Thailand in a World of Global Value Chains (GVCs): A Gravity Analysis of Bilateral Trade in Value-Added (TiVA)

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Abstract

A rise of Global Value Chain has increased complexity of international trade. From a trade that once relied on "goods", today, trade has been transformed into the flow of intermediate goods and final goods. These two distinctive words are a result of "Vertical Specialization", the process of breaking down single production process into multiple processes and relocate these processes in the most efficient location based on "dynamic comparative advantage" concept. This phenomenon in international trade has led to a new challenge for many emerging economies, especially those who rely on export as an engine of economic growth such as Thailand etc. This paper aims to analyze the impact of Global Value Chains on Thai export performance by using Gravity model. The analysis focuses on determinants of bilateral trade in both "Gross" and "Value-added" terms and compare the results by testing equality to measure any divergence between these two terms.

Keywords: Global Value Chains, Vertical Specialization, Trade in Value-Added, Dynamic Comparative Advantage.

I. Introduction

The beginning of Global Value Chains can be traced back to as early as 1960s when four major economies in Asia: South Korea, Taiwan, Hong Kong, and Singapore imitated the success of Japanese economic development by employing export-oriented policy and welcoming Foreign Direct Investment. This pattern is described as Flying Geese pattern coined by Japanese economist Kaname Akamatsu which states that production pattern of developing countries will follow the trace of dynamic comparative advantage. Countries with more advanced economies will lose comparative advantage to countries with less advanced economies. Production exists within advanced economies will be relocated in order to reduce cost of production and to increase efficiency in production. Driving with cost and efficiency incentives, direct investment started to emerge and flow into other Asian economies.

In economic literature, there exists many definitions to define this phenomenon, but mostly defined from different perspectives. Jones and Kierzkowski (1990) defined relocation of production as product fragmentation where they described, for the first time, the link of Global Value Chains with the breakdown of production processes. Arndt (1997) called the relocation of production processes as offshore sourcing or outsourcing. Feenstra (1998) described Global Value Chains as disintegration of production. The closest definition of Global Value Chains is "Vertical Specialization" (Hummels et al., 2001), defined as the breakup of production processes internationally which leads to specialization in tasks.

Despite many definitions, the main points of Global Value Chains are breakdown of production processes, relocation of production based on cost and efficiency incentives, and

specialization in task as a result of comparative advantages. The uniqueness of Global Value Chains has shaped a structure of international trade from trade in goods to trade in intermediate and final goods. One of the most renown example of product reflects the change in structure of international trade is the production of Apple's Ipad and Iphone. Production processes of Ipad and Iphone takes place in many locations internationally and many countries benefits from participation in Apple's production chain, but according to the study by Kraemer, Linden, and Dedrick on "Capturing Value-Added in Apple's Production Chain" (2011), US economy gains most of value-added while China's gain account for only 4 percent of total value-added.

The mentioned example implies that international trade under the emergence of Global Value Chains has become more complex and determinants of trade has changed drastically. Intermediate goods become one of important determinants affecting export performance (Beltramello, Backer, and Moussiegt, 2012). This raises many concerns over conventional trade measurement which does not take into account the influence of intermediate goods. Recently, OECD together with WTO point out Trade in Value-Added (TiVA) to be a better measurement of international trade over conventional statistics where trade is measured in "Gross" term.

Thailand participation in Global Value Chains started in early 1960s when the 1st National Economic Development plan was in effect. Foreign Direct Investment started to flow into Thailand due to geographical advantage and low labor cost. Although Thailand has adopted export-oriented policy in the early 1980s, it is not after Asian Finance Crisis in 1997 when Thai economy suffered harshly and structural change started to take place. Thai economy began relying heavily on export as a main engine of growth. In 2009, Thai export experienced negative growth for first time after

1997, but was able to recover quickly in 2010 before suffered from shock again in 2011 when Great Flood occurred.

With the structural change of Thai economy in 1997, Thai economy is more opened to trade which implies that Thailand is more connected to the world under the rise of Global Value Chains. Based on Figure 1. (see Appendix), Thailand degree of trade openness, the index measures degree of reliance on international trade, has increased steadily from 1998 to 2008 before remaining stable after Global Financial Crisis in 2008. By using linear line as reference to examine the trend of trade activities, trade openness is expected to increase, indicates the higher degree of integration of Thailand in international trade activities.

The motivation of this research is to study the impact of participation in Global Value Chains on Thai export performance. By comparing gross export to value-added export, the of impact can be investigated and meaningful policy recommendation is possible to be derived. Section II discusses literature review from previous studies on Global Value Chains. Section III specifies methodology used in this study and data description together with sources of data are mentioned. Section IV provides results and analysis of this study and section V, the last section, gives possible policy recommendation from this study together with conclusion.

II. Literature Review

The way Global Value Chains shape international trade results in many positive changes in global economy. From development economics viewpoint, positive gains from participating in Global Value Chains can be summarized into 3 main points:

- Decrease overall cost of production as firms in developed countries can relocate their plants in lower cost area and firms in developing countries do not need to build the whole course of production facility. By focusing on comparative advantage, firms are able to participate and integrate themselves in global economy (Kowalski et al, 2015).
- Participating in Global Value Chains creates more job opportunities. Firms driven by low cost incentive will seek labors with lower cost which exists in local economy (UNCTAD, 2013).
- Technological transfer to local is possible through Global Value Chains since spillover effect from capital goods that flow into country will lead to local learning, resulting higher productivity of labor in long-run (Kawakami et al., 2012).

Although participating in Global Value Chains brings massive benefits to local economy, Global Value Chains does not guarantee success in developing local economy to later stage. This depends on degree of integration into Global Value Chains, initial location in global production line and international competitiveness of local economy (Beltramello, Backer, and Moussiegt, 2012). If local economy operates in upstream activities where part and components are mainly traded, gains from trade will be lower in comparison to downstream activities where it is closer to final demand, vice versa. The growing importance of Global Value Chains has challenged the measurement of international competitiveness of economies. The traditional way of using export as measurement is no longer valid as import of intermediate goods become one of determinant of export. When Global Value Chains is important, ties of economy with different level of technology

determines international competitiveness. If local economy can absorb technology fast enough through local learning, the faster economy can develop along the latter of global production line.

The challenges posed by the rise of Global Value Chains is not limited to determinants of trade flows. As mentioned in previous section, the overall conventional statistics used in measuring trade is biased as double counting of intermediate goods does not reflect real value of trade. One of the most successful model used in measuring trade flows for the last 50 years like gravity model also has been challenged. As gravity model uses gross trade flow in estimating trade activities, the model ignores the influence of intermediate goods (Baldwin and Taglioni, 2011). Therefore, by using gravity model to estimate trade in Global Value Chains, the result is not accurate.

In recent economic literature, there exists two main approaches to deal with trade under the rise of Global Value Chains. The first approach is a mathematical framework provided by Koopman (2010) to decompose import of intermediate goods from gross export, resulting in value-added export which can be incorporated in standard gravity model to better estimate trade activities. The second approach is a modified gravity model proposed by Noguera (2012). This version of gravity model incorporates World Input-Output Database into gravity model and use it to create multi-stage gravity model where trade in intermediate goods is determined first before trade in final good is determined.

One of the first study to follow the approach of Koopman is Guilhoto, Siroen, and Yucer (2015). They study the impact of Global Value Chain on Brazil export performance by using standard gravity model to analyze the difference between gross and value-added export. Both set of exports are determined by the same determinants. They found that by decomposing the effect of

intermediate goods from gross export, standard gravity model is better at explaining value-added export. Although there exists no significant difference between two set of exports, exporter and importers fixed effect must be controlled in order to reduce heteroscedasticity bias of data.

The very first attempt to use Noguera's gravity model to estimate trade in value-added can be found in Miroudot (2015). He found out that by separating intermediate goods from final goods, gravity model can estimate trade flows with higher accuracy and by taking into account third countries demand, gravity model fits the data even better. The influence of third country demand indicates Global Value Chains go beyond bilateral trade.

This paper follows the first approach of Koopman (2014) as newly created database "Trade in Value-Added (TiVA)" is available. Although standard gravity model has limitation when it is used to estimate trade in Global Value Chains, a simple and comprehensive framework of Thailand's role in Global Value Chains can be derived. Value-added export and gross export of Thailand are provided by OECD database. Full descriptions of data and methodology will be discussed in the next section.

III. Methodology and Data

In this study, standard gravity model is used to estimate trade flows between Thailand and 60 importing countries. Trade flow data are measured in gross and value-added terms where they are made available by OECD-WTO joint initiative database, "Trade in Value-Added" or "TiVa". GDP of exporting country and importing countries are used as proxy for economic mass in gravity model. GDP data are drawn from World Bank Database with an exception of Taiwan GDP which is drawn

from IMF database. Geographical data, namely bilateral distance, contiguity and landlocked countries, are available in gravity package provided by CEPII. These variables are used to approximate trade cost in the model.

Free Trade Agreements between exporting country and importing countries include both bilateral Free Trade Agreements and Regional Trade Agreements that are signed by both parties and in effect. Trade agreements under negotiation are excluded from this dataset. Asian Development Bank Database on FTAs provides complete information related to FTAs. Weighted Average Tariff rates of importing countries is drawn from World Bank Database, but data is incomplete as data for some countries are missing. Free trade agreements and weighted average tariff rate are used to control the impact of trade policy on trade flows.

The extension from standard gravity model of this study is to include Global Value Chains variables. As discussed in previous section, degree of participation in Global Value Chains and location in global production line are crucial determinants of trade flows. VS participation index and Distance from Final demand index are included in the model to jointly determine trade flows with other groups of variables. Both indices are derived from OECD Global Value Chain indicators. VS participation index is expected to create positive impact of trade flows while Distance from Final Demand index is expected to create negative impact on trade flows.

Panel data is constructed based on gravity package provided by CEPII. Data are based on 1995, 2000, 2005, 2008, 2009, 2010, and 2011 estimations in order to match all variables together with value-added export. As part of data are not available in some years, thus when estimating the model, the lower degree of freedom can be seen.

The model is estimated based on Ordinary Least Square (OLS) and Pseudo Poisson Maximum Likelihood (PPML) for the sake of comparison and robustness checking. By using OLS, it is possible to control exporter's fixed effect and importer's fixed effect since degree of freedom is high, but OLS cannot handle heteroscedasticity issue in the model. Thus, OLS estimation cannot be guaranteed to be the best one. The PPML model deals with heteroscedasticity better than OLS model, the estimated coefficients of PPML model often yields lower value in comparison to coefficients estimated from OLS model.

After both models are estimated, test of equality of coefficients between regressions are used to test the difference of estimated coefficients between gross export and value-added exports. Since objective of this study is to study the impact of Global Value Chains on Thai export and intermediate good effect of Global Value Chains that leads to decomposition of gross export into value-added export, this technique is employed in a sense that if Global Value Chains does have an impact on Thai export, the majority of tests must reject null hypothesis, providing strong evidence confirming hypothesis. This type of test conveys many implication, thus can give beneficial policy recommendation. This technique is limited to OLS model only due to technical errors.

IV. Result and Analysis.

The following is models I estimated and results are shown in table below.

$$lnX_{ijt} = \beta_1 lnGDPEx_{it} + \beta_2 lnGDPIm_{jt} + \beta_3 lndistw_{ij} + u_{ijt} \quad \textbf{Model 1a}$$

$$\ln V_{ijt} = \beta_1 \ln GDPEx_{it} + \beta_2 lnGDPIm_{jt} + \beta_3 lndistw_{ij} + u_{ijt} \quad \textbf{Model 1b}$$

$$\ln X_{ijt} = \beta_1 \ln GDPEx_{it} + \beta_2 lnGDPIm_{jt} + \beta_3 lndistw_{ij} + \beta_4 Contig_{ij} + \beta_5 lndlock_i + \beta_6 FTA_{ijt} + \beta_7 tariff_j + \beta_8 Parti_{it} + \beta_9 DFD_{it} + u_{ijt} \quad \textbf{Model 2a}$$

$$\ln V_{ijt} = \beta_1 \ln GDPEx_{it} + \beta_2 lnGDPIm_{jt} + \beta_3 lndistw_{ij} + \beta_4 Contig_{ij} + \beta_5 lndlock_i + \beta_6 FTA_{ijt} + \beta_7 tariff_j + \beta_8 Parti_{it} + \beta_9 DFD_{it} + u_{ijt} \quad \textbf{Model 2b}$$

Table 1. Result of Model 1a and 1b

Model	1a	1b	2a	2b
	ln X	ln V	ln X	ln V
Estimator	OLS	OLS	PPML	PPML
lnGDPEx	0.745***	0.745***	0.107***	0.112***
	(0.0784)	(0.0784)	(0.0139)	(0.0151)
lnGDPIm	0.553***	0.526***	0.111***	0.112***
	(0.0649)	(0.0649)	(0.0137)	(0.0148)
lndistw	-0.715***	-0.561**	-0.0968***	-0.107***
	(0.267)	(0.267)	(0.0135)	(0.0145)
N	420	420	420	420
R^2	0.998	0.998	0.973	0.973
Fixed Effect	Yes	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

As one can see, model 1a and 1b are based on standard gravity model. Gross export (X) and value-added export (V) are estimated against GDP of exporting country (GDPEx – Thailand) , GDP of importing countries (GDPIm – list of countries in appendix), and weight average distance between exporting and importing countries (distw). GDP of exporting and importing countries are used to proxy for economic sizes while distance between two countries are used as a proxy for trade cost. Table 1. shows the estimated results of model 1a and 1b. The estimated result from both OLS and PPML yield consistent coefficients and signs although value of coefficients from PPML model are lower than OLS model. All coefficients are statistically significant at 0.01 level which

confirms that from this panel dataset, standard gravity model is valid. Extension from model 1 is possible since there exists more variables to be controlled for before comparing coefficients of both models.

Table 2. Result of Model 2a and 2b

Model	2a	2b	2a	2b
	ln X	ln V	ln X	ln V
Estimator	OLS	OLS	PPML	PPML
lnGDPEx	0.918***	0.918***	0.115***	0.121***
	(0.121)	(0.118)	(0.0223)	(0.0237)
lnGDPIm	0.342***	0.394***	0.120***	0.137***
	(0.111)	(0.108)	(0.0219)	(0.0235)
lndistw	-0.575	-0.456	-0.0833***	-0.113***
	(0.348)	(0.341)	(0.0194)	(0.0211)
Contig	1.461*	1.375*	0.0688	0.0419
	(0.850)	(0.832)	(0.134)	(0.143)
lndlock	-2.551***	-2.690***	0.128*	0.153**
	(0.276)	(0.270)	(0.0708)	(0.0755)
FTA	-0.00448	0.00403	-0.0342***	-0.0352***
	(0.151)	(0.148)	(0.0114)	(0.0112)
Tariff	-0.0211*	-0.0211**	-0.00162	-0.00121
	(0.0108)	(0.0106)	(0.00157)	(0.00159)
Parti	0.0187**	0.0132*	0.00305***	0.00238**
	(0.00732)	(0.00717)	(0.000981)	(0.00105)
DFD	-1.282***	-1.370***	-0.247***	-0.277***
	(0.326)	(0.319)	(0.0523)	(0.0551)
N	255	255	255	255
R^2	0.998	0.998	0.979	0.980
Fixed Effect	Yes	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

As an extension from model 1, model 2 contains additional variables controlling various aspects of international trade that can affect trade performance of Thailand. Total number of independent variables increase from 3 in model 1 to 9 in model 2. Standard gravity part remains statistically significant only in PPML model, not in OLS model. Distance variable (distw) from both model 2a and 2b are not statistically significant under OLS estimation. This is due to poor performance of OLS technique in dealing with heteroscedasticity and multicollinearity issues in gravity model. Global Value Chains variables from both estimation techniques, namely – Participation index (Parti) and Distance from Final Demand index (DFD), are statistically significant and consistent with expected relationship. Participation index has positive relationship while Distance from Final Demand index has negative relationship. Estimated coefficients of Global Value Chain variables contain crucial implication in deriving policy recommendation since position of Thai economy under global production line can be located.

Table 3. Test of equality Model 1a vs Model 1b

Model H_o: $\beta_k^a - \beta_k^b = 0$ vs H_a: $Otherwise$ Estimator	1a vs 1b ln X vs ln V OLS
lnGDPEx	$\chi^2(1) = 0.00$ Prob > χ^2 = 0.9864
lnGDPIm	χ^2 = 4.56** Prob > χ^2 = 0.0328
lndistw	χ^2 = 8.52*** Prob > χ^2 = 0.0035

Test of equality has chi-square distribution.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Apart from Global Value Chain variables, Trade cost variables are extended to include geographical characteristics like contiguity (Conti) and landlocked (lndlock) variables which both are dummy variables, taking value of 0 and 1. Trade policy variables, Free trade agreement (FTA) and Average tariff rate (Tariff), are also added into model 2. The latter are added in order to control factors. So, estimated coefficients are not important from this perspective.

Table 3. shows the result of test of equality between gross export (model 1a) and value-added export (model 1b) under standard gravity model. As 2 out of 3 independent variables pass test of equality which provide a strong evidence of Global Value Chains impact on Thai exports. Table 4. shows the result of test of equality between model 2a and 2b. Only 4 out of 9 independent variables confirm statistically difference between gross and value-added export. Although the concreteness of evidence is lower under the extension from gravity model, it is still strong enough to confirm the hypothesis of this study.

Table 4. Test of equality Model 2a vs Model 2b

Model H_o: $\beta_k^a - \beta_k^b = 0$ vs H_a: $Otherwise$ Estimator	2a vs 2b ln X vs ln V OLS
lnGDPEx	χ^2 = 0.00 Prob > χ^2 = 0.9945
lnGDPIm	χ^2 = 5.93** Prob > χ^2 = 0.0149
lndistw	χ^2 = 3.09* Prob > χ^2 = 0.0788
Contig	χ^2 = 0.27 Prob > χ^2 = 0.6007
lndlock	χ^2 = 6.76*** Prob > χ^2 = 0.0093
FTA	χ^2 = 0.08 Prob > χ^2 = 0.7709

Tariff	χ^2 = 0.00 Prob > χ^2 = 0.995
Parti	χ^2 = 15.00*** Prob > χ^2 = 0.0001
DFD	χ^2 = 1.936 Prob > χ^2 = 0.1650

Test of equality has chi-square distribution.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

V. Policy Recommendation.

As main concern of this study is the impact of international trade phenomenon on Thai export, policy recommendations contains two distinctive policies: Trade policy and Stability policy. Trade policy reflects the mean of improving trade performance of Thai economy while Stability policy concerns with the exposure of Thai economy reliance on trade.

Based on coefficients of Global Value Chains variables in model 2, one can approximately locate economic position of Thai economy on global production line, but location alone is impossible to convey any relevant information. Hence, I used data from OECD Global Value Chains indicator to construct smile curve, the graph that shows relationship of relative position on global production line and value-added (See appendix). Value-added can be highly generated if economic position of an economy located at extreme upstream end (where Research and Development rules) and downstream end (where large market rules), but Thailand is located at the trough part of smile curve where intermediate goods rule. So, it is recommended for government to help promoting R&D environment, upgrading and expanding existing R&D facility. Government is also recommended to create incentive system for firms to be engaged into R&D activities. It might seem difficult for Thai firms to penetrate into large market at downstream ends.

It requires brands and investment in marketing in order to capture market value. So, government should encourage and help firms to set up brands as market opportunity still open for Thailand.

As Thai economy relies more on trade to generate economic growth, Thai economy is more likely to synchronize with world economy. So, Thailand is more exposure to external shock. In order to stabilize economy, it is recommended that local large mass consumption market can be an alternative absorption to cope with the shock. Thai export market should also be diversified more as top three export partners (USA, China, and Japan) of Thailand cumulatively rules more than 30 percent. If Thai economy can be rebalanced, economic growth can be consistent which create positive impact in long-run.

VI. Conclusion

Thailand is one of the country that relies on international trade. Thailand trade of openness has been on increasing trend since Asian Financial Crisis in 1997. Together with recent development in international trade, “Global Value Chains”, this has led to the main research question focusing on impact of Global Value Chains on trade performance of Thailand.

The study use gravity model to investigate the impact by estimating standard gravity model using gross and value-added export in order to check validity of dataset before extend it later to control for more factors affecting export. One of main variables that is included in the extension part is Global Value Chain variables since the way it shapes the structure of international trade from final goods to intermediate goods. Global Value Chains variables are statistically significant and consistent to the expected relationships. Test of equality of coefficients between models are used to verify the impact of Global Value Chains on Thai export on a basis that if the difference

between gross and value-added export is significant, it confirms hypothesis of this study. Main criteria of this test is majority of test on independent variables must be statistically significant.

The result from test of equality on both models support main hypothesis of this study, Global Value Chains has direct impact on Thai export. It is unambiguously consistent to the fact that Thai economy relies heavily on trade to generate economic growth. Policy recommendations drawn from this study can be reflected from two perspective policy: Trade policy and Stability policy. In trade policy, it is recommended that Thai economy should be relocated by moving toward upstream economy and downstream economy. In stability policy, it is recommended that Thai economy should be rebalanced by reviving consumption as part of absorption plan from external shock. It is also recommended to diversify Thai export market more to reduce potential adverse effect from external shock.

Limitation of this study is concerned over two main areas. First, gravity model performs poorly in estimating trade under Global Value Chains. It ignores the gravity effects third party market since standard gravity model assumes that final consumption is located at destination of export which is contradicted to trade under Global Value Chains where final consumption does not necessarily occur at destination of export. Noguera's gravity model is recommended instead. Second, there exists endogeneity problem within gravity model because there exists two-way relationship between variables within model itself. It is recommended to construct structural and reduced-form equations in order to perform two stage least square technique.

References

Anrdt, S. (1997). Globalization and the Opened Economy. The North American Journal of Economics and Finance 8(1): 71-79.

Baldwin, R., Taglioni, D. (2012). Gravity Chain: Estimating Bilateral Trade Flows When Parts and Components trade is important. European Central Bank – Euro System Working Paper Series 1401/2011.

Beltramello, A., K. De Backer and L. Moussiegt (2012), "The Export Performance of Countries within Global Value Chains (GVCs)", OECD Science, Technology and Industry Working Paper, 2012/02, OECD Publishing. http://dx.doi.org/10.1787/5k9bh3gv6647-en

Feenstra, R. (1998). Integration of Trade and Disintegration of Production in the Global Economy, Journal of Economic Perspectives, 12(4): 31-50.

Guilhoto, J., Siroen, J., Yucer, A. (2015). The Gravity Model, Global Value Chain and the Brazilian States. Document De Travail: DT/2015-02

Hummels, D., Ishii, J.Yi, K. (2001). The Nature and Growth of Vertical Specilization in World Trade. Journal of International Economics, 54:75-96.

Jones, R. and Kierzkowski, H. (1990). The Role of Service in Production and International Trade: A Theoretical Framework. In R. Jones and A.Krueger, eds., The Political Economy of International Trade, Basil Blackwell, Oxford.

Kawakami, M. and Sturgeon, T.J. (2012). The Dynamics of Local Learning in Global Value Chains: Experience from East Asia. IDE-JETRO Series, Palgrave Macmillan.

Kraemer, K., Linder, G., Dedrick, J.(2011) , Capturing Value in Global Network: Apple's Ipad and Iphone. Alfred P. Sloan Foundation and the U.S. National Science Foundation (CISE/IIS).

Koopman, R., Wang, Z., Wei, S.J. (2014). Tracing Value-added and Double Counting in Gross Exports. American Economic Review, 104(2): 459-494.

Kowalski, P. et al. (2015). Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-related Policies. OECD Trade Policy Papers, 179.

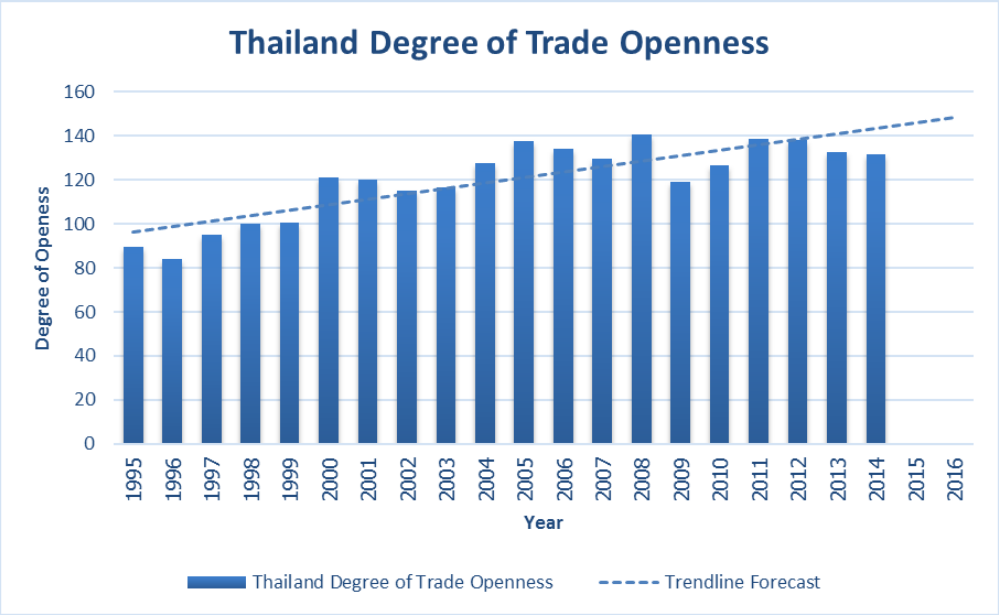
Miroudot, S. (2015). Gravity in a World of Global Value Chains: The International Input-Output Structure as a Determinant of Bilateral Trade. OECD Working Paper.

Noguera, G. (2012). Trade costs and Gravity for Gross and Value-added Trade. Job Working Paper.

UNCTAD (2013). World Investment Report 2013: Global Value Chains: Investment and Trade for Development, United Nations Conference on Trade and Development, United Nations Publication ISBN 978-92-1-112868-0.

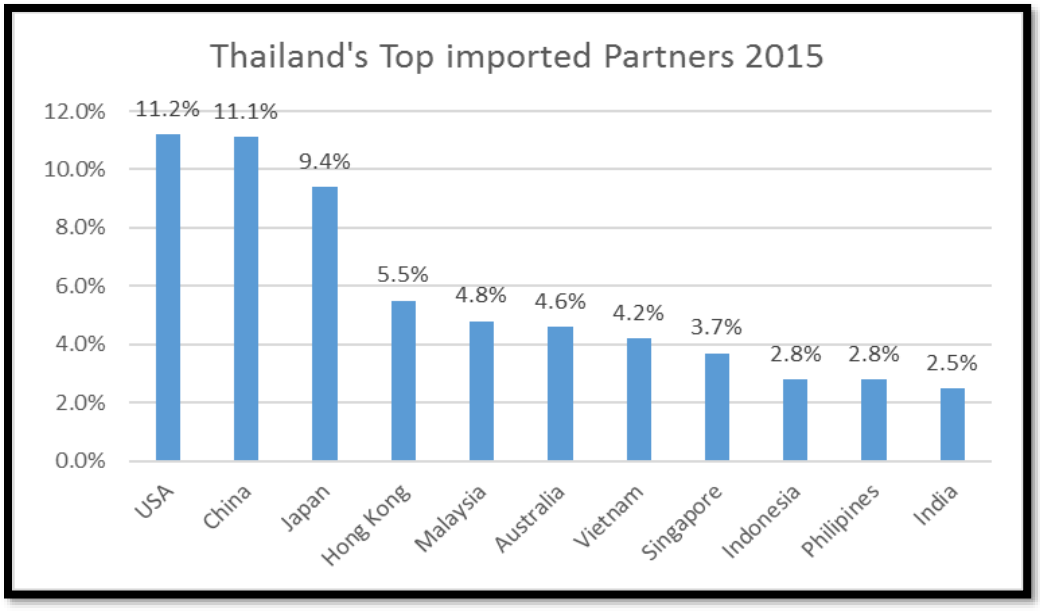
Appendix

Figure 1. Thailand Degree of Trade Openness



Source: World Back Indicator

Figure 2. Thailand Export Partner



Source: TradeMap

Figure 3. Thailand Location on Smile curve.

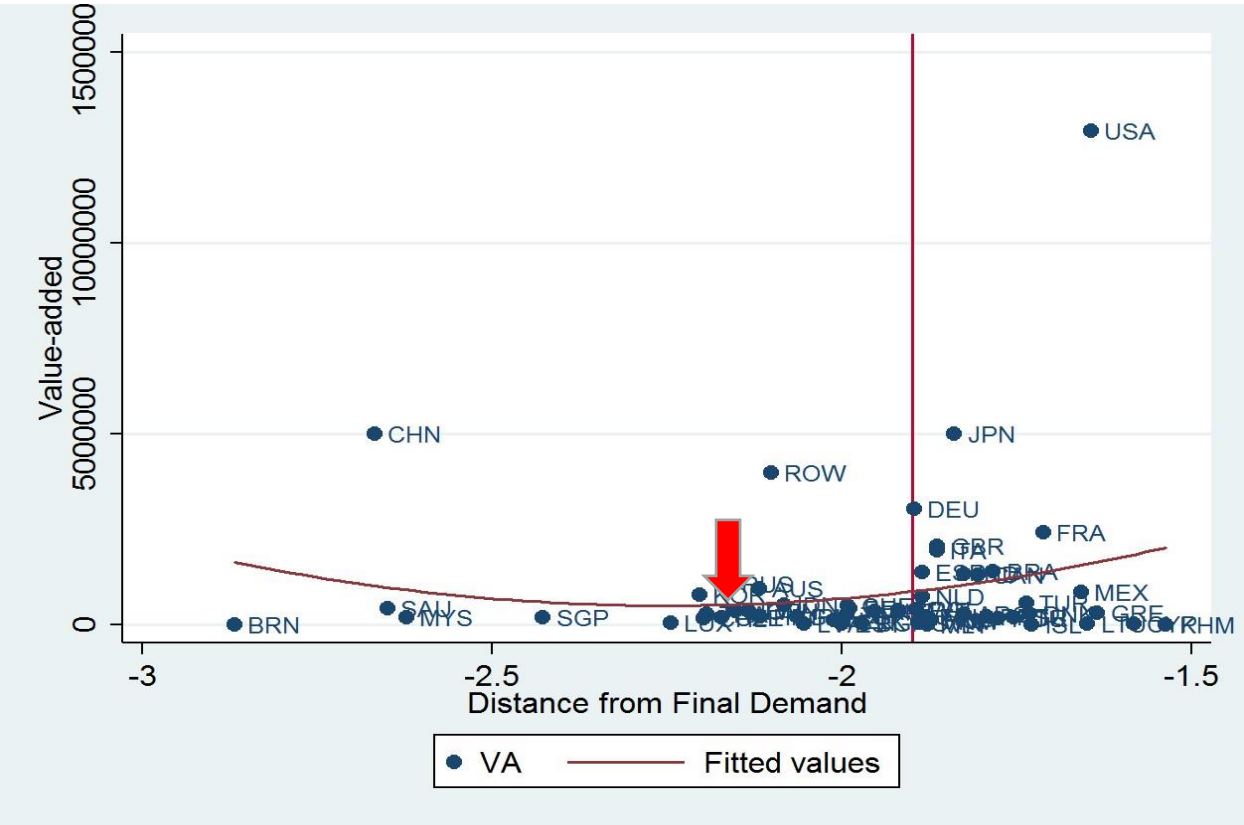


Table 5.. Correlation

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. corr X V GDPEX GDPIM distw Tariff DFD Parti Contig lndlock FTA
(obs=255)
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	X	V	GDPEX	GDPIM	distw	Tariff	DFD	Parti	Contig	lndlock	FTA
X	1.0000										
V	0.9909	1.0000									
GDPEX	0.1454	0.1267	1.0000								
GDPIM	0.5983	0.6176	0.0833	1.0000							
distw	-0.2936	-0.2544	-0.0875	0.1068	1.0000						
Tariff	-0.0499	-0.0483	-0.2768	-0.1019	0.1162	1.0000					
DFD	0.0818	0.0670	0.5917	0.0708	-0.0695	-0.4658	1.0000				
Parti	0.0982	0.0814	0.5716	0.0640	-0.1093	-0.4351	0.8144	1.0000			
Contig	0.1379	0.0847	0.0692	-0.0520	-0.2771	0.0908	0.0588	0.1020	1.0000		
lndlock	-0.1342	-0.1298	-0.0327	-0.1228	-0.0087	-0.0950	-0.0288	-0.0376	-0.0516	1.0000	
FTA	0.3933	0.3319	0.1286	0.0064	-0.5489	0.0825	0.0970	0.1396	0.3606	-0.1432	1.0000

Table 6. List of 60 importing countries

AUS: Australia	HUN: Hungary	POL: Poland	BRN: Brunei Darussalam	LTU: Lithuania
AUT: Austria	ISL: Iceland	PRT: Portugal	BGR: Bulgaria	MYS: Malaysia
BEL: Belgium	IRL: Ireland	SVK: Slovak Republic	KHM: Cambodia	MLT: Malta
CAN: Canada	ISR: Israel	SVN: Slovenia	CHN: China (People's Republic of)	PHL: Philippines
CHL: Chile	ITA: Italy	ESP: Spain	COL: Colombia	ROU: Romania
CZE: Czech Republic	JPN: Japan	SWE: Sweden	CRI: Costa Rica	RUS: Russia
DNK: Denmark	KOR: Korea	CHE: Switzerland	HRV: Croatia	SAU: Saudi Arabia
EST: Estonia	LUX: Luxembourg	TUR: Turkey	CYP: Cyprus	SGP: Singapore
FIN: Finland	MEX: Mexico	GBR: United Kingdom	HKG: Hong Kong, China	ZAF: South Africa
FRA: France	NLD: Netherlands	USA: United States	IND: India	TWN: Chinese Taipei
DEU: Germany	NZL: New Zealand	ARG: Argentina	IDN: Indonesia	TUN: Tunisia
GRC: Greece	NOR: Norway	BRA: Brazil	LVA: Latvia	VNM: Viet Nam