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Economic and social upgrading in global value chains: concepts and metrics

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Abstract

Global value chains (GVCs) are an expression of an unprecedented fragmentation of production processes in an increasingly interconnected global economy. While it is considered an analytical tool, GVC also became a practical and useful explanatory framework for understanding how firms and countries are engaged in the process of value creation, distribution and capture. This paper has documented part of the growing literature on GVCs, reviewing the concepts and measures of one particular dimension of the GVC analysis that is two-fold: the *economic* and *social upgrading.* While economic upgrading is mostly seen regarding the efficiency of production processes and the peculiarities of products and tasks developed by producers, social upgrading is commonly analyzed regarding the effects of GVC participation on living standards and conditions of employment. Following, this paper highlights that the economic gains from greater integration in GVCs may not automatically translate into improvements in living standards. For that reason, it focuses on how both dimensions are related to each other in recent analysis. This paper emphasizes the important diversity of definitions and measures within the GVC literature, considering it as a reflection, to a certain extent, of the absence of a systematic theoretical apparatus in the GVC literature. The paper concludes with some considerations on the role of policymakers in promoting social upgrading as an important topic in the GVC research agenda.

Keywords: Global value chains; Economic upgrading; Social upgrading.

1 Introduction

The increasingly interconnected global economy has posed significant challenges to theorization in the field of economics. The traditional tools of economics, e.g. the theories of supply and demand and national comparative advantage, remind us of simpler times when several assumptions of mainstream economics were taken without considering the rising complexity brought by global integration (Sturgeon; Van Biesebroeck; Gereffi, 2008). Over the last decades, the global economy has become more integrated through trade simultaneously to a disintegration of the production processes led by firms that

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have found a way to become more competitive through outsourcing their non-core activities both domestically and abroad (Feenstra, 1998). In that sense, there is a substantial change from what used to be analyzed in terms of international trade theories as a passive process of actors reacting to market signals to what is now debated in terms of value chain analysis as a dynamic and asymmetric system of organization and coordination by economic and non-economic actors (Neilson; Pritchard; Yeung, 2014). In that spirit, different conceptual model[3] were formulated in recent years to understand the emergence of global production and distribution systems, which combine several economic and non-economic actors operating through complex structures of power relationships. While global value chains (GVCs) are an expression of this unprecedented fragmentation of production processes, it also became a practical and useful explanatory framework for understanding how firms and countries are engaged in the process of value creation, enhancement and capture. This issue is particularly relevant for developing country firms and countries that aim to capture a bigger share of the dynamic gains from trade.

GVCs are commonly used as an analytical tool for understanding not only how firms and countries participate in the global economy but also how would be the policy environment needed for an efficient allocation of resources (Kaplinsky; Morris, 2003). The recent developments in value chain theorization have transformed a heuristic device into an analytical tool, providing a logical structure for studies at the country and firm levels[4]. In order to analyze the emerging pattern of global trade, which has been named a shift from "trade in goods" to "trade in value-added" or "trade in tasks" (OECD, 2011), the GVC approach provides a view of global industries from two contrasting vantage points: *top down* and *bottom up* (Gereffi, Gary; Lee, 2012). The central concept for the *top-down* view is "governance", which focuses mainly on the power relationships between firms that set the parameter to other firms in the chain, and

(3) See Coe et al. (2008) for a discussion about the paradigms for thinking about economic globalization in terms of network- or chain-based research, namely, the Global Commodity Chain (GCC), the Global Value Chain (GVC) and the Global Production Network (GPN) frameworks.

(4) The scheme created by Gereffi (1994, 1995) to comprehend and describe the structure, dynamics, and relationships among firms in a commodity chain, i.e. the four building blocks (input-output structure; territoriality; governance and institutions), is also used under the GVC perspective. These four building blocks are used to reach the GVC approach focuses on how value is created, enhanced and captured within the GVCs. One can understand this four building blocks into a two-part research approach*: value chain mapping*, which uses input-output structure and geography to describe the structure of the chain; and *value chain analysis*, which uses governance and institutions to evaluate the current economic organization of the chain, in terms of actors, places and processes, and how it might evolve in the future (Frederick, 2014).

the key concept for the *bottom-up* view is "upgrading", which refers to the possibility of moving up in the value chain and focuses on the strategies used by countries, regions or firms to maintain or improving their positions in the global economy (Frederick, 2014; Gereffi; Fernandez-Stark, 2011; Gereffi; Lee, 2012). More ambitious than previous approaches, the GVC framework aims to capture the determinants of the organization of global industries (Backer; Miroudot, 2013), and both perspectives are what suggests the originality and singularity of this framework.

Upgrading, which is usually associated with "moving into higher value-added stages", is commonly followed by positive spillovers regarding technology and productivity. Therefore, we emphasize the economic mechanisms in the process of GVC participation that have enhanced productivity growth. However, this narrow view of upgrading regarding firm-level competitiveness misses how the gains are distributed to workers regarding wages and improved working conditions. There are concerns that the economic gains from greater integration in GVCs may not be translated into improvements in living standards. For that reason, several scholars start to distinguish between two different dimensions of upgrading: *economic* and *social* upgrading, and even more importantly, most of the recent analysis focuses on how both dimensions are related to each other. While economic upgrading is mostly seen in terms of the efficiency of production processes and the peculiarities of products and tasks developed by producers, some scholars may say that the different paths of upgrading are not linear, involving learning, the development of national and firm-level capabilities, and innovations (Nathan; Sarkar, 2013; OECD; WTO; Unctad, 2013a).

However, it is important to highlight that GVC analysis does not tell the whole story. Even in theoretical terms, a systematic framework on the specificities of GVCs is still missing. In general lines, there is a significant number of empirical studies of different value chains, without any substantial causal explanation for understanding economic development within this new geographical pattern of value creation and capture in the global economy. In this sense, it is important to understand that the GVC framework has several limitations and must not be taken as a panacea for economic development.

The aim of this paper is to reflect upon some of the conceptual aspects of GVC theorization to further understand the complex balance between opportunities and risks commonly associated with greater integration into GVCs. In particular, this paper reviews and synthesizes the definitions and means of

measurement of one particular dimension of the value chain analysis, which has two perspectives: the *economic* and *social upgrading.* It is usual to assess the concepts of economic and social upgrading by using different measures under distinguished levels. These different measures are applied to several case studies, challenging the possibility of extracting general conclusions about the outcomes of GVC participation. The choice to analyze this two-fold dimension is consistent with the attempt to contribute to the organization of a formal theoretical apparatus within the GVC literature, given the notable diversity of definitions and measures. By reviewing the main definitions and measures addressed in the GVC literature, this paper highlights that no single measure could be used to determine the benefits and risks usually associated with GVC integration. Further, it is argued that not only the outcomes associated with GVC participation are not homogeneous among firms and countries, but also economic upgrading does not drive to social upgrading automatically and regardless of the context, indicating the important role to be played by policymakers.

The analysis proceeds in five sections, including this introduction. Section 2 addresses the widespread outcomes related to GVC integration regarding economic upgrading, discussing the connections between GVC participation and increased productivity. Section 3 discusses the effects of GVC participation on living standards and conditions of employment, which are referred to as social upgrading and have been incorporating other social aspects, such as gender equality. In section 4 we outline the relationship between both dimensions of upgrading, considering both neoclassical and institutionalist explanations for the connection between upgrading and the social impacts of GVC participation. Lastly, Section 5 presents a systematization of this discussion, addressing its policy implications and the need for developing better quantitative measures of GVC participation to explain the effects of countries' integration into GVCs.

2 Economic upgrading: concepts and measures

One of the main reasons why value chain analysis is valuable is its capacity to assess who is benefitting from GVC participation, whether households, firms, sectors, regions or countries, and a particular challenge is to unravel analytically and empirically what are the outcomes associated with increasing participation in GVCs. Even though the analysis does not allow

establishing causality[5] (Taglioni; Winkler, 2016a), the strategy of deepening integration into GVCs has been seen as an opportunity for countries to improve their competitiveness by greater access to global markets. Thereby, the economic gains of participating in GVCs are conceived in the GVC literature regarding *economic upgrading*.

Upgrading, which is commonly referred to as "industrial upgrading" or "economic upgrading[6]", is defined by Gereffi (2005, p. 171) as "the process by which economic actors – nations, firms, and workers – move from low-value to relatively high-value activities in global production networks". Cattaneo *et al.* (2013) consider upgrading as a dynamic movement, highly associated with increased benefits from one stage of production to another within the value chain. It is often implicitly assumed that the benefits from GVC participation are not equally distributed among all production stages and a position in higher-value-added activities generates larger economic benefits, including higher incomes, high-wage employment, and positive spillovers regarding technology (OECD, 2013). Once countries and firms are integrated into GVCs, upgrading their position in value chains may raise as the best long-term strategy for preserving and capturing more gains of participation in GVCs (Cattaneo *et al.*, 2013). Therefore, the positioning of a producer within a GVC and the nature of the value chain are taken as important aspects to understand the distribution of risks and opportunities of GVCs' participation (Gereffi, Gary; Luo, 2015).

But upgrading is not always about "moving up the value chain". According to Kaplinsky and Morris (2003, p. 38), it is important to understand the challenge of upgrading from a wider perspective, which involves "changes in the nature and mix of activities, both within each link in the chain, and in the distribution of intra-chain activities". In other words, it is about "making better products, making them more efficiently, or moving into more skilled activities" (Giuliani; Pietrobelli; Rabellotti, 2005, p. 552). Thereby, economic upgrading has often been associated with increasing competitiveness in higher value-added

(5) According to Taglioni and Winkler (2016), it is not simple to establish the exogeneity of GVC participation. In this sense, the causality between GVC participation and country performance could run in both directions, whether one consider GVC integration as endogenous to the developments in the economic environment.

(6) The GVC literature initially referred to "industrial upgrading", as most of the analysis used to focus on labor-intensive manufacturing, such as garments and footwear (Gereffi, 1999; 2005). But in recent years, the concept of "economic upgrading" has been used as a broaden definition, which is not restricted to a specific manufacturing and is more suitable to analysis across sectors, including agriculture and services (Barrientos; Gereffi; Rossi, 2010; Rossi, 2013).

products, tasks, and sectors (Taglioni; Winkler, 2016a), and may be identified as "directly related to increases in competitiveness in value added process and with national gains in productivity and labor qualifications" (Salido; Bellhouse, 2016, p. 9). Put it simply, upgrading refers to "the improvement of a firm's productivity and competitiveness through the creation of technological and managerial capacity to ensure its inclusion in GVCs" (Unido, 2015, p. 21).

The GVC literature has mainly focused on the ability of producers to engage in more knowledge-intensive activities and on their ability to learn, i.e. the enhancement of technological capabilities for developing new products or processes. In this sense, upgrading is also understood as the ability to innovate to increase the value added of products and processes (Giuliani; Pietrobelli; Rabellotti, 2005; Humphrey; Schmitz, 2002; Kaplinsky; Readman, 2001). As such, there is a logical contradiction when the concept of upgrading is used as a synonym for innovation, yet it is also understood as the outcome of an innovation process, resulting in several empirical studies of upgrading mixing up causes and effects (Morrison; Pietrobelli; Rabellotti, 2007). Although the capacity to innovate is associated with the producers' ability to increase value added, it is necessary to compare it with the innovation efforts of their rivals, whether to truly increase both value added and market share. This means that if the rate of innovation is lower than of its rivals, the outcome may be declining value added and market share (Kaplinsky; Readman, 2001). Furthermore, according to Taglioni and Winkler (2016), upgrading is not exclusively about transitioning from an agricultural to a services economy, as traditional international trade and development views ("old paradigm", as named by GVC literature) suggest. But it is about achieving higher value-added production via skills and know-how, capital and technology, and process upgrading. This means a rupture with the old sector-based paradigm focused on final goods and moving a step forward to a new paradigm focused on intermediates. From a developing country perspective, economic upgrading overcomes the old paradigm based on exploring their comparative advantage on cheap labor costs to become a path to pursue development build on skills and value-added (Rossi, 2013).

In the context of GVCs, there are four equally relevant trajectories that firms can adopt to upgrade (Humphrey; Schmitz, 2002; Kaplinsky; Morris, 2003), namely: i*) process upgrading:* occurs when firms are increasing value-added shares in existing GVC tasks by having a better organization of internal processes than those of rivals or by introducing new technologies, which turn possible to process more complex tasks, resulting in efficiency gains and reduced

per-unit costs, in other words, it is productivity growth in current activities; ii) *product upgrading:* firms are producing new products in the existing value chain (higher value-added products) or even improving old ones faster than their rivals, in a process that usually involves moving into more sophisticated product lines, more skilled jobs or the acquisition of technology capability; it can be measured as the value added per unit of output; iii) *functional upgrading*[7]. Occurs when firms increase the overall skill content of activities, i.e. firms are increasing value added by changing the activities that are performed by the firm or by moving the locus of activities to new segments of a GVC associated with higher value-added; it can be measured as a higher share of value added in the output of the final product; and iv) *chain (or inter-sectoral) upgrading:* participating or moving horizontally to new GVCs that produce higher value-added per unit of output and requires similar knowledge and skills.

The literature on GVCs emphasizes the case studies of functional upgrading, i.e. moving to higher value-added tasks. From a dynamic perspective, the trajectory of functional upgrading process is made of steps from assembly typical of export-processing zones to original equipment manufacturing (OEM) to original brand name manufacturing (OBM) and original design manufacturing (ODM) (Gereffi, Gary; Fernandez-Stark, 2011)[8]. There are, however, other forms of learning processes equally relevant. Additionally to the primary four paths of upgrading, Unido (2015) presents three other forms: i) *organizational upgrading* (the organization of producers in business units, e.g. cooperatives or joint business), ii) *territorial upgrading* (the focus is on a certain locality), and iii) *structural upgrading* (which is related to firm size and business structures). Moreover, Fernandez-Stark *et al.* (2011; 2014) present two other types of upgrading: i) *entry into a GVC by a new actor*; and ii) *end-marketing upgrading*, which means moving into more sophisticated markets with rigorous standards or into larger markets with mandatory production on a larger scale and price accessibility. This last type of upgrading reveals how deeply mistaken is the narrow view of upgrading simply as the need to capture a growing share of a

(7) According to Barrientos et al (2010), a functional upgrading can occur in at least two different ways: vertical integration (adding new capabilities to a firm or cluster) or specialization (substituting an activity for another).

(8) One may say that there is a hierarchy in upgrading, as firms are moving from assembly to ODM in a process that reflects their developed capabilities. In other words, the degree of disembodied activities increases in a trajectory from process upgrading to product, through functional and finally chain upgrading (Kaplinsky; Farooki, 2010; Kaplinsky; Morris, 2003).

product's value[9]. Whilst upgrading is interpreted as the need to capture a growing share of domestic value added in exports, most of the authors that propagate this simplistic, and perhaps erroneous, idea make use of the "smile curve" thesis to put forward the idea that it may be better to move away from the assembly stage of the GVC, given its small share of value of the final products (Kowalski et al., 2015).

The smile curve is one of the most reproduced diagrams in discussions about the different opportunities usually associated with different stages of a value chain and it was first articulated around 1992 by the founder of Acer, Stan Shih, to represent Acer' strategy of upgrading from assembly to higher value-added activities in the value chain for computers (Low, 2013). This diagram asserts that manufacturing, especially the final assembly, adds smaller shares of the final product value than post- or pre-manufacturing services (e.g. marketing, distribution, sales/after service, or concept, R&D, design, branding, respectively). This phenomenon is presented in a graph with Y-axis for value-added and X-axis for value chain, resulting in a curve with the shape of a smile (Ye; Meng; Wei, 2015). Moreover, after the second unbundling it seems like the smile curve has deepened, increasing the difference among those stages (Baldwin, 2013). However, this view of upgrading simply as "moving up the value chain" do not consider the *volume* of the activity, which is as much, or more, crucial as the share of the product (OECD; World Bank Group, 2015). Using the manufacture of garments as example, the joint report from OECD and The World Bank Group shows that in spite of just being considered a relatively labor-intensive process with a small share of the total value of the final product, it is also possible to say that important benefits can be obtained from the specialization of SMEs in this manufacturing activity and their aim to perform on a larger scale.

Some authors understand that the possible paths that firms have undergone through participating in GVCs can be resumed into two broad categories: the *low road* and the *high road* (Kaplinsky; Morris, 2003; Kaplinsky; Readman, 2001). Simply put, it is about two routes to raising international competitiveness that depends on production costs (Milberg; Winkler, 2011). The low road is a trajectory of firms that fight to keep competitive based on lowering wages and profit margins. Usually from developing countries, those firms are trapped in low value-addition activities and become engaged in a "race to the

(9) This idea is commonly driven by the oft-cited iPad case study.

bottom", facing a situation of immiserizing growth [10] (Kaplinsky; Readman, 2001). The low road based on lowering wages is often named "social downgrading". On the other hand, the high road is about raising productivity and increasing value added as a result of innovation, which is commonly facilitated through knowledge gained from other firms in the GVC (Bernhardt; Pollak, 2015). Instead of that built on developing countries' comparative advantage on cheap labor costs, this path is based on skills and added value, and it is identified as "economic upgrading" (Rossi, 2013). Furthermore, those who pursue a high road exhibit the ability to enter a virtuous circle of participation in GVCs and reach sustained income growth (Kaplinsky; Readman, 2001). But what explains the differences between both roads to competitiveness? One of the possible explanations considers the role of different capabilities of firms to "upgrade", or in other words, their *ability to learn* (Giuliani; Pietrobelli; Rabellotti, 2005; Kaplinsky; Readman, 2001). Therefore, the next sub-section emphasizes the role of innovation and learning capacities for boosting productivity spillovers from GVC integration.

2.1 Upgrading, productivity and technology spillovers

One of the most discussed dimensions of GVC participation is technology. Several studies show the positive effects of transferring technology and knowledge through GVC participation, which would lead to increased productivity and greater opportunities for economic growth (National Board of Trade, 2013; OECD, 2013; WTO, 2014a). Moving into higher value-added stages is commonly followed by positive spillovers concerning technology, productivity and skill upgrading, leading to endogenous technology creation (Shepherd, 2015). The different paths of upgrading may not be linear, involving learning, the development of national and firm-level capabilities and innovations (Nathan; Sarkar, 2013). Hence, successful upgrading paths do not depend only on the value added trade participation and domestic value added, but may also depend on participating in GVCs of increasing technological sophistication (OECD; WTO; Unctad, 2013b). But what are the economic mechanisms in the process of GVC participation that have enhanced productivity growth?

(10) "Immiserising growth" was first defined by Jagdish Bhagwti in 1958 as a theoretical situation where economic growth may drive a country to a worse outcome than before the increasing of the overall economic activity, e.g. if producers are competitive only through continual devaluation of the currency, this may led to a reduction of the international purchasing power of domestic incomes; increased exports can only be paid for by lower wages; if growth is export-led, this may lead to a fall in terms of trade (Kaplinsky; Readman, 2001).

According to OECD (2013), besides the general impacts of globalization on productivity as a result of greater access to foreign knowledge and technology, the scope for specialization and economies of scale, and the impacts of international competition on improving efficiency, GVCs participation has an additional effect: it may increase productivity by facilitating access to cheaper or better-quality intermediate inputs. By analyzing the OECD countries, the report claims that those countries with higher share of imported intermediate goods present on average higher productivity, which would be the result of three effects: i) *a price effect:* lower prices of intermediates as the result of stronger competition among producers of intermediated; ii) *a supply effect:* greater variety of intermediates available; iii) *a productivity effect:* increased intermediate imports may spur innovation by improving access to foreign knowledge. As firms within countries deepen their access to GVCs, this affects their potential for learning and productivity growth. Thereby, GVC integration has also affected technology and knowledge transfers. Piermartini and Rubinova (2014) shows that technology and knowledge transfers tend to be higher across countries that are more connected within GVCs. Shepherd (2015) examines some vectors through which technology transfer may take place within GVCs, explicitly and implicitly, ranging from inward FDI, technology licensing, imported intermediates and capital goods, to demand effects. Furthermore, Amiti and Konings (2007) shows that imported intermediates are related to higher technology transfers if compared with imports of final goods.

GVC integration has strong potential for productivity gains via several transmission channels ("dynamic productivity effects"), even though static labor productivity is negative for employment creation (i.e. when the same amount of value added is created with fewer workers) (Taglioni, Winkler, 2016). This said, Taglioni and Winkler (2016) have identified the main transmission channels for economic and social upgrading[11], namely: i) *forward links:* sales of GVC-linked intermediates to the local economy, resulting in an upsurge of production and/or productivity in downstream sector; ii) *backward links:* GVC-linked purchases of local inputs, rising production and/or productivity in several upstream sectors; iii) *technology spillovers:* improved productivity of local firms in the same or related downstream/upstream sectors as a result of GVC production; iv) *skill demand and upgrading:* similar to iii), but connected through training of and demand for skilled labor; v) *minimum scale achievements:* for example, when GVC

(11) See Figure 1 (Annex).

participation stimulates investments in infrastructure that would otherwise not be profitable and that may spur local production in other sectors.

To begin with, the backward and forward links creates a *demand effect* and an *assistance effect* in the host country, i.e. lead firms to tend to require more or better inputs from local suppliers and can assist local suppliers through knowledge and technology sharing, advance payments, and others forms of assistance. Both backward and forward links also generate technology spillovers, improving the production of local firms through two mechanisms: *diffusion effect* (diffusion of knowledge and technology) and *availability and quality effects* (GVC participation increases the availability and quality of inputs in the buyer's industry). In addition, GVC participation can result in pro-competitive market-restructuring effects that extend to nonparticipants of the GVC. Put it simply, the *pro-competition effect* occurs when GVC participation increases competition for the limited resources in the country, resulting in an overall increased average of productivity. There is also a *demonstration effect*, which reveals that knowledge and technology spillovers can upsurge from direct imitation or reverse engineering by the local participant or non-participant firms. The minimum scale achievements also amplify pro-competition effects, by stimulating investment in infrastructure and backbone services that would not be realized if it was not for the scale generated by GVCs. This created infrastructure also spurs local production in other sectors. Furthermore, the minimum scale achievements have also a *sustainability effect*, i.e. it reinforces the ability of the country to sustain GVC participation over time (Taglioni, Winkler, 2016). Following Taglioni and Winkler's (2016) argument, the last mechanisms analyzed are related to how GVCs benefit labor markets. The authors highlighted three effects: i) *demand effect*, i.e. GVC participation involved higher demand for skilled labor; ii) *training effect*, i.e. the local firms engaged in GVCs are more likely to receive training; and finally, iii) *labor turnover effect*, which shows that the knowledge embedded in the workforce of participating firms may move to other local firms.

Taglioni and Winkler (2016) use the case of Bulgaria to illustrate the impacts of countries' GVCs participation on the productivity of firms, more specifically on how a firm's absorptive capacity and a country's institutional variables affect the firm productivity from structural integration[12] in GVCs in manufacturing industries. Their estimations for the full country sample confirm

(12) The authors use network analysis and metrics to measure Bulgaria's structural integration in GVCs in terms of buyer-related and seller-related measures. See Santoni and Taglioni (2015).

that GVC participation increases the productivity of firms in a country, both domestic and foreign firms. In the one hand, several characteristics at the firm level can increase the productivity spillovers from a sector's structural integration in GVCs. Among the factors that affect positively the productivity gains from GVC participation on both buying and selling sides, the authors highlight a lower technology gap of a firm (related to the median productivity level of foreign firms in the same sector), the firm's technology level, size, export share, and FDI status. On the other hand, many national and institutional characteristics are associated with the productivity spillovers from structural integration in GVCs. In a general sense, productivity spillovers from structural integration in GVCs are lower in countries with higher education, less trade protectionism, higher GDP. On the contrary, they are higher in countries with high innovation capacity.

However, learning in GVCs is not automatic, nor all countries can benefit from technology and skills dissemination within GVCs (Unctad, 2013a; Unescap, 2015). According to the report, GVCs can also act as barriers to learning for local firms, limiting learning opportunities to few firms and locking firms into low technology and low value added activities. Shepherd (2015) suggests that GVC participation may support technology upgrading in developing countries under proper circumstances, depending on several factors, such as social structure, policy environment, and most importantly, the domestic governance institutions (especially the rule of law and contract enforcement). Unido (2015) reveals that the positive effects of GVC participation regarding technological learning and innovation depend on governance patterns and power relationships that characterize the GVC, as well as on the domestic capabilities of the firm. Nathan and Sarkar (2013) argue that the role of developing country firms as suppliers is not restricted to receiving technology and learning how to use it. Beyond knowledge using, there is also the possibility of knowledge-changing capabilities, which would enable both catch-up through reverse engineering and innovation. This possibility is determined not only by the firm- or industry-level capabilities, but also by national scientific and innovation capabilities and incentives. Thereby, without sufficient investment in skills, technological progress and GVC participation will not be translated into productivity growth (OECD; WTO; Unctad, 2013b).

2.2 Measuring economic upgrading

No single measure can be used to determine the benefits and risks usually associated with GVC integration. Hence, it is usual to assess the concept of

economic upgrading by using different measures under distinguished levels. These various measures are applied to several case studies, challenging the possibility of extracting general conclusions about economic upgrading. This sub-section assesses a set of different metrics on how GVC participation may impact the economic performance of producers.

According to Milberg and Winkler (2011), economic upgrading has been measured mostly through notions of *productivity growth*, *international competitiveness*, and *unit prices*[13]. This reveals that economic upgrading is mostly seen in terms of efficiency of the production process and the peculiarities of the product and tasks developed by producers. According to the authors, by taking productivity growth (i.e. increasing output per worker)[14] as a *proxy* for economic upgrading, it is common to use *output* and *value added* mutually when measuring at the national level. As the authors present accounting as the basis of a recent set of measures of economic upgrading, and following their argument, *international competitiveness* is usually measured by relative *unit labor costs*[15], with greater competitiveness when unit labor costs are lower. Although, from the total differential of the equation of unit labor costs[16], it becomes clear that a decline in the growth rate of relative unit labor costs (i.e. improvements in international competitiveness) can be the result of several events, such as a decline in wage growth, an increase in productivity growth, or from currency devaluation. Hence, in the presence of these different factors of competitiveness, it would be a difficult task to associate a better trade performance with economic upgrading. Therefore, looking for a measure of upgrading in accordance with the previously discussed concept of upgrading, Milberg and Winkler (2011) consider one of the first studies that measured economic upgrading by using unit prices *and* market share, Kaplinsky and Readman (2005).

Some studies emphasize the producer's ability to learn. Kaplinsky and Readman (2005) consider the relative innovative performance as a reflection of upgrading, which is measured in terms of unit-prices in accordance with data on

(13) According to the authors, a closer look at the precise definitions of these concepts may reveal some dichotomy in relating them to social upgrading.

(14) By measuring labor productivity (π) as output (Q) per worker (L), we have the growth in labor productivity ($\pi\hat{}$) as the growth in output ($Q\hat{}$) surplus the growth in employment ($L\hat{}$) (Milberg; Winkler, 2011).

(15) By the equation: $R= W(1/\pi)E$, where R is unit labor costs in foreign currency terms, W is wages, π is labor productivity and E is the nominal exchange rate (Milberg; Winkler, 2011).

(16) $R\hat{}= W\hat{}- \pi\hat{}+ E\hat{}$, where $R\hat{}$ is the growth rate of relative unit labor costs, $W\hat{}$ is the growth rate of wages, $\pi\hat{}$ the growth rate of labor productivity, and $E\hat{}$ the growth rate of the exchange rate (Milberg; Winkler, 2011).

market shares. As a first step, the authors distinguished the capacity to innovate (to produce something new or with increased efficiency) from the capacity to upgrade, i.e. to innovate faster or better than rivals. Therefore, their measure of upgrading focuses on outcomes rather than processes and inputs, using unit prices and market share as an indicator of competitiveness. Put it simply, a producer has experienced economic upgrading when it shows that it: i) *increased its export unit values*[17] *relative to the industry average*, and ii) *increased its world export market share*. On the other hand, a combination of falling unit prices and falling market share within the respective GVC is taken as downgrading process. Other combinations would end up in ambiguous results[18]. This metric of upgrading was applied by Kaplinsky and Readman (2005) to a particular economic activity – wooden furniture, during the 1990s, given their methodological purpose of capturing upgrading in a specific sector in different countries using trade statistics in general.

Following Kaplinsky and Readman's (2005) definition, Bernhardt and Pollak (2015) consider the growth differential between a country's export unit values and the global industry average as one indicator[19], and also complement their analysis by adding the change in world export market shares. These two indicators can show evidence of different paths of upgrading, e.g. product, functional and process upgrading (Bernhardt, 2013). However, using these indicators may not allow distinguishing which type of upgrading is associated with the competitiveness performance, nor capturing directly the inter-sectoral upgrading[20]. Their analysis of upgrading dynamics was applied to four manufacturing GVCs (Apparel, Wood furniture, Automotive, and Mobile phones), ranging different degrees of technological sophistications, as well as

(17) Export unit values are seen as proxies for product quality and "are calculated by dividing the total value of a country's exports (of a certain commodity or product group) in a given period by the quantity or volume of these exports" (Bernhardt; Pollak, 2015, p. 9).

(18) According to Kaplinsky and Readman (2005), when market share decreases (increases) and unit value rises (falls) relative to industry average, the result depends on the degree of price increase (falling), on the degree of falling (rising) market share and the opportunity cost of the resources invested in exports.

(19) The growth differential is used in order to avoid a measurement bias and to adjust for sector-wide inflation. The authors consider that because export unit values are a nominal concept, it can be driven by increases in input factor and other productions costs (reflecting, for example, an increase in the technology gap relative to the frontier), what would lead to misunderstanding increases as economic upgrading.

(20) According to Bernhardt and Pollak (2015, p. 10), economic downgrading within a sector may not be an undesirable outcome, "but may be a manifestation of the country's economy undergoing a process of structural change, i.e. a shift in the composition of economic activities towards sectors with higher value-addition".

different governance structures, and a sample size of around 35 countries. Their results indicate a notable variation across the four GVCs, with economic upgrading revealing to be more common in complex sectors with a higher degree of technological sophistication, and conversely, economic downgrading in low-tech sectors. In addition, developing countries, which have been gaining importance as producers and exporters, have been more likely to experience economic upgrading[21]. To sum up, the authors conclude that "the promise of economic upgrading through participation in GVCs does not materialize for everyone", as they find that only a quarter of the cases in their sample had experienced economic upgrading (Bernhardt; Pollak, 2015, p. 31).

Similarly, Bernhardt and Milberg (2011) present economic upgrading as a combination of growth in world export market-shares and export unit values. When taken them separately, an increase in the world export market-shares shows that a country's exports are internationally competitive and an increase in the export unit value indicates the production of higher-value products. However, an increasing export unit value may also reflect rising production costs, which would lead to a loss of international competitiveness (Bernhardt, 2013). Thus, upgrading in a given sector takes place when *both* conditions are experienced simultaneously. The authors focused on four sectors (Apparel, Horticulture, Mobile phones, and Tourism), varying in terms of technological intensity, and for each sector they analyzed a set of eight to ten developing countries for the period 1990-2009. In respect to the economic upgrading, their findings show that multiple patterns can be traced across sectors, although two parallel can be extracted: first, an association between economic upgrading and growth in world export market share in all sectors, except apparel; second, export market share was generally associated with declines in export unit values. The authors also found that economic downgrading does occur, but social downgrading would be more common. Following the approach used by Bernhardt and Milberg (2011), Salido and Bellhouse (2016) recently focused in the case of Mexico, analyzing four aggregated sectors (Agriculture, Manufacturing, Mining, and Tourism). The authors slightly modify the Bernhardt and Milberg analysis by adding the measurement of the national productivity to capture data on labor and production, regardless the external sector performance. According to the authors, this

(21) Bernhardt and Pollak (2015) suggest that advanced economies are less likely to undergo economic upgrading than developing countries because of their loss of world market share to dynamic emerging market economies.

approach that includes productivity data would provide a more dynamic view of the changes in the Mexican economy.

Another set of measures of economic upgrading is used by Taglioni and Winkler (2016): i) *growth of domestic value added embodied in gross exports*; ii) *level of domestic value added*; iii) *productivity* (labor or total factor productivity). Even though the first variable is only available at the sector level, the others can be measured at the firm level. All three measures of economic upgrading were used as dependent variables, and then related to various measures of GVC integration at the sector level (the "GVC links"). By using statistical methods or econometric analysis, the authors aim to explain the impacts of GVC participation, more specifically: i) if the intensity and nature of GVC links[22] are important aspects of growth in domestic value added that is exported; ii) the effects of GVC integration, as buyer or seller, on domestic value added, considering the mediating role of national policy[23]; iii) the effects of GVC participation of an industry on a firm's productivity[24].

On the other hand, Kowalski *et al* (2015) are critical to analysis that simply defines upgrading as increasing the domestic value added share of a product[25]. Thereby, claiming for more rigorous empirical works on how GVC participation may impact the economic performance of countries, the authors use

(22) Different metrics were used to measure GVC links, such as "GVC measures of structural integration as buyers and sellers in networks, foreign value added embodied in gross exports, domestic value added embodied in exports of third countries, GVC participation index, position in GVCs (upstreamness), domestic length of sourcing chains, and share of foreign output in a sector" (Taglioni; Winkler, 2016, p. 121)

(23) The policy variables used in their analysis were able to assess a country's ability to join GVCs and its ability to upgrade, e.g. a country's infrastructure, foreign presence, legal institutions, and innovation capabilities.

(24) The authors merged the Farole and Winkler (2014) data set with two sector measures of structural integration in GVCs, i.e. BONwin (i.e. buyer's perspective) and BONwout (i.e. seller's perspective). Farole and Winkler (2014) investigate "how foreign investor characteristics, domestic firm's absorptive capacity, and a country's institutional variables influence intra-industry productivity spillovers to domestic firms from FDI" (Taglioni; Winkler, 2016, p. 124). The description of these variables (chapter 6), the baseline of the estimation equation (annex 7B), and an application of this model to Bulgaria (annex 7C), see Taglioni and Winkler (2016).

(25) They illustrate their questioning with the case of China's electrical and optical equipment: with a domestic content of exports falling from 87% to 57% between 1995 and 2009, and the volume of domestic value added embodied in exports increasing more than tenfold, China had grown its domestic share of global value added in exports of electrical and optical equipment (from 3% to 22%). These developments show that profit-maximizing firms operating in China had increased the foreign content of their products meanwhile increasing their production. Therefore, the authors suggest that product or functional paths of upgrading are scarcely possible if not followed by higher productivity.

three different forms of measuring the outcomes of GVC participation: i) *the overall per capita domestic value added embodied in a country's exports*; ii) *the sophistication of export bundles*; and iii) *the diversification of exported products*. Their empirical analysis is mostly based on OECD Trade in Value Added (TiVA) data, but Eora database is also used to maximize the covered countries, as well as the Baci dataset (based on UN Comtrade and the World Bank Development Indicator databases) for non-value added-based measures and controls. The entire sample is composed of 152 countries and 15 years.

The first measure captures the benefits related to exporting that spread to domestic labor and capital. In other words, it would be a value added measure of productivity changes associated with GVC participation (similar to *process upgrading*). With the aim of testing econometrically for complementarity/substitution between domestic and foreign value added in imported inputs, and to better understand the relationship between GVC performance and access to more sophisticated intermediate inputs, Kowalski *et al* (2015) estimate the correlation of this first variable with: i) changes in the use of foreign value added in exports; and ii) changes in measures of sophistication of imported manufacturing intermediate inputs and primary intermediates. They find evidence that foreign value added is *complementary* to increasing per capita domestic value added in exports; changes in the sophistication of imported non-primary sector intermediates have a positive impact (though it decreases at higher levels of sophistication), as well as positive changes in per capita GDP; and, on the other hand, a growing distance from economic activity have a negative impact. The second variable is based on the methodology of Hausman *et al* (2007) and is considered a *proxy* for product upgrading. By measuring its changes, becomes possible to identify the path of increasing (or decreasing) sophistication of exported products. Empirical evidence suggests that growing backward participation (i.e. a bigger share of foreign value added in exports), using more sophisticated inputs and higher per capita GDP, are positively associated with producing more sophisticated export products; however, positive changes in FDI inflows are not. The third measure, which is based on the presumption that lower degree of export concentration has a positive correlation with a diversified exporting structure, is considered a *proxy* for functional upgrading. By measuring the diversification of exported products, it is possible to assess a country's competitiveness and quality of integration with international markets. The empirical evidence on the third measure shows that diversification can be associated with positive changes in backward participation and the use of more

sophisticated non-primary imported intermediaries, meanwhile, concentration is associated with growing per capita GDP (Kowalski *et al.*, 2015).

Furthermore, Kowalski *et al.* (2015) have found different paths of process, product and functional upgrading across income groups, respectively: i) most of the gains in per capita domestic value added embodied in exports from high-income countries are driven by a growing use of more sophisticated primary and non-primary intermediates, while it is the sophistication of non-primary intermediates that matters the most for low-income countries and the growing flows of inward FDI in the case of middle income countries; ii) engaging in wider fragmentation as the basis of most of the product upgrading in high/middle-income countries; and iii) high-income countries importing more sophisticated non-primary intermediates results in more diversified exports, whilst middle/low countries shows a wider engagement in backward participation. Put it simply, their results show no regularity when it comes to the spread of gains associated with value chain trade. However, a wider GVC participation, e.g. by using the more foreign content of intermediates imports or importing more sophisticated intermediates, is assumed to correlate with positive outcomes. Thereby, the possibility of gaining from GVC participation appears to be highly associated with the structure of specialization and level of development (Kowalski *et al.*, 2015).

The literature presents several challenges for measuring and analyzing economic upgrading, such as the quality of the data available, the level of analysis and its comparability, and the fact that most of the case studies suffers from a bias towards examples of successful upgrading (Bernhardt; Milberg, 2011; Salido; Bellhouse, 2016). Beyond those limitations, the analysis of upgrading focused on value added does not address the question of distribution of value added among profits, wages, and taxes, or even different types of labor (Milberg; Winkler, 2013). In addition to the problems related to which variable to choose, the authors highlighted the issue of magnitude. In this sense, to address how much change in a given variable is enough to constitute upgrading or downgrading, they used a cross-national evidence to measure "absolute" and "relative" upgrading [26] (Milberg; Winkler, 2011). According to them, this distribution is essential to the analysis of the relationship between economic and social upgrading. To sum up

(26) "We calculate an "upgrading ratio", z, as the ratio of the growth in value added per person engaged to the growth in exports and define three measures of upgrading, as follows: if $z > 1$, it indicates "strong absolute upgrading"; if $z > 1/3$, it indicates "weak absolute upgrading"; if $z > 1/\beta$ (where β is the slope coefficient in the regression), it indicates "relative upgrading" (Milberg; Winkler, 2011, p. 350).

the measures of economic upgrading and complement Milberg and Winkler's (2011) analysis, Table 1 (annex) shows a list of measures of economic upgrading that have been discussed in this section at different levels of analysis (country, sector or GVC, and the firm level).

While missing how the gains from upgrading are distributed to workers and improved working conditions, the view of upgrading restricted on firm-level competitiveness was soon criticized for its narrow view of development (Werner; Bair; Fernández, 2014). Thus, GVC scholars started to distinguish between two different dimensions of upgrading: economic and social upgrading. According to the authors, the relationship between both dimensions of upgrading is the main study subject of the current research frontier of GVC studies, overcoming the first generation of studies focused on the relationship between governance and upgrading. The next section discusses the social dimension of upgrading.

3 Social upgrading: concepts and measures

The effects of GVC participation on living standards and conditions of employment are commonly referred to as "social upgrading". By emphasizing the role of workers as social actors, several authors define social upgrading in terms of the quality of employment, and also in multiple aspects of economic and social life, such as working conditions, remuneration, gender quality, labor regulation, workforce development, the greening of value chains, social protection and entitlements (Barrientos; Gereffi; Rossi, 2010; Fernandez-Stark; Bamber; Gereffi, 2014; Gereffi, Gary; Luo, 2015; Milberg; Winkler, 2011; Rossi, 2013; Sen, 1999). In a general sense, social upgrading can be understood as the portion of gains from economic upgrading captured by workers, which may be translated in terms of wages or improved social wellbeing (Salido; Bellhouse, 2016). Put it simply, social upgrading is considered the social impact perceived by the workers involved in a GVC.

The concept of social upgrading can be analyzed in terms of the notion of "decent work" framed by the ILO over the past ten years, which is based on four pillars[27]: employment, standards and rights at works, social protection and social dialogue (Barrientos; Gereffi; Rossi, 2010; Milberg; Winkler, 2011). Apart from the labor dimension of economic upgrading related to skills development and the productivity of workers, social upgrading does not consider labor simply as a productive factor complementary to capital. Social upgrading, as the

(27) See Ghai (2003) and ILO (2008) for an explanation of this four elements.

quantitative and qualitative improvements within a specific enterprise, may help to reduce the risks for worker households and remove some of the volatility that they otherwise would have to confront (Gereffi, Gary; Luo, 2015). Thereby, the main focus of social upgrading analysis is workers as social actors.

The impacts of GVC integration on employment are highly complex. Farole (2016) assesses the impact of GVC integration on jobs in developing countries in four dimensions: i) *the number of jobs*; ii) *the return to jobs* (job-specific wages and upgrading potential); iii) *the distributional impacts of jobs and wage effects*; and iv) *the working conditions present in GVC-linked jobs*. Hence, the GVC integration impacts on labor market go beyond jobs, including changes in relative payoffs to skills, levels of inclusion, and skill developing (upgrading) potential. Their main findings are complex and multi-faceted. In respect to jobs, in general terms, the scale and nature of job impacts depend on comparative advantages for hosting labor-intensive stages of production. Apparently, countries with large labor surpluses and low wages presented strong jobs growth. Moreover, those countries that successfully attract GVC investment usually also experienced a significant increase in formal manufacturing jobs, which may not result in an increase in "labor intensity[28]" (i.e. a larger spending of labor relative to capital). When it comes to wages, large-scale job creation in GVCs usually requires sustained low wages (countries may be trapped in a "race to the bottom" on costs), and consequently, in terms of development requires, what matters are unit labor costs and not wages per se. But overall, wages rise and net employment falls, with more skilled workers gaining most. In terms of inclusion, as the demand is higher for lower-skilled labor-intensive activities, the GVC-investment contributes to more "inclusive" job creation, i.e. access to jobs for youth, women, and lower-skilled workers. Finally, as GVC participation imposes higher labor standards, the outcome appears to be a win-win situation, where workers benefit from better working conditions and firms benefit from productivity gains (Farole, 2016).

On the other hand, several studies by OECD find evidence that economic globalization has little, or none, impact on aggregate employment in OECD countries, showing that the shift from manufacturing has been compensated by considerable job growth in services and that there is no systematic association between cross-country differences in trade openness and unemployment rates (OECD, 2013). Furthermore, the composition of employment may have been

(28) As a matter of fact, GVC participation will usually result in fewer jobs relative to a given volume of output (in part, because firms are gaining productivity from scale economies).

affected in terms of activities and skill categories. The general idea is that those labor-intensive production stages are more likely to be offshored, and then their corresponding employment will decline, meanwhile, these job losses may be compensated by the upsurge of productivity and competitiveness of the remaining activities, which may lead to employment growth (OECD, 2013). De Backer (2011) describes the losses in labor market as visible and concentrated, while the gains appear to be more hidden and diffused. Moreover, despite the small impact on the aggregate level of employment, the effects on composition ("winners and losers") are wide larger. Low (2013) considers that the job consequences of moving into higher value-added activities on a GVC will depend on the structure of the entire economy. This means that while upgrading apparently can imply fewer employment opportunities on that GVC, other factors, such as skills levels and the functioning of the labor market, may have an important role in the employment consequences of upgrading.

The characteristics of the actors involved in the process of social upgrading may play an important role. Barrientos *et al* (2010) illustrate[29] three possible trajectories: i) *small-scale worker upgrading*: workers keep within home based production (agriculture or manufacture), but are still able to enjoy improvements in their work conditions (e.g. more secure contracts, better wages and safety in the workplace); ii) *labor intensive upgrading*: workers more to better labor intensive types of work that provide better working conditions; and iii) *higher skill upgrading*: workers move towards better paid jobs combined with progressive social upgrading (e.g. workers from India that gain sufficient education and training and were able to more from lower-paid and low skilled work into the IT sector). The authors indicate that moving from lower to the higher skilled type of work may lead to social upgrading, but this is not an automatic or homogenous process[30].

Several authors analyze the impact of GVCs on jobs and inequality. If upgrading may lower total employment (by increasing demand for more skilled labor and reducing even more demand for low-skill labor), it may also act in the opposite way (by raising demand for high-skill labor and for home-based or informal workers even more) (Milberg; Winkler, 2013). Apparently, the

(29) By using a diagram with the horizontal axis representing different types of work (from small scale household-based work; through low- and moderate-skilled labor-intensive work; to high skilled technology-intensive work and knowledge-intensive work) and the vertical axis indicating social upgrading (by measurable standards),

(30) Evidences suggest that regular workers are the main beneficiaries from GVC participation in terms of measurable standards and enabling rights (Barrientos; Gereffi; Rossi, 2010).

emergence of GVCs increased aggregate employment through the reallocation of tasks across and within countries. Following Görg (2012)'s argument, GVCs impact on employment through a number of channels. The productivity of the offshoring firm becomes higher with trade in tasks, leading to an upsurge of sales that creates employment. Meanwhile, offshoring also results in firms offering intermediate and final goods at lower prices. This means that other businesses that now will obtain cheaper inputs will expand, resulting in growing employment. Employment may grow also through an increase in demand of final consumers, which are experiencing their real incomes surge (IMF, 2013). But GVCs have also contributed to a global reallocation of jobs, with developing countries, in particular East Asia, attracting labor-intensive manufacturing jobs given their lower labor costs, among others (World Bank, 2013).

It is important to highlight that GVCs can be associated with short-term unemployment for specific types of workers. Low-skilled workers, workers specialized in less complex tasks and workers with industry or occupation specific skills are more likely to suffer the adjustment costs in the short-term, even if aggregate unemployment is not reduced (IMF, 2013). Hence, "results show that an increase in offshoring to low-income countries can increase short-term unemployment for certain occupations in advanced economies, but this effect (when positive) is economically very small" (2013, p.13). Nadvi (2004) analyzes the link between GVC participation and local employment and poverty impacts by focusing on the export-oriented horticulture, garments and textiles industries in four countries (Bangladesh, Vietnam, Kenya and South Africa). Their broad findings are consistent with significant employment and income gains to workers, especially women workers, depending on where workers are engaged in higher value-added GVCs that shows greater income gains and better working conditions. However, workers are increasingly vulnerable to changing employment contracts and increasing casualization of work.

The impact of GVCs on the recent raising inequality shows that "offshoring can affect inequality by increasing relative demand for high-skilled workers both in developed and in developing countries (Hanson; Feenstra, 1996, 1997, 1999), by reducing job opportunities for workers in advanced economies whose occupations are more easily offshored to low-wage countries (Ebestain et al, 2009), and by increasing wages of workers in firms that offshore relatively to workers in firms that source domestically (Amiti; Davis, 2012; Hummels et al, 2011)" (IMF, 2013, p.13). Gonzalez *et al* (2015) also find evidence of the relationship between GVC participation and wage inequality, showing that

countries with a higher degree of backward participation in GVCs have lower levels of wage inequality. The authors also suggest that the type of offshoring matters. In the one hand, countries with a higher degree of low-skilled task offshoring are associated with lower wage inequality, as the result of a productivity boost of the remaining low-skilled workers (what would increase their wage and reduce the gap between high and low skilled wages). On the other hand, offshoring high-skilled tasks would also result in a productivity boost (and higher high-skilled wages, deepening the gap between high and low-skilled wages). Considering that low-skill offshoring is more expressive than high-skill offshoring, the result on aggregate is lower wage inequality (Gonzalez; Kowalski; Achard, 2015).

Similar to the case of economic upgrading, the extent of social upgrading will be influenced by several factors, such as governance structure, labor regulations and labor unions, and opportunities for acquiring new skills relevant to employment (Bernhardt; Pollak, 2015). Gereffi and Fernandez-Stark (2011) provide a resume of the main commercial and social drivers of social upgrading: i) commercial drivers: cost (wages, transportation, inputs), time to market, volume and quality, end-market demand/preference, technology and skills, the nature and location of GVC lead firms, social (ethical) standards and certifications, and corporate social responsibility; and ii) social drivers: effectiveness of labor law, policies and regulations (education/skills, health/safety, gender, and environment), degree of activation of NGOs, existence and power of trade unions, and nature of industrial relations (e.g., tripartite cooperation). Shingal's (2015) review suggests that even though GVC integration has been associated with greater employment opportunities, income gains for workers and better working conditions, the position of the firm in the GVC is a key determinant factor and may have also contributed to the skilled-unskilled labor division. Taglioni and Winkler (2016) consider that social upgrading can derive from labor regulation and monitoring (e.g. occupational safety, health, and environmental standards in GVCs), besides the role of well-functioning labor markets, given the reallocating resources within becoming integrated into GVCs. Although, the authors emphasize that for social upgrading being translated into social cohesion through better living standards, it is necessary to ensure "equal opportunities to strengthen social cohesion by: i) creating a sense of belonging and active participation, ii) promoting trust, iii) offering upward social mobility, and iv) fighting inequality and exclusion" (Taglioni, Winkler, 2016, p. 30). The authors thus conclude: "equal access to jobs (including for women and minorities) is the most important opportunity in GVCs" (2016, p.30).

Gender equality is also an important dimension of the impacts of GVC participation. As GVCs are gendered structures, with men and women playing different roles in households, working in different sectors and stages of GVCs, with different occupations, and with different access to resources and basic services[31], GVC participation and upgrading strategies may affect men and women differently (Staritz, 2013). Tejani and Milberg (2010) find that different paths of upgrading are closely related to different patterns of female labor force participation relative to male participation, as is the case of East Asian firms that were moving into higher-technology industries and showed decreases in the incidence of female employment. At the same time, gender inequality may also have implications for upgrading processes in GVCs and its outcomes. Women are usually exposed to occupational segregation, what tends to maintain women's wages artificially low and may act as a twisted source of export competitiveness, especially in labor-intensive exports sectors (BUSSE; Spielmann, 2006; Staritz, 2013). On the other hand, gender inequality can affect negatively the gains from GVC participation, such as skill development and innovation, constraining the possibility of moving into higher and more complex value added stages within GVCs (Fontana, 2009; Hagen, 2014). Salido and Bellhouse (2016) find evidence that women experienced greater increases in wages and employment in the case of Mexico for all analyzed sectors, with the exception of agriculture. Undoubtedly, this is a fruitful field of research in GVC literature. Finally, it is possible to say that the concept of social upgrading is broader than the previously discussed concept of economic upgrading, resulting in several local case studies and a great challenge to link the mixed findings.

3.1 Measuring social upgrading and case studies

The measurement of social upgrading varies according to how the concept is understood. In general lines, social upgrading encompasses both quantitative and qualitative variables, distinguished by their difficulty to measure and quantify. The first element is composed of measurable standards, which are easy to quantify through factory visits and to modify through policy interventions, such as total and type of employment (formal and informal), wage level, physical wellbeing (e.g. health and safety, working environment, and working hours), and employment security (e.g. social protection, type of contract). The second component, less easily quantifiable variables, is related to labor conditions and

(31) Usually the reasons for gender inequality are not related to their capacities and economic potential but to social norms (Staritz, 2013).

enabling rights, which would be the full expression of the rights and entitlements of workers as social actors, including freedom of association and collective bargaining, the right to freely chose employment, non-discrimination, voice and empowerment (Barrientos; Gereffi; Rossi, 2010; Barrientos; Smith, 2007; Milberg; Winkler, 2011; Salido; Bellhouse, 2016). It is thus quite difficult to measure social upgrading by using one single indicator.

Social upgrading is usually measured by changes in employment and wages (Milberg; Winkler, 2011). Social upgrading occurs when both conditions are satisfied: i) *increased (or at least no decrease) in sectoral employment*, and ii) *increased in sectoral real wages*[32] (Bernhardt, 2013; Bernhardt; Milberg, 2011; Bernhardt; Pollak, 2015). Their option for these indicators suggests a simple logic: by creating jobs, labor encompasses the chance of earning income, and then moving away from poverty and an overall increased social well-being. Whether formal jobs, it may provide social insurance and certain workers benefits (Bernhardt; Pollak, 2015). At the same time, real wages are a measure of how much workers benefit from the value created by production in their country. In other words, it would be an indicator of labor' bargaining power and of the distribution of value among production factors (labor and capital). Taglioni and Winkler (2016) consider wage growth as a reasonable representation of social upgrading. Wide apart from fully capturing the qualitative features of social upgrading, real wages are seen as a proxy for the quality of employment, however, it may not always be translated as better working conditions (Bernhardt, 2013). Bernhardt and Pollak (2015) findings suggest that the patterns of social upgrading are quite varied across all four[33] GVCs analyzed, but the overall number of social downgraders countries is lower than the number of social upgradgers in every GVCs. According to the authors, with the exception of the automotive GVC, job cuts and increases in real wages have been very common across GVCs and this combination has been even more common in developed countries, reflecting a structural transformation in these economies. Bernhardt and Milberg (2011) findings show a general pattern of employment growth and considerably less growth of real wages, but a considerable variation in outcomes across different GVCs.

(32) Bernhardt (2013) applied this metrics to analyze the developments of the apparel sector during the 2000s in 18 selected developing countries. Bernhardt and Milberg (2011) focused on four sectors (apparel, horticulture, mobile phones and tourism) of ten developing countries.

(33) Apparel, wood furniture, automotive, mobile phone manufacturing sectors.

According to Milberg and Winkler (2011), there are several qualitative aspects of social upgrading that may not be extracted from a value added analysis, e.g. the incidence of informality in labor markets, features of worker rights and labor standards. To overcome the problems of using qualitative aspects of social upgrading, the authors used the concept of social upgrading in accordance with the notion of "decent work" developed over the past ten years by the ILO (i.e. employment, social protection, workers' rights, and social dialogue) and each category can be measured by a set of variables.

Taglioni and Winkler (2016) analyze the impact on labor and wages by distinguishing two groups of measures: indirect and direct measures of social upgrading. The first group is composed mainly by descriptive statistics that can be used to assess which sectors are associated with better labor market outcomes, namely: the averages of the number of employees, wages and salaries, wage rate (wages and salaries divided by the number of employees), or labor share (wages and salaries as a percentage of value added). According to the authors, these labor market indicators may be regressed on indicators of GVC participation by running cross-country "controlled correlations" at the sector level. Furthermore, the authors provide a more direct way to measure the link between GVC participation and labor market outcomes, by constructing several indicators already developed in literature that are based on international input-output data.

The first indicator of the group of direct measures of social upgrading is *labor content of gross exports*. By computing a dataset based on matrix data available in the Global Trade Analysis Project for more than 100 countries, 24 or 57 sectors, and covering the period of 1995-2011, their findings shows that there are two cases of successful GVC insertion: the Chinese machinery and equipment, and the Indian private services. The second indicator pointed by Taglioni and Winkler (2016) is *labor component of domestic value added in exports*, which was developed by the Unctad and is a proxy for the employment-generating potential of exports. By using Unctad Eora GVC database it is possible to see the positive correlation between GVC participation and labor component of domestic value added in exports, and even more, those countries with faster growth in GVC participation have also faster growth in the labor component of domestic value added in exports, even if the country depend on higher foreign value added share.

The third indicator is *jobs sustained by foreign final demand* and was developed by the OECD-WTO as part of the TiVA database. This indicator goes one step further by considering the domestic value added in foreign final demand

and not the domestic value added in total exports, which could be used as intermediates in third countries and be exported as final goods. In other words, it calculates how the domestic employment is affected by changes in the final demand in foreign markets ("upstream impact"). Their analysis considering the period of 1995-2008 shows a general higher share of jobs sustained by foreign final demand, even though it appears to vary in accordance with countries' size and specialization. The fourth indicator is the number of *jobs generated (domestically and abroad) by a country's involvement in GVCs* (Taglioni; Winkler, 2016). Jiang and Milberg (2013) decomposed the employment effects of a country's trade in five detailed components: i) labor content in exports; ii) labor content in imports; iii) labor content in the import content of exports; iv) labor content in the export content of imports; and v) labor content in intermediates contained in imports. The last three components reflect trade in intermediates, and the general idea is to assess the different channels through country's trade, especially in GVCs, can result in creating jobs. Hence, a country's exports create jobs and incomes in foreign countries because of the import content of exports, meanwhile, a country's imports may contain its own exports in the form of intermediate inputs that were exported to foreign countries. In other words, a country's imports generate jobs domestically because of the export content of imports (Taglioni; Winkler, 2016).

The fifth, and last, the indicator is *jobs in GVC manufacturing*, which was applied for selected countries between 1995 and 2008, using WIOD. It shows a broader picture of the employment structure in GVCs within a country by measuring (directly and indirectly) the number of GVC jobs involved in the production of final manufacturing goods (Taglioni; Winkler, 2016). Their findings shows: i) with the exception of China and Turkey, the share of manufacturing GVC jobs in overall employment has declined; ii) only about one-half of the workers in manufacturing GVCs are employed in manufacturing (the other half is employed in non-manufacturing industries that deliver intermediates); iii) employment in manufacturing GVCs increased in the services sector (for Germany, Italy, and Spain, the job creation in services were higher than the losses in manufacturing and agriculture). To sum up the measures of social upgrading and complement Milberg and Winkler's (2011) analysis, Table 1 (annex) shows a list of measures of social upgrading that have been discussed in this section at different levels of analysis (country, sector or GVC, and firm-level). The next section outlines the relationship between economic and social upgrading.

4 The relationship between economic and social upgrading

Several studies have analyzed the relationship between economic and social upgrading, investigating whether social upgrading is endogenous to economic upgrading or not. While the traditional presumption in the literature is that economic upgrading brings social upgrading, there has been an increasing concern that this may not be an automatic process. Beyond different findings, there are distinguished theoretical explanations for the connection between economic upgrading and the social impacts of GVC participation, as it is revealed by the debate between neoclassical and institutionalist theories.

The neoclassical theory, mainly based on the tradition of marginalist analysis, understands that wage growth is closely attached to productivity growth. This traditional microeconomic view understands that the marginal product of labor determines wages, with firms continuing to employ until market wage equals labor's value of marginal product (VMP_L) and marginal revenue product (MRP_L)[34]. This relation implies a series of assumptions, such as economic agents (workers and firms) are "wage-takers", given the prevalence of perfect competition in labor market; firms are profit-maximizing; labor is mobile and substitutable to other production factors (e.g. capital), among others. This said, the wage rate will be determined by the interaction of demand and supply curves of a competitive labor market, with higher productivity leading to higher remuneration (given constant prices of the good produced). For our purpose, this economic theory (*marginal productivity theory of wages*) gives a potential explanation for the relationship between economic and social upgrading, whether the first is measured by productivity growth and the second is measured by wage growth, respectively. Put it simply, in accordance with the marginal productivity theory of wages, social upgrading would be the automatic outcome of economic upgrading (Bernhardt, 2013; Milberg; Winkler, 2011).

Alternatively, the institutionalist view considers the influence on wages of other factors that are time and local-specific. In this sense, wages are the result of a bargaining power, in which social norms, and the strength and credibility of social institutions play an important role (Milberg; Winkler, 2011; Salido; Bellhouse, 2016). Thereby, differently from the neoclassical perspective where labor market regulation would cause a distortion in ideal competitive markets, the institutionalist view highlights the existence of labor market imperfections and

(34) This relation can be seen in most of the microeconomic textbooks, such as Mankiw (2006).

the role of labor regulatory interventions to improve the outcomes[35]. According to Milberg and Winkler (2011, p.358), "union density, bargaining rights, minimum wages and active labor market policies have been found to be significant determinants of labor market outcomes in developed and developing economies". Gereffi and Luo (2015) understand that economic upgrading is related to, but it may not determine, the extent and type of social upgrading, since other institutional factors and actors also influence this possibility, such as the extent and nature of worker organization, civil society actions, and government legislation and its enforcement.

Several case studies have shed light on the relationship between economic and social upgrading, supporting that the link between both is not automatic. In order to do so, some studies created a single (composite) index of economic upgrading and a single (composite) index of social upgrading, and thus plot them together (Bernhardt, 2013; Bernhardt; Milberg, 2011; Bernhardt; Pollak, 2015). A 2x2 matrix of possible combinations of economic and social up/downgrading is used to analyze the four different scenarios: overall upgrading (i.e. economic and social upgrading) *versus* overall downgrading (i.e. economic and social downgrading), and a mixed combination of both (economic upgrading and social downgrading, and economic downgrading and social upgrading). Following it, it is necessary to reduce these four outcomes to just two dimensions. Beyond several possibilities to create these indexes, the authors' first option is a simple method of giving equal weight to each component of both indicators (Method 1), composing a symmetrical composite index[36]. But what if a country has experienced an increase in export market shares and a decrease in export unit values, or when employment grows but real wages are falling?

Undoubtedly, there are several ways to create these composite indexes. In the face of a certain pro-upgrading bias of the first method, the authors follow checking for robustness[37]. In this sense, to address the problem of the existence

(35) For this conflicting views, Quibria (2002) argues that excessive regulations have worked against workers interest by creating an inflexible market, reducing the profitability of investments (as a reflection of the redistribution of economic rent from capital to labor), and creating economic rigidities. In other words, excessive labor regulations may hurt wage and employment growth. For a recent analysis of the influence of globalization on labor market institutions, see Potrafke (2013).

(36) Economic upgrading (or downgrading) = 0,5*(%-change in market share) + 0,5* (%-change in export unit value); and social upgrading (or downgrading)= 0,5*(%-change in employment) + 0,5*(%-change in real wages).

(37) "A drawback of this first method (…) is that the underlying indicators have a lower bound of -100 percent but an upper bound of infinity. To be sure, none of the indicators can fall below zero – which would

of a lower bound in the absence of an upper bound, they introduce Method 2[38]. This method is considered stricter than Method 1 because when one of the two indicators has declined, a country would have to show a bigger increase in the second indicator to still record an economic or social upgrading in the composite index. But following Kaplinsky and Readman (2005), an even stricter method is suggested: Method 3 considers that "a country can be said to have experienced economic or social upgrading if and only if both underlying indicators have positive signs" (Bernhardt, 2013, p. 25).

Bernhardt and Milberg (2011) find evidence that social upgrading occurs generally in the presence of economic upgrading[39], but economic upgrading does not guarantee social upgrading. Besides a considerable variation across sectors[40], social downgrading appears to be more common than economic downgrading. Bernhardt (2013) investigates whether an overall upgrading has occurred among the apparel-exporting of developing countries. Bernhardt's (2013) findings are consistent with a positive correlation between economic and social upgrading in the apparel sector, although no clear pattern has emerged. It is important to highlight that they found no single case in their sample of social upgrading occurring without economic upgrading[41], even though not every country that experienced economic upgrading also experienced social upgrading. These findings lead them to conclude that whether economic upgrading does not automatically translate into social upgrading, it is at least a conducive condition. Bernhardt and Pollak (2015) applied the same indicators of social and economic upgrading of Bernhardt (2013) in four selected GVCs - apparel, wood furniture, automotive, and mobile phones manufacturing – and found a considerable variation across the four GVCs. In general lines, there are more cases of overall upgrading than overall downgrading or intermediate cases[42]. Expanding the 2x2

correspond to a decrease of -100% from any initial level. On the other hand, countries can in principle register increases on any of the indicators that go (far) beyond +100 percent" (Bernhardt, 2013, p. 24).

(38) Economic upgrading (or downgrading)= [(1+Δmarket share) *(1+ Δ unit value)]-1; and social upgrading (or downgrading) = [(1+Δemployment) *(1+ Δ real wage)]-1.

(39) To recall, social and economic upgrading are proxied by increasing employment and real wages, and rising export market shares and unit export prices, respectively.

(40) Their analysis is applied for four sectors (apparel, horticulture, mobile phones and tourism). In apparel and horticulture there is a positive correlation between economic and social upgrading, however, in mobile phones there is considerable economic upgrading without social upgrading, and finally the opposite is seen in the tourism value chain, i.e. social upgrading without signs of economic upgrading (Bernhardt; Milberg, 2011).

(41) With the exception of Jordan (by using Method 1 and 2) and Nicaragua (Method 3).

(42) In other words, "social upgrading without economic upgrading" or "economic upgrading without social upgrading".

matrix into 3x3 in order to include intermediate cases, the situations where economic upgrading is associated with social upgrading correspond to the cells in the diagonal from the bottom-left to the top-right. Among their sample of countries, Bernhardt and Pollak (2015) found that the direction of economic and social upgrading run at the same time in more than half of the countries, and more specifically, the automotive GVC presents the strongest relationship while the wood furniture shows the weakest. There are only a few cases of economic upgrading without social upgrading and of countries that have achieved social upgrading without economic upgrading (with the wood furniture sector as an exception).

Rossi (2013) analyzes under which conditions economic upgrading is translated as social upgrading by using the Moroccan garment sector as an empirical case study. The evidence shows that different paths of upgrading result in mixed outcomes for workers, with process upgrading leading to reductions in excessive overtime worked, improved the working environment, and regulated contracts; and product upgrading related to skill upgrading for regular workers, if the product involves a more sophisticated production. When it is about functional upgrading, becomes clear that different types of workers may have different experiences: for regular workers, moving into new activities can imply training, skill upgrading, better measurable standards and enabling rights, but functional upgrading may pressure for reducing costs with more flexibility and speed of delivery, resulting in social downgrading for less skilled irregular workers (employed in packaging, storage, and loading, for example), both in terms of measurable standards (irregular contracts, poor wages, and long working hours) and of enabling rights (discrimination at the workplace) (Rossi, 2013).

Barrientos *et al.* (2010) suggest that economic and social upgrading are often interweaved, but one does not necessarily lead to the other. The authors suggest that economic upgrading can lead to social upgrading or downgrading, depending on how local-suppliers manage lead-firms' pressure for higher quality with lower costs' pressure to remain competitive. These suppliers may take a "low road" involving economic and social downgrading or a "high road" involving economic and social upgrading, or even, as most of them, a mixed approach, reflected in the use of regular and irregular workers together. While producers undertaking a low road strategy based on worsening labor conditions are risking losing out on quality, those on the high road are risking losing out on price competitiveness for improving wages and labour conditions (Barrientos; Gereffi; Rossi, 2010). But may not be possible to ensure that the high road will

be followed by wage growth, meanwhile, it is possible to say that the low road strategy of lowering wages has limits, which are posed by human subsistence and political stability (Milberg; Winkler, 2011; Taglioni; Winkler, 2016). Salido and Bellhouse (2016) argument that a view based strictly on the performance of external sectors would give the wrong impression. In the specific study case of Mexico, following Bernhardt and Milberg's (2012) approach, the authors find social upgrading being achieved in a context of economic downgrading. However, the authors provide more specific information about the Mexican case by adding measures of national productivity, besides wage and employment, and thus finding different outcomes: an overall upgrading.

The relationship between social and economic upgrading is not clearly and unambiguously identified yet, varying in accordance with the context. The research available confirms that economic upgrading can result in social upgrading, but this may not always be the case. The connection between improvements in firm efficiency, productive capacity and functional capabilities is not inherent to poverty reduction and better living standards (Werner; Bair; Fernández, 2014). Whilst it is important to highlight that the impacts of economic and social upgrading are not homogeneous, affecting firms and producers according to several features, such as their size, position in the GVC, formality, skills, income, or gender (Gereffi, Gary; Fernandez-Stark, 2011). After all, developing strategies that combine social and economic upgrading requires further analysis of the new features of the global economy, so policymakers can improve their ability to define goals and capture greater benefits from GVC participation.

4 Concluding remarks: some policy implications

This paper has critically documented a vast literature addressing the multi-layered outcomes associated with participating in GVCs, contributing to the organization of a formal theoretical apparatus within the GVC literature. From the firm to the macro-level, for instance, some of the outcomes considered within the GVC literature are: increased productivity, greater access to new markets and technologies, diffusion of technology and knowledge, higher skilled and better paid jobs (direct and indirect) creation, enhanced economic growth and higher per capita income, political and economic stability, better living standards and working conditions, and better and more sustainable use of resources (Cattaneo *et al.*, 2013; Taglioni; Winkler, 2016; Unescap, 2015). While participating in GVCs can accelerate the catch-up of developing countries' economic growth

rates and income levels at the global level, leading to a greater convergence between economies, the effects of GVC participation may be much more heterogeneous at the level of individual developing economies (Unctad, 2013b). In fact, this different potential impact of GVC participation becomes clear when we consider the distinguished activities that lead firms and other firms are engaged, with the former controlling higher value added activities (e.g. innovation activities, branding and new product development) and the later engaged in assembly activities that earn less, have fewer opportunities to growth and are more vulnerable to business cycles shocks (Unctad, 2013b).

It is the possibility of downgrading what makes some authors wonder that rather than questioning if producers – firms, regions or countries – should participate in GVCs, the key issue in GVC literature is *how* they should do so (Kaplinsky; Morris, 2003; Kaplinsky; Readman, 2001). GVC participation is not all about benefits. While the literature has recognized its mixed impacts, GVC participation alone may not ensure development benefits and, as a matter of fact, it may entail a number of potential downsides. Beyond the several obstacles to access GVCs, producers are exposed to several risks once they are actively participating in GVCs. From greater interdependencies across economies that reveal greater exposure to external shocks and supply disruptions, through exacerbated inequalities and environmental degradation, to labor markets deterioration and narrow learning capacities, GVC participation can lead to multiple negative impacts (Sturgeon; Memedovic, 2011; Unescap, 2015; WTO, 2014b). More importantly, governments are unable to control these risks directly, because GVC participation is the outcome of firm's choices. However, this does not imply that policymakers cannot influence firm's judgment and strategies. Thereby, these risks need to be appropriately taken into account.

Firms, and not countries, are the main actors in GVCs, and when it comes to GVCs participation, one may say that firms have three general objectives: i) entry to GVCs, ii) expand their presence and deepen it, and iii) upgrade to higher value-added positions within the GVC (Iliuteanu, 2016). As is discussed by Kowalski *et al.* (2015), firms' engagement is associated with the possibility of making profit, and there are at least two considerable differences in terms of a country or policymaker's perspective on GVC participation and the firm perspective. First, a country perspective on GVCs participation considers gains not only to capital but also to labor or, in general terms, other social outcomes. Second, it considers that the policy environment can influence firm's choices and then the several dimensions of the outcomes of GVC participation at the country

level. While the rationale of firms' decisions to participate in GVCs is related to economic efficiency and competitive advantage, policymakers are expected to analyze GVCs from a different perspective that considers economic, political and strategic factors (Bhatia, 2013). As it is added by the author, policymakers also have a different perspective from that of firms on the issue of upgrading, which usually involves higher technology that is labor saving. It is seen from an economic logic by the firms, and a part of having positive implications, yet there can be some situations where firms may use economic downgrading as a business strategy. Meanwhile, the viewpoint of policymakers is broader and involves generating the most jobs and capturing the maximum value within the country.

Therefore, there are some strategic questions that policymakers should formulate when it comes to upgrading. By facing the challenge of maximizing the benefits from GVCs participation and choosing which type of economic upgrading they want to pursue, policymakers should focus on strengthening existing GVC-domestic economy links, which usually are associated with greater diffusion of knowledge, technology, and know-how from foreign investors or trade partners abroad, along with strengthening domestic firms' absorptive capacity (Taglioni; Winkler, 2016). In that sense, both economic upgrading and GVC densification are key-factors to transform GVC participation into sustainable development. This means that the effort is not only about becoming more competitive in higher value-added activities, but also about engaging more local actors, both firms and workers, in the GVCs. Thereby, this may suggest that moving into higher value-added activities may not always result in large value addition for a country, and more importantly, in some cases this may come from performing in lower value-added activities on a large scale.

This paper has discussed that several studies on economic upgrading have recently emphasized its connection to social upgrading. Understanding how economic and social upgrading are related is a necessary step forward in the direction of more suitable industrial and commercial policies in agreement with the sustainable development goals (Salido; Bellhouse, 2016). To economic upgrading translates as sustainable development, policymakers should be concerned with the distribution of the opportunities and outcomes for GVC participation among all segments of society, and this means formulating social policies to create a balanced distribution of the gains that leads to social cohesion (Taglioni; Winkler, 2016). For that reason, considering the absence of a single measure, this paper has systematically analyzed the different measures applied to several case studies concerning both economic and social upgrading. Thus, the

existence of several measures at different levels reflects, to a certain extent, the absence of a formal theoretical apparatus in the GVC literature. Considering that economic upgrading may drive to social upgrading, but not automatically, the role of policymakers in promoting social upgrading is an important topic in the GVC research agenda.

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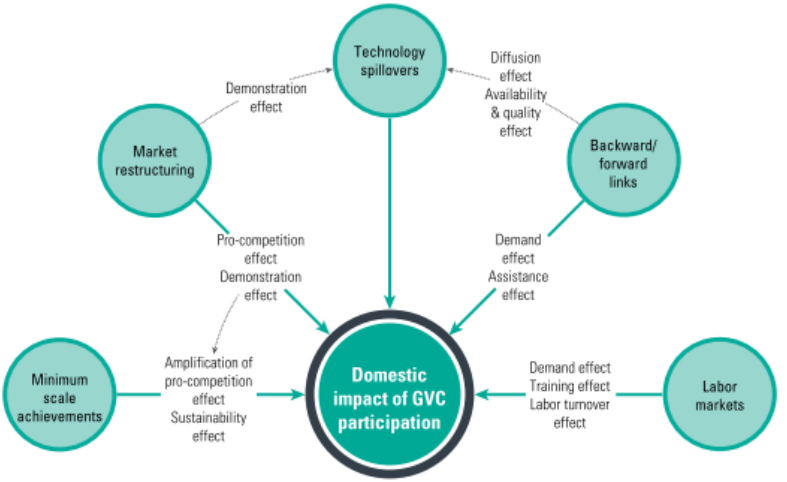
Annex

Table 1
Synthesis of the measures of economic and social upgrading

Measures of economic upgrading	Measures of social upgrading
	Country-level
Productivity growth (labor or total factor)	Wage growth
Value added growth	Employment/popultion growth
Profits growth	Formal employment
Incresead capital intensity	Decline in youth unemployment
Export growth	Gender equality in employment and wages
Growth in export market share	Poverty reduction
Unit value growth of output	Share of wage employment in non-agricultural employment
Unit value growth of exports	Improved labor standards (including the right to freely choose employment, freedom of association, and collective bargaining, job safety, child labor, forced labor, employment discrimination, voice and empowerement)
Unit cost growth of labour	Regulation of monitoring
Per capita domestic value added embodied in a country's exports	Improved political rights (freedom house index)
Sophistication of export bundles	Human Development Index (HDI)
Diversification of exported products	Employment security (e.g. social protection, type of contract)
	Labor share (wages and salaries as a percentage of value added)
	Labor content of gross exports
	Labor component of domestic value added in exports
	Jobs sustained by foreign final demand
	Jobs generated domestically and abroad by a country's involvement in GVCs
	Jobs in GVC manufacturing
	Sector or GVC-level
Productivity growth (labor or total factor)	Wage growth
Value added growth	Employment growth
Profits growth	Labor share (wages and salaries as a percentage of value added)
Export growth	Jobs sustained by foreign final demand
Growth in export market share	Jobs generated domestically and abroad by a country's involvement in GVCs
Growth of domestic value added embodied in gross exports	Jobs in GVC manufacturing
Unit value growth of output	Improved labor standards (including the right to freely choose employment, freedom of association, and collective bargaining, job safety, child labor, forced labor, employment discrimination, voice and empowerement)
Unit value growth of exports	
Incresead capital intensity	
Increased skill intensity of functions (assembly/OEM/ODM/OBM/full package)	
Incresead skill intensity of employment	
Incresead skill intensity of exports	
Level of domestic value added	
	Firm-level
Increased skill intensity of functions (assembly/OEM/ODM/OBM/full package)	Number of workers per job
Developing skills to manage the supply chain	Type of contract
Composition of jobs	Improved standards in plant monitoring (e.g. management and working conditions audit (M-audit) criteria)
Incresead capital intensity/mechanization	
Product, process, functional, chain upgrading	
Level of domestic value added	
Productivity growth (labor or total factor)	

Source: Own elaboration based on Milberg and Winkler (2011).

Figure 1
The main transmission channels for economic and social upgrading



Source: Taglioni and Winkler (2016).