THE ROLE OF FOREIGN DIRECT INVESTMENT IN IMPROVING VALUE CHAINS: EVIDENCE FROM VIETNAM AND OTHER DEVELOPING COUNTRIES

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Abstract

Global value chains (GVCs) has become much more prevalent and concerned problems on over the world since the past 2 decades. As the fast rising of globalization, internationalization and integration has put countries in tight connections of supply chains through Foreign Direct Investment (FDI). The emerging from firms in developing countries have changed the orchestra in international production, their progressively active global participation put more spotlights on their growth and their subsequent GVCs. Encouraged by OCED (2016) , TiVA is considered as an indicator that helps a more empirical and sophisticated understanding of GVCs; we therefore use TiVA to measure GVCs throughout this research. Furthermore, this paper applies econometric regression analysis to measure the impacts of determinants, specially, FDI inflows, on global value chains of Asian developing countries by collecting data TiVA, FDIinflow, Trade_GDP and Mobile_sub during the period 1995-2014. Then, we also compare those results within groups of developing countries in order to figure out the dynamic role of FDI in different contexts as well as different periods. As the results, it is not surprising that there is a significant effect of the above factors on Trade in value added of a country where an $FDIinflowGDP_{i(t-1)}$ and $GDPcapita_{it}$ have negative effects on TiVA, which are conflicting with TiVA outcome of $DtradeGDP_{it}$ and $Mobile\_sub_{it}$. Yet, when it comes to grouping by level of GDP, GDPcapita, Trade, TiVA, before and after the economic crisis in 2008, the results are interestingly different.

1. Background

The world economy has experienced a speedy era of change from the traditional comparative advantage theory based on one country's endowments to global-scale industrial organization or global value chains since the past two decades (Dicken, 2003). Due to the prominent inventions in technology and transportation in 20th century, companies progressively commenced to relocate some of their activities offshore in order to reduce their costs. Consequently, this product fragmentation has altered the international trade structure and put developing countries into a global manufacturing networks.

By the middle of the first decade of this century, for instance, manufactures accounted for 85 percent of the total merchandise exports of developing East Asia and they constituted nearly three-quarters of ASEAN's exports. International merchandise trade is now increasingly based on vertical specialization, that is, trade in components that are part of the same product. World trade in components increased substantially in the first decade of the 21st Century, up from 24 percent of global manufacturing exports in 1992–3 to 54 percent of the total in 2003 (OECD 2007: 2)

Viet Nam has been considered as a very successful FDI recipient after participating World Trade Organization (WTO).

In the way of pursuing sustainable economic growth, Viet Nam has tried to achieve remarkable position in GVCs' map, in particular, upgrade to upstream GVCs. Thanks to regional integration, especially, the establishment of Asean Economic Community (AEC), Asean countries, Vietnam in particular, has witnessed the significant intra-investment in region… Following Asean Investment Report (2013 – 2014), in 2013, Asean companies invested approximately $21 billion in the region. It is also recorded that Intra-ASEAN investment accounts 17 percent to the total inflows in the ASEAN Member States and is a major investment source in most such members. The growing interest of corporations from Asean Member States to invest and source regionally is due to the fact that investors can benefit from a dynamic and sizeable market, access to a large pool of relatively low-cost skilled professional labor and low-cost labor, and low transaction costs for investing, sourcing, trading and producing in ASEAN (Asean Secretariat, 2013). This led to the surge of fragmentation in production and tasks between nations within Asean.

Similarly, other developing countries are economically beneficial from both inflow investment and integration in international production and tasks. Hence, the increase of value added of a nation is highly concern by both academic work and practices. It; therefore, is critical to find out which drivers boost the upgrade of GVCs' of a nation in global scope.

Through analyzing the impact of main factor, namely inflow FDI and others, the paper aims to determine how factors affect on the contribution of GVCs in developing countries. In addition, the look of to what extent the impacts change over different periods and between economic development level of nations is also concerned in this paper.

2. Problem statement

Former academic works have shown the impact of various drivers that are attributed to the GVCs. Moreover, the globalization and integration of economic integration have boosted the development

of national economy. Especially, developing countries have been benefited by liberalization of international trade and production. Taking investment flows into consideration, it is evident that increasing foreign direct investment are concentrating on developing nations where the costs are lower than more-developed ones. The purpose of this trend is to maximize the value added of the global value chains from initial inputs to final consuming output. Nevertheless, the findings from previous researches only have purely focused on the correlation between GVCs' indicator and economic factors, such as FDI, productivity, ICT-level, trade policies, GDP, and so on. Furthermore, there are lack of researches that explicit the extent of impact of driven factors on GVCs in developing countries. In national perspective, it is far from similarity of economic condition and development mechanism between developed and developing countries. In addition, though there have been a handful of researches analyzing the drivers affecting on GVCs in such nations, it is incomprehensive in describing the nature of these impacts on contribution to value added of developing nations. From this point of view, the paper is constructed.

3. Research question

It is agreed that one of the core feature of globalization is the extensive fragmentation of production. Many goods are no longer produced in a single manufacture nor either a single country or region. It is assembled from raw material, components which are sourced from different location across the borders around the world. The GVCs frameworks have been studied as well as paid attention on the critical role of " lead firms " or big brands in developed countries. However, it is believed that the developing countries who are embedded in the low end of global value chain can upgrade their position as well as contribution to GVC by improving FDI. Capturing the lacks of quantifying investigation on GVCs driven determinants, this paper uses an econometric specification by collecting TiVA, FDIinflow, Trade_GDP and Mobile_sub of 22 data from 22 developing countries in South East Asia and East Asia to examine what country specific factors cause its participant in GVCs. Based on this approach, the flowing three questions are expressed throughout this paper:

- What drives GVC participation?
- Do FDI inflows have significant impact on GVCs of host countries?
- Is there any difference in the influence of determinants on GVCs during period from 1995 to 2014?
- How can developing countries engage and benefit from GVCs?

As mentioned in the previous sections, GVCs stand as the center of attention in global production networks and increasing GVCs participating has become priority of developing countries in order to achieve sustainable economic growth. In the next section, we revise previous empirical researches on GVCs and its determinants. The other main topics of this paper are organized as follows:

- After reviewing existing empirical researches, we will present our research methodology and research results.
- Finally, the last section will suggest some policy implications of this paper's findings.

4. Literature review

4.1. What is GVCs?

It is commonly defined that "A global value chain describes the full range of activities undertaken to bring a product or service from its conception to its end use and how these activities are distributed over geographic space and across international borders" (DFAIT, 2011). These activities include tasks such as design, production, marketing and support. However, Amador and Cabral (2014) argue that the networks that operate GVC are highly complex which links a lot of activities to make the orchestra works. GVCs involves manufacturing, logistics, transportation and other services firms, as well as customs agents and other public authorities. While Marcel, et all (2014) approach in different way, Marcel and his partners differentiate GVCs into two types in production fragmentation which are intermediate product and final product. They focus on GVCs of a final product which is defined as the value added of all activities that are directly and indirectly needed to produce it where intermediate products continue on in the production process. This research captures the lack of Marcel, et al. on intermediate product in the production process.

4.2. How's GVCs changing?

A wide set of terms: vertical specialization, outsourcing, offshoring, internationalization of production, international sharing have been addressed for GVCs by international trade literatures. Jones and Kierzkowski (1990) proposes to call it "fragmentation". Indeed, along with deepening the interdependency of national economies through international trade, the share of trade in intermediate goods has substantially increased with the progress of production fragmentation in the global production networks (Kwon and Ryou, 2015).

It has been studied that firms from developed countries play an incredible role in expansion and improvement of global value chains from the past decades. Yet, the emerging from firms in

developing countries have changed the orchestra in international production, their progressively active global participation put more spotlights on their growth and development and their subsequent internationalization. The pattern of production organization has been captured through the analytical lens of the global value chains framework where firms from developed countries manage high rent activities such as distribution, design, marketing and retailing while outsourcing low cost, low return, functions to developing countries (Gereffi, 1999; Kaplinsky, 2005). Yet, it is questioned that whether the roles of developing countries only stop as a back-up or supporting role in the GVC. Penanond (2013) explains that firms from developing countries that started off at the lowest position can use international expansion as a way to move up to higher value added position. Indeed, developing countries started the game as local subsidiaries and local suppliers has often been attributed to benefits accumulated through interactions with AC MNEs. After having accumulated sufficient capabilities, many of these local firm undertake outward international expansion and become multinational themselves. It is agreed in the research by Pananond (2013) that Southeast Asia countries have long positioned themselves as export platforms for the world's leading multinationals, resulting in their success in attracting inward FDI from global players in numerous industries. This inward internationalization of the economy through inward FDI has contributed to the development of local firms and their subsequent outward international expansion.

4.3.How developing countries participate in GVCs?

The splitting up and globalization of production networks has been a key factor that integrates many emerging economies into the global economy through a variety of arrangements. Many MNEs from more advanced countries may establish local subsidiaries or outsource to local suppliers in developing economies to benefit from lower cost of production and to engage these firms in their global value chain (GVC). The subsequent development of local subsidiaries and local suppliers has often been attributed to benefits accumulated through interactions with AC MNEs. After having accumulated sufficient capabilities, many of these local firms undertake outward international expansion and become multinational themselves (Shamel and Khalid, 201). On the other hand, to enhance their position within GVCs, firms from developing countries that started off at the lowest position can use international expansion as a way to move up to higher value added position. The primary direction of their move depends on the nature of the value chain govern structure. The progressively active global participation of firms from developing

economies puts more spotlights on their growth and development, and their subsequent internationalization. Indeed, according to UNCTAD (2013), the developing country share in value added trade increased from 20% in 1990 to 30% in 2000 and over 40% in 2013.

Engaging activities in value chains are defined into types which are the buying or selling; these two types of activities are also called "backward" and "forward" (Backer and Miroudot, 2013) where countries either import foreign inputs for export production, or deliver inputs to foreign partners for their export production. It is believed that there is significant difference between the developing regions such as Southeast and Eastern Asia, South Asia, the Middle East and North Africa, West and Central Africa, or Eastern Africa (OECD, 2015). The difference depends on their tendency to trade in intermediate inputs and whether trade is performed within or outside their own regions. Moreover, according to a study of OECD (2015), Southeast and Eastern Asia (SEA) has strong a backward in the GVCs which mean that it is likely to increase their intermediates import; while other regions like West and Central Africa has weaker backward and becoming important destination for intermediates import. The connectivity between developing countries in trading has been increased which help improving their position in GCVs.
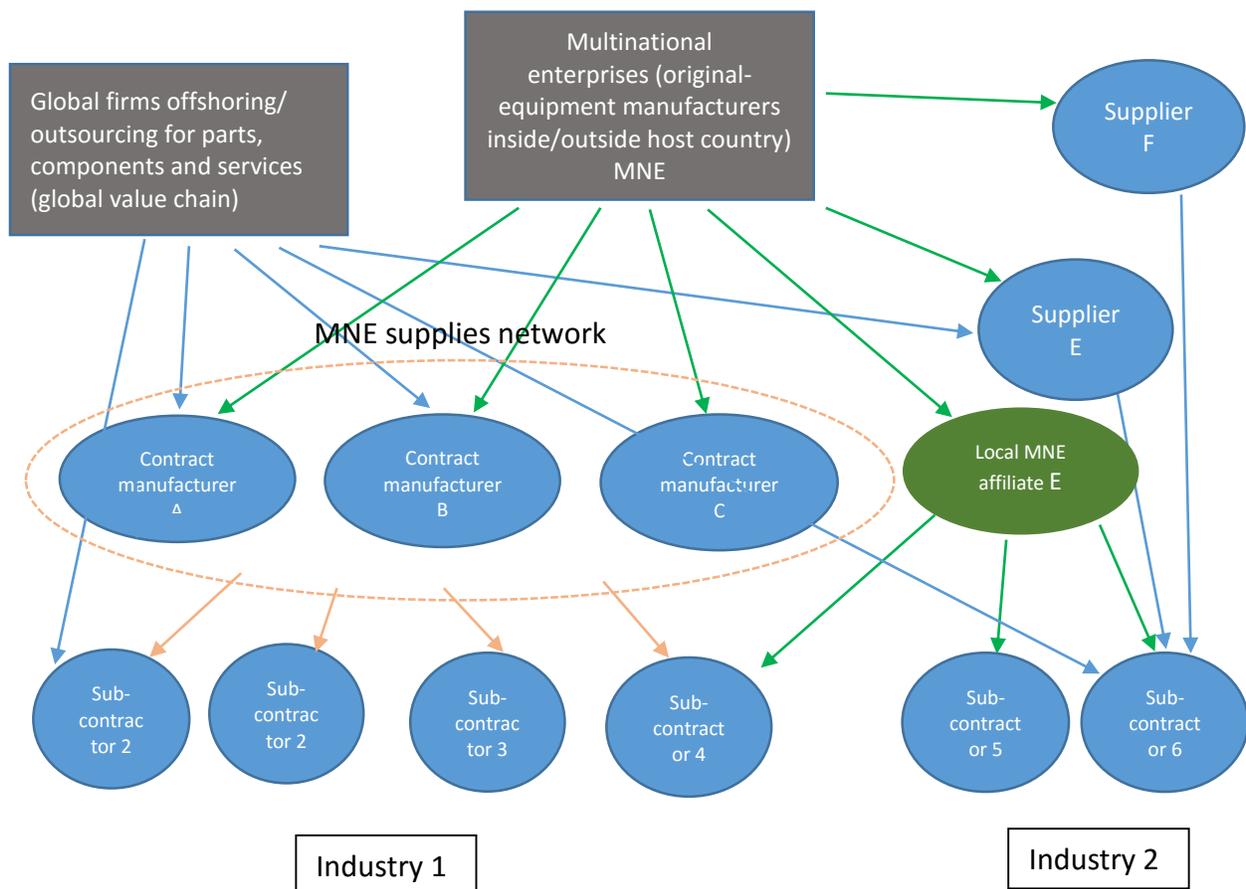
FIGURE 1. Global supply networks, global value chains and backward linkages
Source: A. Bhanich Supapol, (1995)

4.4.Previous researches on FDI and GVCs?

It is proved the foreign direct investment (FDI) has played a pivotal role in successful economic system through smoothing the cross-border trade and paving the mechanism for national development. Indeed, thanks to FDI, a nation has increasingly engaged in international production process where import and export have taken more remarkably than in precedent period.

According to the classification cited by Kurtishi-Kastrati, FDI has different motives, such as market-seeking, efficiency-seeking, resource-seeking or strategic-seeking. Therefore, the international trade in a host-country would be relied on the type of FDI applied. This, hence, led to the diversification of value added that a host-country could gain. Taking efficiency-seeking FDI as an example, the country tends to export the output generating from this given FDI activity. Consequently, the impact of such FDI seems to be an increase of export from the host-country. It turns out that the GVCs of such host-country is skewed to forward participation. (Kurtishi-Kastrati, 2013). Following the research taken by Jones and Kierzkowski (1990), models written by former academia describe how firms increasingly fragment their production processes into various stages or tasks and allocate them to more advantageous locations (e.g., Deardorff, 2001a , 2001b ; Findlay & Jones, 2001 ; Grossman & Rossi- Hansberg, 2008 ; Jones & Kierzkowski, 2000 , 2001). Another earlier literature on FDI also implied that firm disintegrate production or tasks across different countries to arbitrage international differences in factor prices (Helpman, 1984; Helpman & Krugman, 1985). The rationale behind most models of fragmentation can be stated in simple terms: in traditional production processes, inputs are organized and combined to generate final outputs in the same location. Where there are many inputs, coordination is normally necessary and proximity helps to lower the costs of coordination and transportation. But if firms could separate the production process into different production blocks and relocate them in places with lower factor prices, the total costs of production could be further reduced. Therefore firms will unbundle their production processes, as long as the resulting reduction in production costs would more than

compensate for the additional costs of coordinating remotely located production blocks and moving these production blocks around. This statement proves that FDI has dragged the global value chains participation positively along.

In a research related to GVCs participation of small & medium-sized enterprises (SMEs), Kaplinsky and Readman indicate that SMEs need to go through various processes and standards to join the global value chain, which requires a high fixed cost. However, SMEs still participate in global value chains through a variety of flexible and efficient ways like cooperating with downstream enterprises. The authors divide the SMEs in global value chain into two types: buyer-driven chain and producer-driven chain (Kaplinsky and Readma, 2001). In buyer-driven chain, SMEs can conduct FDI through corporation with local enterprises or build transactional corporations; in producer-driven chain, SMEs can join industrial clusters or vertical value chain to achieve mutual cooperation and improve collective efficiency, which can effectively overcome the shortcomings of scale, capital and so on. With the accumulation of international experience, most SMEs' roles have gradually transferred from low value-added production processes (such as OEM, OEA) to high value-added, knowledge-intensive and high return rate of ODM (original design manufacturer) or OBM (Original Brand manufacturers). In other words, the trend of FDI has lifted the economic activities of SMEs to more internationalization.

In other context, the research took into account the cost minimization and the need to operate in cost-competitive locations which have pushed transnational companies to establish production facilities in less-developed countries (Asean Secretariat, 2014). Japan, in specific, has invested into ASEAN due to these aforementioned reasons. In addition, the attraction of a regional market has also been encouraging such companies to expand their operations and invest in the region recently. Opportunities to exploit complementary locational advantages and tap economies of scale to achieve production efficiency are further motivations and determinants of Japanese FDI in ASEAN. In short, FDI footprint has surged due to its benefits in increase of value added in a chain of supply.

Given that the total value of inputs used in producing a given level of output can be originated by either firm (insource) or from another firm (outsource). Some or all of the intermediate inputs can be obtained within the domestic economy (onshore) or from abroad (offshore). Following this phenomenon, this source of inputs gives rise to foreign direct investment (Dahlby, 2011)

(FDI). Trade and investment are complementary flows. Foreign direct investment in developing countries therefore provides a complementary view to that of trade flows regarding changes in the geographical structure of production. According to the report of In 2012, for the first time ever, foreign direct investment flows to developing countries exceeded those to developed countries. The level of inflows sharply declined globally (by 18% compared to 2011) but declined less in developing countries, and in some regions, such as parts of Africa and Latin America, the inflows even increased. It remains to be seen whether this trend will shift once the large amounts of divested capital are invested again, but it is nevertheless an important shift that few would have envisaged as recently as at the turn of the 21st century. It is also worth noting that companies in developing countries are becoming increasingly important investors. More than one-third of all cross-border mergers and acquisitions in 2012 were conducted by companies in developing countries. (Kommerskollegium, 2013)

4.5.Determinants of GVCs

FDI inflow

The rapid development of information technology and transportation from a couple decades ago has continuously tighten firms around the world into line of the world production network where more goods and services are delivered through series of production in different countries. Apparently, according to a report of OECD (Organization for Economic Co - operation and Development), WTO (World Trade Organization), and the WBG (World Bank Group) (2014), intermediate goods and services occupied 70 percent of global trade transactions. The report also points out that there is an increase in the share of developing countries in global value-added trade during the period from 1990 to 2012. These results gives evidence of a positive relationship between FDI and global value chain participation of developing countries. Therefore, indicating that FDI inflows may encourage developing countries to participate in global value chains (UNCTD, 2013).

Many investment researches indicates the significantly contribute of FDI inflow to GVC participation of a country because inward FDI may not only prompt exports but also boost value added of host country. Due to receiving a lot of benefits, most developing countries have opened up to attract FDI flows which could bring the opportunities for domestic firms to promote their participation in GVCs as well as step up their value capture. These new changes have brought

considerable impacts of inward FDI to developing countries in terms of global value chains participation.

Labor productivity

Labor productivity Given that labor productivity has the two-dimensional relationship with GVCs participation under the impact of inflow FDI. In a study conducted by Damijan, Kostevc and Rojec, as looking over the phenomenon in the industries and technology segment, the author states the mechanism of economic efficiency, especially through labor productivity, is likely to be correlated with the foreign penetration of the host country. In case of FDI attraction, the overall performance and productivity growth take place only if the industries engage in the right stage of production process – both regionally and globally. In other words, the relative performance of industries is reliant on their positioning within the global value chains (Damijan, Kostevc, & Roject, 2013). Another study also observes that changing dynamics of supply chains across regions or sources of demand which are based on various levels of capacity and skills of specific low-income countries. The literature reveals the strong connection between economic productivity and participation in international value chains. The finding concludes that GVCs stage has urged the strategic framework for developing countries to join, upgrade and be competitive in the supply chain capacity. As a result, the labor productivity pushes the upgrading of GVCs stage that a country penetrating in. As regard to backward GVCs, the balance of payment is skewed to import. It; therefore, is rationale that GVCs participation is likely to be negatively correlated with labor productivity. In other words, the low efficiency of labor productivity leads more foreign content in an international activity that a country needs to pave in production process. (Gary, 2013),

Tech level: ICT, R&D:

It is argued that technological progress has increasingly contributed to the development of GVCs. The advanced technology in communication, information and transportation has transformed the way of international trade which has descended trade cost in overall In the light of this argument, ICT-based level is partly affected the GVCs.

In a former finding, it is stated countries having high scores on internet penetration are relatively positioned at higher participation rates in vertically fragmentation production chains (E.Van der Marel, 2015). Another researcher also advocates the remarkable impact of technology level on global supply chains, especially, the upgrading of production chains of developing countries. Palit has implied that the ability of developing country firms to move into global chains and graduate

to 'high-end' activities depends on their existing technological capabilities, as well as the support mechanism made available by national country governments. (Palit, 2006)

"In supply chain management, ICT has especially been recognized as an enabler for information-sharing which companies in the supply chain can use for eliminating the so called bullwhip-effect (Lee et al., 1997). Information-sharing is also a key component in many of the recent automatic replenishment programs (ARP) (Daugherty et al., 1999). Initiatives such as vendor managed inventory (VMI) and collaborative planning, forecasting and replenishment (CPFR) are based on an increased level of automation in both the flow of physical materials and goods and the flow of information between companies to improve the efficiency in the entire supply chain. In an operations management perspective, companies seek to further improve the efficiency in the supply chain by sharing information related to matching demand and supply such as short- and long-term production planning, demand forecasting and materials and capacity planning. Information that can be relevant to share between customers and suppliers typically includes point-of-sales data, forecasts and inventory levels." (Kollberg and Dreyer, 2006).

Against this backdrop, we will define ICT – level of a country based on figures of internet users, mobile subscription of given countries. Data will be collected ranging from 1995 to 2014.

Trade

As reported by UNCTAD (UNCTD, 2013), trade in intermediate goods and services takes up 60 per cent of more than $20 trillion global trade. The evolution of production process fragmentation of tasks and activities on over the world has led to complex networks or borderless production systems.

Current international trade and investment regulations like tariff provide the groundwork for GVCs development. Because trade and investment policies have been seen as an instrument of government relying on closer connection with regional production networks as GVCs. (Stephenson, 2016).

5. Data and methodology

5.1. How to measure GVCs in this research: TiVA (Thu)

5.1.1. TiVA

The global value chains are also defined as the global supply chains of goods and services. In an international trade environment, most countries have involved in the supply chain activities in

various stages and industries (E. Van der Marel, 2015). According to OECD, global value chains (GVCs) are measured by various methods including a variety of literatures pertaining to GVCs as "vertical specialization", "offshoring", "outsourcing", "international production sharing", "disintegration of production", "internationalization of production", "multi-stage of production", to name but a few. In the context of this paper, the author use the Trade in Value Added (TiVA) indicator to represent the GVCs participation. This database is an initiative combining between two sources including OECD and WTO. The indicator aims to allow tracking of global production networks and supply chains and is considered as better than conventional trade statistics.

Generally speaking, the TiVA database consists of a handful of indicators measuring "the value added content of international trade flows and final demand" (OECD, 2015). The indicators have various approaches to measure the value added content in a given export output. (OECD, 2015). As regard to the scope of this paper, we only limit the measure of TiVA as the sum of intermediate inputs import divided by total import for 22 developing countries over 20-year period from 1995 to 2014.

The use of TiVA is appropriate to the purpose of the research as this indicator comprehensively reflects the fragmentation of international production that a country employs. Back to the application suggested by OECD, the derived TiVA database provides estimates is considered as a useful tool for providing broad insights into the nature and impact of economic globalization; the characteristics of global value chains (GVCs) and how they change over time and across countries. Due to those facts, it is rationale to apply TiVA as a dependent variable observed in the paper.

5.1.2. MFN

In this research, we skew to the concept of fragmentation of production process in a country, a term originally proposed by Jones and Kierzkowski (2001). In a research of Van Bergeijk, the GVCs is also indicated by import share of manufacturers (Van Bergeijk, 2013). The researcher focused on manufacturing share by accounting for the import of SITC 6, 7, 8 in total national import. In other words, MFN presents the extent of foreign value added dependence of manufaturing in SITC 6, 7, 8 in total industries of a nation. In the context of this argument, international production sharing inevitably are part of international trade as manufactured goods are mostly imported to be assembled in exported products. (cited with Yeats (1998)). Ironically, this approach is a crude measure of the presence of GVCs and this indicator does not reflect the nature of fragmentation of production

5.1.3. Value added per GDP

Against the backdrop of global value chains (GVCs) definition, this indicator is measured by the adding value of the whole activities undertaken in a certain industrial sector from the inputs to the end-using output. There have been a handful of GVCs indicators represented in former researches, such as TiVA (trade in value added), MFN (manufacturing share), VSI (vertical specialization indicator), namely but a few. Another look of GVCs presence is the figures described value added per GDP in manufacturing sector of given countries. The manufacturing share per GDP is seen as the amount of value added created by one unit of GDP for global economic development. It is implied that the more value added contributed, the higher position on global value chain map that a country can gain.

According to International Standard Industrial Classification (ISIC), value added is defined as the net output of a given sector by subtracting intermediate inputs after adding up the whole outputs. In sense, the definition is focused on domestic contribution in the chain of production process within national context. Globalization has caused the fragmentation trend of international production in which the typical products and services are assembled from both foreign and domestic components. In order to analyze the GVCs trend, it can be taken into account either foreign or domestic value added. This paper, typically, takes the domestic added value as the indicator to describe the national contribution in term of GVCs perspective. However, the measure of value added per GDP cannot sufficiently illustrate the extent of international production sharing, but aims to express the adding value of a national development. In overall, the indicator is taken as a share of manufacturing net output divided by GDP (UN Statistics, 2013). The relevant valuation concept is gross value added at basic prices, defined as the difference between output at basic prices and intermediate consumption at purchaser's prices. It; therefore, only reflects the extent of economic development of a country.

5.1.4. Why choose TiVA

Due to the nature of these above indicator, TiVA is the best measure of GVCs participation in this paper. The database is collected from UN Statistics for 22 developing countries in 20-year period since 1995. Though there has been constrained by few blank figures, that dataset is adequate to observe the phenomenon conducted.

5.2. Data and methodology

5.2.1. Research model

Although, there have been a lot of researchers studying on determinants of GVCs in both theoretical and empirical literatures, there still lacks of quantifying investigation the impacts of factors driving changes in GVCs over time. Among the previous studies, gravity models is more likely to be applied in order to figure out the relationship between bilateral trade flows and value added of a country. Nevertheless, gravity approach focuses only on explaining why countries trade, but misses the other key issue associated with why countries involve in global production networks. Hence, this study employs a simple econometric specification to examine what country-specific factors cause its participant in GVCs. Then, we use cluster analysis to compare the difference of GVCs' determinants in different countries.

The research model apply in this paper is as follows:

$$TiVA_{it} = FDIinflowGDP_{i(t-1)} + GDPcapita_{it} + Trade\_GDP_{it} + Mobile\_sub_{it} + error_{it}$$

Where

(1) **FDIinflowGDP$_{i(t-1)}$:** Foreign direct investment lag 1 period of country i in year t, is the value of inward direct investment made by foreign investors in the reporting economy. Inward direct investment is also considered to include all the liabilities and the transferred assets between the businesses receiving the investment and their investors. In addition, inward direct investment covers all the assets and liabilities' transfers of the resident and nonresident enterprises, supposing that the ultimate controlling parent is foreign. Taken inward FDI of country i in year t divides GDP of country i in year (t-1) that is FDIinflowGDP$_{i(t-1)}$; this way of calculation explains the relative change of FDI scale compared to GDP in the year t-1. This is also the reason why we did not apply GDP as our independent variable in this model.

Economic meaning: The FDI inflow indicator presents the situation of external financing resources through the form of direct investments from foreign investors on the reporting economy. Negative values of FDI inflows in a certain year show that the value of disinvestment by foreign investors was larger than the value of capital new investment in one country.

Moreover, the FDI inflows are considered as means to achieve sustainable development goals and growth of private sector. In many cases, FDI also contributes to the transfer of technology, management skills and improvement of labor. (Lagendijk & Hendrikx, 2009)

(2) **DTradeGDP$_{it}$** : Trade of a country i in year t is defined as the total import and export in year t. Taken the total import and export divides by GDP of country i in year t that is **TradeGDP$_{it}$.**

DTradeGDP$_{it}$ is the different between **TradeGDP$_{it}$** of country i in year t compared to year t-1. This variable explains the level of openness of a country over the years.

Merchandise trade (% of GDP): "Merchandise trade as a share of GDP is the sum of merchandise exports and imports divided by the value of GDP, all in current U.S. dollars."

Citation: http://data.worldbank.org/indicator/TG.VAL.TOTL.GD.ZS

Economic meaning: This reflects the country's dependence on trade or trade openness, but it also suggests that they are likely highly involved in global value chains. This indicator is positively correlated with integration in GVCs as well as real GDP and productivity (Alcala & Ciccone, 2004). The synthesis report of OECD (May 2013) also states that the openness brings to better working conditions, higher productivity and economic growth. The trade openness positively correlates with the liberalization in term of economic activity of a country. It; therefore, implies that significant growth rates are often associated with countries embracing the ongoing globalization and increasing openness to the international exchange of goods and services as well as ideas and technologies (World Bank, 1993). And there is hardly any doubt that openness to international trade facilitates the economic and social development.

(3) GDPcapita: productivity

(GDP/total employment) Productivity is defined as a ratio of a volume measure of output to a measure of input use. The volume measure of output is measured either by gross domestic product (GDP) or gross value added (GVA). For the labor input, the amount is measured either by the total number of hours worked of all persons employed or total employment (head count). (OECD, 2001)

Economic meaning: Labor productivity is a revealing indicator of several economic indicators as it offers a dynamic measure of economic growth, competitiveness, and living standards within an economy. It is the measure of labor productivity (and all that this measure takes into account) which helps explain the principal economic foundations that are necessary for both economic growth and social development.

(4) Mobile_sub$_{it}$: Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months). The indicator applies to all mobile cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or

USB modems, subscriptions to public mobile data services, private trunked mobile radio, tele-point, radio paging and telemetry services.

Economic meaning: "Telecommunications and social, economic, and institutional development are closely linked. Modern communications is considered to be relatively benign to the environment. There is unlikely to be sustainable development without a well-developed communications infrastructure. Communications is critical to support sustainable development." (OECD (Organisation for Economic Co-operation and Development);WTO (World Trade Organization);WBG (World Bank Group), 2014)

Variable symbol	Variable name	Source & Unit	Expected impacts
$TiVA_{it}$	Trade in Value added: Dependent variable	United Nation Statistics As % of total import	-
$FDIflowGDP_{i(t-1)}$	Inward FDI to the host country with one period lag: Independent variable	World Bank As % of GDP	-
$GDPcapita_{it}$	Labor productivity: independent variable	World Bank USD/year/person	
$Trade\_GDP_{it}$	Openness to international trade: independent variable	World Bank As % of GDP	
$Mobile\_sub_{it}$	ICT-level of the host country: independent variable	World Bank As % of 100 person	

TABLE 1: Variables explanation

5.2.2. Data description

The unbalanced panel data used in this paper including TiVA, FDIinflow, Trade_GDP and Mobile Cellular Subscriptions of 22 Asian developing countries, were collected from UNCT over the periods from 1995 to 2014. 22 Asian developing countries contain Afghanistan, Bangladesh, Bhutan, Cambodia, Myanmar, India, Indonesia, Kazakhstan, Kyrgyzstan, Republic of Laos,

Malaysia, Maldives, Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan. (UN Statistics, World Bank, OECD).

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. sum TiVA FDIinflow GDPcapita Mobile_sub Trade_GDP

    Variable |        Obs        Mean    Std. Dev.         Min         Max
-------------+--------------------------------------------------------------
        TiVA |        230    .6323913    .1330427         .29         .84
   FDIinflow |        436    2571.263    5549.547    -4550.355    43406.28
   GDPcapita |        440    12864.07    10634.33      819.47    54169.48
  Mobile_sub |        433    3.07e+07    1.05e+08           0    9.44e+08
   Trade_GDP |        418    208.5024    120.8063           1         417

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```

TABLE 21: Statistic summary of variables

```
. tab Country if TiVA>0

     Country |      Freq.     Percent        Cum.
-------------+-----------------------------------
 AFGHANISTAN |         20        4.55        4.55
  BANGLADESH |         20        4.55        9.09
      BHUTAN |         20        4.55       13.64
    CAMBODIA |         20        4.55       18.18
       INDIA |         20        4.55       22.73
   INDONESIA |         20        4.55       27.27
  KAZAKHSTAN |         20        4.55       31.82
  KYRGYZSTAN |         20        4.55       36.36
        LAOS |         20        4.55       40.91
    MALAYSIA |         20        4.55       45.45
    MALDIVES |         20        4.55       50.00
    MONGOLIA |         20        4.55       54.55
     MYANMAR |         20        4.55       59.09
       NEPAL |         20        4.55       63.64
    PAKISTAN |         20        4.55       68.18
 PHILIPPINES |         20        4.55       72.73
   SRI LANKA |         20        4.55       77.27
  TAJIKISTAN |         20        4.55       81.82
    THAILAND |         20        4.55       86.36
TURKMENISTAN |         20        4.55       90.91
  UZBEKISTAN |         20        4.55       95.45
     VIETNAM |         20        4.55      100.00
-------------+-----------------------------------
       Total |        440      100.00
```

TABLE 3: List of 22 observed Asian developing countries
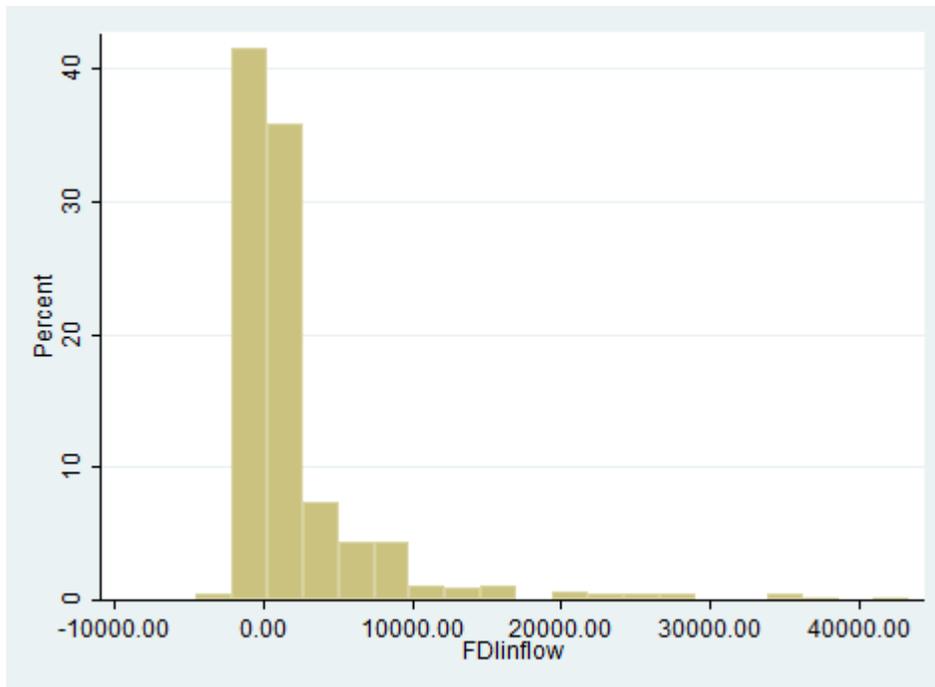
Graph 1: FDI inflow distribution

A basic description of our paper begins with a comparative of some indicators that present as independent variables in the quotation. First, considering FDIinflow (is the value of inward direct investment made by foreign investors in the reporting economy covering all the assets and liabilities between the businesses receiving the investment and their investors), Graph 1 shows the FDI inflow of these 22 countries is a huge distance from 1995 – 2014 from zero to almost 40000.00, in which only few countries that reach 30000.00 USD. It is noted in this Graph that there are a lot of countries withdrawn capital by investors as presented negative number.

Second, considering GDP, Graph 2 shows that there is 70% of selected countries that have GDP below 100 Billion USD while only around 25% has GDP between 100 – 500 Billion USD and less than 5% has GDP more than 500 USD.

Third, considering GDPcapita, Graph 3 indicates the big diference of productivity among those selected coutries. Most of them are ranged from 2000 USD to 25000 USD while onely few countries reach more than 25000 USD.

Fourth, considering TiVA, Graph 4 shows that there are around 18% of observed countries that is less than 5.5 of TiVA while more than 80% countries have TiVA from 5.5 to 8.4. Its not
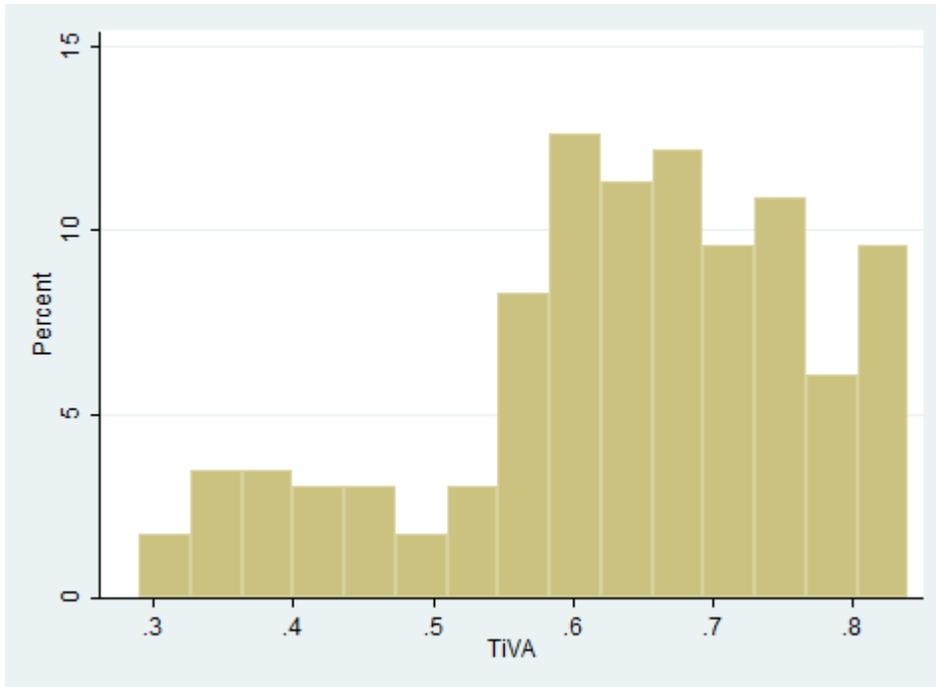
abnormal that even the least developed countries still participate in GVCs; but the level of the contribution that counts ((Kommerskollegium, 2013)
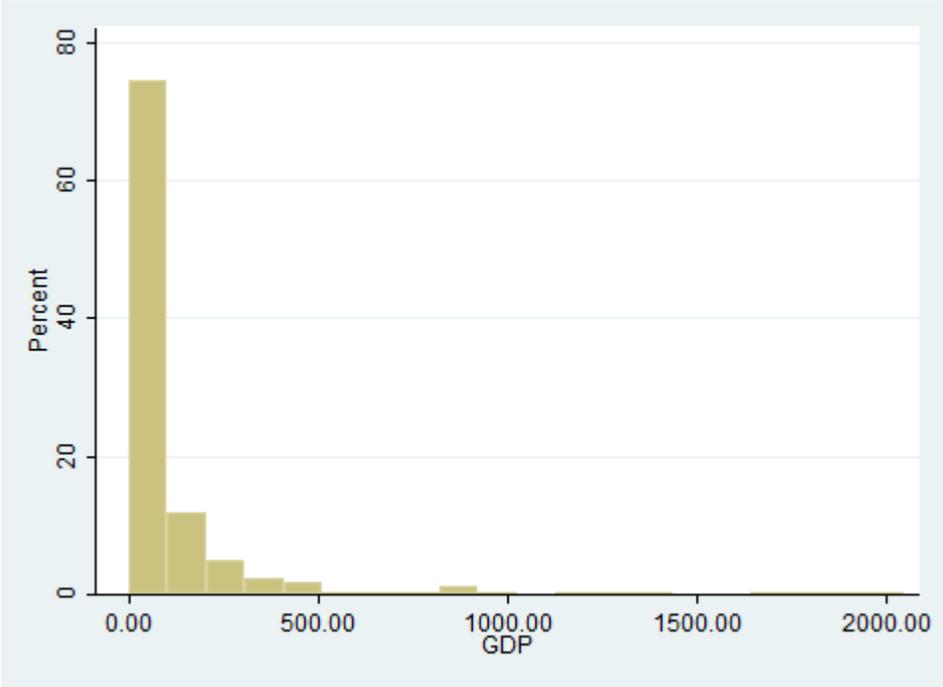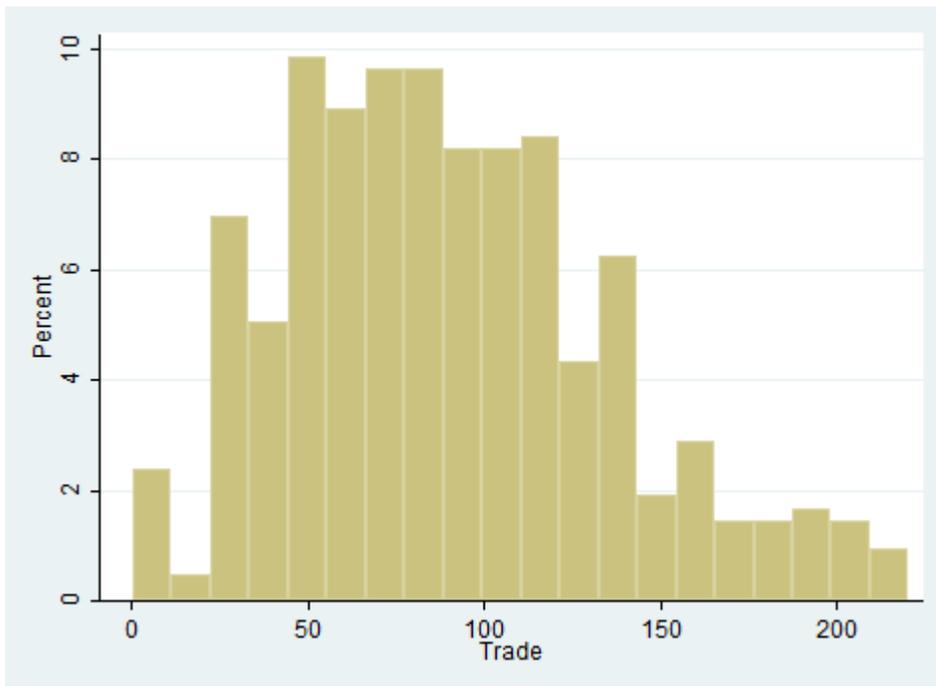

Graph 2: GDP distribution
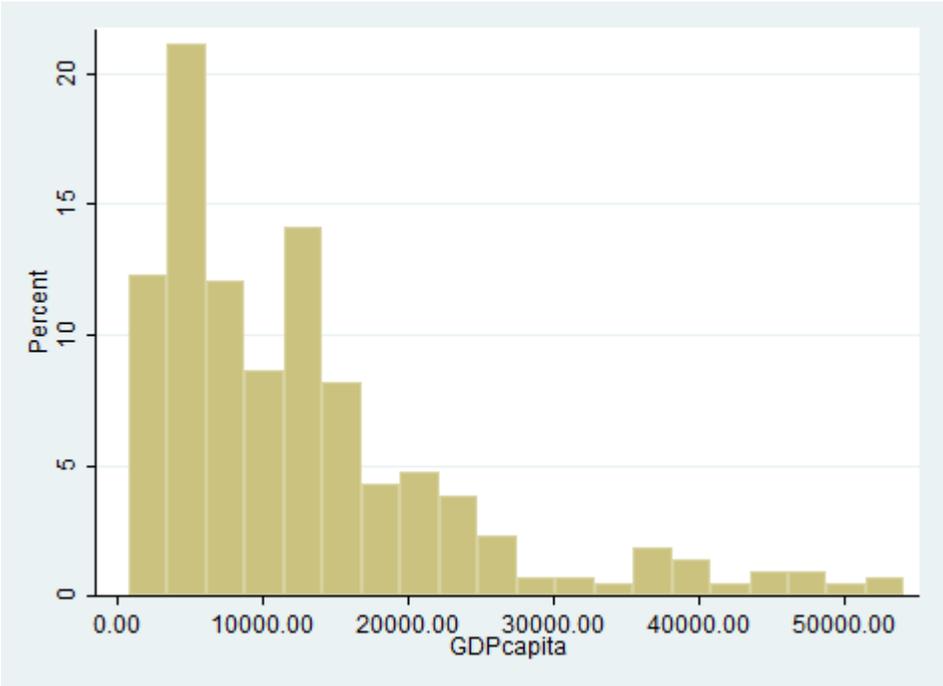
Graph 3: GDPcapita distribution

Graph 4: TiVA distribution

Graph 5: Trade distribution

Firth, considering Trade, Graph 6 shows that around 85 % of the selected countries trade in the size of from 20 Billion USD to 140 Billion USD while there is around 11% has total import and

export from 150 Billion USD to 220 Billion USD. Interestingly that there is around 3% of them has value of trade less than 20 Billion USD.

5.2.3. Hypothesis:

Hypothesis 1: *an increase of FDIinflowGDP lag 1 period leads to a decrease in TiVA of a developing country*

Hypothesis 2: *the impact of FDIinflowGDP lag 1 period on TiVA of a larger developing country is less significant than that of a smaller developing country.*

Hypothesis 3: *the impact of FDIinflowGDP lag 1 period on TiVA of a developing country with higher productivity is less significant than that of a developing country with lower productivity.*

Hypothesis 4: *the impact of FDIinflowGDP lag 1 period on TiVA of a developing country with more openness is less significant than that a developing country with less openness.*

Hypothesis 5: *the impact of FDIinflowGDP lag 1 period on TiVA of a developing country with smaller TiVA is less significant than that of a developing country larger TiVA.*

Hypothesis 6: *the impact of FDIinflowGDP lag 1 period on TiVA of a developing country before global financial crisis is less significant than that after 2008*

5.2.4. Empirical results:

Based on the 50 percent of data distribution (TABLE 4: quantile of variables distribution), the observed data are divided into two groups by FDIinflowGDP, GDPcapita (prodctivity), DtradeGDP (level of openness), TiVA, in which the lower group includes the 50% of observations with smaller value, while the upper group contains the rest of 50%. Then, we run regression for panel data with fixed effect for 5 rounds as follows:

Round 1: Run regression for panel data with fixed effect for all Asian developing countries (hypothesis 1)

Round 2: Run regression for panel data with fixed effect for developing countries with GDP >18.897 and developing countries with GDP <=18.897 (hypothesis 2)

Round 3: Run regression for panel data with fixed effect for developing countries with GDPcapita >10382.09and developing countries with GDPcapita <=10382.09 (hypothesis 3)

Round 4: Run regression for panel data with fixed effect for developing countries with Trade >83.17272 and developing countries with Trade <=83.17272 (hypothesis 4)

Round 5: Run regression for panel data with fixed effect for developing countries with TiVA >.64 and developing countries with TiVA <=.64 (hypothesis 5)

Round 6: Run regression for panel data with fixed effect for developing countries with Year <2008 and year >=2008 (hypothesis 6)

Finally, we use Mixed-effects regression model which contains both fixed and random effects and are considered as multilevel models and hierarchical models. In detail, mixed model combines fixed effects analogous to the coefficients in standard regression models and random effects. But instead of directly estimated, the mixed-effects model summarized through the unique elements of the variance-covariance matrix.

TABLE 4: quantiles of variable distribution

Stats.	GDP	FDIinflowGDP	GDPcapita	TiVA	Trade	Mobile_sub
Mean	113.1928	2571.263	12864.07	.6323913	89.92238	3.07e+07
Percent 25	4.234	76.534	5048.205	.57	55.6278	105000
Percent 50	**18.897**	**397.4068**	**10382.09**	**.64**	**83.17272**	**1763178**
Percent 75	104.849	2311.419	16306.38	.73	119.3075	1.76e+07
Max	2048.517	43406.28	54169.48	.84	220.4074	9.44e+08
Min	0	-4550.355	819.47	.29	.3088029	0
SD	260.8617	5549.547	10634.33	.1330427	45.83198	1.05e+08

At the end, we got the following results:

TABLE 5: Result of hypothesis 1,2 and 3.

Dependent variable: TiVA	Hypothesis 1	Hypothesis 2		Hypothesis 3	
		GDP>18.897	GDP<=18.897	GDPcapita >10382.09	GDPcapita <=10382.09
FDIinflowGDP$_{i(t-1)}$	**-.0004229*****	-.000556	**-.000373****	**-.0003733*****	**-.0006135*****
	(-.0006631)	(.0003586)	(.0001392)	(.000116)	(.0001508)
GDPcapita$_{it}$	**-4.68e-06****	**-4.84e-06***	**-7.44e-06****	**-5.62e-06****	**.0000419 ***
	(1.95e-06)	(2.33e-06)	(2.70e-06)	(1.83e-06)	(.0000202)
DtradeGDP$_{it}$	**.0000538****	**.0000478***	**.0000563***	.0000308	.0000352
	(.0000204)	(.0000243)	(.000029)	(.0000194)	(.0000729)

Mobile-sub$_{it}$	8.97e-11***	8.39e-11***	2.38e-09***	4.37e-11	-3.90e-10
	(1.4e-11)	(1.51e-11)	(2.83e-10)	(1.03e-10)	(4.42e-10)

Hypothesis 1 result: (hypothesis 1 column)

This fixed effect model examines the impact of individual factors such as FDIinflowGDP, GDPcapita, DtradeGDP, Mobile_sub, on TiVA of an Asian developing country from 1995-2014 in general. The results points out a significant effect of the above factors on Trade in value added of a country where an FDIinflowGDP$_{i(t-1)}$ and GDPcapita$_{it}$ have negative effects on TiVA, which are conflicting with TiVA outcome of DtradeGDP$_{it}$ and Mobile_sub$_{it}$. In detail, an increase in FDIinlowGDP of previous year can lead to a decrease in TiVA of a country this year with 99% confidence level, which means H1 is accepted. The other factors such as GDPcapita, DtradeGDP and Mobile_sub remains their significant parts in TiVA of a developing country. Anxiously, GDPcapita, as a proxy of productivity, negatively influence on a country's TiVA. This result again supports substitution relationship between import and inward FDI –see Baer (1972), which state that an increase in FDI inflow will improve domestic productivity and production capacity, then this domestic improvement results in replacing foreign intermediate imports with domestic production.

The correlation between import dependence economic and inward FDI is still uncertain. We have witnessed numerous of countries that successfully take advantage of FDI to enhance their competence (United States and Australia during the late 19th century). Otherwise, we have also observed Korea minimizing dependence on foreign investments, which claims that FDI is just a necessary, but not a sufficient condition for sustainable economic growth of a country. Mardon (1990).

Hypothesis 2 result: (hypothesis 2 column)

This fixed effect model determines the different effects of FDIinflowGDP, GDPcapita, DtradeGDP, Mobile_sub, on TiVA of Asian developing countries respecting different size (GDP). For the larger countries belonging to upper groups by GDP (larger GDP), the external factor FDIinflowGDP seems to have less influence on TiVA of a country, whereas the internal factors such as GDPcapita, DtradeGDP, Mobile_sub have significant impacts on TiVA. On the contrary, the role of FDIinflowGDP becomes much more important element of TiVA.

Moreover, small countries tend to be more integrated into GVCs because of their greater need for foreign inputs (downstream participation). The relationship is diluted, however, by the fact that large countries tend to supply many inputs used in third countries' exports (upstream participation), which also feeds into the participation index (Backer / Miroudot 2013).

So hypothesis 2 is accepted.

Hypothesis 3 result: (hypothesis 3 column)

Regarding productivity, although FDIinflowGDP lag 1 period have negatively significant impact on both high and low productivity groups, GDPcapita switches its significant influence side from negative to positive. It seems to be conflicting with theory arguing that the higher productivity countries achieve, the less backward GVCs they depend on. In fact, the relationship between TiVA and GDPcapita is not a simple one-way. When there is a low GDPcapita level in a country, an increase in GDPcapita can increase GVCs' backward dependence of that country. This dues to the more high skilled workers in a low productivity country, the higher technology absorbability of that country, which leads that country to import more modern intermediate goods with higher value. Advocating of this point, in a research of Columbian firm, Fernandes and Isgut (2005) conclude that the higher productivity in firm, the higher level of intermediate goods firm imported. Adversely, for a higher productivity country, an increase in productivity will drive in-house production to substitute imports of intermediate input. Consequently, import dependence level of higher productivity countries will fall off.

Hypothesis 3 is rejected.

The TABLE 6 continues to present the results of hypothesis 4, 5 and 6.

TABLE 6: Result of hypothesis 4, 5 and 6.

Dependent variable: TiVA	Hypothesis 4		Hypothesis 5		Hypothesis 6	
	Trade> 83.17272	Trade<= 83.17272	TiVA>.64	TiVA<=.64	Year>=2008	Year<2008
FDIinflowGDP$_{i(t-1)}$	**-.0003658**** (-.0006631)	-.0006986 (.000499)	-.0001452 (.0003905)	**-.0004603**** (.0001669)	**-.0003127**** (.0001486)	**-.0013993***** (.0004326)
GDPcapita$_{it}$	**-4.68e-06**** (1.95e-06)	**-.0000104***** (2.59e-06)	**-4.55e-06**** (1.99e-06)	-1.82e-06 (3.43e-06)	**-7.64e-06*** (4.11e-06)	-2.75e-06 (2.70e-06)

DtradeGDP$_{it}$	**.0000538****	-.0001218	**.0000292***	.0000133	7.17e-06	**.0000356***
	(.0000204)	(.0001999)	(.0000148)	(.0000377)	(.0002258)	(.0000185)
Mobile_sub$_{it}$	**8.97e-11*****	**1.29e-10*****	**7.26e-11** ***	1.04e-10	**1.70e-10*****	3.17e-11
	(1.4e-11)	(1.43e-11)	(1.39e-11)	(9.62e-11)	(3.02e-11)	(8.69e-11)

Hypothesis 4 result: (hypothesis 4 column)

Considering countries' openness level, import dependence indicatior of countries with higher level of openness is influenced by FDIinlowGDP and DtradeGDP rather than that of countries with lower openness level. Hypothesis 4 is accepted. Whereas, the roles of GDPcapita and Mobile_Sub remain their significant impacts on TiVA of both opened and less opened countries. The result implies that for the less opened countries, productivity factor GDPcapita and ICT-level Mobile_sub, which mean production capacity, play a crucial role in the supply chains position of host countries. Therefore, the only way for closed economies to be independent on import inputs is improving their own production capacity such as labor quality and technology level.

Hypothesis 4 is accepted.

Hypothesis 5 result: (hypothesis 5 column)

The hypothesis 5 examines the different roles of external factor FDIinflowGDP on TiVA of a country. While countries with lower TiVA <= 64 are more likely affected by foreign investment than the countries with higher TiVA >64. From the above results, this finding seems to be surprised because numerous of previous studies argue that inward FDI have a significant impact on intermediate imports in host country, which maybe substitution or complementary. The findings of this paper provides a more detailed view of the level impact of FDI in a countries that have lower TiVA. Yet, different argument in Central and Eastern Europe Countries studied by Damijan and Rojec (2013) that outsourcing of lower value added production stages may constrain the positive impact of FDI.

Hypothesis 5 is accepted.

Hypothesis 6 result: (hypothesis 6 column)

Concerning the impacts of global financial crisis in 2008 on position of the above determinants in TiVA of a country, we divided the observations into two groups. One includes data before 2008 and another group includes the rest of data. The empirical results proves that the differences between period before 2008 and period after 2008 are the impacts of GDPcapita, DtradeGDP and

Mobile_sub. Before the crisis, the results show that there is a remarkable impact of the above factors on Trade in value added of a country where an FDIinflowGDPi$_{(t-1)}$ have negative effects on TiVA while DtradeGDP$_{it}$ have positive effect on TiVA. This means that developing countries can reduce their dependence on intermediate goods imported from foreign countries by encouraging FDI inflows and trade protection by tariff as government policies of China, which attracted a lot of FDI inflows to substitute intermediate imports.

However, after the financial crisis in 2008, FDIinflowGDPi$_{(t-1)}$ and GDPcapita$_{it}$ have negative effects on TiVA while Mobile-sub$_{it}$ have positive effect on TiVA. This result can be possibly explained by government policies to increase country productivity. According to Ravallion (2008), after the financial crisis in 2008, government in developing countries applied many social protection and human development programs to increase productivity and carry out many programs to evaluate worth projects to attract FDIs. (Lin, 2008).

Hypothesis 6 is rejected.

6.   Conclusion and Implementation

The rising of GVCs during the last two decades has invited countries over the world to pay attention on their trade and investment policies as well as barriers to optimize benefits from global production networks. Still GVCs and its' implication are not yet fully understood in term of integration between value chains and other macroeconomic factors. For that reason, this paper aims to contribute a deeper analysis to examine the position of countries in term of backward GVCs under impacts of FDI inflow, trade, productivity and technology level by using fixed-effects regression model. It also derives a more detailed examination of backward GVCs' determinants in Asian developing countries.

The GVC participation index indicates the extent to which a country is involved in a vertically fragmented production process (in relative and absolute terms). The index of the number of production stages shows how long global value chains are and also highlights the domestic and international part of the value chain. The results reveals the interesting facts that inward FDI negatively affected on TiVA of a developing country. In other words, an increase in and FDI invested in a developing country will substitute intermediate goods imported from downstream, or decrease dependence on intermediate imports of the host country. Even though, the effective influence of FDI depends on the quality of FDI and the absorptive capacity of domestic economy. First, the FDI quality or types of FDI needs to be investigated because the motivation of FDI may

influence technology and labor productivity of domestic firms. Second, FDI spillovers rely upon the absorptive capacity of domestic economy, which includes labor productivity and skills. Narula and Marin (2003) analyzing data of Argentina, have shown that FDI spillovers benefit only countries that improved their absorptive capacity.

Implication of this research is that governments of developing countries should pay attention to understand GVCs which includes various activities along the production chain, such as research, operations, marketing, etc. In order to take advance of global production networks, governments should regularly adjust their trade policies such as import tariffs, rules of origin, anti-dumping to increase competitive advantages of domestic industries. Moreover, a better understanding of the GVCs participation of countries disclose the position of national employment in the global production networks. In addition, the stand of a country in GVCs provides opportunities for that country to upgrade in the value chain, create more value-added and achieve higher economic growth.

Mapping GVCs clearly illustrates the interconnectedness between economies and highlights the transmission of macro-economic shocks along global value chains. The vulnerability of individual countries to global shocks is directly determined by their participation and position in GVCs.

In spite of these unsolved problems, we hope that our study might shed some light on the understanding of intra-regional and inter- regional divisions of labor and the global production network.

7. Apendix

7.1. Test stationary:

. xtunitroot ips FDIinflow

Im-Pesaran-Shin unit-root test for FDIinflow

Ho: All panels contain unit roots   Number of panels   =   22

Ha: Some panels are stationary   Avg. number of periods = 19.82

AR parameter: Panel-specific   Asymptotics: T,N -> Infinity

Panel means: Included   sequentially

Time trend: Not included

ADF regressions: No lags included

Statistic	p-value	1%	5%	10%
t-bar	-1.2394		(Not available)	
t-tilde-bar	-1.0905			
Z-t-tilde-bar	1.8473	0.9677		

Accept Ho: stationary

7.2. Regression of Hypothesis 1

```
. xtreg TiVA L1.FDIinflowGDP GDPcapita  Mobile_sub DTradeGDP if FDIinflow>0  , fe robust

Fixed-effects (within) regression              Number of obs      =        212
Group variable: Country_nu~r                   Number of groups   =         17

R-sq:  within  = 0.1659                         Obs per group: min =          1
       between = 0.0661                                        avg =       12.5
       overall = 0.0644                                        max =         19

                                                F(3,16)            =          .
corr(u_i, Xb)  = -0.1930                         Prob > F           =          .

                           (Std. Err. adjusted for 17 clusters in Country_number)
```

TiVA	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]
FDIinflowGDP						
L1.	-.0004229	.0001133	-3.73	0.002	-.0006631	-.0001827
GDPcapita	-4.68e-06	1.95e-06	-2.40	0.029	-8.81e-06	-5.51e-07
Mobile_sub	8.97e-11	1.40e-11	6.43	0.000	6.01e-11	1.19e-10
DTradeGDP	.0000538	.0000204	2.63	0.018	.0000105	.0000971
_cons	.7115033	.0270841	26.27	0.000	.6540875	.768919
sigma_u	.12419481					
sigma_e	.04641401					
rho	.87744989	(fraction of variance due to u_i)				

7.3. VIF test

```
. vif, uncentered
```

Variable	VIF	1/VIF
GDPcapita	1.63	0.613212
FDIinflowGDP		
L1.	1.54	0.648518
Mobile_sub	1.09	0.913408
DTradeGDP	1.01	0.994453
Mean VIF	1.32	

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