The Role of Global Production Networks in Indonesian Exports

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Abstract*: This study looks into Indonesia's participation in fragmented structures within the Global Value Chain. By using a global input-output dataset and splitting gross exports into distinctive elements of value-added, the study measures vertical specialization of Indonesia against its four largest trading partners (NAFTA, East Asia, European Union and ASEAN) covering 29 countries for three periods: 1997, 2004 and 2012. Value-added is computed according to the initial source country and in the last destination. The paper also compares Indonesia to its ASEAN partners. The results show that Indonesia moved from exporting 50% of its value-added through finished products in 1997 to being a supplier of intermediates goods in 2012 (nearly 60% of its value-added). Foreign inputs in Indonesian exports account for 12%, a lower share versus ASEAN regional partners (35%) who are more vertically integrated. A total of 21% of Indonesian goods will be further exported to third countries. The degree of vertical integration in Indonesia in 2012 is 32.3%, up from 26% in 1997. Indonesia advanced in integration with East Asia and ASEAN countries (region), while it lowered its share of value-added traded with the North America and the Europe. Indonesia gained more than any other ASEAN partner in intra-regional trade

***Keywords* : ASEAN, Fragmented Networks, Trade in Value-added, Vertical Specialization, World Input Output.**

I. INTRODUCTION

In the 1980s, Indonesia began an intensive regional-international process to diversify the economy and to liberalize trade. Efforts include the opening of markets with multiple agreements, reduction of tariffs, lowering of taxes and subsidies, removing some non-trade barriers (NTBs), and implementing trade facilitation measures. As a result, by 2018 Indonesia had Free Trade Agreements in place with more than 25 countries, average tariffs declined from 27% in 1986 to nearly 2.0% by 2018, and exports increased more than three times from the year 2000 to 2012 (its highest point). The most ambitious liberalization efforts of Indonesia are under the ASEAN Free Trade Agreement (AFTA) framework, which aims towards trade and investment liberalization, the formation of an integrated production area, and deeper integration into the global economy. AFTA members have signed free trade deals with Six strategic partners; three in East Asia (China, S Korea, and Japan), India, Australia and New Zealand.

Asia is now a more integrated region with the particularity of following a fragmented production network, portrayed by a rapid increase on back-and-forth transactions in intermediate parts and components (IPC henceforth) under intra-industry trade. International trade in parts and components accounts for no nearly a third of the growth of manufacturing trade [1], [2]. Regional production networks in Asia have achieved impressive realisation, particularly through increased IPC trade [3], [4]. Exports under fragmented structures for manufacturing increased from 22.5% in 1995 to more than 30% in 2011, with multiple cross-border trade moving from 19% in 1995 to 25% in 2011[5].

Integration under fragmented structures requires dynamic and competitive service links to benefit from competitive labor, access to supply of intermediate key goods, and to access fast growing markets [6]. Indonesia needs to consider such factors that could boost its integration within the GVC. Large immersion within the GVC could offer large potential in trade expansion, improvements in technological capability, access to global markets, more efficient sourcing of inputs, and larger job creation [7].

As [8] noted, the effects of joining the GVC may differ across countries, pointing out that being part of a GVC does not secure high domestic value-added in export, technological upgrading[9], or large impacts on labour creation [7], [8]. While OECD countries obtain nearly 67% of value-added in GVC [8], emerging countries tend to keep up a high dependency on foreign imports. Indonesia plays a smaller role in sectors where impacts on technological upgrades are more often found, particularly within higher technological sectors such as in the automotive industry [10], [11], or semiconductors industry [12], although the technological upgrade varies from country to country.

While it is true that merchandise exports in Indonesia expanded from nearly US$63 billion in 1997 to US$213 billion in 2012, Indonesia remains at a low level of integration under vertical structures or fragmented networks [13]. [14] found that FDI inflows in Indonesia support its integration into the global value chain through larger export intensity and through larger use of foreign intermediate inputs, although the share of vertical integration in Indonesia (32%) remains lower than for its ASEAN partners (54%).

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It is possible that having a large number of trade deals -bilateral or multilateral- may not necessarily lead to larger vertical integration. A probable reason why not all agreements can offer a real contribution is the rather small role of Indonesia within GVC, or due to its particular role as a supplier of raw goods.

This article measures the participation and temporal changes of Indonesia within fragmented structures in the GVC from 1997 to 2012, by addressing three questions: 1) What is the composition of value-added exports in Indonesia and how has the structure changed after the liberalization process started in 1997? 2) How does Indonesia integrate with the main trading hubs (ASEAN, East Asia, European Union and North America) and how does it performs versus its ASEAN partners? and 3) How vital is the role of Indonesia in ASEAN fragmented structures?

Measuring Indonesian participation in GVC has strong implications for trade policy. It allows the assessment of the achievement of Indonesia's liberalization efforts. It also enables the distinguishment of the role the country plays in GVC, either as a supplier of intermediate goods, as an assembler, as a player in one-way exports, or as a player in multiple cross-border trade which often entail more dynamic and integrated service links. The study offers a deeper understanding into the links generated by Indonesia with other regions which then locates Indonesia's role in a specific segment of the GVC and addresses more strategic partnerships. While literature on ASEAN production networks offer a picture at the sectoral level [7], there is a gap in inter-temporal changes and in the links of Indonesia with the main trading hubs.

The study employs an adjusted global input-output dataset to deconstruct the value-added of Indonesia's gross exports based on where the value of is initially created and where is the value-added finally consumed. The value-added could be delivered either through intermediate parts and components or final products. This study considers the years 1997, 2004 and 2012, to relate the integration development across 15 years and the links within the ASEAN region, East Asia (EA), North American countries (NAFTA) and the European Union (EU), in order to analyse backward-forward interactions.

II. LITERATURE REVIEW

The literature review centres on two main issues: firstly, the concept of fragmented structures, and secondly, in value-added measurement methodologies presented in the next section. The first issue is needed to distinguish trade created from fragmented structures portrayed by the splitting of production processes across multiple countries, where parts and components cross multiple borders before finally be integrated into final goods. Vertical structures help to understand cooperation across nations to add value within the GVC. [15] developed a theoretical framework on global fragmentation, considering the contributions of [16], and those of [17], among others, regarding integration, coordination and production networks.

A. The nature of vertical structures

The creation of production networks implies a relocation of production activities across countries and sectors. A more efficient relocation of resources is promoted by factor endowments and specialization, as lower service link costs and scale economies allow for more efficient allocation and coordination of production activities. The relocation of production across countries is often referred to as integration or globalization of production and trade in [15]. The splitting of production activities has experienced further developments. Initially fragmentation included (1) widespread relocations of production activities to new settings [18]. Eventually, a broader fragmentation of production, distribution, and trade allows moving towards (2) arm's length settings where global buyers and producers are linked in both advanced and developing countries [1], [19]. More recently, (3) specialized processes are distributed in fragmented sections across regions, entering into back-and-forth relations on intermediate goods (IPC's) [19]. As noted in [20], international fragmentation is mainly present within intra-industry trade, and either within vertical trade or one-way trade. Fragmentation is mainly driven by differences in cost of production (wages and technology) and due to efficient service links including transportation, coordination and trade measures, among others.

[21] proposed a typical framework for fragmentation as production units (blocks), which links each part through transportation, communication, and coordination (services). Vertical structures are also presented as production processes sliced into numerous stages, performed in proper locations for their specific activities [22]–[24] described it as "a sequential, vertical trading chain stretching across many countries, with each country specializing in particular stages". Fragmented production - trade of value-added is used as a proxy to measure vertical specialisation under fragmented structures, where countries allocate resources into the common fabrication of products.

This large fragmentation, while being mainly determined by specialization and factor endowments, is also determined by non-traditional factors of production and new interrelations [25]. Different factors such as costs of service links, trade barriers, investment-trade advantages, location and market factors, among others, can further determine (magnify) the degree of production fragmentation, as noted in the literature on GVC [1], [20], [26]. This is to indicate that rather than a new trade theory, production fragmentation intends to capture paths towards industrialization and technological development, as depicted in [9].

For production fragmentation to take place, it is necessary to face low service links costs, to enjoy competitive logistics and telecommunications, and to efficiently handle diverse coordination tasks [20], [22], [26]. Fragmented structures are then highly dependent on a set of factors such as labour costs, materials, distance, and trade costs. [1] noted that in order for firms to specialized and to access the global value chain, differential cost arising from production and transportation are needed. As the cost of producing and transporting goods lowers, as technology increases, and as countries gain in integration, it is possible to expect production activities to fragment and to play a more important role in global trade.

Countries that are quicker to benefit from international fragmentation are then those that more easily facilitate the relocation of resources, those supporting specialization of production, and those with more conducive environments to coordinate fragmented structures. The complexity of the networks suggest that the role countries play within fragmented structures vary, as noted in [7] when mapping the participation of ASEAN in the GVC.

Another important factor likely to drive international fragmentation is trade and industrial policies. A number of literature reviews agree that an extended version of regional integration has more potential than limited multilateral agreements [22], [26] in creating a more favourable environment for production networks. [4] identify the large role of MNEs in supporting investment and technological transfers to the development of production networks in East Asia, suggesting that production networks within the ASEAN region still depend on foreign players to drive the enlargement of vertical structures [19], [27] and enlarge access to global markets. Other factors that are critical for global integration are presented in a number of empirical studies on production sharing [23], [28].

The rapid and extensive fragmentation of the last three decades has implications in value-added measurement, as goods and services go through multiple cross border transactions not commonly captured in trade statistics, opening up a research gap in estimation of value-added flows across partners. The production fragmentation approach allows the tracking of the flows of value-added trade (origin-destination) and by instance, identifying new patterns of relocation of production based on factor endowments and specialization. Indonesia stands on a different ground from its ASEAN neighbours within the GVC and follows a different path of integration. The dissimilarity is often connected with a lower engagement in GVC, lower share in manufacturing and service trade, being delayed in adopting export-oriented strategies [29], or relying on exports within natural-resource sectors [7], [30] where domestic content is high and foreign inputs rather low. The rapid extension of fragmented networks, the specific role of Indonesia within natural-resources, the decrease of transportation and coordination costs, and the rapid growth of Asian production networks, open up a research gap in identifying the role that Indonesia plays in the dynamic GVC. Besides, the liberalization process of the last two decades of Indonesia needs to be assessed if the liberalization effort is driving Indonesia into new patterns of trade within the evolving production sharing.

III. RESEARCH METHODOLOGY

This paper falls within value-added measurement and vertical specialization ((VS hereafter). This paper uses [2], [30] approach employing linear combinations of indicators recently introduced on value-added trade literature and vertical specialization such as those proposed by [1], [2], [20], [24], [30]–[33]. In [5] a detailed analysis on the deficiencies of using only previous indicators are depicted. Nevertheless, the methodology proposed in this study [30] appears to be an improved version versus others for several reasons. In some other research, value-added following multiple cross-border trade is accounted for at a country and sectoral level, meaning that forward and backward linkages break up the value-added and allocate the contribution to the country and sector that initially created the value. A contribution of [30] arises as the new indicator of production sharing is able to capture the value-added created at home and remaining abroad. Another contribution is the decomposition of value-added tracing the original point of creation and the final point of absorption. An advantage of the methodology also arises as value-added is split into four groups: 1) domestic value-added produced at home and absorbed abroad. 2) domestic value-added content initially sent abroad but then returned back home. 3) foreign content of value-added employed in the production of exported goods that eventually remained abroad. 4) The value-added which is double counted that arises due to multiple cross-border trade.

As some of the above previous approaches rightly categorized the value content on exports according to direct and indirect proportions [22], they often missed slices of value that cross borders several times incorporated in other nations' intermediate parts. The shortcomings arise as value-added components are estimated according to the point of origin but not always bearing in mind who finally consumes it.

A. Materials and Methods

This methodology is an extension of [2], [30] with the special contribution of integrating regions and tracing inter-temporal variations. It also employs a different database. The structure of this methodology entails slicing up a country's gross exports into shares of value-added exported, domestic value content that proceeds back home after being initially exported, foreign value-added incorporated in exports, and additional double value-added content included in gross exports. All value-added elements are estimated based on the origin of value-added creation and the country where value-added (VA) is finally consumed. Versus other methodologies, this approach adds in the following points: 1) whole breakdown of gross exports considering the sources of initial production and the point of final consumption allowing to trace links within the global value chain. 2) calculation of value-added in trade which has been double counted, and 3) identification of components of value along the global chain.

Gross exports are splitting into nine different terms contained in a main equation, following a further development of Leontief Input-Output. The original Leontief matrices allow deriving the value-added content in goods according to the inputs used, the flow of goods across sectors and countries. Nevertheless, they do not facilitate the identification of value-added when inputs experience multiple cross-border. The methodology proposed in this paper address the matter, deriving the value content of goods from the gross exports. The model is carried out in four steps:

B. Inter-Input-Output Country Matrix

It is presumed that each K-nation produces goods in N distinguished tradable fields. Products can be employed as

final goods or used as intermediate components.

Both intermediate goods and final ones are either traded abroad or employed/consumed within the domestic country.

$$X_c = \sum_r^K (A_{cr} X_r + Y_{cr}), \quad r, c \ldots . K \qquad (1)$$

"X_c is the Nx1 gross output vector of country *c*; Y_{cr} is the Nx1 final demand vector that gives demand in country *r* for final goods produced in *c*; and A_{cr} is the NxN Input-Output (I-O) coefficient matrix, giving intermediate use in *r* or goods produced in *c"* [30].

Equation (1), the K-nation, N-sector production-trade system, the gross output decomposition matrix and VA is written as a matrix notation in the inter country input-output,

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_3 \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} \ldots & A_{1K} \\ A_{22} & A_{22} \ldots & A_{2K} \\ \vdots & \vdots \ddots & \vdots \\ A_{K1} & A_{K2} \ldots & A_{KK} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_K \end{bmatrix} + \begin{bmatrix} Y_{11} + & Y_{12} + \cdots + & Y_{1K} \\ Y_{22} + & Y_{22} + \ldots + & Y_{2K} \\ & \ldots \ldots & \\ Y_{K1} + & Y_{K2} + \ldots + & Y_{KK} \end{bmatrix} \qquad (2)$$

and rearranging,

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_K \end{bmatrix} = \begin{bmatrix} I - A_{11} & -A_{12} \ldots & -A_{1K} \\ -A_{22} & I - A_{22} \ldots & -A_{2K} \\ \vdots & \vdots \ddots & \vdots \\ -A_{K1} & -A_{K2} \ldots & I - A_{KK} \end{bmatrix}^{-1} \begin{bmatrix} \sum_r^K Y_{1r} \\ \sum_r^K Y_{2r} \\ \vdots \\ \sum_r^K Y_{Kr} \end{bmatrix} = \begin{bmatrix} B_{11} & B_{12} \ldots & B_{1K} \\ B_{21} & B_{22} \ldots & B_{2K} \\ \vdots & \vdots \ddots & \vdots \\ B_{K1} & B_{K2} \ldots & B_{KK} \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_K \end{bmatrix} \qquad (3)$$

$$\begin{bmatrix} X_{11} & X_{12} \ldots & X_{1K} \\ X_{21} & X_{22} \ldots & X_{2K} \\ \vdots & \vdots \ddots & \vdots \\ X_{K1} & X_{K2} \ldots & X_{KK} \end{bmatrix} = \begin{bmatrix} B_{11} & B_{12} \ldots & B_{1K} \\ B_{21} & B_{22} \ldots & B_{2K} \\ \vdots & \vdots \ddots & \vdots \\ B_{K1} & B_{K2} \ldots & B_{KK} \end{bmatrix} \begin{bmatrix} Y_{11} & Y_{12} \ldots & Y_{1K} \\ Y_{21} & Y_{22} \ldots & Y_{2K} \\ \vdots & \vdots \ddots & \vdots \\ Y_{K1} & Y_{K2} \ldots & Y_{KK} \end{bmatrix} \qquad (4)$$

Y_s is a N×1 vector, which *indicates* the foreign use of *c*' final products. B_{sr} represents the total requirement (N×N) Leontief inverse matrix indicating the gross output in the producing nation *c* that is needed for a one-unit rise in the demand for final goods of destination nation *r*.

A. Build value-added share matrix (Vc)

Vc represents the direct value-added coefficient vector (1×N) indicating the share of direct domestic value content in total output for nation *c*. V_c is stated as the direct domestic value matrix (KxKN) for K-countries. Multiplying the direct value-added ratios with the Leontief inverse matrices yields the K×KN value share matrix (*VB* matrix).

$$VB = \begin{bmatrix} V_1 B_{11} & V_1 B_{12} \ldots & V_1 B_{1K} \\ V_2 B_{21} & V_2 B_{22} \ldots & V_2 B_{2K} \\ \vdots & \vdots \ddots & \vdots \\ V_K B_{K1} & V_K B_{K2} \ldots & V_K B_{KK} \end{bmatrix} \qquad (5)$$

To estimate the domestic value-added in each country's gross output, the model employs a value-added coefficient matrix ($\hat{V}_c$), with dimensions of KNxKN, containing along the diagonal elements the direct value-added coefficients. The $\hat{V}BY$ matrix is computed by multiplying the KNxKN matrix with the right-hand side of equation (4). Differentiating the components in B_{cr} and the point of final processing and consumption identified in Y_{cr} enables the estimation of value-added incorporated in each country.

$$BY = \begin{bmatrix} \hat{V}_1 & 0 \ldots & 0 \\ 0 & \hat{V}_2 \ldots & 0 \\ \vdots & \vdots \ddots & \vdots \\ 0 & 0 \ldots & \hat{V}_K \end{bmatrix} \begin{bmatrix} X_{11} & X_{12} \ldots & X_{1K} \\ X_{21} & X_{22} \ldots & X_{2K} \\ \vdots & \vdots \ddots & \vdots \\ X_{K1} & X_{K2} \ldots & X_{KK} \end{bmatrix} = \begin{bmatrix} V_1 \sum_r^K B_{1r} Y_{r1} & V_1 \sum_r^K B_{1r} Y_{r2} \ldots & V_1 \sum_r^K B_{1r} Y_{rK} \\ V_2 \sum_r^K B_{2r} Y_{r1} & V_2 \sum_r^K B_{2r} Y_{r2} \ldots & V_2 \sum_r^K B_{2r} Y_{rK} \\ \vdots & \vdots \ddots & \vdots \\ V_K \sum_r^K B_{Kr} Y_{r1} & V_K \sum_r^K B_{Kr} Y_{r2} \ldots & V_K \sum_r^K B_{Kr} Y_{rK} \end{bmatrix} \qquad (6)$$

"Elements in the diagonal columns of equation (6) give each country's production of value-added absorbed at home. The exports of VA can be defined as the elements in the off-diagonal columns of this KN by K matrix", ignoring the domestic VA returning after being processed abroad *[34]*.

C. Decomposition of gross exports

The total value exported by a country equal:

$$VT_{c*} = \sum_{r \neq c}^K VX_{cr} = V_c \sum_{r \neq c}^K \sum_{k=1}^K B_{ck} Y_{kr} \qquad (7)$$

Equation (7) is modified based on where and how the value in exports is added. Gross exports per country is defined *as:*

$$VT_{c*} = V_c \sum_{r \neq c}^K B_{cc} Y_{cr} + V_c \sum_{r \neq c}^K B_{cr} Y_{rr} + V_c \sum_{r \neq c}^K \sum_{t \neq c,r}^K B_{cr} Y_{rt} \qquad (8)$$

Equation (8) records the value-added embodied in exports, including three different value-added terms. First, the value in nation's *c* final products sent to *r*. Second, the value in inputs (IPCs) exported from *c* to be re-processed before consumption by *r*. Third, the value-added in IPCs exports to be re-processed by country *r* and eventually re-exported to third countries (*t*). The gross exports of country c is stated *as*

$$E_{c*} = \sum_{r \neq c}^K E_{cr} = \sum_{r \neq c}^K A_{cr} X_r + Y_{cr} \qquad (9)$$

E_{cr} contains those IPC originated in country *c* but sent to country *r*. Gross exports in (9) are further split according to the location where IPCs and final products are consumed.

$$uE_{c^*} = V_c B_{cc} E_{c^*} + \sum_{r \neq c}^K V_r B_{rc} E_{c^*}$$

$$= VT_{c^*} + \{V_c \sum_{r \neq c}^K B_{cr} Y_{rc} + V_c \sum_{r \neq c}^K B_{cr} A_{rc} X_c\} + \{\sum_{t \neq c}^K \sum_{r \neq c}^K V_t B_{tc} Y_{cr} + \sum_{t \neq c}^K \sum_{r \neq c}^K V_t B_{tc} A_{cr} X_r\} \qquad (10)$$

Equation (10) indicates first, VT_{c*} denoting the value in final goods exported. Additionally, four components indicate specific flows of the country's value-added through diverse channels at different stages of production.

Each nation, X_c and X_r are represented as :

$$X_c = (I - A_{cc})^{-1} Y_{cc} + (I - A_{cc})^{-1} E_{c*}$$

$$X_r = (I - A_{rr})^{-1} Y_{rr} + (I - A_{rr})^{-1} E_{r*} \qquad (11)$$

Finally, substituting the new equations :

$$uE_{c*} = \{V_c \sum_{r\neq c}^{K} B_{cc} Y_{cr} + V_c \sum_{r\neq c}^{K} B_{cr} Y_{rr} + V_c \sum_{r\neq c}^{K} \sum_{t\neq c,r}^{K} B_{cr} Y_{rt}\} + \{V_c \sum_{r\neq c}^{K} B_{cr} Y_{rc} + V_c \sum_{r\neq c}^{K} B_{cr} A_{rc} (I - A_{cc})^{-1} Y_{cc}\} + V_c \sum_{r\neq c}^{K} B_{cr} A_{rc} (I - A_{cc})^{-1} E_{c*} + \{\sum_{t\neq c}^{K} \sum_{r\neq c}^{K} V_t B_{tc} Y_{cr} + t\neq cKr\neq cKVtBtcAcr(I-Arr)-1Yrr+t\neq cKVtBtcAcrr\neq cK(I-Arr)-1Er*$$ (12)

[34] offer the detailed step-by-step proof. Elements in equation (12) are split on nine different terms based on the sources of production and consumption.

D. Value-added trade decomposition

Value-added in exports is aggregated into three slabs containing nine elements that yields 100% of each nation's gross exports. The number denotes the term position in equation (12). The first three elements account for the value in direct exports. The fourth and fifth elements include the value exported as intermediate goods and eventually returning to the domestic market. The seventh and eighth terms include foreign content of value incorporated in exports from home. The double value-added in trade is captured by the sixth and ninth terms as it is accounted in both partners as gross exports, arising from back-and-forth trade of parts and components. The domestic value-added in exports is accounted from the first to the sixth term. From the fourth to the ninth term the value added of inputs crossing multiple borders is identified as the share of vertical specialisation.

From the nine value-added components, a different set of indicators are estimated to assess involvement in the GVC [34]. Value-added in exports (VT) = (1)+(2)+(3); Foreign Content in exports (VS) = (7)+(8)+(9); GDP in Exports = (1)+(2)+(3)+(4)+(5); Value-Added crossing borders more that twice = sum (4) through (9); Indirect Value in Foreign Exports (VS1); Total Vertical Specialization (VS + VS1).

E. Data

This research uses the Yokohama National University – Globally-linked Input-Output (YNU-GIO) Table, developed by the Center for Economic & Social Studies in Asia (CESSA) by [35]. The Inter Country Input-Output table (ICIO) involves 29 endogenous countries, covering 11 economies in Asia and larger nations in Europe (EU) and in North America (NAFTA). Another 59 countries are covered as exogenous units. [35] carried out a detailed harmonization in the dataset, connecting the OECD Input-Output tables with data capturing flows of gross exports - imports from UN COMTRADE. The data-base includes inputs and outputs across 35 industries (YNU-GIO) and across country partners, meaning allowing tracing domestic and global flows.

IV. RESULTS

Table I presents the accounting of Indonesia versus five top partner regions for three periods: 1997, 2004 and 2012. Results are express in gross export values. The column numbers follow the same arrangement as that of [34] denoting the order of every element in the equation (12). Data is exhibited based on aggregated trade flows per region: East Asia (hereafter EA), ASEAN, North America (NAFTA), Europe (EU), and other economies (OE). The results are presented into three sub-sections: the decomposition of gross export, interactions of Indonesia with main trading blocs in the Global Value Chain, and policy implications. Trade flows are stated as a share of gross exports.

A. Gross export decomposition in Indonesia trade

Table I presents the disintegration of gross exports into components of value-added trade for Indonesia, as well as for the top six largest ASEAN exporters (regional trade partners), and three trade blocs: East Asia, NAFTA, and the EU. Referring to Table I, column (1) shows the domestic value-added exports (DV) in direct exports of final goods. Indonesia increased its exports of domestic value-added through final goods by 89% in value terms. However, as a portion of gross exports, direct value-added exports fell from 51% in 1997 to 29% in 2012, meaning that Indonesia shifted to a higher share of indirect exports and a higher share of intermediate goods. Indonesia has a low participation in direct value-added exports of final products in comparison with Thailand, the Philippines and Vietnam, as well as with East Asia and NAFTA, who recorded a direct value-added export of nearly 50%, while the Euro registered nearly 46%.

Column 2 indicates the domestic value-added in exports of intermediates for the importer market. Indirect value-added (intermediate goods) registered at 46% in 2012, a noteworthy increase from the previous 31% in 1997 and a sharp change in value terms (401%). Indonesia has the largest share compared to any other ASEAN country, defining a new role as exporter of intermediate goods.

Column 3 reports 14% in value-added in parts and components imported by a foreign partners to be re-process and re-exported to third country partners. Inputs oriented for re-exports expanded 525% versus the exports of 1997, creating a structural change in Indonesian exports from an initial 7% as share of gross exports in 1997 to 14% in 2012. Both concepts of value-added exported through intermediate goods account for nearly 60%, defining a clear role as supplier of intermediate goods (IPC) within the GVC.

Columns 4 and 5 account for back-and-forth trade, meaning domestic value-added being exported but then being re-exported back home as parts and components or as final goods. Both shares are rather small (nearly 1%), however they expanded more than 700% in value terms in 15 years. The estimations of back-and-forth trade are in line with other references [34] denoting a small participation of developing countries within back-and-forth trade.

In terms of share of foreign content included in Indonesian's exports of final goods (Foreign Value-added, column 7), Indonesia has only 3%, a low share compared with its ASEAN neighbours which have the largest share in the World (nearly 20%). In terms of foreign value embodied in intermediate goods exported by Indonesia (column 8), Indonesia registered 4.5% in 2012, half the share of ASEAN which ranks as the number one region with nearly 10% . All in all, foreign value content in Indonesian exports reports 11.8%, meaning that for every American dollar exported by Indonesia, US$0.11 accounts for foreign value. In the case of ASEAN, foreign value is nearly 35% of gross exports, signifying an important dependence with foreign inputs. Foreign value-added indicates the degree of backward integration, where Indonesia is rather low versus its ASEAN peers. The ratio of foreign value (FV) in Indonesian

exports experienced minimal change in terms of share (less than 0.5%), but an important growth in terms of value.

Out of the entire foreign value embedded in combined exports from ASEAN, Indonesia supplies less than 2% (other ASEAN partners supply 20%). Intermediate goods from extra-ASEAN countries account for 78%, with East Asia supplying 30% of them. Intra-ASEAN foreign value share is almost the same as 1997 levels (less than 25%), meaning that the implementation of the ASEAN single region has not resulted in a deep structural change in the dream of creating a single production region. Intra-regional in NAFTA and Intra-EU display stronger regionalisation, as nearly 50% of its foreign value-added content in final products is supplied from within the region, and more than 65% of its foreign value-added content in intra-regional exports of IPC (column 7). East Asia has made an important progress as well in creating stronger intra-regional links as nearly 40% of its total foreign value in exports is supply from inside the region.

Table I Accounting gross exports. 1997, 2004, 2012 (% of gross exports)

Country / Region	Gross Exports USD $ million	Value-added exports (VT)			DVA return Home (VS1*)			Foreign Value-added (FVA)		
		Direct Final Goods exports	IPCs directly absorbed	IPCs re-exports to 3rd country partners	in final exports	in IPC exports	Domestic IPC exports return home	in final goods	in IPC exports	IPC exports Produced abroad
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1997										
EAST ASIA	$961	53.10%	28.50%	5.90%	0.40%	0.40%	0.10%	7.10%	3.50%	1.30%
ASEAN	$449	37.50%	21.90%	5.60%	0.20%	0.10%	0.20%	19.80%	8.30%	4.30%
Singapore	$170	27.40%	15.60%	3.20%	0.20%	0.10%	0.30%	31.20%	11.50%	4.60%
Malaysia	$93	36.50%	22.50%	7.40%	0.40%	0.20%	0.30%	17.60%	8.10%	6.40%
Thailand	$72	45.60%	24.90%	6.70%	0.10%	0.10%	0.10%	13.20%	7.20%	4.00%
Indonesia	$63	50.90%	30.70%	7.50%	0.10%	0.10%	0.00%	6.10%	3.40%	1.70%
Philippines	$38	45.20%	27.40%	6.30%	0.10%	0.10%	0.00%	11.90%	5.80%	2.60%
Vietnam	$12	45.60%	26.10%	6.10%	0.00%	0.00%	0.00%	12.90%	6.70%	3.00%
NAFTA	$1,336	55.30%	28.40%	4.30%	1.60%	1.20%	0.20%	5.50%	2.80%	0.80%
EU	$2,472	50.00%	21.90%	5.00%	0.40%	0.20%	0.10%	14.40%	5.60%	2.30%
OE	$227	54.70%	25.50%	4.70%	0.10%	0.00%	0.00%	9.70%	4.00%	1.30%
2004										
EAST ASIA	$1,743	48.20%	29.10%	6.60%	0.50%	0.40%	0.10%	8.70%	4.90%	2.20%
ASEAN	$662	31.60%	21.40%	6.50%	0.20%	0.10%	0.30%	21.30%	9.50%	6.40%
Indonesia	$83	45.30%	32.20%	9.70%	0.10%	0.10%	0.00%	6.40%	3.80%	2.50%
NAFTA	$1,767	52.50%	29.80%	4.70%	1.80%	1.30%	0.10%	5.70%	3.10%	0.90%
EU	$4,021	46.50%	23.00%	5.50%	0.40%	0.30%	0.10%	14.70%	6.20%	2.90%
OE	$415	50.60%	26.30%	5.70%	0.10%	0.10%	0.00%	10.50%	4.70%	1.90%
2012										
EAST ASIA	$4,109	55.40%	21.70%	5.50%	0.50%	0.50%	0.10%	10.60%	4.10%	2.00%
ASEAN	$1,504	30.50%	24.50%	7.10%	0.20%	0.10%	0.20%	19.40%	9.40%	5.70%
Singapore	$555	22.90%	15.80%	4.00%	0.10%	0.00%	0.30%	30.20%	11.50%	5.90%
Malaysia	$266	24.50%	30.10%	10.50%	0.30%	0.30%	0.40%	12.60%	13.10%	11.10%
Thailand	$268	41.90%	22.30%	5.80%	0.10%	0.10%	0.10%	17.70%	7.60%	4.00%
Indonesia	$213	28.50%	45.50%	14.10%	0.40%	0.30%	0.10%	3.60%	4.60%	3.10%
Philippines	$77	45.20%	29.70%	8.50%	0.10%	0.10%	0.00%	8.90%	5.50%	3.20%
Vietnam	$125	46.80%	16.50%	4.00%	0.00%	0.00%	0.00%	22.60%	6.70%	3.10%
NAFTA	$3,130	50.60%	30.70%	6.00%	1.40%	1.20%	0.20%	5.30%	3.30%	1.20%
EU	$6,132	46.80%	18.20%	5.90%	0.40%	0.20%	0.20%	18.20%	5.80%	3.70%
OE	$1,150	34.20%	38.50%	9.20%	0.20%	0.10%	0.00%	7.50%	6.50%	2.80%

[a] East Asia (EA): Japan, China, Taiwan, Rep of Korea,. ASEAN: Singapore, Malaysia, Thailand, Philippines, Vietnam, Indonesia. NAFTA: USA, Canada, and Mexico. EU: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, UK. Other economies (OE): Brazil, India, Australia, South Africa, plus exogenous groups Hong Kong, ROA, ROE, OPEC, ROW

Columns 6 and 9 denote the double value-added content of exports, primarily due to back-and-forth trade of intermediate goods [34]. Indonesia registered 2.6% of double-counted value-added exports, a relatively small amount versus other countries. ASEAN recorded nearly 6% of double value-added content of exports, the largest ratio among sampled countries.

Indonesia experienced a relatively small change in its share of trade related to backward integration (12% of gross exports), half the ASEAN level. The country has the lowest share of vertical trade among ASEAN members. The growth in exports of Indonesia was highly supported by trade intermediate parts and components (IPCs or raw goods), mainly by value-added directly absorbed by the importer (45%). Surprisingly, 75% of Indonesian trade is one-way.

The insertion of Indonesia in vertical structures as a supplier of intermediate goods

(columns 2 and 3, IPCs) is giving the country a push in exports. The country is less dependent on foreign parts than most ASEAN countries.

However, a low share of foreign inputs may indicate that Indonesian exports tend to be less sophisticated as goods have to be re-processed abroad before being finally consumed. While Malaysia, Thailand and Vietnam are driven within high foreign input sectors (automotive, electronics, machinery, textiles, among others), Indonesia developed within natural-resource intensive sectors, mainly raw materials and therefore driven by different market forces. More than 80% of the total trade expansion of Indonesia is attributed to five sectors, all based on natural resources (mining, food, chemicals, metals and agriculture). The large export sectors of Indonesia are dominated by raw materials accounting for 73% of total export growth, and are mainly directed towards ASEAN and East Asian markets. Mining alone captured 37% of total Indonesian export growth; 96% of mining are raw materials. Similarly, 96% of basic metal exports are intermediates, and 83% of chemical exports are also IPC.

B. Interactions of Indonesia in GVC

Table II presents four indicators of value-added created by different components from the gross export decomposition. Table III displays the decomposition of exports according to main components of value-added. The figures are aggregated at the regional level, indicating at row level the country creating the value and at column level the destination of value-added. Column 10 reveals the value-added based on who is the exporter and who is the consumer of the value-added. In a similar fashion, column 11 denotes the foreign value content in exports and the region supplying the value.A specific aspect of fragmented trade is that goods cross multiple borders. Since 1997, exports of ASEAN rely heavily on multiple cross trade border trade (33% to 35%, column 14). The trend of Indonesia differs from other ASEAN members (e.g., Malaysia, Thailand and Vietnam) as Indonesia changed only slightly (11%-12%). However, in value terms, gross exports under back-and-forth trade increased 256% from 1997 to 2012. Back-and-forth trade is more dominant within automotive, electronics and electrical, among other fragmented sectors where Indonesia is a late comer versus ASEAN neighbours and East Asian countries.

As early as 1997, the largest shares of value-added exports from Indonesia were directed towards East Asian markets, which reached 34% of value-added exported in 2012.

Table II Accounting of value-added exports 1997, 2004 and 2012.

	Gross Exports USD $ million	*Value-added exports (VT) (10)*	*Foreign Content in exports VS (11)*	*Indirect Value in Foreign Exports (VS1)*	*Total VS (11+VS1)*	*GDP in Exports (12)*	*Domestic Content (13)*	*VA that crosses nations at least twice (14)*
1997								
EAST ASIA	$961	87.50%	12.00%	11.00%	23,00%	88.20%	88.30%	12.80%
ASEAN	$449	65.10%	32.40%	17.00%	49,40%	65.40%	65.60%	33.00%
Singapore	$170	46.20%	47.30%	16.00%	63,30%	46.50%	46.80%	47.80%
Malaysia	$93	66.40%	32.10%	20.00%	52,10%	67.10%	67.40%	33.10%
Thailand	$72	77.20%	24.40%	12.00%	36,40%	77.40%	77.50%	24.70%
Indonesia	$63	89.10%	11.10%	15.00%	26,10%	89.30%	89.40%	11.40%
Philippines	$38	79.00%	20.40%	19.60%	40,00%	79.10%	79.20%	20.60%
Vietnam	$12	77.90%	22.60%	19.40%	42,00%	77.90%	77.90%	22.60%
NAFTA	$1,336	87.90%	7.00%	15.00%	22,00%	90.70%	90.80%	12.00%
EU	$2,472	76.80%	22.30%	14.00%	36,30%	77.40%	77.50%	23.00%
OE	$227	84.90%	14.90%			85.00%	85.00%	15.00%
2004								
EAST ASIA	$1,743	83.90%	15.80%	13.00%	28,80%	84.80%	84.90%	16.80%
ASEAN	$662	59.60%	37.20%	19.00%	56,20%	59.80%	60.10%	37.70%
Indonesia	$83	87.30%	12.70%	15.00%	27,70%	87.50%	87.60%	13.00%
NAFTA	$1,767	87.00%	9.70%	20.00%	29,70%	90.10%	90.20%	12.90%
EU	$4,021	75.00%	23.90%	16.00%	39,90%	75.70%	75.80%	24.70%
OE	$415	82.70%	17.10%			82.80%	82.80%	17.20%
2012								
EAST ASIA	$4,109	82.60%	16.80%	15.00%	31,80%	83.50%	83.70%	17.90%
ASEAN	$1,504	62.10%	34.50%	20.00%	54,50%	62.40%	62.60%	35.00%
Singapore	$555	42.70%	47.50%	20.00%	67,50%	42.80%	43.20%	48.00%
Malaysia	$266	65.10%	36.80%	18.00%	54,80%	65.60%	66.00%	37.70%
Thailand	$268	69.90%	29.40%	17.00%	46,40%	70.20%	70.30%	29.70%
Indonesia	$213	88.00%	11.30%	21.00%	32,30%	88.70%	88.80%	12.10%
Philippines	$77	83.30%	17.60%	21.00%	38,60%	83.50%	83.50%	17.80%
Vietnam	$125	67.30%	32.40%	16.00%	48,40%	67.40%	67.40%	32.50%
NAFTA	$3,130	87.20%	9.80%	19.00%	28,80%	89.90%	90.10%	12.60%

EU	$6,132	70.90%	27.60%	18.00%	45,60%	71.50%	71.70%	28.40%
OE	$1,150	81.80%	16.80%			82.20%	82.20%	17.20%

[b] Values expressed as a share of gross exports . * VT Column (10) = 1 + 2 + 3; VS (11) = 7 + 8 + 9 ; Column (12) GDP in exports (1)+(2)+(3) +(4)+(5);Column (14) equal sum (4) through (9). VS1 (Indirect domestic value-added in foreign goods). Vertical Specialization (VS + VS1)

Contrarily, value-added exports to ASEAN countries accounted for 17% of total value-added exports from Indonesia. Combining East Asia and ASEAN means that more than 50% of Indonesia's value-added exports remained within intra-Asia, denoting the great weight of the Asian region for Indonesia. NAFTA as a market destination for Indonesian goods decreased from 15% of value-added exports in 1997 to only 11% in 2012. NAFTA, the EU, and other economies (OE is omitted in Table III) absorbed less of Indonesia's value-added in 2012 compared to 1997 levels.

Table III Accounting Gross Exports. 1997 and 2012 base on Origin (Row) and Destination (Column) of Value-Added

Gross Exports in USD million	Region	Value-added in exports (VT) (10)					(VS) Foreign value-added of Region (11)					Multiple Cross-border trade (14)				
		EA	ASEAN	IDN	NAFTA	EU	EA	ASEAN	IDN	NAFTA	EU	EA	ASEAN	IDN	NAFTA	EU
1997																
960.73	EA	20%	12%	2%	24%	10%	3%	1.81%	0.24%	3%	1%	3%	2%	0%	3%	1%
449.2	ASEAN	18%	12%	1%	13%	8%	7%	7.41%	0.88%	6%	4%	7%	8%	1%	6%	4%
63.04	IDN	30%	12%	0%	15%	12%	3%	2.01%	0.00%	2%	1%	4%	2%	0%	2%	1%
1,335.61	NAFTA	16%	4%	1%	33%	14%	1%	0.39%	0.04%	5%	1%	1%	1%	0%	7%	1%
2,471.86	EU	4%	2%	0%	10%	38%	1%	0.56%	0.07%	3%	17%	1%	1%	0%	3%	28%
1,268.48	OE	14%	6%	1%	17%	50%	1%	0.23%	0.06%	0%	1%	1%	0%	0%	1%	1%
2012																
4,109.13	EA	22%	9%	2%	19%	10%	4%	2.08%	0.33%	4%	2%	5%	2%	0%	4%	2%
1,503.51	ASEAN	22%	11%	2%	8%	7%	10%	7.52%	1.46%	4%	4%	10%	8%	1%	4%	4%
213	IDN	34%	17%	0%	11%	9%	4%	3.09%	0.00%	1%	1%	4%	4%	0%	1%	1%
3,130.03	NAFTA	19%	4%	1%	34%	14%	2%	0.53%	0.05%	5%	1%	2%	1%	0%	7%	2%
6,131.74	EU	8%	2%	0%	9%	34%	3%	0.81%	0.07%	3%	18%	3%	1%	0%	3%	24%
4,133.90	OE	23%	6%	1%	15%	37%	1%	0.45%	0.08%	1%	1%	2%	1%	0%	1%	1%

[c] Notes: All values stated as a share of gross exports. See additional notes for Group of Countries as in Table I and Table II. East Asia (EA), Indonesia (IDN), European Union (EU), Other Economies (OE)

In relation to foreign content inserted in Indonesian exports, East Asian countries contributes with nearly 4%, meaning that per each dollar exported from Indonesia, $0.04 is value-added from East Asian goods. The contribution of ASEAN countries to foreign content in Indonesian exports equals 3.09%, an increase of only 1% since 1997. The share of foreign inputs originated in NAFTA and the EU and included in Indonesian exports declined from 2% to 1%. On the contrary, Indonesian inputs embedded in foreign countries exports increased from nearly 3% in the year 1997 to almost 3.9% in 2012, signifying a growth of Indonesia in GVCs. Even though Indonesia sources large quantities of IPCs to the World, the country accounts for only a small share of global supplies within fragmented structures. Indonesia could add more value to its parts and components, as 60% of its exports will be re-processed before final consumption.

80% of the total value-added of exports of IPCs (column 3) remains within Asia. While the share of Indonesia as a supplier of intermediate parts and components to be re-processed and re-exported within the ASEAN region enlarged, the focus of Indonesia shifted to build links with East Asian countries rather than building stronger connections within the ASEAN. The share of intermediate inputs from Indonesia exported through the ASEAN region to third countries fell.

An interesting example of developing regional supply chains is found in East Asia, as it shifted from high dependency from NAFTA to a higher regional content. In 1997, 24% of the value-added of East Asia were inputs from NAFTA, by 2012 the share fell to 19%. Among ASEAN countries, Indonesia is the country that has experienced the largest expansion to East Asia's value chain. The ASEAN countries lowered their share of vertical trade with East Asian from 12% to 9%.

In terms of vertical specialization, also understood as the domestic multiple-cross border trade or value-added crossing nations more than twice, Indonesia kept its share at 4% of gross exports, while it increased its share with ASEAN countries from 2% to 4%. On the other hand, Indonesia lowered its share of multiple cross border trade with NAFTA, the EU and OE to 1% each. This highlights that Indonesia is increasing its participation in regional value-chains (ASEAN- EA), mainly as a supplier of parts and components. However, the dynamics of Indonesian trade differ from that of other ASEAN members, as vertical structures within the ASEAN have at least twice as much share of vertical trade. Indonesian exports are connected with initial parts of the GVC but may not be directly connected to Multinational Firms who are the largest players within vertical trade, frequently sourced in advanced countries, as noted by [2], [4], [19], [26], [28].

[15] developed a typology of GVC based on the complexity of relations, the capacity to array transactions, and the competencies of the suppliers. Within the

industries of mining, food, chemicals, metals, and agriculture, it is possible that Indonesia has moved from a market-based global value chain (little explicit coordination) as defined in [15] to more explicit coordination where there is further development of products and suppliers and importers have stronger relations, albeit without creating "captive relations." Indonesia increased its capacity (larger scale),

particularly within five manufacturing groups, namely, pulp-paper, coke, rubber, machinery, and transport equipment. Although Indonesia has experienced large growth in GVC participation within transport, machinery, and electronics, the country is left behind compared with the top ASEAN exporters (e.g., Malaysia and Thailand).

In other key industries (as in textiles and manufactures), Indonesia has developed the capability to cope with foreign designs, and quality standards, while still being dependent on key foreign inputs (65% of key inputs). Indonesia displays a "full package production" structure within those sectors, where the key lies in meeting price and time. However, after the year 2000, Indonesia faced strong competition from China, two of its ASEAN partners (Vietnam and Thailand), and South Asia, losing share in both regional (Asian) and Global (NAFTA and EU) markets. The share of textiles and manufacturers decreased (less weight in total exports although higher in value), and foreign content increased.

Indonesia also stands as a case in itself when compared with other ASEAN countries, as it holds a forward position in GVC (supplier of intermediate parts) versus its Southeast Asian neighbours who are more backward integrated. Backward integration requires absorbing large shares of foreign input in their exports, more visible in Malaysia, Thailand and Vietnam, who rapidly expanded through backward participation in the GVC with nearly 40% of FVA in their exports. Indonesia benefited far more from forward integration [6], [7], [13]. The development of Indonesia also differs from global patterns, as noted in [36] where extra-regional fragmentation experienced a growth larger than intra-regional value chains, with proximity factors having less impact than in the past.

Discussion

Regarding the question of whether Indonesia is better integrated in the GVC and as a result is producing more together with other countries under fragmented structures, the evidence suggests a yes. Goods under vertical structures increased from US$7.2 billion in 1997 to US$25.6 billion in 2012 (column 14, Table II). Indonesia strengthened ties with its ASEAN neighbours and with East Asia, while lowered its Domestic value-added share with NAFTA and the EU. Indonesia increased its combined exports with ASEAN from almost US$3.9 billion in 1997 to nearly US$22 billion in 2012, a more than five-fold growth in combined value-added.

Even though ASEAN has the largest share of foreign content in exports, more than twice that of the other regions, with 35% (backward content on our measure of vertical specialization), Indonesia differs from its ASEAN peers. Indonesia not only exported more of the same goods but it gained in regional integration, benefiting from the development of Asian trade. However, backward integration of Indonesia in GVC is only 12% of Indonesian exports and forward integration 21%, indicating that 32.3% of value-added is linked to GVC. If Indonesia is to participate more actively in GVC, it should enhance the expansion of these structures through trade policy, creating a more conducive environment for MNE and supporting infrastructure to facilitate logistics and coordination. Indonesian exports of indirect value-added embedded in foreign goods (VS1) accounts for 21%, a large share that indicates a strong forward-oriented position within the GVC (upstream), so far the greatest improvement in vertical specialization.

Indonesia is exporting lower shares of value-added through final products than through intermediate parts (59%), indicating its role as a supplier of intermediate goods (IPCs), likely within the initial segment of the GVC. The country could benefit from further processing inputs at home before exporting, or by expanding domestic chains to increase the value-added in goods.

On the other hand, exports from Indonesia have a small portion of foreign inputs (11%), a low dependency on foreign supplies, but signalling possible low sophisticated exports. Developing countries with an important presence in manufacturing exports tend to be more vertically specialized (VS), such as Malaysia 32%, Vietnam 22.6%, and Thailand 17.7%. While gross exports have increased in Indonesia, the country has not entered into those industries characterized by back-and-forth trade, remaining as an exporter of one-way raw materials. This suggest a more aggressive industrial policy at home aiming to build more extensive and specialized domestic chains.

Regional value chains within Asia work as an excellent vehicle for Indonesia to reach global markets as nearly 21% of total value-added of Indonesia through IPCs will be eventually re-processed within intra-Asia and re-exported. A better integrated ASEAN+Six region (Australia, China, India, Japan, South Korea, and New Zealand) could drive additional demand for Indonesia through re-exports. While East Asia accounts for a bigger market and is demanding a large share of inputs, it also places risk on dependency in the supply of IPC inputs (as is the ASEAN case), more competition, and latent negative effects arising from the slowdown in global demand.

Indonesia increased its participation within vertical trade (multiple cross-border) in value terms, however not in share from gross exports. Vertical structures in Indonesia are expanding at a slower speed than other regions. Even though the participation of Indonesia in other regions' exports has increased in the last 15 years (from US$9.2 to US$44.7), the share is relatively small. While it is possible that Indonesia shifted to "captive relationships" [15], there is no sign of deep changes, and thus perhaps it remains as "captive suppliers" in the value chain, confined to a rather narrow array of products, as noted in [37], where comparative advantage has strengthened within a few groups, with a focus on cost and trade advantages rather than product differentiation.

V. CONCLUSION

This paper looks into the effects of liberalization-integration of Indonesia within the context of fragmented structures, and particularly into the role it plays in vertical structures. It was established that Indonesia is a strong supplier of parts and components (IPCs) rather than as a player of exports of final products. The fact that goods still have to be re-processed before being consumed indicates that the country is exporting low value-added goods.

Indonesia has created a strong presence in Asian value-chains. Important implications arise by strengthening regionalization rather than globalization: 1) distance plays a key role for Indonesian exports; 2) demand for Indonesian inputs (IPCs) is motivated by the fast growth of Asian countries in exports, as well as by regional consumption (of raw materials) as 50% of value-added is absorbed in Asia; 3) developing the right policies is indispensable for the country to obtain greater benefits from indirect exports and local needs (ASEAN+6); and 4) Indonesia has a strong dependence from ASEAN and East Asia, that provides both optimistic and harmful outcomes); however, it is not clear if the dependency is within those fast-growth industries.

Indonesia's participation in fragmented structures appears to be increasing, albeit still at a small scale (32.3% of gross exports) compared to other regions (ASEAN 54.5%) and it accounts for a rather small share of global value in fragmented structures. The role of Indonesia as a supplier of intermediate goods has experience large growth suggesting its key contribution in GVC as a supplier of inputs. GDP in exports has increased over time, showing that exports take mainly domestic value-added, contrary to ASEAN patterns of lower value-added exports. However, the larger GDP in exports does not necessarily mean that the country is developing capabilities in the supply chain but possibly due to increasing volume of exports and positive prices.

Indonesia is enlarging its exports and to a lesser extent it has improved in integration with Asian countries. A lower share of key inputs from NAFTA and the EU in Indonesian exports (and vice versa) denotes a re-orientation towards regional efforts rather than globalization. Although, it is likely that Indonesia loss in competitiveness to China and other Asian countries in global markets.

Fragmented production networks are important for Indonesian exports as these are helping the country to increase the value of exports. However, the participation in these kind of structures is rather small. Compared with other ASEAN countries, Indonesia is less dependent on vertical exports, more intra-ASEAN oriented, and has low foreign value-added embedded in its exports.

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