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Global fragmentation of production and its effects for developing countries

Ndiaye, Modou

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Thesis presented by
Modou NDIAYE

Supervisor
Lorenzo TRIMARCHI (UNamur)

Tutor
Guohao YANG (UNamur)

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School of
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ABSTRACT

The twilight of the 19th century and the dawn of the 20th century saw the emergence of Global Value Chains in international trade which shows a new way of participating in world trade. They have taken a leading role in international trade and therefore their accounting becomes a major paradigm that should be considered especially for developing countries. Thus, the relevance of this paper lies in the fact that the GVCs are studied for the countries which participate considerably in them, in contrast to the developing countries. This paper proposes an exploratory and descriptive study of the participation of developing countries in GVCs and their effects on development.

Keywords: Trade, Global Value Chains, value added, fragmentation of production, effects, developing countries.

INTRODUCTION

The fragmentation of production has experienced remarkable growth since the 1990s. Since then, the place of the fragmentation of production in the international trade has not ceased to evolve until it constitutes one of the major fields of research pursued by international economists.

The orientation of international trade towards a global fragmentation of production has as a corollary the difficulty of attributing entirely the origin of a final product to a single country or a single company. Indeed, companies outsource all or part of their production or source an intermediary good from a national or international company. Thus, from design through assembly to obtain a finished product, multiple national and international companies are involved. Each stakeholder brings a certain added value that comes from its participation in the overall fragmentation of production giving rise to intermediate or final goods. This participation takes place at different levels and to varying degrees of involvement, therefore the gains of the actors are not the same. The level of these gains is acquired, according to the literature review, through the position on the value chain (upstream versus downstream), by being the leading firm in the value chain, the contracts and property rights, and the ability to place oneself in the trade of intermediate Good.

In this perspective, to understand the effects of the global fragmentation of production in developing countries and the key variables that these countries should rely on to increase their involvement, it is necessary to define and agree on the fundamental characteristic's participation in GVCs.

Thus, first of all, it is necessary to present the general context by showing the evolution of the fragmentation of production and the multiple fields of study of researchers on the subject with a clear interest in the participation of developing countries. This is the point out in the first chapter. The GVC has investigated by many authors, both empirically and theoretically. Among these authors, Antràs, P. (2003) who predicts the importance of the interaction of the minimization of transaction costs and the comparative advantage. Author explains the high propensity to integrate in capital intensive industries through the transferability of capital investment decisions, investment-sharing reducing the holdup faced by suppliers, and the attractiveness of vertical integration. Following the same logic, Uzor (2011) shows the importance of the interconnectivity of firms' production activities in different geographical locations. In continuation, Antràs, P., & Chor, D. (2013) point out the sequentiality of

production and the relationships between final good producers and their various suppliers in upstream stages and in downstream stages. Another important field concerns the accounting for intermediates shows by Johnson, R. C., & Noguera, G. (2012). The sharing and exchange of skills and knowledge and the information and communication technologies presented by Markusen (2004) and Acemoglu & Autor (2010) also have a huge stake in the participation in the global fragmentation of production.

Secondly, to better understand and study the global fragmentation of production and its effects, it is necessary to present an overview on GVCs showing the relationship between trade and GVC and the way of identifying and accounting for world trade by considering the added value contained in trade from its origin to its final destination this allowing of accounting for value added in GVCs. This is mentioned in chapter II.

After the presentation of these foundations, it is relevant to agree on the drivers of participation in chapter III before agreeing and as main findings on the one hand on effects of GVCs for developing countries in chapter IV and on the other hand on domestic policies promoting GVC participation and enhancing benefits in chapter V.

I. GENERAL CONTEXT, MOTIVATION AND LITERATURE REVIEW

To better understand the participation of countries in the global fragmentation of production, it is important to understand its general context and its evolution in order to identify the motivations that militate to strengthen knowledge of this new field of study and to present the theoretical foundations and the literature produced.

1. General context

GVCs have experienced remarkable growth since the 1990s before being held back by the 2008 financial crisis which impacted world economy and significantly reduced world exchange.

This development is confirmed by Olczyk & Kordalska (2016) citing WTO (2015), which in 2011, nearly half (49 per cent) of the world trade in goods and services took place within global value chains (GVCs), up from 36 per cent in 1995. Also the intensity of the participation and the evolution of the GVCs is more noticed in the advanced countries in particular those of the OECD which, underlines de Soyres et al., (2019) between 1995 and 2011, the import content of exports increased by 63%, reaching a value of 24.3% on average.

It should be noted that participation in the GVC has varying levels and implications for countries as well as for firms or sectors. Indeed, all countries participate in the GVCs, but the

implication levels differ. Developed and large emerging countries participate in complex GVCs producing advanced and innovate manufactures and services. Unlike developing countries that enforce in product commodities processing or engage in limited manufacturing industries.

However, since 2011, surprisingly traditional trade and GVCs have not experienced any growth in GDP ratio, point out (WB report, 2017). What could explain this trend? The 2017 WTO report does not give precise indications on the probable causes of this stagnation but is it a slowdown in international trade in general or the result of protectionism which probably must hamper the process of integration of GVCs and resulted in lower world trade.

On analysis, it emerges that the rise of Global Value Chains (GVCs) is a dominating feature of the recent evolution in the structure of international trade. Compared to traditional trade, the effects of GVC are more pronounced on the flow of trade. The traditional trade involves only two countries (an exporting country and importing country) while the GVC involves multiple countries (sectors or firms of different countries). Moreover, main seminal features such as the hyper-specialization, durable firm-to-firm relationship, the cross-country implications, tend to amplify the GVC.

Currently the context is marked by the health crisis due to the covid 19 pandemic, as the 2008 global financial crisis, risks affecting the development of global value chains. The pandemic which has affected the world economy with the world GDP which is expected to contract by 4.9% in 2020 (IMF, 2021).

Responses to the health crisis led countries to lock themselves into the practice of protectionist policies linked to the covid crisis were mostly anti-export and had a negative impact on global trade. Indeed, the protectionist policies implemented within the framework of the lockdown have resulted in the reduction of foreign direct investment, import and export restrictions, the disruption of global supply chains and the threat to food supply (Baldwin & Evenett, 2020). This situation will undoubtedly have repercussions on world production as well as on Global value chains.

2. Motivation

Trade has always played a catalytic role in the evolution of humanity through technical progress and the innovation that it has generated with the migration of peoples and exchange of capital and resources. With commerce people have learned to specialize and this has boosted innovation. This is what summarize Mat Rideley says at these words: "Exchange is to technology as sex to evolution".

The importance of commerce has demonstrated by Leonard E. Read, (1964) through the manufacture of a pencil which the input of hundreds of people from various geographical locations is necessary. He shows the importance of trade by illustrating two tools for the hand: Biface and Mouse. While the biface only requires the knowledge of one person, the mouse requires knowledge from hundreds of persons: collective knowledge. Thus, the importance of specialization, cooperation, exchange, sharing of ideas, integration and communication is readily apparent. What is call a "collective brain".

Since then, trade has undergone notable changes in the manner and the involvement of transnational actors. Thus, it appears that trade must include these new aspects such as the global fragmentation of production. Therefore, only gross trade value data may not fully reflect international trade. Hence considering the added value contained in trade and the intermediate inputs can represent a more relevant and precise illustration of international trade insofar as these specific aspects (WB report, 2017).

For this purpose, the separation of the resources and the comparative advantages that each locality has, imply a Global fragmentation of production allowing to improve the profits and promoting technical progress and innovation. However, the share of participation of this Global fragmentation of production varies according to the level of development of the countries and also to the size of the firms (multinational firms). It is noted that the volume of intra-firm trade is very large when it comes to capital-intensive goods, or multinationals firms. It is also noted that when it comes to trade with low-capital countries or with firms supplying labor-intensive goods, trade takes place under arm's length conditions (Antràs & Chor, 2013).

In this context, bargaining power and transaction-cost minimized are matter. According to Antràs (2003), when the bargaining power of suppliers is weak, incentives to undertake adequate levels of investment may be insufficient. In this direction in the developing countries due to lower bargaining power, the benefits of GVC participation are lower. Indeed, compared to multinational firms and advanced countries, developing countries which have less negotiating capacity due to several factors such as human capital, factor endowments, infrastructure, communication technology, investment, etc. This in no way detracts from the interest of developing countries to participate in GVCs. Indeed, GVCs provide, for developing countries, opportunities to increase their participation in global trade and to diversify their exports. With traditional trade, a developing country must produce a good or service in its entirety before exporting. This is difficult for these countries given their level of industrial

development which historically leads them to export more unprocessed raw materials. However, it should be noted that only a small number of developing economies are deeply involved in GVCs. Thus, developing countries do not fully benefit from their participation in the GVCs by taking full share of the opportunities for integrating in specific parts of the value chain (WB report, 2017).

These main aspects lead us to study the effects of Global fragmentation of production for developing countries. At the light of this study, it will be showing how the Global fragmentation of production can promote effective development policies.

Global fragmentation of production is important for the development of developing countries, but it is not sufficient on its own. There are other characteristics to be considered. In this theme, the role of global fragmentation of production for the development of developing countries will be studied. In light of these overall features, this study considers the following key question and two sub-questions:

- How developing countries can profit of the Global fragmentation of production?
 - What domestic variables in the developing countries can allow to promote maximum benefit on the Global fragmentation of production?
 - How are the effects of the Global fragmentation of production for the development?

Thus, it is first necessary to study how Global fragmentation of production can impact developing countries. To do this, it is important to understand the link between the Global fragmentation of production on growth, the poverty, environment, the institutions (governance), job creating, the infrastructures, human capital. Also, it is essential to determine the added value contained in the trade, the imports content in exports, the foreign direct investment flows. These main indicators allow to study the evolution of GVC in a country.

Insofar as it is observed that trade between multinational firms have a large place in the world volume. Well-defined contracts and property rights are also important. In this optical, the "transferability of capital investment decisions" from advanced economies to developing countries can lead to sufficiently high capital amplifying to integrations or cooperation. What Antràs (2003) confirms: "In general, the attractiveness of vertical integration is shown to be increasing in the capital intensity of intermediate input production". Another important aspect to be considering by developing countries insofar where they hold more labor input, as mentioned by Antràs (2003) is that: investments related to the labor input that are harder to

share than investments in physical capital. Thus, it will be discussed the determinants that can affect human capital and lead to a competitive workforce in order to promote greater participation in GVCs.

Global fragmentation of production involves different sectors and various implications in developing countries whether for the communities and for the services through industrialization as well as the political determinants, institutions, the legal framework, the infrastructures, the human capital, the bargaining power.

3. Literature review

Of seminal works of Leonard E. Read (1964) which showed how the production of a good could be distributed and shared across the world, in geographically remote locations, to make a product semi- finished or a final product. Each part of the world participates to varying degrees in the production of a product, which results in the sharing of added value, labor, wages, costs, benefits, but also leads to the sharing of ideas, the integration, and the communication. What is called a "collective brain".

This process of global fragmentation of production is fully integrated into the principles of international trade and is increasingly becoming its main driving force. Indeed, the global fragmentation of production has assumed an undeniable importance since the 1990s. Several authors have addressed this new field of study of international trade, however with distinct approaches and methods which tend towards the same goal, which is to better understand, measure, evaluate, value, and develop the global fragmentation of production that is called to in the literature Global value chain (GVC).

The literature review is structured through different considerations, approaches and methods that can be divided into two parts. In the first part, the implications and the main aspects developed by the authors regarding the Global Value Chain will be presented, especially the interconnectivity, interdependence and complementarity of multinational firms and economies. In a second part, it will be highlighted some methods allowing the accounting and measurement of the participation in GVCs. The presentation of these two parts would allow to understand the complexity of this new field of study of international trade in order to identify potential factors that could contribute to its development but also a better understanding.

This interconnectivity of firms' production activities in different geographical locations, which Uzor (2011) defines as Global Value Chains (GVCs), offers opportunities for local producers

to learn from global value chain leaders and to form mutually beneficial partnerships. It is within this framework that Markusen (2004) highlighted the involvement of multinational firms in the fragmentation of production by presenting the incorporation of multinational firms into multi-plant production in his general equilibrium theory of trade.

Some authors, such as Antràs (2003) have emphasized the importance of firms, contracts, and trade structure in global production, showing the share of intra-firm trade in the volume of world trade and also explain why a domestic firm might have an incentive to undertake part of its production process abroad in a context where bargaining power and well-defined contracts play key role of incentive. He also highlights the importance capital abundant countries versus capital-scarce countries, capital-intensive goods versus labor-intensive goods and especially bargaining power in the developing countries which have less negotiating capacity due to several factors - such as size, competence, and financial means - compared to multinational firms and developed countries that have more capacities.

These considerations are in line with the reflections of Antràs & Chor (2013), Krugman et al. (2016) and Kraemer et al. (2011) on the organization of the value chain and the position of the firm in the participation in GVCs. This position is crucial to capture more value added and gain more in the participation in the global fragmentation of production. Indeed, they highlight the various degrees of gain that this position can generate. Krugman et al, (2016) illustrate in a study of the iPhone 4, that a tiny fraction of the average factory price per phone stays in the Chinese economy where the assembly of the product, the last stage of production is done, while a much larger amount goes to Korean producers who supply more sophisticated components. Kraemer et al. (2011) gives the same point of view stating that the greatest value added of this product goes to the United States, which in turn rewards its employees with higher salaries and higher dividends for shareholders. This is confirmed by Antràs & Chor (2013), according to whom the share of marginal product of low-value-added suppliers is particularly low along the value chain.

This organization of multinational firms is studied by Trienekens (2012) from both vertical and horizontal perspectives focusing on the collaboration and role of multinational firms and firms operating in the domestic market with smallholders. It should be noted that firms' identity continues to matter. Kraemer et al, (2011) in their work on a highly globalized industry such as electronics, show that the greatest value of these products goes to the home country of the firm which houses the most essential high value-added production functions and thus those

employees and shareholders benefit the most. Trienekens (2012), citing Nadvi (2004), highlights the positive effects of local actors' involvement in GVCs on employment and income, especially when many multinational firms are involved.

This organization and interconnectivity of production fragmentation create strong interdependence and transnational complementarities between economies, and also create fluctuations in GDP. De Soyres & Gaillard (2019) show, in this sense, the relationship between international trade, the business cycle synchronization and GDP co-movement. According to de Soyres & Gaillard, (2019), the stronger the trade relationships, the more GDP co-movement these countries experience. Thus, they find that input trade strengthens the linkages and synchronization of different economies as opposed to final goods.

The collaboration and relationship between different firms also foster the sharing and exchange of skills and knowledge that are important to participation in GVCs. This fragmentation of knowledge in production is highlighted by Markusen (2004) in a general equilibrium theory of multinational firms. His work informs that the internationalization of production can be based on the fragmentation of skills and knowledge. Skills can move from foreign to domestic industries. It therefore appears that the fragmentation of production takes place through the localization of skills to produce knowledge-intensive assets. In this respect, developed countries have a certain advantage over developing countries. Indeed, according to Antràs & Chor (2013), developing countries trade with low-capital countries or firms by supplying labor-intensive goods because they hold more labor capital. However, this labor is low-skilled, and the skills are lower compared to that of advanced countries. The exchange and sharing of these skills are limited by the fact that, as Antràs (2003) points out, investments in physical capital are less complex to share than investments in labor input, which require skills that are acquired over the long term.

The importance of information and communication technologies in international trade is also clear. This is also confirmed in the global fragmentation of production. Indeed, Acemoglu & Autor (2010) show the importance of technologies in international trade by presenting in their canonical model the relationships between skills, tasks and technologies that can participate in the distribution of income across workers. They also show the fragmentation of production allowing the substitutability of domestic workers by foreign workers through information and communication technologies and skill transfers. Their model thus treats skills (embodied in labor), technology (embodied in capital), and trade or offshoring as providing competing inputs

to accomplish various tasks in order to determine how the distribution of activities allows for comparative advantage. It appears that this model does not consider the value-added content of trade and intermediate input contented of gross bilateral international trade flows that are the subject of this study.

The second important part is the accounting of value added and intermediate inputs, which is of obvious interest for measuring participation in GVCs. Thus, to measure the effects of global fragmentation of production on the economy, different methods and models are proposed. According to Antràs & Chor (2013), the aim is to propose models that allow us to understand the organization of the global value chain, especially regarding the sequencing of the value chain, the number of actors involved, the position of the firm in the value chain (upstream or downstream), and the place of each stakeholder in relation to the processes of production of a final good. They stressed the importance of the sequentiality of production to shape the contractual relationships between final good producers and their various suppliers, and also the allocation of control rights along the value chain to design the optimal effort on the part of suppliers. They emphasize that the decision to participate on GVCs depends on that position in the value chain. They also proposed measures of downstreamness in aim to know how production line position influences integration outcomes. In the continuity of their work, an extension has been proposed with positioning measures within GVC in order to capture the upstreamness or downstreamness of industries and countries in GVCs (Antras & Chor, 2017).

Johnson & Noguera (2012), on the other hand, focused their study on the accounting of intermediate goods in international trade. Their work provided a better understanding of the value-added content of trade. Their presented models provide frameworks to analyze the linkages of the value-added content of trade by discussing on: i) over two countries with one sector per country, ii) three countries with one sector per country, iii) over two countries with many sectors, and iv) one region within countries that can be extended across borders.

Kaplinsky (2000) investigates another method of accounting for value added by proposing five major categories to divide value added – i) trade rents -coming from production scarcities or trade policies-, ii) technological rents -related to asymmetric command over technologies-, iii) organizational rents -related to management skills-, iv) relational rents -related to interfirm networks, clusters, and alliances-, and v) branding rents -derived from brand name prominence.

In the same logic of effectively capturing data related on value added, WTO in its global value chain development report 2017 proposed a GVC index system that includes three indexes: a

production length index, a participation index, and a position index (WB Group, 2017). Although many have gained from the process of globalization, there remains a stubbornly large number of people living in absolute poverty and a rise in inequality within and between countries. The issue is thus not whether to participate in the global economy but how to do so in a manner which provides for sustainable and equitable income growth. This study shows how value chain analysis can be used to chart the growing disjuncture between global economic activity and global income distribution and to provide causal explanations for this outcome. In so doing, value chain analysis provides valuable insights into policy formulation and implementation (Kaplinsky, 2000).

In a similar spirit, de Soyres et al. (2019), suggest indices of participation to the GVC by focusing on the importance of the country as a supplier of inputs and the importance of the regional share of the GVC for a given country.

Note the continuous improvement efforts for accounting and measuring participation in GVCs in the various papers. Literature proposes approaches and methods to measure the participation and weight of GVCs in countries. It shows that multinational firms, property rights, contracts on the one hand; and interconnectivity, knowledge and skill sharing, exchange, and communication technologies on the other hand, are of considerable importance in valuing and participating in GVCs.

In addition, it is worth mentioning that the accounting of value added, and intermediate inputs is less in developing countries than in advanced countries, especially those of the OECD.

II. OVERVIEW ON GVC

To have a global overview of participation in GVCs and their effects on developing countries, it is important first to show the links between international trade and GVC in order to facilitate the analysis of this new theme; secondly to present the way of accounting for value added in GVCs; and the pioneering organizations and thirdly to present the types of existing data and how they are taken into account.

1. Trade and GVC

International trade growth is the result of the globalization which accelerated in the years 1985 with the abandonment of the import export substituting policy that many countries had implemented but also by the fall in tariffs and subsidies. The reduction of these barriers and the improvement of interconnectivity with the development of Information Technology and

Communications, and transport infrastructure have strengthened and consolidated global value chains leading multinational companies to outsource their production and trade of inputs. Thus, GVCs which are procyclical to trade, experienced a marked development from the 1990s. The increase of Global Value Chains (GVCs) is a major characteristic of the recent growth of the structure of international trade confirms de Soyres et al. (2019). This boom is more marked in the OECD, which experienced an increase of 24.3% on average of the import content of exports between 1995 and 2011.

This development is also mentioned by Olczyk & Kordalska (2016) according to whom, the world trade in goods and services recorded within global value chains (GVCs) went from 36 percent in 1995 to 49 percent in 2011. Thus, we can surely affirm the positive relationship between the development of international trade in the last two decades and the GVCs are a feature of international trade.

The World Bank define: “A global value chain breaks up the production process across countries. Firms specialize in a specific task and do not produce the whole product ” (*World Development Report, 2020*). The intend of value chain is to increase the value of a product or service and to involve the participation of many stakeholders.

This characteristic of international trade calls for a new way of identifying and accounting for world trade by precisely considering the added value contained in trade from its origin to its final destination, passing through the intermediary stages requiring intermediate inputs.

This trade in value added can be considered as production activities that take place in different countries and sectors of which goods or services are exported and consumed to another country (see illustration Figure 1). Thus, GVCs imply activities many countries and the value added created by production across national borders are embodied in intermediate trade flows (WB report, 2017). Conversely, the classical idea of trade which imply that goods or services are entirely produced in one country and are exported to another country.

Trade in intermediate inputs also plays a driving role in the relations between high income countries and low-income countries. Indeed, the trade in inputs makes it possible to strengthen the links and synchronization of the different economies. The more the trade relations are solid, the more these countries know a synchronization of the GDPs which co-move according to de Soyres & Gaillard (2019). Their work showed relationship between international trade, business cycle synchronization, and GDP co-movement.

Figure 1: An accounting framework for Global Value Chains

			Final products of a global value chain, identified by country and industry of completion						Value added
			Country 1		...		Country M		
			Industry 1	...	Industry N	...	Industry 1	...	
Value added from country-industries participating in global value chains	Country 1	Industry 1							
		...							
	Country M	Industry 1							
		...							
		Industry N							
	Total final output value								

Note: Cell values represent the value added generated in the country-industry given in the row, within the global value chain corresponding to the country-industry of completion given by the column.

Source Slicing Up Global Value Chains (Timmer et al., 2014)

2. Accounting for value added in GVCs

Accounting for value added is the core in GVCs. It makes it possible to understand and measure the participation and gains of countries in GVCs. It should be noted that advanced countries, especially those of the OECD, have developed new datasets such as the TiVA database, the Eurostat's FIGARO1 database and the European Commission funded WIOD database. These datasets allow to account the Trade in Value Added (TiVA) and to measure the overall fragmentation of production. In this evolution, new types of data sources such as the Inter-Country Input-Output (ICIO) allows to construct an appropriate measure on trade in value-added and participation in global value chains of countries and sectors.

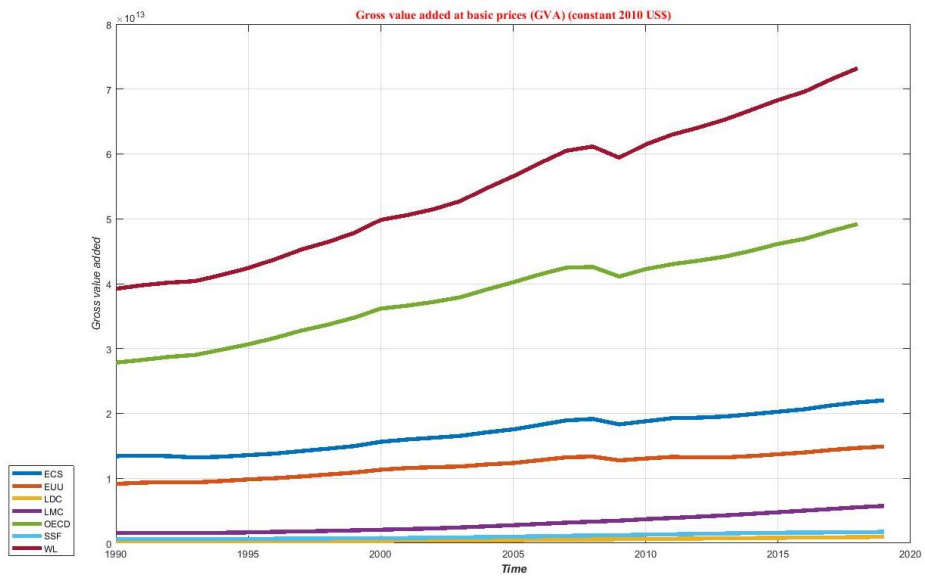
Major indicators country's participation in GVCs are: Gross Value Added (GVA) and Gross exports by final destination and origin of value added. The first is a metric that measures the contribution of a firms, multinational company, or country to production of good in given sector and another country. The second illustrates the value added from many origins either country or sector, that allows to product final goods consumed in each country. This indicator shows how the value of gross exports and intermediate and final goods for a country are produced by several sectors from many countries.

In addition, participation in GVCs is also measured thanks to the origin of value added in final demand, origin of value added in gross exports and origin of value added in gross imports.

In view of these indicators, advanced countries share most of the value added and the crucible is increasing with developing countries, whose lack of statistics on trade in value added is one of them evidence. Taking the countries of the OECD in the manufacturing, in 2015, about 35% of gross output concerned value added generated in production. Specifically, Germany, the United Kingdom and the United States had shares between 38% and 40% while China and the aggregate of Southeast Asian (ASEAN) countries are to 25% and 28% respectively(OECD, 2019). This confirms that participation in GVCs is greater in developed countries than in other countries of the world. The figures below confirm this thesis. Indeed, *Figure 2* shows that Gross Value Added is more shared by OECD member countries while the share of low developing countries, Sub-Saharan African countries is very low. This is also confirmed on *Figure 3* which shows that G20 countries share almost all Gross exports by final destination and origin of value added and the share of OECD member countries is well over half. Therefore, the share of developing countries is lesser.

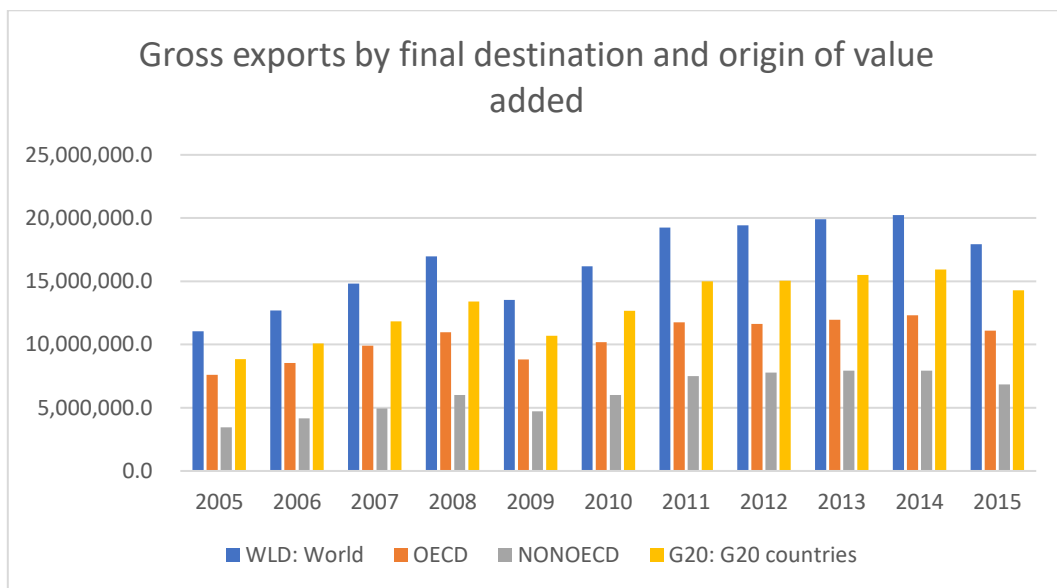
This could be explained by the fact that developed countries participate in the GVCs in high value-added segments and host the most important multinational firms. Krugman et al. (2016) show through the example of the iPhone where a small amount of the average price of product remains in the Chinese economy where assembly is done while that a much higher amount goes to Korean producers and Americans who on the one hand provide more sophisticated components or on the other hand where the parent company is established. Indeed, according to Kraemer et al. (2011) the lead firms and the identity of companies i.e., its origin continues to matter even in a highly globalized industry. Thus, it can be noted that the gains in added value differ from one country to another. The origin of the multinational firms and the countries participating in the GVCs on the more sophisticated segments and requiring more developed skills gain more in the GVCs.

Figure 2: Gross Value Added



Source: by author with World Bank national accounts data, and OECD National Accounts data

Figure 3: Gross exports by final destination and origin of value added



Source: by author with OECD Statistics data

3. An overview of data

In terms of statistics, the last two decades have been marked by the inclusion of data related to trade in intermediate goods, the accounting and sharing of the value added contained in international trade in different industries in various countries. Developed countries had been

making significant progress in the statistical system, especially OECD countries, unlike developing countries where data on trade in intermediate goods is virtually non-existent. The rapid growth of global production networks calls an adjustment of statistical tools in order to allow a representation of complex production linkages between and within economies. Data on the value added traded are increasingly available specifically for major economies during 1995–2014 (WB Group, 2017). Indeed, the OECD has set up statistical information systems with databases and indicators to measure the added value contained in trade (OECD, 2019) through the Inter-Country Input-Output (ICIO) tables. What confirms Belotti et al. (2020), the most famous ICIO tables are the World Input-Output Database (WIOD), the OECD TiVA database (OECD, 2018), and the Eora Global Supply Chain Database. However, it should be noted that these data do not take into account all the countries that participate in the GVCs, especially the statistics of low-income countries.

There is even a large gap in accounting for the added value contained in trade between developed and developing countries. The latter are marked by a great deficit of reliable and precise data. This constitutes an objective limit for a rigorous study of the global fragmentation of production and its potential effects on developing countries. This is confirmed by the scarcity of studies on GVCs targeting developing countries.

This difficulty in recording data is also reported in the global value chain development report 2017 where it is noted that current statistical systems designed for international trade by measuring the gross value of transactions between partners were not adapted to account for the global fragmentation of production and the sharing of the value added contained in the different stages of the value chain and for the multitudes of stakeholders.

Thus, the lack of data on this new field is more apparent in developing countries, which partly limits our study because it focuses on these countries.

Furthermore, in order to better account for the internationalization and fragmentation of production, it was set up a standard method used to collect, manipulate, and interpret international trade statistics (WB report, 2017). Thus, new are being datasets developed such as the OECD TiVA database, the Eurostat's FIGARO1 database and the European Commission funded WIOD database, among others (Arto et al., 2019). These datasets confirm the fact of evolution in database in the developed and advanced countries.

To be more precise and to simplify the use, the OECD has set up a Trade in Value Added (TiVA) guide that brings together a set of indicators to measure the overall fragmentation of

production. These indicators are classified into four groups: (i) structural indicators; (ii) indicators based on value added, gross exports and gross imports; (iii) indicators based on value added and final demand; and (iv) detailed indicators by origins of value added in gross exports, gross imports, and final demand (OECD, 2019).

In addition to this guide, Belotti et al., (2020) show up, in the World Development Report 2020, a new types of data sources, the Inter-Country Input-Output (ICIO) tables, and new analytical frameworks which have been developed to measure supply and demand contributions of countries and sectors in global value chains (GVCs). ICIO tables allow to construct an appropriate measure on trade in value-added and participation in global value chains of countries and sectors. By exploiting inter-country input-output tables, ICIO provides decompositions of aggregate, bilateral, and sectoral exports, and imports according to the source and destination of their value-added content.

This tool is determined as follow. Firstly, it refers to a much broader set of measures allowing to assess the participation of countries and sectors in GVCs and their position (Antràs & Chor, 2013). Secondly, it builds a set of indicators to better evaluate the direct and indirect effects of trade policies, considering the GVC structure (Arto et al., 2019).

In the same logic of the effective taking into account of the data that WTO in its global value chain development report 2019 proposed a GVC index system that includes three indexes: (i) a production length index for the average number of production stages and complexity of the value chain, (ii) a participation index for the intensity of a country-sector's engagement in GVCs, and (iii) a position index for the location of a country-sector pair on a GVC (Antras & Chor, 2017)- that is, the relative distance of a particular production stage to both ends of a GVC (WB, 2017).

Table 1: Structure of trade in intermediate inputs and Inter-Country Input-Output

	Intermediates use	Final Demand		
	ctry 1 x indy 1 [...] ctry 69 x indy 69	Country 1	[...]	Country 65
country 1 x industry 1	(Z)	(FD)	[...]	(FD)
country 1 x industry 2				
[...]				
economy 69 x industry 1				
[...]				
economy 69 x industry 36				
Taxes less subsidies on intermediate and final products	(TLS)	[TLS]	[...]	[TLS]
Value added + taxes - subsidies on intermediate products (VA)	(VA)			
Output (X)	(X)			

Source : OECD, Inter-Country Input-Output (ICIO) Tables, 2018 edition

Z= Intermediate transactions
 TLS= Taxes less subsidies on
 intermediate and final products

VA=Value added at basic prices
 X=Output at basic prices

FD=Total final demand

III. DRIVERS OF PARTICIPATION

Participation in the global fragmentation of production is determined by prerequisites and certain favorable conditions which are among others productive capacities in terms of human capital, Natural capital, Energy, Information and Communication Technology (ICT), and institutions. The attractiveness of financial resources through the attraction of foreign direct investment, the size of the market and the country's geographical position also favor participation in the global fragmentation of production. According to Porter (1990), factor conditions such as physical and human knowledge, technology and infrastructure enable or constrain value chain upgrading. For developing countries major constraints faced by companies include lack of specialized skills in certain areas and difficult access to technology, inputs, market, and information. Added to this is, according to Trienekens, (2012), three conditions allow an effective participation of GVCs. These are first, low levels of available physical resources, second, the geographic position of a company or value chain and third, availability of educated labor and the availability of knowledge (Trienekens, 2012).

In this part, it will be a question of describing the factors of production which are preponderant for the efficiency of the participation global fragmentation of production, and which have a notable impact.

1. Productive capacities

Empirical studies have traditionally measured the drivers of GVC using human capital which is determined in several studies by workers' skills by educational attainment or occupational status. Human capital can be seen as the driving force behind the GVCs, but it is not the only one. Indeed, other factors can motivate participation in GVCs including human capital, natural capital, energy, Information and Communication Technology (ICT), and Institutions. With this in mind, UNTACD, through Productive capacities index, has proposed a set of indicators that take these aspects into account.

To better understand the drivers of GVCs, it will be presented and analyzed the aspects which lead and reinforce the participation in the GVCs through Productive capacities index (PCI)¹ of the UNTACD composed of: Human capital, Natural capital, Energy, Information and Communication Technology (ICT), and Institutions. Productive capacities index is therefore heterogeneous and multidimensional. Productive capacities are defined as “the productive resources, entrepreneurial capabilities and production linkages which together determine the capacity of a country to produce goods and services and enable it to grow and develop” (UNCTAD, 2006: 61, UNCTAD, 2020).

Thus, through these elements we can measure the comparative advantages that a country has in participating in GVCs.

➤ Human capital

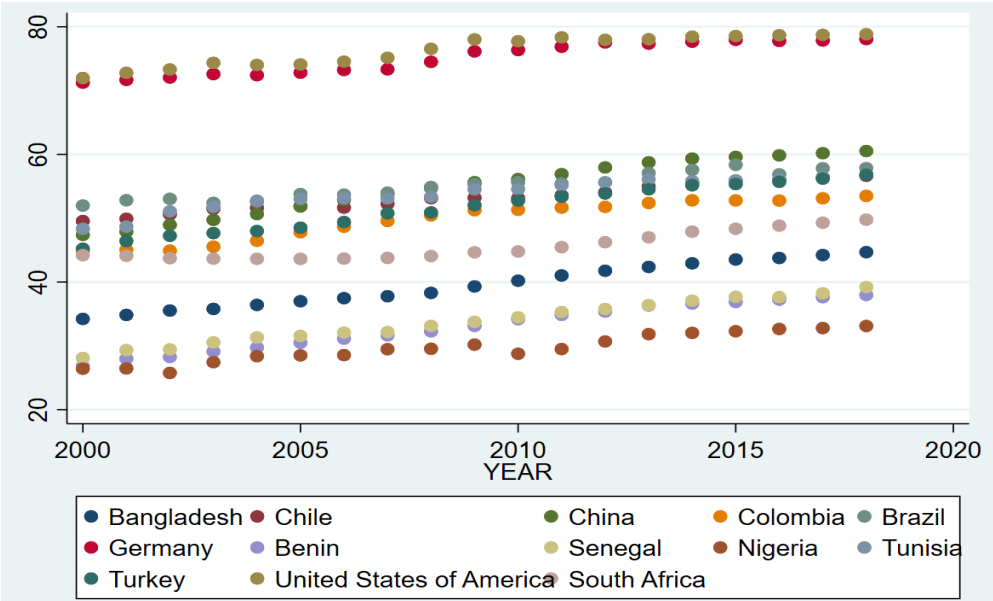
Human capital has a prominent place in GVCs promoting. It can be considered as one of the driving forces behind the global fragmentation of production. Indeed, through the substitutability of workers by skills in certain sectors of activity, human capital makes it possible to generate more fragmentation of production. In this regard, developed countries with highly skilled people operating in complex sectors such as aeronautics can benefit more from the fragmentation of production in these industries. However, developing countries with low skill workers can participate in GVCs where their degree of skill substitutability is competitive.

¹ Retrieved from <https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=199270>. The PCI is a multidimensional index that measures productive capacities in all economies and that can provide country-specific insights and diagnostics of productive capacity development. The set of productive capacities and their specific combinations are mapped across 46 indicators. This makes our PCI multidimensional in its analytical abilities.

It is in this logic that Matilde Bombardini et al. (2013) highlight the importance of skill substitutability in certain industries where low skills reduce performance, productivity, and efficiency. Hence, we can underline the importance of skill substitutability in GVCs to promote participation but also productivity and efficiency. Therefore, it can be noted that the importance of human capital in GVCs and the need for developing countries to align themselves in industries where they can make their skill substitutability prevail and take greater advantage of the global fragmentation of production.

Figure 4 shows the importance of human capital in selected developed and developing countries according to UNTACD data. It appears that advanced countries have very high levels of human capital; middle income countries have acceptable levels of human capital while developing countries have low levels of human capital. This strengthens our analysis of the weakness of human capital in developing countries, which reduces their capacity for substitutability in complex sectors with high value added.

Figure 4: Scatter plot of Human Capital for selected countries



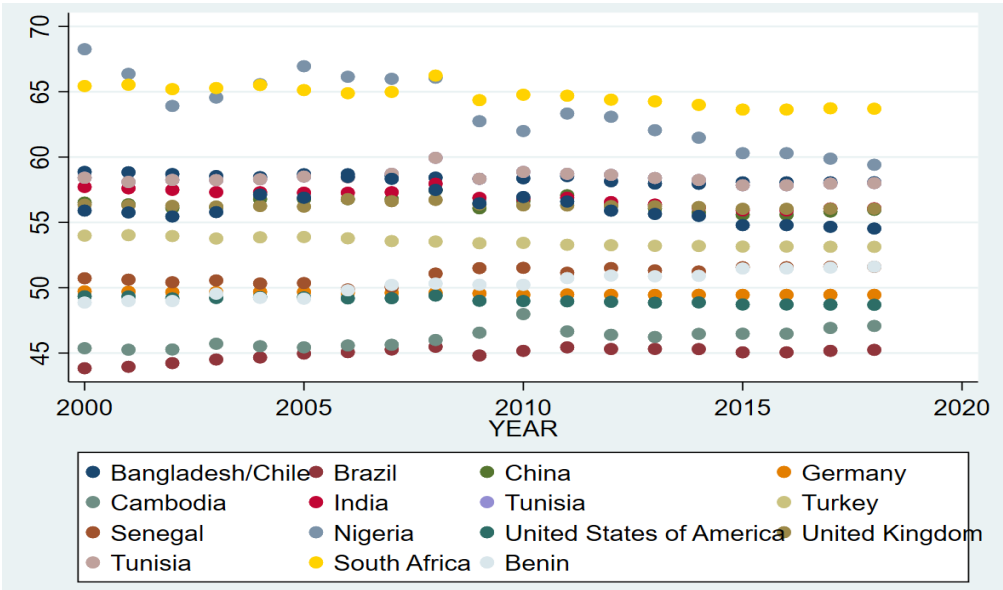
Source: by author with unctadstat.unctad.org data

➤ **Natural capital**

Natural capital brings together the natural resources and agriculture that a country abounds that can be an advantage for participating in GVCs. On this aspect, we note that developing countries participate in world trade by offering more commodities.

Figure 5 shows the productive capacity of selected countries with respect to natural capital. We observe a scattering of data which shows that each country has their own strengths to be prevailed. For instance, we note that some developing countries have very high natural capital indices, which shows that these countries have large stocks of natural resources and that they supply in the world market of commodities, iron ores, or crude oil. these countries have a great interest in participating in the GVC in sectors where their natural resources are abundant to better gain in participation.

Figure 5: Scatter plot of Natural Capital for selected countries



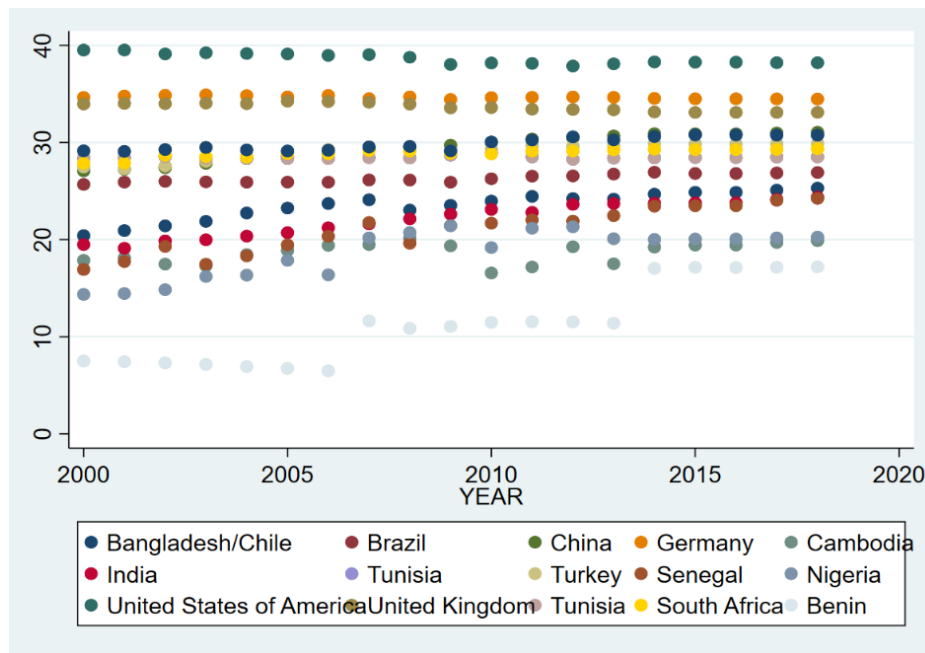
Source: by author with unctadstat.unctad.org data

➤ **Energy**

Energy plays an essential role. The availability and accessibility of energy can be a major issue for participation in GVCs. In developing countries, the unavailability and high cost of energy hamper participation in GVCs. Indeed, the high cost of energy resources increases production costs and reduces the competitiveness of companies. Therefore, the availability of energy is often a major constraint facing businesses in developing countries.

Figure 6 shows globally that the low accessibility to energy resources of developing countries comparing to advanced countries. This decreases the competitiveness of developing countries compared to rich countries and constitutes a hindrance to participation in GVCs.

Figure 6: Scatter plot of Energy for selected countries



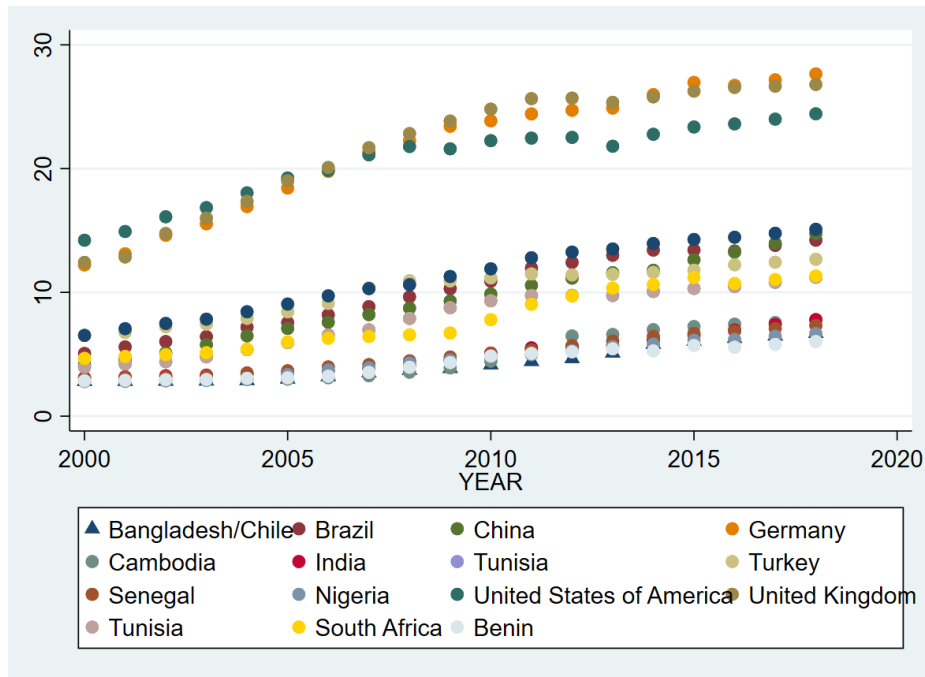
Source: by author with unctadstat.unctad.org data

➤ Information and Communication Technology (ICT)

There are individual, managerial and communication skills that can promote a country's participation in the global fragmentation of production. These skills give a country the ability to win in globalization by using the country's resources efficiently. Indeed, Robert Grundke et al. (2017) find a persistent and positive association with labor productivity and participation in GVCs, at the industry level, for non-cognitive skills such as managing and communication skills, ICT skills and workers' readiness to learn. From then on, it appears that learning and Information and Communication Technology (ICT) have a prominent place in participation in GVCs. Robert Grundke, et al. (2017) further argue that ICT skills, management and communication skills and willingness to learn are significantly and positively associated with productivity and with forward integration into GVCs. Also, the availability and quality of information and communication equipment are also very important to support these technical and managerial skills. Communication infrastructure and equipment as well as human resources with ICT skills are necessary to enable developing countries to fully participate in GVCs.

However, we note the differences between developed and developing countries concerning ICTs, which is emphasized on the Figure 7 where we see that some countries have better structural ICT resources in particular advanced countries, which could explain their high participation in GVCs.

Figure 7: Scatter plot of Information and Communication Technology (ICT) for selected countries



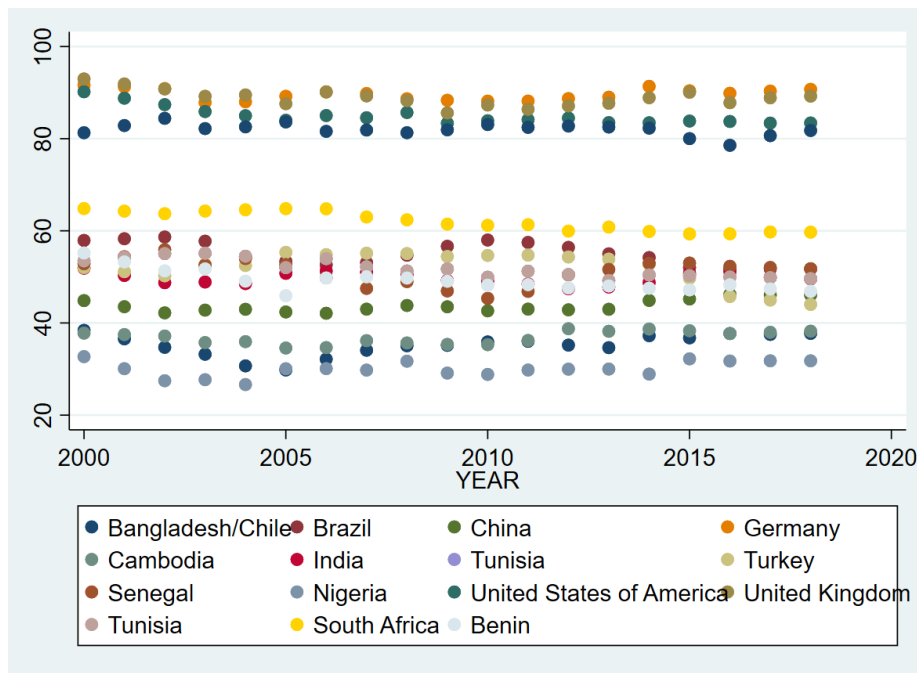
Source: by author with unctadstat.unctad.org data

➤ **Institution**

It should be noted that government legislation, regulations and policies can constrain value chain upgrading, amongst others by setting trade barriers for production materials and production technology, or by limiting the flow of information national as well as international, by unfavorable tax policies and denying infrastructural investments to value chains (Trienekens, 2012). Developing countries are characterized by weak institutions which do not have enough human and material resources in sufficient quality and quantity to face the challenges of globalization and to obtain more profit from the GVCs. This is confirmed in the Figure 8 which points out the low indices for developing countries. The fragility of institutions in developing countries is reflected in the lack of independence and corruption which limit effective participation in GVCs. This weakness of institutions can constitute a limit in the counterbalance role that strong institutions can play when the authorities take decisions for partisan or electoral reasons and not for an economic perspective.

Institutions with technical, human, and financial capacities and above all autonomy are important elements in promoting GVCs in developing countries.

Figure 8: Scatter plot of Institutions for selected countries



Source: by author with unctadstat.unctad.org data

2. Foreign Direct Investment

The movement of goods, capital, persons, and information corresponds to globalization. This process of market integration calls for exchanges and capital flows that have spawned the growth of world imports and exports.

According to Uzor (2011), since the 1980s, the globalization process has accelerated the growth of world imports and exports as well as increased Foreign Direct Investment (FDI).

Foreign Direct Investments are an essential aspect of international business. They are advantageous for the economic development of country and allow to introduce capital flux, new knowledge, and lead to spillovers for the host country to such as technological, increase of production, and expansion knowledge.

Therefore, FDI can be a major driver of the global fragmentation of production in that they allow businesses with low to medium incomes to have additional resources. Trienekens (2012) also argues these global value chains are often linked through long-term relationships and supported by FDI. Thus, FDI can promote exports, also can allow to create more jobs, and increase wage.

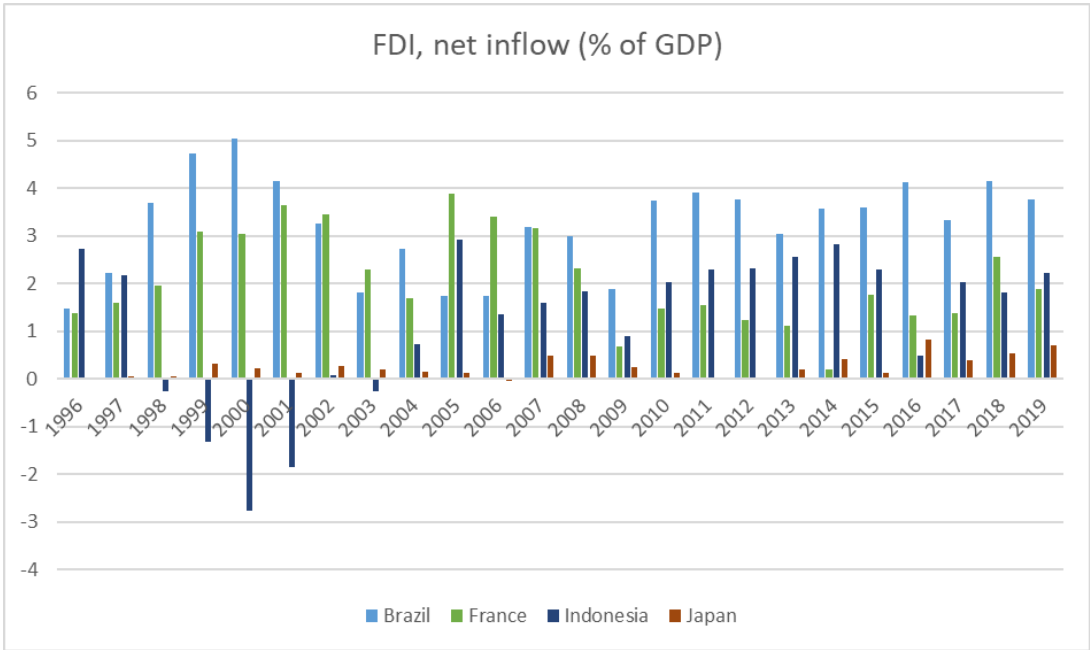
The attractiveness of a country to capture FDI depends on key elements that are market size and per capita income, access to regional and global markets, and favorable production factors such as labor, technological, physical infrastructure (Kostevc et al., 2011).

In this regard, the role of the IDF in the GVCs especially by allowing increasing production capacities and the participation is of utmost importance.

Figures 9 and 10 present FDI for selected countries, some of which are heavily involved in GVCs, and some others are developing countries. On analysis, we note that countries with net inflow (% of GDP) seem to participate more in GVCs than developing countries which have low percentages of net inflow (% of GDP). This could be a sign of participation in GVCs because multinational firms by outsourcing their production increase the net inflow of FDI of countries. Consequently, net inflows of FDI constitute a lever for the global fragmentation of production and allow countries to participate more in GVCs. The increase of net inflows (% of GDP) of Cambodia displays the evolution of the country in international trade and in the GVCs (see Figure 10).

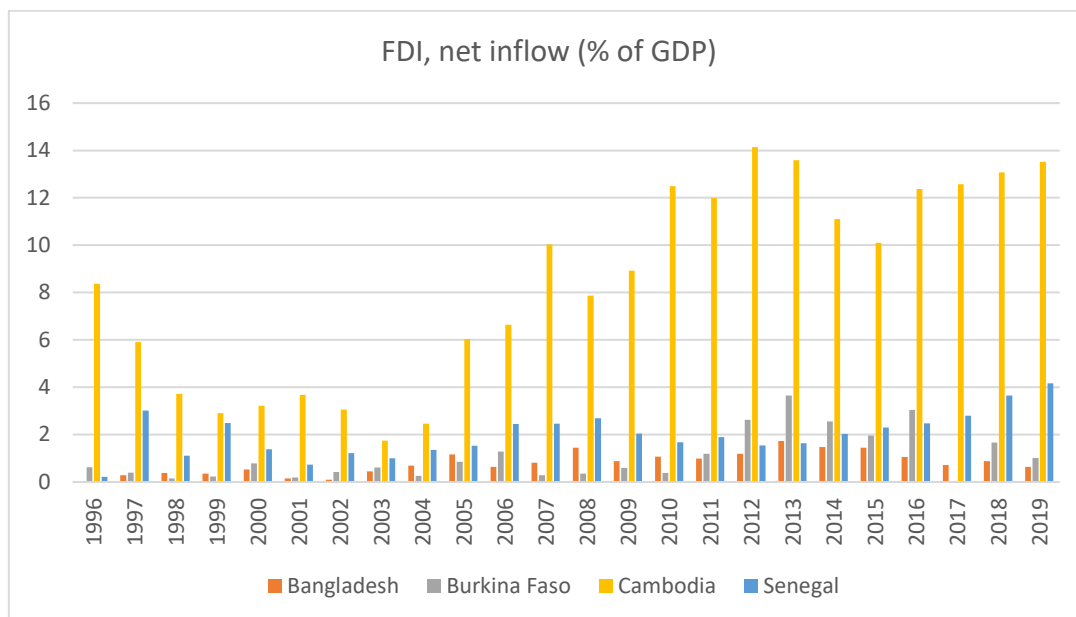
Favorable conditions giving a certain advantage to a country are necessary to capture more FDI. Among which we can cite market size, market growth, access to regional and global markets and position of the country.

Figure 9: FDI, net inflow (% of GDP) for selected countries



Source: by author with World Development Indicators data

Figure 10: FDI, net inflow (% of GDP) for selected developing countries



Source: by author with World Development Indicators data

3. Geography and Market size

The geographic position and size of the domestic market are very important for participation in GVCs. They give the country on the one hand the capacity to attract investments to develop the economy, and on the other hand the possibility of exchange thanks to the accessibility of the country whether by sea, air, or land. Interconnectivity and a vast market are important aspects for GVCs.

According to WB (2017), the world can be share to three interconnected production hubs for the trade of components: one centered on the United States, one on Asia (China, Japan, Republic of Korea), and one on Europe. Thus, one note that African countries are not interconnected with these existing hubs what reduce the participation in the GVCs. Within developing countries, it is large firms that tend to be involved in global production networks. Multinational corporations are therefore important in participating in GVCs. Through exchanges of processes, transferring technology, know-how and skills, and also by providing a better access to export markets, multinational firms may help developing countries to modernize their economies and industries (Rugraff & Hansen, 2011). But also, through the channel of foreign direct investment (FDI), multinational firms are beneficial to economic development.

Apart from the geographical position, the size of the market is another essential aspect for GVCs. Indeed, with a large internal market, the interconnectivity of the market with regional markets without tariff barriers or membership of an economic area give the country a significant advantage in attracting investment and participating more in GVCs. However, the quality and availability of infrastructure could hamper market interconnectivity in developing countries.

IV. EFFECTS OF GVCs FOR DEVELOPING COUNTRIES

Participation in the global fragmentation of production leads to significant changes on the economic situation and welfare in the developing countries. Thus, it would be interesting to study the effects of GVCs on important economic variables such as employment, earnings, and growth, but also the effects of GVCs on promoting industrialization, innovation and technological progress, and finally on the environment.

1. GVC and Employment and Earnings

International trade patterns can affect employment and wage. In light of the positive correlation between trade and GVCs that we studied at the beginning, it is possible to make an analysis of the impact of GVCs on wages through trade. Thus, trade plays role of instrumental variable (underlying variable) making it possible to study the effects of GVCs on earnings. This will allow an analysis of the relationship between GVC and employment, and GVC and wage.

Content of trade factors influence wages. Feenstra (2004) thus shows that trade in intermediate inputs can have effect on production and factor prices such that wages. The latter analyzes the link between input prices and wages by showing that the influence of trade in intermediate inputs. It is emphasized that when the price of imported intermediate inputs experience falls out, the relative wage of the factor involved intensively in those imports decreases, particularly the employees of the sectors involved in GVCs. According to this framework, we can consider that international trade, through the channel of the transmission of skills and the relative price of workers, can guide the level of wages.

Under this register and with reference to Ricardo's theory of comparative advantage, Acemoglu & Autor (2010) show to a certain extent that firms can choose to set up by taking into account the optimal allocation of skills in the production process, given the prices of different tasks and the wages for different types of skills in the market. Thus, the link between GVCs and employment is heavily shown. Intuitively one can think that participation in GVCs creates additional jobs in the sense that a simple model can show the increase in the number of people

who are active in the different segments. However, it should be noted that the magnitude of jobs created, at the scale of a country, depends on many factors. The size, the level of participation in intermediate goods trade and the position one is in the sequentiality of production i.e., the position in the GVCs are matters (Antràs & Chor, 2013). Indeed, the position in the sequencing of stages either upstream or downstream between final good producers can make it possible to gain more added value and better participation in the GVCs.

In short, the link between employment and GVCs can be measured thanks to the share of domestic employment embodied in foreign final demand presented in the Figure 11. On analysis of this figure, it emerges that developing countries, middle income countries, or non-OECD countries have domestic employments embodied in foreign final demand higher than OECD countries which are considered more developed. This shows that participation in GVCs creates jobs for developing countries and is a benefit.

The link between GVCs on employment and income are also investigated by Trienekens (2012) who finds a positive relationship. Indeed, according to him employment and income can be positively affected when many multinational companies are involved in global value chains. In addition, it should be noted that workers in GVCs become vulnerable to possible changes in participation in value chains and multinational contracts, hence the need for well-defined contracts in order to guarantee the preservation of jobs against possible shocks.

The effects of GVCs on wages can be seen indirectly and with delays as the channel of GVCs on wages is through skills and learning. Indeed, as argued Davidson et al. (2020), workers acquire skills by doing their jobs, acquiring new skills through globalization and skill transfer. These new skills allow them to be more competitive in the job market and get better jobs with higher wages than before. However, this is possible in a context of worker mobility.

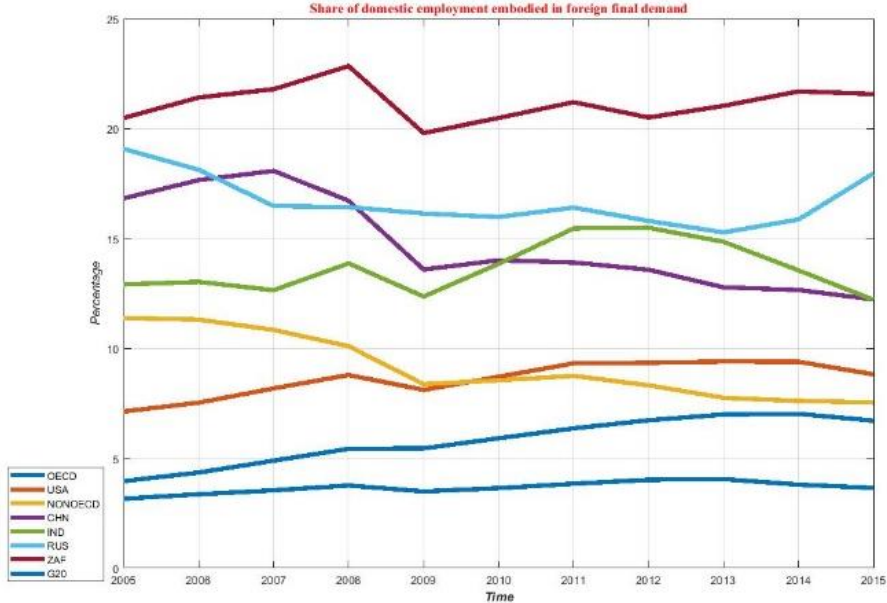
The wage level of workers also depends on the value added provided by the workers, the level of innovation and the position in the GVC. Thus, innovation in the participation of the GVC allows gains in jobs and wages. Kraemer et al. (2011) give the example of the value in global innovation networks in the information and communications technology industry by showing how innovation allows to capture the largest share of value and also allows better wages. They show, in this work, that primary benefits go to the US economy which controls most of its product design, software development, product management, marketing, and other high-wage functions while China workers who participate in the value chain through assembly of these products and most of the processes manufactured have low wages. Kraemer et al. (2011) show

that there is little value, particularly in electronics assembly. Thus, we can deduce that the countries which participate in the GVC by offering the assembly or commodities as is the case of the developing countries earn less than the advanced countries which control the innovation, the processes of management, marketing, etc. However, even if these workers in developing countries earn lower wages than their alter-egos in developed countries; wages of workers in industries in developing countries participating in GVCs are higher than those who do not contribute to GVCs.

Another very important aspect is the origin of the company which directs the global value chain insofar as this country gains more in the participation in the GVC than the other countries in terms of wages but also in terms of market stability of the labor market. Indeed, as underlined by Kraemer et al. (2011) in a globalized industry, most suppliers are at the mercy of decisions by the lead firms in the value chain. However, only some powerful suppliers remain rare exceptions as to vulnerability to lead firms.

Although it should be noted that multinationals in developing countries engaged in global value chains like China benefit more from the expansion of GVCs thanks to the capital deployed there. There are significant wage increases for all workers even though the majority is made up of low or medium skills, i.e., 90% of the workforce employed in the information and communication technology sector in China (World Bank report, 2017).

Figure 11: Share of domestic employment embodied in foreign final demand for selected countries



Source: by author with OECD Statistics data

2. GVC and Growth

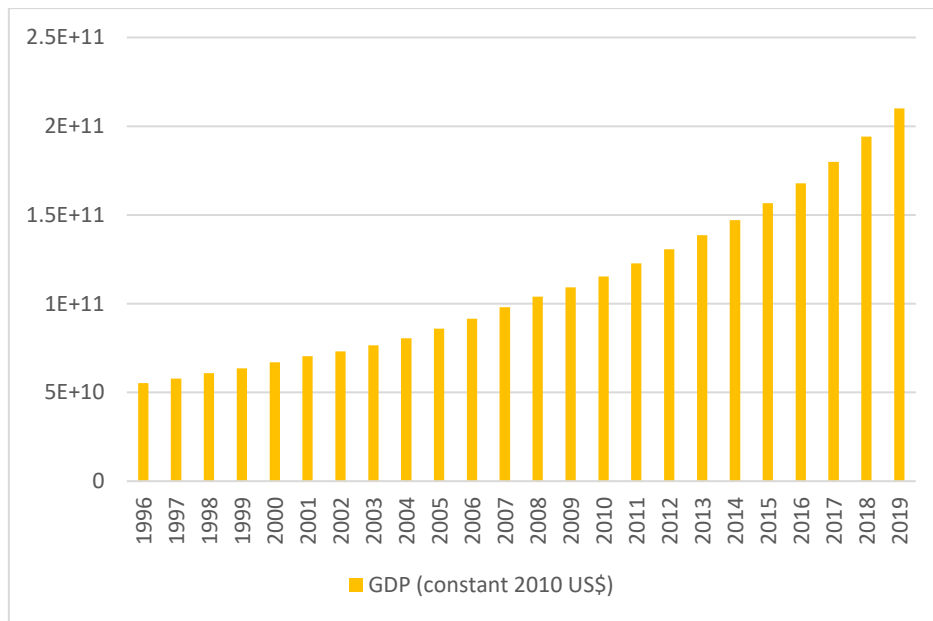
Beyond complementarity in trade policy, GVC or Global fragmentation of production creates strong interdependence and cross-country complementary and between economics, and also creates GDP fluctuation (de Soyres et al., 2019). In this extending, de Soyres & Gaillard (2019) show trade is significantly related on GDP correlation, particularly when we consider value added accounting. Indeed, using methodology from Borin and Mancini (2019), they show that miscellaneous indices of GVC participation are strongly related to GDP correlation across countries. This shows the role that participation in GVCs can play on growth.

Moreover, intermediate inputs that are absorbed by the destination country seem to play a more important role for GDP fluctuation than inputs that are re-exported further. This means that intermediate inputs have a more heightened relationship with growth when the country uses them to obtain finished products for self-consumption in the country.

The findings de Soyres & Gaillard (2019) shows the role of Global Value Chains in the synchronization of GDP fluctuations by ricochet in the growth. For developing countries, their place is very important because these countries mainly participate in GVCs by offering raw materials. Trienekens (2012) based on the work of Grunert et al. (2005) points out that the more heterogeneous and dynamic the supply of raw material to the value chain, the more market-oriented activities can be expected to take place upstream in the value chain. Thus, we can consider that more actors in the raw material supply chain can participate in GVCs. It is therefore a boon for developing countries to participate in GVCs by aligning themselves with activities upstream of the value chain considering their capacity to mainly offer raw materials and commodities.

According to World Bank, Bangladesh is a good example which shows how participation in global value chains (GVCs) has supported economic growth and structural change (World Development Report 2020). Indeed, Figure 12 illustrates this example by presenting the evolution of GDP in Bangladesh. We can clearly observe the evolution of GDP from 1996 to 2019. However, it should be emphasized that this evolution cannot be the result only of the trade, but other factors can explain this growth.

Figure 12: Evolution of GDP in Bangladesh



Source: by author with World Development Indicators data

3. GVC promoting industrialization, Innovation, and technological progress

The capacity for innovation and technical progress can be considered as essential factors promoting industrialization and in GVCs participation. They improve the competitiveness and productivity of enterprises in developing countries. These mechanisms are important for capturing dividends from GVCs. Technology facilitates expanding offshoring opportunities by allowing national workers to acquire specific skills and to replace foreign workers in multinational firms in specific activities (Acemoglu & Autor, 2010). These latter even recounted the interactions between the evolution of technology, worker skills, job tasks, and shifting trading opportunities of advanced economies by emphasizing that recent technological developments and recent trends in offshoring and outsourcing appear to have directly effects on foreign and domestic workers.

Technological development can take place within the company or driven by technology transfers promoted by the global fragmentation of production. Thus, developing countries can take advantage of technology transfers from multinationals in advanced countries to acquire new skills and thus be able to attract shares of GVCs. This is what Tambunan (2011) shows by defining technology broadly including the product, process, as well as management skills.

Thanks to these skills, a country becomes more attractive to attract foreign investment and to welcome the relocation of multinational firms.

Through the transfer of skills, technology transfer, circulation of capital flows, particularly with FDI and exchanges of good practices, GVCs can promote industrialization, innovation, and technological progress.

4. GVC and Environment

The sharing of global production in several geographically distant sites induces enormous costs regarding the transportation of traded goods, the establishment of industries but also can move pollution from rich countries to poor countries with less demanding regulations in terms of environmental protection and pollution.

In this setting, Copeland & Taylor (2003) show the link between economic activity and the quality of the environment by presenting a theoretical framework which separates the impact of economic growth on the environment from that caused by trade liberalization. Even if this framework does not specifically consider GVCs, it will allow us to understand their effects on the environment through trade liberalization and economic activity insofar as there is a positive correlation between trade and GVCs as shown at the beginning of this paper.

Additionally, GVCs lead to trade involving multiple countries. This fragmentation of production could be beneficial for preserving the environment and reducing pollution. Indeed, the global fragmentation of production can induce some benefit for the environment if we consider the Ricardian model. In this model, a country specializes in the production of goods where it has a certain advantage and has fewer constraints. A binding environmental regulatory system could lead countries to limit greenhouse gases. This system would thus make it possible to reduce greenhouse gas emissions from industrialized countries. Developing countries could gain in this system by capturing more sharing of world production insofar as highly industrialized countries could relocate part of their production to other less industrialized countries that are less demanding in terms of regulations on the environment. This question is reported by Copeland & Taylor (2003) which show that dirty industries will leave tightly regulated countries and migrate to countries with lax regulations leading poor countries with relatively weak environmental regulation to specialize in the production of dirty goods.

However, it should be noted that in this scenario global pollution is shifted from country to country. Indeed, the burden of pollution is borne by developing countries which could accommodate the most polluting industries from the global fragmentation of production.

In the other side, it should be noted that the development of increasingly complex GVCs and involving many countries whose objective is to maximize profits and make economies of scale, could increase global production, and induce huge costs of sea, air, rail, or road transportation what could lead to more pollution and environmental degradation. In this case, the offshoring of industries to developing countries would be more beneficial as these countries would gain to some extent if the spillovers were well considered against the losses.

Overall, the net gain for the environment is mixed if we consider these two aspects.

V. DOMESTIC POLICIES PROMOTING GVC PARTICIPATION AND ENHANCING BENEFITS

Promoting GVC participation in developing countries requires the implementation of reforms and policies adapted to the situation of these countries aimed at improving the climate and the business environment. A favorable environment is an institutional framework, available and quality infrastructures, an efficient and effective vision, and coordination of resources in value chains (Trienekens, 2012). In developing countries, it should be considered that companies are characterized by their size and by weak technical and financial capacities to invest and lack of contact with (international) market players.

Moreover, it is important to mention that power of stakeholders within relationships in value chains and trade barriers impact on the distribution of costs and benefits over the participants either for advanced countries or for the weak economies that have a weak effect on international trade (Trienekens, 2012). Due to lower bargaining power, producers in developing countries encounter difficulties in collaborating with large international firms and are forced to fight for their negotiating position in these chains thus, the benefits of GVC participation are lower (Antràs, 2003). Thus, bargaining power and transaction-cost minimized are matter for GVCs participation.

A challenge for most developing countries, according to Trienekens (2012), is to know the way to participate in value chains and how to upgrade so as to be able to compete in these markets. To this end, international and regional cooperation, multinational firms, well-defined contracts,

and property right and also, governance and institution quality are powerful levers on which developing countries can rely to increase their participation in GVCs.

1. Importance of international and regional cooperation

International / regional cooperation coats a keen interest in promoting GVCs. This cooperation allows countries to position themselves in production segments where they have an advantage. This can be reinforced by regional trade agreements. de Soyres et al. (2019) confirm the importance of regional trade agreements by explaining the positive effect of regional agreements in global value chains and the performance of industries that pass through regional networks. According to Soyres et al. (2019), taking GVCs into account leads to a greater increase in outflows from regions where regional trade agreements are established. Considering the importance of the regional part of the global value chain, de Soyres et al. (2019) suggest that the effect of regional trade agreements on trade volumes decreases the region's incentive to establish trade barriers on inbound flows, while it increases incentives for the rest of the world to increase trade barriers on outbound flows from the region. These trade policies promote intra-regional trade. Thus, we can surely see the importance of international / regional cooperation. The effects of regional trade agreements are established in two concepts according to de Soyres et al. (2019). It is about of trade creation which increases the volume of intra-regional trade associated with a regional trade agreement, and trade diversion which is a reduction in trade between the region and the rest of the world.

This global trend towards multilateralism through regional agreements can be observed with the examples of the North American Free Trade Agreement (NAFTA) that is now United States – Mexico – Canada Agreement (USMCA), Euro area, West African Economic and Monetary Union (WAEMU) or indeed the African Continental Free Trade Area (AfCFTA). For developing countries, this regional cooperation allows pooling of capacities, greater participation in GVCs and greater benefits. Indeed, developing countries experienced difficulties in terms of human, technical and financial resources to master GVCs. Thus, intra-regional input transfers between relatively inefficient national producers to more efficient regional producers could increase the benefits and promote the participation in GVCs.

To improve international / regional cooperation, it is necessary for developing countries to make structural investments in support areas such as transport and communication infrastructure allowing intra-regional trade to be facilitated.

Trienekens (2012) finds that through horizontal collaboration between producers, developing countries reinforce position of their firms in these value chains, especially by establishing regional clusters. By strengthening the bargaining power, this approach improves opportunities and the competitive position of firms of a region or country.

2. Firms, contracts, and property rights

The relationship between firms, contracts and property right is essential in international trade, more particularly in GVCs. First, it will be a question of analyzing the relationship between firms and contracts, and secondly between firms and property rights.

To fully understand the relationship between firms and contracts, it is interesting to refer to Antràs (2016) who presented the example of a Brazilian firm and Chinese firm on the trade of soybeans. He relates the situation where the two companies agreed on a contract and a few months later the price of soybean fell by 20%. This decrease creates losses for the buyer who has agreed to a price higher than the current market price. This situation led the buyer to look for ways to break the contract. There will be a loser regardless of the outcome of the contract (breach or not). On analysis, it appears the implications of well-defined contracts or imperfect-contracting on world trade shape the global sourcing decisions of firms. Antràs (2016) confirms that weak contracting has effect on the profitability and on offshoring.

The interest of this example lies in the fact that most developing countries participate in international trade with commodities. Thus, they are generally confronted with fluctuations in the commodity markets which can make contracts obsolete or generate losses or gains depending on the direction of the fluctuation.

To this end, well-defined contracts are of great importance. They make it possible to secure transactions and relationships between stakeholders. However, it should be noted that as mentioned earlier developing countries have weak negotiating capacities due to technical, financial, or human factors. This is a hindrance to establishing well-defined contracts allowing to guarantee mutual gains. This aspect that Antràs (2016) underlined can be summed up in the governance of contracts.

A second key feature in the relationship between firms is the property rights that are determinants for the GVCs participation. The central idea of the property rights approach, according to Antràs (2016), is that when contracts are incomplete or bad-defined, owners of non-human assets have a power comparing to other party. This means that when parties

encounter contingencies that were not foreseen in the initial contract, the owner of the property rights holds control of the contract and takes more advantage of the situation because of having greater negotiating power. Therefore, whoever owns property rights has the capacity to maximize his earnings.

For developing countries, property rights are matter since they reinforce their benefit in the participation in the GVCS and attenuate failures.

3. Governance and Institution qualities

“Weak institutional environment will act as a deterrent for foreign firms seeking offshoring opportunities in a particular country” (Antràs, 2016). This assertion shows the importance of institution quality. Governance in GVCs, on the other hand, can be defined as "the relations of authority and power which determine the way in which financial, material and human resources are allocated and circulated within a chain" (Gereffi, 1994). Thus, governance and quality institutions take all their interest in GVCs. However, in developing countries, institutions, and governance in the broad sense of the term involving transparency, coordination and vision encounter limits which hamper participation in GVCs. The governance problem can be gauged by the availability of data on participation in GVCs. These data are almost non-existent for most developing countries, unlike advanced countries such as those of the OECD. Weak institutions and problems of poor governance in developing countries are limitations to note. In this regard, the establishment of quality institutions and good governance are the major challenges for developing countries to promote participation in GVCs and increase earnings.

CONCLUSION

The difference between international trade and global fragmentation of production lies in the fact that the first involves transactions between only two countries (exporting country and importing country) while global fragmentation of production trades cross borders several times and involves several firms and or countries. This difference has several implications for countries.

First, there are factors that promote and multiply participation and the gains that participation can bring. According to Antràs (2016), three major factors contribute to development of GVC: reduction of transport and communication costs, the acceleration of technological progress and the removal of political and economic barriers to trade. In other words, the rapid expansion of GVCs can be summed up in technological progress, trade cost reduction and liberalization. These factors presented by Antràs (2016) have been extended in our work into three main drivers namely: (i) productive capacities -embedding human capital, natural capital, energy, information, and communication technology (ICT), and institutions-, (ii) Foreign Direct Investment and geography, and (iii) Market size.

Considering these main drivers matter for development of GVC, developing countries are badly off, which is why their participation and value added are lower compared to advanced countries.

Participation in the global fragmentation of production leads to significant changes on the economic situation and welfare in the countries in terms of employment, earnings, and growth, but also the effects of GVCs on promoting industrialization, innovation, and technological progress. Therefore, developing countries as Sub-Saharan African countries such as Senegal have a great interest in engaging in the promotion of GVCs in order to benefit greatly and to engage the path of economic growth.

In this logic, cooperation, multinational firms, well-defined contracts, and property right and also, governance and institution quality are powerful levers on which developing countries can rely to increase their participation and enhance benefits in GVCs.

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