

Doctoral Dissertation

Trade and Foreign Direct Investment under Open-door Policies in Myanmar for 2011-2019

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Executive Summary

Since 2011, Myanmar has been moved forward for the process of democratic transition and has entered a new regime of market-based economy with open-door policies from a centralized-market economy. Throughout the process of democratic transition in Myanmar for 2011-2020, it is time to evaluate economic performances under the new economic regime. For the economic evaluation, foreign trade, trade facilitation, inward foreign direct investment (FDI) and their impacts on economic development are important aspects. To explore the foreign trade and inward FDI effects in Myanmar, this dissertation is separated into two parts.

Part I aims to examine two main research questions about foreign trade and trade logistics: whether Myanmar's manufacturing exports have recovered towards the gravity-trade-standard of ASEAN after economic sanctions were lifted; and whether there is a linkage between logistics performance and participation in global value chains (GVC) of emerging economies of ASEAN, and if so, how to encounter the challenges of low logistics performances of Myanmar in a participation of GVC. The first research question is analyzed by applying in-sample and out-of-sample approaches to the gravity trade model. The study targets the analytical period from the sanction period of 2004-2012 to post-sanction period of 2013-2018 in Myanmar. The main findings are summarized as follows. First, both in-sample and the out-of-sample estimations could imply the validity of the expected gravity trade model in emerging ASEAN manufacturing exports. Second, the deviation of Myanmar's manufacturing export to gravity trade standard of western countries and ASEAN countries is found even after the sanction period. As a result, the low institutional quality and the Dutch Disease effect are identified as the deviation factors from gravity trade standard in western countries but not fully in the other ASEAN countries. It then comes to consider Myanmar's sluggish participation in the GVC as an additional deviation factor in ASEAN countries.

The second empirical analysis of the linkage between logistics performances and GVC backward participation (expressed by foreign value added in exports) of eight emerging ASEAN economies is investigated by adopting a "structural" gravity model setting. Under the "fragmentation" theory, the logistics performances of the host country is considered as a component of service-link costs. The study found the large gap in GVC backward participation between forerunners (e.g., Malaysia and Thailand) and latecomers (e.g., Myanmar, Cambodia, and Lao PDR) of ASEAN could be explained by logistics performance effects to some extent. Based on this result, the study explores the challenges of Myanmar's logistics sector which is important in its participation in GVC. In this respect, the logistics performances of Myanmar

is investigated from their input and output perspectives: areas of policy regulations as the input component to supply chain and supply chain performance outcomes as output. Additionally, the logistics services in corridor-based SEZ and cross-border gates of Myanmar are examined as the case study. As a result, Myanmar needs to tackle those challenges of logistics services not only by enhancing the status of input and output supply chain but also by building logistics hub in economics corridors and cross-border trade zones to increase the degree of its GVC participation.

Part II analyzes the quantitative relationships among inward FDI, economic growth, domestic investment and employment under the open-door policies in Myanmar by applying a panel vector-autoregressive model framework from 2012 to 2018. To examine the impacts of inward FDI in Myanmar, three empirical analysis are investigated as follows: whether FDI causes economic growth or economic growth induces the FDI, whether the inward FDI crowds in or crowds out domestic investment, and whether FDI have positive effects on domestic employment or not. The first empirical analysis is carried out at the regional level by dividing states and regions according to the FDI-value intensity and number of industrial zones. The empirical results are found as follows: bidirectional positive causality between FDI and economic growth in FDI-high-intensive region; unilateral positive causality from economic growth to FDI in FDI-middle-intensive region; and negative causality from FDI to economic growth and positive causality from economic growth to FDI in FDI-low-intensive regions. Those differences in FDI-economic relationship among the regions reveals the existence of the gap in their agglomeration effects. The second empirical analysis is examined at the sectoral level: total sector including oil and gas and non-oil and gas sector. It shows the result of the crowding-in effect of FDI on domestic investment only in non-oil and gas sector. The third empirical analysis on FDI-employment relationship is investigated on the regional level. The result shows that the employment has positive effects on FDI in all the regions whereas the impact of FDI on employment is insensitive due to the underutilization of labor forces. This result implies the urgent need to upgrade the capacity of human capital to internalize the positive effects of FDI.

Based on the empirical findings of Part I and Part II, it can be concluded as follows. First, Myanmar remains inactive in foreign trade and inward FDI status in comparison with the other ASEAN economies due to its lack of institutional quality, logistics performances and human capital, which has been affected by the former political effect on economic setting. Thus, there is much room for Myanmar to improve these areas to enhance its trade and FDI. Second, the manufacturing sector needs to be emphasized not only by the enhancement of trade

liberalization, trade promotion and trade facilitation but also by speeding up the inducement of inward FDI. Third, SEZs in border areas of Myanmar needs to be developed successfully in accordance with the link of economic corridor in order to take full advantage of its strategic location. In this regard, Myanmar is expected to fully utilize its trade and investment potential to catch up with other emerging ASEAN economies.

Table of Contents

Introduction.....	8
Part I Foreign Trade in Myanmar.....	11
Chapter I Myanmar’s Manufacturing Exports after the Lifting of Economic Sanctions	11
1.1 Introduction	11
1.2 Literature Review and Contribution	12
1.3 Empirics	15
1.4 Chapter Summary	26
Chapter II Participation in Global Value Chains and Logistics Performance in Emerging ASEAN Economies.....	28
2.1 Introduction	28
2.2 GVC backward participation in emerging ASEAN economies.....	31
2.3 Empirics	33
2.4 Estimation Outcomes	36
2.5 Chapter Summary	38
Chapter III Case studies: Participation in Global Value Chains and Logistics Performance in Myanmar.....	40
3.1 Introduction	40
3.2 Areas for Policy Regulations (Inputs).....	41
3.3 Supply Chain Performance Outcomes	43
3.4 Case Study: Corridor based SEZ and Cross-border Gates.....	44
3.5 Chapter Summary	45
PART II Inward FDI and Its Effects in Myanmar	47
Chapter IV Myanmar’s Inward Foreign Direct Investment	47
4.1 Introduction	47
4.2 Literature Review and Contribution	50
4.3 Empirics	52
4.4 Estimation Outcomes	55
4.5 Chapter Summary	58

An Addendum to Chapter IV Employment Effects of Inward Foreign Direct Investment in Myanmar	60
A4.1. Introduction	60
A4.2. Empirical Results.....	60
A4.3. Interpretations	61
Summary and Conclusion	63
References.....	66

List of Figures

PART I

Figure 1-1 Myanmar's Exports (mil. \$)	71
Figure 1-2 Manufacturing Exports as a Percentage of GDP in ASEAN.....	71
Figure 1-3 Trends in Myanmar Manufacturing Exports: Counterfactual and Actual.....	75
Figure 2-1 GVC Backward Participation of Emerging ASEAN by Manufacturing Industries for 1990-2017	76
Figure 2-2 Foreign Value Added of Emerging ASEAN by Country Origins for 1990-2017...	78
Figure 2-3 Relationship between Service-Link Costs and Fixed Effects	80
Figure 3-1 Number of TEU Operated by Myanmar Ports	85
Figure 3-2 Connectivity of SEZs.....	81
Figure 3-3 Composition of Ordinary Trade and Border Trade	88

PART II

Figure 4-1 Accumulated Impulse Responses in Regional Analysis.....	92
Figure 4-2 Impulse Responses in Sectoral Analysis	95
Figure A4-1. Accumulated Impulse Responses in Regional Analysis.....	98

List of Tables

PART I

Table 1-1 ASEAN Manufacturing Exports to Major Partners	72
Table 1-2 List of Variables for Estimation	73
Table 1-3 Estimation Outcomes of Gravity Trade Model.....	74
Table 2-1 Descriptive Statistics	80
Table 2-2 Estimation Outcomes on Total Manufacturing.....	81
Table 2-3 Estimation Outcomes on Machinery Industry	82
Table 2-4 Host country's Fixed Effect and Logistics Performance in 2017 on Total Manufacturing.....	83
Table 2-5 Host Country's Fixed Effect and Logistics Performance in 2017 on Machinery Industry	83
Table 3-1 Ranking of Logistics Performance Index	84
Table 3-2 Time to Complete for Clearance and Inspections Required by Customs	85
Table 3-3 Export and Import by Nodes of Transport in Myanmar	85
Table 3-4 General Information of SEZs in Myanmar	86

PART II

Table 4-1 Classification of Regions and States by FDI in Myanmar	89
Table 4-2 Unit Root Test.....	89
Table 4-3 Regional Analysis on Relationship between FDI and GRP.....	90
Table 4-3-1 Estimated PVAR Model	90
Table 4-3-2 Granger Causality Test	90
Table 4-3-3 Variance Decomposition.....	91
Table 4-4 Sectoral Analysis on Relationship between FDI and DIV.....	93
Table 4-4-1 Estimated PVAR Model	93
Table 4-4-2 Granger Causality Test	93
Table 4-4-3 Variance Decomposition.....	94
Table A4-1 Unit Root Test	96
Table A4-2. Regional Analysis on Relationship between FDI and EMP	96
Table A4-2-1 Estimated PVAR Model.....	96
Table A4-2-2 Granger Causality Test.....	97
Table A4-2-3 Variance Decomposition	97

Introduction

Over nearly half of century, Myanmar is a country experiencing diverse economic systems along with the political system changes. To be specific, Myanmar economic systems have been passing the following five eras of political system: the colonial period (1826-1947); the parliamentary democracy period (1948-1962) with mixed economic systems; the socialist period under military rule (1962-1988) with command economic system; the market-oriented period under military rule (1988-2010); and the democratization period (2011-2015) and democratic period (2016-2020) with open-door economic policy. Prior to the democratization period, Myanmar had been isolated from the global economy due to sanctions imposed by western countries since 1993 (see Appendix 6). The long sanctioning period over two decades had hampered the Myanmar economy with an unfavorable trade condition in comparison with the other ASEAN economies. On the other hand, in the presence of sanctions, the direction of trade had turned to neighboring countries. Among them China became a top trading partner with Myanmar and the trade in Myanmar depended largely on natural resource sectors. As shown in Appendix 2-5, natural resource items such as gas and jade were represented as the Myanmar's major composition of export items, and China had been regarded as the top exporter and importer country in Myanmar. In 2011, the civilian government came into power and a wide range of democratic transitions has been undertaken. Since then, Myanmar has been instituting a series of political, social and economic reforms in order to rejoin the world economy, and the FESR (Framework for Economic and Social Reform) has been developed as a policy tool. In the FESR framework, the government of Myanmar (GOM) has set out a wide range of economic reforms: fiscal and tax reforms, monetary and financial sector reforms, liberalization of trade and investment, and private sector development. Consequently, western countries started to lift the sanctions on Myanmar. The US Department of Treasury's Office of Foreign Assets Control (OFAC) lifted sanctions in Myanmar: easing of initial sanctions in 2012 and full lift of US embargo in 2016. Similarly, the EU not only suspended the sanctions in 2012 and lifted import ban in August 2013, but also reinstated the Generalized System of Preferences (GSP) in July 2013. As a result, Myanmar has gained the opportunity to rejoin the global economy through the channel of trading with western countries.

Regarding the trade and investment sectors, a wide range of reforms has been set up in response to changing economic policies. In the context of trade, with a reference to the final report of Ministry of Commerce (MOC) in 2016, it adopted four basic trade polices: trade

liberalization, trade facilitation, trade promotion and trade education, which are in line with the establishment of ASEAN Economic Community (AEC). To liberalize trade, GOM has reformed the following processes: abolishing and reducing taxes and tariffs; larger cooperation with free trade agreements in ASEAN such as RCEP (Regional Comprehensive Economic Partnership); and the establishment of SEZ (Special Economic Zones) according to the Special Economic Zone Law in 2011. Moreover, the Foreign Exchange Management Law has been enacted in August 2012 to realize a managed-floating exchange rate system. With an attempt to facilitate trade, simplification of export and import procedures and custom procedures has been carried out by undertaking online application for export and import licenses according to the four pillars of AEC's blueprint. In the context of trade promotion reform, the Nation Export Strategy (NES) has been launched in March 2015 with an aim to tackle three main issues: diversification of export products from limited export items; development of value-added products not to concentrate on exporting un-processed products; and diversification of trading partners not to depend excessively on a few countries. Moreover, to promote border trade, border trade agreements with five neighboring countries permits the use of local currency of partner countries except for the Myanmar-Bangladesh border trade point. To educate the trade knowledge, the establishment of Trade Training Institute (TTI) Unit and Employee Capacity Development Unit has been undertaken by MOC. With respect to investment liberalization, the GOM enacted a new Myanmar Investment Law (MIL) in October 2016 by replacing the former Foreign Investment Law (2012) and Citizens Investment Law (2013) to create an enabling and responsible business environment. To reduce the gap in developed and less-developed states and regions, investment incentives differ according to investment zones: zone one for least developed region; zone two for medium developed region; and zone three for high developed region. Moreover, regarding the investments in special economic zones, the investors are given the option between domestic-oriented market investment and export-oriented market one by dividing free zone and promotion zone. With an aim to equitable development in all states and regions, tax incentives for foreign investors differ depending on the choice of zones such as initial five-year income tax exemption for promotion zone and initial seven-year income tax exemption for free zone.

It has been over nine years of Myanmar democratic transition with a series of trade and investment reforms and implementation, and it is needed to evaluate those trade and investment performances under open-door economic policy. For this reason, this dissertation aims to give the new insight on the trade and inward FDI of Myanmar throughout the democratic transition from 2011 to 2019. With this regard, the dissertation is organized into Part I and Part II. Part I

analyzes the trade performance of Myanmar as follows: Chapter I for the study of manufacturing exports after lifting economic sanctions; and Chapter II and III for the study of the linkage between logistics performances and participation in global value chains in emerging ASEAN economies with the case study of Myanmar. In Part II, Chapter IV investigates the economic effects of inward FDI on Myanmar.

Part I Foreign Trade in Myanmar

Part I aims to analyze the performance of foreign trade and trade facilitation services of logistics in Myanmar. Chapter I investigates whether Myanmar's manufacturing exports has reached gravity trade standard of the other emerging ASEAN economies in post-sanction period by applying the gravity trade model. Chapter II explores the linkage between the logistics performance and participation in global value chain in emerging ASEAN countries by employing the structure gravity trade model. Based on the results of Chapter II, Chapter III reviews the challenges and opportunities of logistics performance in Myanmar to participate in regional and global value chains.

Chapter I Myanmar's Manufacturing Exports after the Lifting of Economic Sanctions

1.1 Introduction

As mentioned in Introduction, Myanmar experienced different kinds of economic systems, and suffered the long-sanctioning period under inward-looking trade policy. Under the democratization period with open-door trade policy since 2011, Myanmar has been able to rejoin the global economy though a lot of reforming processes need to be done. In accordance with the regime transformation, the economic performances in Myanmar have showed remarkable improvements under the new regime. Through the economic growth process, Myanmar economy has promoted its economic status from "low income" to "middle income" since 2014, according to the World Bank Classifications¹. Among economic indicators, the level and growth of exports are the most important indicators for Myanmar, since the exports of manufactured goods were seriously affected by the imposition and lifting of economic sanctions by western countries. Figure 1-1 illustrates the trends in the export values of Myanmar's total and manufacturing products, and indicates that the exports of manufacturing products have jumped up for the post-sanction period of 2013-2018 after their stagnation for the sanction period, while the total exports have shown an increasing trend through the periods. In manufacturing exports, the garment export has been rising significantly due to the

¹ See the website: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>. (accessed January 31, 2020)

reinstatement of GSP from the United Kingdoms and it has now been able to export garment items to western countries. On the other hand, when the trend in manufacturing exports of Myanmar is compared with those of the other emerging ASEAN countries in terms of exports-GDP ratio in Figure 1-2, the level and growth of Myanmar's exports seems to be not necessarily high and robust even for the post-sanction period of 2013-2018 relative to those in Vietnam, Cambodia and Thailand.

The objective of this chapter is to evaluate Myanmar's exports of manufacturing products for the post-sanction period of 2013-2018, by using a gravity trade model for emerging ASEAN economies. The main theme is whether Myanmar's manufacturing exports have recovered towards the gravity-trade-standard of the other emerging ASEAN countries for the post-sanction period. This paper's contribution is to assess the current Myanmar manufacturing exports under the new open-door regime in a timely manner, in the sense that there have been a very limited number of quantitative studies on Myanmar trade under the new regime, and that five or six years for the post-sanction period are enough to be analyzed quantitatively.

1.2 Literature Review and Contributions

Regarding a gravity trade model, the model has been the most commonly used as an analytical framework in empirical studies of international trade flows. The model originated from Tinbergen (1962) and Pöyhönen (1963), which were the first to apply the "Newton's Law of Gravitation" to international trade flows. The original intent of the gravity trade equation was to explain bilateral trade flows by the economic size of two countries and the distance between them. Since Anderson (1979) assigned the model with theoretical underpinnings for the first time, the gravity trade model has been established as being consistent with trade theories based upon models of imperfect competition and with the Heckscher-Ohlin model (see, e.g., Helpman and Krugman, 1985; and Deardorff, 1998). Bergstrand (1989), extending the microeconomic foundations for the gravity equation to incorporate factor-endowment variables in the spirit of Heckscher-Ohlin model and taste variables in the spirit of Linder model², developed the augmented version of the gravity model by including per capita income levels for both exporters and importers as additional regressors³.

The gravity trade model has often provided a useful instrument to assess the trade-

² Linder (1961) suggested that countries with similar per capita incomes will have similar demands.

³ The augmented version of the gravity model has been widely used in empirical studies of international trade flows. See, e.g., Frankel et al. (1995) and Stack (2009).

integration effects of exogenous events and factors such as free trade agreements, cross-border infrastructure development, economic sanctions with import bans and policy changes in trade. Among a large volume of literature on trade analyses using a gravity trade model, there have been a very limited number of the studies targeting Myanmar trade. There are two kinds of approaches to evaluate the actual trade values in gravity trade analyses: “in-sample” and “out-of-sample” approaches. The former one is to contain the economy targeted for its evaluation with a dummy variable in estimating a gravity model, and to investigate the significance of the dummy variable with its interpretations. A negative or positive coefficient for the dummy with a conventional significance is regarded as evidence that the actual trade values of targeted economy are below or beyond a gravity-trade-standard for specific reasons. Nu Nu Lwin (2009), for instance, examined the impact of trade sanction against Myanmar using bilateral trade data of Myanmar with 27 partners over the period for 1998-2007, by employing a dummy variable for sanctioning country of the United States (US) in a gravity model. The study identified a significantly negative impact of the trade sanction on Myanmar-US trade by roughly 0.02 times of standardized bilateral trades.

The other approach is “out-of-sample” one. This approach is to estimate a gravity model by excluding a targeted economy, and to calculate the counterfactual trade values of the targeted economy by using the estimated parameters of the estimated model. The serious gap between the counterfactual trade values and the actual ones implies the existence of specific events and factors to make the trade of the targeted economy below or beyond the gravity-trade-standard. The gap by which the counterfactual values exceed the actual ones could also be interpreted as an unexhausted trade potential in the targeted economy. Oh and Thant (2016) examined ASEAN members’ trade pattern by using a gravity model with a panel dataset encompassing ASEAN countries and their 85 trading partners for a 15-year time period for 1994-2008. Based on the estimated model, they simulated Myanmar’s gravity-based counterfactual trade flows, and found that Myanmar’s trade has been distorted due to political factors including economic sanctions. Ferrarini (2013) estimated a gravity trade model using export data of six ASEAN members with their 35 major trade partners for the period of 2000-2010. By using the parameters of the estimated model, the study projected Myanmar’s counterfactual export value, and showed that it was four times greater than her actual export in 2010. Kubo (2014) also studied Myanmar’s export potential using the out-of-sample gravity model approach with the sample of the ten countries’ exports to 157 countries and regions during the period of 2004-2011. The study employed non-resource exports as the dependent variable in order to consider the effects of natural resource exports on non-resource exports, namely, the Dutch Disease

effect. The finding was that the counterfactual predicted non-resource exports were lower than the actual exports with the consideration of the effects of natural resource exports, whereas the predicted exports were more than five times than the actual one without counting natural resource effects, thereby implying the existence of the Dutch Disease.

The previous studies of applying a gravity trade model to Myanmar's trade, as described above, have commonly demonstrated negative trade effects and unexhausted trade potentials during the sanction period under the military-ruled regime before 2011. Then the academic contributions of this study to the reviewed literature above could be demonstrated as follows. First, the study targets the post-sanction period of 2013-2018 unlike the previous studies, aiming to evaluate whether Myanmar's manufacturing exports have recovered from their stagnated trend under the sanctions towards the gravity-trade-standard of the other emerging ASEAN countries under the post-sanctions. The study also investigates the factors such as the Dutch Disease effects and institutional quality to explain the current trend in Myanmar's manufacturing exports. The evaluation would be in a relevant timing, because five or six years have passed since the lifting of the sanctions and there have been few empirical studies for the quantitative evaluation targeting the post-sanction period. It is expected that the Dutch Disease effect has occurred in resource-rich countries such as Myanmar with poor institutional quality, which has resulted in lesser volume of manufactured exports. Despite no specific studies on the relationship between institutional quality and manufacturing exports in Myanmar, this relationship in other countries has been analyzed by a number of researchers. Amiri et al. (2019) analyzed the impact of institutional quality on the performance of the manufacturing sectors in 28 resource-rich countries by using the panel data from 2000 to 2016. They pointed out that the countries with good institutional quality result in positive direct and indirect effects in manufacturing sector and even mitigate the negative Dutch Disease effects. Meon and Sekkat (2004) investigated the causal relationship from institutional quality including six dimensions to trade by using a panel data of countries over 1990-2000. They identified the positive causality in manufacturing sector, the negative causality in non-manufacturing sector (natural resource) and no causality in total export sector and it suggested that the six dimensions of institutional quality need to be treated as the prioritized instruments of a country to facilitate integration in international manufacturing trade.

Second, this study applies both of in-sample and out-of-sample approaches to gravity model estimation, so that the consistency of both approaches can be checked, and the robustness of the estimation outcomes can be ensured. To be specific, this study includes Myanmar as the estimation sample with a dummy variable and examines its significance in the

in-sample approach. At the same time, the study excludes Myanmar from the estimation, and examines the gap between the counterfactual values and the real ones in the out-of-sample approach.

1.3 Empirics

This section conducts empirical analyses of Myanmar's manufacturing exports by applying a gravity trade model. This study focuses on manufacturing exports, not total exports, as in Kubo (2014), to take the Dutch Disease effect into account. The section first simply observes the flow of manufacturing exports of emerging ASEAN countries (including Myanmar) with their major trading partners, then clarifies the data and the methodology of a gravity trade model and represents the estimation outcomes and discuss them.

1.3.1 Overview of Export Flows in Emerging ASEAN Economies

Table 1-1 indicates the structure of manufacturing exports of Myanmar and the other emerging ASEAN countries with their major trading partners in terms of US dollar base in 2018. The share of intra-ASEAN exports relative to the exports to the world ranges from 3.08 percent in Cambodia to 48.34 percent in Lao PDR with the average of ASEAN countries being 15.90 percent; the share of ASEAN exports to Asian countries including intra-ASEAN countries ranges from 20.63 percent in Cambodia to 64.81 percent in Lao PDR with the average being 41.90 percent; and the share of ASEAN exports to western countries ranges from 22.89 percent in Thailand to 66.33 percent in Cambodia with the average being 34.75 percent. It should be noted that the share of Myanmar exports to intra-ASEAN countries is 5.97 percent, the second lowest among ASEAN countries.

Compared with the structure of emerging ASEAN manufacturing exports in 2000, the drastic changes are found as follows: for all emerging ASEAN countries except Vietnam, the share of intra-ASEAN exports increases from 10.00 to 15.90 percent on ASEAN average; the share of ASEAN exports to Asian countries also rises from 23.79 to 41.90 percent; on the other hand, the share to western countries sharply declines from 54.28 to 34.75 percent. These changes suggest that the international production networks, characterized by the fragmentation of production processes and the international dispersion of tasks and activities have been prevailed in East Asia since the 2000s, as demonstrated by Kimura (2006). The extension of the international production networks has usually involved active back-and-forth international

transactions of intermediate goods such as processed goods, parts and components, thereby being consistent with the rapid growth of ASEAN manufacturing exports to Asian countries including intra-ASEAN countries since the 2000s. Under this trend, however, Myanmar economy seems to have been lagging the participation in the international production networks as shown in the low share of its exports to intra-ASEAN countries. This low participation of Myanmar in the intra-ASEAN production network suggests synchronized effects of western countries' sanctions on Myanmar. While the western countries' sanctions on Myanmar had lasted for decades, the other ASEAN countries' responses to those sanctions seem to be conservative to the trade with Myanmar.

Myanmar's Trade Relationship with ASEAN

Historically, Myanmar has kept its trade relationships with neighboring countries whether it is on the track of sanctioned times or not, though its trade pattern has been changed in a number of ways. Due to political reasons, western nations had ever imposed sanctions several times in various ways as described in Larry and Weiss (2009): the round-one sanctions for military sales and fairly low amounts of foreign aid (1987-1997); the round-two sanctions for prohibiting for further investment (1998-2003); and the final round sanctions for both new and old trade and investment (2003-2007). Although US called ASEAN nations to join those sanctions, ASEAN continued its diplomatic and business ties with Myanmar with the typical example that Myanmar was allowed to join ASEAN on 23 July 1997.

Prior to the sanctions, majority of Myanmar exports to ASEAN were the primary products, in particular, agricultural products. On the contrary, Myanmar's imports from ASEAN were machinery and industrial parts. At that time, the industrial product that Myanmar had the chance to produce in regional and global production networks was garments. Myanmar had maintained its booming sector of garment industry for 1990-2001 by having the United States (US) and the European Union (EU) as the largest garment importers. However, due to the trade embargo from the US, Myanmar tried to reorient its garment exports toward the partners in Asia, but its booming sector had started to slow and ended in 2003 as in Kudo (2009).

As a response to the western sanctions, Myanmar's export composition had been changed gradually from agricultural products to natural resources, in particular, natural gas for the exports to China and Thailand, and those nations became Myanmar's alternative trading partners, which led to the Myanmar's total export growth as described in Anguelov (2015). Regarding manufacturing exports, Myanmar has occupied their lowest share in ASEAN regional trade (e.g., Chen and Lombaerde, 2019). As for imports, on the other hand, Myanmar

has accepted diverse manufactured products from ASEAN members around by 40 percent. The trade structure of resource-based exports and manufactured-based imports has led Myanmar to a small player in ASEAN production network as argued in Bernhardt et al. (2017). Overall, Myanmar has experienced negative trading effects from western countries' sanctions with a reorientation towards natural resource exporting, which has resulted in low participation in ASEAN production network.

1.3.2 Sample Data and Key Variables

The sample period is the one from 1998 to 2018, in which the data are available for the estimation variables and cover the sanction period of 2004-2012. The sample economies are 16 countries/region: eight of ASEAN emerging-market countries (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Vietnam)⁴, and eight of their major trading partners outside of ASEAN (Japan, China, Korea, India, the United States, Canada, the United Kingdom and Euro Area). Table 1-1 again shows that the manufacturing exports of the sampled emerging ASEAN countries to the sampled trading partners covers 60-90 percent out of their total exports to the world as shown in the last line of the table. The study then constructs panel data for 1998-2018 with the export combinations between emerging ASEAN countries and their sampled trade partners ($8 * 15 = 120$) for the in-sample estimation, and Myanmar's exports are excluded from this panel data in the out-of-sample estimation.

Regarding the sources of the sampled data (see the last column and notes of Table 1-2), the data of manufacturing exports (EXt) are retrieved from UNCTAD Stat, by the series of the "Manufactured goods (SITC 5 to 8 less 667 and 68)" of "Merchandise trade matrix"; GDP and per capita GDP of an exporter and an importer (YEt, YMt, YPCEt and YPCMt) are from the World Economic Outlook (WEO) Database (October 2019) of the International Monetary Fund (IMF), by the series of "current prices U.S. dollars"; the distance between capital cities of an exporter and an importer (DIS) are measured by the Great Circle Distance Between Cities on Map (Fromto); the natural resources rent (NRRt), expressed by a percentage of GDP, comes from the World Development Indicators (WDI) of the World Bank; and the government effectiveness index (GEft) is from the Worldwide Governance Indicators (WGI) of the World Bank, which takes the number ranging from approximately -2.5 (weak) to 2.5 (strong). Lastly, the bilateral real exchange rate of an exporter against an importer (REXt) is computed by using

⁴ Brunei Darussalam and Singapore are excluded here since this study focuses on emerging-market economies.

consumer prices (CPI) and bilateral nominal exchange rates (ER), which are retrieved from the WEO, as follows.

$$(\text{CPI}_{\text{exporter}} / \text{ER}_{\text{exporter currency per US Dollar}}) / (\text{CP}_{\text{importer}} / \text{ER}_{\text{importer currency per US Dollar}})$$

The EX_t, YE_t, YM_t, YPC_t, YPCM_t, DIS and REX_t are set in logarithm to avoid scaling issues.

Finally, the estimation method this study applies is a pooled censored regression model (Tobit model) to avoid the problem of sample selection bias in the panel data. The Ordinary Least Square supposes that a dependent variable be observed as a continuous and unrestricted scale. The export values as a dependent variable that this study samples, however, are only partially observed at positive or zero values. Thus, we adopt the Tobit model with a dependent variable left-censored at zero and with the logistic distribution for the error term.

1.3.3 Model Specification

This section clarifies the methodology of a gravity trade model estimation to evaluate Myanmar's manufacturing exports among those of emerging ASEAN economies. For the estimation, this study applies both in-sample approach including Myanmar and the out-of-sample one excluding Myanmar.

1.3.3.1 In-sample Estimation

This study, as in the previous studies such as Kubo (2014), applies the augmented version of gravity model by including per capita income levels for both exporters and importers as additional regressors, but modifies it in accordance with our analytical interests. The equation for estimation is specified as follows.

$$\begin{aligned} \ln(\text{EX}_t) = & \text{const.} + \alpha_1 * \ln(\text{YE}_t * \text{YM}_t) + \alpha_2 * \ln(\text{YPC}_t * \text{YPCM}_t) + \alpha_3 * \ln(\text{DIS}) \\ & + \alpha_4 * \ln(\text{REX}_t) + \alpha_5 * \text{NRR}_t + \alpha_6 * \text{GEF}_t + \alpha_7 * \text{DS_WEST} + \alpha_8 * \text{DS_ASIA} \\ & + \alpha_9 * \text{DPS13_WEST} + \alpha_{10} * \text{DPS16_WEST} \\ & + \alpha_{11} * \text{DPS13_ASIA} + \alpha_{12} * \text{DPS16_ASIA} + \alpha_{13} * \text{Dt} + \varepsilon_t \end{aligned} \quad (1)$$

where EX_t denotes manufacturing exports of emerging ASEAN economies including Myanmar to their major trading partners in year t ; YEt and YMt are an economic size represented by Gross Domestic Product (GDP) of an exporter and an importer respectively; $YPCEt$ and $YPCMt$ are a per capita GDP of an exporter and an importer respectively; DIS is a geographical distance between the capital city of an exporter and that of importer; REX_t is a bilateral real exchange rate of an exporter against an importer; NRR_t is a natural resources rent of an exporter; GEF_t is an indicator of government effectiveness; DS_WEST and DS_ASIA are dummy variables for economic sanctions on Myanmar for 2004-2012 against western countries and Asian countries respectively; $DSP13_WEST$, $DSP16_WEST$, $DSP13_ASIA$ and $DSP16_ASIA$ are dummy variables for post-economic sanctions of 2013-2018 and 2016-2018 on Myanmar against western countries and Asian countries respectively; D_t is a time dummy in year t ; ϵ_t is an error term; and $\alpha_1 \dots \alpha_{13}$ are coefficients of explanatory variables. All the variables are listed in Table 1-2.

The following points should be considered in the specification of the estimation model (1). First, the greatest concern in the estimation is to assess the Myanmar's manufacturing exports during the sanction and post-sanction periods. Then the in-sample estimation model including Myanmar as a sample equips six dummy variables related to the economic sanctions on Myanmar with three different periods and two different trading partners. The dummy variable takes a value 1 if Myanmar exports belong to the targeted period and the trading partner, and 0 otherwise. Regarding the three different periods for setting the dummies, they are composed of the sanction period of 2004-2012 (DS), and the post-sanction periods of 2013-2018 (DPS13) and of 2016-2018 (DPS16). The sanction period of 2004-2012 covers the periods of general import bans imposed by the United States, Canada and the European Union. The reasons for setting two different post-sanction periods of 2013-2018 and 2016-2018 are as follows: to materialize the two-step liftings of the sanction by the United States (easing the import ban in November 2012 and lifting it in September 2016); and to consider the time lag taken from the lifting of the sanctions to the recovery of the production capacities in Myanmar economy. As for the two different trading partners for the dummies, they are divided into two groups: western countries ($_WEST$) and Asian countries ($_ASIA$). It is the United States, Canada and the European Union, belonging to western countries, which imposed the sanctions on Myanmar. These sanctions might, however, affect Myanmar's exports to Asian countries, in such an indirect way that Myanmar's exports might decline due to their synchronized actions with western countries, or that Myanmar's exports might increase towards the other Asian countries as alternative trading partners.

Second, additional regressors to the gravity model, i.e., a natural resource rent of an exporter (NRRt) and an indicator of government effectiveness (GEFt), are the factors that are supposed to cause deviations from the gravity-trade-standard. The NRR is an indicator of natural resource development. The NRR indicator is defined as “the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents” by the World Bank Open Data⁵, and its estimates are based on sources and methods described in World Bank (2011). The purpose of the NRR inclusion is to examine whether an exporter’s natural resource development has crowded out its manufacturing exports. This negative effect is called the Dutch Disease, and its theoretical framework was originally described by Corden and Neary (1982). The GEF is a variable to represent institutional quality and governance. According to the World Bank description⁶, the government effectiveness captures “perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies”. The data sources contain the factors of transportation infrastructure, electricity grid and education system. Thus, the GEF matters in enhancing manufacturing activities and alleviating the Dutch Disease effect at the early stage of an economy’s development, as a significant number of empirical studies have examined the effects of institutional qualities on economic development in general (e.g., North 1990, Rodrik et al. 2002, Lee and Kim 2009, Vaal and Ebben 2011 and Flachaire et al. 2014).

Third, a bilateral real exchange rate of an exporter against an importer (REX) is introduced as a multilateral time-varying price resistance term. The gravity trade model proposed by recent theoretical developments requires the inclusion of the multilateral price term in the model. Anderson and van Wincoop (2003) suggested the use of country-specific fixed effects as the method to account for the multilateral price term in the cross-section. In a panel setting, however, the multilateral price term would be time varying. One way to control for price changes is to introduce, similarly to Rose (2000) and Vandebussche and Zanardi (2010), the bilateral real exchange rate that varies over time and tracks price changes.

Based on the description of the variables above, the sign of each variable’s coefficient could be expected to be as follows (see Table 1-2 again). If the estimation follow the augmented version of gravity trade model, the coefficient’ signs of the products of GDP (YEt*YMt) and per capita GDP (YPCeT*YPCMt), α_1 and α_2 , are expected to be positive, and that of

⁵ See the website: <https://data.worldbank.org/>.(accessed January 31, 2020)

⁶ See the website: <https://info.worldbank.org/governance/wgi/Home/Documents>. (accessed January 31, 2020)

geographical distance (DIS), α_3 , is expected to be negative; the coefficient of bilateral real exchange rate of an exporter against an importer (REXt), α_4 , should have a negative sign; and the coefficient of natural resources rent (NRRt) and that of government effectiveness (GEFt), α_5 and α_6 , should have a negative sign and a positive one respectively. Regarding the dummy variables related to the economic sanction on Myanmar, the coefficient's sign of the sanction dummy against western countries (DS_WEST) is naturally supposed to be negative. The other sanction-related dummies might, however, have ambiguous signs in their coefficients for the following reasons. First, the coefficient of the sanction dummy against Asian countries (DS_ASIA) might depend on the side-effects of the sanctions by western countries on Myanmar's exports to Asian countries: synchronized effects or alternative ones. Second, the coefficients of the post-sanction dummies (DSP13 and DSP16) might depend on the degree and speed of the recovery of Myanmar's exports after the lifting of the sanctions. The post-sanction dummies that are significantly negative bring the discussion to the factors to push down Myanmar's exports from the gravity-trade-standard of emerging ASEAN countries even after the lifting of the sanctions on Myanmar.

1.3.3.2 Out-of-sample Estimation

The out-of-sample approach adopts the same specification for gravity model estimation as that of the in-sample approach, except that the estimation excludes Myanmar's exports from the sample, thereby removing the dummy variables related to the economic sanctions on Myanmar from Equation (1). The equation for estimation is, therefore, specified as follows.

$$\ln(\text{EXt}) = \text{const.} + \beta_1 * \ln(\text{YEt} * \text{YMt}) + \beta_2 * \ln(\text{YPCEt} * \text{YPCMt}) + \beta_3 * \ln(\text{DIS}) + \beta_4 * \ln(\text{REXt}) + \beta_5 * \text{NRRt} + \beta_6 * \text{GEFt} \quad (2)$$

Where the variables have the same denotation as Equation (1), and $\beta_1 \dots \beta_6$ are coefficients of explanatory variables in the out-of-sample estimation. The counterfactual Myanmar's exports are calculated by using the coefficients of the constant term and $\beta_1 \dots \beta_6$. The serious gap between counterfactual values and the real ones leads to the investigation of the factors to make downward deviations of Myanmar's exports from the gravity-trade-standard of the other emerging ASEAN countries.

1.3.4 Estimation Outcomes

This section presents the outcomes of the in-sample and the out-of-sample estimations of gravity trade model. The section starts with the in-sample estimation outcomes followed by the out-of-sample ones. The common outcomes of the estimations are summarized as follows: the Myanmar's manufacturing exports for the post-sanction period have been still significantly below the level of the gravity-trade-standard; the downward deviation from the standard could be explained by the two Myanmar-specific factors, i.e., the low institutional quality and the Dutch Disease effect in the Myanmar's exports to western countries, but not fully in those to Asian countries.

1.3.4.1 In-sample Estimation Outcomes

The column from (1) to (4) in Table 1-3 reports the in-sample estimation outcomes. The outcomes contain four estimation cases: the case (1) of the simple augmented version of gravity model with a multilateral time-varying price resistance term, the case (2) including the sanction dummies on Myanmar in the gravity model, the case (3) including both the sanction and post-sanction dummies on Myanmar, and the case (4) with the sanction-related dummies and additional variables (natural resources rent and government effective index) for explaining the deviations from the gravity-trade-standard.

Regarding the case (1), the coefficients of all the explanatory variables have expected signs: the coefficients of products of GDP ($YE*YM$) and per capita GDP ($YPCE*YPCM$) are significantly positive; the coefficient of geographical distance (DIS) is significantly negative; and that of bilateral real exchange rate (REX) is negative though it is not significant⁷. The result of case (1) estimation thus implies the validity of gravity trade model.

The case (2) adding the sanction dummies on Myanmar (DS) has their significantly negative coefficients: the sanction dummy against western countries (DS_WEST) has expectedly a negative coefficient ($\exp. (-3.003) = 0.050$) as a direct sanction effect; and the dummy against Asian countries (DS_ASIA) has reasonably smaller size of a negative coefficient ($\exp. (-2.271) = 0.103$), which suggests an indirect "synchronized" effect of the sanctions. It means that, under the western countries' sanction period, Asian countries such as Japan and Korea took similar actions with the western countries, and that this synchronized

⁷ The insignificance in the REX 's coefficient implies the premature markets as in Myanmar economy where the mechanism of prices including exchange rates has not perfectly been working.

effect exceeds the alternative effect in which Myanmar increased its exports to China and Thailand.

The case (3) adding further the post-sanction dummies on Myanmar (DPS) against western and Asian countries has two different coefficients with opposite signs between DPS13 (2013-2018 dummy) and DPS16 (2016-2018 dummy). The negative coefficients of DPS13_WEST (exp. $(-3.265) = 0.038$) and DPS13_ASIA (exp. $(-3.202) = 0.041$) turn into the positive ones of DPS16_WEST (exp. $(2.168) = 8.741$) and DPS16_ASIA (exp. $(1.337) = 3.808$), respectively. This changes in their coefficients' signs are considered to reflect the two-step sanction liftings by the United States and the recovery lag of Myanmar's production capacities during the post-sanction period. It should also be noted, however, that the recovering and regaining degrees of Myanmar's manufacturing exports have still been insufficient to reach the gravity-trade-standard, since the sums of the coefficients with opposite signs in the post-sanction dummies are still negative in DPS_WEST (exp. $(-1.097 (= a + b)) = 0.334$) and in DPS_ASIA (exp. $(-1.865 (= c + d)) = 0.155$), as shown at the bottom part of Table 1-3.

These results lead to another estimation in the case (4) for investigating the deviation factors from the gravity-trade-standard. In this case, the coefficient of natural resources rent (NRR) is significantly negative, thereby implying the existence of the Dutch Disease effect, and that of government effective index (GEF) is significantly positive, thus suggesting the positive role of institutional quality in promoting manufacturing exports.⁸ What should be noted is that adding these regressors contributes to compressing the negative sizes of the coefficients of the post-sanction dummies towards -0.245 in DPS_WEST (exp. $(-0.245) = 0.783$) and -0.855 in DPS_ASIA (exp. $(-0.855) = 0.425$). This means that some parts of the negative deviations of Myanmar' manufacturing exports from the gravity-trade-standard during the post-sanction period could be explained by the higher natural resources rent (the Dutch Disease effect) and the lower government effective index of Myanmar than those of the other emerging ASEAN countries. In fact, according to the sample data in 2017, the natural resources rent of Myanmar is 7.14 as a percentage of her GDP, whereas that of the other emerging ASEAN countries on the average is 3.92; and the government effective index in Myanmar is -1.052 , while that of the other emerging ASEAN countries is 0.025. The critical remaining point is that, even after taking two factors above into account, there is still a large negative gap between Myanmar exports to Asian countries and the gravity-trade-standard,

⁸ In the case (4), the bilateral real exchange rate (REX) has a significantly positive coefficient unexpectedly. It might come from multicollinearity problem in the sense that the Dutch Disease effect by adding natural resources rent (NRR) accompanies the appreciation of real exchange rate.

represented by the coefficient of DPS_ASIA ($\exp. (-0.855) = 0.425$), while the gap on Myanmar exports to western countries is almost alleviated as shown in the coefficient of DPS_WEST ($\exp. (-0.245) = 0.783$). Another possible factor to push down Myanmar exports to Asian countries will be discussed in the later section.

1.3.4.2 Out-of-sample Estimation Outcomes

The column from (5) to (6) in Table 1-3 again reports the out-of-sample estimation outcomes: the case (5) of the simple augmented version of gravity model and the case (6) including additional variables (natural resources rent and government effective index) for explaining the deviations from the gravity-trade-standard.

The case (5), as in the case (1) of the in-sample estimation, has positive coefficients of $YE*YM$ and $YPCE*YPCM$ and negative ones of DIS and REX at their significant levels, respectively. It supports the validity of gravity trade model even in the out-of-sample estimation excluding Myanmar's exports. The case (6) also shows almost the same result as that of the in-sample estimation: the negative coefficient of natural resources rent (NRR) implies the existence of the Dutch Disease effect, and the positive coefficient of government effective index (GEF) suggests the active role of institutional quality in promoting manufacturing exports, both of which are significant factors to deviate manufacturing exports from the gravity-trade standard.

The study now calculates the counterfactual Myanmar's manufacturing exports by using the coefficients estimated in the case (6) and compares those with the actual Myanmar's exports. Figure 1-3 displays three kinds of the counterfactual values as well as the actual value in logarithm terms for Myanmar's manufacturing exports to western countries and to Asian countries: 1) the gravity-trade-standard (GTS), using the constant term and the coefficients of $YE*YM$, $YPCE*YPCM$, DIS and REX , 2) the GTS adding the coefficient of NRR, and 3) the GTS adding the coefficients of both NRR and GEF.

It is observed that there are large gaps between actual value and the counterfactual GTS values for Myanmar's manufacturing exports to both western countries and Asian countries. In particular, the largest gap is found in 2010-2011 to western countries, during which the import bans were imposed on Myanmar by not only the United States but also Canada and the European Union. In addition, the period for 2010-2011 was the one when the internal conflicts

with ethnic groups had been getting so violent that the foreign trade activities were hindered.⁹

Focusing on the post-sanction period after 2013, however, there is a difference in the gap of the actual and the counterfactual values on between the exports to western countries and those to Asian ones. While in Myanmar exports to western countries the gap is getting filled up toward 2017 by taking NRR and GEF into account, in those to Asian countries the gap remains even including the two variables. This means that the negative deviation of Myanmar's exports to western countries from the gravity-trade-standard during the post-sanction period could be explained by the low institutional quality and the Dutch Disease effect in Myanmar, which is consistent with the findings of Amiri et al. (2019) and Meon and Sekkat (2004), and the negative deviation to Asian countries requires the explanation of another possible factor to create it. This outcome of the out-of-sample estimation is consistent with that of the previous in-sample estimation.

1.3.5 Discussions

Both in-sample and the out-of-sample estimation could identify the validity of the expected gravity trade model in emerging ASEAN manufacturing exports, and the economic-sanction effect to compress Myanmar's manufacturing exports, particularly, to western countries. Both estimations also revealed that even after the economic sanctions was lifted, Myanmar's exports have been deviated from the gravity-trade-standard of the other ASEAN economies, and that the deviation could be explained by the two Myanmar-specific factors, i.e., the low institutional quality and the Dutch Disease effect in the exports to western countries but not fully in those to Asian countries.

The remaining issue is to investigate another factor to push down Myanmar manufacturing exports to Asian countries from the gravity-trade-standard for the post-sanction period. The factor might come from the fact that Myanmar economy has been less integrated with the international production networks than the other ASEAN economies. As was discussed in Section 1.3.1, the intra-ASEAN manufacturing exports have recently risen, reflecting active back-and-forth international transactions of intermediate goods such as processed goods, parts and components under the prevailing international production networks in that area. The low share of Myanmar's intra-ASEAN exports, however, implies that her economy has been lagging behind the participation in the international production networks.

⁹ This affected the trade with not only western countries but also the other Asian countries except Korea and India. In the in-sample estimation, this effect was dealt with by the time-dummy.

Myanmar's sluggish participation in the international production networks has been pointed out by the other previous studies such as Taguchi and Ni Lar (2015a) and Taguchi and Tripetch (2014). Taguchi and Ni Lar (2015a) assessed the existing production networks in Mekong region by applying fragmentation theory, through examining the trade of machinery parts and components between Thailand and the other Mekong countries. They found that the machinery trade has been less-integrated between Thailand with Myanmar, which was explained by the higher service-link costs, namely, the poorer logistic performances in Myanmar side. Taguchi and Tripetch (2014) also argued that although Myanmar's border areas with Thailand could be the gateways for production networks to extend across the national borders, the areas have still been underdeveloped due to the lack in logistical frameworks such as so-called Special Economic Zone.

The additional factor to deviate Myanmar manufacturing exports to Asian countries from the gravity-trade-standard might, therefore, be Myanmar's sluggish participation in the international production networks, in other words, global value chains (GVCs).

1.4 Chapter Summary

This chapter aims to evaluate Myanmar's exports of manufacturing products by using a gravity trade model for emerging ASEAN economies. The main focus of this study is whether Myanmar's manufacturing exports have recovered towards the gravity-trade-standard of the other emerging ASEAN countries for the post-sanction period of 2013-2018. This paper contributes to the literature by targeting the post-sanction period unlike the previous studies, and by applying both of the in-sample and the out-of-sample estimation methods to ensure the consistency and robustness of their results.

The main findings are summarized as follows. First, both in-sample and the out-of-sample estimation could identify the validity of the expected gravity trade mode in emerging ASEAN manufacturing exports, and the economic-sanction effect to compress Myanmar's manufacturing exports, particularly, to western countries. Second, both estimations also revealed that even after the economic sanction was lifted, Myanmar's exports have been deviated from the gravity-trade-standard of the other ASEAN economies, and that the deviation could be explained by the two Myanmar-specific factors, i.e., the low institutional quality and the Dutch Disease effect in the exports to western countries but not fully in those to Asian countries. The additional factor to deviate Myanmar manufacturing exports to Asian countries

from the gravity-trade-standard might come from Myanmar's sluggish participation in the international production networks, in other words, global value chains.

Chapter II Participation in Global Value Chains and Logistics Performance in Emerging ASEAN Economies

2.1 Introduction

Global value chains (GVCs) have been a trend in global economic activities over the past two decades and have also been one of the prominent analytical targets for intensive theoretical and empirical studies in academic circles. The concept of GVCs was initially introduced by Koopman et al (2014) in their study of tracing value added by country in global production chains and measuring vertical specialization in international trade. Since Koopman et al (2014) provided a unified accounting framework for analyzing GVCs, empirical studies have been intensified. Among them, Gereffi (2018) presented a comprehensive study as the seminal work of GVCs and demonstrated the conceptual foundations of GVC analysis and the twin pillars of “governance” and “upgrading” along with detailed case studies of China, Mexico, and other emerging market economies. The economic effects of GVC participation were estimated by the World Bank (2020): a 1 percent increase in GVC participation would boost per capita income by more than 1 percent or cause a much more than 0.2 percent income gain from standard trade.

Regarding the forms of GVC participation characterized by “vertical specialization,” Hummels et al. (2001) originally suggested the following two modalities: (a) using imported intermediate inputs to produce exports (called “backward participation” in this study) and (b) exporting intermediate goods used as inputs by other countries to produce goods for export (called “forward participation” in this study). In the context of the analytical setting of the UNCTAD-Eora Global Value Chain Database¹⁰ (UNCTAD-Eora database) that this study uses, the backward participation corresponds to the “foreign value embedded in a country’s exports” in the database, and the forward participation corresponds to the “domestic value added embedded in other countries’ exports.” This study focuses on the backward participation measured by the “foreign value embedded in a country’s exports,” because this study targets emerging ASEAN economies, which depend on foreign inputs for their exports and have less capacity to contribute to the third countries’ exports in their GVC participation process.

Vertical specialization has also been referred to by the seminal work of Kimura (2006) in the context of the “intra-industry trade” activated in the prevailing international production

¹⁰ See the website: <https://worldmrio.com/unctadgvc/>. (accessed April 1, 2020) The property of this database will be explained in Section 2.

networks in East Asia. Kimura (2006) argued that the mechanics of the East Asian production networks are represented by the “vertical” division of labor in “intra-industries” among several countries with different income levels, and that the mechanics are typically found in such sophisticated manufacturing industries as machinery, which involve many multi-layered vertical production processes.

As an analytical framework to illustrate the vertical intra-industry trade, Kimura (2006) applied “fragmentation theory.” The “fragmentation” was clearly defined by Deardorff (2001): the splitting of a production process into two or more steps that can be undertaken in different locations but that lead to the same final product. The theoretical rationale for “fragmentation” has been provided by Jones and Kierzkowski (1990, 2005). They argued that a firm’s decision on whether to fragment production processes depends on the differences in location advantages (e.g., the differences in factor prices such as wages) and the levels of the “service-link costs,” which are costs to link remotely located production blocks. The greater disparity in factor prices between countries could encourage the use of several international locations for production blocks, and the decline in the service-link costs could further facilitate the process of fragmentation at international levels. In this context, emerging ASEAN economies could be one of the major players in fragmentation mechanics, under such backgrounds as their large differences in factor prices with different development stages, and the reductions of service-link costs with the promotion of free trade and infrastructure development under the ASEAN Economic Community.

Thus, the service-link costs could be a key manageable factor to facilitate the vertical intra-industry fragmentation because the policy efforts such as institutional improvements and infrastructure development could mitigate the service-link costs. The service links were defined by Jones and Kierzkowski (1990) as the bundles of activities to connect fragmented production blocks, comprising coordination, administration, transportation, and financial services. Thus, the service-link costs contain not only bilateral trade costs such as transportation costs but also country-specific costs such as the costs for operating in a given country. This study focuses on the logistics performance on the host country in vertical trade as a component of the service links because the harmonization of logistics policies has been a crucial field for the trade facilitation in ASEAN economies (e.g., Nguyen et al., 2016). The index of logistics performance is presented by the World Bank¹¹, measuring the performances of customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing,

¹¹ See the website: <https://lpi.worldbank.org/>. (accessed March 30, 2020)

and timeliness.

Given the aforementioned backgrounds, the research question in this chapter is as follows: is there a linkage between GVC backward participation (vertical trade defined as foreign value embedded in exports) and the logistics performance in the host country (as a component of the service links) in emerging ASEAN economies? The hypothesis behind this research question is that there would be a substantial difference in GVC backward participation between forerunners in ASEAN such as Malaysia and Thailand and latecomers such as Cambodia, Lao PDR, and Myanmar and that the difference would be from the gap in the logistics performance between them as host countries.

The contributions of this study to the literature are summarized as follows. First, this study expresses vertical trade by the foreign value added in exports, using the UNCTAD-Eora database. Studies such as Kimura et al. (2007) and Taguchi and Ni Lar (2015a and 2016) have analyzed vertical trade by using gross trade values of manufactured parts and components, because it was useful to illustrate the “intra-industry” trade that has involved their back-and-forth international transactions. Gross trade values, however, do not necessarily gauge vertical trade precisely, because imported parts and components could, for instance, be used for domestic selling. However, the foreign value added in exports in this study measures vertical trade but are not confined to the “intra-industry” trade that characterizes the fragmentation, because the foreign value contains raw materials and services that manufacturing companies usually import. Thus, both indicators might have pros and cons and adding the value-added indicator might therefore contribute to enriching the evidence.

Second, this study applies a “structural” gravity model setting for the specification of estimated equations. Studies such as Kimura et al. (2007) and Taguchi and Ni Lar (2015 and 2016) have relied on a “traditional” gravity model setting for estimating vertical intra-industry trades in the manufacturing and machinery sectors. As Piermartini and Yotov (2016) argued, the traditional gravity model might lead to biased and even inconsistent estimates. Subsequently, Piermartini and Yotov (2016) presented a comprehensive and theoretically consistent econometric specification of a gravity model setting with the following six recommendations: (i) use panel data, (ii) use interval data to allow for adjustment in trade flows, (iii) include intra-national trade flows, (iv) use directional time-varying fixed effects, (v) employ pair fixed effects, and (vi) estimate gravity with the Poisson Pseudo Maximum Likelihood (PPML). This study adopts five recommendations out of the six, excluding recommendation (iii), because this study concentrates on the comparison in vertical trade among the emerging ASEAN economies.

2.2 GVC backward participation in emerging ASEAN economies

This section illustrates the degree of GVC backward participation in emerging ASEAN economies by using the UNCTAD-Eora Database. As mentioned in Introduction in Section 2.1, GVC backward participation is defined as vertical trade measured by the foreign value embedded in a country's exports in the database.

GVC participation has also been examined by international organizations such as UNCTAD (2013) and the World Bank (2016, 2020). The World Bank (2016), for instance, investigated differentiated buyer- and seller-related participations: the GVC participation on the buying side is indicated by the percentage of the foreign value added embodied in gross exports, and those on the selling side are shown by the percentage of the value of domestic inputs exported to third countries and used in their exports in gross exports. The GVC backward participation in this study corresponds to the buyer-related participation in the analytical framework of the World Bank (2016).

GVC backward participation is of significance in the industrial and economic development of emerging market economies because the participation could involve intermediate inputs containing foreign technology and thus boost the competitiveness of their exports by facilitating the combination of foreign technology with their own labor, capital, and technology. An economy's ability to participate in GVCs is, therefore, linked with its capacity to import world-class inputs efficiently and to export competitive products.

The UNCTAD-Eora database that this study uses offers global coverage (189 countries and a "Rest of World" region) and a time series from 1990 to 2018 of the key GVC indicators, i.e., foreign value added, domestic value added, and indirect value added. The methodological background was described by Casella et al. (2019). The value-added-based trade data originated from the work of the OECD and WTO as the "Trade in Value Added (TiVA)" dataset (see OECD and WTO, 2012). Thus, Casella et al. (2019) also provided a comparison of the results of the UNCTAD-Eora database against the TiVA database.

The UNCTAD-Eora database also provides the country/sector by a country matrix of value-added decomposition in trade from 1990 to 2017 in addition to the key GVC indicators so that the gross exports of countries and their sectors could be decomposed into home countries' value added and foreign countries' value added with each country origin. By using this database, this section elucidates the GVC backward participation of emerging ASEAN

economies by manufacturing industries¹², in terms of the foreign value added embodied in gross exports as the percentage of gross exports. This section also shows the foreign value added of emerging ASEAN economies by foreign country origins, in terms of the percentage of the total foreign value added. This study targets eight emerging ASEAN countries: Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam. Brunei Darussalam and Singapore are excluded from this study's sample because they belong to the high-income group according to the World Bank classification.¹³

Figure 2-1 displays, based on the UNCTAD-Eora database classification, the backward GVC participation of emerging ASEAN economies by total manufacturing and seven manufacturing sectors: food and beverages (food), textiles and wearing apparel (textile), wood and paper (wood), petroleum, chemical and non-metallic mineral products (chemical), metal products (metal), electrical and machinery (machinery), and transport equipment (transport).¹⁴ Figure 2-1 is described every five years from 1990 to 2015 and 2017, with the vertical axis being the foreign value-added share of gross exports (representing the degree of GVC backward participation), and with the horizontal axis being per capita GDP in real terms (showing the development stage of the economies). The data for per capita GDP in real terms is from UNCTAD Stat database and named "US dollars at constant prices (2010) per capita."¹⁵

The main observations from Figure 2-1 are summarized as follows. First, the foreign value-added share to exports is positively correlated with per capita GDP in total manufacturing and seven manufacturing sectors.¹⁶ This observation is consistent with the argument by World Bank (2020): a 1 percent increase in GVC participations would boost per capita income by more than 1 percent. There is also a large gap in GVC backward participation between the forerunners of ASEAN (e.g., Malaysia and Thailand) and the latecomers (e.g., Myanmar, Cambodia, and Lao PDR). Second, the gaps in GVC backward participation between the forerunners and the latecomers differ in manufacturing sectors: the gaps are moderate in traditional industries such as food and wood products, while the gaps are extreme in sophisticated industries such as metal

¹² This study focuses on manufacturing sectors because GVC activities and fragmentation phenomena are typically observed in their sectors.

¹³ See the website: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>. (accessed March 30, 2020)

¹⁴ The classification applies to Cambodia, Lao PDR, and Myanmar in the UNCTAD-Eora database. The other five countries have another detailed commodity classification in the database, and the classification is transformed into the seven classifications, based on the SITC Revision 3 Product Code. See Appendix.

¹⁵ See the website: <https://unctadstat.unctad.org/EN/>. (accessed April 1, 2020)

¹⁶ The positive correlation between the foreign value-added share and per capita GDP would hold in the case of the lower-income group. As an economy advances to upper-middle- and high-income stages by upgrading its industries, the correlation would become negative after a certain threshold of per capita GDP. This could be observed, for instance, in Li et al. (2019).

products, machinery, and transport equipment.

Figure 2-2 shows the foreign value added of emerging ASEAN economies by country origin. The point observed commonly in eight sample economies is a clear contrast: the decreasing trends in the shares of Japan, the United States, and Taiwan and the increasing trend in China. Another point to be noted is that the intra-regional linkages among ASEAN economies have been strengthened in terms of the increasing trends in the shares of the foreign value added from ASEAN economies, such as Cambodia from Thailand, Indonesia from Malaysia, Lao PDR from Thailand, Malaysia from Indonesia, Thailand from Malaysia, and Vietnam from Malaysia.

In summary, the GVC backward participation in ASEAN economies has made substantial progresses during the 1990s, along with their per capita GDP growth. There has been, however, a large gap in the degree of GVC backward participation between the forerunners and the latecomers in ASEAN economies. Additionally, the country origins of foreign value added have changed from Japan, the United States, and Taiwan to China and the ASEAN countries themselves.

2.3 Empirics

This section conducts an econometric analysis by estimating the structural gravity model to verify a quantitative linkage between GVC backward participation (vertical trade) and logistics performance on the host country in emerging ASEAN economies. The previous section identified the difference in GVC backward participation between the forerunners and latecomers in ASEAN. Thus, the analytical question is whether the difference would be from the gap in the logistics performance between them as host countries. This section first specifies the sample data and the estimation model, and then presents estimation outcomes with discussions.

2.3.1 Sample Data and Key Variables

This subsection first describes the data of each variable in detail, and the descriptive statistics are presented in Table 2-1. Regarding the dependent variable FVA, foreign value added in exports, the data are from the UNCTAD-Eora database and expressed as thousand US dollar terms. The variable targets total manufacturing and the machinery industry (the sum of “machinery” and “transport” in Section 2.2). The machinery industry typically represents many

multi-layered vertical production processes as the mode of fragmentation, as Kimura (2006) argued.

Regarding the DIS data in Equation (1), the distance is measured by the Great Circle Distance between Cities on Map (Fromto).¹⁷ The GDP data are retrieved from the World Economic Outlook (WEO) database (October 2019) of the International Monetary Fund by the series of “current prices US dollars.”¹⁸ As for the GAP data, the GDP per capita is from the WEO, based on the series of “current prices US dollars.” The GAP is calculated by the GDP per capita of host countries divided by that of origin countries. The LPI index from the Logistics Performance Index of the World Bank takes the number ranging from 1 (very low in the performances) to 5 (very high).

Next, the sample economies and period are set as follows. The host countries are the eight countries from emerging ASEAN, and the origin countries/economies of foreign value added are selected as the eight ASEAN countries and their major seven trading partners: China, Germany, India, Japan, South Korea, Taiwan, and the United States. The foreign value added that the host countries receive from the sampled origin economies cover 60 to 80 percent of the total foreign value added they received from the world in 2017.¹⁹ As for the sample period, the study selects such discrete years as 2007, 2010, 2012, 2014, 2016, and 2017 because of the constraint of data availability of the LPI.²⁰ The study then constructs panel data for six years with the combinations between host countries and origin economies ($6 * 8 * 14 = 672$) for the estimation.

2.3.2 Model Specification

This study equips the following three types of model specifications for examining the vertical trade in the manufacturing and machinery industries: (i) the traditional gravity setting (Equation 1), (ii) the structural gravity setting using the directional time-varying fixed effects (Equation 2), and (iii) the structural gravity setting using the logistics performance of host countries instead of the host country’s time-varying fixed effects. The models for the estimations are specified as follows:

¹⁷ See the website: <https://www.distancefromto.net/>. (accessed March 30, 2020)

¹⁸ See the website: <https://www.imf.org/en/Data>. (accessed March 30, 2020)

¹⁹ The coverage in Myanmar as a host country is below 60 percent because it had ever received economic sanctions from Western countries and diversified its trade partners.

²⁰ The UNCTAD-Eora database has the data range by 2017, and the LPI data in 2018 is applied to the data as 2017, since the LPI does not have the data in 2017.

$$\ln FVA_{ij,t} = \alpha_0 + \alpha_1 \ln DIS_{ij} + \alpha_2 \ln GDP_{i,t} + \alpha_3 \ln GDP_{j,t} + \alpha_4 \ln GAP_{ij,t} + \varepsilon_{ij,t} \quad (1)$$

$$FVA_{ij,t} = \exp [\beta_0 + \mu_{ij} + \pi_{i,t} + \chi_{j,t} + \beta_1 \ln GAP_{ij,t}] + \varepsilon_{ij,t} \quad (2)$$

$$FVA_{ij,t} = \exp [\gamma_0 + \mu_{ij} + \gamma_1 LPI_{i,t} + \chi_{j,t} + \gamma_2 \ln GAP_{ij,t}] + \varepsilon_{ij,t} \quad (3)$$

where the subscripts $i, j,$ and t denote host countries (receiving foreign value added in exports), origin countries (offering foreign value added in exports), and trading years, respectively; FVA is the vertical trade measured by foreign value added in exports; DIS is the geographical distance between host countries and origin countries; GDP is gross domestic product; GAP is the gap in per capita GDP between host countries i and origin countries j ; μ_{ij} is the pair fixed effects between countries i and j ; $\pi_{i,t}$ and $\chi_{j,t}$ are the time-varying fixed effects of countries i and j , respectively; LPI is the logistics performance index; ε is an error term; α_i ($i = 0, 1, \dots, 4$), β_i ($i = 0, 1$), and γ_i ($i = 0, 1, 2$) are estimated coefficients of Equations (1), (2) and (3), respectively; and \ln shows a logarithm form.

Equation (1), the traditional gravity setting, is based on Kimura et al. (2007). Kimura et al. (2007) modified the standard gravity equation to account for the elements that affect cross-border fragmentation, by incorporating location advantages and service-link costs in the equation, both factors that Jones and Kierzkowski (1990, 2005) identified as the determinants of fragmentation in their theory. The location advantages are reflected in the variable GAP as a proxy for the differential in the total level of factor prices in an economy, and the service-link costs are represented by the geographical distance between exporters and importers, DIS, due to the scarcity of their statistical information.²¹ For the estimation methodology, ordinary least squares (OLS) estimators are applied in this study, as in Kimura et al. (2007).

Equation (2), the structural gravity setting, conforms to the following recommendations of Piermartini and Yotov (2016), except for the existence of GAP representing location advantages. First, the time-varying fixed effects of countries i and j , $\pi_{i,t}$ and $\chi_{j,t}$ are incorporated in the equation to control for the unobservable multilateral resistances initially addressed by Anderson and van Wincoop (2003). The time-varying fixed effects absorb both countries' GDPs as well as all other observable and unobservable country-specific characteristics that influence bilateral trade (this study treats Indonesia as a benchmark country). Second, the pair fixed effects between countries i and j , μ_{ij} , are introduced to the equation to account for the effects of all time-invariant bilateral trade costs, as Agnosteva et al. (2014) demonstrated. The

²¹ The subsequent studies such as Taguchi and Ni Lar (2015 and 2016) have added the logistics performance index as the proxy of the service-link costs to the equation. This study, however, uses the original form proposed by Kimura et al. (2007).

pair fixed effects absorb the geographical distance, DIS, as well as any other time-invariant bilateral elements such as the presences of contiguous borders, a common official language, and colonial ties. Third, the PPML is applied to the estimation in order to manage possibility of zero trade flows and heteroscedasticity of trade data, as Santos Silva and Tenreyro (2006) suggested.²² Equation (2) also applies the OLS estimator as a robustness check for the PPML estimator, as Head and Mayer (2014) recommended.

The question is where the service-link costs are positioned in this equation. As mentioned in Introduction in Section 2.1, the service-link costs contain not only bilateral trade costs such as transportation costs, but also country-specific costs such as the costs for operating in a given country. Thus, the service-link costs occupy some portions of the time-varying fixed effects of host and origin countries ($\pi_{i,t}$, $\chi_{j,t}$) and the pair fixed effects (μ_{ij}).²³ This study focuses on the time-varying logistics performance of the host country side as one part of the service-links costs. Thus the major concern in Equation (2) in this study is the volume of the time-varying fixed effects of host countries ($\pi_{i,t}$), and together with the estimation results of Equation (3), this study demonstrates the contribution of the host country's logistics performance to the country-specific fixed effects (Figure 2-3).

Equation (3), in this context, replaces the time-varying fixed effects ($\pi_{i,t}$) with the logistics performance ($LPI_{i,t}$) of the host countries. The coefficient γ_1 is used to compute the contribution of the host country's $LPI_{i,t}$ to $\pi_{i,t}$. The PPML is applied to the estimation with Equation (3).

2.4 Estimation Outcomes

Table 2-2 and Table 2-3 reports the estimation outcomes of Equations (1), (2), and (3) for the cases of total manufacturing and machinery industry. Both cases show similar results with the same directions of the coefficients' signs, although their magnitudes differ between the two cases.

Starting with the estimation results of Equation (1) with the traditional gravity setting in column (i), the coefficients of the DIS and GDP of host and origin countries have expected signs with conventional significance. The coefficient of GAP representing the location advantages, however, has the sign opposite to what the fragmentation theory supposed in

²² In this study, the UNCTAD-Eora database is used with estimation and it does not include zero trade data as shown in Table 1. However, the application of PPML estimation is still appropriate and effective because of the heteroscedasticity of trade data.

²³ The service-link costs are also affected by the "time-varying" bilateral trade costs, represented by the effects of, for instance, new regional trade agreements. This study omits these effects to highlight the arguments.

Equation (1) and is of insignificance in the other equations. This result suggests that the location advantages do not necessarily constitute a major factor to explain the vertical trade in this study.

Columns (ii) and (iii) correspond to the OLS and PPML estimations of Equation (2), with the structural gravity setting using the directional time-varying fixed effects. The major concern in this equation is the coefficients on the time-varying fixed effects in host countries (those in origin countries and the coefficients on the pair fixed effects are omitted for brevity). The coefficients show the wide range of the magnitudes with Indonesia in a middle position being a benchmark country, from the largest negative values in Myanmar to the largest positive values in Malaysia. The negative coefficients are displayed in the latecomers in ASEAN and the positive coefficients are in the forerunners, the contrast of which approximately corresponds to the gap in the degree of GVC backward participation between them. Comparing the coefficients between the OLS and PPML estimations in columns (ii) and (iii), their magnitudes in the OLS estimation are too large, for example, the negative maximum exp. $(-10.927) = 0.0000\dots$ in Myanmar (machinery industry). In the PPML estimation, by contrast, the negative maximum exp. $(-3.938) = 0.019$ in Myanmar in 2010 (machinery industry) and the positive maximum exp. $(0.212) = 1.236$ in Malaysia in 2010 (machinery industry) are at reasonable levels. What is more important is that the RESET p values, at the bottom of Table 2-3, reveal that only PPML estimations pass the misspecification tests in total manufacturing and machinery industry. This study thus identifies the PPML as a reasonable standard estimation and based on the PPML estimation in column (iii), Equation (3) replaces the time-varying fixed effects with the LPI of host countries.

Column (iv) represents the PPML estimations of Equation (3) with the structural gravity setting using the logistics performance of host countries. The RESET p values do not show, unfortunately, that the column (iv) estimations pass the misspecification tests, probably because the logistics performance itself does not necessarily cover all the time-varying country-specific characteristics. The coefficients of the LPI in both total manufacturing and machinery industry, however, have positive signs with conventional significance, as expected. This finding implies that the difference in logistics performance has some linkage with the gap in the degree of GVC backward participation among emerging ASEAN economies. This result leads to questioning the statistical degree of the logistics performance's contribution to the time-varying fixed effects on host countries that reflect the degree of GVC backward participation.

Table 2-4 and 2-5 reveal the comparison between the host country's fixed effect and logistics performance in 2017 for the total manufacturing and machinery industry: column (a) re-displays the coefficient of the host country's fixed effect in 2017 in column (iii) of Table 2-

3; the LPI deviation from the benchmark in column (c) is computed by subtracting Indonesia's LPI from each country's LPI in 2017 in column (b); the LPI effect in column (d) is then calculated by multiplying the LPI deviation with the estimated coefficient (0.512 in total manufacturing and 0.761 in machinery industry) in column (iv) of Table 2-3; and in column (e), the LPI effect in column (d) is divided by the coefficient of the host country's fixed effect in column (a) for their comparisons.

The result in column (e) suggests that the host country's logistics performance accounts for the country-specific effect to a comparable extent, with the reasonable range of the LPI-fixed effect ratio from 0.186 in Malaysia (total manufacturing) to 1.230 in Thailand (machinery industry). This finding implies the existence of some linkage between the host country's logistics performance and the degree of its GVC backward participation in ASEAN economies. This outcome is also consistent with the analyses by the World Bank (2016 and 2020) that GVC integrations are highly sensitive to logistics performances.

2.5 Chapter Summary

This chapter attempted to address the issue on the degree of GVC backward participation for emerging ASEAN economies, and the specific research question was whether there is a linkage between the GVC backward participation, namely, vertical trade defined as the foreign value embedded in exports, and the logistics performance as a component of the service links in the host country. This study's major contributions were to represent vertical trade by the foreign value added in exports, using the UNCTAD-Eora Database, and to apply a "structural" gravity model setting for the specification of estimated equations.

The statistical observations demonstrated that the GVC backward participation in emerging ASEAN economies has made substantial progresses during the 1990s along with their per capita GDP growth and that there has been a large gap in the degree of GVC backward participation between the forerunners and the latecomers in ASEAN economies. The empirical estimation under the structural gravity model identified the quantitative linkage between GVC backward participation and the logistics performance of the host country.

Because the logistics performances are one of manageable factors for countries' strategies, there should still be the policy space for the ASEAN latecomers to catch up with the forerunners in GVC integrations. The latecomers, namely, Myanmar, Lao PDR, and Cambodia, are in the Mekong region, where GVC activities have started to be activated in the border areas with Thailand in the form of so-called "Thailand-plus-one" (e.g., see Kuroiwa, 2016). To fully

utilize this momentum, the framework of special economic zones (SEZs) should be developed and upgraded in the border areas for the latecomers because it could provide a convenient avenue to facilitate “vertical” border trades with the high-end border logistics (e.g., single window, single stop) and with the privileges for foreign investors (e.g., custom-duty exemption, labor transferability, one stop services). However, Myanmar as a typical example of the lack in GVC backward participation has no active SEZ frameworks in the border areas with Thailand, although the areas could be the effective gateways for vertical border trades with Thailand (e.g., see Taguchi and Tripetch, 2014). In this sense, there should be substantial room for the latecomers of ASEAN to facilitate their GVC participation in their development strategies.

Chapter III Case studies: Participation in Global Value Chains and Logistics Performance in Myanmar

3.1 Introduction

This chapter presents a case study in Myanmar on the relationship between its low participation in global value chains (GVCs) and its lower logistics performance.

Since 2011, Myanmar has transformed its political status from a military-ruled one to a democratic one, and has implemented political, social and economic reforms. Consequently, western nations have lifted sanctions and, thus, Myanmar has started to rejoin the global economy as a potential “new frontier” for GVCs. For an economy to participate and integrate in GVCs, the service-link costs, specifically, the logistic service costs are one of the largest hampering factors in Myanmar. In this context, the Myanmar government made the National Logistics Master Plan in 2016. In this plan, nine priority projects for logistics facilities are set up as follows: 1) institutional development of customs and operations of the Myanmar Automated Cargo Clearance System (MACCS); 2) capacity building program for operation of MACCS; 3) establishment of terminal stations at selected cities; 4) establishment of new large-scale truck terminals; 5) legislation of seamless container transport system; 6) multi-modal facility at major river port and intersection; 7) cross-border trade development project (CBTT); 8) container switching station in Myawaddy trade zone; and 9) multi-modal facility at Bago intersection node. Based on the findings of Chapter II, despite setting up project goals, however, Myanmar’s GVC participation is still lower than those of the other emerging ASEAN countries, resulting from its low levels of logistic performances.

According to the Logistics Performance Index (LPI) of the World Bank²⁴, Myanmar’s overall LPI ranking improved slightly from 147 in 2007 to 137 in 2018, as seen in Table 3-1. However, the large gap in LPI has persisted between Myanmar and the other ASEAN countries, and Myanmar is the only ASEAN member with the LPI ranking being over 100 and even under the category “logistics unfriendly” (Arvis et al. 2012).

The research studies for the lower LPI performances and the less participation in GVCs in Myanmar have been investigated by few previous studies such as Min and Banomyong (2017) and Bernhardt (2017). Min and Banomyong (2017) analyzed the key factors of Myanmar’s national logistic system hampering its integration in the global economy, and demonstrated that

²⁴ See the website: <https://lpi.worldbank.org/>.(accessed April 1, 2020)

the underdevelopment of logistic infrastructure and the fragmented governance in transport and logistic sectors are the major detrimental factors for the involvement in global value chains. Bernhardt (2017), in its firm-level study, pointed out the risks occurring in Myanmar's attempt to deepen a GVC participation, and showed that international transactions of GVC-related products, in specific, manufacturing parts and components in Myanmar, have been much smaller than those in the other ASEAN nations. Bernhardt (2017), based on the analyses, proposed the following government reforms and supports for Myanmar's further integration into GVCs: public investments to upgrade the country's hard infrastructure (electricity, transport and ICT-information and communication technology); and country's soft infrastructure such as trade policy reforms to streamline export and import procedures; industrial policies to foster firms' usage ICT and to develop business-support-services industries; investment policies to attract more FDI; human capital development and skills upgrading; and financial regulatory and institutional reforms.

Regarding the literature review, however, there have been few research studies in Myanmar for analyzing and evaluating the detailed components of the LPI index in the context of GVC participation. The LPI index has six kinds of components: customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing, and timeliness. Arvis et al. (2012) in the World Bank report classifies these components into two categories: areas for policy regulation indicating main inputs to the supply chain (corresponding to the LPI of customs, infrastructure and logistics quality and competence), and supply chain performance outcomes (corresponding to timeliness, international shipments, and tracking and tracing).

This chapter examines the extent of Myanmar's logistics performance gap in connection with GVCs, following the two categories proposed by Arvis et al. (2012), and also provides the geographical perspective on the linkage between the economic corridors in creating value chains and the corridor-based logistics.

3.2 Areas for Policy Regulations (Inputs)

Regarding the areas of policy regulations, three main components are considered as the inputs to supply chain: customs, infrastructure and logistics quality and competence. This subsection describes how far the Myanmar's logistic performance has lagged behind by each component, compared with the other emerging ASEAN countries.

The first component is the customs, that is, the custom clearance system in international gateways such as border gates, port and airports. The bottlenecks in the customs raise the

transaction costs, which hinder a nation's capacity to participate in GVCs. Table 3-2 reports the time to complete for clearance and inspections required by customs, based on the Ease of Doing Business Database published by the World Bank. According to Table 3-2, the importers and exporters in Myanmar need to take more time to complete their border trade compliances than those of the other ASEAN nations: in particular, the importers in the Myanmar are supposed to spend 110 hours (nearly 5 days) to complete their custom clearance and inspections, whereas those in the other ASEAN nations spend less than 30 hours. To narrow down the trade-related procedure gap, Myanmar needs to build a national "single" window for unifying immigration and quarantine procedures with custom one, which can be connected to the ASEAN standard "single" window. In this regard, the adoption of the MACCS in 2016 with the cooperation of Japan International Cooperation Agency (JICA) has contributed to the speed-up of the trade logistics, although the system has been applied only to the Thilawa Special Economic Zone, and Myawaddy and Muse border gates.

The second component is infrastructure, and the inefficient transport infrastructure and the absence of the logistic infrastructure led to the higher transportation costs through longer time of delivery. Table 3-3 reports the nodes of transport in the trade of Myanmar and shows that the Myanmar's trade cargoes have depended largely on the coastal shipping, whereas its air cargo is the least transport node. Min and Banomyong (2017) points out the Myanmar's low capacity of transport infrastructure to accommodate increased cargo demands with two different kinds of congestions: the port congestions in Yangon Port, and traffic jams in the Lashio-Muse Road due to the weaknesses in cargo handling system. This issue implied the shortcomings of logistic facilities such as dry ports, off-dock, bonded warehouses and truck terminals. Thus, the logistics infrastructure, including the establishment of multimodal freight logistics hubs, is prerequisite to improve the logistic performance in Myanmar.

The third component is logistics quality and competence, and the logistics service providers (LSPs) play a major role in providing the services. Sumantri and Lau (2011) defines the LSPs as an agent to offer excellent logistics services such as optimizing logistic supply chain inventory, lead times and economies of scale. However, Myanmar has a limited number and capacity of the LSPs in competing with foreign LSPs due to the lack in ICT technologies and financial stress. Min and Banomyong (2017) points out the needs for the Myanmar government's actions to liberalize further the LSP activities and to promote joint ventures between foreign providers and local providers, and the needs for MIFFA (the Myanmar International Freight Forwarders' Association) and UMFCCI (the Union of Myanmar Federation of Chambers of Commerce and Industry) to provide the logistics knowledge for

their members through the trainings and workshops.

3.3 Supply Chain Performance Outcomes

Another category for logistics performance, that is, the supply chain performance outcomes are measured by three output indicators: timeliness, international shipments, and tracking and tracing. The effective and efficient supply chain outcomes can be achieved only if the input components work well as mentioned in Section 3.2.

The first indicator is timeliness. As Sy et al. (2020) argues, ensuring on-time delivery of inbound and outbound shipments has become even more challenging, as global supply chains become more complex, and a country's ability to export on time can be a comparative advantage of the economy. As a matter of course, the timeliness requires policy inputs of the development of infrastructure and quality of logistics services. In that case, the key requirement for Myanmar is to transform its trade-related procedures into digitalization, and to develop the skills of human resources for delivering the products in right time and right place. Moreover, it is also important to develop the financial institutions to smooth the payment procedures. In this context, the pre-deposit banking of MACCS (Myanmar Automated Cargo Clearance System) has just started to operate. If the MACCS provides a user-friendly and fully online system for the payment procedures of importers and exporters, trade-related procedures are supposed to be completed much faster, and products would be delivered within a scheduled and expected time.

The second indicator is international shipments. The Liner Shipping Connectivity Index (LSCI), which is published by the UNCTAD, is an important indicator to describe how well countries are connected to global shipping networks. Aye (2019), analyzing the LSCI, shows that the Myanmar's LSCI is still far behind those of the other ASEAN nations though it has been in an improving trend: the Myanmar's LSCI ranking in 2019 is 99, while the Vietnam's LSCI ranking is 13. Looking at Figure 3-1, the number of TEU operated by Myanmar ports increased nearly twice from 2013-14 to 2017-18. However, the container-carrying capacity in Yangon Port including Thilawa Terminal area is still limited to 800-TEU per container ship, due to the constraint as a river port. Ministry of Transport and Communications (2018) in its Myanmar's logistics report shows that the international shipment from Yangon to Tokyo takes 19 days with the higher shipment costs, whereas that from Thailand Port (Laem Chabang) to Tokyo takes only 8 days with lower costs, and also points out that the long lead-time and the high costs of container transportation in Myanmar are caused by the limited accessibility of

Yangon Port to ships due to the restrictions on the feeder ships plying between Singapore and Yangon.

The third indicator is tracking and tracing. Sy et al (2020) defines the tracking as monitoring the movement of products to the end-user, and the tracing as a tool to point out the destinations if the product delivery deviates from the track. To usefully apply tracking and tracing, ICT plays as an important role. Without applying online system fully, it is difficult to track and trace the product movements along the delivered way. In the case of international shipment, for instance, the Myanmar Port Authority in coordination with JICA has started to outline the Port-EDI (Electric Data Interchange) system since 2015, in which the logistic monitoring system is included. With an aid of the system, the shipper can track and trace the cargo status daily, through ship movement information, container status information and gate in/gate out time information. However, the Port-EDI system has not been applied fully yet, and thus, the Myanmar Port Authority still rely on the traditional paper documents to record shipping information.

3.4 Case Study: Corridor based SEZ and Cross-border Gates

This subsection provides the economic linkage between corridor-based SEZ and cross-border gates from the perspective of logistics in geographical perspective.

As shown in Table 3-4 and Figure 3-2, Myanmar currently has the three special economic zones (SEZs) as economically central hubs: Thilawa, Dawei and Kyaukphyu SEZ, and the three economic corridors linking these SEZs within the Greater Mekong Sub-region (GMS) are planned to develop: the East-West Economic Corridor from Yangon-Thilawa through the border gate of Myawaddy to Thailand; the North-South Economic Corridor from Yangon-Thilawa and Kyaukphyu through the border of Muse to China; and the Southern Economic Corridor from Dawei through the border of Htee-khee to Thailand (Dawei is expected to be linked with Europe, Africa, India and Middle East as well). GVCs in Myanmar are expected to develop along with the planned economic corridors above.

In order for the GVCs to work well in the economic corridors, the logistics in the economic corridor need to be developed, which is equally important as transport corridors. Developing cross-border economic zones rather than single-spot economic zones could contribute to facilitating regional GVC integration such as the Thai-Plus-One linkage. The branch factories in the context of “Thai Plus One” has been set up in Cambodia and Laos such as the export type branch factories. Once trade facilitation infrastructures have been fulfilled, Myanmar also

has an opportunity to join the global value chain (Final Report of DICA, 2014).

The border trade has recently gained its importance in Myanmar. Figure 3-3 reports the composition of ordinary trade and border trade in the past decade in Myanmar and shows the weight of border trade has increased particularly in the export of manufacturing products. The major border stations for border trade among 18 stations are Muse, Myawaddy and Htee-khee, and these stations are the focal points for the three economic corridors. As Taguchi and Tripetch (2014) argues, the border areas could be the gateways for GVCs to extend across the national borders in the region. Thus, improving the border trade logistics along with the corridors would be extremely important for Myanmar. The custom system such as the single window with ICT, as emphasized in Section 3.2, need to be applied widely in the border gate areas.. It should also be noted that the Myawaddy border trade zone has recently reduced logistic bottlenecks, by building the logistics hub, allowing a direct truck cargo transportation on the route of Bangkok-Myawaddy-Thilawa SEZ, and realizing easy trade payments with the help of central bank coordination. As for the route between Dawei SEZ and Htee-khee, the road infrastructure is expected to be upgraded into two-lane highway with the financial assistance from the Thai organization, Neighboring Countries Economic Development Cooperation Agency (NEDA), so that it can take only 5.5 hours from Bangkok to Dawei SEZ, which could be the most attractive economic corridor.

3.5 Chapter Summary

Since 2011, Myanmar has been regarded as the new frontier for GVC extension based on its locational advantages, but the capacity to integrate into GVCs is still limited due to the lack of the national logistic system. As multinational firms seek efficiency and efficacy of their supply chains by looking at the logistic performance of a country, Myanmar needs to have quick-fix solutions in its logistics system though it will not be done in a short time. Due to this awareness, the Myanmar government has laid down the blueprint of National Logistic Master Plan (NLMP) in 2016, with an aim to participate in regional and global economy. To successfully implement the NLMP, the government needs to focus not only on the policy regulations (as in Section 3.2) but also on the supply chain performance outcomes of the whole logistic system (as in Section 3.3). Moreover, in the formation of the GMS economic corridors, Myanmar should enhance not only the connectivity between commercial nodes (SEZs) and border nodes, but also the trade facilitation services, in other words, the logistic services throughout the movement of products and services. To sum up, Myanmar could intensify the

GVC integration like the other ASEAN nations, if its logistics sectors were developed substantially in alignment with its locational advantages.

PART II Inward FDI and Its Effects in Myanmar

Part II analyzes the quantitative relationships among inward FDI, economic growth, domestic investment and employment under the open-door policies in Myanmar by applying a panel vector-autoregressive model framework from 2012 to 2018. Chapter IV deals with the relationship among inward FDI, economic growth and domestic investment, and an Addendum to Chapter IV focuses on the effects of inward FDI on domestic employment.

Chapter IV Myanmar's Inward Foreign Direct Investment

4.1 Introduction

With the rise of globalization, the Association of South East Asian Nations (ASEAN) has liberalized their policies on foreign direct investment (FDI) in favor of attracting inward FDI, which is the principal factor for accelerating economic development. ASEAN has gradually become one of the leading destinations for FDI with an increasing global share of inward FDI stock from 2.52 percent in 1989 to 7.37 percent in 2019. During that period, the inward FDI stock share to GDP in ASEAN also rose significantly from 14.10 percent to 84.70 percent²⁵.

As mentioned in PART I, Myanmar is now turning from an unfavorable trade condition to a favorable one, searching new export markets and having a diverse trade partner. However, to take full advantage of this new potential, inward FDI in Myanmar should be welcomed not only by offering incentives but also by the liberalization of investment related rules and regulations. In this respect, Government of Myanmar (GOM) has launched a wide-ranged reformation process to enhance its investment climates, in specific, by enacting Myanmar Investment Law (MIL) in October 2016. The MIL is the consolidation of Myanmar Citizen Investment law (2013) and Myanmar Foreign Investment Law (2012), designed to facilitate and promote domestic and foreign investments.

In addition to enacting new Laws and Regulation, the GOM has also strengthened the investment relations with potential investor countries by making Bilateral Investment Treaties (BITs). Recently, BITs agreements have been set out with not only Asian countries such as Japan in 2013, Republic of Korea (ROK) in 2014, Israel in 2014, Indonesia in 2013 and Singapore in 2019, but also western countries like the United States (US) in 2013 as a

²⁵ The figure is based on UNCTAD Stat: <https://unctadstat.unctad.org/EN/>. (accessed April 1, 2020)

consequence of lifting sanctions.

In an effort to attract inward FDI, it is critically important to know how inward FDI interacts with economic growth and which sector is the most effective and efficient sector to absorb inward FDI. To deal with these issues, numerous researches have been discussing and analyzing the effect of inward FDI theoretically and empirically, though there has been no clear consensus on the results.

Theoretically, in the context of FDI-driven growth hypothesis, both the neoclassical growth model (Solow, 1956) and the endogenous growth model (Romer, 1990) argues that the accumulation of capital stock and technological progress are the principal determinants of economic growth, but they differ in the treatment of technology. The neoclassical model treats technological progress as an exogenous variable and assumes that FDI merely increases the investment rate with exogenously input technology, resulting in a transitional growth in per capita income. In the endogenous growth model, however, technological progress is considered to be endogenous, and FDI is assumed to have a permanent growth impact via its technological transfer and spillover effects.

From the empirical perspective, several empirical studies have examined the economic impacts of inward FDI, but there have still been controversial issues in the following aspects. Some studies identified the positive effect of inward FDI on economic growth, whereas the others found the opposite causality between inwards FDI and economic growth: the FDI could be attracted by growing economies and markets, which is referred to as the “market-size hypothesis” or the “growth-driven FDI hypotheses proposed by e.g., Caves (1996) and Zhang (1999, 2001). Another dispute is whether inward FDI crowded-in or crowded-out domestic investment.

This study sets out to investigate the effects of inward FDI on economic growth and domestic investment at the regional and sectoral levels of Myanmar economy, by applying the toolkit of a panel vector autoregressive (PVAR) model: granger causality test, impulse response function analysis and variance decomposition check. The reason for using the PVAR model in this study is that there is the endogeneity problem among the variables of FDI, economic growth and domestic investment.

The specific research questions in this study are twofold: whether the inward FDI causes economic growth or economic growth attracts the FDI, and whether the inward FDI crowds in or crowds out domestic investment. The regional analysis focuses on the causality between inward FDI and economic growth. The regions and states in Myanmar are divided according to the FDI-value intensity (the FDI-high-intensive, middle-intensive and low-intensive regions)

with an aim to analyze the differences in the FDI - economic growth relationship. The hypothesis behind the regional division is that the FDI intensity is supposed to create agglomeration effects on economies through technological spillovers and industrial linkages. The sectoral analysis is for examining the crowd-in or -out effects of inward FDI on domestic investment. Since the investment in the oil and gas sector is dominated only by FDI, the sectors without the oil and gas are examined as well as the sectors including the oil and gas.

4.1.1. Overview of Inward FDI in Myanmar

In an attempt to create favorable investment climates in Myanmar, the government started to liberalize its legal framework as the first and foremost step. The outdated investment policies have been reformed by Myanmar Investment Law (2016), Myanmar Companies Act (2018) and the Special Economic Zone Law (2014). Additionally, three special economic zones have been established in accordance with the SEZ law (2014) to attract inward FDI: Thilawa SEZ in Yangon Region; Kyaukphyu SEZ in Rakhine State; and Dawei SEZ in Tanitharyi Region. In attracting inward FDI, diversified investment incentives have been offered depending on the regional differences and economic zone differences. However, the majority of investment incentives in Myanmar is largely dependent on tax-based fiscal incentives rather than the non-fiscal incentives of trade facilitation and infrastructure. For instance, the proportion of fiscal investment incentives in Thilawa SEZ is over 85% while trade facilitation and infrastructure incentives are only 19% (OECD Investment Review, 2020). Therefore, the shortage of electricity supply in Thilawa SEZ has been one of infrastructure obstacles for foreign investors (IGC, 2016).

In accordance with improvements in investment climates, the number of foreign enterprises permitted in Myanmar have increased significantly from 14 in 2010 to 1470 in 2018, out of which hundred-percent-foreign-owned enterprises are 610 (CSO, 2019). Within those foreign investments, Asian countries are top three investing countries including China, Singapore and Thailand. Interestingly, inward FDI in oil and gas sector has not been offered and non-existent since 2016, while the inward FDI share of manufacturing sector has been rising from 11.3 % in 2015 to 32.5 % in 2017 (DICA). Therefore, it suggests that inward FDI in Myanmar has been reoriented from resource-seeking FDI to efficiency-seeking FDI.

Regarding investment destinations of those enterprises, the majority of inward FDI is concentrated in the following areas: two growth-pole centers such as Yangon region and Mandalay region; special economic zones (SEZs); towns in Greater Mekong Subregion

(GMS); and the border areas (Final Report of DICA,2014). In the midst of those destinations, more than 60 percent of inward FDI flowed into Thilawa SEZ (TSEZ), which is the successful SEZ with a combination of 19 foreign investing countries and with over 110 enterprises (OECD Investment Review, 2020). In particular, the dominant manufacturing products in TSEZ are garment, food and beverages (F&B) products, which are low-value and labor-intensive such as the brands of H&M, GAP and Unilever. To generate positive spillover effects of TSEZ, bottlenecks of the linkage between TSEZ and the rest of the economy should be removed such as large trade costs including unproductivity of firms in non-zonal areas and unnecessary red tapes in linking with domestic plants (IGC, 2016).

4.2 Literature Review and Contribution

This section reviews the literature related to FDI-growth relationship in emerging-market and developing economies including Myanmar. The studies could be classified by the examined samples depending on the national, regional, sectoral, and firm levels.

Regarding the national-level analyses, there are some empirical studies targeting multi-countries with mixed results. Oladipo (2012), sampling 16 developing countries, identified the causality from FDI to economic growth in majority of sample countries and the reverse causality from growth to FDI in half of samples. Chowdhury and Mavrotas (2006) found the unilateral causality from GDP to FDI in Chile, and the bilateral causality between them in Malaysia and Thailand. These studies imply the need of different kinds of policies depending on the modality of the causality. On the other hand, Zhang (2001), sampling 11 economies, showed that the extent to which FDI is growth-enhancing depended on host-country-specific characteristics such as trade regime, human capitals, FDI policies and macroeconomic stability. Kotrajaras (2010) analyzed the effects of FDI on economic growth among the East Asian countries by using endogenous growth model, and found out that FDI can only have positive effects on economic growth on high- and middle-income countries but not in low-income countries. Kotrajaras (2010) pointed out that human capital, infrastructure and trade openness is the most important factors to pursue FDI-growth effects in low-income countries. As for the studies focusing on a single country e.g., China, Shan (2002) found the two-way causality between FDI and output growth though the causality from growth to FDI was more significant. On the contrary, Zhao and Du (2007) confirmed only the impact of economic growth on FDI influx, which supported the market-size hypothesis.

For the regional-level analyses, Changyan (2007), using the panel data of provinces in

China, found that FDI produced positive effects on China's economy via its crowding-in domestic investments, not through its direct channel on economic growth. Taguchi and Pham (2019), sampling the provincial data in Vietnam, showed the contrasts on FDI effects between the FDI-intensive region and the FDI-less intensive one: FDI caused growth and crowded in domestic investment in the FDI-intensive region, whereas growth caused FDI and FDI crowded out domestic investment in the FDI-less-intensive one.

Concerning the sectoral-level analyses, Aykut and Sayek (2007), using cross-country data, revealed that FDI had a positive effect on economic growth as the share of the manufacturing sector in FDI flows increases, while having a negative effect as the share of primary and services sector in FDI increases. Shah et al. (2020), examining the case of Pakistan, found that FDI in manufacturing and services sectors, but not in primary sector, crowded in domestic investment.

With regard to firm-level analyses, Girma (2005) examined the effect of FDI on productivity growth with a threshold-regression analysis by using the firm-level data from UK manufacturing industry. Girma found out the non-linear threshold effect indicating that FDI-related productivity spillovers initially increase at a rate with a rise in absorptive capacity of the firms but diminishing marginal effects occurred in high technological capacity firms. To achieve the positive productivity spillovers from FDI, firms need to exist beyond a minimum absorptive capacity threshold level, and more importantly, FDI-related sectors need to be motivated by traditional asset-exploiting considerations. Todo and Miyamoto (2006) analyzed the possible endogenous effect of FDI on knowledge spillover effects, by classifying foreign firms into R&D and non-R&D ones using plant-level data from Indonesian manufacturing sector with the method of GMM. They pointed out that only R&D performing foreign firms can cause significant positive spillover effects on domestic firms.

The FDI-growth studies focusing on Myanmar that this study targets are quite limited even in the national-level analyses. It is probably because it is only after the sanctions imposed by western countries was lifted during the 2010s that the FDI influx has been activated in Myanmar. Taguchi and Ni Lar (2015b) could not identify the causality from FDI to GDP with the sample for 1984-2012 in Myanmar and picked up the following reasons: too small scale of FDI, much dependence on oil and gas sectors in FDI and the lack in time-series sample data. Bissinger (2012) also pointed out that the FDI concentrating on extractive sectors has retarded the economic growth of Myanmar. The recent study, Thunt and Jung (2018), sampling the period for 1970-2016, found that the FDI has a positive effect on GDP per capita growth in the long-run as well as in the short-run by using a Vector Error Correction Model. To endogenously

achieve the long-run effect of FDI in Myanmar, Thunt and Jung (2018) also pointed out that policies should prioritize the accumulation of human capital which facilitate and cause interactive development with the FDI industries through technology transfer and training.

To sum up, there has been no clear consensus in the empirical literature on the causality between FDI and economic growth, and the FDI effects on GDP and domestic investment. As far as Myanmar economy is concerned, there has been few evidence on the FDI- growth relationship. In this context, the contributions of this study to the existing literature could be highlighted as follows.

First, this study contributes to enriching the evidence on the FDI-growth relationship in Myanmar under the lack in its empirical studies. The evidence of this study could be significant enough to add to the literature, since it would be the first time to examine its relationship using regional and sectoral data in Myanmar. The recent availability of the time-series data for 2012-2018 makes it possible to analyze the interaction among FDI, GDP and domestic investment at the regional and sectoral levels.

Second, this study uses not a single-equation regression but a PVAR model to avoid the endogeneity problem among targeted variables. The PVAR estimation lets the data determine the causality between targeted variables and makes it possible to trace out the dynamic responses of variables to exogenous shocks overtime.

4.3 Empirics

This section conducts an empirical analysis using a PVAR model for examining the relationship among FDI, growth and domestic investment. The section describes data, the model specification and estimation outcomes with its interpretations.

4.3.1 Sample Data and Key Variables

This subsection describes the data sources and the sample data used for the estimation. The first PVAR model requires two variables' datasets: FDI and GRP. The data of FDI is obtained from Directorate of Investment and Company Administration (DICA) in Myanmar as a permitted-value base, and that of GRP is from the annual report of Planning Department of Myanmar. The FDI values on US dollar base are converted into those on local-currency (Kyat) base by the exchange rate retrieved by International Financial Statistics (IFS) of International Monetary Fund (IMF). Since the FDI significant data is available only after 2012, a national

level analysis faces the lack in time-series sample. Hence comes the necessity to disaggregate the data into regional or sectoral levels. Then the first PVAR estimation chooses the regional disaggregation for FDI and GRP, because sectoral classifications in both dataset mismatch each other²⁶. Table 4-1 lists up 15 regions and states as the sample for the estimation. The time series sample of each region and state for FDI and GRP are available for 2012-2017.

Then, this study classifies the regions and states into four categories: the FDI-high-intensive region, the FDI-middle-intensive region, the FDI-low-intensive-region, and the oil-and-gas FDI-intensive region. The reason why the oil-and-gas FDI is treated separately is that the investment in that sector, different from those in other sectors, is dominated by FDI with the less linkage to domestic investment. Tanintharyi Region, Rakhine State and Ayeyarwady Region are classified into the oil-and-gas FDI-intensive region, since their oil-and-gas productions accounts for 96.0 percent out of its nation-wide production, and their FDI's are dominated by the oil-and gas sector. Excluding the oil-and-gas FDI-intensive region, the remaining regions and states are further divided into three groups, according to the FDI intensity measured by their FDI values for the average for 2012-2017 and number of industrial zones. The reason for adding the number of industrial zones as a criterion for FDI intensity is that this study hypothesizes that the FDI intensity would create agglomeration effects on economies through technological spillovers and industrial linkages, and that the existence of industrial zones would also facilitate technological spillovers and industrial linkages. To be specific, the sample regions and states are arranged in the sequence of the FDI values and number of industrial zones from the top to the bottom, and are organized finally into three regional groups as follows. The first regional group of Yangon region and Mandalay region is called “the FDI-high-intensive region”, the second group from the 3rd (Mon State) to the 7th (Kachin State) is called “the FDI- middle-intensive region”, and the last group from the 8th (Magway Region) to the 12th (Chin State) is “the FDI-low-intensive region”. For the PVAR estimations for each region, the study constructs a panel data for 2012-2017 with two regions for the FDI-high-intensive group, and with five regions for the FDI-middle and low-intensive groups, respectively.

The second PVAR model needs two variables' datasets: FDI and DIV. Both data are taken from the DICA as a permitted-value base. The FDI values on US dollar base are converted into those on Kyat base by the exchange rate retrieved by the IMF-IFS. The second PVAR

²⁶ For instance, the GRP data has no classification of “Hotel and Tourism”, Real Estate Development” and “Industrial Estate” that the FDI data has in its sectoral classification.

estimation adopts the sectoral disaggregation for FDI and GRP for the following reasons. First, the sectoral-level analysis seems to be suitable for the analysis of crowding-in or -out effects of FDI on domestic investment since the technological spillovers in intra-industries could directly be addressed in that analysis. Second, the sectoral classifications on each dataset is perfectly consistent since they come from the same DICA data source. The sectors could be divided into 11, and the time series sample of each sector are available for 2012-2018. Thus, for the PVAR estimation of the total-sector model, the study constructs a panel data with 11 sectors for 2012-2018. In addition, the study also estimated the model without the oil and gas sector since the investment in the oil and gas sector is dominated by FDI with the less linkage to domestic investment.

4.3.2 Data Property

Before conducting the PVAR analysis, the study examines the stationary property of the data through a panel unit root test, on the regional panel of FDI and GRP for the first PVAR model estimation, and on the sectoral panel of FDI and DIV for the second model estimation. The unit root test is conducted on the null hypothesis that a level of the individual data has a unit root. The pre-tests for unit roots are critical in determining the appropriate transformations that render the data stationarity by reducing the estimation uncertainty and the degree of small-sample bias of impulse response estimates (Gospodinov et al., 2013).

With respect to a panel unit root test, the study employs the Levin-Lin-Chu unit root test (proposed by Levin et al., 2002), which assumes that the parameters of the series lagged are common across cross sections. The test equation is specified by containing “individual intercept” and “individual intercept and trend” with the lag length being automatic selection.

The test results for each variable used for the first and second PVAR model estimations are reported in Table 4-2. The test rejected a unit root at the conventional level of significance in all the data except the GRP with the specification of individual intercept, thereby their data showing stationary property. Their level data are thus justified to be used for the subsequent estimation.

4.3.3 Model Specification

In the estimation, monetary and external sectors are assumed to be an equilibrium at the national level so that interest rate and exchange rate can be given. This assumption would be

justified since this study's analysis targets regions and sectors in Myanmar. The study thus focuses only on the real aspect of the economy, ignoring the financial variables.

The estimation uses three macroeconomic variables for two research questions: inward FDI and gross regional products (GRP) in each region and state, for examining the causality between FDI and economic growth; and inward FDI and domestic investment (DIV) in each sector, for the analysis of the crowding-in or -out effects of inward FDI on domestic investment.

Since all the variables above are in the context of endogenous property and the direction of the causality is controversial, using a single-equation regression approach would lead to the existence of biased and inconsistent estimators. To deal with these issues, a PVAR model is the most coherent and credible approach for the following two reasons: a PVAR model is the data-based system such that the data determine the direction of the causality (Sims, 1980); and each variable in the model is explained by its own lags and lagged values of other variables (Gujarati, 2004). Regarding the estimation technique of the PVAR, this study follows Abrigo and Love (2016).

As a toolkit of the PVAR model estimation, this study employs Granger causality test (GC), impulse response function (IRF) and forecast error variance decomposition (FEVD) on the bilateral combinations between FDI and GRP and between FDI and DIV. The GC identifies the direction of the causality between a pair of variables; the IRF traces out the impact of a one-unit shock to one variable on the other variable; the FEVD separates the variation in one variable into the component shock so that it can provide information about the relative importance of each random innovation in affecting the variable. Regarding the lag interval, the study takes one-year lag, following the Schwarz Information Criterion with the maximum lags being equal to two-year lags under the limited number of time-series data. Then the first PVAR model estimation together with GC, IRF and FEVD on the combination between FDI and GRP is conducted by using regional data in Myanmar by classifying the regions into the FDI-high-intensive region, the FDI-middle-intensive region and the FDI-low-intensive region. The second PVAR model on the combination between FDI and DIV is conducted by using sectoral data in Myanmar, in terms of the total-sector model and the model without the oil and gas sector.

4.4 Estimation Outcomes

The estimation outcomes are reported by two levels of the PVAR model analyses in the following subsections: the regional-level analysis on the relationship between FDI and GRP; and the sectoral-level analysis on the relationship between FDI and DIV.

4.4.1 Regional Analysis on Relationship between FDI and GRP

Table 4-3 and Figure 4-1 report the estimated PVAR model with Granger causality test (GC), impulse response function (IRF) and forecast error variance decomposition (FEVD) on the regional-level analysis between FDI and GRP. The estimation outcomes for the regional model are shown by dividing regions and states into three groups: the FDI-high-intensive region, the FDI-middle-intensive region and the FDI-low-intensive region.

Regarding the GC test, different results on causalities are found depending on the level of the regional FDI-intensity. The causality from FDI to GRP is significantly positive in the FDI-high-intensive region, insignificant in the FDI-middle-intensive region, and significantly negative in the FDI-low-intensive region. Furthermore, the causality from GRP to FDI is significantly positive in all the regions. Thus, the bidirectional causality between FDI and GRP is identified only in the FDI-high-intensive region.

In the IRF analysis, the outcomes are in line with those of the GC test. The accumulated responses of GRP to the one-unit shock of FDI are different among the regions: significantly positive in the FDI-high-intensive region, insignificant in the FDI-middle-intensive-region, and significantly negative in the FDI-low-intensive region, respectively. The FDI responses to the GRP shock are significantly positive in all the regions. All the responses are found to be continuous from the beginning year.

As for the FEVD results, the FDI's contributions to GRP variance after eight quarters are 54.2 percent in the FDI-high-intensive region, and 45.8 percent in the FDI-low-intensive region, whereas it is only 3.8 percent in the FDI-middle-intensive region. On the other hand, GRP's contributions to FDI variance after eight quarters are only one percent or under it in all the regions. These outcomes imply that the impacts of FDI on GRP are larger than those of GRP on FDI in the FDI-high and -low intensive regions.

4.4.2 Sectoral Analysis on Relationship between FDI and DIV

Table 4-4 and Figure 4-2 report the estimation results on PVAR model, the GC test, the IRF analysis and the FEVD check on the sectoral regional-level analysis between FDI and DIV. The outcomes are shown for the total-sector model and the model without the oil and gas sector.

Regarding the GC test, it is only in the model excluding the oil and gas sector that the causality is identified from FDI to DIV at the conventional level of significance (95 percent). The IRF consistently shows that DIV responds positively to FDI with 95 percent error band in

the model excluding the oil and gas sector. As for the FEVD in the model excluding the oil and gas sector, FDI's contributions to DIV variance after eight quarters are 19.8 percent, while DIV's contributions to FDI variance are only 4.3 percent.

4.4.3 Interpretations of Estimation Outcomes

This subsection interprets the estimation outcomes above by each model at regional and sectoral level analyses, from the perspectives of the causality between FDI and economic growth and the crowding-in or crowding-out effect of FDI on domestic investment.

In the regional level analysis, there is a difference in the FDI-economic growth relationship depending on the level of the regional FDI intensity. According to the GC and IRF test results, in the FDI-high-intensive region, the bidirectional FDI-economic growth relationship is found, and it means that the both hypotheses, the FDI-driven growth hypothesis and the growth-driven FDI hypothesis (market-size hypothesis), are valid in that region. From the FEVD analysis, the FDI-driven growth effect is considered to be larger than the growth-driven FDI one, and its effect, which is found to be not temporary but long-lasting, seems to follow the endogenous growth theory rather than the neoclassical growth one. On the other hand, the FDI effect on economic growth is insignificant in the FDI-middle-intensive region and even negative in the FDI-low-intensive region, while economic growth induces FDI in both regions as in the FDI-high-intensive region.

The difference in the FDI-economic growth relationship between the regions might come from the gap in agglomeration effects. For instance, Yangon, the top FDI-recipient region of Myanmar, has developed the special economic zones (SEZs) to intensively invite the foreign investors. The SEZs are the convenient avenues to create a cluster and network between foreign companies and local ones, so that the technological spillovers and inter- and intra- industrial linkages could be facilitated in effective ways. In the FDI-middle-intensive region (from Mon State to Kachin State in Table 4-1) and the FDI-low-intensive region (from Magway Region to Chin State in Table 4-1), on the other hand, there have been no active SEZs to link foreign investors' activities with local companies, and only a limited number of industrial zones that are not enough to work for the linkage. In the FDI-low-intensive region, even though FDI comes into these regions with the limited resources like skill labors and absorptive capacities, the foreign investors might even result in crowding out local resources and local firm's activities.

In the sectoral level analysis, it is reasonable that the crowd-in effect of FDI on domestic

investment is only found in the non-oil and gas sectors, since the FDI in the oil and gas sector has less linkages to domestic investment.

The contributions of this study's result in comparison with previous findings in the literature shown in Section 4.2 could be highlighted as follows. First, in the regional level analysis, this study could reveal a clear contrast in the validity of the FDI-driven growth hypothesis in Myanmar: the hypothesis is valid in the FDI-intensive region but not in the FDI-less-intensive region. This contrast is perfectly consistent with the one in the Vietnamese regional analysis conducted by Taguchi and Pham (2019). Thus, this study could enrich the evidence on the regional gap in the FDI-driven growth effect in the ASEAN latecomers such as Myanmar and Vietnam. This study's findings also implied the significance of SEZs and industrial zones in creating agglomeration effects, and this implication is also consistent with the following studies. Chidlow et al (2009), analyzing the location choice of inward FDI investors in 14 special economic zones in Poland, found out that the regions with agglomeration factors are more attractive locations for FDI than the regions with the availability of natural resources, efficiency and geographical factors motives. Wang (2013), examining the differential effects of SEZs on the local economy of China by using 321 Chinese prefecture-level municipalities for 1978-2008, pointed out that the extent of agglomeration effect is larger in municipalities with multiple SEZs than those with only one SEZ.

Second, in the sectoral level analysis, this study could reconfirm the crowd-in effect of FDI on domestic investment only in the "non-oil and gas" sectors in Myanmar. This outcome is in line with the evidence in Pakistan provided by Shah et al. (2020) and is also consistent with the arguments on Myanmar's case presented by Bissinger (2012) and Taguchi and Ni Lar (2015b). Thus, this study could endorse the previous studies' arguments through empirical tests in Myanmar. Lastly, the agglomeration effect is larger and concentrated in the region with SEZ rather than non-SEZ and few SEZ regions and, therefore, it contribute the findings of Wang (2013).

4.4 Chapter Summary

This chapter examined the effects of inward FDI on economic growth and domestic investment at the regional-level and sectoral-levels of Myanmar economy, by applying the PVAR model framework. The major research questions are twofold: whether inward FDI causes economic growth or economic growth attracts inward FDI, and whether inward FDI crowds in or crowds out domestic investment. The regional-level analysis focuses on the

causality between FDI and economic growth, and the regions are disaggregated according to the FDI-value intensity (the FDI-high, -middle, and -low intensive regions) with an aim to analyze the differences in the FDI - economic growth relationship. The sectoral-level analysis is for examining the crowd-in or -out effects of FDI on domestic investment for the total sectors and the non- oil and gas sectors.

The main findings are summarized as follows. In the regional level analysis, there is a difference in the FDI-economic growth relationship depending on the level of the regional FDI intensity. In the FDI-high-intensive region, the bidirectional FDI-economic growth relationship is found, supporting the both hypotheses of FDI-driven growth and growth-driven FDI, while the FDI-driven growth effect is larger than the growth-driven FDI one. On the other hand, the FDI effect on economic growth is insignificant in the FDI-middle-intensive region and even negative in the FDI-low-intensive region, while economic growth induces FDI in both regions as in the FDI-high-intensive region. The difference in the FDI-economic growth relationship between the regions might come from the gap in agglomeration effects. In the sectoral level analysis, the crowd-in effect of FDI on domestic investment is found in the non-oil and gas sectors, since the FDI in the oil and gas sector has less linkages to domestic investment.

Based on the above-mentioned findings, the following policy implication for inward FDI could be suggested in Myanmar economy. Since the significance of inward FDI in economic growth depends on its agglomeration effects, the policy should be designed to facilitate the technological spillovers and inter- and intra- industrial linkages between foreign companies and local ones. In the FDI-middle-intensive region and the FDI-low-intensive region, establishing the SEZs with effective infrastructure is one of the options for accepting inward FDI. Another option might be to focus on domestic-firm-driven development, not relying on FDI, in such fields as agro-business and tourism, since it seems to be difficult for all the regions to set up the SEZs specific for inward FDI.

An Addendum to Chapter IV Employment Effects of Inward Foreign Direct Investment in Myanmar

A4.1. Introduction

This addendum aims to examine the effects of inward foreign direct investment (FDI) on employment at the regional level of Myanmar economy, and to check its consistency with its effects on economic growth shown in Chapter 4. For this purpose, the study applies the same methodology of a panel vector autoregressive (PVAR) model and the same regional classification (the FDI-high-intensive, middle-intensive and low-intensive regions). The FDI-domestic employment nexus has also been of great concerns in the literature. Jenkins (2006), for instance, analyzed the impact of FDI on employment in Vietnam, and found that the employment generated has been very limited and even possibly negative, because of the high labor productivity with the low ratio of value added to output in the FDI investment, the limited linkages which foreign investors create, and the possibility of “crowding out” of domestic investment. Herlita et al. (2020) examined the relationship between FDI inflow and employment in the Indonesia construction service sector, and identified the unidirectional causality from employment to FDI, thereby arguing that Indonesian human resources play a vital role in attracting FDI. The previous studies in the literature have not necessarily presented the robust effects of the inward FDI on domestic employment. What follows is the empirical test on the causality between inward FDI and domestic employment in Myanmar case.

A4.2. Empirical Results

As in Chapter IV, the PVAR model estimation together with Granger causality (GC) test, impulse response function (IRF) and forecast error variance decomposition (FEVD) on the combination between FDI and domestic employment (EMP), is conducted by using regional data in Myanmar by classifying the regions into the FDI-high-intensive region, the FDI-middle-intensive region and the FDI-low-intensive region in Table A4-1.

The data for EMP in each region and state for 2012-2017 are retrieved from the Department of Labor, the Government of Myanmar. Then, the study constructs a panel data of the combination between FDI and EMP for 2012-2017 with two regions for the FDI-high-intensive group, and with five regions for the FDI-middle and low-intensive groups, respectively. The study first examines the stationary property of the data through the Levin-Lin-Chu panel unit

root test on the regional panel of FDI and EMP. Table A4-1 shows that the test rejects a unit root at the conventional level of significance, thereby their level data being justified to be used for the subsequent estimation.

Table A4-2 and Figure A4-1 report the estimated PVAR model with the GC test, IRF and FEVD. Regarding the GC test result in Table A4-2-2, only the unilateral positive causality from EMP to FDI is significantly confirmed in all the regions. This result is different from the one between GRP and FDI in Chapter IV, where the causalities from FDI to GRP are identified positively in the FDI-high-intensive region and negatively in the FDI-low-intensive region. The result of the IRF analysis is consistent with the GC test, and also different from the one in Chapter IV. The accumulated responses of FDI to the one-unit shock of EMP are significantly positive in all the regions, whereas all the responses of EMP to the FDI shock are insignificant. As for the FEVD result, the EMP's contributions to FDI variance are larger than the FDI's contributions to EMP variance in all the regions. This outcome is in contrast to the one between GRP and FDI in Chapter IV, where the impacts of FDI on GRP are larger than those of GRP on FDI in the FDI-high and -low intensive regions.

A4.3. Interpretations

There is a similarity between the FDI-EMP relationship and the FDI-GRP one in that EMP and GRP have positive effects on FDI in all the regions. On the other hand, the difference between them lies in the result that the impact of FDI on EMP is insensitive in all the regions whereas the impact of FDI on GRP is significant in the FDI-high (positively) and -low intensive regions (negatively). These results seem to be in line with the effect of FDI on employment in Vietnam shown in Jenkins (2006) and the Indonesian case presented by Herlita et.al (2020), as referred to in Introduction in Section A4.1.

The result on the FDI-EMP relationship in Myanmar could be interpreted that the insensitivity of inward FDI on the labor market has been attribute to the underutilization of labor forces due to their skill shortages in Myanmar. On the labor supply side, 48.8 percent of the employed persons concentrates on agriculture, forestry and fishing sectors, whereas 15.9 percent on wholesale and retail trade and 10.8 percent on manufacturing. As for the occupation classification, the skilled agriculture workers occupy the highest contribution by 34.0 percent, while the technicians and associate professional account for only 1.5 percent.²⁷ On the labor

²⁷ The information of labor supply is based on the annual labor force survey in 2017, published by the Department of Labor, the Government of Myanmar.

demand side, the inward FDI for manufacturing sectors occupies the low share (17.7 percent) out of the total inward FDI in Myanmar, and the joint ventures between foreign companies and domestic private enterprises stay still at a low level out of the total cases.²⁸ Therefore, it is needed to attract foreign investors to invest more in manufacturing sectors and to increase the partnership between domestic private enterprises and foreign companies. What is of more importance fundamentally is that Myanmar needs to invest more on human capitals to upgrade its labor forces from low-skilled occupation status to high-skilled one so that the inward FDI could have explicitly positive effects on Myanmar's employment.

²⁸ The information of labor demand is based on the data in 2017, retrieved from the Directorate of Investment and Company Administration (DICA), the Government of Myanmar.

Summary and Conclusion

This dissertation aims to examine the performances of foreign trade and inward FDI of Myanmar in line with the democratic transition in Myanmar from 2011 to 2019. Despite the chances of rejoining the global economy, Myanmar still needs “catch-up capacity” in trade and inward FDI in comparison with the other emerging ASEAN economies. To utilize fully the economic potential of Myanmar, the policies on foreign trade and inward FDI need to be reinforced and strengthened in attracting foreign markets and foreign investors. In this regard, the dissertation is divided into two parts: Part I for trade and Part II for inward FDI in Myanmar.

Empirical results in Part I presented two main research questions: whether the manufacturing export of Myanmar catch up with the gravity trade standard of the other emerging ASEAN countries in post-sanction period (Chapter I); and whether the low level of logistics performance of Myanmar is related to the low level of its participation in GVC (Chapter II and III). Regarding the first empirical question of Chapter I, Myanmar’s manufacturing exports has deviated downward from the gravity trade standard of the other emerging ASEAN economies with western countries and Asian countries ever after lifting sanctions. In examining the reasons of negative deviations, the existence of the Dutch Disease effect and the low level of institutional quality in Myanmar are the common deviation factors in the exports to western countries but not fully in those to Asian countries. In fact, the lack of the participation in international production networks, in other words, global value chains, might be another deviation factor in the exports to Asian countries.

In examining the second research question in Chapter II and III, it is found that there is a large gap in the GVC backward participation between forerunners and latecomers (including Myanmar) in ASEAN economies, and that the gap in the GVC participation is quantitatively related to the difference in the logistics performance of the host country. Based on this empirical results, the logistics performance of Myanmar was investigated and the major findings are as follows. First, although a wide range of trade facilitation measures has been carried out, there still needs a deeper emphasis on its logistics sector development. Second, there are still challenges in implementing policy regulations (inputs) and supply chain performance outcomes (outputs) of logistics services, which have hampered Myanmar’s participation in regional and global value chains through the development of border trade zones and economic corridors.

Part II explored the economic effect of inward FDI in Myanmar. The first research question on the causal relationship between FDI and economic growth was investigated in the regional

level. The empirical result showed different FDI-economic growth relationships among states and regions, which are classified according to the FDI-value intensity and the number of industrial zones as follows: in the FDI-high-intensive region, the bidirectional FDI-economic growth relationship is found, supporting the both hypotheses of FDI-driven growth and growth-driven FDI, while the FDI-driven growth effect is larger than the growth-driven FDI one; on the other hand, the FDI effect on economic growth is insignificant in the FDI-middle-intensive region and even negative in the FDI-low-intensive region, while economic growth induces FDI in both regions as in the FDI-high-intensive region; and the difference in the FDI-economic growth relationship between the regions might come from the gap in agglomeration effects. The second research question on the effect of inward FDI on domestic investment was examined in the sectoral level and the result revealed that only inward FDI in non-oil and gas sector has a crowding-in effect on domestic investment. The third research question on the causal relationship between inward FDI and employment was investigated in the regional level and the results showed only unilateral causality from employment to inward FDI, which implied that human capitals are necessary for attracting inward FDI. The result highlighted that the issues of the underutilization of labor and the mismatch between labor supply and demand in Myanmar need to be addressed to have a positive effect of FDI on employment.

Based on the empirical results of Part I and Part II, the policy messages could be highlighted as follows. First, the Government of Myanmar should take more emphasis on attracting foreign traders and investors in manufacturing sectors rather than natural resource sectors, which might lead to the Dutch Disease effect and even the crowding-out for domestic investment in Myanmar. Second, to achieve an equitable economic growth in all regions and states, Myanmar's investment activities should be diversified by not only offering investment incentives to foreign investors but also by the establishments of successful SEZs in states and regions, and the human capital development should be prioritized to make the most of investment opportunities for economic growth. Lastly, the challenges in logistics sector of Myanmar should be addressed with a "quick-fix" solution in order to participate in regional and global value chains. Even though Myanmar is currently under the low track of manufacturing exports, building and upgrading "logistics-hub" along with economic corridors could enhance the participations in regional and global value chains through the channel of vertical trade.

Aside from the aforementioned findings, some limitations exist in this dissertation. The dissertation only covers the period from 2011-2019, which was the democratic transition period. Under this period, the analysis can focus on the performances of the manufacturing sector in

terms of trade and investment in Myanmar after the sanctioned period. If the targeted period was extended to the one in the latest political difficulties, however, different results and implications would come out.

The empirical analyses in this dissertation also has limitations in terms of the lack of data availability and the lack of accumulation in quantitative studies in Myanmar. Regarding the data availability, the shortage of data limits the scope of empirics, for instance, in Chapter 4, such as the lack of inward FDI data before the period of 2012; mismatching dataset in classification between FDI and GRP in regional and sectoral analyses; and the lack of latest and reliable data on labor forces. If those data were available, it would make it possible to investigate inward FDI effects in the longer time-series including the period before the sanction, and to examine the regional and sectoral effects of inward FDI in more details. As for the literature on quantitative studies targeting Myanmar, its absence makes it difficult to compare the findings in this dissertation with the others. Thus, enriching quantitative evidence is definitely needed in the future works.

Lastly, the addendum to Chapter IV revealed the significance in human capital for inward FDI to have a positive effect on employment creation. In this context, the further detailed analyses on the linkage between human capital and inward FDI in regions and states would definitely be required as future works.

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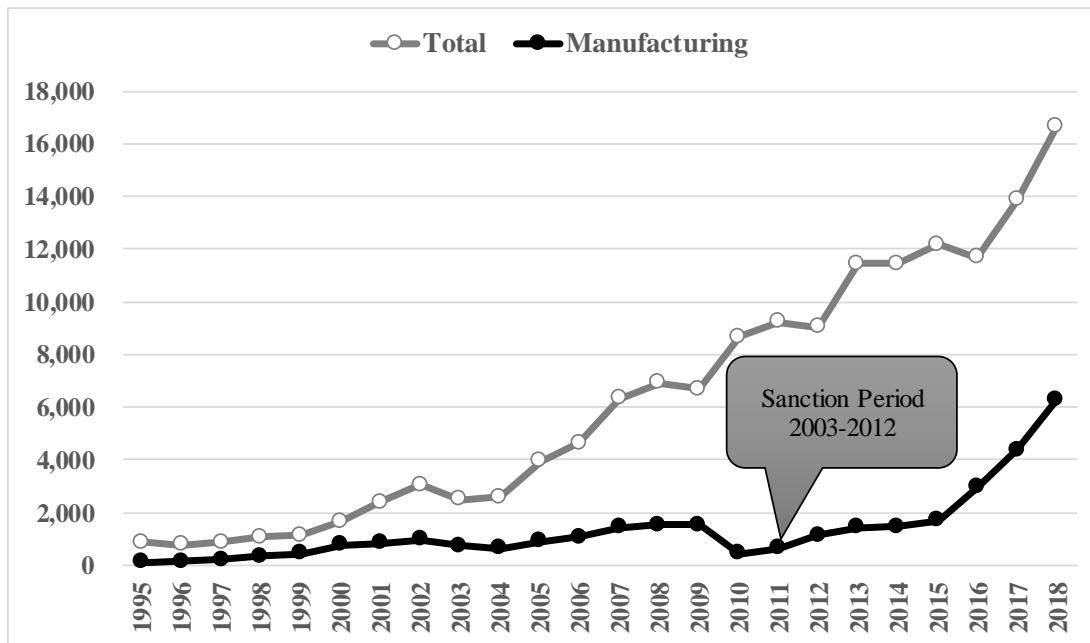
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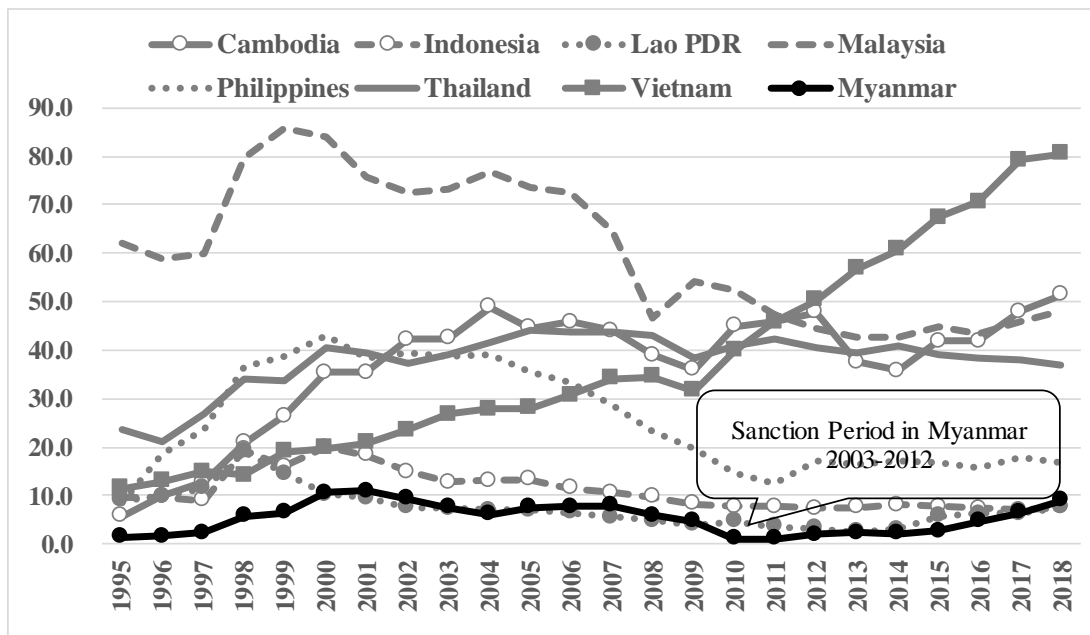
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Figure 1-1 Myanmar's Exports (mil. \$)



Source: UNCTAD STAT

Figure 1-2 Manufacturing Exports as a Percentage of GDP in ASEAN



Source: UNCTAD STAT

Table 1-1 ASEAN Manufacturing Exports to Major Partners

Exports in 2018	Myanmar	Cambodia	Indonesia	Lao PDR	Malaysia	Philippines	Thailand	Vietnam
Total Values (mil. USD)	6,275	12,535	77,661	1,350	169,619	55,250	186,037	196,887
Ratio to the World (%)								
Myanmar	-	0.01	0.40	0.07	0.20	0.03	1.49	0.32
Cambodia	0.01	-	0.15	1.02	0.14	0.04	1.59	1.28
Indonesia	0.22	0.16	-	1.00	2.74	1.20	4.29	1.61
Lao PDR	0.00	0.02	0.01	-	0.01	0.00	1.21	0.19
Malaysia	0.64	0.57	4.10	0.30	-	2.85	4.57	1.44
Philippines	0.12	0.17	4.74	0.46	1.42	-	3.49	1.23
Thailand	3.73	1.85	4.54	41.45	6.13	3.90	-	2.06
Vietnam	1.25	0.30	3.49	4.04	2.70	1.44	4.82	-
ASEAN above	5.97	3.08	17.43	48.34	13.34	9.46	21.46	8.13
Average	15.90							
ASEAN above in 2000	1.42	0.92	8.00	32.24	6.59	7.61	10.53	12.69
Average	10.00							
Japan	20.89	9.02	9.96	7.03	5.75	13.49	10.23	7.93
China	7.48	6.73	10.11	8.45	13.38	11.39	10.16	14.01
Korea	6.35	1.67	3.77	0.87	2.95	3.22	1.72	7.99
India	1.75	0.13	3.13	0.12	2.07	0.66	3.23	2.35
Asia above	42.44	20.63	44.40	64.81	37.49	38.22	46.79	40.41
Average	41.90							
Asia above in 2000	6.61	6.27	26.99	33.34	23.43	25.41	29.86	38.42
Average	23.79							
US	7.33	22.89	15.65	7.79	12.27	16.88	12.67	21.96
Canada	1.18	6.85	0.80	3.33	0.44	0.75	0.51	1.30
UK	6.39	7.17	1.56	1.47	1.15	0.61	1.59	2.66
Euro	27.74	29.41	9.79	11.75	9.47	11.75	8.11	14.77
West above	42.63	66.33	27.80	24.34	23.32	29.99	22.89	40.70
Average	34.75							
West above in 2000	84.24	81.50	38.17	60.65	40.05	50.11	40.52	38.97
Average	54.28							
Total above	85.07	86.96	72.20	89.15	60.81	68.21	69.68	81.11

Source: UNCTAD STAT

Table 1-2 List of Variables for Estimation

Variables	Description	Exp. Sign	Source
Dependent Variable			
EXt	Manufacturing exports from emerging ASEAN countries to partners [USD, log term]		UNCTAD
Explanatory Variables			
YEt	Gross domestic product (GDP) of an exporter [USD, log term]	+	WEO
YMt	Gross domestic product (GDP) of an importer [USD, log term]	+	WEO
YPCeT	GDP per capita of an exporter [USD, log term]	+	WEO
YPCMt	GDP per capita of an importer [USD, log term]	+	WEO
DIS	Distance between capital cities of an exporter and an importer [km, log term]	-	Fromto
REXt	Bilateral real exchange rate of an exporter against an importer [1998=1, log term]	-	WEO
NRRt	Natural resources rent [% of GDP]	-	WDI
GEFt	Government effectiveness index [from -2.5 (weak) to 2.5 (strong)]	+	WGI
DS_WEST	Sanction dummy for Myanmar against western countries for 2004-2012	-	
DS_ASIA	Sanction dummy for Myanmar against Asian countries for 2004-2012	+/-	
DPS13_WEST	Post-sanction dummy for Myanmar against western countries for 2013-2018	+/-	
DPS16_WEST	Post-sanction dummy for Myanmar against western countries for 2016-2018	+/-	
DPS13_ASIA	Post-sanction dummy for Myanmar against Asian countries for 2013-2018	+/-	
DPS16_ASIA	Post-sanction dummy for Myanmar against Asian countries for 2016-2018	+/-	
Dt	Time dummy		

Note: The data sources are shown as follows:

UNCTAD: UNCTAD Stat, UNCTAD, <https://unctadstat.unctad.org/EN/>

WEO: World Economic Outlook Databases, International Monetary Fund,

<https://www.imf.org/en/Data>

Fromto: Great Circle Distance Between Cities on Map, <https://www.distancefromto.net/>

WDI: World Development Indicators, World Bank, <https://data.worldbank.org/>

WGI: Worldwide Governance Indicators, World Bank, <http://info.worldbank.org/governance/wgi/>

Source: Author's description

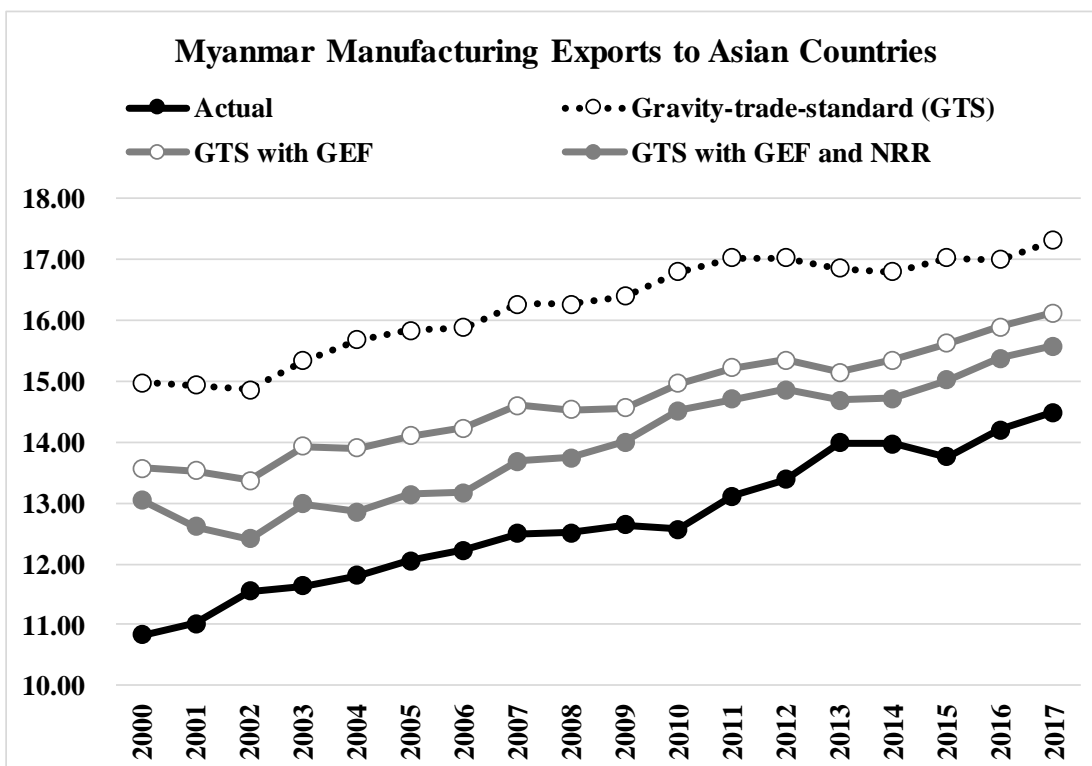
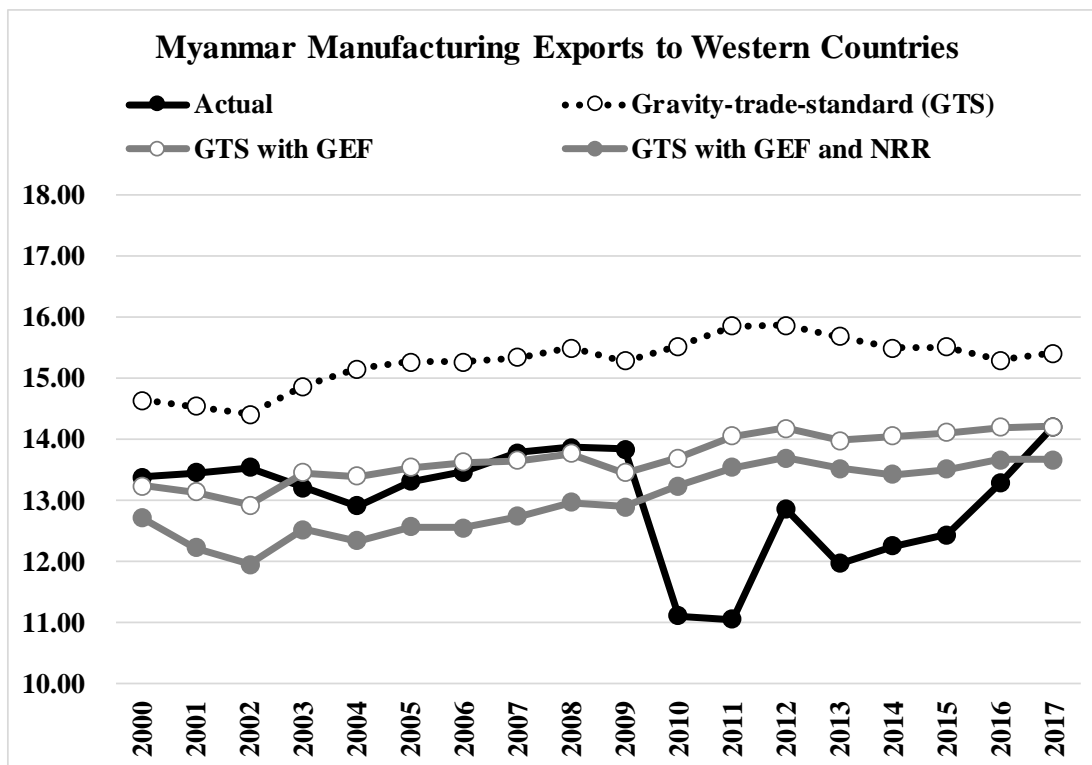
Table 1-3 Estimation Outcomes of Gravity Trade Model

	In-sample Estimation				Out-of-sample Estimation	
	(1)	(2)	(3)	(4)	(5)	(6)
Const.	3.577 *** (0.431)	4.125 *** (0.423)	4.674 *** (0.417)	6.444 *** (0.429)	6.197 *** (0.398)	7.625 *** (0.409)
ln(YE*YM)	1.083 *** (0.023)	1.080 *** (0.022)	1.077 *** (0.021)	0.963 *** (0.022)	1.132 *** (0.021)	1.004 *** (0.022)
ln(YPCE*YPCM)	0.712 *** (0.034)	0.651 *** (0.033)	0.618 *** (0.032)	0.429 *** (0.033)	0.462 *** (0.031)	0.325 *** (0.032)
ln(DIS)	-1.930 *** (0.062)	-1.865 *** (0.061)	-1.836 *** (0.060)	-1.453 *** (0.062)	-1.769 *** (0.058)	-1.433 *** (0.060)
ln(REX)	-0.184 (0.123)	-0.059 (0.119)	0.191 (0.118)	0.783 *** (0.118)	-0.255 ** (0.116)	0.514 *** (0.122)
NRR				-0.074 *** (0.009)		-0.076 *** (0.009)
GEF				1.149 *** (0.068)		1.132 *** (0.067)
DS_WEST		-3.003 *** (0.434)	-3.036 *** (0.423)	-1.351 *** (0.407)		
DS_ASIA		-2.271 *** (0.211)	-2.343 *** (0.208)	-0.853 *** (0.218)		
DPS13_WEST (a)			-3.265 *** (0.570)	-1.861 *** (0.529)		
DPS16_WEST (b)			2.168 *** (0.765)	1.616 ** (0.764)		
DPS13_ASIA (c)			-3.202 *** (0.353)	-1.847 *** (0.343)		
DPS16_ASIA (d)			1.337 *** (0.476)	0.992 ** (0.505)		
DPS_WEST (a) + (b)			-1.097	-0.245		
DPS_ASIA (c) + (d)			-1.865	-0.855		
Number of observations	2,520	2,520	2,520	2,370	2,184	2,080

Note: Standard errors are in parentheses. ***, and ** denote statistical significance at 99 and 95 percent level, respectively.

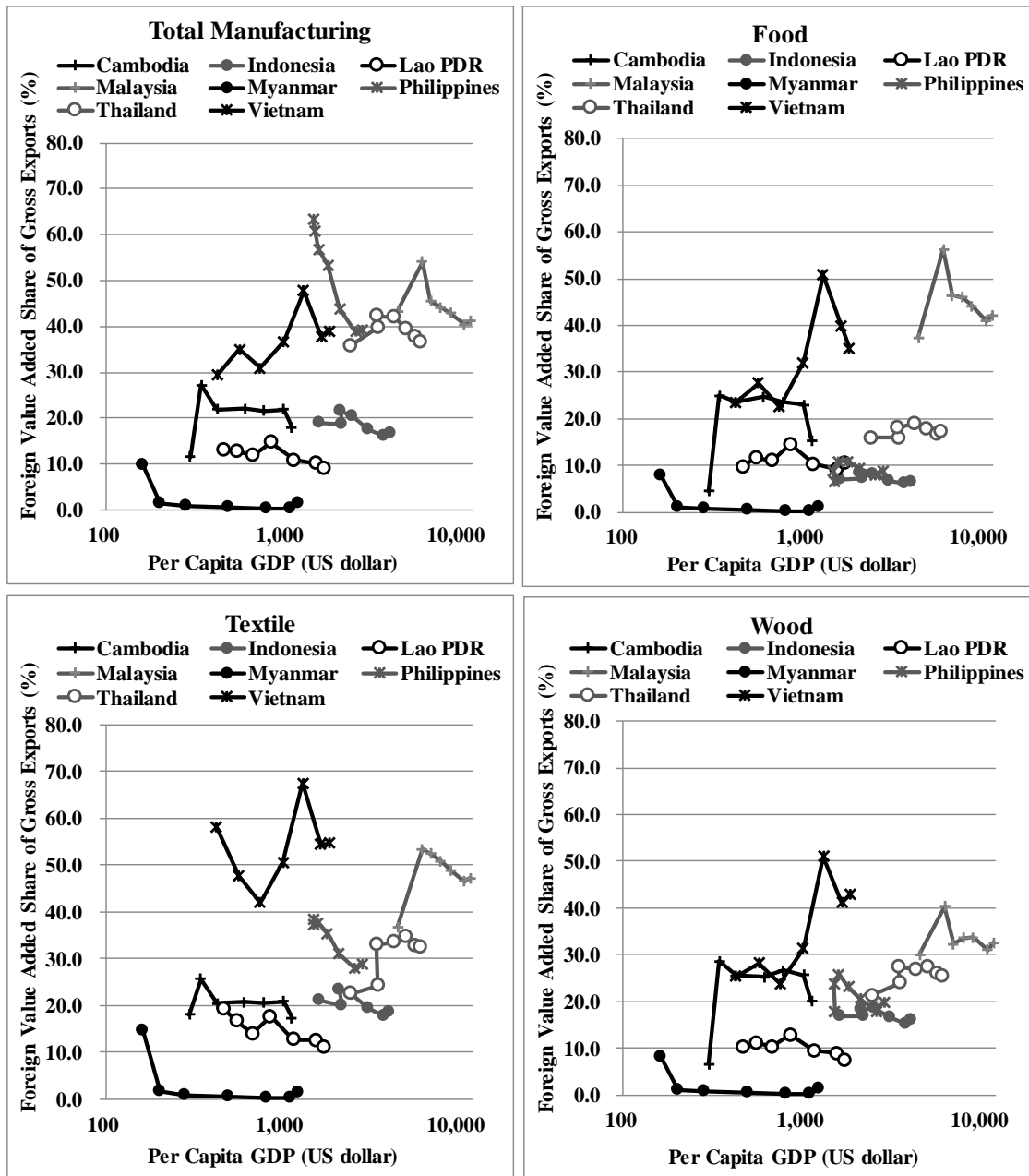
Source: Author's estimation

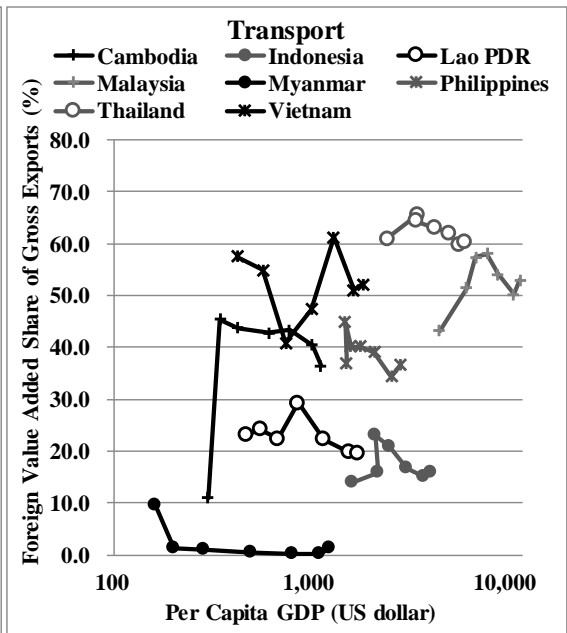
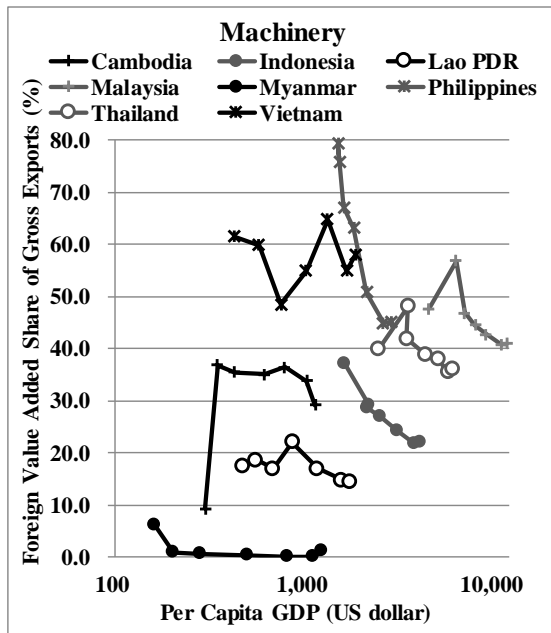
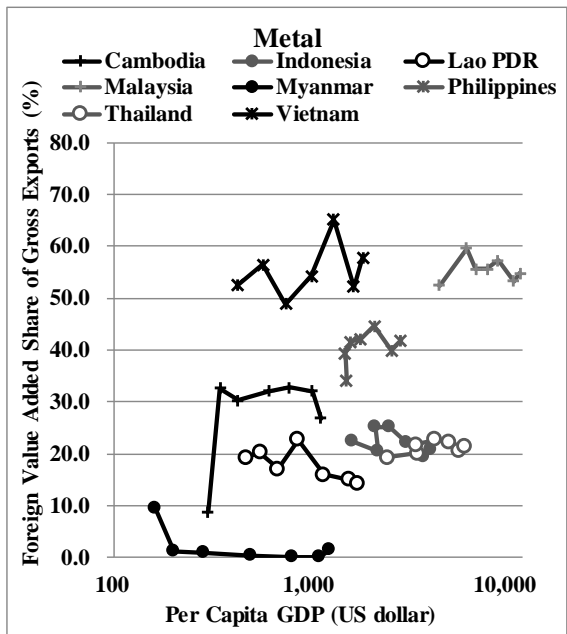
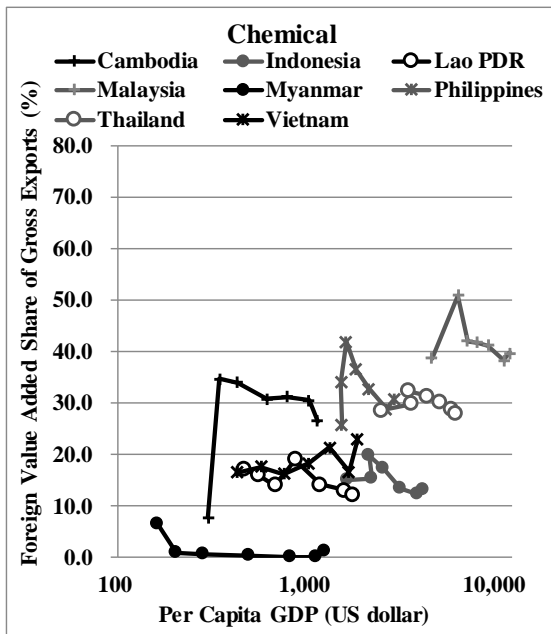
Figure 1-3 Trends in Myanmar Manufacturing Exports: Counterfactual and Actual



Source: Author's estimation

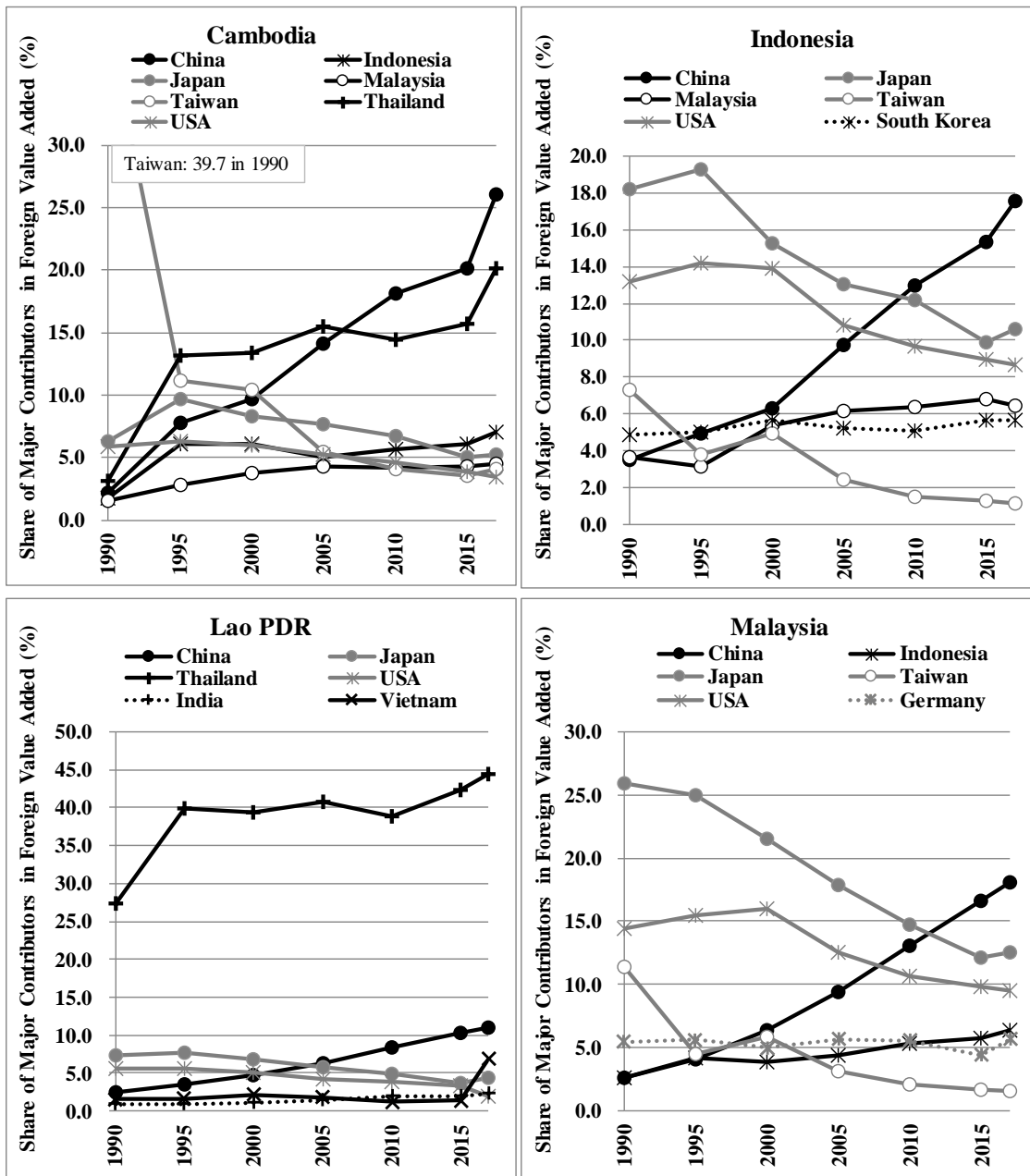
Figure 2-1 GVC Backward Participation of Emerging ASEAN by Manufacturing Industries for 1990-2017

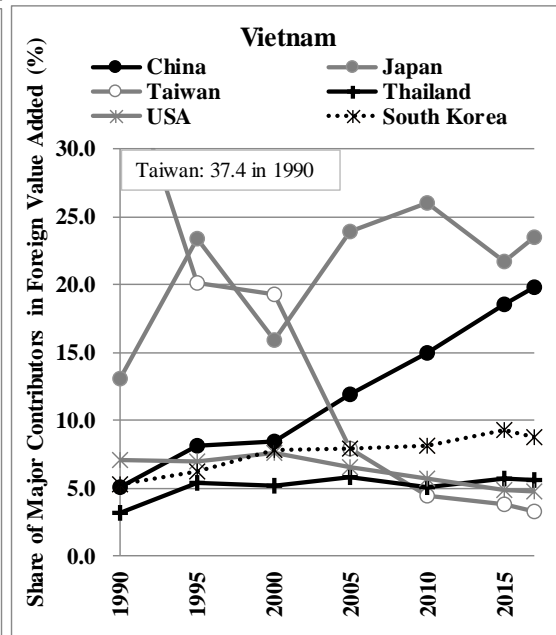
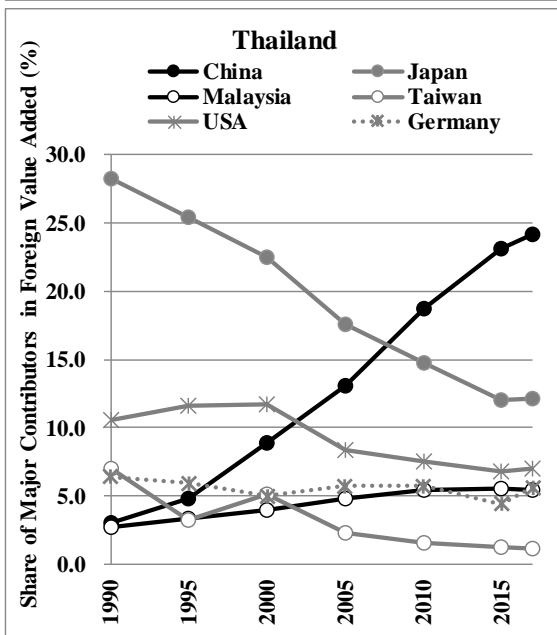
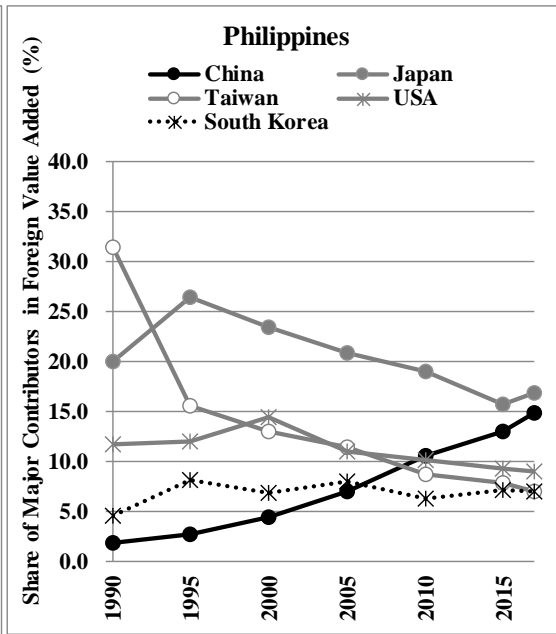
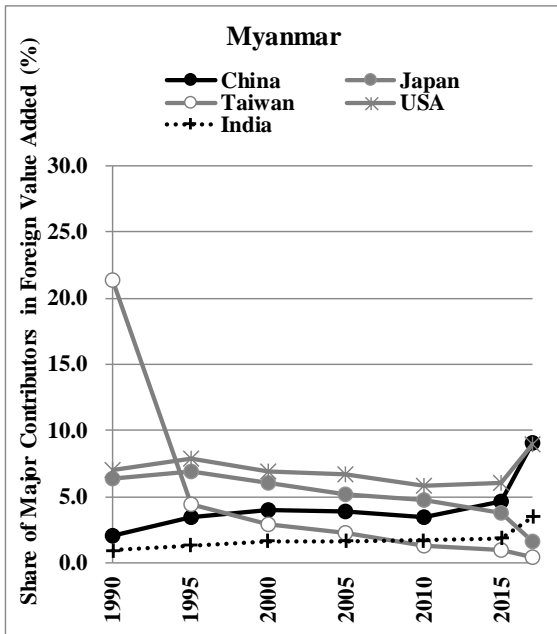




Note: The figure is plotted by seven points of years: 1990, 1995, 2000, 2005, 2010, 2015 and 2017.
Sources: UNCTAD-Eora Global Value Chain Database and UNCTAD Stat

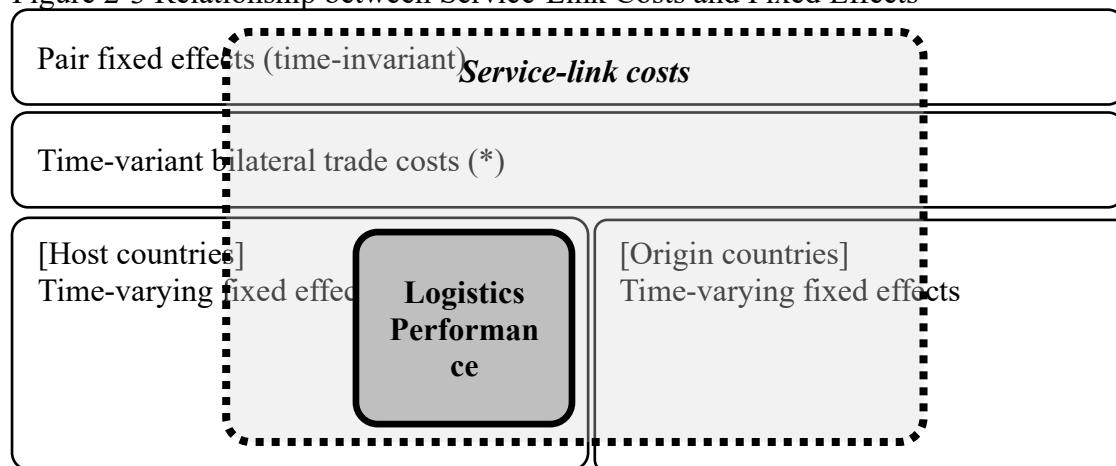
Figure 2-2 Foreign Value Added of Emerging ASEAN by Country Origins for 1990-2017





Sources: UNCTAD-Eora Global Value Chain Database

Figure 2-3 Relationship between Service-Link Costs and Fixed Effects



*: They are not incorporated in the estimation.

Source: Author's description

Table 2-1 Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max
Dependent Variable					
FVA, Total Manufacturing (thousand USD)	672	1,271,464	2,564,148	2	16,972,006
FVA, Machinery (thousand USD)	672	762,188	1,704,375	1	11,252,061
Explanatory Variables					
DIS (km)	672	3,739	3,623	481	16,357
GDP (billion USD) in host countries	672	248	265	5	1,015
GDP (billion USD) in origin countries	672	2,848	4,684	5	19,519
GAP (ratio of GDP per capita: host countries / origin countries)	672	1.190	2.023	0.008	20.614
LPI (from 1 to 5)	672	2.872	0.421	1.862	3.590

Source: Author's count and calculation

Table 2-2 Estimation Outcomes on Total Manufacturing

		Traditional M.	Structural M.	Structural M.	Structural M.
		OLS	OLS	PPML	PPML
		(i)	(ii)	(iii)	(iv)
		Equation (1)	Equation (2)	Equation (2)	Equation (3)
Const. [$\alpha_0, \beta_0, \gamma_0$]		5.174 *** (1.121)	13.102 *** (0.702)	2.527 *** (0.036)	0.975 *** (0.178)
ln DIS [α_1]		-1.447 *** (0.188)			
ln (GDPi) [α_2]		1.786 *** (0.188)			
ln (GDPj) [α_3]		1.353 *** (0.076)			
ln GAP [$\alpha_4, \beta_1, \gamma_2$]		0.301 *** (0.087)	0.211 (0.886)	0.049 (0.048)	0.042 (0.033)
LPI [γ_1]					0.512 *** (0.054)
Dummy: Myanmar	2007		-9.388 ***	-1.413 ***	
	2010		-9.605 ***	-1.510 ***	
	2012		-9.570 ***	-1.485 ***	
	2014		-9.405 ***	-1.403 ***	
	2016		-7.737 ***	-0.964 ***	
	2017		-7.717 ***	-0.971 ***	
Dummy: Lao PDR	2007		-6.313 ***	-0.578 ***	
	2010		-6.128 ***	-0.569 ***	
	2012		-6.052 ***	-0.536 ***	
	2014		-6.045 ***	-0.559 ***	
	2016		-5.932 ***	-0.547 ***	
	2017		-5.861 ***	-0.531 ***	
Dummy: Cambodia	2007		-4.501 ***	-0.269 ***	
	2010		-4.416 ***	-0.255 ***	
	2012		-4.371 ***	-0.234 ***	
	2014		-4.286 ***	-0.242 ***	
	2016		-4.543 ***	-0.280 ***	
	2017		-4.668 ***	-0.283 ***	
Dummy: Philippines	2007		0.366	0.090 *	
	2010		0.519	0.112 **	
	2012		0.531	0.124 **	
	2014		0.563	0.127 ***	
	2016		0.536	0.115 **	
	2017		0.562	0.122 **	
Dummy: Vietnam	2007		0.177	0.092	
	2010		0.310	0.094	
	2012		0.289	0.112	
	2014		0.304	0.108	
	2016		0.703	0.138 **	
	2017		0.718	0.138 *	
Dummy: Thailand	2007		1.262 ***	0.136 ***	
	2010		1.426 ***	0.132 ***	
	2012		1.505 ***	0.149 ***	
	2014		1.542 ***	0.150 ***	
	2016		1.431 ***	0.136 ***	
	2017		1.441 ***	0.144 ***	
Dummy: Malaysia	2007		2.108 ***	0.161 ***	
	2010		2.316 ***	0.168 ***	
	2012		2.348 ***	0.185 ***	
	2014		2.362 ***	0.178 ***	
	2016		2.393 ***	0.190 ***	
	2017		2.416 ***	0.195 ***	
Adjusted R ²		0.625	0.984	0.985	0.877
i,t Fixed Effects		No	Yes	Yes	No
j,t Fixed Effects		No	Yes	Yes	Yes
i,j Fixed Effects		No	Yes	Yes	Yes
RESET p-val		0.002	0.000	0.460	0.000

Note: Standard errors are in parentheses. *, ** and *** denote the statistical significance at 90, 95 and 99 percent level, respectively.

Source: Author's estimation

Table 2-3 Estimation Outcomes on Machinery Industry

		Traditional M.	Structural M.	Structural M.	Structural M.
		OLS	OLS	PPML	PPML
		(i)	(ii)	(iii)	(iv)
		Equation (1)	Equation (2)	Equation (2)	Equation (3)
Const. [$\alpha_0, \beta_0, \gamma_0$]		-0.689 (1.290)	11.941 *** (0.778)	2.465 *** (0.037)	0.074 (0.284)
ln DIS [α_1]		-1.263 *** (0.217)			
ln (GDPi) [α_2]		2.299 *** (0.087)			
ln (GDPj) [α_3]		1.411 *** (0.088)			
ln GAP [$\alpha_4, \beta_1, \gamma_2$]		0.413 *** (0.100)	0.156 (0.981)	0.025 (0.049)	0.071 (0.054)
LPI [γ_1]					0.761 *** (0.088)
Dummy: Myanmar	2007		-10.718 ***	-3.747 ***	
	2010		-10.874 ***	-3.938 ***	
	2012		-10.870 ***	-3.613 ***	
	2014		-10.927 ***	-3.761 ***	
	2016		-9.500 ***	-2.369 ***	
	2017		-9.493 ***	-2.366 ***	
Dummy: Lao PDR	2007		-8.190 ***	-1.135 ***	
	2010		-7.932 ***	-1.048 ***	
	2012		-7.865 ***	-1.026 ***	
	2014		-7.832 ***	-1.011 ***	
	2016		-7.684 ***	-0.980 ***	
	2017		-7.555 ***	-0.962 ***	
Dummy: Cambodia	2007		-7.440 ***	-0.769 ***	
	2010		-7.210 ***	-0.723 ***	
	2012		-7.137 ***	-0.718 ***	
	2014		-6.990 ***	-0.691 ***	
	2016		-7.287 ***	-0.728 ***	
	2017		-7.428 ***	-0.739 ***	
Dummy: Philippines	2007		1.297	0.155 ***	
	2010		1.434	0.170 ***	
	2012		1.430	0.163 ***	
	2014		1.494	0.172 ***	
	2016		1.496	0.168 ***	
	2017		1.507	0.171 ***	
Dummy: Vietnam	2007		-1.577	-0.109	
	2010		-1.441	-0.099	
	2012		-1.421	-0.100	
	2014		-1.329	-0.092	
	2016		-0.757	-0.017	
	2017		-0.736	-0.019	
Dummy: Thailand	2007		1.781 ***	0.136 ***	
	2010		1.932 ***	0.150 ***	
	2012		1.992 ***	0.162 ***	
	2014		2.052 ***	0.161 ***	
	2016		2.001 ***	0.162 ***	
	2017		1.996 ***	0.161 ***	
Dummy: Malaysia	2007		2.377 ***	0.181 ***	
	2010		2.552 ***	0.212 ***	
	2012		2.566 ***	0.208 ***	
	2014		2.620 ***	0.213 ***	
	2016		2.682 ***	0.218 ***	
	2017		2.686 ***	0.217 ***	
Adjusted R ²		0.661	0.986	0.866	0.866
i,t Fixed Effects		No	Yes	Yes	No
j,t Fixed Effects		No	Yes	Yes	Yes
i,j Fixed Effects		No	Yes	Yes	Yes
RESET p-val		0.000	0.000	0.160	0.000

Note: Standard errors are in parentheses. *** denotes the statistical significance at 99 percent level.

Source: Author's estimation

Table 2-4 Host country's Fixed Effect and Logistics Performance in 2017 on Total Manufacturing

2017	Host Country's Fixed Effects	LPI	LPI (b) - Indonesia LPI	(c) × 0.512 *** [coefficient]	(d) / (a)
	(a)	(b)	(c)	(d)	(e)
Myanmar	-0.971 ***	2.298	-0.852	-0.436	0.449
Lao PDR	-0.531 ***	2.253	-0.897	-0.459	0.864
Cambodia	-0.283 ***	2.579	-0.571	-0.293	1.032
Indonesia	0	3.150	-	-	-
Philippines	0.122 **	2.904	-0.246	-	-
Vietnam	0.138 *	3.274	0.124	0.063	0.457
Thailand	0.144 ***	3.411	0.261	0.134	0.928
Malaysia	0.195 ***	3.221	0.071	0.036	0.186

Note: Standard errors are in parentheses. *, ** and *** denote the statistical significance at 90, 95 and 99 percent level, respectively.

Source: Author's estimation

Table 2-5 Host Country's Fixed Effect and Logistics Performance in 2017 on Machinery Industry

2017	Host Country's Fixed Effects	LPI	LPI (b) - Indonesia LPI	(c) × 0.761 *** [coefficient]	(d) / (a)
	(a)	(b)	(c)	(d)	(e)
Myanmar	-2.366 ***	2.298	-0.852	-0.649	0.274
Lao PDR	-0.962 ***	2.253	-0.897	-0.683	0.709
Cambodia	-0.739 ***	2.579	-0.571	-0.435	0.588
Indonesia	0	3.150	-	-	-
Philippines	0.171 ***	2.904	-0.246	-	-
Vietnam	-0.019	3.274	0.124	-	-
Thailand	0.161 ***	3.411	0.261	0.199	1.230
Malaysia	0.217 ***	3.221	0.071	0.054	0.247

Note: Standard errors are in parentheses. *** denotes the statistical significance at 99 percent level.

Source: Author's estimation

Table 3-1 Ranking of Logistics Performance Index

	2007	2010	2012	2014	2016	2018
Overall LPI						
Myanmar	147	133	129	145	113	137
Cambodia	81	129	101	83	73	98
Laos	117	118	109	131	152	82
Vietnam	53	53	53	48	64	39
Thailand	31	35	38	35	45	32
Customs						
Myanmar	124	146	122	150	96	131
Cambodia	104	95	108	71	77	109
Laos	120	113	93	100	155	74
Vietnam	37	53	63	61	64	41
Thailand	32	39	42	36	46	36
Infrastructure						
Myanmar	145	134	133	137	105	143
Cambodia	81	114	128	79	99	130
Laos	120	132	106	128	155	91
Vietnam	60	66	72	44	70	47
Thailand	31	36	44	30	46	41
International Shipment						
Myanmar	146	131	116	151	144	144
Cambodia	95	146	101	78	52	71
Laos	103	97	123	120	148	85
Vietnam	47	58	39	42	50	49
Thailand	32	30	35	39	38	25
Logistics Quality and Competence						
Myanmar	135	148	110	156	119	128
Cambodia	82	118	103	89	89	111
Laos	106	137	104	129	144	83
Vietnam	56	51	82	49	62	33
Thailand	29	39	49	38	49	32
Tracking and Tracing						
Myanmar	149	129	129	130	94	143
Cambodia	81	111	78	71	81	111
Laos	139	113	111	146	156	69
Vietnam	53	55	47	48	75	34
Thailand	36	37	45	33	50	33
Timeliness						
Myanmar	147	82	140	117	112	108
Cambodia	74	132	104	129	73	84
Laos	102	89	118	137	133	117
Vietnam	65	76	38	56	56	40
Thailand	28	48	39	29	52	28

Source: Logistics Performance Index by the World Bank

Table 3-2 Time to Complete for Clearance and Inspections Required by Customs

	Myanmar	Cambodia	Lao	Vietnam	Thailand
Customs: Clearance and Inspections Required by Customs Authorities					
Export					
Time to Complete (hours)	11	28	8	5	12
Associated Costs (USD)	195	275	130	60	90
Import					
Time to Complete (hours)	110	4	4	16	28
Associated Costs (USD)	285	240	90	85	106
Trade Documents: Documentary Compliance (hours)					
Time to export	144	132	60	50	11
Time to import	48	8	60	76	4
Total: Border compliance (hours)					
Time to export	142	48	9	55	44
Time to import	230	8	11	56	50

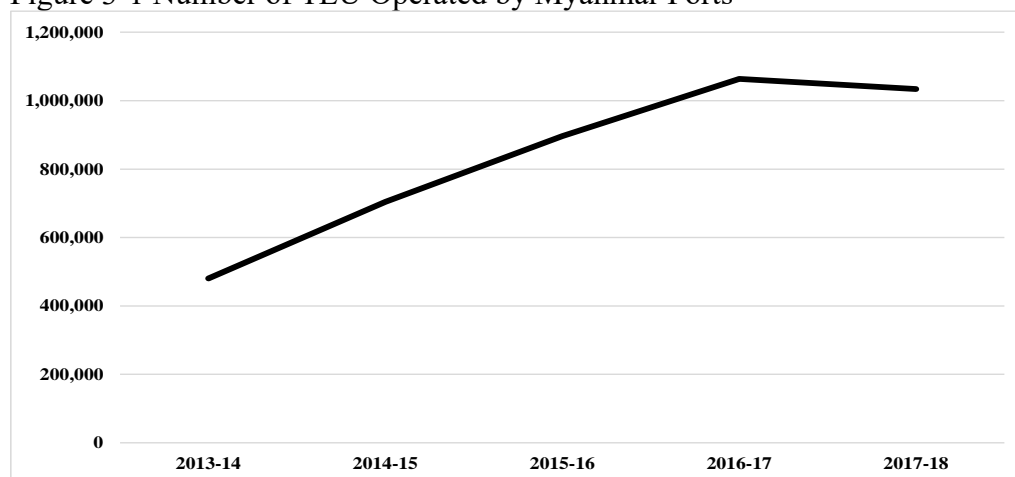
Source: Ease of Doing Business Database by the World Bank

Table 3-3 Export and Import by Nodes of Transport in Myanmar

Fiscal Year	Export					Import			
	Sea	Air	Land	Pipeline	Total	Sea	Air	Land	Total
2010-2011	37%	22%	13%	28%	100%	80%	4%	16%	100%
2014-2015	32%	4%	23%	41%	100%	82%	3%	15%	100%
2015-2016	31%	6%	24%	39%	100%	82%	2%	16%	100%
2016-2017	40%	5%	31%	25%	100%	79%	4%	17%	100%
2017-2018	44%	5%	27%	24%	100%	78%	6%	16%	100%

Source: Central Statistical Organization of Myanmar (CSO)

Figure 3-1 Number of TEU Operated by Myanmar Ports



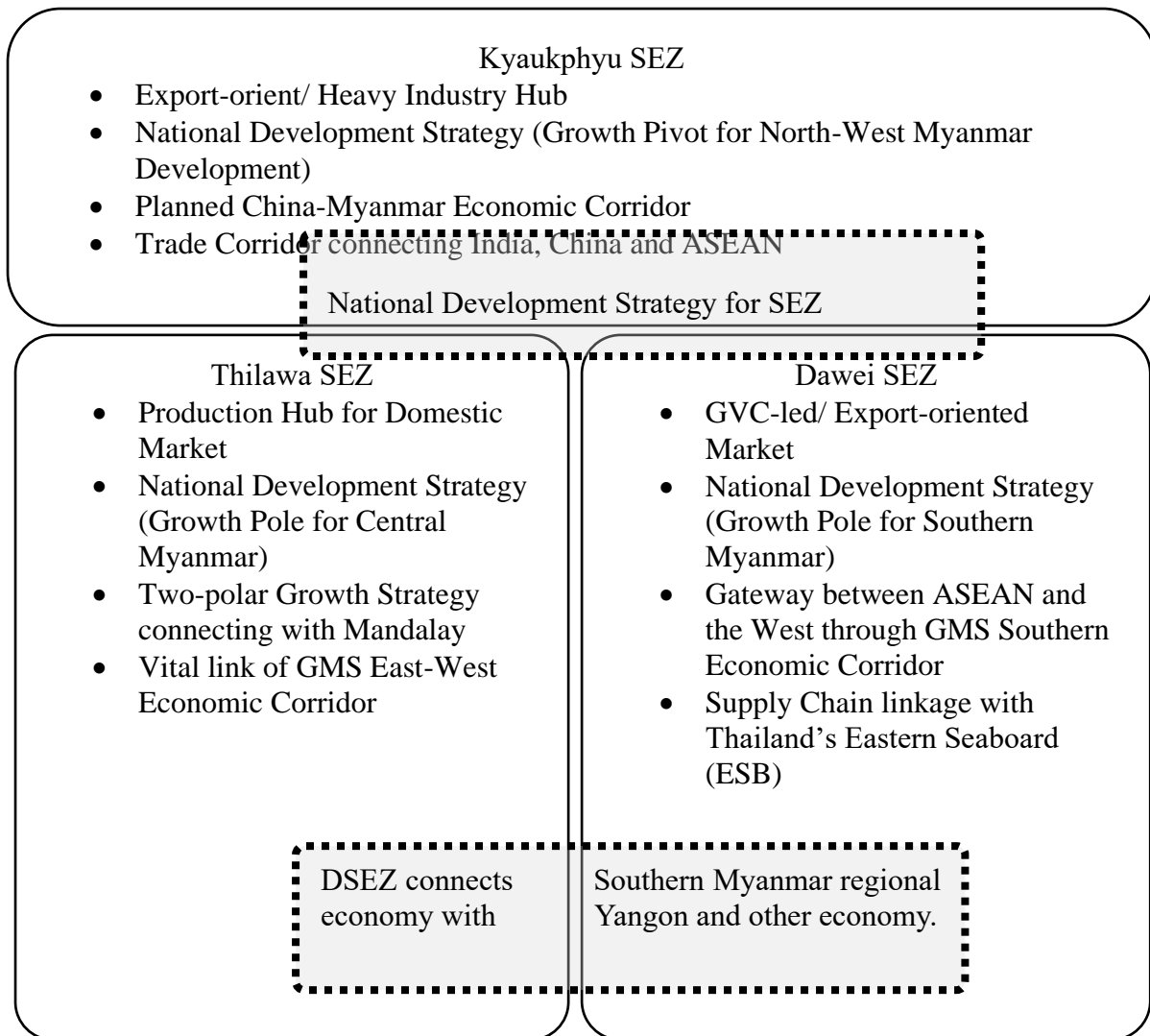
Source: Myanmar Port Authority (MPA)

Table 3-4 General Information of SEZs in Myanmar

	Thilawa SEZ	Dawei SEZ	Kyaukphyu SEZ
Location	<ul style="list-style-type: none"> • Outskirt of Yangon • Thilawa Port • Planned road link to Thailand • Southern Myanmar 	<ul style="list-style-type: none"> • Near Dawei City • Coastal Port • Road link to Thailand • Southern Myanmar 	<ul style="list-style-type: none"> • No large town nearby • Container Port • Pipeline link to China • Central Western Coast of Myanmar
Developers	<ul style="list-style-type: none"> • Myanmar Japan Development Ltd 	<ul style="list-style-type: none"> • Italian-Thai-Development (ITD) 	<ul style="list-style-type: none"> • Consortium led by CITIC, China
Key Industries	<ul style="list-style-type: none"> • Cluster <p><u>Current</u></p> <ul style="list-style-type: none"> • Medium & Light Industries <ul style="list-style-type: none"> • auto-parts, electrical products, household goods, garment, construction materials, etc. • logistic companies <p><u>Prospect</u></p> <ul style="list-style-type: none"> • Technology-intensive and Knowledge-based Industries 	<ul style="list-style-type: none"> • Enclave <p><u>Current</u></p> <ul style="list-style-type: none"> • Traditional Industries <ul style="list-style-type: none"> • agriculture (rubber, palm oil, nut • aquaculture (fishery, pearls) • edible bird's nest • mining <p><u>Prospect</u></p> <ul style="list-style-type: none"> • Heavy Industries <ul style="list-style-type: none"> • international production & Distribution base for automotive industry • Logistics 	<ul style="list-style-type: none"> • Enclave <p><u>Current</u></p> <ul style="list-style-type: none"> • Traditional Industries <ul style="list-style-type: none"> • agriculture (paddy) • aquaculture (fishery) • offshore gas <p><u>Prospect</u></p> <ul style="list-style-type: none"> • Petrochemical Hub

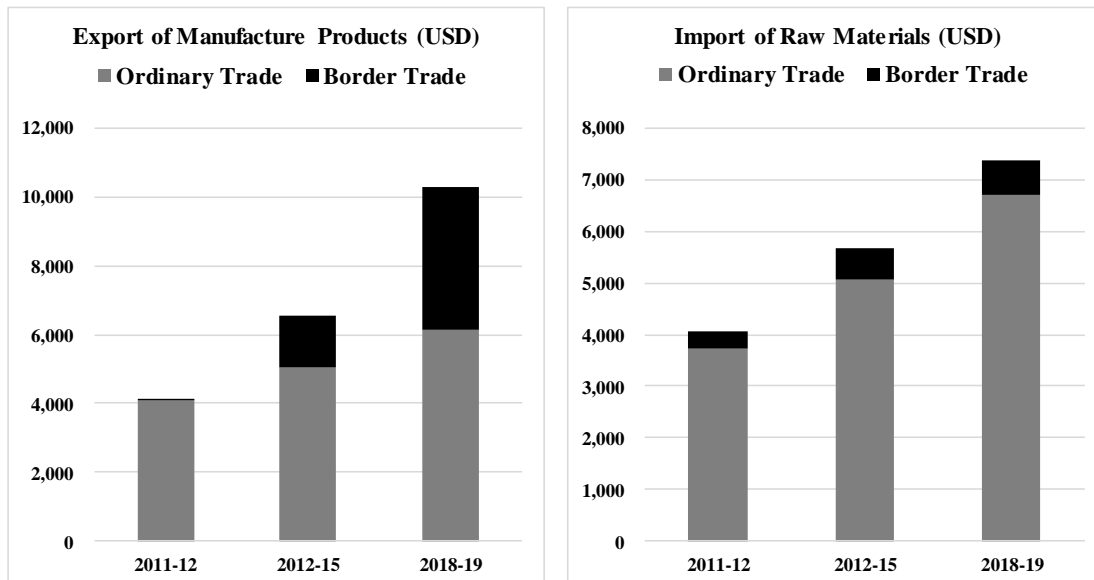
Source: Author's Description based on DICA

Figure 3-2 Economic Linkages of SEZs in Myanmar



Source: Author's Description

Figure 3-3 Composition of Ordinary Trade and Border Trade



Source: Customs of Myanmar

Table 4-1 Classification of Regions and States by FDI in Myanmar

<i>Regions & States</i>	<i>FDI values average for 2012-2017 million kyat</i>	<i>Number of Industrial Zones</i>	<i>FDI intensity</i>
Yangon Region	3,704,365	34	<i>High-Intensive</i>
Mandalay Region	632,260	7	
Mon State	282,911	4	<i>Middle-Intensive</i>
Bago Region	269,552	4	
Sagaing Region	84,980	4	
Shan State	64,130	4	
Kachin State	54,853	4	
Magway Region	108,585	2	<i>Low-Intensive</i>
Naypyitaw	9,600	0	
Kayin State	8,305	3	
Kayah State	328	1	
Chin State	0	0	
Tanintharyi Region	830,224	3	<i>Oil & Gas</i>
Rakhine State	493,688	4	
Ayeyarwaddy Region	63,296	7	

Source: Directorate of Investment and Company Administration (DICA) in Myanmar

Table 4-2 Unit Root Test

	Unit Root Test (Levin, Lin & Chu Test)	
	Intercept	Intercept & Trend
[FDI & GRP: regioanl panel]		
FDI	-6.231 ***	-15.232 ***
GRP	12.827	-2.978 ***
[FDI & DIV: sectral panel]		
FDI	-4.131 ***	-6.342 ***
DIV	-12.984 ***	-15.312 ***

Note: ***, **, * denote the rejection of null hypothesis at the 99%, 95% and 90% level of significance.
Source: Author's estimation

Table 4-3 Regional Analysis on Relationship between FDI and GRP

Table 4-3-1 Estimated PVAR Model

[FDI High-Intensive Region]		
FDI & GRP	FDI	GRP
FDI(-1)	0.435 [1.687]	0.157*** [4.237]
GRP(-1)	0.166** [2.578]	1.113*** [120.035]
adj. R ²	0.769	0.999
[FDI Middle-Intensive Region]		
FDI & GRP	FDI	GRP
FDI(-1)	0.278 [1.062]	-0.04 [-0.315]
GRP(-1)	0.024** [2.072]	1.123*** [203.904]
adj. R ²	-0.229	0.999
[FDI Low-Intensive Region]		
	FDI	GRP
FDI(-1)	-0.744*** [-4.642]	-0.666** [-2.667]
GRP(-1)	0.036*** [7.060]	1.100*** [137.786]
adj. R ²	0.632	0.999

Note: ***, ** denote the rejection of null hypothesis at the 99% and 95% level of significance. The t-statistic is in parentheses [].

Sources: Author's estimation

Table 4-3-2 Granger Causality Test

[FDI High-Intensive Region]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause GRP	1	17.952***
GRP does not Granger Cause FDI	1	6.646***
[FDI Middle-Intensive Region]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause GRP	1	0.099
GRP does not Granger Cause FDI	1	4.291**
[FDI Low-Intensive Region]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause GRP	1	7.110***(negative)
GRP does not Granger Cause FDI	1	49.848***

Note: ***, ** denote the rejection of null hypothesis at the 99% and 95% level of significance.

Sources: Author's estimation

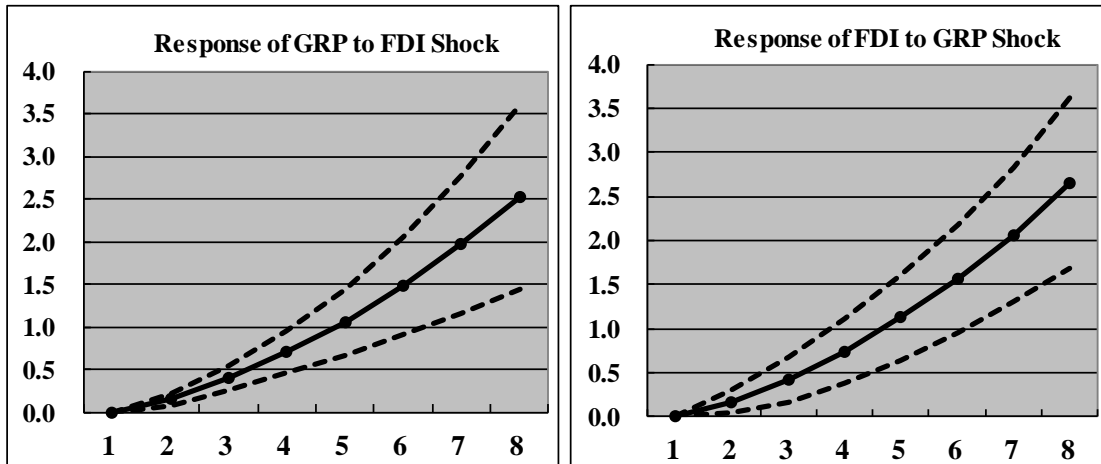
Table 4-3-3 Variance Decomposition

[FDI High-Intensive Region]				
	Variance Decomposition of GRP		Variance Decomposition of FDI	
	FDI	GRP	FDI	GRP
1st Quarter	44.789	55.211	100.000	0.000
2nd Quarter	31.495	68.505	99.973	0.027
3rd Quarter	37.640	62.360	99.912	0.088
4th Quarter	44.171	55.829	99.816	0.184
5th Quarter	48.478	51.522	99.682	0.318
6th Quarter	51.209	48.791	99.504	0.496
7th Quarter	52.981	47.019	99.269	0.731
8th Quarter	54.168	45.832	98.962	1.038
[FDI Middle-Intensive Region]				
	Variance Decomposition of GRP		Variance Decomposition of FDI	
	FDI	GRP	FDI	GRP
1st Quarter	1.106	98.894	100.000	0.000
2nd Quarter	2.245	97.755	99.988	0.012
3rd Quarter	2.883	97.117	99.965	0.035
4th Quarter	3.249	96.751	99.932	0.068
5th Quarter	3.473	96.527	99.891	0.109
6th Quarter	3.619	96.381	99.838	0.162
7th Quarter	3.718	96.282	99.772	0.228
8th Quarter	3.788	96.212	99.688	0.312
[FDI Low-Intensive Region]				
	Variance Decomposition of GRP		Variance Decomposition of FDI	
	FDI	GRP	FDI	GRP
1st Quarter	29.351	70.649	100.000	0.000
2nd Quarter	46.203	53.797	99.860	0.140
3rd Quarter	43.565	56.435	99.865	0.135
4th Quarter	45.892	54.108	99.785	0.215
5th Quarter	45.098	54.902	99.753	0.247
6th Quarter	45.827	54.173	99.668	0.332
7th Quarter	45.553	54.447	99.601	0.399
8th Quarter	45.836	54.164	99.496	0.504

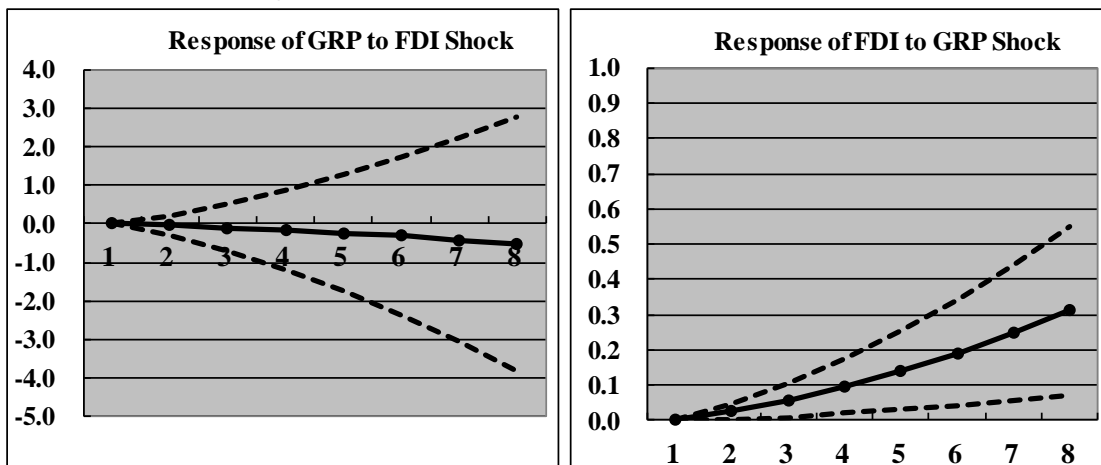
Sources: Author's estimation

Figure 4-1 Accumulated Impulse Responses in Regional Analysis

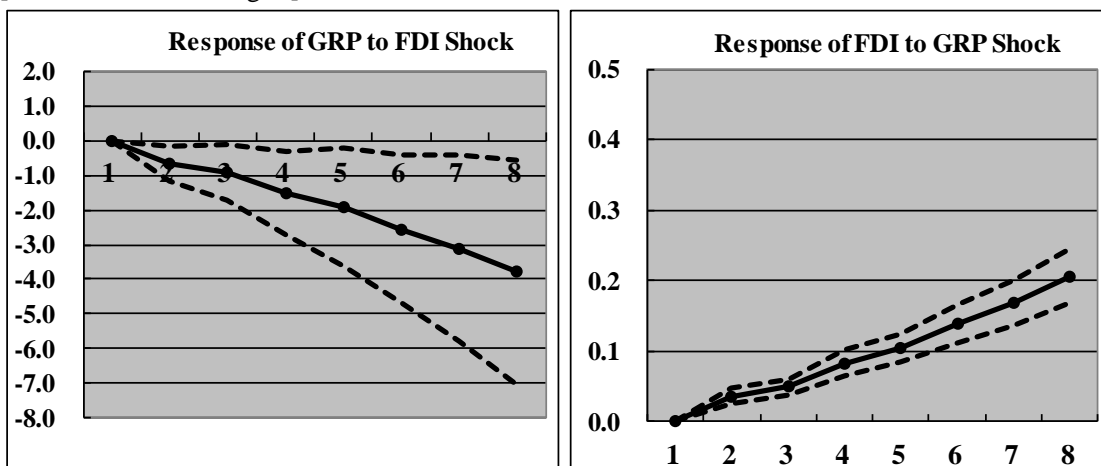
[FDI High-Intensive Region]



[FDI Middle-Intensive Region]



[FDI Low-Intensive Region]



Note: 1) The shock is defined as one unit innovation.

2) The dotted lines denote a 95 percent error band over 8-year horizons.

Sources: Author's estimation

Table 4-4 Sectoral Analysis on Relationship between FDI and DIV

Table 4-4-1 Estimated PVAR Model

[Total]		
FDI & DIV	FDI	DIV
FDI ₋₁	0.421 *** [3.653]	0.050 [1.155]
DIV ₋₁	0.414 [1.249]	0.233 * [1.858]
adj. R ²	0.204	0.063
[Excluding Oil & Gas]		
FDI & DIV	FDI	DIV
FDI ₋₁	0.547 *** [4.723]	0.157 ** [2.414]
DIV ₋₁	0.385 [1.567]	0.086 [0.621]
adj. R ²	0.390	0.114

Note: ***, **, * denote the rejection of null hypothesis at the 99%, 95% and 90% level of significance. The t-statistic is in parentheses [].

Sources: Author's estimation

Table 4-4-2 Granger Causality Test

[Total]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause DIV	1	1.334
DIV does not Granger Cause FDI	1	1.569
[Excluding Oil & Gas]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause DIV	1	5.832 **
DIV does not Granger Cause FDI	1	2.456

Note: ** denotes the rejection of null hypothesis at the 95% level of significance.

Sources: Author's estimation

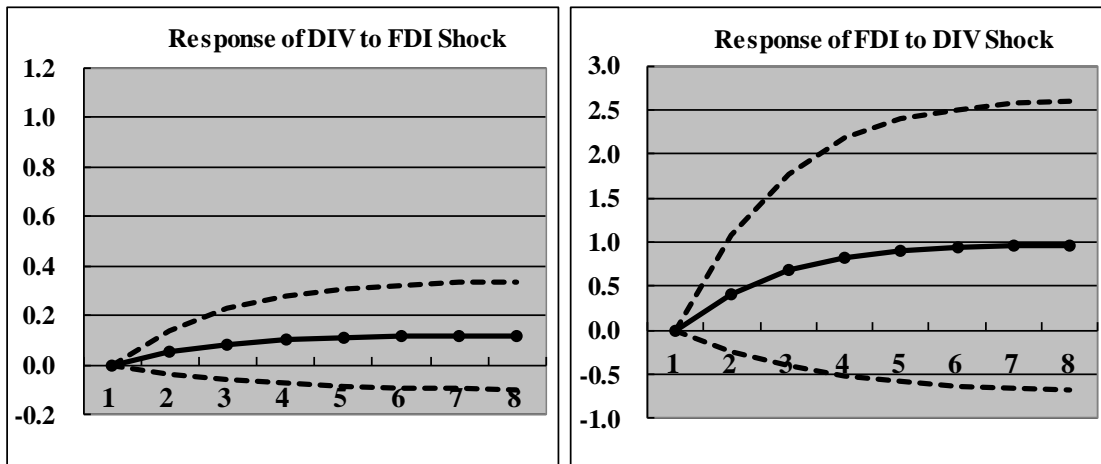
Table 4-4-3 Variance Decomposition

[Total]				
	Variance Decomposition of DIV		Variance Decomposition of FDI	
	FDI	DIV	FDI	DIV
1st Quarter	2.627	97.373	100.000	0.000
2nd Quarter	5.131	94.869	98.044	1.956
3rd Quarter	5.960	94.040	97.328	2.672
4th Quarter	6.184	93.816	97.130	2.870
5th Quarter	6.242	93.758	97.078	2.922
6th Quarter	6.256	93.744	97.065	2.935
7th Quarter	6.260	93.740	97.062	2.938
8th Quarter	6.261	93.739	97.061	2.939
[Excluding Oil & Gas]				
	Variance Decomposition of DIV		Variance Decomposition of FDI	
	FDI	DIV	FDI	DIV
1st Quarter	7.330	92.670	100.000	0.000
2nd Quarter	15.047	84.953	96.907	3.093
3rd Quarter	17.849	82.151	96.145	3.855
4th Quarter	18.988	81.012	95.867	4.133
5th Quarter	19.466	80.534	95.755	4.245
6th Quarter	19.668	80.332	95.709	4.291
7th Quarter	19.755	80.245	95.689	4.311
8th Quarter	19.792	80.208	95.681	4.319

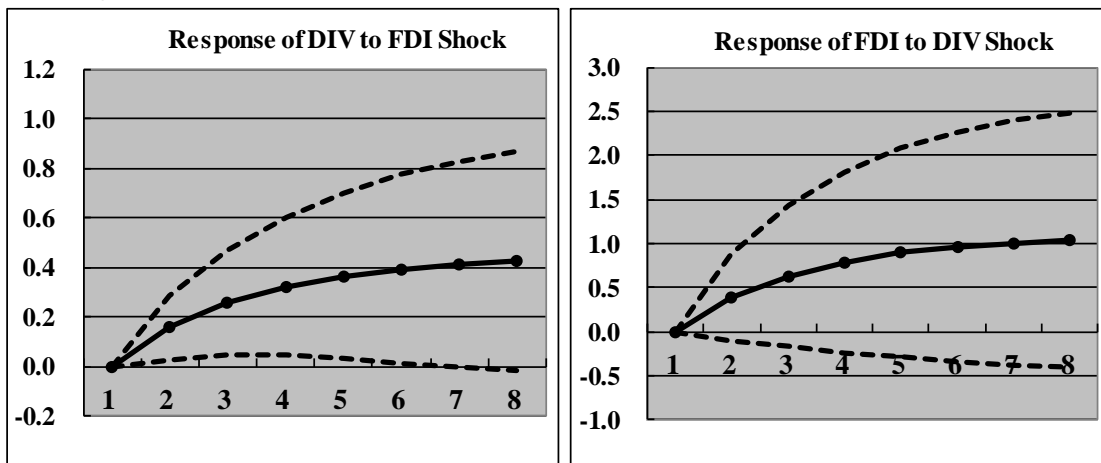
Sources: Author's estimation

Figure 4-2 Impulse Responses in Sectoral Analysis

[Total]



[Excluding Oil & Gas]



Note: 1) The shock is defined as one-unit innovation.
 2) The dotted lines denote a 95 percent error band over 8-year horizons.
 Sources: Author's estimation

Table A4-1 Unit Root Test

	Unit Root Test (Levin, Lin & Chu Test)	
	Intercept	Intercept & Trend
[FDI & EMP: regional panel]		
FDI	-6.231 ***	-15.232 ***
EMP	-6.349 ***	-7.460 ***

Note: *** denotes the rejection of null hypothesis at the 99% level of significance.

Source: Author's estimation

Table A4-2. Regional Analysis on Relationship between FDI and EMP

Table A4-2-1 Estimated PVAR Model

[FDI-high-intensive Region]		
	FDI	EMP
FDI ₋₁	0.729 *** [4.349]	0.004 [0.908]
EMP ₋₁	10.017 ** [2.478]	0.810 *** [8.150]
adj. R ²	0.761	0.859
[FDI-medium-intensive Region]		
	FDI	EMP
FDI ₋₁	-0.019 [-0.075]	-0.004 [-1.044]
EMP ₋₁	15.534 *** [3.629]	0.900 *** [13.950]
adj. R ²	0.073	0.846
[FDI-less-intensive Region]		
	FDI	EMP
FDI ₋₁	-0.149 [-0.781]	-0.002 [-0.340]
EMP ₋₁	6.092 ** [2.813]	0.739 *** [11.638]
adj. R ²	0.133	0.815

Note: ***, ** denote the rejection of null hypothesis at the 99% and 95% level of significance. The t-statistic is in parentheses [].

Sources: Author's estimation

Table A4-2-2 Granger Causality Test

[FDI-high-intensive Region]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause EMP	1	0.825
EMP does not Granger Cause FDI	1	6.143 **
[FDI-medium-intensive Region]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause EMP	1	1.090
EMP does not Granger Cause FDI	1	13.168 ***
[FDI-less-intensive Region]		
Null Hypothesis	df	Chi-sq
FDI does not Granger Cause EMP	1	0.115
EMP does not Granger Cause FDI	1	7.912 ***

Note: ***, ** denote the rejection of null hypothesis at the 99% and 95% level of significance.

Sources: Author's estimation

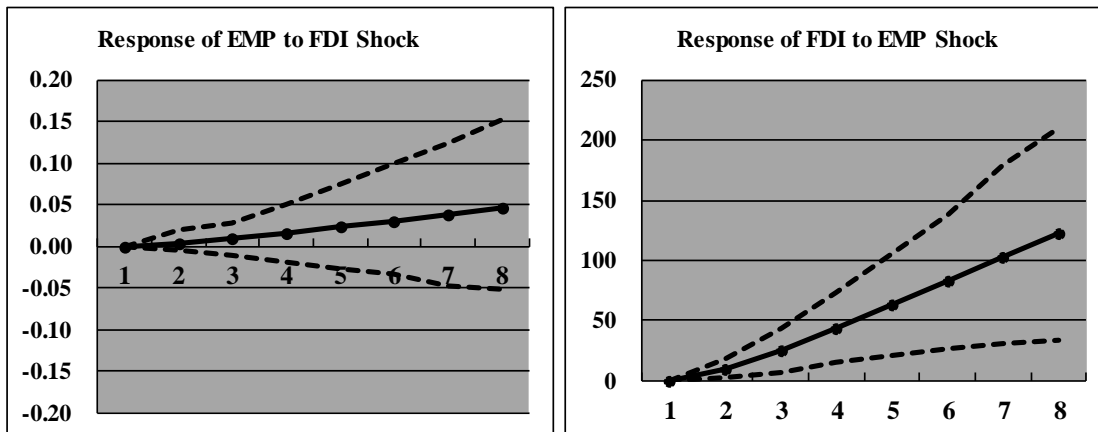
Table A4-2-3 Variance Decomposition

[FDI-high-intensive Region]				
	Variance Decomposition of EMP		Variance Decomposition of FDI	
	FDI	EMP	FDI	EMP
1	0.000	100.000	94.036	5.964
2	1.252	98.748	85.733	14.267
3	3.114	96.886	77.453	22.547
4	5.004	94.996	70.343	29.657
5	6.695	93.305	64.591	35.409
6	8.131	91.869	60.026	39.974
7	9.326	90.674	56.404	43.596
8	10.314	89.686	53.508	46.492
[FDI-medium-intensive Region]				
	Variance Decomposition of EMP		Variance Decomposition of FDI	
	FDI	EMP	FDI	EMP
1	0.000	100.000	96.765	3.235
2	3.681	96.319	91.872	8.128
3	5.001	94.999	88.691	11.309
4	5.607	94.393	86.644	13.356
5	5.934	94.066	85.300	14.700
6	6.127	93.873	84.404	15.596
7	6.247	93.753	83.803	16.197
8	6.324	93.676	83.396	16.604
[FDI-less-intensive Region]				
	Variance Decomposition of EMP		Variance Decomposition of FDI	
	FDI	EMP	FDI	EMP
1	0.000	100.000	93.361	6.639
2	0.249	99.751	89.375	10.625
3	0.282	99.718	88.504	11.496
4	0.298	99.702	87.958	12.042
5	0.306	99.694	87.683	12.317
6	0.310	99.690	87.538	12.462
7	0.312	99.688	87.462	12.538
8	0.313	99.687	87.422	12.578

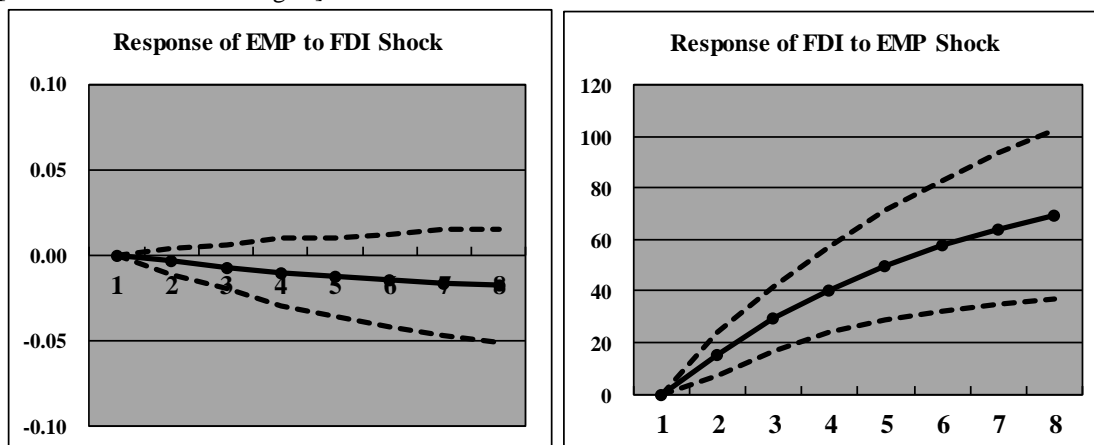
Sources: Author's estimation

Figure A4-1. Accumulated Impulse Responses in Regional Analysis

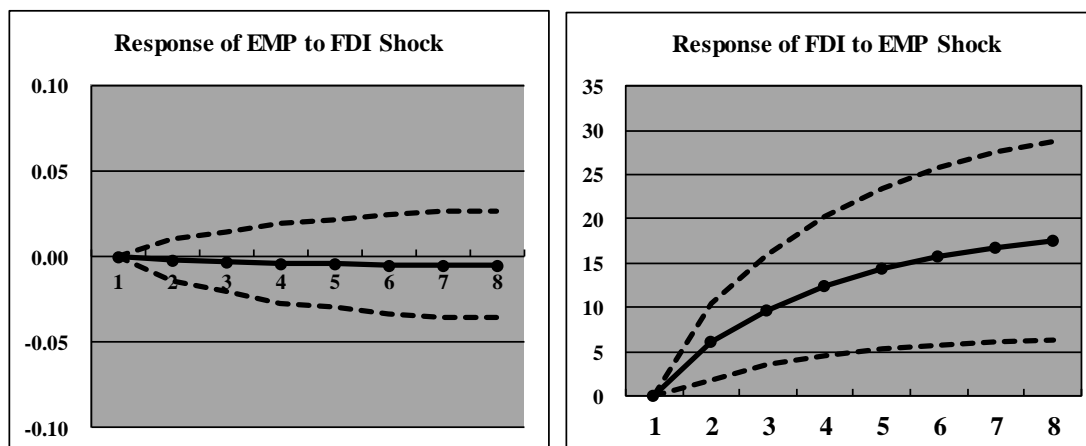
[FDI-High-Intensive-Region]



[FDI-Middle-Intensive-Region]



[FDI-Less-Intensive-Region]



Note: 1) The shock is defined as one-unit innovation.

2) The dotted lines denote a 95 percent error band over 8-year horizons.

Sources: Author's estimation

Appendix A Conversion of Manufacturing Sector's Classifications

Food & Beverages	Indonesia, Philippines	Milled grain and flour; Fish products; Slaughtering, meat products and dairy products; Other food products; Beverage; Tobacco
	Malaysia	Meat & meat products; Dairy products; Preserved fruits & vegetables; Preserved seafood; Oils and fats; Grain mill products; Bakery products; Confectionery; Ice; Other foods; Animal feeds; Wine and spirits; Soft drinks; Tobacco
	Thailand	Canning Preserving of Meat; Dairy Products; Canning of Fruits and Vegetables; Canning Preserving of Fish; Coconut and Palm Oil; Other Vegetable Animal Oils; Rice Milling; Tapioca Milling; Drying and Grinding of Maize; Flour and Other Grain Milling; Sugar; Bakery Products; Noodles and Similar Products; Confectionery; Ice; Monosodium Glutamate; Coffee and Tea Processing; Other Food Products; Animal Feed; Distilling Blending Spirits; Breweries; Soft Drinks; Tobacco Processing; Tobacco Products
	Vietnam	Processed, preserved meat and by-products; Processed vegetable, and animals oils and fats; Milk, butter and other dairy products; Cakes, jams, candy, coca, chocolate products; Processed and preserved fruits and vegetables; Alcohol, beer and liquors; Beer and liquors; Non-alcohol water and soft drinks; Sugar, refined; Coffee, processed; Tea, processed; Cigarettes and other tobacco products; Processed seafood and by products; Rice, processed; Other food manufactures; Animal feeds
Textiles and Wearing Apparel	Indonesia, Philippines	Spinning; Weaving and dyeing; Knitting; Wearing apparel; Other made-up textile products; Leather and leather products
	Malaysia	Yarns & cloth; Knitted fabrics; Other textiles; Wearing apparel; Leather products; Footwear
	Thailand	Spinning; Weaving; Textile Bleaching and Finishing; Made-up Textile Goods; Knitting; Wearing; Apparels Except Footwear; Carpets and Rugs; Cordage Rope and Twine Products; Tanneries Leather Finishing; Leather Products; Footwear Except Rubber
	Vietnam	Weaving of cloths (all kinds); Fibers, thread (all kinds); Ready -made clother, sheets (all kinds); Carpets Weaving and embroidery of textile -based goods (except carpets); Products of leather tanneries; Leather goods
Wood and Paper	Indonesia, Philippines	Timber; Wooden furniture; Other wooden products; Pulp and paper; Printing and publishing
	Malaysia	Sawmill products; Other wood products; Furniture; Paper & board; Printed products
	Thailand	Pulp Paper and Paperboard; Paper Products; Printing and Publishing; Saws Mills; Wood and Cork Products; Furniture and Fixtures Wood
	Vietnam	Paper pulp and paper products and by products; Processed wood and wood products; Products of printing activities; Products of publishing house
Petroleum, Chemical and Non-Metallic Mineral Products	Indonesia, Philippines	Synthetic resins and fiber; Basic industrial chemicals; Chemical fertilizers and pesticides; Drugs and medicine; Other chemical products; Refined petroleum and its products; Plastic products; Tires and tubes; Other rubber products; Cement and cement products; Glass and glass products; Other non-metallic; mineral products; Non-ferrous metal
	Malaysia	Industrial chemicals; Paints & lacquers; Drugs & medicines; Soap & cleaning preparations; Other chemical products; Petrol & coal products; Processed rubber; Rubber products; Plastic products; China, glass & pottery; Clay products; Cement, lime & plaster; Other non-metal products; Non-ferrous metal
	Thailand	Basic Industrial Chemicals; Synthetic Resins and Plastics; Fertilizer and Pesticides; Paints Varnishes and Lacquers; Drugs and Medicines; Soap and Cleaning Preparations; Cosmetics; Matches; Other Chemical Products; Petroleum Refineries; Other Petroleum Products; Rubber Sheets and Block Rubber; Tyres and Tubes; Other Rubber Products; Plastic Wares; Cement; Concrete and Cement Products; Ceramic and Earthen Wares; Glass and Glass Products; Structural Clay Products; Other Non-metallic Products; Non-ferrous Metal
	Vietnam	Cude oil, natural gas (except exploration); Glass and glass products; Ceramis and by products; Bricks, tiles; Ciment; Concrete, mortar and other cement products; Other building materials; Basic organix chemicals; Basic inorganix chemicals; Chemical fertilizer; Fertilizer; Pesticides; Veterinary; Health medicine; Processed rubber and by products; Soap, detergents; Perfumes and other toilet preparation; Plastic (including semi-plastic products); Other plastic products; Paint; Inl. varnish and other painting materials; Other chemical products; Non-ferrous metals and products(except machinery equipment); Gasoline, lubricants (already refined)
Metal Products	Indonesia, Philippines	Iron and steel; Metal products
	Malaysia	Iron & steel; Other fabricated metal and fixtures; Structural metal products; Other metal products;
	Thailand	Iron and Steel; Secondary Steel Products; Cutlery and Hand Tools; Furniture and Fixtures Metal; Structural Metal; Products; Other Fabricated Metal Products
	Vietnam	Ferrous matals and products
Electrical and Machinery	Indonesia, Philippines	Boilers, Engines and turbines; General machinery; Metal working machinery; Specialaized machinery; Heavy Electrical; equipment; Television sets, radios, audios and communication equipment; Electronic computing equipment; Semiconductors and integrated circuits; Other electronics and electronic products; Household electrical equipment; Lighting fixtures, batteries, wiring and others; Precision machines
	Malaysia	Industrial machinery; Household machinery; Radio, TV & com. Equipment; Elect. appliances & houseware; Other electrical machinery Instruments & clocks
	Thailand	Engines and Turbines; Agricultural Machinery; Wood and Metal Working Machinery; Special Industrial Machinery; Office and Household Machinery; Electrical Industrial Machinery; Radio and Television; Household Electrical Appliances; Insulated Wire and Cable; Electric Accumulator & Battery; Other Electrical Aparatuses & Supplies; Scientific Equipments; Photographic & Optical Goods; Watches and Clocks; Recreational and Athletic Equipment
	Vietnam	Health instrument and apparatus; Precise and optics equipment, meter (all kinds); Home appliances and its spare parts; General -purpose machinery; Other general -purpose machinery; Other special -purpose machinery; Electrical machinery; Other electrical machinery and equipment; Machinery used for broadcasting, television and information activities
Transport Equipment	Indonesia, Philippines	Motor vehicles; Motor cycles; Shipbuilding; Other transport equipment
	Malaysia	Ships & boats; Motor vehicles; Cycles & motorcycles; Other transport equipment
	Thailand	Motor Vehicle; Motorcycle, Bicycle & Other Carriages; Repairing of Motor Vehicle; Ship Building; Railway Equipment; Aircraft
	Vietnam	Motor vehicles, motor biles and spare parts; Bicycles and spare parts; Automobiles; Other transport mean

Sources: UNCTAD-Eora value-added-trade database

Appendix B Share of Export Value by Commodity in Myanmar

Item	2010	2011	2016	2018 (Apr-Sept)
Gas	28.5	38.3	14.5	13.3
Beans, Pulses and oilseeds	9.5	11.4	8.8	3.2
Garments	4.3	5.4	15.6	25.2
Jade	22.8	0.4	1.3	1.9
Rice	2.2	2.9	1.7	1.9
Base Metal	0.5	0.8	4.0	6.5
Maize	0.1	0.5	0.1	0.0
Fishery Products	3.2	4.8	1.9	1.5
Rubber	1.7	1.4	0.5	0.4
Forestry Products	6.9	6.8	1.0	0.4
Others	20.2	27.1	50.7	45.7

Source: Customs Department of Myanmar

Appendix C Share of Export by Destination in Myanmar

Country	2010	2011	2016	2018 (Apr-Sept)
China	13.6	24.2	42.3	32.9
Thailand	32.8	41.9	18.5	17.8
Singapore	5.2	5.9	4.0	4.2
India	9.8	11.4	7.9	3.4
Japan	2.7	3.5	6.6	8.6
South Korea	1.7	2.4	2.9	2.6
Hong Kong	21.4	0.5	1.7	2.6
Malaysia	4.9	1.7	1.3	1.4
Indonesia	0.5	0.4	1.1	0.7
Germany	0.4	0.5	1.9	3.2
UK	0.4	0.2	1.1	2.6
US	0.0	0.3	1.6	3.4
Others	6.6	7.1	9.1	16.6

Source: Customs Department of Myanmar

Appendix D Share of Import Value by Commodity in Myanmar

Item	2010	2011	2016	2018 (Apr-Sept)
Machinery & Transport Equipment	18.8	20.2	17.8	14.4
Raw Materials	32.8	32.1	33.1	36.8
Base Metals & Edible Oil	8.6	10.5	8.3	8
Electrical Machinery & Apparatus	5.4	5.2	6.8	6.7
Food Products	5.6	6.5	5.8	4.1
Medicine	2.8	2.4	2.3	2.7
Fabrics	4.6	3.4	4	5
Chemicals	1	0.9	1.3	0.8
Construction Materials	2.4	1.8	9.3	7.9
Others	29.5	28	11.3	13.6

Source: Customs Department of Myanmar

Appendix E Share of Import Value by Destination in Myanmar

Country	2010	2011	2016	2018 (Apr-Sept)
China	33.9	30.9	33.4	31.6
Singapore	25.7	27.0	14.5	18.3
Thailand	11.1	7.7	12.1	14.2
Japan	4.0	5.6	7.3	3.4
Malaysia	2.3	3.4	4.8	4.8
India	3.1	3.6	5.8	5.2
Indonesia	4.3	4.8	4.1	4.6
US	0.9	2.9	2.9	1.7
South Korea	4.8	5.0	3.1	2.1
Germany	0.8	1.1	0.7	1.1
Hong Kong	0.1	0.1	0.2	0.1
UK	0.3	0.3	0.1	0.4
Others	8.8	6.9	11.0	12.5

Source: Customs Department of Myanmar

Appendix F United States' and European Unions' Sanctions on Myanmar

Year	United States	European Unions
1993	Arms embargo	None
1996	None	Adoption sanctions in a common position a) Sanctions on targeted industries: - timber processing - mining of metals - precious and semi-precious stones b) Visa ban, suspension of high-level visits
1997	Prohibition of new investment in Myanmar market	None
2000	None	Sanctions on freezing assets
2003	a) Banning imports, financial exports freezing assets, b) Extending visa restrictions	a) Sanctions on EU's and other financial institutions' loans to state-owned enterprises
2006	None	Investment ban on state-owned enterprises
2007	Adding 25 individuals to its SDN list	a) Adoption sanctions in new common position b) Targeting 1,207 firms with visa bans and asset freeze
2012	Initial Easing of sanctions	Suspension of sanctions
2013	None	Full lift of sanctions
2016	Full lift of embargo	None

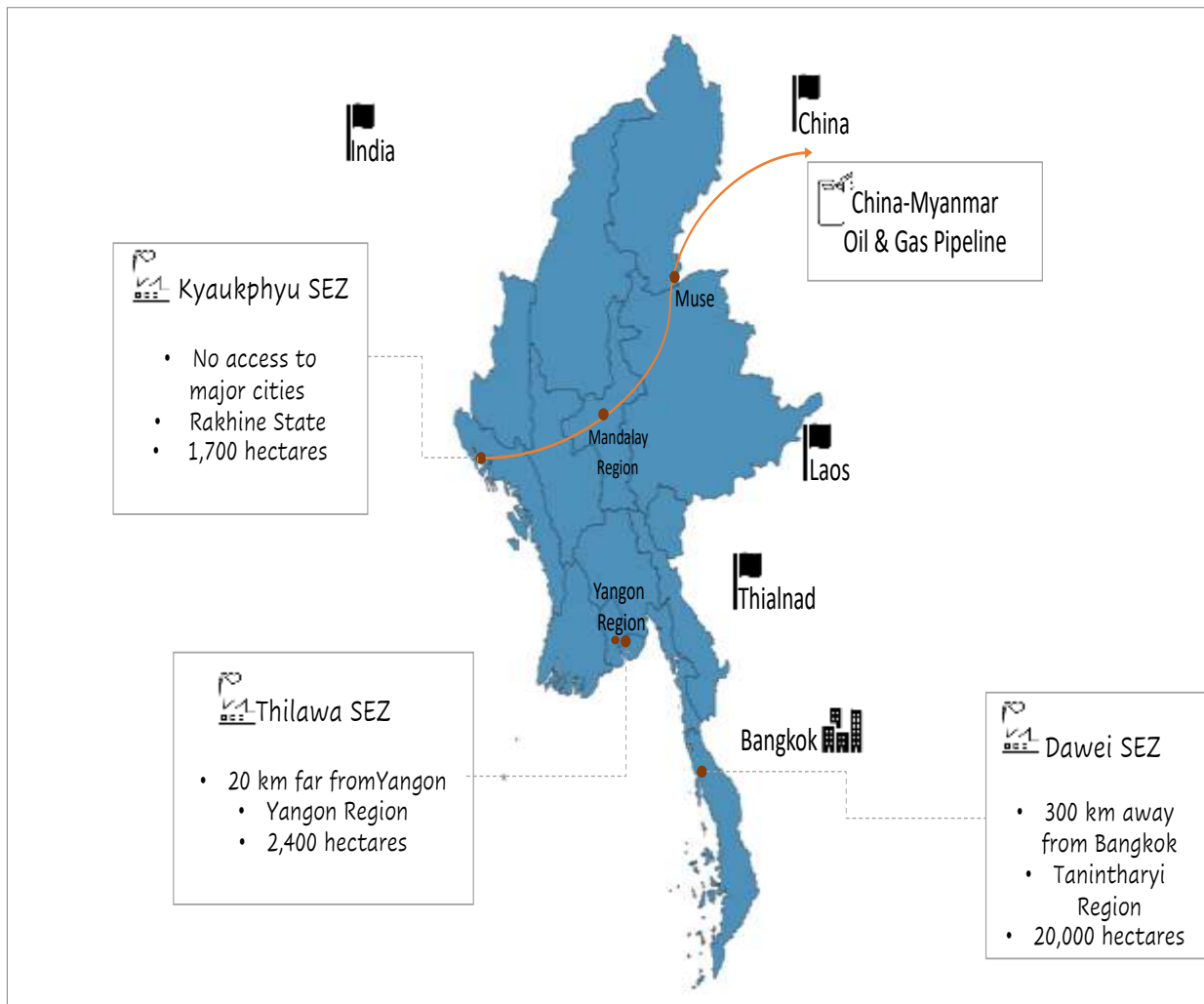
Sources: Author's description

Appendix G Trade-related Laws & Policies in Myanmar

Particular	Laws & Policies
Trade-related Laws & Regulations	<ul style="list-style-type: none"> b) Export/ Import Control <ul style="list-style-type: none"> - The Essential Supplies & Services Act (2012) - The Foreign Exchange Management Law (2012) - The Central Bank of Myanmar Law (2013) c) Customs Clearance <ul style="list-style-type: none"> - The Tariff Law (1922) - The Sea Customs Act and Land Customs Act (1962) d) Tax <ul style="list-style-type: none"> - The Law Amending the Commercial Tax Law (2014)
Trade Liberalization Policies	<ul style="list-style-type: none"> a) Tax Reform <ul style="list-style-type: none"> - abolishment of commercial tax on exports (8%) (enactment of commercial taxation on exports of natural resources & electricity) b) Tariff Reduction <ul style="list-style-type: none"> - elimination of duties on 98.86% of tariff lines in 2010 (ASEAN Trade in Goods Agreement) c) Beneficiary of GSP schemes <ul style="list-style-type: none"> - Australia - Belarus - Japan - New Zealand - Russian Federation - EU d) Free Trade Agreements of ASEAN <ul style="list-style-type: none"> - ASEAN-EU Free Trade Agreement - Regional Comprehensive Economic Partnership (RCEP) - Bay of Bengal Initiative for Multi-Sectoral Technical & Economic Cooperation (BIMSTEC) - ASEAN-Hong Kong, China Free Trade Agreement (proposed) - ASEAN-Pakistan Free Trade Agreement (proposed) - Comprehensive Economic Partnership for East Asia (CEPEA/ASEAN+6) (proposed) e) Enactment of Special Economic Zones Law (January 2011)
Trade Facilitation Policies	<ul style="list-style-type: none"> a) Issuing Export & Import Licenses (2011) b) Custom Procedure <ul style="list-style-type: none"> - Implementation of National Single Window System (NSW) (2015) - Introducing MACCS System (2016) (Myanmar Automated Cargo Clearance System)
Trade Promotion Policies	<ul style="list-style-type: none"> a) Launch of the National Export Strategy (NES) in 2015 b) Trade Promotion Master Plan (TPMP) in 2013

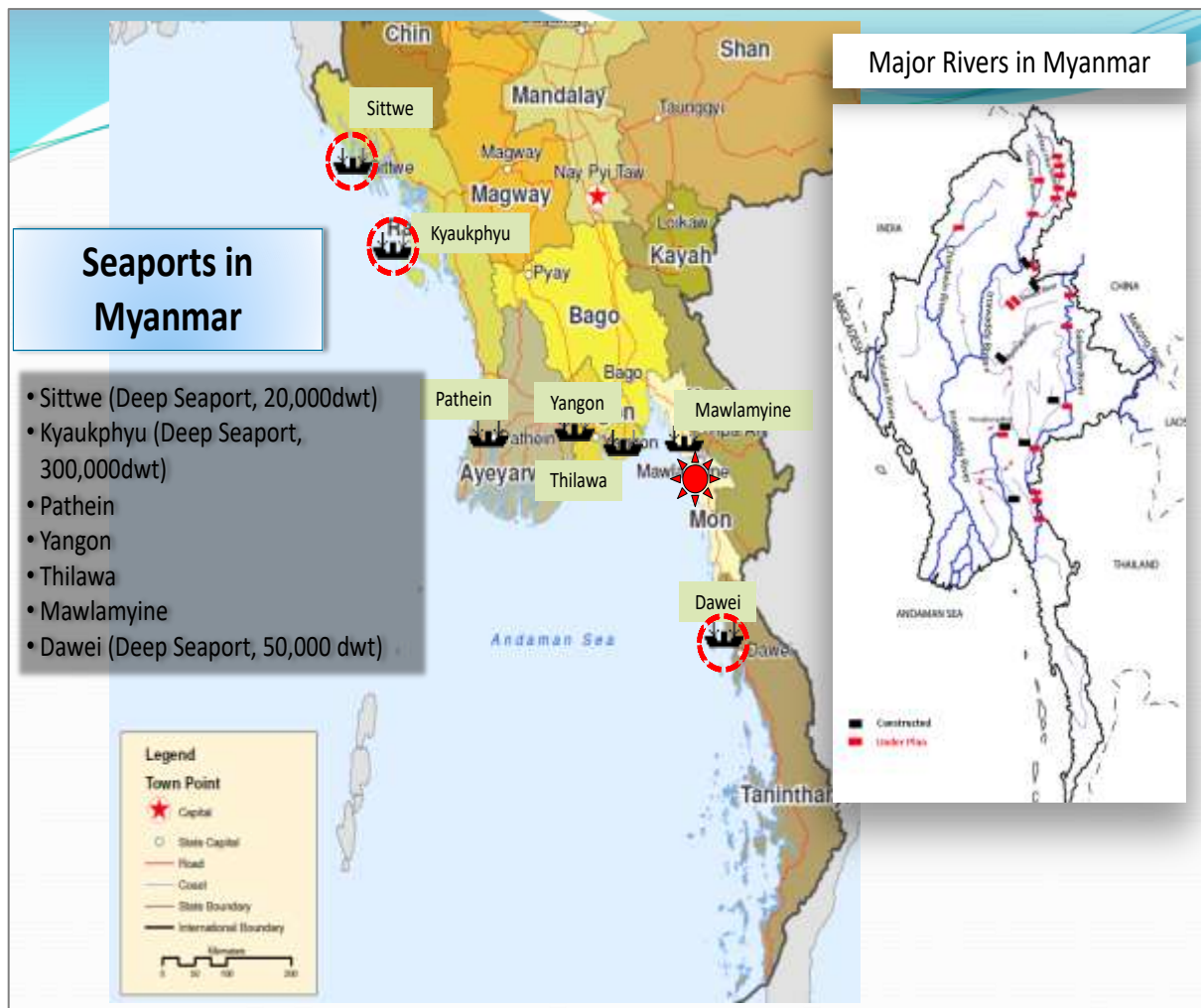
Source Final Report of MOC (2016)

Appendix H Special Economic Zones (SEZs) in Myanmar



Source: Author's Creation

Appendix I Sea Ports in Myanmar



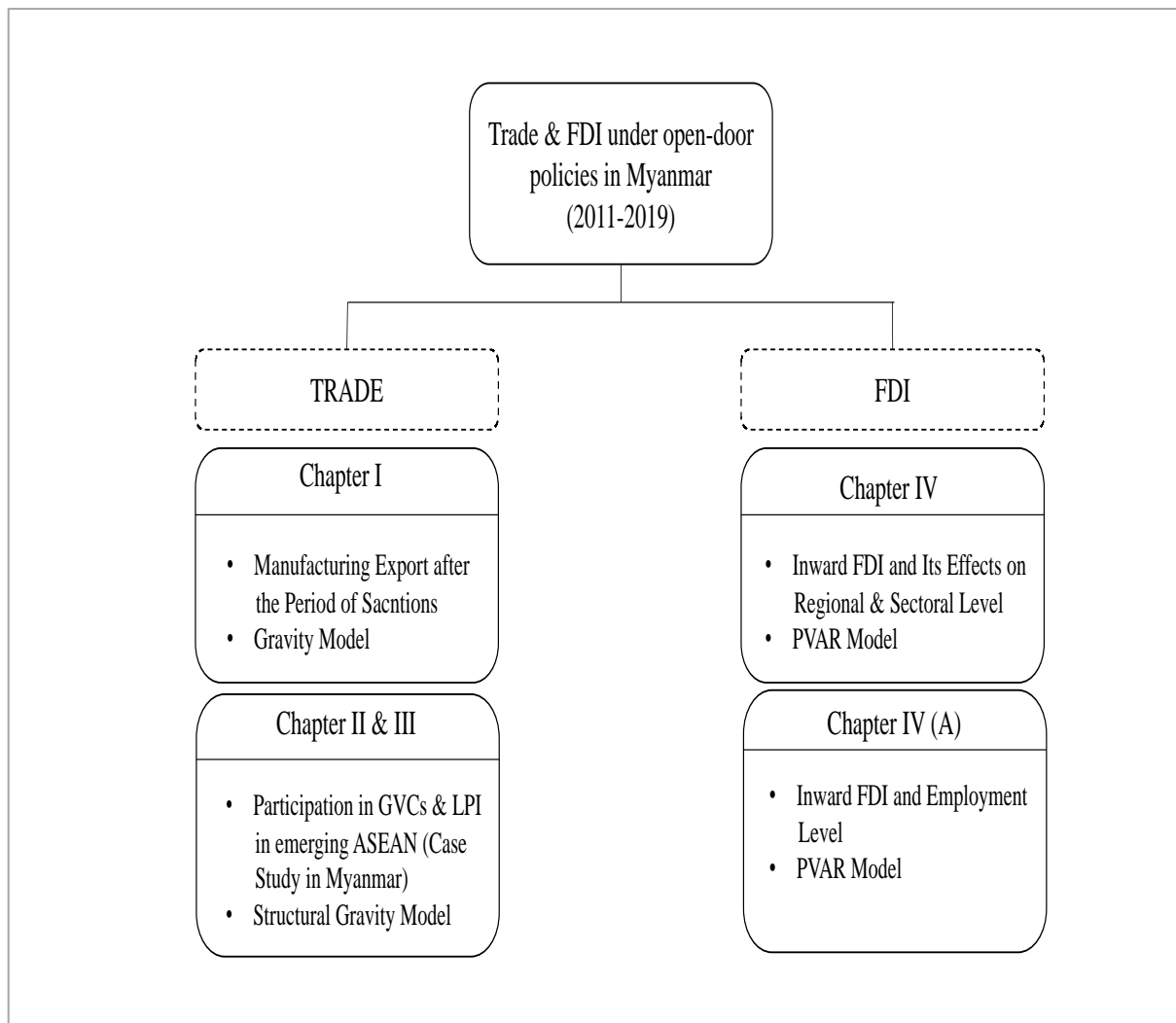
Source: Ministry of Construction

Appendix J Foreign Investment-related Laws, Agreements & Benefits in Myanmar

Particulars	Laws , Agreements & Benefits
Foreign Investment Law	<ul style="list-style-type: none"> - Foreign Investment Law (1988) - Reenactment of Foreign Investment Law (2012) - Myanmar Investment Law (2016)
Investment Agreement	<ul style="list-style-type: none"> a) ASEAN Comprehensive Agreement (ACIA) in 2012 b) Bilateral Investment Treaties (BITs) <ul style="list-style-type: none"> 1) Singapore (2019) 2) Israel (2014) 3) Republic of Korea (2014) 4) US (2013) 5) Indonesia (2013) 6) Japan (2013) 7) India (2008) 8) Thailand (2008) 9) Kuwait (2008) 10) Laos (2003) 11) China (2001) 12) Vietnam (2000) 13) Philippines (1998)
Market-oriented Investment in SEZs a) Free Zone b) Promotion Zone	<ul style="list-style-type: none"> Export-oriented manufacturing <ul style="list-style-type: none"> 1) manufacturing 2) transportation 3) wholesale areas Domestic-market oriented manufacturing <ul style="list-style-type: none"> 1) manufacturing 2) housing 3) departmental stores 4) banking, insurance 5) schools, hospitals and recreation places

Source: DICA

Appendix K The Structure of the Dissertation



Source: Author's Creation