Economics
The Open-Access, Open-Assessment E-Journal

Discussion Paper
No. 2018-44 | May 29, 2018 | http://www.economics-ejournal.org/economics/discussionpapers/2018-44

China's economic integration with the Greater Mekong Sub-region: an empirical analysis by a panel dynamic gravity model

Saleh Shahriar, Lu Qian, and Sokvibol Kea

Abstract
The purpose of this study is to fill an existing gap in the literature by addressing the following research question: what are the major determinants of China's regional economic integration with the Greater Mekong Sub-regional countries (GMS), namely; Cambodia, Laos, Myanmar, Thailand and Vietnam? The author measures the economic integration in terms of bilateral trade and foreign direct investment (FDI). In accordance with the literature, the present study adopts a panel gravity framework method to analyze the significant factors affecting the bilateral aggregate exports flows of China with five economies of the Greater Mekong sub-region. Data were collected from both the Chinese national and the international sources over the period of 23 years, spanning from 1993 to 2016. The time period was chosen on the consideration of data availability. The result shows that the gravity model is econometrically fitted to our dataset. Among other factors GDP, bilateral exchange rate, and population have a positive impact on regional trade integration with the GMS. The author´s second-stage regression analysis confirms that China's accession to the WTO impacts positively on the bilateral trade. China's accession to the WTO is a significant factor for facilitation of trade flows. As expected, distance hinders regional trade. Furthermore, the role of historical trade relationship between China and GMS countries is estimated in the dynamic model. The result shows that China's trade relationship with GMS countries is determined historically.

JEL F14, F15

Keywords China; regional economic integration; dynamic gravity model; Greater Mekong Sub region (GMS); exports; panel data

Authors
Saleh Shahriar, Northwest A&F University, Yangling, Shaanxi, China
Lu Qian, Northwest A&F University, Yangling, Shaanxi, China;
luqian@nwafu.edu.cn
Sokvibol Kea, Northwest A&F University, Yangling, Shaanxi, China

Citation *Saleh Shahriar, Lu Qian, and Sokvibol Kea* (2018). China's economic integration with the Greater Mekong Sub-region: an empirical analysis by a panel dynamic gravity model. Economics Discussion Papers, No 2018-44, Kiel Institute for the World Economy. http://www.economics-ejournal.org/economics/ discussionpapers/2018-44

Received April 12, 2018 **Accepted as Economics Discussion Paper** May, 22, 2018 **Published** May 29, 2018

1. Introduction

International trade is an important driver of economic development. It is one of the most important catalysts of growth and productivity (Singh, 2010). It plays a substantial role in the economic development of China. R. C. Feenstra and Wei (2009) have introduced China's growing role in global trade with regional levels integration. As they observed, "*In less than three decades, China has grown from having a negligible role in world trade to being one of the world's largest exporters, as well as a substantial importer of raw materials, intermediate inputs, and other goods*" (R. C. Feenstra & Wei, 2009). China has already demonstrated extraordinary performances in export trade (Liang, 2008; Maddison, 2007; Rodrik, 2006). The country has achieved a double-digit growth for three decades. Some studies are available to support the assumption that to date regional economic integration is on the increase (Atkinson, 1998; Hossain, 2009; Lin & Wang, 2012; Plummer, Morgan, & Wignaraja, 2016; Pogoretskyy & Beketov, 2012; Roberts & Moshes, 2016; Rodríguez-Delgado, 2007; Teeramungcalanon, 2016; Yang & Martinez-Zarzoso, 2014). Recently, there has been a decline in China's export-led economic growth performance. Since 2007-2008 global economic crisis, the Chinese economy is facing a slow pace of economic development. The Chinese economists prefer to call the slow trend as a 'new' normal growth. To address the problem of slow economic growth, the Chinese government has already introduced an interconnected chain of supply-side structural reforms. Moreover, in the newly formulated the "13th Five-Year Plan 2016-2020" (CCCPC, 2016), the government has promised to provide support to export-intensive industries. The Chinese government also began to implement anew and large-scale project, i.e. the "Belt & Road" Initiative, to facilitate the flows of trade and infrastructural development. However, there is definitional debate on the notion of regional economic integration (Schneider, 2017). Usually, economic integration is facilitated by means of regional trade, investment and connectivity (Dur, Baccini, & Elsig, 2014; Bassem Kahouli, 2016; Liu, 2016). Economic integration has both deepening and widening dimensions. It is a process of mutual agreement among countries in a geographic region that reduce trade barriers to the free flows of goods and services and factors of production among each other. It reduces trade costs and

increases economic activities or gross domestic product (GDP) and welfare among members of integrated nations. Economic integration essentially 'involves the removal of barriers at and behind the border with the aim of increasing welfare from increased trade, investment and economic activity that comes from the ability to specialize, develop the economy and take advantage of mutually beneficial exchange with other countries' (Armstrong, 2015). It is essentially a market building effort in the sense that 'it creates a new market with new rules' (Orcalli, 2017). There are five forms of integration such as free trade zone, custom union, common market, economic union, and full economic integration. China is making gigantic efforts to open up its economy to the outside world since 1978 economic reforms. After China's accession to the WTO in 2001, the country has gone through a substantial process of trade liberalization and expansion of international trade (P. Lai, Du, Wang, & Chen, 2016). There are interesting questions among the academic circles with regard to the Chinese economy and implications of the its trading systems (Naughton, 2017; Schweickart, 2015). In that context, this paper aims to examine the determinants of China's regional economic integration in the light of the gravity model of trade. The empirical evidence presented in the paper lends support to the hypothesis that China is regionally integrated with its five neighboring economies of the Greater Mekong Sub-region (GMS); namely, Cambodia, Laos, Myanmar, Thailand, Vietnam.

The paper is organized as follows. **Section 1** introduces the research objective along with a brief background of China-GMS trade relations within the larger global contexts. **Section 2** provides a brief profile and overview of GMS and some emerging trends of global economic integration. A description of sample size, dataset, methodology, and the gravity model are given in the **Section 3**, followed by the results and discussion in **Section 4**. Finally, **Section 5** makes the concluding observations.

2. Greater Mekong Sub-region (GMS) and Global Economic Integration

2.1. Brief Socioeconomic Profile of GMS

The Greater Mekong Sub-region (GMS) comprising the Kingdom of Cambodia, the People's Republic of China (Yunnan province), the Lao People's Democratic Republic, and the Socialist Republic of Vietnam (see **Figure 1**), is home to some 250 million people who have had social, cultural and economic linkages dating back many centuries. With impressive GDP growth rates ranging between 5-10 percent per annum during the 1990s and early 2000s, the GMS region has recorded equally high rates of urbanization and economic development. To put the analysis into the proper perspective, some background information is presented in the **Table 1** and **Table 2**.China's commodity exports flows to these countries are shown in Appendix 2 to Appendix 5.

Figure 1: Geographical Location(Google)

Table 1: Selected socioeconomic indicators of China

Sl.	Indicators	2012	2013	2014	2015	2016
1.	**Social**					
	Total Population (1,000 persons)	1,350,695	1,357,380	1,364,270	1,371,220	1,378,665
	Population growth rate (annual %)	0.5	0.5	0.5	0.5	0.5
	Urban population growth (annual %)	3.1	2.9	2.8	2.7	2.6
	Poverty head count ratio at $1.9 a day (2011 PPP) (of population)	6.5	1.9	-	-	-
2.	**Economic**					
	GDP (growth rate)	7.9	7.8	7.3	6.9	6.7
	Consumption Contribution to GDP growth (%)	4.3	3.7	3.7	4.6	4.7
	Industrial Output (growth rate %)	8.1	7.7	7.0	6.0	6.0
	Fixed Assets Investment Growth Rate	20.3	19.3	15.3	9.8	7.9
	Share of Manufacturer sector in GDP	47.1	47.2	47.2	46.9	40.7
	Share of Service Sector in GDP	44.1	44.4	44.6	45.1	50.7
	Electricity production (growth rate %)	4.7	8.9	4.2	2.8	5.2
	Electricity Consumption (growth rate %)	5.9	8.9	4.2	2.9	-
	Total energy consumption (growth rate)	3.9	3.7	2.1	1.0	-
	Total freight volumes (growth rates %)	-0.7	1.6	-3.9	-11.9	-0.8
	Railway freights volumes (growth rate)	12.1	9.1	-2.7	4.2	-3.7
	CPI (%)	2.6	2.6	2.0	1.4	2.0
	PPI (output price, %)	-1.7	-1.9	-1.9	-5.2	-1.3
	PPI (Input price, %)	-1.8	-2.0	-2.2	-6.1	-1.9
3.	**Monetary and Income Indicators**					

	Foreign exchange reserve (growth rate)	4.1	15.4	0.6	-13.3	-9.6
	Real disposable Income per capita (Yuan)		18,310.8	20,167.1	21,966.2	23,821.0
	Real disposable income per capita (growth rate%)	-	-	8.0	7.4	6.3
	Nominal medium of disposable income per capita (Yuan)	-	25,632.1	17,569.8	19,281.1	20,883.0
	Nominal medium of disposable income per capita (growth rate %)	-	-	12.4	9.7	8.3
	Real disposable wage per capita (Yuan)	-	10,410.8	11,420.6	12,459.0	13,455.0
	Real disposable wage per capita (growth rate)	-	-	9.7	9.1	8.0
4.	**Trade**					
	Share of Chinese exports in world exports	9.5	10.0	10.6	11.4	10.6
	Share of Chinese imports in world imports	8.7	9.3	9.7	9.8	9.6
	Exports (% of GDP)	25.4	24.5	24.1	22.0	19.6
	Imports (% of GDP)	22.7	22.1	21.6	18.5	17.4
	Total trade growth rate	6.2	7.5	3.4	-8.1	-6.8
	Exports growth rate	4.3	7.2	0.5	-14.3	-5.5
	Import growth rate	4.3	7.2	0.5	-14.3	-5.5
	Trade surplus growth rate	48.7	12.5	47.9	55.0	-14.1
	Share of service exports in total exports	9.3	8.8	8.9	9.2	9.5
	Share of service imports in total imports	14.5	15.6	19.3	21.8	23.2
	Share of processing trade	42.1	39.0	37.7	35.1	34.1
	Inflow FDI growth rate (actual)	-3.7	5.3	1.7	5.6	-0.2
	Outflow FDI growth rate	17.6	22.8	14.2	18.3	-

Source: Compiled by the authors from the World Bank Database (World_Bank, 2018); and Zhang (2017).

Table 2: Selected indicators of the Mekong Sub region Countries, 2016

Indicator	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Total land area (km2)	181,035	236,800	676,576	513,120	331,231
Total population (1,000 persons)	15,158	6,621	52,917	67,455	92,695
Annual population growth (%)	1.2	2.0	0.9	0.3	1.1
GDP at current prices (US$ million)	19,194	15,903	68,636	407,048	198,196
GDP per capita at current prices (US$)	1,266	2,402	1,297	6,034	2,138
GDP per capita at current prices (US$ PPP)	3,848	7,123	5,959	17,273	6,325
International merchandise Export (US$ million)	10,073	3,124	11,509	215,327	176,575
International merchandise Import (US$ million)	12,371	4,107	15,696	194,668	174,463
International merchandise Trade, Total (US$ million)	22,444	7,231	27,205	409,994	351,038
Foreign direct investments inflow	2,280	1,076	2,989	2,553	12,600

Source: Compiled by authors from the ASEAN Statistics Database, http://www.aseanstats.org/

2.2. The Emerging Trends of Global Economic Integration

Regional cooperation and integration (RCI) is a well-known economic strategy. The strategy is especially adopted by the ADB. The RCI Strategy is anchored on four pillars:

1. **Regional and Sub Regional Economic Cooperation Programs on Cross-border Infrastructure and Related Software** - physical connectivity through regional and sub-regional infrastructure complemented by harmonized regulations, procedures, and standards that will facilitate cross-border trade.
2. **Trade and Investment Cooperation and Integration** - elimination of trade and investment barriers through improvement of the transparency, efficiency, and procedural uniformity of cross-border transportation of goods and services.

3. **Monetary and Financial Cooperation and Integration** - ensuring economic and financial stability through establishment of regional financial mechanisms

4. **Cooperation in Regional Public Goods** - promotion of regional public goods (RPG) through coordinated actions to supply RPGs, such as clean air, control of communicable diseases, and management of natural disasters.

The effort to integrate the Asian economies is getting new impetus in the twenty first century. Regional trade and cooperation across the international borders have been used as a strategy to promote the growth and development of the peripheral areas in different parts of the worlds. There are many instances of horizontal and vertical economic integration initiative in Asia. Trade cooperation is one of the key issues in almost all economic integration and partnership agreements. Some notable regional arrangements and mechanisms are mentioned below:

1. **Greater Mekong Sub-Region** (GMS) involving Yunnan province of China, Vietnam, Laos, Cambodia, Thailand and Myanmar.

2. **Indonesia, Malaysia and Thailand Growth Triangle** (IMT-GT) involving Sumatra in Indonesia, peninsular Malaysia and southern Thailand.

3. **Greater Tumen Initiative** (GTI) involving four provinces of China, four eastern port cities of South Korea, three provinces of Mongolia and Russia's Far East. The GTI is an intergovernmental cooperation framework supported by the United Nations Development Programs (UNDP). This GTI is originally known as the Tumen River Area Development Program. GTI's one of the key priority areas is agricultural trade and investment

4. **Southern Growth Triangle** (SIJORI) involving Singapore, Johor state of Malaysia and Indonesian island of Batam in the province of Riau. The Singapore-Johor-Riau (SIJORI) Growth Triangle was first mooted in December 1989.The main areas for cross-border integration are the agriculture, fisheries and trade.

5. **Southern China Growth Triangle** involving Guangdong and Fujian provinces of China, Taiwan and Hong Kong. It consists of Hong Kong, Taiwan and four special economic zones of south China.

6. **Asia-Pacific Economic Cooperation** (APEC) established in 1989, is a forum for twenty-one countries for trade integration and mutual cooperation. The TPP agreements signed in 2015 is a free trade agreement initiative among the twelve countries of the APEC. China expressed its interest to be a party of the TPP. But, an economist raised the question: should China join the TPP? (Devadason, 2014). She expressed doubts and difficulties of the success of the TPP without the cooperation of China (p.474).

7. **Regional Comprehensive Economic Partnership** (RCEP) is a free trade agreement between ten members of the ASEAN and six states with which ASEAN has existing free trade agreements (Australia, China, India, Japan, South Korea and New Zealand). This agreement may be an alternative to the Transpacific Partnership (TPP) Agreement. China is not a member of the TPP.

8. **Shanghai Cooperation Organization** (SCO) is Eurasian organization led by China. Its members are China, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan. India and Pakistan joined as full members of SCO in 2017. Its head-quarter is in Shanghai. Many analysts believe that the SCO is largely a Chinese Initiative(Song,2011).

9. **Brazil-Russia-China-South Africa** (BRICS) is an association of five emerging economies, namely Brazil, Russia, India, China, and South Africa. Its motto is 'Stronger Partnership for a Bright Future'. 9th BRICS, 3-5 September 2017, summit has recently been held in Xiamen, a port-city of Fujian in China. BRICS countries created the New Development Bank (NDB) for mutual cooperation. The Bank will provide funds in OBOR related infrastructure development projects. The bank has already approved seven investment projects of $ 1.5 billion in the BRICS countries. Reportedly, it is going to approve a second package of investment projects worth $2.5-$3billion in total (Putin, 2017).

10. **The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation** (BIMSTEC) is a regional grouping of South Asian and south-east Asian countries. These are: Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan and Nepal. The countries are dependent on the Bay of Bengal. The head-quarter of BIMSTEC is in Dhaka, Bangladesh.

11. **Economic Cooperation Organization** (ECO) is an organization of ten Muslim-majority states. It was founded in 1985 in Tehran by the leaders of Turkey, Iran and Pakistan. Its seven members: Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The Economic Cooperation Organization Trade agreement (ECOTA) was signed in 2013 in Islamabad. The ECO should be the powerhouse for regional integration. But reality is different as the three founding states don't trust each other (Tang & Yung, 2008).

12. **Group of Twenty** (G-20) is an international forum for twenty major economies. Currently, these are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, United Kingdom, United States, and the European Union. Founded in 1999, the G20 aims to discuss policy issues pertaining to the promotion of international financial stability and economic governance.

13. **South Asian Association for Regional Development** (SAARC) is a regional organization of 8 South Asian Countries such as India, Bangladesh, Sri Lanka, Bhutan, Nepal, Maldives, Pakistan and Afghanistan. China is an observer of SAARC.

14. **Southeast Asian Association for Regional Cooperation** (ASEAN) is a regional grouping of 10 South East Asian countries: Thailand, Singapore, Philippines, Malaysia, and Indonesia, Vietnam, Burma, Laos, Cambodia, and Brunei.

15. "**Belt & Road" Initiative** is a global and regional platform of 64 countries across the world. China has led the initiative. The Asian Infrastructure Investment Bank (AIIB) is formed to facilitate the infrastructure projects in the member countries (Chin, 2016).

Not only that, there has been a proliferation of bilateral trade agreements. ***Table 3*** presents the status of several preferential trade agreements to demonstrate the magnitude of regional economic integration across the globe.

Table 3: Preferential trade agreements (PTA)

Acronym	Full name of PTA	Member countries
AFTA	ASEAN Free Trade Area	Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam
Andean Pact	Andean Community	Bolivia, Colombia, Ecuador, Peru, Venezuela
ASEAN	Association of South East Asian Nations	Same membership as AFTA
CER	Closer Trade Relations	Australia and New Zealand
ECO	Economic Cooperation Organization	Afghanistan, Azerbaijan, Iran, Kazakhstan, Kyrgyz, Republic, Pakistan, Tajikistan, and Uzbekistan
EFTA	European Free Trade Association	Iceland, Liechtenstein, Norway, and Switzerland
EU	European Union	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom
Mercosur	Southern Common Market	Argentina, Brazil, Paraguay, and Uruguay
NAFTA	North American Free Trade Agreement	Canada, Mexico, and United States
SAPTA	South Asian Preferential Trade Agreement	Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka
SPARTECA	South Pacific Regional Trade and Economic Cooperation Agreement	Australia, New Zealand, Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Papua, New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa

Source: Clarete, Edmonds, and Wallack (2003), P.94

2.3. China-GMS Trade Patterns and Economic Integration

The following **Figure 2** and **Figure 3** reveal that China's domestic investment and outward foreign direct investments are on the increase. We are therefore here to argue that China is becoming integrated with the rest of the world. **Figure 2** clearly shows that the overall trend of China's trade activities is on the rise.

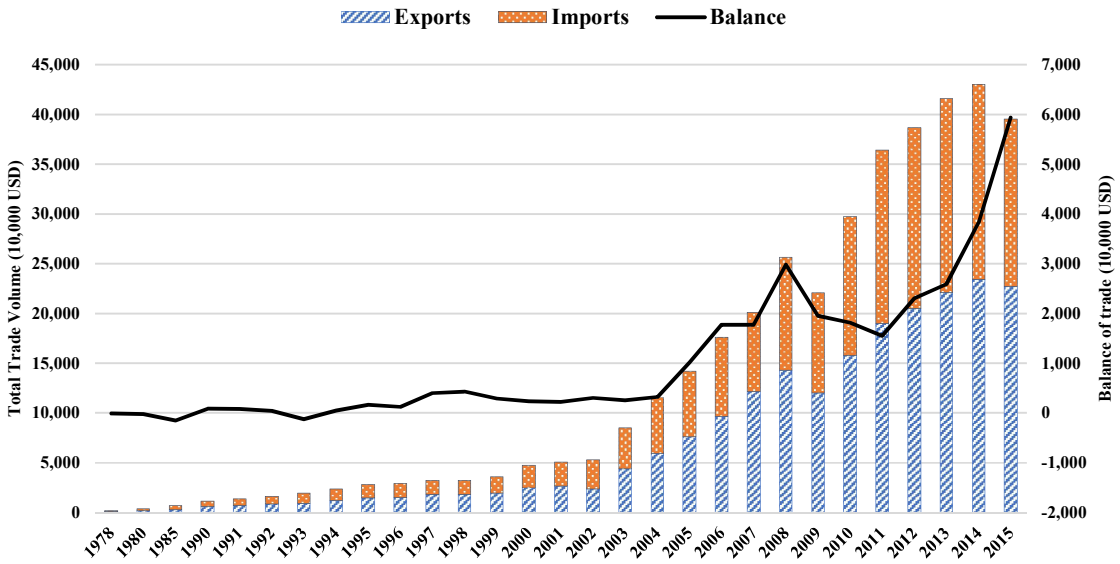

Figure 2: Chinese export and import trade volume, 1978-2015

Source: By authors, China Statistical Yearbook 2016, (NBSC, 2016)

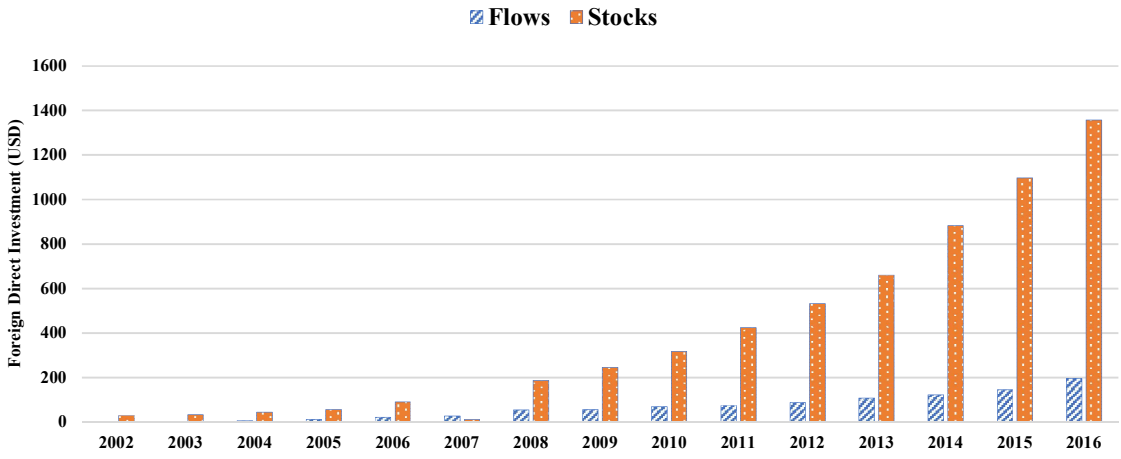

Figure 3: Chinese FDI Flow and Stocks

Source: By authors, National Bureau of Statistics of China, (NBSC, 2013, 2017)

Table 4: Figure Stock of Chinese FDI in the GMS (Millions US$)

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cambodia	59	90	77	104	168	391	633	1130	1757	2318	2849
Laos	9	15	33	96	302	305	536	846	1276	1928	2771
Myanmar	10	20	24	163	262	500	930	1947	2182	3094	3570
Thailand	151	182	219	233	379	437	448	1080	1307	2127	2472
Vietnam	29	160	229	254	397	522	729	987	1291	1604	2167

Source: Compiled by author, China Ministry of Commerce

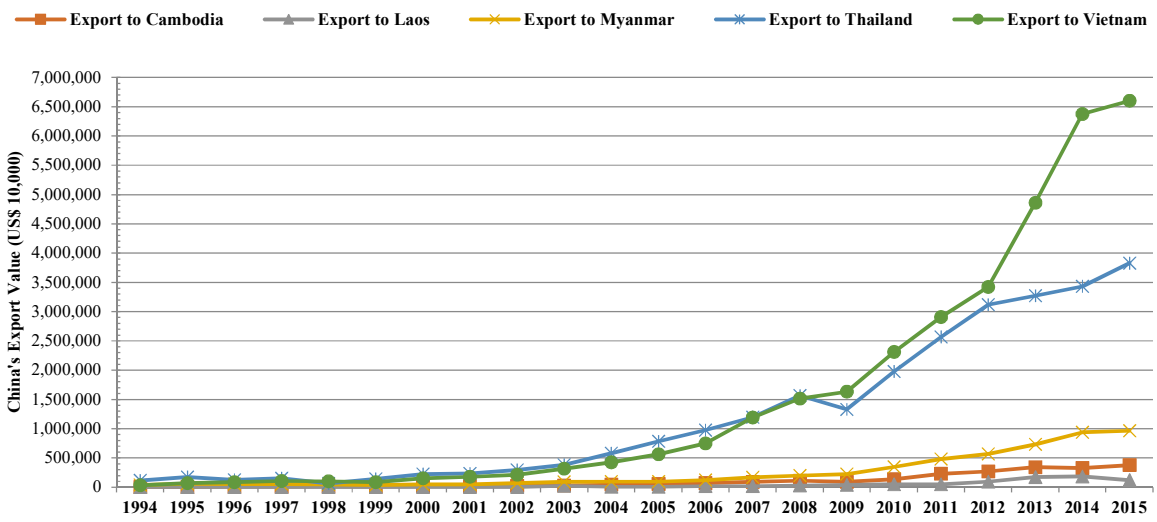

Figure 4: China's Exports to Greater Mekong Sub-Region Economies, 1994-2015

Source: By authors, China Statistical Yearbook 2016, (NBSC, 2016)

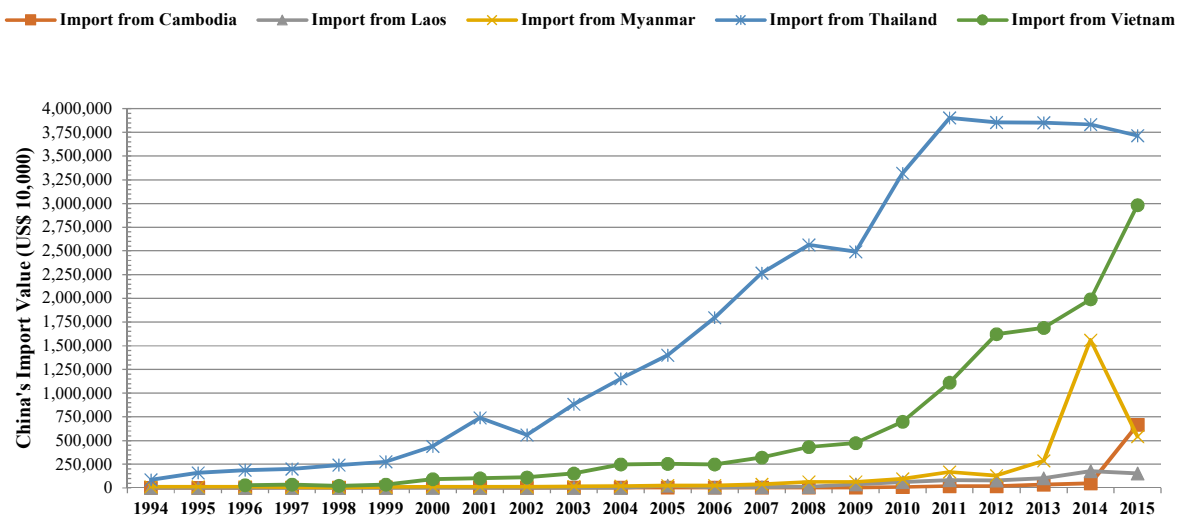

Figure 5: China's Imports to Greater Mekong Sub-Region Economies, 1994-2015

Source: China Statistical Yearbook 2016, (NBSC, 2016)

3. Materials and Methods

3.1. Gravity model

Tinbergen was the first to introduce the gravity equation for international trade analysis and Tinbergen (1962), Pöyhönen (1963), Pulliainen (1963), and Linnemann (1966) worked to further develop the theoretical foundations of the gravity equation. Linnemann (1966) used the gravity in an extensive empirical analysis. Along with the empirical application of the gravity, much works has been done (Anderson, 1979; Anderson & Wincoop, 2003; Baier & Bergstrand, 2009; Jeffrey H. Bergstrand, 1985; J. H. Bergstrand, 1989, 1990; Deardorff, 2013; Egger, 2002; Evenett & Keller, 2002; R. Feenstra, 2004; E. Helpman, 1987; Elhanan Helpman, Melitz, & Rubinstein, 2008; Laszlo Matyas, 1997; L. Matyas, 1998; Yotov, Piermartini, Monteiro, & Larch, 2016) to provide theoretical foundations for the model. These works, as demonstrated in the Figure, proved that the key assumptions of the gravity model are in line with various theoretical approaches such as Heckscher-Ohlin model, Ricardian comparative advantage, Ermington model, monopolistic competition, 'new trade' theory.

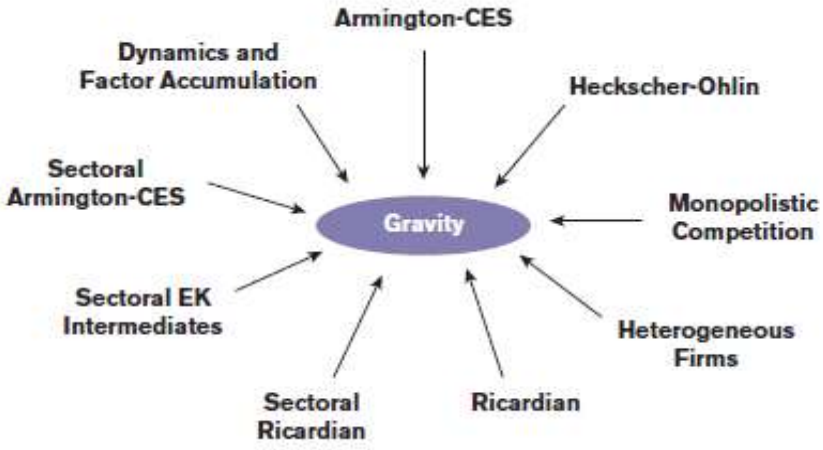

Figure 6: The conceptual and theoretical foundation of the gravity model

Source: Yotov et al. (2016), p.12

Additionally, the next section will review some empirical works to detect the key factors of Chinese regional trade integration. There is indeed a huge volume of literature on the empirical studies of the trade gravity model. However, studies which investigate the determinants of Chinese trade integration with the Greater Mekong Sub region are much fewer in number. The related literature can be divided into two strands of research: i) investigation of trade patterns of China with other nations or a group of nations, and ii) using the gravity model to explore the issues of trade integration of several economic blocs.

Poncet (2006) studied the process of economic integration between the Chinese border province of Yunnan and its riparian areas of the Greater Mekong Sub-region by using the gravity model for the period from 1988 to 1999. According to the study, Greater Mekong Sub-region cooperation efforts have positive effects on Yunnan's trade.

Hemkamon (2007)'s doctoral dissertation employed the gravity model to analyze the determinants of bilateral trade flows and the foreign direct investment of ASEAN countries. The work concludes that ASEAN 10 countries are strongly influenced by regional and global market forces.

Edmonds, La Croix, and Li (2008) reviewed the public policies that shaped China's manufactured export explosion and examined long trend statistics on the evolution of China's trading

partners and the goods it traded in the post-reform period. The paper shows that China's patters of trade changed dramatically to reflect its increasing market orientation and its evolving comparative advantage. The researchers applied the gravity model to explain the 'export booms' of China with 157 countries over the period 1985-2002.

Ge, He, Jiang, and Yin (2014) used the gravity model to investigate the determinants of China's cross-border trade with its 14 neighboring economies. They used disaggregated firm-level trade transaction data from the Chinese Customs for the period from 2000 to 2006. The findings showed that "income and the GDP growth rate of the destination countries are positively correlated", whereas the low levels of "institutional quality of the importing country is negatively correlated with border exports from China".

Xinjiang is a Uygur autonomous region connecting China with Central Asia and South Asia. It is an important province for regional integration and trade facilitation of china under the belt and road initiative framework (Fan, Zhang, Liu, & Pan, 2016; Herrero & Xu, 2017; Huang, 2016; Yiwei, 2016). The result shows Xinjiang has trade integration with Central Asia, Central and Eastern Europe, Western Europe, East Asia and South Asia. But its foreign trade with West Asia is much lower for the existence of trade barriers.

Caporale, Sova, and Sova (2015) analyzed the Chinese trade flows with its 190 countries for the period 1992-2012. They estimated the gravity model along with panel data with the fixed effects vector decomposition (FEVD) techniques. They model bilateral exports as a function of GDP, the difference in per capita income, geographical distance, FDI inflows and other the dummy variables. The findings confirm the significant change in China's trading structure associated with the fast growth of foreign trade. In particular, there has been a shift from resource- and labor-intensive to capital- and technology-intensive exports. The results show that trade on the whole is fostering the Chinese economic growth.

Arvis, Duvan, Shepherd, and Raj (2016) used a dataset of 167 developing countries to estimate the trade costs for the period, 1996-2010. The gravity analysis shows that among developing countries

African and low-income countries have high level of trade costs. The study reports that distance, regional trade agreements, maritime transport connectivity and trade facilitation performance are important determinants of trade costs.

Studies reveal that there are positive economic effects of cultural institute on trade and investment. For instance, the gravity analysis of Rauch and Trindade (2002) reports that ethnic Chinese network have an important impact on bilateral trade. Also, Gao (2003), and Ghosh, Lien, and Yamarik (2017) shows that the presence of Confucius Institute in the source countries positively affect the trade and FDI flows. Similarly, the effects of the British Council on trade and investment are positive (Lien & Lo, 2017). **Table 5** provides some summary information of existing literatures implementing gravity model to investigate international trade.

Table 5: Summary of existing literature

Authors	Region / Economic Block	Methodology	Main results and conclusion
Irshad, Xin, Shahriar, and Arshad (2018)	OPEC & China	OLS, Fixed effect model	The researchers applied the panel data gravity model to analyze China's trade patters with 14 OPEC member countries for the period, 1990-2016.The study confirms that China's bilateral trade with OPEC member countries positively impacts on GDP, GDP per capita income, trade openness in China and WTO membership. As usual, the distance has a negative impact on trade.
Rasoulinezhad and Wei (2017)	OPEC & China	Fixed effects (FE), Random effects (RE), and the	The study analyzes the trade patterns between China and 13 OPEC member countries over the period 1998-2014 by using the panel-gravity model. It confirms the existence of long-term relationships between the bilateral trade flows and

		FMOLS approaches	the main components of gravity model-GDP, income (GDP *per capita*), the difference in income, exchange rate, the openness level, distance, and WTO membership.
Gashi, Hisarciklilar, and Pugh (2016)	EU & Kosovo	Dynamic Panel Poisson Gravity model	Higher transaction costs are barriers to Kosovo's market integration into the EU. Need for personal and community networks for trade facilitations and integration.
Narayan and Nguyen (2016)	Vietnam and her 54 partners	Unit roots model, Cointegration method	The authors examine the trade issues of Vietnam with its 54 partners. The conclusion is that the influence of trade gravity variables is dependent on trading partners. For instance, trade with rich nations is more sensitive to distance, economic size, and trading partners, openness of trading partners, and exchange rate, than trade with low income nations.
B. Kahouli and Maktouf (2015)	Mediterranean area	GMM estimation, panel model	The study examines cross-section and panel of 27 countries for 1980-2011. The gravity results show the existence of a strong relationship between the factors of free trade agreements and trade flows.
Geda and Seid (2015)	Africa	PPML, Tobit	The authors have examined the nature and potential for trade and regional integration in Africa. They found a low level of integration due to the absence of infrastructure. The results from the gravity model and revealed comparative advantage demonstrate the problems of trade

			competitiveness and integration of the African countries.
Moinuddin (2013)	South Asia	Panel least square, Random & Fixed effect	The gravity analysis shows that compared to other regions such as East Asia, Latin America and North America, South Asian region is lagging behind in terms of regional integration
Kabir and Salim (2010)	BIMSTEC	Panel estimation	The researchers find the gravity results are meaningful to explain the trade patterns of the 7 South East and South Asian Countries. They found that both GDP and good governance positively influence the bilateral trade and create an environment for regional trade integration
Gu (2008)	OECD & China	OLS	The thesis on the extended gravity analysis reports that GDP per capita and population have strong effects on China's exports. Trade cooperation positively effects on the export trade.
Sharma and Chua (2000)	South East Asia	Gravity model	The study focuses on the economic integration of the 5 ASEAN economies namely Indonesia, Malaysia, Philippines, Thailand and Singapore. The estimated gravity model reveals that trade in ASEAN countries increases with the size of the economy. But there was gap in intra-ASEAN trade.

Source: Organized by authors

Prior studies on China's trade integration show that there is a deficiency in the literature with regard to the empirical analyses of China's economic integration with the Greater Mekong Sub-region. To the best of the author's knowledge, this paper is the first attempt to study the export dynamics between China and the Greater Mekong Sub region. The paper is timely and important for a number of reasons. First, the study for the first time will apply the gravity model to explain the nature of China's trade integration with the MSR economies. **Second,** despite China remains a 'global trade power' (B. Naughton, 2007), our knowledge on the country's trade relations with its GMS neighbors is limited. **Third,** the economic rise of China is a recent global phenomenon. It is projected that China would become the single largest economic power by 2050 with a reasonable economic size of 58.499 trillion US dollar (**Appendix 1**). **Fourth,** there is a section titled *New Export Strength* in recently formulated "13th Five Year Plan (2016-2020)" of China (CCCPC, 2016). According to the plan: "*We will move faster to make our export-intensive industries more internationally competitive in terms of their technology, standards, brand names, quality, and services; encourage the export of high-end equipment; and increase the use of high technology and the value-added of our exports. We will expand the export of services, improve after-sale maintenance and repair services, and coordinate the development of onshore and offshore outsourcing. We will increase support to the exports of micro, small, and medium enterprises*." It is, therefore, crucial to find out the influencing factors of bilateral exports from the policy perspective of China. Finally, since 2013 the Chinese government is implementing the Belt and Road Initiative. The initiative is aimed to integrate China with the rest of the world. The facilitation of the free flows of trade is a fundamental economic goal of the "Belt & Road" Initiative (Lemoine & Unal, 2017). Therefore, there should not be any question that studying such a topic is of great importance from both academic and policy implications.

3.2. Sample, Data, Methodology, and Empirical Model Specification

For author(s)'s knowledge, the studies on the trade relations between China and GMS economies tend to remain in a few number, which allowing this study to focuses on bilateral trade integration between China and the GMS economies. Our dataset covers panel data over time period from 1993 to 2016. The dependent variable used in this paper is the total export flows of China. Several researchers like Baltagi, Egger, and Pfaffermayr (2014) and Egger (2002) suggested to employ panel data methodology in the estimation of the gravity model to overcome the biasness and problems of the time series and cross-sectional data, and panel data econometrics has some basic models- pooled OLS, fixed and random effects models.

The gravity model explains international trade flows as a log-liner function of income and distance between countries. It predicts that bilateral trade depends positively on income and negatively impacted by distance. This basic concept came from Newton's Theory of Gravity discovered in 1687. According to the Law of universal gravitation, the standard gravity model simply describes that the trade between two countries is determined positively by each country's GDP, and negatively by the distance between them. This formulation can be generalized as follows:

$$X_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} D_{ij}^{\beta_3} \quad (1)$$

where X_{ij} is the flow of exports into country j from country i , Y_i and Y_j are country i's and country j's GDPs and D_{ij} is the geographical distance between the countries' capitals. The linear form of the model is as follows:

$$\log(X_{ij}) = \alpha + \beta_1 \log(Y_i) + \beta_2 \log(Y_j) + \beta_3 \log(D_{ij}) \quad (2)$$

The generalized gravity model of trade states that the volume of exports between pairs of countries, X_{ij}, is a function of their incomes (GDPs), their populations, their distance (proxy of transportation costs) and a set of dummy variables either facilitating or restricting trade between pairs of countries. That is,

$$X_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} L_i^{\beta_3} L_j^{\beta_4} D_{ij}^{\beta_5} A_{ij}^{\beta_6} \varepsilon_{ij} \quad (3)$$

$$\ln(X_{ij}) = \alpha + \beta_1 \ln(Y_i) + \beta_2 \ln(Y_j) + \beta_3 \ln(L_i) + \beta_4 \ln(L_j) + \beta_5 \ln(D_{ij}) + \beta_6 \ln(A_{ij}) + \varepsilon_{ij} \quad (4)$$

where Y_i (Y_j) indicates the GDP of the country i (j), L_i (L_j) are populations of the country i (j), D_{ij} measures the distance between the two countries' capitals (or economic centers), A_{ij} represents other factors that might affect export flow (mostly, dummy variables), ε_{ij} is the error term and β_s are parameters of the model.

This study follows the frameworks of the most updated development of gravity model, which introduced in the research works of Narayan and Nguyen (2016), Rasoulinezhad and Wei (2017) and Irshad et al. (2018). These researches included bilateral exchange rate, openness and population variable into the gravity model and proved helpful in explaining trade variations between trading partners. Therefore, by inclusion of these variables, our empirical gravity models can be expressed as follows:

$$\begin{aligned} \ln Export_{ijt} = {} & \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln PCGDP_{it} + \beta_4 \ln PCGDP_{jt} \\ & + \beta_5 \ln DPCGDP_{ijt} + \beta_6 \ln Distance + \beta_7 \ln BEXCH_{jt} \\ & + \beta_8 \ln Openness_{jt} + \beta_9 \ln POP_{jt} + \varepsilon_{ijt} \end{aligned} \quad (5)$$

where, subscript terms i, j, and t denote exporting country (i.e. China for the this study), importing country (i.e. GMS economies), and time period respectively. β_0 and β_s correspondingly indicates the country-specific intercept term and estimated coefficients. $Export_{ijt}$ is the total bilateral export value between country i and j. GDP_{it} (GDP_{jt}) is Gross Domestic Product (GDP) in millions of US dollars of country i (j), and $PCGDP_{it}$ ($PCGDP_{jt}$) represent Per Capita GDP of country i (j), while $DPCGDP_{ijt}$ is the absolute difference value between GDP per capita of country i and j. $Distance$ indicate the geographical distance (in kilometer) between country i's capital (Beijing, China) and j's capital. $BEXCH_{jt}$ is bilateral exchange rate of country j's currency against country i's

currency (Chinese Yuan) at time t. $Openness_{jt}$ is trade openness level of country j within time t. POP_{jt} represent the population of the GMS countries at time t, ε_{ijt} is an error terms.

Furthermore, Gashi et al. (2016) expressed that countries with a history of trading with one another continue to do so either for political, economic, policy, or other related reasons, thus, changes in trade flows can produce effects with significant persistence. Moreover, the authors also argue that the omission of historical factors is likely to bias estimated trade effects. Specifically, such kind of results may produce omitted variable bias. Our empirical gravity model, therefore, will also include dynamic factor variable to investigate the effect of historical bilateral trade relationship on current trade flow. Thus, empirical gravity models in **Equation 5** can be transformed into **Equation 6** by including variable $Export_{ij,t-1}$ as follows:

$$\begin{aligned}\ln Export_{ijt} = {} & \beta_0 + \beta_1 \ln Export_{ij,t-1} + \beta_2 \ln GDP_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln PCGDP_{it} \\ & + \beta_5 \ln PCGDP_{jt} + \beta_6 \ln DPCGDP_{ijt} + \beta_7 \ln Distance + \beta_8 \ln BEXCH_{jt} \\ & + \beta_9 \ln Openness_{jt} + \beta_{10} \ln POP_{jt} + \varepsilon_{ijt}\end{aligned} \quad (6)$$

where $Export_{ij,t-1}$ is the lagged variable (or dynamic / historical trade) of export flow between country i (China) and country j (GMS countries), and other variables' notation are same as in **Equation 5** above.

More importantly, according to Narayan and Nguyen (2016), for avoiding inaccurate estimation of the parameters, the model of **Equation 6** should be sub-divided into three different models, i.e. **Model I**, **Model II**, **Model III** as showing in **Equation 7, 8, 9** follows, in which the income variables (GDP, GDP per capita, and the absolute difference value between GDP per capita) appear separately in each and the remaining factors are consistent.

Thus, this study's Empirical Gravity Models are expressed as follows:

Model I

$$\ln Export_{ijt} = \beta_0 + \beta_1 \ln Export_{ij,t-1} + \beta_2 \ln\left(GDP_{it}.GDP_{jt}\right) + \beta_3 \ln Distance + \beta_4 \ln BEXCH_{jt} + \beta_5 \ln Openness_{jt} + \beta_6 \ln POP_{jt} + \varepsilon_{ijt} \quad (7)$$

Model II

$$\ln Export_{ijt} = \beta_0 + \beta_1 \ln Export_{ij,t-1} + \beta_2 \ln\left(PCGDP_{it}.PCGDP_{jt}\right) + \beta_3 \ln Distance + \beta_4 \ln BEXCH_{jt} + \beta_5 \ln Openness_{jt} + \beta_6 \ln POP_{jt} + \varepsilon_{ijt} \quad (8)$$

Model III

$$\ln Export_{ijt} = \beta_0 + \beta_1 \ln Export_{ij,t-1} + \beta_2 \ln\left(DPCGDP_{ijt}\right) + \beta_3 \ln Distance + \beta_4 \ln BEXCH_{jt} + \beta_5 \ln Openness_{jt} + \beta_6 \ln POP_{jt} + \varepsilon_{ijt} \quad (9)$$

In accordance with the theoretical structure of the gravity model, it is anticipated that economy size and income (GDP per capita) would have positive impacts on trade flow and promote trade between China and GMS economies. The effect of the third income measure is ambiguous. The coefficient can have a positive sign, if countries have the Heckscher–Ohlin (H-O) bilateral trade pattern, while the negative sign of this variable can appear under the Linder hypothesis. The coefficient for the bilateral exchange rate of j's currency against Chinese yuan is expected to be negative (for instance, any increase in the GMS's currency compare to Chinese yuan leads to decrease in trade flows between China and GMS economies). The more open the country economy the more it will trade. So, we are excepting the positive sign for economy openness. For population, Martinez-Zarzoso and Nowak-Lehmann (2003) point out that the coefficient of population can be negative or positive signed, depending on whether the country exports less when it is big (absorption effect) or whether a big country exports more than a small country (economies of scale).

In case of time-invariant variable(s), we expect negative sign for distance because it is the proxy for transportation cost. The more distance between the partners which results more transportation cost. **Table 6** describes the variables, data sources and their expected coefficient sign.

Table 6: Summary of variables, data sources, and expected sign

Variable	Description	Data source	Expected Sign
ln $Export_{ijt}$	Export at t	UN COMTRADE	
ln $Export_{ij,t-1}$	Export at $t-1$	UN COMTRADE	$+$
ln GDP_{it}	GDP of China	UNCTAD	$+$
ln GDP_{jt}	GDP of country j	UNCTAD	$+$
ln $PCGDP_{it}$	Per capita GDP of China	UNCTAD	$+$
ln $PCGDP_{jt}$	Per capita GDP of country j	UNCTAD	$+$
ln $DPCGDP_{ijt}$	Absolute difference between Per capita GDP of China and country j	Calculated by authors	$+/-$
ln $Distance$	Geographical distance between China and country j	www.timeanddate.com	$-$
ln $BEXCH_{jt}$	Bilateral Exchange Rate of country j against Chinese Yuan	UNCTAD	$-$
ln $Openness_{jt}$	Degree of trade openness of country j at period t	UNCTAD	$+$
ln POP_{jt}	Population of country j	World Development Indicators	$-/+$
WTO_{it}	WTO membership of China	WTO	$+$

Source: Organized by author(s)

4. Results and Discussions

4.1. Panel Unit Roots Test

Before estimating Empirical Equations, this paper analyzes the univariate characteristics of the data that entails panel unit roots test. Panel unit roots test determines a potentially cointegrated relationship between the variables. If all variables have no unit root *i.e.* are stationary, then the traditional estimation methods can be used to estimate the relationship between the variables. If the variables have unit root test *i.e.* are non-stationary, a test for cointegration will be performed. There are several different types of panel unit roots test, and most common used for unit roots test approach in the exiting literatures is Levin-Lin-Chu (LLC) test. Therefore, in this paper LLC test was also applied for panel unit roots test at both *Level* and *First Difference*. This method assume that the autoregressive parameters are common across countries. The null hypothesis of unit root is used in the LLC method. The result of the test is presented in **Table 7**. At *Level*, we found 5 significant variables include $\ln GDP_{it}$, $\ln PCGDP_{it}$, $\ln DPCGDP_{ijt}$ (significant at 5%) and $\ln BEXCH_{jt}$ (significant at 1%), while all other 7 variables (include $\ln Export_{ijt}$, $\ln Export_{ij,t-1}$, $\ln GDP_{jt}$, $\ln PCGDP_{jt}$, $\ln Openness_{jt}$, and $\ln POP_{jt}$) are strongly significant at 1% at *First Difference*.

We carried out panel analysis for China's trade flow with the five GMS economies by using STATA 14.0. **Table 8** represent results of Empirical Gravity Model (Model I, Model II, Model III) estimation for both Fixed effect and Random effect. We find positive coefficients on lagged trade (dynamic) variable ($\ln Export_{ij,t-1}*$) and statistically significant at 5% and 10% in all models. The findings are not only confirmed initial preference for the dynamic modelling of China's trade integration estimation with GMS but also confirmed the fact for both econometric and economic reasons. Moreover, these findings also confirm the importance of dynamic/historical issues in the trade performance as similar to previous literatures, like Gashi et al. (2016), and Olivero and Yotov (2012). For the income variables, from **Table 8** showing that the estimation results of "Model I" and "Model II" confirm that GDP and income (GDP per capita) of China is a highly significant (at 1%) positive influence on China-GMS bilateral trade flow while in "Model III" estimation result illustrates

that difference of income ($DPCGDP$), also highly significant with positive sign that means it countries have the Heckscher–Ohlin (H-O) bilateral trade pattern. Moreover, the geographical distance, bilateral exchange rates and population size of GMS economies are having strongly negative affects the trade flow (in all Model I, II, III for both Fixed effect and Random effect model).

Table 7: Levin-Lin-Chu (LLC) unit roots test result

Level	**LLC**	**P-Value**	**1st Difference**	**LLC**	**P-Value**
ln $Export_{ijt}$	-1.4608	0.0720	ln $Export_{ijt}$ *	-3.5277***	0.0002
ln $Export_{ij,t-1}$	-0.7499	0.2267	ln $Export_{ij,t-1}$ *	-2.6537***	0.0040
ln GDP_{it}	-2.2229**	0.0131	ln GDP_{it} *	3.9193	1.0000
ln GDP_{jt}	0.6445	0.7404	ln GDP_{jt} *	-3.6079***	0.0002
ln $PCGDP_{it}$	-2.2229**	0.0131	ln $PCGDP_{it}$ *	3.9193	1.0000
ln $PCGDP_{jt}$	0.6979	0.7574	ln $PCGDP_{jt}$ *	-3.3862***	0.0004
ln $DPCGDP_{ijt}$	-2.2272**	0.0130	ln $DPCGDP_{ijt}$ *	3.9280	1.0000
ln $BEXCH_{jt}$	-4.8775***	0.0000	ln $BEXCH_{jt}$ *	2.2829	0.9888
ln $Openness_{jt}$	-0.4018	0.3439	ln $Openness_{jt}$ *	-4.0237***	0.0000
ln POP_{jt}	0.1582	0.5629	ln POP_{jt} *	-4.4113***	0.0000
WTO_{it}	-1.7224**	0.0425	WTO_{it} *	-4.5032***	0.0000

Note: (*) on variable name indicate First different of variable, (*, **, ***) on LLC result indicated significant of LLC test at 10%, 5%, and 1%.

Additionally, from our Fixed effect model, we found that GDP and income (GDP per capita) of GMS economies have positive signs on China-GMS trade integration but results unexpectedly shows negative sign in Random effect model. That findings indicated that China tends to export more to smaller economies of GMS such as Cambodia, Laos, Myanmar, rather than bigger economies, like Thailand and Vietnam (from **Table 2**, it is showed that GDP and GDP per capita of Thailand and Vietnam are much higher than other three economies). However, we did not find any significant results for GDP and income of GMS economies on China-GMS's trade integration flow. Also, we found insignificant positive coefficient of openness level of GMS, which indicated that openness level of GMS economies might not be statistically different from each other, which leads to insignificant effect on China-GMS export flow.

In case of GDP, the result reveals that a 1% increase in the GDP of China would raise the bilateral trade volume by approximately 1.4%. Similarly, the results also predict that the bilateral trade between China and GMS economies could be boosted up about 1.4% with a 1% increase in the GDP per capita. Moreover, the effect of the difference between incomes (DPCGDP), one trade is positive which shows 1% increase in DPCGDP leads to a 1.4% increase in the bilateral trade volume between China and GMS economies.

The finding of all three model results provides evidence of a strong negative effect (significant at 1%) of bilateral exchange rate and population size of GMS economies. A 1% increase in the bilateral exchange rate and population size of GMS are reducing the trade export flow from China to GMS economies by an average of 0.4% and 38.4% (for Fixed effect model) or 95.7% (for Random effect). According to Martinez-Zarzoso and Nowak-Lehmann (2003), the coefficient of population of GMS economies in this study which have negative signs, indicated that GMS economies tend to export more as its population grow bigger (economies of scale). Therefore, as a result GMS tend to reduce import volume from China (i.e. China's export decreased).

Table 8: Empirical Gravity Model Estimation

$\ln Export_{ijt}$ *	Model I				Model II				Model III			
	Fixed Effect		Random Effect		Fixed Effect		Random Effect		Fixed Effect		Random Effect	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
$\ln Export_{ij,t-1}$ *	0.22*	0.06	1.02**	0.02	0.22*	0.06	1.02**	0.02	0.23**	0.04	0.92**	0.02
$\ln GDP_{it}$	1.46***	0.00	1.33***	0.00								
$\ln GDP_{jt}$ *	0.10	0.71	-1.03	0.29								
$\ln PCGDP_{it}$					1.46***	0.00	1.33***	0.00				
$\ln PCGDP_{jt}$ *					0.10	0.71	-1.02	0.30				
$\ln DPCGDP_{ijt}$									1.46***	0.00	1.34***	0.00
$\ln Distance$			-5.62***	0.00			-5.62***	0.00			-5.82***	0.00
$\ln BEXCH_{jt}$	-0.34***	0.00	-0.38***	0.00	-0.34***	0.00	-0.38***	0.00	-0.33***	0.00	-0.40***	0.00
$\ln Openness_{jt}$ *	0.31	0.25	1.06	0.27	0.31	0.25	1.06	0.27	0.34	0.18	0.73	0.42
$\ln POP_{jt}$ *	-38.20***	0.00	-97.33***	0.00	-38.10***	0.00	-98.29***	0.00	-38.90***	0.00	-91.52***	0.01
$Constant$	1.57**	0.04	49.16***	0.00	1.57**	0.04	49.20***	0.00	1.60***	0.03	50.66***	0.00
No. of groups	5		5		5		5		5		5	
No. of observations	115		115		115		115		115		115	
R^2:												
within	0.9644		0.9395		0.9644		0.9396		0.9643		0.9444	
between	0.2680		0.6072		0.2680		0.6069		0.2705		0.5971	
overall	0.6008		0.7651		0.6009		0.7650		0.6022		0.7625	
Hausman Test			25.90***	0.00			25.97***	0.00			27.99***	0.00

Note: The (*) on variable name represent the first-different value. (*, **, ***) on the coefficient represent the significant level 10%, 5% and 1%, respectively. Coeff. = Coefficient; Prob. = Probability.

Finally, distance which is a proxy for transportation cost, that expected that more the transportation cost less the trade between countries, also shows negative influence signs in all three Random effect models. In our empirical model also revealed that 1% increase in the distance would decreases bilateral trade by an average of 5.7% between China and the five GMS economies.

According to **Table 8** , the overall R-squares for all three fixed effects models reaches 60%, and for random effects models the R-squares reaches more than 76%, meaning that our models fit the data quite well. Moreover, in order to distinguish between fixed and random effects test, the Hausman test has been applied. The null hypothesis of Hausman test states that "Random effect model is more efficient than the Fixed effect model". The results in **Table 8** show that the Hausman specification test rejects the null hypothesis and this indicates that country specific effects are correlated with regressors. This suggests that the fixed effects model is preferred. Since the fixed effects model is the appropriate one, interpretation of the results will focus on the fixed effects model.

Additionally, we have included China's WTO membership as dummy in our second-stage fixed effect model. Since joining the WTO in December 2001, China has emerged as a major player in the world trading system (Agarwal & Wu, 2004; Imbruno, 2016; Mau, 2017; Wong, 2003). A study reports that China's trade dependence (measured by the ratio of exports and imports to gross domestic product (GDP)) has risen from about 35% prior to its accession to the World Trade Organization (WTO) to as high as 65% afterwards (T.-W. Lai, Riezman, & Wang, 2016). The result on fixed effects regressed on dummy shows that China's accession to the WTO has significant impact on bilateral export flows.

Table 9: Second- stage regression: Fixed effects regressed on dummy (China's WTO membership in December 2001)

$\ln Export_{ijt}$	Model I Fixed Effect		Model II Fixed Effect		Model III Fixed Effect	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
$\ln Export_{ij,t-1}$ *	0.14	0.23	0.14	0.23	0.14	0.22
$\ln GDP_{it}$	1.43***	0.00				
$\ln GDP_{it}$ *	0.00	1.00				
$\ln PCGDP_{it}$			1.43***	0.00		
$\ln PCGDP_{jt}$ *			0.00	1.00		
$\ln DPCGDP_{ijt}$					1.43***	0.00
$\ln BEXCH_{jt}$	-0.38***	0.00	-0.38***	0.00	-0.38***	0.00
$\ln Openness_{jt}$ *	0.33	0.20	0.33	0.20	0.33	0.18
$\ln POP_{jt}$ *	-21.06	0.11	-21.06	0.11	-21.10	0.11
WTO_{it}	0.28**	0.01	0.28**	0.01	0.28**	0.01
$Constant$	1.87**	0.01	1.87**	0.01	1.87**	0.01
No. of groups	5		5		5	
No. of observations	115		115		115	
R^2:						
within	0.9665		0.9665		0.9665	
between	0.2236		0.2236		0.2236	
overall	0.5736		0.5736		0.5736	

Note: The (*) on variable name represent the first-different value. (*, **, ***) on the coefficient represent the significant level 10%, 5% and 1%, respectively. Prob. = Probability.

5. Conclusions

In this study, an attempt is made to explore the major determinants influencing the china's export to the MSR. We have filled a void in the current literature with regard to China's economic integration with the MSR economies. Depending on the nature and availability of data, we have chosen a period of 23 years ranging from 1993 to 2016. Three has been a rising trend of global and regional economic integration. Since the 2007 global economic crisis, China has been encountering the slow pace of economic growth. It is according to the Chinese economists a new normal economic growth. The government of China in its new Five-Year Plan has emphasized to accelerate the exports flows of China. The government also initiated a large-scale project-the Belt and Road-to boost up its economic development. One of the main goals of the Belt and Road Initiative is to facilitate the free flows of trade. The trade pattern between China and MSR economies are mutually interdependent having a strong historical tie of economic cooperation. The basic premise of the cooperation could be highlighted by the principle of comparative advantage. China has dominated consumer and electronic goods in these markets. In this study we applied panel gravity model to identify the major factors of regional economic integration. The results demonstrated that GDP, GDP per capita, openness, bilateral exchange rate and population have positive influence on bilateral export, whereas distance is an impediment to trade. China's membership has significant impact on bilateral export between China and GMS economies. It is revealed that China is integrated with the GMS economies. We encountered the problem of data limitations. There are some unobserved factors such as border conflict, tariffs, pricing, import substitution policy, language and policy variables that could have significant impact on trade relations between China and GM. Further research is needed to explore new factors with larger dataset. Furthermore, future researcher could focus on the estimation of the parameters on the imports and exports separately.

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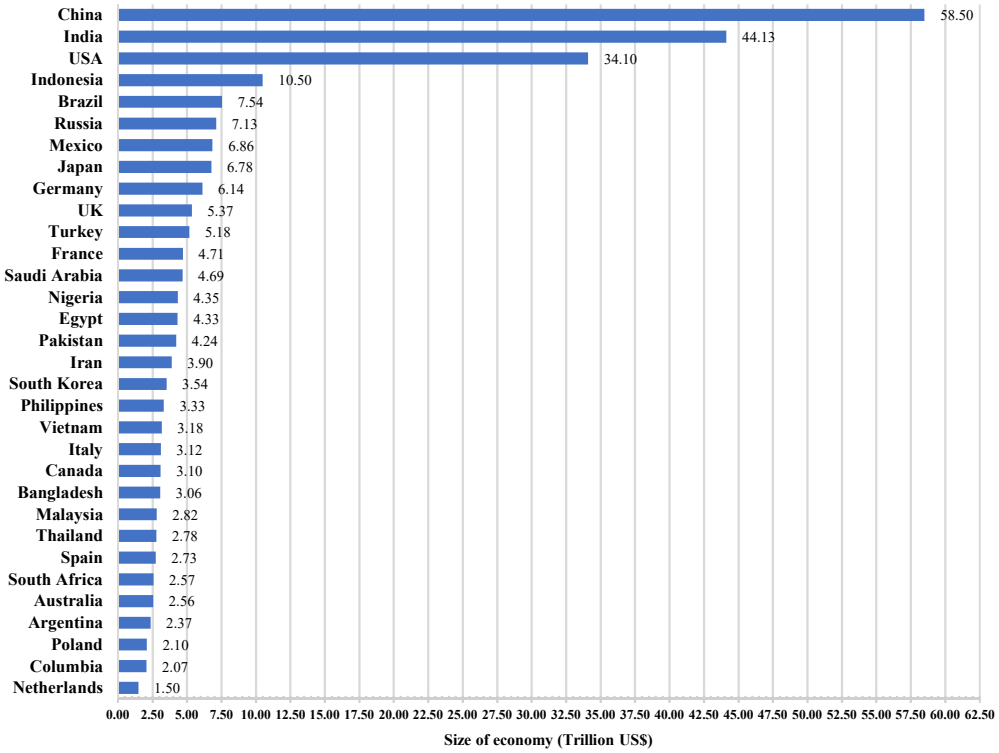
Appendix 1:

Projection of the most powerful economies in the world, by 2050

Rank	*Country*	*Size of Economy (Trillion USD)*	*Rank*	*Country*	*Size of Economy (Trillion USD)*
1	China	58.499	17	Iran	3.900
2	India	44.128	18	South Korea	3.539
3	USA	34.102	18	Philippines	3.334
4	Indonesia	10.502	20	Vietnam	3.176
5	Brazil	7.540	21	Italy	3.115
6	Russia	7.131	22	Canada	3.100
7	Mexico	6.863	23	Bangladesh	3.064
8	Japan	6.779	24	Malaysia	2.815
9	Germany	6.138	25	Thailand	2.782
10	UK	5.369	26	Spain	2.732
11	Turkey	5.184	27	South Africa	2.570
12	France	4.705	28	Australia	2.564
13	Saudi Arabia	4.694	29	Argentina	2.365
14	Nigeria	4.348	30	Poland	2.103
15	Egypt	4.333	31	Columbia	2.074
16	Pakistan	4.236	32	Netherlands	1.496

Source: Compiled by the authors from Martin (2017).

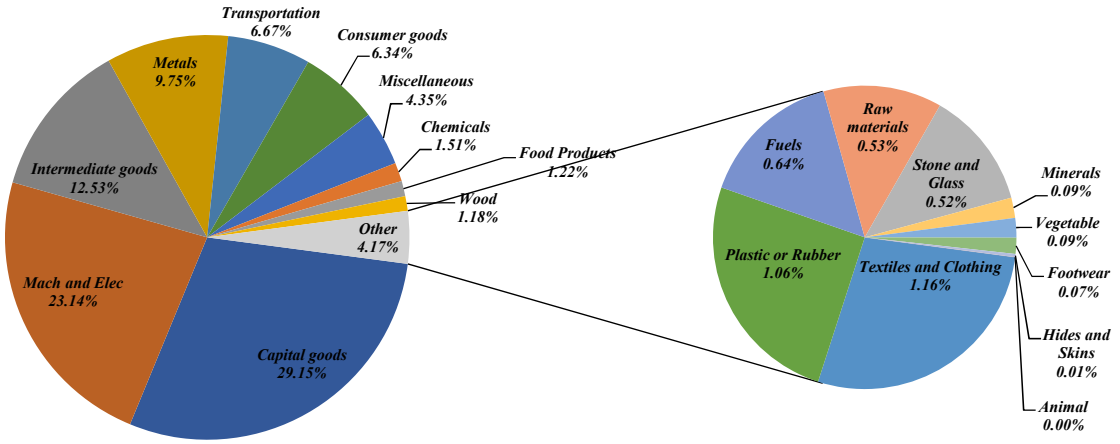


Appendix 2:

Products exports by China to Laos, 2016

Reporter	Partner	Year	Trade Flow	Product Group	Export (1,000 US$)
China	Lao PDR	2016	Export	Capital goods	558,985.81
China	Lao PDR	2016	Export	Consumer goods	121,601.12
China	Lao PDR	2016	Export	Intermediate goods	240,272.47
China	Lao PDR	2016	Export	Raw materials	10,097.30
China	Lao PDR	2016	Export	Animal	3.20
China	Lao PDR	2016	Export	Chemicals	28,966.67
China	Lao PDR	2016	Export	Food Products	23,330.64
China	Lao PDR	2016	Export	Footwear	1,389.60
China	Lao PDR	2016	Export	Fuels	12,252.31
China	Lao PDR	2016	Export	Hides and Skins	258.29
China	Lao PDR	2016	Export	Mach and Elec	443,813.37
China	Lao PDR	2016	Export	Metals	187,057.92
China	Lao PDR	2016	Export	Minerals	1,710.53
China	Lao PDR	2016	Export	Miscellaneous	83,430.90
China	Lao PDR	2016	Export	Plastic or Rubber	20,274.90
China	Lao PDR	2016	Export	Stone and Glass	10,036.14
China	Lao PDR	2016	Export	Textiles and Clothing	22,325.82
China	Lao PDR	2016	Export	Transportation	127,838.91
China	Lao PDR	2016	Export	Vegetable	1,672.07
China	Lao PDR	2016	Export	Wood	22,605.34

Source: Calculated by authors from World Integrated Trade Solution (WITS, 2018)

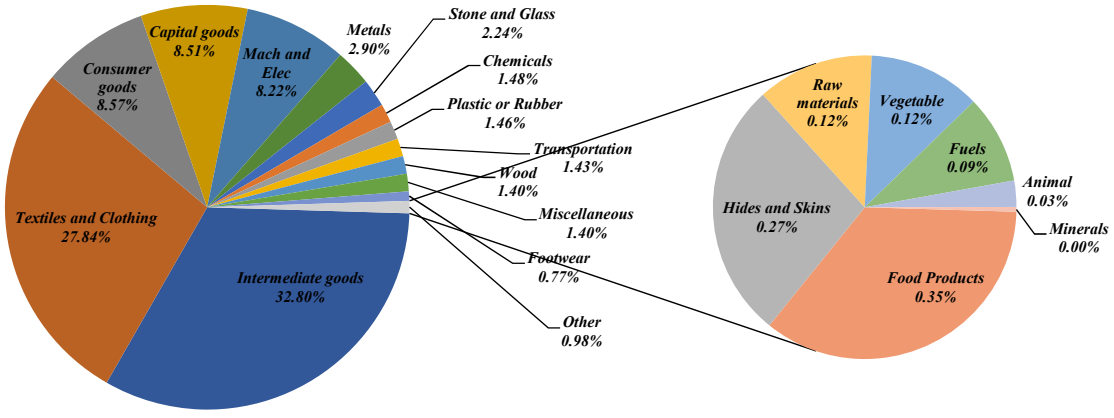


Appendix 3:

Products exports by China to Cambodia, 2016

Reporter	Partner	Year	Trade Flow	Product Group	Export (1,000 US$)
China	Cambodia	2016	Export	Capital goods	668240.89
China	Cambodia	2016	Export	Consumer goods	672901.55
China	Cambodia	2016	Export	Intermediate goods	2576450.01
China	Cambodia	2016	Export	Raw materials	9576.44
China	Cambodia	2016	Export	Animal	2160.63
China	Cambodia	2016	Export	Chemicals	116583.74
China	Cambodia	2016	Export	Food Products	27204.8
China	Cambodia	2016	Export	Footwear	60135.05
China	Cambodia	2016	Export	Fuels	7261.97
China	Cambodia	2016	Export	Hides and Skins	21187.48
China	Cambodia	2016	Export	Mach and Elec	646110.04
China	Cambodia	2016	Export	Metals	228136.65
China	Cambodia	2016	Export	Minerals	386.89
China	Cambodia	2016	Export	Miscellaneous	109985.26
China	Cambodia	2016	Export	Plastic or Rubber	114515.93
China	Cambodia	2016	Export	Stone and Glass	176141.85
China	Cambodia	2016	Export	Textiles and Clothing	2187349.86
China	Cambodia	2016	Export	Transportation	112173.95
China	Cambodia	2016	Export	Vegetable	9237.28
China	Cambodia	2016	Export	Wood	110113.38

Source: Calculated by authors from World Integrated Trade Solution (WITS, 2018)

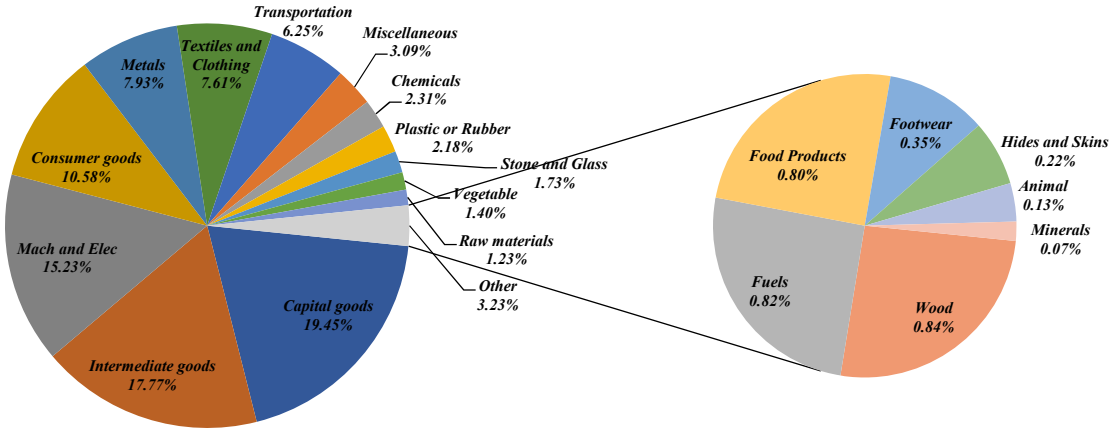


Appendix 4:

Products exports by China to Myanmar, 2016

Reporter	Partner	Year	Trade Flow	Product Group	Export (1,000 US$)
China	Myanmar	2016	Export	Capital goods	3125534.2
China	Myanmar	2016	Export	Consumer goods	1699143.94
China	Myanmar	2016	Export	Intermediate goods	2855564.91
China	Myanmar	2016	Export	Raw materials	197691.79
China	Myanmar	2016	Export	Animal	21340.7
China	Myanmar	2016	Export	Chemicals	371870.16
China	Myanmar	2016	Export	Food Products	128572.21
China	Myanmar	2016	Export	Footwear	56079.03
China	Myanmar	2016	Export	Fuels	132043.81
China	Myanmar	2016	Export	Hides and Skins	36054.3
China	Myanmar	2016	Export	Mach and Elec	2446170.01
China	Myanmar	2016	Export	Metals	1274495.48
China	Myanmar	2016	Export	Minerals	10624.95
China	Myanmar	2016	Export	Miscellaneous	495981.31
China	Myanmar	2016	Export	Plastic or Rubber	349535.08
China	Myanmar	2016	Export	Stone and Glass	278603.7
China	Myanmar	2016	Export	Textiles and Clothing	1222540.42
China	Myanmar	2016	Export	Transportation	1003945.49
China	Myanmar	2016	Export	Vegetable	225034.56
China	Myanmar	2016	Export	Wood	134760.04

Source: Calculated by authors from World Integrated Trade Solution (WITS, 2018)

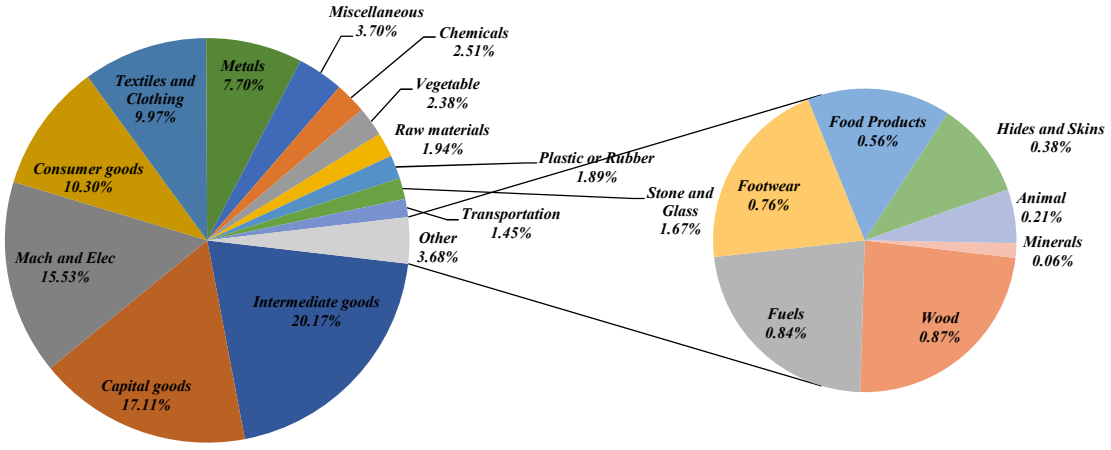


Appendix 5:

Products exports by China to Vietnam, 2016

Reporter	Partner	Year	Trade Flow	Product Group	Export (1,000 US$)
China	Vietnam	2016	Export	Capital goods	20717355.17
China	Vietnam	2016	Export	Consumer goods	12470130.22
China	Vietnam	2016	Export	Intermediate goods	24417116.08
China	Vietnam	2016	Export	Raw materials	2350911.37
China	Vietnam	2016	Export	Animal	256814.28
China	Vietnam	2016	Export	Chemicals	3032774.55
China	Vietnam	2016	Export	Food Products	681550.86
China	Vietnam	2016	Export	Footwear	923075.66
China	Vietnam	2016	Export	Fuels	1015393.41
China	Vietnam	2016	Export	Hides and Skins	460984.69
China	Vietnam	2016	Export	Mach and Elec	18803009.95
China	Vietnam	2016	Export	Metals	9318454
China	Vietnam	2016	Export	Minerals	67904.67
China	Vietnam	2016	Export	Miscellaneous	4472887.64
China	Vietnam	2016	Export	Plastic or Rubber	2288311.71
China	Vietnam	2016	Export	Stone and Glass	2026682.79
China	Vietnam	2016	Export	Textiles and Clothing	12063646.75
China	Vietnam	2016	Export	Transportation	1749809.07
China	Vietnam	2016	Export	Vegetable	2879985.97
China	Vietnam	2016	Export	Wood	1052810.78

Source: Calculated by authors from World Integrated Trade Solution (WITS, 2018)



Appendix 6:

Products exports by China to Thailand, 2016

Reporter	Partner	Year	Trade Flow	Product Group	Export (1,000 US$)
China	Thailand	2016	Export	Capital goods	15,196,109.51
China	Thailand	2016	Export	Consumer goods	8,928,605.80
China	Thailand	2016	Export	Intermediate goods	10,872,057.33
China	Thailand	2016	Export	Raw materials	2,175,654.68
China	Thailand	2016	Export	Animal	1,146,903.83
China	Thailand	2016	Export	Chemicals	3,359,029.11
China	Thailand	2016	Export	Food Products	669,391.97
China	Thailand	2016	Export	Footwear	442,562.93
China	Thailand	2016	Export	Fuels	224,772.62
China	Thailand	2016	Export	Hides and Skins	297,615.77
China	Thailand	2016	Export	Mach and Elec	14,672,445.01
China	Thailand	2016	Export	Metals	4,890,859.37
China	Thailand	2016	Export	Minerals	96,810.88
China	Thailand	2016	Export	Miscellaneous	2,375,773.77
China	Thailand	2016	Export	Plastic or Rubber	1,758,103.67
China	Thailand	2016	Export	Stone and Glass	861,205.89
China	Thailand	2016	Export	Textiles and Clothing	2,593,937.83
China	Thailand	2016	Export	Transportation	1,540,983.49
China	Thailand	2016	Export	Vegetable	1,657,187.46
China	Thailand	2016	Export	Wood	595,147.56

Source: Calculated by authors from World Integrated Trade Solution (WITS, 2018)