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PRODUCTION NETWORKS UNDER THE ASEAN PLUS SIX. A GOOD DEAL OR A THREAT?*

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Abstract. This study breaks up the gross trade of ASEAN countries into the different components of Value-added trade to analyze the integration of ASEAN into the Global Value Chain (GVC). The study employs a global input-output database using data by the years1997, 2004, and 2012. The research considers the possible effects of expanding ASEAN into an ASEAN Plus Six agreement from the Vertical Specialization point of view. Gross trade is further broken down into nine components of value-added trade which creates a series of indicators of value creation, participation-position in GVC, among others. The study found that ASEAN has made significant gains in enlarging total trade (235%), and thus undergoing a particularly faster growth in production sharing structures. Over the time, ASEAN has assumed a notable function across the GVC as a provider of value-added through parts and components (33%) than as a producer of final goods (30%). Vertical trade accounts for more than 43% of ASEAN gross exports, but it depends on foreign intermediate goods (35%) to produce its exports, most of them are supplied from Asia. ASEAN single production region has gained a little while it has grown with Asian partners and lost market share with NAFTA and Europe. The ASEAN Plus six leads to a broad range of integration and might translate to larger gains than Intra-ASEAN trade. While ASEAN is expanding faster regionally than globally, both in supplies and in demand, the ASEAN internal market might not be large enough to drive growth. Meanwhile the dynamics of ASEAN appear as being part of a strong GVC through Asia.

Keywords: vertical specialization; production networks; value-added trade; global input-output; ASEAN Six

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1. Introduction

The Association of Southeast Asian Nations (ASEAN) has actively promoted both regional and global liberalization and integration in the most recent years. Included in the main goals of the ASEAN are the free movement of services and goods, and investment across the region, the creation of a single production base able to compete globally, and its integration into the global economy (among others). Internally, ASEAN has achieved a large removal of tariffs and non-tariff barriers, engaged in trade facilitation programs, and worked in coordination, rules of origin, among other initiatives. However, Intra-ASEAN patterns of trade, while expanding fast, have remained similar to 2000 levels. The region seems to be supporting the extra-ASEAN integration more than building the Intra-ASEAN production base project.

At the same time, Asia is heading towards a more integrated region with the peculiarity of having a fragmented manufacturing structure under the pattern of vertical specialization, portrayed by a large and rapid expansion on back-and-forth operations in intermediate parts and components (henceforth, IPC) in the form of intra-industry trade. ASEAN has gained important competitiveness in fragmented structures and has re-oriented its trade flows from NAFTA and EU to Asian markets. All the six largest ASEAN members gained in immersion in vertical trade from the year 1997 to 2012, turning ASEAN into a region with the largest share of trade under vertical specialization equivalent to 55% (Esquivias Padilla, Sari, & Handoyo, 2017). However, ASEAN has a large dependency towards foreign IPC as inputs to their exports, particularly with East Asia being the largest supplier of IPC. ASEAN has turned towards Asia. By the year 2012, 78% of total IPC and 50% of total final good exported by ASEAN were to Asian countries. While the single production project region does not seem to be the engine of a more integrated ASEAN—or at least it is not changing the pattern of regional integration—it seems to be helping the ASEAN to a better integration into the Global Value Chain (henceforth GVC).

This study analyses the impact of the extension of the ASEAN single production base region to a wider scope of ASEAN Plus Six (China, S. Korea, Japan, India, Australia, and New Zeeland) not often explored previously under vertical trade. The issue of an increasingly dependent ASEAN has been raised (e.g. Haddad, 2007; Urata, 2008), however, this paper gives more recent data, includes more ASEAN countries, and it provides more detailed data on the sources of dependence as it splits exports into different components and it traces Value-added exports (rather than gross exports) from the origin to end. By doing that, this study offers links of the drastic development in regional trade with Vertical Specialization, particularly evaluating changes in patterns over the period of 15 years. This study looks into the following research questions: How does the pattern of Vertical Specialization change by including the six partners proposed by ASEAN Plus Six?, and How does the role of ASEAN within GVC change when the ASEAN is extended to Plus Six? Such questions aim to measure the trade under Vertical Specialization and the change in the role played by ASEAN when the region strengthens connects with booming Asian region, which is a strong driver of trade and growth. This study through production networks approach intents to reveal they dynamics of growth and the importance are played by these structures in the rapid expansion of trade in the ASEAN region.

2. Literature Review

This paper falls into Value-added (henceforth VA) measurement and Vertical Specialization. This paper uses the methodology of (Koopman, Powers, Wang, & Wei, 2010; Koopman, Wang, & Wei, 2012) in which they incorporate the linear combinations of earlier indicators on value-added exports and Vertical Specilization (henceforth VS) such as those developed by (Daudin, Schweisguth, & Rifflart, 2011; Hummels, Ishii, & Yi, 2001; Johnson & Noguera, 2012). Whereas the above experiential methodologies rightly broke down Value-added derived from direct and some indirect degrees, some neglected shares of value-added embedded in other countries' IPC that cross multiple borders (Wang, Wei, & Zhu, 2013). A particular role of this study is the

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aggregation of different value-added indicators, over a long period of time, analysing trade across and within main trading communities.

Empirical studies on vertical trade report a large expansion over the last decades. Los et al. (2015) referred to a global increase in foreign Value-added by nearly 20% from the year 1995 to 2011, claiming that global fragmentation is taking stronger importance over regionalization. Other studies as in Baldwin and Lopez-Gonzalez (2015) claimed that Asia, American and European blocs had created regional factories rather than expanding globally. Other studies claimed rather mix results for Asia (ADB, 2007; Athukorala & Nasir, 2012; Cheewatrakoolpong, Sabhasri, & Bunditwattanawong, 2013). Esquivias Padilla et al. (2017) noted a regional expansion in supply (Asian) and global expansion in demand, rebalancing towards Asia. This study aims to fill up the gap in literature by clarifying regionalization and globalization effects under the ASEAN Plus Six by employing Vertical Specialization and Value-added trade approach and tracing changes (gains and losses through time).

ASEAN Plus Six countries are probably experiencing the most dynamic changes in integration under production networks, both the intra-region and World. This paper offers the perspective of two regions in process of a more integrated trade regime, evaluation the gains under the perspective of regional targets, and unveiling the possible existence of spillovers and contagious effects towards the ASEAN by being more integrated with East Asia and India.

Versus other studies, this paper employs indicators on Vertical Specialization as a proxy to measure and evaluate the integration of regional communities in a period highly relevant as it covers important milestones towards the full implementation of the agreement. While literature on the region might try to explain trade expansion through CGE models (Urata, 2008), gravity models, and other approaches (ADB, 2007; Ando, 2008; Baldwin & Lopez-Gonzalez, 2015; Cheewatrakoolpong et al., 2013), the focus of the studies is seldom placed on measuring and evaluating the development of production networks under the ambitious ASEAN Plus Six agreement.

3. Research Methodology

This study employs Value-added trade scrutiny derived from Vertical Specialization through a global Input-Output stand. It measures Value-added trade for ASEAN Plus Six countries, and looks at two larger trading blocs NAFTA and EU as a reference. This method is an expansion of Koopman et al., (2010, 2012) with the additional element of integrating regions and finding changes on regional VA trade across 15 years, a special period of the implementation of the ASEAN Free Trade Area (AFTA). Including the Plus Six partners also give an important contribution to literature in the field, as the ASEAN Plus Six is seldom address under this structures.

The common outline of this research entails subset the country's gross exports into domestic Value-added exports, foreign Value-added, Value-added exports returning home, and some added double counted terms. From the nine main Value-added terms, additional indicators are measured: vertical specialization, GVC participation, GVC position, indirect specialization, among others. By breaking down export flows based on origin and destination, and by integrating data based on the ASEAN Plus Six region, it is possible to trace the complete value chain and to dash global effects rather than looking only at direct destinations as it is often found. This methodology completely broke down gross exports according to sources of VA formation and VA inclusion, which allow tracking connections in the Global Value Chain.

This study includes different indicators of vertical specialization developed by other authors. This paper employs the YNU-GIO Inter-Country Input-Output dataset developed by the CESSA, (Sato & Shrestha, 2014). This study is the first one employing the YNU-GIO table under this approach, offering the advantage of including more

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Asian countries (i.e. WIOD, AIO) and longer periods of time than most Input-Output datasets. It comprises 29 endogenous countries, 59 exogenous ones and 35 economic sectors by the years 1997, 2004, and 2012.

The overall gross exports are divided into nine provisions consisting in a main derived equation, an additional breakdown of Leontief input-output. First, data are set as an ICIO Matrix. It is presumed that each G-country generates goods in N distinguished tradable sectors. Goods can be consumed at home as final goods or employed as IPC. Goods can also be exported as final goods or IPC.

$$X_S = \sum_r^G (A_{Sr}X_r + Y_{sr}), r, s \ldots . G \qquad [1]$$

X_s is the Nx1 gross output vector of country s, Y_{sr} is the NxN final demand vector and A_{sr} is the NxN IO coefficient matrix (Koopman et al. 2012). The G-country, N-sector production and trade system in Equation (1) is written as an Inter-Country Input-Output matrix notation:

$$\begin{bmatrix} X_{11} & X_{12} & \ldots & X_{1G} \\ X_{21} & X_{22} & \ldots & X_{2G} \\ \vdots & \vdots & \ddots & \vdots \\ X_{G1} & X_{G2} & \ldots & X_{GG} \end{bmatrix} = \begin{bmatrix} B_{11} & B_{12} & \ldots & B_{1G} \\ B_{21} & B_{22} & \ldots & B_{2G} \\ \vdots & \vdots & \ddots & \vdots \\ B_{G1} & B_{G2} & \ldots & B_{GG} \end{bmatrix} \begin{bmatrix} Y_{11} & Y_{12} & \ldots & Y_{1G} \\ Y_{21} & Y_{22} & \ldots & Y_{2G} \\ \vdots & \vdots & \ddots & \vdots \\ Y_{G1} & Y_{G2} & \ldots & Y_{GG} \end{bmatrix} \qquad [2$$

B_{sr} denotes the total requirement matrix (Leontief inverse). Next, the VA share matrix by source is built. Vs correspond to the 1×N direct VA coefficient vector. Multiplying these direct VA shares with the matrix B (Leontief inverse) generates the G×GN Value-added share (VB). However, to get domestic Value-added in a country's gross output, an additional Value-added coefficient matrix is introduce ($\hat{V}_s$), with a GN-by-GN dimension with the direct VA coefficients along the diagonal and exports of VA in the off-diagonal columns. This GNxGN matrix is multiplied by BY to obtain $\hat{V}BY$ matrix.

$$BY = \begin{bmatrix} \hat{V}_1 & 0 & \ldots & 0 \\ 0 & \hat{V}_2 & \ldots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \ldots & \hat{V}_G \end{bmatrix} \begin{bmatrix} X_{11} & X_{12} & \ldots & X_{1G} \\ X_{21} & X_{22} & \ldots & X_{2G} \\ \vdots & \vdots & \ddots & \vdots \\ X_{G1} & X_{G2} & \ldots & X_{GG} \end{bmatrix} = \begin{bmatrix} V_1 \sum_r^G B_{1r}Y_{r1} & V_1 \sum_r^G B_{1r}Y_{r2} & \ldots & V_1 \sum_r^G B_{1r}Y_{rG} \\ V_2 \sum_r^G B_{2r}Y_{r1} & V_2 \sum_r^G B_{2r}Y_{r2} & \ldots & V_2 \sum_r^G B_{2r}Y_{rG} \\ \vdots & \vdots & \ddots & \vdots \\ V_G \sum_r^G B_{Gr}Y_{r1} & V_G \sum_r^G B_{Gr}Y_{r2} & \ldots & V_G \sum_r^G B_{Gr}Y_{rG} \end{bmatrix} [3]$$

Next gross exports are decomposed. A country's total VA exports, denoted by $VT_{s*} = \sum_{r \neq s}^G VX_{sr} = V_s \sum_{r \neq s}^G \sum_{a=1}^G B_{sa}Y_{ar}$ are rewritten according to where and how the VA is absorbed.

$$VT_{s*} = V_s \sum_{r \neq s}^G B_{ss}Y_{sr} + V_s \sum_{r \neq s}^G B_{sr}Y_{rr} + V_s \sum_{r \neq s}^G \sum_{t \neq s,r}^G B_{sr}Y_{rt} \qquad [4]$$

Equation (4) is the VA export equation, including Value-added in a country's *s* final goods exports to *r*; 2nd Value-added in IPC exports; 3rd VA in re-exports to *t* countries. Gross exports from country s are defined:

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$$E_{s*} = \sum_{r \neq s}^{G} E_{sr} = \sum_{r \neq s}^{G} A_{sr} X_r + Y_{sr} \quad [5]$$

Equation (5) is further broken down according to where the IPC and final goods are taken in.

$$uE_{s^*} = V_s B_{SS} E_{s^*} + \sum_{r \neq s}^{G} V_r B_{rs} E_{s^*}$$

$$= VT_{s^*} + \left\{ V_s \sum_{r \neq s}^{G} B_{sr} Y_{rs} + V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} X_s \right\} + \left\{ \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} Y_{sr} + \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} A_{sr} X_r \right\} [6]$$

VT_{s*} in equation (6) specifies the Value-added exports in final goods, and four different flows of the country's VA exports. Based on each country's gross output identity, $X_s = (I - A_{ss})^{-1} Y_{ss} + (I - A_{ss})^{-1} E_{s*}$ and $X_r = (I - A_{rr})^{-1} Y_{rr} + (I - A_{rr})^{-1} E_{r*}$ and substituting into equation (6):

$$\begin{aligned} uE_{s*} = & \left\{ V_s \sum_{r \neq s}^{G} B_{ss} Y_{sr} + V_s \sum_{r \neq s}^{G} B_{sr} Y_{rr} + V_s \sum_{r \neq s}^{G} \sum_{t \neq s,r}^{G} B_{sr} Y_{rt} \right\} + \left\{ V_s \sum_{r \neq s}^{G} B_{sr} Y_{rs} + V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} (I - A_{ss})^{-1} Y_{ss} \right\} \\ & + V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} (I - A_{ss})^{-1} E_{s*} + \left\{ \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} Y_{sr} + \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} A_{sr} (I - A_{rr})^{-1} Y_{rr} \right\} \\ & + \sum_{t \neq s}^{G} V_t B_{ts} A_{sr} \sum_{r \neq s}^{G} (I - A_{rr})^{-1} E_{r*} \quad [7] \end{aligned}$$

Equation (7) contains nine special terms derived from the sources of formation and destination. The first three terms stand for the VA in exports; the fourth and fifth comprise VA firstly being exported but ultimately returning home. The seventh and eighth terms comprise foreign VA in the home's country exports. The sixth and ninth terms are two times counted terms.

From the nine main terms the following indicators are proposed (the number indicate the terms in equation 7): GDP in exports composed by adding 1 to 5. Domestic Value-added (DVA) is a country's exports equals sum of 1 to 6. Value-added exports (VT) sum 1 to 3. Foreign Value-added (FV or VS ratio) is in gross exports sum 7 to 9. Double counted home country's intermediate exports 6 and 9. Multiple back-and-forth trade sums from 3 through 9. One-way trade equals 1 + 2. Vertical Specialization (VS1 Share) Share measure measures the Domestic Value-added embedded in the exports of foreign countries. GVC position equals Share of VS ratio to VS1 share. Share of Vertical Trade equals VS ratio + VS1 share.

4. Results and Discussion

This study distinguishes trade flows from gross terms and Value-added terms. It also considers the gains in the expansion of the free trade agreement with the ASEAN to the six strategic partners (South Korea, China, India, New Zealand and Australia). ASEAN exports to six partners grew 328% from the year 1997 to 2012, which is larger than any other region. IPC reaches a 369% growth rate while growth in final goods with East Asia alone produced 277% (Table 1). In gross terms, 64% of ASEAN exports are absorbed within the ASEAN Plus 6. The total of 78% of the IPC and 50% of the final goods are exported within the ASEAN Plus 6. In Value-added export terms, East Asia takes up a third of ASEAN Value-added exports, which represents about 8% more than the year

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1997, while VA to NAFTA and EU shrank as a share of total ASEAN VA exports. The Plus Six strategic members experience the largest growth rates in both gross exports (total, parts and components and final goods) and Value-added terms. It also represents the region which ASEAN experience the largest changes, both in exports and imports of gross and Value-added terms. Gains with Plus Six are larger in almost all VA components than the Intra-ASEAN gains due to better integration.

ASEAN has a quite little contribution in the GVC as an exporter of VA embedded in final goods (30.5%) and is shifting into a strong position as a supplier of IPC equal to 50% of the total ASEAN VA trade (column 2 and 3 Table 2). ASEAN exports contain a high share of Foreign Value-Added (FVA) in exports (US$ 0.35 per each US$ 1.00 exported), largest share among all regions, showing dependency to foreign supplies, and high participation in vertical trade.
This research finds that ASEAN is highly integrated with the ASEAN Plus 6. As an example, it absorbs 65% of the total ASEAN VA exports; together, they absorb 75% of the total ASEAN VA exports of IPC, indicating a strong regional (Asian) orientation in production networks. Two-thirds of foreign VA employs in ASEAN exports originate from Asia. A total of 75% of ASEAN's re-exports and 95% of its back-and-forth trade remained within the ASEAN Six.

Table1. Gross Exports IPC, Final Goods and Total 1997 and 2012 ASEAN Plus Six

	IPCs		**Final Goods**		**Total**	
From / To	**ASEAN+6**	**Other**	**ASEAN+6**	**Other**	**ASEAN+6**	**Other**
1997	**Share from IPC's**		**Share from Final Goods**		**Share from Total Exports**	
PLUS SIX countries	56%	44%	30%	70%	41%	59%
ASEAN	65%	35%	39%	61%	50%	50%
2012	Share from IPC's		Share from Final Goods		Share from Total Exports	
PLUS SIX countries	68%	32%	30%	70%	46%	54%
ASEAN	78%	22%	50%	50%	64%	36%
TOTAL Growth 1997 - 2012						
PLUS SIX countries	416%	204%	380%	364%	401%	313%
ASEAN	369%	152%	277%	137%	328%	141%
Share from Global exports	**1997**	**2012**	**1997**	**2012**	**1997**	**2012**
Global Exports (US$ Billion)	2 577.43	8 240.75	3 908.44	1 0767.56	6 485.88	19 008.32
ASEAN Plus Six (US$ Billion)	620	2 567	836	3 462	1 456,93	6 029.30
ASEAN Plus Six Global Share	24%	31%	21%	32%	22%	32%

Notes: ASEAN Plus 6 (Indonesia, Singapore, Malaysia, Thailand, the Philippines, Vietnam, China, South Korea, Japan, Australia, India, New Zeeland)

This study finds that it is a vital to further integrate with plus Six as East Asian countries alone absorb more Value-added (35%) than Intra-ASEAN partners (20%), and the growth of trade with Plus Six partners is larger than Intra-ASEAN trade. Most of the growth in ASEAN exports from 1997 to 2012 was under fragmented structures which happened to be oriented towards Asia.

Table 2. Gross Exports Decomposition ASEAN, East Asia, NAFTA, and EU 1997 and 2012 (Share of Total Gross Exports)

	Region	Exports US$ Billion	Value-added exports (VT)			DV return Home (VS1*)			Foreign Value-added (FV)		
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1997	ASEAN	$449	37.5%	21.9%	5.6%	0.2%	0.1%	0.2%	19.8%	8.3%	4.3%
	EAST ASIA	$961	53.1%	28.5%	5.9%	0.4%	0.4%	0.1%	7.1%	3.5%	1.3%
2012	ASEAN	$1 504	30.5%	24.5%	7.1%	0.2%	0.1%	0.2%	18.9%	9.4%	5.7%
	EAST ASIA	$4 109	55.4%	21.7%	5.5%	0.5%	0.5%	0.1%	10.6%	4.1%	2.0%
	NAFTA	$3 130	50.6%	30.7%	6.0%	1.4%	1.2%	0.2%	5.3%	3.3%	1.2%

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	EU	$6 132	46.8%	18.2%	5.9%	0.4%	0.2%	0.2%	18.2%	5.8%	3.7%

Note: (1) Domestic Value-added (DV) in direct final goods, (2) DV in IPC exports absorbed by direct importer, (3) DV in IPC re-exported to third countries, (VS1) DV in IPC exports that return home, (4) DV in IPC that return via final goods, (5) DV in IPC that return via IPCs, (6) Double counted IPC exports, (VS or FV) Foreign Content, (7) FV in final goods exports, (8) FV in IPC goods exports, (9) Double counted IPC exports produced abroad.*

East Asia's regional value chains have expanded to neighboring countries, creating a strong regional supply chain but it remains globally oriented for final demand. By contrast, the ASEAN keeps a similar structure in domestic VA exports and shares in global trade under vertical trade. ASEAN also decreases its share with NAFTA and EU, and re-oriented exports to East Asia. It is highly probable that ASEAN lost foreign markets to East Asia.

The ASEAN Plus 6 region has substantially developed for the last 15 years. Today it accounts for almost one-third of total global trade, about becoming the largest free trade area in the World. It also changes its patterns of trade with almost all regions of the World, either by replacing foreign VA with domestic content, increasing its share of VA in other countries exports (indirect VA), increasing participation in all markets, or re-orienting its role within the value chain (largest producer of IPC). East Asia is now more oriented to final goods while ASEAN has become a strong supplier of IPC's. The dynamics of East Asia shifts the role of ASEAN countries in the GVC: Indonesia as a supplier of IPC, Thailand and Vietnam increase East Asian content in their exports. Total East Asian content in ASEAN exports account for 10% (3% higher than 1997). ASEAN Plus 6 structures highly matter for ASEAN.

Table 3. Vertical Share VS1, Total VS, VS Share, GVC participation, and GVC Position Regions

	VS1 (16)	TOTAL VS	VS Share FV (14)	VS1 Share (16)	TOTAL VS (GVC Participation)	GVC Position
	Gross Exports ($US million)		Share (%) Gross Exports			
1997						
East Asia	108 712	223 707	12%	11%	23%	-0.006
ASEAN	72 697	218 424	33%	17%	50%	-0.133
NAFTA	192 434	290 019	7%	15%	22%	0.065
EU	340 601	891 896	22%	14%	36%	-0.072
2004						
East Asia	230 558	505 150	16%	13%	29%	-0.022
ASEAN	120 256	366 694	38%	19%	57%	-0.153
2012						
East Asia	606 631	1 276 718	16%	15%	31%	-0.013
ASEAN	283 212	794 885	35%	20%	55%	-0.124
NAFTA	583 331	874 683	9%	19%	28%	0.082
EU	1 087 695	2 746 422	27%	18%	45%	-0.077

Notes: (VS) Value-added Foreign Content, (VS1) Domestic Value-added embedded in foreign exports, (Total VS) Vertical Specialization or GVC Participation, and (GVC) Global Value Chain Position

In 2012, ASEAN Plus Six accounted for 32% of global trade, up from 22% in 1997. IPC's increased from 24% of total IPC trade in 1997 to 31% in 2012, and final goods from 21% to 32%. At this speed of growth rate, soon ASEAN Plus Six might become the largest free trade area in the World.

The rapid growth of the Six strategic partners offers great possibilities to expand (both for local demand and to complement their exports) but also presents the challenges of increasing competition as the area is more aggressive than the Intra-ASEAN. While East Asia offers a noticeably larger market and also offers a channel of indirect exports to the World, it also places pressure on ASEAN as the dependency in the supply of intermediate inputs was previously noted by (Athukorala and Yamashita, 2006; Haddad, 2007; Urata, 2008; and Kimura and

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Obashi, 2016). This study offers more recent data, and brakes down exports into components of Value-added, identifiyng stages of dependency, both as a source of supply of intermediate goods as well as the destination of exports.

A more integrated ASEAN Plus Six might also intensify competition, and open the door of potential negative spillover effects upon slow down in East Asian exports. Additional findings: 1) Leadership under vertical trade in the region shifts from Japan to China (now three times larger than Japan). 2) Trade of ASEAN with emerging countries (India, China, ASEAN) grew faster than with advanced ones. 3) Asia is more diverse than NAFTA and EU in network creation (regional in production, global in final demand). 4) Asia is changing the gravitational center of Production Networks (40% of total vertical trade in 2012). ASEAN reports downstream orientation in the GVC (larger shares of IPC in their exports) together East Asia and EU. NAFTA remains as an upstream player (large exports of IPC). ASEAN slightly shifts in its position towards upstream, as the region experienced firm grow due to high global demand for commodities. All other blocks strengthen their roles in the GVC.

Table 4. Value-Added Exports Indicators ASEAN + Six 2012

	Value-added (VT) exports (11) US$ Billion		Share of Domestic Value-added (VT) in Gross Exports		Share of Foreign content (VS) on Gross exports		Destination of Value-added exports VT (%)		Share of Origin of Foreign content VS in exports (%)	
	Intra ASEAN SIX 6	Extra ASEAN SIX 6	Intra ASEAN SIX 6	Extra ASEAN SIX 6	Intra ASEAN SIX 6	Extra ASEAN SIX 6	Intra ASEAN SIX 6	Extra ASEAN SIX 6	Intra ASEAN SIX 6	Extra ASEAN SIX 6
East Asia	4 021	815	36%	46%	8%	9%	44%	56%	45%	55%
ASEAN	933	519	39%	23%	21%	14%	63%	37%	60%	40%
NAFTA	2 731	307	26%	61%	2%	7%	30%	70%	24%	76%
EU	4 347	1 903	12%	59%	4%	27%	17%	83%	14%	86%

East Asia appears as a more dynamic region than ASEAN as it grew 5.3 times in back-and-forth trade. East Asia shifted from high dependency from NAFTA, from 24% of intermediate goods in 1997 to only 19% in 2012, while increasing intra-East Asia Foreign Value-added from 20% to 23%. East Asia is the region with the largest domestic Value-added in final goods (55.4%), successfully substituting foreign Value-added with local content.

Even though ASEAN has expanded its trade with East Asia more than with any other region, some re-exports through East Asia appears rather small (2.5% of gross exports) to conclude that East Asia is a significant driver of re-exports for ASEAN. In fact, intra-ASEAN re-exports are larger than re-exports through East Asia channel (2.8%). However, it is true that re-exports of ASEAN through East Asia grew from 1.07% (share of ASEAN gross exports) in 1997 to 2.5% in 2012, while those of ASEAN fell from 2.97% to 2.8%. Interestingly, by integrating ASEAN Plus Six, a network of re-exports of almost 6% of total Value-added in intermediate goods is created.

The Plus Six countries are larger and more developed than ASEAN. In 1997 Plus Six accounted for 31% of global share in internal consumption of parts and components (IPC) while 27% in final goods. On the other hand, ASEAN accounted for only 4% of share in global consumption of IPC and 3% in final goods. By 2012 Plus Six accounted for 45% of IPC global consumption and 34% of final good, while ASEAN accounted for 4% and 3% respectively. ASEAN market lack size (market volume) and by instance, the region has to go extra-ASEAN to find additional growth in the exports. The expansion of vertical trade in ASEAN is then related to the dynamism (and size) of its partners rather than by a more integrated ASEAN. Plus Six regions have grown faster than ASEAN in global shares while ASEAN has only expanded maximum 1% share of either global exports, production and consumption share.

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While this study does not look at determinants of GVC participation, the findings might be in line with those structural factors found by (Kowalski, Gonzalez, Ragoussis, & Ugarte, 2015) with ASEAN probably benefiting from 1) geographic location with booming East Asia and India; 2) expanding GVC as ASEAN for further develop, improves trade-investment regimes, logistics, and infrastructure; 3) though not largely benefiting from market volume as it is slowly gains in size and links. The ASEAN appears highly integrated with neighboring Asian partners, more dependent in regional trade for parts and components, but still oriented to extra-ASEAN for final demand and key supplies of parts and components. Looking at particular components of Value-added trade rather than gross exports allows understanding while the ASEAN is exporting more; it is highly connected to regional – global value chains, playing important roles at particular segments in the GVC but remaining dependent on foreign players.

Conclusion

ASEAN is growing its trade flows in East Asia, keeping its Intra-ASEAN rates of vertical integration, and losing steam with EU and NAFTA. The largest changes in patterns of vertical trade for ASEAN arise as it increases participation by joining the GVC, rather than by creating new sources of trade, or diversifying efforts. The single production project of ASEAN region does not seem to be the engine of a more integrated ASEAN, or at least it is not changing the pattern of regional integration. The dynamics in ASEAN growth appear not so much because of the inner strength as a single region but as being a part of the dynamic Asian network, meaning a larger scope of integration might help the region to expand. East Asia and India are changing their pattern of trade towards larger shares of final goods and less IPC exports, opening opportunities for ASEAN to complement them by supplying IPC and re-locate IPC production.

ASEAN's large and fast growing share in vertical trade (41% of total growth trade, equivalent to 251% of growth in vertical trade) denotes competitiveness developed in these structures with some factors (production, service links, trade, competitiveness, location advantages) possibly supporting the expansion of fragmented structures.

Further integration with ASEAN Plus Six also represents a challenge for the ASEAN. 1) East Asia relies in low foreign VA 18% for their exports, 2) Re-exports from Plus Six are not as large though, 3) Plus Six members had more productive capability, technical innovation, and larger global networks than ASEAN, which might result in larger completion, 4) ASEAN comprises a negative trade balance with all trading associates when considering trade under Value-added, while overall positive under gross terms. The last point indicates that while ASEAN might export more in gross terms, over the time, the impact gets lower in Value-added.

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