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Trade Integration of Thailand with Mekong Region

— An Assessment Using Gravity Trade Model —

Hiroyuki Taguchi

Abstract

Purpose – The purpose of this paper is to examine the extent of the trade integration of Thailand with the Mekong region in comparison with its trade integration with the other major partners (advanced ASEAN, China, India, Japan, and the United States). **Design/methodology/approach** – The study adopts the gravity trade model as an analytical framework, for the period from the 1980s through the 2000s. **Findings** – It is found that Thailand's trade integration with the Mekong region has remarkably grown from the 1980s to the 2000s, in the sense that Thailand's total trade with the Mekong region, which lies below the gravity-model standard in the 1980s, exceeds the standard in the 1990s and the 2000s. However, it is also found that the intensity of Thailand's trade integration with the Mekong region is still behind that with advanced ASEAN even in the 2000s. It might come from the higher service-link costs that prevent the Mekong region from being fully involved in international production network. **Originality/value** – The paper may be valuable to the policy makers and researchers in the Mekong region, since it contributes to reviewing the two-decade progress of the regional cooperation of the Greater Mekong Sub-region from such quantitative perspectives as trade integration.

Key words: Thailand; Mekong region; ASEAN; trade integration; gravity trade model

Article Classification: Research paper

1. Introduction

This paper aims to assess the extent of the trade integration of Thailand with the Mekong region in comparison with its trade integration with the other advanced ASEAN economies and the other major partners (China, India, Japan, and the United States), by using the gravity trade model as an analytical framework, for the period from the 1980s through the 2000s.

The Mekong region in this paper is composed of five countries: Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam. Although the five countries share not only the Mekong River but also deep cultural, ethnic and historical similarities, substantial economic cooperation among these countries has developed just after the 1990s, due to international political difficulties during the cold war and the delayed transition of these economies except Thailand to market economies until the 1980s. In 1992, with the main support of the Asian Development Bank, the members of the Greater Mekong Sub-region (hereafter referred to simply as GMS) ^[1] met together for the first time, and agreed to launch a program of the sub-regional economic cooperation designed to facilitate economic linkages across their borders. The program covers both the “hard” (infrastructure development) and “soft” (agreements and reforms) aspects of cooperation, specifically nine sectors and areas of cooperation: agriculture, energy, environment, human resource development, telecommunications, transport, tourism, trade and investment. For about two decades since then, the GMS economic cooperation has been steadily promoted. Thus, it is an appropriate time to review the two-decade progress of the GMS cooperation from such quantitative perspectives as trade integration.

Thailand has played a central role in the GMS cooperation in terms of promoting trade and investment in private sectors as well as providing financial resources in the implementation of the GMS cooperation program. At the same time, Thailand is an original member of the Association of Southeast Asian Nations (ASEAN) that was established in 1967. The cooperation framework of the ASEAN is by far precedent to that of the GMS, as we can see that the ASEAN agreed on the Free Trade Area (AFTA) in 1992, and the original members already enacted zero tariff rates on virtually all imports. ^[2] Thus, it would provide significant implications on the development stage of the GMS cooperation, to compare quantitatively the degree of trade integration of Thailand with the Mekong region, with that of Thailand with the originally-member ASEAN. In addition, it would also be interesting to see if there is a change in the intensity of trade integration of Thailand with such major trading partners as China,

India, Japan, and the United States, amid the growing presence of China and India in the global economy.

The paper is structured as follows. Section 2 review previous studies and clarify this paper's contribution. Section 3 presents empirical analyses introducing the methodology and data, and discussing the estimate results. Section 4 summarizes the results and concludes.

2. Previous Studies and Our Contribution

Although there are a large number of previous studies that examine trade integration using the gravity trade model, the studies on the trade integration in the Mekong region, which includes least-developed countries (LDCs), are so limited. In this section, we first outline the literature development on the gravity trade model, then represent the studies in which the gravity model is adopted for examining the trade integration in the Mekong region, and finally clarify our study's contribution.

The gravity model of trade has been the most commonly used analytical framework in empirical studies of international trade flows. Tinbergen (1962) and Pöyhönen (1963) were the first to apply the "Newton's Law of Gravitation" to international trade flows. In its original form, the gravity equation explains bilateral trade flows by the economic size of two countries and the distance between them. Since Anderson (1979) assigned the gravity model with theoretical underpinnings for the first time, trade theorists have found that the gravity model equation is consistent with theories of trade 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 model ^[3], developed the augmented version of the gravity model by including per capita income levels for both exporters and importers as additional regressors. ^[4] The model has often provided a useful tool to assess the trade-integration effects of regional cooperation such as free trade agreements, economic partnership agreements and cross-boarder infrastructure development. The intensity of non-standard trade relations is measured by dummy variables for specific partners, which are added in the gravity equation. A positive and statistically significant coefficient for a dummy variable shows that trade flows exceed the normal level, i.e. the level predicted by the countries economic sizes and the distance between them. It implies that the economic cooperation in the region has a preferential effect on the region's trade flows.

There are a large number of empirical studies that addresses the issue of trade integration in the world and in the specific regions by using the gravity model. There seem, however, to be few studies in which the trade integration in the Mekong region is analyzed by the gravity model, although there has been a regional framework of cooperation such as the GMS program. We herein represent the following two studies that focused on the trade integration in the GMS: Poncet (2006), which adopted the gravity model approach with the GMS dummy variables in international-trade context, and Edmonds and Fujimura (2008), which applied the gravity model in the intra-GMS for examining the impact of cross-border infrastructure. Poncet (2006) examined the trade-integration evolution of Yunnan, i.e. Chinese province covered in the GMS, with the other GMS economies and the other ASEAN countries, by estimating the gravity trade model with their dummy variables between 1988 and 1999. He identified an above-standard level of trade integration of Yunnan with the neighboring GMS countries, e.g. Myanmar and Lao PDR, but, at the same time, found that its integration with the neighboring GMS has decreased while the trade integration with other ASEAN countries such as Singapore, Indonesia and Malaysia has increased. Edmonds and Fujimura (2008) investigated the impact of cross-border road infrastructure on trade and foreign direct investment in the intra-GMS, based on the gravity model estimation with panel data from 1981 to 2003. They found that the development of cross-border road infrastructure has had a positive effect on intra-GMS trade in major commodities, and also reported that the results regarding the impact of road infrastructure on foreign direct investment flows are ambiguous probably due to data limitations.

This paper basically follows the gravity model approach adopted by Poncet (2006). Whereas Poncet (2006) focused on Yunnan province among the GMS economies, however, this paper focuses on Thailand, the largest economy of the Mekong region. As we stated in the introduction, our analysis not only investigates whether the trade integration of Thailand with the other Mekong economies has exceeded the normal level predicted by the gravity equation, but also compares the level of the Mekong trade integration with that of the trade integration with the other ASEAN and the other major trading partners. Another contribution of our study is that our estimation covers the period from the 1980s through the 2000s so that it enables us to review the recent evolution of the GMS cooperation projects, whereas Poncet (2006), and Edmonds and Fujimura (2008) did not fully target the 2000s, i.e. the post-Asian crisis period in their estimation.

3. Empirics

We now proceed to the empirical analysis. We first simply overview the trends in trade integration of Thailand with the Mekong countries, the other ASEAN, and the other major trading partners, i.e. China, India, Japan, and the United States. Then we move to statistical tests on the intensity of trade integration of Thailand with these trading partners by estimating the gravity trade model.

3.1 Overviews of Trade Integration in Thailand

Table 1 indicates the trade values and their shares of Thailand with major trading partners in terms of its exports (the upper part of Table) and its imports (its lower part) in 1990, 2000 and 2010. As the Mekong region, we represent the four countries: Cambodia, Lao PDR, Myanmar, and Vietnam, which we call “CLMV”. For the other ASEAN, we pick up the four countries: Indonesia, Malaysia, Philippines and Singapore, which we call “advanced ASEAN”. The rough findings on their trends are as follows.

First, Thailand’ trade with CLMV has rapidly expanded its share from 1990 to 2010. The export expansion (from 0.5 to 6.3) exceeds the import expansion (from 0.8 to 2.8). Among CLMV, the export to Vietnam and the import from Myanmar signify a remarkable increase. The level of trade shares with CLMV are, however, still far below that with advanced ASEAM in 2010. Second, Thailand’ trade with advanced ASEAN has also increased in the same period, while the export-share increase (from 11.2 to 16.3) has exceeded the import-share increase (from 11.7 to 13.7). Among advanced ASEAN, the trade (export and import) with Indonesia shows a remarkable increase. The growth rate of trade (export and import) with advance ASEAN during 2000-2010 is, however, lower than that with CLMV, and the trade shares with advanced ASEAN appear to peak out in 2000. Third, regarding Thailand’s trade with the other major trading partner, it should be noted that Thailand’s trade shares with Japan and United States have declined during 1990-2010 period, whereas the trade share with Chine has grown rapidly.

The next section conducts the statistical tests on whether the trend of Thailand’s trade with the Mekong region as well as with other trading partners during the past decades are following the standard level predicted by the gravity trade model, exceeding it, or falling below it.

3.2 Analysis of Gravity Trade Model

This section first clarifies the methodology and data, then shows the estimation results, and discusses the results.

3.2.1 Methodology and Data

Considering the evolution of the gravity trade model as shown in Section 2, we herein adopt the augmented version of the model with per capita income levels for both exporters and importers, which was used for estimation also in Poncet (2006). We specify the equation in the following way.

$$\ln(T_{it}) = \text{const.} + \alpha \cdot \ln(Y_i \cdot Y_t) + \beta \cdot \ln[(Y_i/P_i) \cdot (Y_t/P_t)] + \gamma \cdot \ln(D_{it}) + \delta \cdot DM + \varepsilon_{it} \quad (1)$$

where the subscript t and i denote Thailand and its trading partner's country; T is trade flows (exports, imports, and their total flows) between Thailand and country i ; Y is the economic size of country, i.e. GDP; Y/P is per capita GDP; D is the geographical distance between the capital cities of Thailand and its trading partner i ; DM is a dummy variable that takes the value of one for a specific trading partner which is supposed to have a preferential trade integration with Thailand, i.e. CLMV, advanced ASEAN and the other major trading partners such as China, India, Japan, and the United States (the dummy is divided into such periods as 1980-89, 1990-99 and 2000-2010; α , β , γ , and δ are coefficients of each explanatory variable; ε is the disturbance term. The variables except a dummy take a logarithmic form for the estimation.

According to the theoretical underpinning of the gravity model that bilateral trade flows are explained positively by the economic size and level of two countries, and negatively by the geographical distance between them as a proxy for trade costs, we can expect a positive sign in α and β , and a negative sign in γ . Of particular importance is the coefficient for a dummy variable, δ , which is useful for identifying the intensity of trade integration with Thailand. A positive and statistically significant coefficient, δ , means that trade flows with Thailand exceed the level predicted by the gravity elements, thereby implying the partner's preferential economic ties with Thailand.

For estimating the equation (1), we construct panel data for the period between 1980 and 2010 with 174 countries as Thailand's trading partners identified in the statistics of International Monetary Fund (IMF). To avoid the problem of sample selection bias in our panel data which contain a large number of missing data in a specific group of countries such as small-size countries, we adopt the truncated regression model with dependent variables left-censored at zero and with the normal distribution for the error

term.

As for the source of the annual data used for estimation, the bilateral trade data with Thailand in terms of the export and import values of millions of U.S. dollar are retrieved from “Direction of Trade Statistics” of IMF. The data on GDP and per capita GDP on U.S. dollar base comes from the World Bank’s “World Development Indicators”.^[5] The geographical distance between Thailand and each trading partners is measured by the “greater circle” distance formula between Bangkok (the capital of Thailand) and the capital city of each country.^[6]

3.2.2 Findings

Table 2 reports the results of the gravity model estimation on Thailand’s trades: Table 2a on Thailand’s exports, Table 2b on Thailand’s imports, and Table 3c on the total of its imports and its exports. Figure 1 describes the summary on the trade integration of Thailand with CLMV in the Mekong region, advanced ASEAN and the other major trading partners (China, India, Japan, and the United States).

We could verify the validity of the gravity trade model through all the estimations shown in Table 2. The basic explanatory variables have the expected signs with statistical significance at the one-percent level: the coefficient of joint GDP is significantly positive; the one of joint per capita GDP is significantly positive; the one of geographical distance is significantly negative.

Our great concern is the coefficients of dummy variables to describe the intensity of trade integration beyond the gravity-model level, which are introduced for CLMV, advanced ASEAN, and the other major economies as the trading partners of Thailand.

Regarding with Thailand’s exports in Table 2a, towards CLMV, the export to Cambodia significantly exceeds the gravity-model standard in the 2000s; the export to Lao PDR exceeds the standard after the 1990s; the export to Myanmar, which is significantly below the standard in the 1980s, is not beyond the standard even after the 1990s; the export to Vietnam, which is significantly less than the standard in the 1980s, is above the standard in the 2000s. As a total, the exports to CLMV, which fall below the gravity-model standard in the 1980s, and then exceed the standard in the 1990s and the 2000s. In comparison with the exports to advanced ASEAN, which exceeds the gravity-model standard in all the periods, the intensity of the export integration of Thailand with CLMV nearly catches up with that with advanced ASEAN in the 1990s and the 2000s. The coefficient of dummy variables signifies that in the 2000s, Thailand’s exports to CLMV are 4.26 times ($\exp. (1.45) = 4.26$) larger than the

gravity-model standard, whereas those to advanced ASEAN are 4.57 times ($\text{exp. } (1.52) = 4.57$) greater than that level. As for Thailand's exports to the other major partners, the export to the United States keeps the above-standard level in all the periods, the exports to China and Japan stay mostly at the gravity-model level, and the export to India falls below the standard in the 1990s with being still negative in the 2000s.

Concerning with Thailand's imports in Table 2b, from CLMV, there are no countries except Myanmar in the 2000s, from which the imports are significantly above the gravity-model standard, while the imports from Cambodia in the 2000s and from Vietnam in the 1980s are even discernibly below the standard. The imports from CLMV show a clear contrast with those from advanced ASEAN, which remarkably exceeds the gravity-model standard in all the times. The imports from China, Japan and the United States indicate the above-standard level respectively all through the periods, although the import from the United States reduces its intensity towards the 2000s. The import from India, however, stays at the standard level all the times.

We finally report the total trade of Thailand's exports plus imports in Table 2c. The total trade with CLMV, which lies below the gravity-model standard in the 1980s, exceeds the standard in the 1990s and the 2000s. The intensity of trade integration with CLMV is in the process of catching up with that with advanced ASEAN, but still behind its level. The coefficient of dummy variables signifies that in the 2000s Thailand's trade volume with CLMV, which is 2.85 times ($\text{exp. } (1.05) = 2.85$) greater than the gravity-model standard, is less than that with advanced ASEAN shown by 4.17 times ($\text{exp. } (1.43) = 4.17$) above the standard. As for the trade with the other major partners, Japan and the United States keep the above-standard level all through the periods, whereas China represents the above-standard, but not so high level in the 2000s. Although we found the growing trade share between Thailand and China in Table 1, it might reflect the growing economic size of China for the most part. India, however, indicates negative trade integration though the level is not significant.

3.2.2 Discussions

We now discuss the implications of the above-mentioned outcomes of the gravity model estimation. One of the important findings is that the trade integration of Thailand with the Mekong region has remarkably grown from the 1980s to the 2000s, as shown in the estimation results that Thailand's trade with CLMV, which lies below the gravity-model standard in the 1980s, exceeds the standard in the 1990s and the 2000s, mainly reflecting the trend in Thailand's exports. It might reflect the steady progress of

the GMS collaboration, which launched in 1992 and has evolved in terms of facilitating the hard and soft infrastructure as the cross-border projects with nine sectors and areas, as we stated in the introduction.

The intensity of the trade integration of Thailand with the Mekong region is, however, still behind that with advanced ASEAN in the 2000s, as indicated in the estimation outcomes that Thailand's import integration with the Mekong region is far below that with advanced ASEAN, whereas its export integration with the Mekong region nearly catches up with that with advanced ASEAN in the 2000s. We speculate as to the possible reasons for the immaturity of the trade integration with the Mekong region as follows.

The intensity of the trade integration is one of the reflections for the formation of international production networks in East Asia. Kimura (2006) described the international production networks in East Asia in such ways as active foreign direct investment, development of cross-border production sharing or fragmentation, sophisticated disintegration of production activities, and the formation of industrial agglomeration, and showed the "18 facts" based on a number of studies, which included the analysis of intra-East Asia trade. The core argument of the international production networks is the "fragmentation theory". The founders of this theory, Jones and Kierzkowski (1990 and 2005), presented the idea that a firm's decision on whether to fragment or not depends on the differences in location advantages and the levels of the "service-link costs", which are costs to link remotely-located production blocks. ^[7] The large differences in location advantages and the lower the service-link costs encourage a firm to facilitate the fragmentation.

When we examine the differences in location advantages and the levels of the service-link costs focusing on the Mekong region and advanced ASEAN, the international production networks would be more favorable in advanced ASEAN than in the Mekong region in terms of the service-link costs, whereas the differences in location advantages might work in the future creation of production networks in the Mekong region. Table 3 compares the GDP per capita, and the Logistic Performance Index (LPI) presented by the World Bank among ASEAN. The LPI can be a proxy variable of service-link costs since it includes the performance of customs, infrastructure, international shipment, logistics competence, tracking and tracing, and timeliness. Table 3 clearly shows that the logistic performances of Lao PDR, Cambodia, and Myanmar are far behind those of advanced ASEAN, while CLMV has a potential to accept fragmentation impacts due to the lower levels of GDP per capita.

Therefore, it would be the existence of the higher service-link costs that prevent the

Mekong region from being fully involved in international production network, and thus from creating full-fledged, two-way trade integration. This interpretation would also be consistent with the suggestions of ADB (2007): the GMS cooperation has still much room to facilitate the software components of cooperation, while the GMS projects had so far placed much emphasis on the need to remove the physical barriers to sub-regional cooperation. In this context, ADB (2007) recommended “enhancing efforts to promote private sector participation” for investment promotion and trade facilitation in the GMS.

As for Thailand’s trade integration with the other major partners, China, Japan and the United States roughly keep the above-standard level as total trades. On the other hand, India shows negative trade integration as a total trade. It seems to be affected by the existing geographical condition between Thailand and India. The usual sea transportation of trade goods has to go through the Strait of Malacca at present, which is far the longer way compared with the “greater circle” distance. Thus, the trade volume between Thailand and India may have to be confined due to the detour through the Strait of Malacca. It implies that if the alternative transportation route near to their “greater circle” distance were developed, the trade volume might be expected to expand following gravity-trade model. In this sense, the development of deep seaport and access-roads in the area of Dawei in Myanmar, which is planned between Thailand and Myanmar, is of vital importance since its development would contribute to cutting the real route remarkably shorter towards the “greater circle” distance between Thailand and India.

4. Concluding Remarks

This paper examined the extent of the trade integration of Thailand with the Mekong region in comparison with its trade integration with the other advanced ASEAN economies and the other major partners (China, India, Japan, and the United States), by using the gravity trade model as an analytical framework, for the period from the 1980s through the 2000s. The strategic purpose is to review the two-decade progress of the GMS cooperation from such quantitative perspectives as trade integration.

We found that Thailand’s trade integration with the Mekong region has remarkably grown from the 1980s to the 2000s, in the sense that Thailand’s total trade with the Mekong region, which lies below the gravity-model standard in the 1980s, exceeds the standard in the 1990s and the 2000s. It might reflect the steady progress of the GMS collaboration efforts since 1992. However, we also found that the intensity of Thailand’s trade integration with the Mekong region is still behind that with advanced ASEAN

even in the 2000s. It might come from the higher service-link costs in Lao PDR, Cambodia, and Myanmar that prevent the Mekong region from being fully involved in international production network. With regard to Thailand's trade integration with the other major partners, China, Japan and the United States still keep the above-standard level as total trades, whereas India shows negative trade integration probably due to the detour route through the Strait of Malacca.

Table 1 The trends in trade integration of Thailand with major trading partners

Thailand's exports to:	1990		2000		2010		2010/2000
	mil.dollars	% of total	mil.dollars	% of total	mil.dollars	% of total	growth
CLMV	127	0.5	2,070	3.0	12,394	6.3	6.0
Cambodia	1	0.0	347	0.5	2,340	1.2	6.7
Lao PDR	66	0.3	381	0.6	2,135	1.1	5.6
Myanmar	42	0.2	504	0.7	2,073	1.1	4.1
Vietnam	18	0.1	838	1.2	5,846	3.0	7.0
Advanced ASEAN	2,592	11.2	11,230	16.3	31,826	16.3	2.8
Indonesia	154	0.7	1,338	1.9	7,350	3.8	5.5
Malaysia	575	2.5	2,813	4.1	10,569	5.4	3.8
Philippines	167	0.7	1,082	1.6	4,888	2.5	4.5
Singapore	1,696	7.3	5,997	8.7	9,019	4.6	1.5
China	269	1.2	2,806	4.1	21,479	11.0	7.7
India	63	0.3	566	0.8	4,395	2.2	7.8
Japan	3,969	17.2	10,164	14.7	20,424	10.5	2.0
United States	5,240	22.7	14,706	21.3	20,243	10.4	1.4
World	23,072	100.0	68,964	100.0	195,364	100.0	2.8
Thailand's imports from:	1990		2000		2010		2010/2000
	mil.dollars	% of total	mil.dollars	% of total	mil.dollars	% of total	growth
CLMV	279	0.8	671	1.1	5,239	2.8	7.8
Cambodia	9	0.0	8	0.0	217	0.1	27.5
Lao PDR	44	0.1	76	0.1	759	0.4	10.0
Myanmar	132	0.4	256	0.4	2,849	1.5	11.1
Vietnam	94	0.3	331	0.5	1,414	0.8	4.3
Advanced ASEAN	3,912	11.7	9,158	14.8	25,352	13.7	2.8
Indonesia	198	0.6	1,299	2.1	5,742	3.1	4.4
Malaysia	1,125	3.4	3,344	5.4	10,837	5.9	3.2
Philippines	109	0.3	1,098	1.8	2,404	1.3	2.2
Singapore	2,480	7.4	3,416	5.5	6,370	3.5	1.9
China	1,107	3.3	3,377	5.5	24,528	13.3	7.3
India	544	1.6	620	1.0	2,280	1.2	3.7
Japan	10,144	30.4	15,315	24.7	38,320	20.8	2.5
United States	3,600	10.8	7,291	11.8	10,884	5.9	1.5
World	33,421	100.0	61,924	100.0	184,613	100.0	3.0

Source: Directions of Trade Statistics (International Monetary Fund)

Table 2a Gravity model estimation on Thailand's exports

Dependent variables	Thailand's Exports		
	Baseline	CLMV	Major Partners
Const.	-9.76 ***	-10.20 ***	-10.46 ***
Joint GDP: $\ln(Y_i^*Y_t)$	0.83 ***	0.83 ***	0.81 ***
Joint GDP per capita: $\ln(Y_i/P_i^*Y_t/P_t)$	0.08 ***	0.08 ***	0.09 ***
Distance	-1.25 ***	-1.20 ***	-1.09 ***
Cambodia_90		0.96	
Cambodia_00		1.24 **	
Laos_80		0.46	
Laos_90		1.42 ***	
Laos_00		1.67 ***	
Myanmar_80		-2.12 ***	
Myanmar_90		-0.70	
Myanmar_00		0.43	
Vietnam_80		-3.60 ***	
Vietnam_90		-0.04	
Vietnam_00		1.00 **	
CLMV_80			-1.41 ***
CLMV_90			0.94 ***
CLMV_00			1.45 ***
Advanced ASEAN_80			1.00 ***
Advanced ASEAN_90			1.02 ***
Advanced ASEAN_00			1.52 ***
China_80			0.63
China_90			0.12
China_00			0.79
India_80			-0.89 *
India_90			-1.23 **
India_00			-0.18
Japan_80			0.76
Japan_90			0.64
Japan_00			0.94 *
U.S._80			1.39 ***
U.S._90			1.69 ***
U.S._00			1.50 ***
Number of observations	4,504	4,504	4,504

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

Source: Direction of Trade Statistics by IMF; World Development Indicators by the World Bank; World Economic Outlook Database, October 2010 and 2012, by IMF

Table 2b Gravity model estimation on Thailand's imports

Dependent variables	Thailand's Imports		
	Baseline	CLMV	Major Partners
Const.	-10.79 ***	-10.28 ***	-11.02 ***
Joint GDP: $\ln(Y_i^*Y_t)$	0.83 ***	0.83 ***	0.77 ***
Joint GDP per capita: $\ln(Y_i/P_i^*Y_t/P_t)$	0.19 ***	0.19 ***	0.22 ***
Distance	-1.39 ***	-1.44 ***	-1.19 ***
Cambodia_90		-0.48	
Cambodia_00		-2.06 ***	
Laos_80		-1.28	
Laos_90		0.17	
Laos_00		0.46	
Myanmar_80		-0.71	
Myanmar_90		-0.33	
Myanmar_00		1.28 **	
Vietnam_80		-2.73 ***	
Vietnam_90		-0.32	
Vietnam_00		-0.00	
CLMV_80			-0.65
CLMV_90			0.50
CLMV_00			0.68 *
Advanced ASEAN_80			1.64 ***
Advanced ASEAN_90			1.54 ***
Advanced ASEAN_00			1.76 ***
China_80			2.00 ***
China_90			1.54 **
China_00			1.65 ***
India_80			0.19
India_90			0.87
India_00			0.54
Japan_80			2.15 ***
Japan_90			1.70 ***
Japan_00			1.75 ***
U.S._80			2.08 ***
U.S._90			1.84 ***
U.S._00			1.31 **
Number of observations	4,073	4,073	4,073

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

Source: Direction of Trade Statistics by IMF; World Development Indicators by the World Bank; World Economic Outlook Database, October 2010 and 2012, by IMF

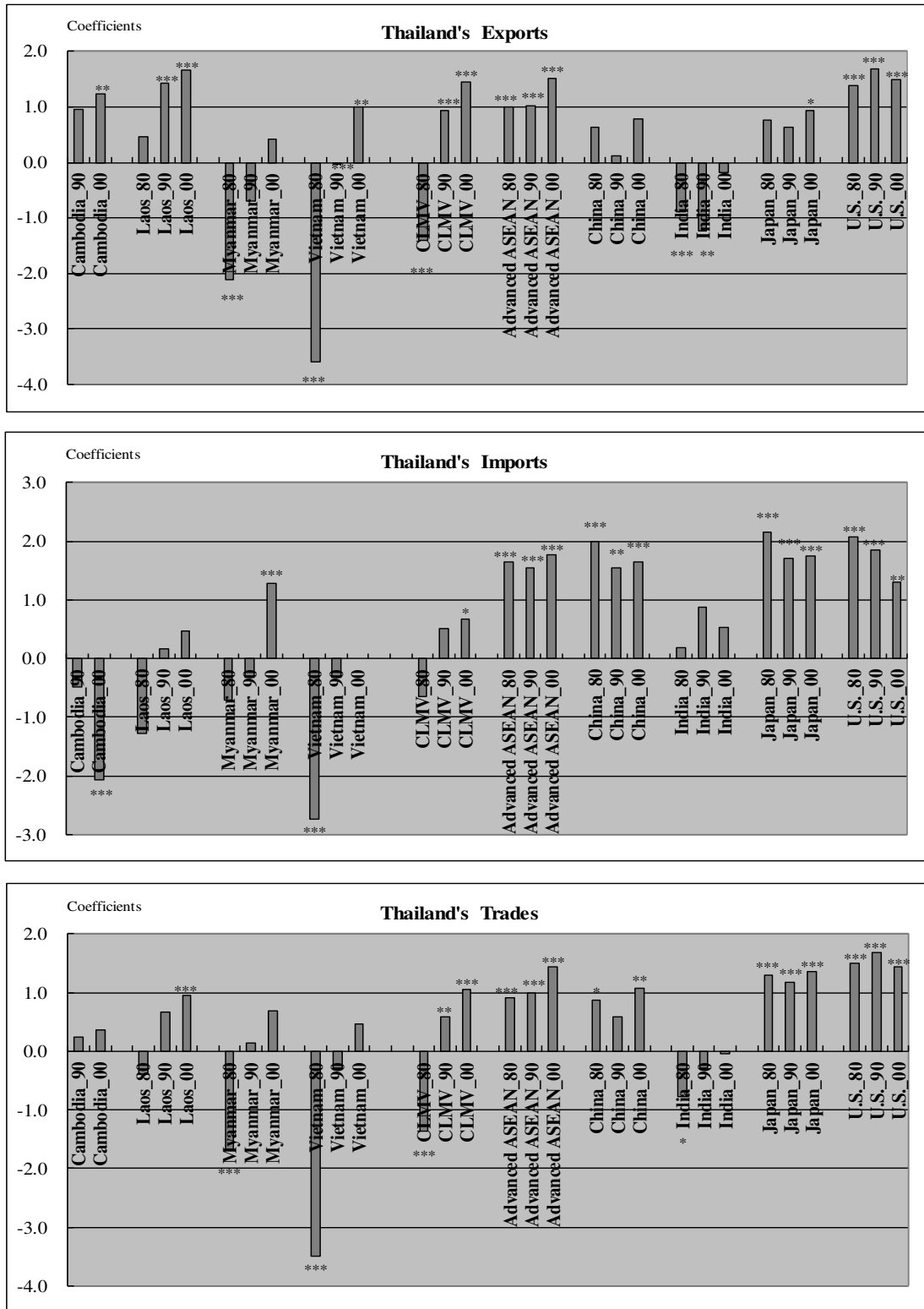
Table 2c Gravity model estimation on Thailand's trades (exports plus imports)

Dependent variables	Thailand's Trades (Exports plus Imports)		
	Baseline	CLMV	Major Partners
Const.	-7.53 ***	-7.53 ***	-7.65 ***
Joint GDP: $\ln(Y_i^*Y_t)$	0.78 ***	0.78 ***	0.74 ***
Joint GDP per capita: $\ln(Y_i/P_i^*Y_t/P_t)$	0.10 ***	0.10 ***	0.11 ***
Distance	-1.22 ***	-1.21 ***	-1.08 ***
Cambodia_90		0.24	
Cambodia_00		0.36	
Laos_80		-0.39	
Laos_90		0.66	
Laos_00		0.96 **	
Myanmar_80		-1.66 ***	
Myanmar_90		0.14	
Myanmar_00		0.69	
Vietnam_80		-3.50 ***	
Vietnam_90		-0.28	
Vietnam_00		0.47	
CLMV_80			-1.37 ***
CLMV_90			0.58 **
CLMV_00			1.05 ***
Advanced ASEAN_80			0.92 ***
Advanced ASEAN_90			1.00 ***
Advanced ASEAN_00			1.43 ***
China_80			0.87 *
China_90			0.59
China_00			1.07 **
India_80			-0.77 *
India_90			-0.29
India_00			-0.04
Japan_80			1.30 ***
Japan_90			1.18 ***
Japan_00			1.36 ***
U.S._80			1.49 ***
U.S._90			1.68 ***
U.S._00			1.43 ***
Number of observations	4,036	4,036	4,036

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

Source: Direction of Trade Statistics by IMF; World Development Indicators by the World Bank; World Economic Outlook Database, October 2010 and 2012, by IMF

Figure 1 Trade integration of Thailand with the GMS and the other ASEAN



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

Source: Direction of Trade Statistics by IMF; World Development Indicators by the World Bank; World Economic Outlook Database, October 2010 and 2012, by IMF

Table 3 GDP Per Capita and Logistics Performance Index in ASEAN

	Singapore	Malaysia	Thailand	Philippines	Indonesia	Vietnam	Lao PDR	Cambodia	Myanmar
GDP per capita (US dollar) in 2010	43,865	8,737	4,992	2,123	2,981	1,174	1,105	753	742
Logistics Performance Index 2012	4.13	3.49	3.18	3.02	2.94	3.00	2.50	2.56	2.37
Global Ranking in Logistics Performance Index 2012 (Total: 155 countries)	1	29	38	52	59	53	109	101	129
<Customs>	1	29	42	67	75	61	94	108	122
<Infrastructure>	2	27	43	62	84	72	107	127	133
<International shipments>	2	27	36	55	57	38	124	103	117
<Logistics competence>	6	30	48	39	61	81	105	103	111
<Tracking & tracing>	6	29	45	38	51	48	111	78	129
<Timeliness>	1	28	39	69	41	38	118	103	140

Sources:

GDP per capita: World Economic Outlook Database, October 2012, IMF

Logistics Performance Index 2012: The World Bank, (<http://lpisurvey.worldbank.org/international/global>)

Notes

- [1] The Greater Mekong Sub-region included Yunnan Province of China as well as five countries in the Mekong region in 1992. Since 2004 Guangxi Zhuang Autonomous Region of China has also joined the GMS program.
- [2] Cambodia, Lao PDR, Myanmar, and Viet Nam, which joined the ASEAN in the 1990s, agreed to enact zero tariff rates by 2015.
- [3] Linder (1961) suggested that countries with similar per capita incomes will have similar demands.
- [4] 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).
- [5] Regarding with the data for Myanmar, since there is no data in the World Bank's "World Development Indicators, we alternatively use the data from World Economic Outlook Database, October 2010 and 2012, by IMF.
- [6] For the calculation of "greater circle" distance, the website, <http://www.distancebetweencities.us>, is available.
- [7] The service-link costs include those of transportation, finance, co-ordination, and communication.

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