support, consolidate the development of surplus services trade departments with international competitive advantages, support and guide key deficit services trade departments, and maintain the balance of services trade imports and exports. Use fiscal and taxation policies, such as special funds for foreign economic and trade development, optimise the structure of funding arrangements, increase support for the services trade industry, and enhance international competitiveness.

The "Belt and Road" is important for China to expand the services trade market. China should actively develop more services trade with countries along the "Belt and Road", such as services outsourcing, engineering construction, financial services, information technology, and foreign direct investment. Taking the "One Belt One Road" infrastructure construction project as an opportunity, use convenient transportation conditions, such as sea-rail combined transportation, to open up new areas of the services trade. Promote countries along the route to establish bilateral free trade agreements, accelerate openness and exchanges with countries in finance, education, and medical services, and gradually realise the liberalisation of the services trade.

7.4 Limitations And Suggestions For Future Research

The focus of this study is on services that move across borders. The provision of services by affiliates of companies based in foreign countries is not considered. In other words,

the role of foreign direct investment (FDI) as a conduit for trade in services is ignored. Firm-level determinants are not captured (such as foreign ownership, firm size, wages et al) which may have significant influence on a country's services trade. Therefore, future research should focus on micro-level determinants to study China's trade in services.

7.5 Conclusions

This studies has examined issues related to China's services trade deficit. The findings of this studies have direct implications for policymakers and enterprise decision-makers. As discussed in the previous chapters, China's services exports and imports are influenced by the country's; economic mass, distance, infrastructure development, trade barriers, price competitiveness and sharing common borders, which have different impact levels on China's trade in services. After considering the influencing factors comprehensively, some suggestions have been brought to improve the competitiveness of China's trade in services.

Firstly, improve the foreign trade development environment, creating a convenient and liberalised development environment for the services trade by improving the level of foreign trade openness. Strengthen and deepen the reform of "delegation, regulation, and optimise service" and encourage enterprises to seek opportunities to expand services trade exports actively. Additionally, relax restrictions on the movement of people, especially in the fields of; science and technology, tourism, studying abroad, business and culture. Visa-free policies can be implemented to promote the exchange of standards and qualifications in related services fields with developed countries.

Secondly, focus on countries or regions along the "Belt and Road" to expand international cooperation for the trade in services. Grasp the opportunities that the Belt

and Road Initiative (BRI) brings to service trade and continue to deepen bilateral or multilateral cooperation with countries or regions along the “Belt and Road”. Expand China’s trading partners and construct a diversified and multi-level service trade international cooperation system to establish a trade cooperation mechanism conducive to developing China’s services trade.

Lastly, vigorously develop digital trade by taking advantage of the features of the times. Encourage companies to integrate; big data, the Internet of Things, artificial intelligence, and 5G technology with services to promote the intellectualisation and digitisation of the services trade. This outcome will improve the competitiveness of China’s services trade exports. For example, establishing "digital trade pilot zones" in coastal cities in the eastern part of the country might further promote China’s rapid development in digital trade.

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