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Systematic literature review: Theory on GVCs' impact on wages, employment, and productivity

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FACULTY OF
MANAGEMENT AND ECONOMICS

SYSTEMATIC LITERATURE REVIEW: THEORY ON GVCS' IMPACT ON WAGES, EMPLOYMENT, AND PRODUCTIVITY

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Systematic literature review: theory on GVCs' impact on wages, employment, and productivity

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Abstract

This study presents a systematic literature review (SLR) to provide a collection of theories explaining the impact of global value chains (GVCs) on labour market outcomes. Due to the complex nature of GVCs and the interconnectedness of wages, employment, and productivity, many direct and indirect effects are at play. To ensure a transparent and systematic flow of the review process, I follow the PRISMA guide. Eventually, 36 records out of 1221 results from Scopus database were selected for full-text analysis. This SLR may be useful for theorists, empirical economists, and policy makers as an up-to-date overview of theoretical developments and convenient map of potential outcomes expected from involvement in GVCs. It identifies and systematizes a number of effects existing in the literature under various names. Additionally, it shows the shortcomings of the existing theories. They often adopt the perspective of developed country trading with developing one, while nowadays the intermediate trade occurs in many forms, affecting various actors. Less aggregated levels of analysis could be a great input to the discussion, as well as addressing different GVCs' dimensions and types of organisation. The understanding of relation between GVC position and labour market is especially worth exploration as the existing evidence adopt different and even contradicting perspectives on the definition of upgrading the GVC position.

Keywords: systematic literature review; global value chains; wage; employment; productivity

JEL codes: F16; F60

1. Introduction

Global value chains (GVC) reports published in recent years (WTO, 2019; WBG, 2020; WTO, 2021) as well as other studies (e.g. Timmer et al., 2016; Taglioni & Winkler, 2016) confirm a rapid growth of the GVCs' trade since the 90s, interrupted by the global financial crisis of 2008, for which one can observe a sudden drop. According to Miroudot et al. (2009), trade in intermediate goods was over half of the goods traded between developed economies, and trade in intermediate services was about three-quarters of the services trade. It explains why GVCs are called the world economy's "central nervous system" (World Economic Forum, 2013, p.4). In the recent post-crisis period, the GVCs' trade somewhat slowed and stabilised (Timmer et al., 2016). Despite the documented slowdown in its expansion and the recent impact of the global pandemic, it still defines how a huge part of the production of goods and services in the world is taking place. As the data on intermediate flows come with a significant delay, it is still early to assess how COVID-19 possibly changed the picture (WTO, 2021). What is certain, though, is that the global pandemic raised awareness about risks related to international production networks (WTO, 2021).

The focus of this literature review is put on a particular subtopic related to GVCs, namely its impact on labour market outcomes like wages, employment, and productivity. Much attention was dedicated to this topic in theoretical and empirical studies. Among the motivations, one could mention, on the one hand, the general view popular in economics on the benefits of openness to trade, which could be traced back to the Ricardian model or even earlier. On the other hand, the emergence of GVCs raised many concerns about, e.g. the threat it may cause to selected types of workers. The theory and empirics provided a full palette of evidence about how GVCs shape labour market outcomes.

What makes the picture even more complicated is that it is not enough to study only the direct channels of impact. The three examined aspects: wages, employment, and productivity are interconnected, and changes in one may alter another (Meager & Speckesser, 2011). Moreover, in the interconnected production systems, there is no shock that would impact only its target. Instead, shocks are distributed through the whole production system, affecting its various participants: countries, sectors, firms, and workers (empirical evidence by, among others, Tintelnot et al., 2018; Connell et al., 2017). Recently, the COVID-19 pandemic reminded us how strongly connected are global production structures these days (WTO, 2021).

The phenomenon of globally dispersed production appears in the literature under many names. During the years, it was referred to as, among others: international fragmentation (Jones & Kierzkowski, 1990), global commodity chains (Gereffi & Korzeniewicz, 1994), international outsourcing (Feenstra & Hanson, 1996), offshore sourcing (Arndt, 1998b), vertical specialisation (Hummels, Ishii & Yi, 2001), trade in intermediate inputs (Feenstra & Hanson, 2001), global production sharing (Feenstra & Hanson, 2001), global value chains (Gereffi et al., 2001), global sourcing (Antràs & Helpman, 2004), second great unbundling (Baldwin, 2006), trade in tasks (Grossman & Rossi-Hansberg, 2008), offshoring (Feenstra, 2010), trade in value added (Johnson & Noguera, 2012), global production networks (Coe & Yeung, 2015), and others.¹

¹ In this work, I use most often the term "global value chains" (GVCs). However, when referring to literature, I use the terms used in the source.

The roots of the theory connecting GVCs with labour market outcomes are sometimes traced all the way back to the Ricardian model of comparative advantage, the Heckscher-Ohlin (H-O) two-countries, two-goods, two-factors (2x2x2) model and its extensions, new trade theory by Krugman (see, among others, Milberg & Winkler 2010 for review). In the reality of globalised production, the explanatory power of, for instance, the H-O model was proved by empirical studies to be low. Among other factors, it could be due to a lack of accounting for heterogeneous firms or technology impact (Wang, Findlay & Thangavelu, 2021). But importantly, none of these approaches allowed for trade in intermediates and the consequences of fragmentation of production of a particular good between countries. Therefore, the impact of fragmented production could have only been captured since the emergence of contributions introducing at least two components or production stages to the model. Later, many contributions have been made to the field, calling the growing phenomenon different names, as listed in one of the previous paragraphs.

Some authors argued that at some point empirical studies were left far behind the theory of GVCs and the consequences of input trade (Hummels & Uchida, 2010; Kaplinsky, 2015). Recently, it seems hardly believable, even understanding that the theoretical model always simplifies reality to some extent. Especially, improvements in data availability allowed for a deeper analysis of complex production sharing structures and the development of appropriate measures of this complexity (for review see Amador & Cabral, 2016; and later studies, among others, Wang, Wei & Zhu, 2018; Handel, 2016; Timmer et al., 2016; Wang et al., 2017a, 2017b). These methodological contributions fuelled the progress in delivering new and high-quality empirical evidence. In the literature, one may find several reviews and meta-analyses on previous empirical results obtained for GVCs' impact on employment (Carneiro et al., 2023; Hummels et al., 2018), wages (Cardoso et al., 2020; Hummels et al., 2018), productivity (Murakami & Otsuka, 2020), or all the three (Radło, 2016; Shingal, 2015).

It is possible to find the literature (e.g. Milberg & Winkler, 2011; Franssen, 2019; Shingal, 2015) providing some summaries of theoretical papers on GVCs' impact on labour market outcomes. However, according to my knowledge, no such summary is conducted with the rigour of a systematic literature review (SLR). There are plenty of recently published SLRs regarding GVCs. However, they usually tackle different problems and focus on collecting empirical evidence. For instance, there is De Marchi and Alford (2022) on state policies and upgrading; De Marchi et al. (2018) on learning and innovation opportunities for developing countries; Golgeci et al. (2021) on the environmental sustainability of emerging market firms; Khattak and Pinto (2018) on environmental upgrading; Nyagadza et al. (2022) on industrial innovation dynamics; Panibratov et al. (2022) on the Belt and Road Initiative; and Kano et al. (2020) who reviews multidisciplinary literature on GVCs.

Motivated by all of the above arguments, it is urgent to conduct a systematic literature review on channels of GVCs' impact on labour market outcomes. Not only is it a hot topic in economic literature, fuelled by improvements in trade measurements but also a point of interest of policy makers concerned about threats and gains of globalization. This study sheds light on the direct and indirect channels stemming from the complex nature of production systems itself and also from the interconnectedness of the three: wage, employment, and productivity. In the presence of variety of names referring to global value chains, it contributes to clear identification of theories concerning specifically fragmented production. The method of systematic review assures the most objective and transparent procedure of selection of the relevant literature, going beyond the few mostly cited papers. Due to the nature of analysed records (theoretical papers) this review is of a descriptive type

supported with some graphical summary. This study may be useful for theorists (as an up-to-date overview of theoretical developments with identified gaps in existing theory), empirical economists (as a base for conducting an empirical research), and policymakers (as a convenient map of potential outcomes from international integration of trade).

Therefore, conducting an SLR to fill this gap most certainly constitutes valuable input to the literature. The research question is: What is the impact of GVCs on labour market outcomes: wages, employment demand, and productivity? The systematic literature review presented in further sections aims to identify relevant literature with theoretical contributions to answer this research question.

2. Systematic literature review methodology

To ensure a transparent and systematic flow of the review process, I follow the guideline by Xiao and Watson (2019) and the most up-to-date PRISMA (The Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement by Page et al. (2021). Table 1 summarises the review protocol developed for this study. Figure 1 presents the PRISMA flow chart reporting the number of literature records analysed at each review process step.

[Table 1 about here]

[Figure 1 about here]

I chose Scopus as the database to use in this study, as it is one of the leading abstract and citation databases of peer-reviewed literature, often used in similar SLR studies (De Marchi & Alford, 2022; Panibratov et al., 2022; De Marchi et al., 2018; Nyagadza et al., 2022). Moreover, it offers broader coverage than the Web of Science (Panibratov et al., 2022; Mongeon & Pauls-Hus, 2016). Some studies also consider Google Scholar, especially when searching through so-called grey literature, which could enrich the review. However, in my study, I was focused on theoretical contributions that are expected to be relatively higher-quality papers, so I limited my search to Scopus. Due to the same reason, the search was limited to journal articles, books and book chapters. I only considered documents in English. Subject areas covered "Economics, Econometrics and Finance" and "Business, Management and Accounting".

Based on the research question, I defined a set of keywords to build a search string. I divided the keywords into two concept domains: GVCs and labour market outcomes, and thus the searched document's title, keywords and/or abstract must contain at least one keyword/phrase out of each domain. The final list of keywords was decided after a few pre-review search attempts. In this way, it was possible to narrow down the topic and obtain a manageable number of search results in the first step while assuring a good coverage of all studies possibly related to the research question at the same time.² Finally, the Scopus database search resulted in 1221 records³.

² In the presence of many names used to describe the phenomenon of globally dispersed production (see a paragraph in the Introduction), the GVCs-related keywords must be limited (see list of keywords in Table 1). With the focus on reviewing the literature capturing the growing complexity of production structures, the keywords referring to "chains", "networks", and "fragmentation" were chosen as a base. The exception was the term "supply chain", which was purposely omitted, as it doubled the number of results while it is a term used rather in logistics and management.

³ Database accessed: 4 February 2023

The first screening was based on analysing titles and abstracts (alternatively, introduction snippets available in Scopus in case of books or book chapters if the abstract was unavailable). The record must have met all the inclusion criteria listed in Table 1 to be included in the review. Most of the excluded records are either unrelated to the topic (failed to meet condition Ia or Ib, please see Table 1) or not in the scope of interest of this review as purely empirical, methodological or policy papers (failed to meet condition III). I did not include documents which explained the relation between GVCs and the labour market, although in the opposite direction (failed to meet condition II), such as analyses on, e.g. labour costs as a determinant for GVCs participation. The one exception for the inclusion criteria was theoretical literature reviews, and they were also included in this review, even if they did not provide any original theoretical contribution. In case of any doubts about whether a record meets the inclusion criteria, it was included at the first screening stage to be further assessed at the full-text analysis stage, as it is recommended for the first screening to be inclusive (Xiao & Watson, 2019). For instance, records regarded broadly, e.g. working conditions or economic/social upgrading were also included as these notions may cover issues related to wages or productivity and, therefore, could be relevant.⁴ Another example could be empirical works for which it was unclear at the first screening stage whether they may also contain any extension of the theory. On the other hand, records with too narrow focus, including but not limited to, for instance, GVCs' impact on child labour or gender wage inequality, were out of the scope of this review. The first screening of titles and abstracts resulted in 220 records qualified for further consideration⁵.

The next step was screening full-text documents to select those that meet the inclusion criteria. There were a few duplicates and records for which full text could not be retrieved. Finally, 36 reports were selected as relevant to the analysed topic. Among them, 15 were classified as closely related to the topic and providing substantial theoretical contributions. Another 12 were classified as less related or with smaller theoretical input. Lastly, 9 papers with a minimal own theoretical contribution were also included in the SLR, as they deliver reviews on literature connecting GVCs with implications for labour markets.

3. Results - systematic literature review report

3.1. Main findings

The most general insight from the review is that there are two clear streams of GVCs studies. One stream pertains to strictly economic models, which stand for most of the works described below. The second stream consists of studies referring more to the organisational dimension and governance of GVCs and the social dimension of this phenomenon (like, among others, many works authored by Gereffi). These studies were included in this review to a much less extent, as they usually do not provide systematic evidence on GVCs' impact on wages, employment, and productivity. However, they may place the problem in a relevant context.

3.1.1. Two economies models

Two economies mean either Home and Foreign (where foreign may be understood like the Rest of the World, and so the focus is put on the effects in the Home economy) or an explicit model of so-

⁴ Murakami and Otsuka (2020) suggest that many studies even use the term “upgrading” (meaning economic upgrading) interchangeably with productivity. Milberg and Winkler (2010, p.251) provide a summary of proxies used in the literature for measuring economic and social upgrading, where wages, employment and productivity appear as examples.

⁵ From this point I was using Mendeley Desktop (version 1.19.8) to collect and manage the selection of records.

called North and South (where particular assumptions regarding factor endowments are included). Other settings (like North-North or South-South) are much more rare.

Arndt (1998b), basing his reasoning on Heckscher-Ohlin (H-O) model, studies offshoring impact on wages and employment in advanced (high-wage) country. He proves that when import-competing industries abandon the production of labour-intensive components, wages rise. This effect is due to specialisation in the type of production that ensures comparative advantage and brings costs savings. Under the assumption that prices of goods are exogenous and cost savings do not lower them, the consequence is a change in relative factor prices, particularly the increase in wages. However, this effect works under the strict assumption of homogenous and mobile labour and, as Arndt points out, may not appear in a multi-factor setting with an imperfectly integrated labour market. This paper also contributes to understanding the employment effects of labour-intensive production offshoring. Cost savings make industry expansion possible, and this may lead to the rise of employment. The overall change in employment will consist of new jobs created in the assembly of the imported components as well as in the other industry not directly involved in offshoring. There will also be a loss of jobs in production that now is offshored. Therefore, labour mobility between industries and the ability to adjust is an important issue for the overall employment effect to be positive.

The model Venables (1999) presented is less unequivocal regarding the wage effect of production fragmentation. In the initial setting, the foreign economy (characterised by a low wage-rental ratio) is specialised only in production in one industry that is not vulnerable to fragmentation. Home economy (high wage-rental ratio) production includes this industry and the other, where production is split into upstream and downstream stages. The wage effect after fragmentation between economies occurs may be positive or negative. It depends on which of the production stages in a fragmented industry is more capital- or labour-intensive, what is the level of this intensity compared to the other industry, and how different are the factor endowments between countries. For instance, in the case of the upstream labour-intensive production stage being offshored and sufficiently different factor endowments of countries, the wage rate and labour demand may fall in both countries. The offshored tasks were more labour-intensive than other domestic production, but they may still be less labour-intensive than the rest of the production in the destination country. The example of a positive response in wages is presented for, e.g., the destination country if the offshored production is more labour-intensive than the rest of the production in the destination economy. Other settings of assumptions are also considered. Additionally, the indirect channel of impact on wages (with both signs) may occur because fragmentation of production may change the composition of exports and imports. Eventually, the impact of international fragmentation on wages may be either positive or negative for both countries.

Jones (2005), building on the model by Jones and Kierzkowski (2001), compares the obtained wage effects of international outsourcing to the effects of technical progress: a country's labour-intensive activity improves the country's real wage rate, while technical progress in a capital-intensive activity reduces it. Similarly to Venables (1999), he considers different sets of assumptions regarding countries' factor endowments and comparative advantage, as well as the type of production offshored (labour- vs capital-intensive) compared to other industries at home and in the destination country. It is confirmed that a slight modification of initial conditions may flip the sign of the result. Notably, he emphasises that in a world open for cross-border production sharing, international

outsourcing in one industry may occur simultaneously with 'insourcing' in another one. Therefore, job destruction may be balanced with job creation and labour force adjustment remains crucial.

The model proposed by Egger and Kreickemeier (2017) addresses the limitations of previous studies in explaining international fragmentation's impact on imperfect labour markets, allowing for non-market-clearing wages and involuntary unemployment. Under a set of assumptions, among others, fragmentation occurring in the sector with intermediate skill intensity and efficiency wages paid according to the fair wage concept by Akerlof and Yellen (1990), the model goes beyond the simple rationale of the substitution effect. The results suggest that the increase in international fragmentation decreases unemployment for a sufficiently high endowment ratio of high- to low-skilled labour. In contrast, increased fragmentation leads to a rise in unemployment for a sufficiently low endowment ratio. Furthermore, the critical value of the endowment ratio may differ for economies differing in preferences towards the fairness of wages, with international fragmentation being more beneficial in the egalitarian economy. Another important extension includes the level of unemployment benefits in the analysis, emphasising the role of labour policies in assessing the international fragmentation impact.

Most early studies analysed the situation when the relatively more labour-intensive parts of production or the tasks performed by low-skill labour are offshored. It was usually built as a model of trade between countries differing in factor endowments (like so-called North-South models and some of the examples listed at the beginning of this section). Among studies focusing on different settings, one could find the work by Dluhosch and Hens (2016) and their model of the North-North trade. As mentioned by the authors, it is similar to Grossman and Rossi-Hansberg (2012) as the countries are assumed to be identical in factors proportions. Grossman and Rossi-Hansberg (2012) show that if they are also identical in size, the impact of offshoring on wages is ambiguous, with possible advantages for either of them or equal wages in both. When the two countries differ in size, the workers in the larger one will enjoy higher wages due to offshoring. The North-North perspective is relevant since it reflects the real data on business services offshoring, which is the focus of Dluhosch and Hens (2016). Business services are assumed high-skill intense and treated as intermediate inputs. The increased offshoring in this sector may be driven by advances in information and communication technologies (ICT) or by widening trade integration. Dluhosch and Hens (2016) argue that the effects on employment and wages of either of these channels are different. The net outcome may be ambiguous and determined rather by the prevailing channel and not simply by the amount of services offshored. While trade integration is perceived as a threat to high-skilled workers, and advances in ICT should benefit skilled labour, a third mechanism is also at play that is specific to the analysed case. It is the additional productivity-enhancing effect as business services help to manage a more fragmented production chain and thus to benefit more from a finer division of labour.

Another paper which elaborates on the productivity-enhancing effect of services is the work by Cheng and Xiao (2021). It covers a broader range of producer services, including sectors like e.g. transportation or post and telecommunication. The framework is a simple one-sector economy with labour as the only production factor, but many product varieties are produced with several possible technologies, where higher technology is equivalent to higher specialisation (higher fragmentation) of the production process. Productivity of final production grows with the growth of producer

services (measured in terms of labour employed), which was forced by associated with GVCs expansion demand for services helping to coordinate multiple production stages.

Coming back to the traditional North-South models, Li and Liu (2018) present a more modern approach, where intermediate trade occurs between two economies differing in factor endowments, typically one being more labour abundant and less technologically advanced (the South) compared to the other one (the North). Their contribution, among others, is to employ the production process industrial cycle to this framework. The model operates on the concept of tasks as production fragments. The implications for North are pretty standard: North benefits from cost savings but suffers from job loss in the offshored tasks. Interestingly, this paper devotes much attention to the offshoring consequences for the South, which often have been neglected in the North-South models. The parts of production offshored from the North to the South meet or slightly exceed the technological possibilities of the South. Especially those parts which create a technological gap, open for the South the opportunities for improvements through learning by doing, positively impacting productivity and wages. The learning process, however, eliminates the technological gap in time; the rising wages diminish the incentive for offshoring. The whole process slows down. However, as the technological capability of the South shifts upward, an opportunity for other tasks to be offshored arises, and the cycle may start again. The authors also refer to the concept of the routinisation of tasks⁶ and prove that the results are robust when allowing for offshoring costs (often neglected in similar models).

Theoretical, as much as empirical studies, most often capture GVC in terms of intensity of involvement and rarely focus on the position in GVCs. The study by Ma, Liang and Zhang (2019) is one of the exceptions. They also contribute to the vast literature on North-South trade models by extending the framework by Feenstra and Hanson (1996) with the additional assumption that the average skill level of unskilled workers in the North is no less than that of skilled workers in the South. Similarly to Li and Liu (2018), they emphasise the importance of technology content in internationally produced inputs. As more technologically advanced, the North is assumed to be a source of innovation, namely the new high-technology intense intermediate inputs. The new inputs push out the least advanced (and so least competitive) inputs of the market. In a simple graphical model, they show that through international fragmentation, the technology content increases in both countries and so increases the skill intensity of labour. One of the mechanisms at play is the same as pointed out by Li and Liu (2018), that is productivity improvement in the South through learning from higher technology embedded in inputs from the North. The stages offshored are relatively advanced in technology for the South. Therefore it will boost demand for high skilled workforce in the South. Demand for high skills also rises in the North since the offshored stages were relatively low technology intense for this country (it is a similar rule as, with the relativity of factor endowments of offshored parts of production in Feenstra and Hanson (1996), Venables (1999) or Jones (2005) described earlier in this section). Moreover, the new innovative inputs production in the North also requires more high-skill labour. Hence, the overall conclusion is that GVCs bring a shift toward a higher share of high skilled labour in both developed and developing countries. The author links these results to the GVCs position since the more technology-intense, higher value-added production stages are placed at the ends of the value chains, accordingly to the smile curve concept

⁶ For a detailed discussion on definitions of skills, tasks, and their dimensions like routine, offshorability, etc. see Autor (2013).

by Shih (1996), while less sophisticated stages are those in the middle of the production chain. The conclusion from Ma, Liang and Zhang (2019) is, therefore: the closer to one of the ends the GVCs position is, the greater the demand for skilled workers.

The response of high- and low-skill labour to GVCs is elaborated also in the paper by Mitra and Gupta (2020) but in terms of the wage gap and with a focus on developing country. The model is a small open Home economy with four sectors, some mobility of labour and capital allowed between them, international fragmentation possible for selected sectors, and full employment. A new thing here is the possibility of skill formation. The authors discover a feedback mechanism between higher fragmentation and wage gap: fragmentation lowers the wage gap, but a lower wage gap lowers incentives for skill upgrading. This mechanism maintains unskilled labour endowment that is a driving force for fragmentation.

3.1.2. Other approaches

Milberg and Winkler (2010) criticise i.a. the full employment assumption. It is not only a strong assumption, but it also imposes that the labour market can be affected only through the channel of wages. Most of the models presented above rely on this assumption, except for, e.g. Egger and Kreickemeier (2017). Additionally, Milberg and Winkler (2010) emphasise institutional factors in shaping the impact of GVCs on countries and propose an alternatively grounded theory that uses the perspective of lead firms in GVCs and takes into account their business strategies. First of all, this book summarises influential theories, how they evolved, and points out their caveats.

Among other studies, much attention was dedicated to the trade in tasks model by Grossman and Rossi-Hansberg (2006, 2008) due to its popularity. In this model, the starting point is a split of the production process into a continuum of tasks performed by low- or high-skilled workers, and these tasks are subject to offshoring burden with heterogeneous offshoring costs. This model contributed to separating three possible channels of offshoring impact on labour market outcomes, with a main focus on low-skill wages, further extended to the case of high-skill tasks offshoring. First, there is the labour-supply effect (also called the substitution effect by, e.g. Amiti & Wei, 2009), as offshoring particular tasks reduces demand for workers with corresponding skills and may reduce their wages. The second channel (compared to the Stolper –Samuelson effect) is called the relative-price effect. It regards the possible decline of wages of workers performing tasks that have been offshored if the relative price of produced good falls due to cost savings from offshoring.

Third, there is the productivity effect coming from the simple fact that less productive tasks are offshored, and thus the aggregate productivity rises. The productivity effect is greater with a greater volume of tasks trade. Grossman and Rossi-Hansberg (2008) compare this effect to an increase in low-skill labour productivity. Therefore, it may have an indirect positive effect on low-skill wages. At the same time, it may reduce labour demand (Amiti & Wei, 2009), but if the sector expands due to productivity increase, the demand for low-skills may also rise, which is not an obvious result at first glance. This mechanism is sometimes distinguished under a separate name of scale effect (Amiti & Wei, 2009; Milberg & Winkler, 2010). The scale effect indirectly impacts employment demand positively: lower intermediate prices due to offshoring lead to lower output prices, which boosts demand for final goods and, further, raises labour demand.

Milberg and Winkler (2010) argue that particularly the productivity and scale effects may be disturbed by other factors. Generally, they distinguish between two types of gains from offshoring:

static and dynamic ones and argue that the latter are overlooked by most of the theoretical models (some limited examples could be the wage consequence of the abovementioned productivity effect). Dynamic gains may be realised through reinvestment of a part of the profits that firms achieve thanks to offshoring, which could lead to an increase in employment or further productivity improvements. This approach requires a firm-level perspective and builds a bridge between the strictly economic branch of theory and the problem of successful GVC governance. One common concern is how the asymmetric power distribution between GVCs' participants modifies the possible gains from global production sharing. The markup effect is defined as raising markups over costs by the leading firms in the chain, not by raising product prices but through control of input costs. Further, the leading firms decide what share of the higher profits will be reinvested or, for instance, turn into shareholder returns, which may significantly lower the magnitude of positive productivity and scale effects. On top of that, workers only anticipating the possible negative consequences of offshoring may lower their wage demands, which the authors call the threat effect. Another critical remark is that all the labour market effects are moderated through an institutional environment. Therefore, considering factors like union density and power or types of bargaining coordination may be relevant in assessing the response to offshoring.

The markup effect is explored by Schröder (2020), who investigates under what conditions offshoring brings demand-deficient unemployment, using a demand-constrained small open economy model, where offshoring is seen as labour-saving import-using technical change. Schröder (2020) further decompose the scale effect into the expenditure effect (domestic demand-induced) and competitiveness effect (foreign demand-induced) on employment. He separates two scenarios. In the first one, the sales price is held constant, so the firms completely absorb the advantage of cost saving. Here (except the negative productivity effect, in other words, technological unemployment), a negative case of expenditure effect is in action: reduced domestic labour income leads to a deficiency in domestic demand, further generating unemployment. The second scenario is when markups are held constant, meaning that gains from cost savings are entirely transferred into the lower price of good. Here additionally appears a positive competitiveness effect since lower price stimulates exports. The rise of foreign demand may overcome the domestic demand inefficiency by switching the sign of expenditure effect to positive if exports-led production improves domestic incomes, and consequently also domestic demand. However, the sign of the overall effect resulting from the opposing forces is ambiguous. Schröder (2020) shows that it depends on the price elasticity of export demand, which must be sufficiently high if this scenario expects to bring positive change in employment. Among the limitations of this study, the need for an extension to a multi-country model is mentioned.

For example, the complex structure of GVCs is mirrored closely by Lee and Yi (2018) in their model of multiple countries (characterised by different technologies) and multiple sectors producing a variety of final goods in multi-stage production chains. The sectors differ in productivity levels, which is a source of comparative advantages between them (the Ricardian channel). Countries differ in factor endowments, and production stages differ in factor intensities (Heckscher-Ohlin channel of comparative advantage). There are also multiple factors of production, called occupations, so the model adopts a worker perspective. Workers choose between occupations and sectors motivated by their individual productivities, different for each sector-occupation pair and worker type. This mechanism is called the Roy channel and is borrowed from Lee (2020), while the general framework on which Lee and Yi (2018) build their extended model comes from Antràs and de Gortari (2020) and

de Gortari (2019). Production on a given stage takes the production of a previous stage as an intermediate input, accounting for the value chain structure. The story goes as follows: due to the increase in international specialisation of production, the demand for occupations changes, further affecting wages, and wages drive workers' choices of occupation-sectors. GVCs magnify the effects of trade shocks on aggregate outcomes like wages due to the higher connectedness and dependence of production stages internationally. The results show that GVC act as an additional propagation mechanism for the abovementioned Ricardian, Heckscher-Ohlin and Roy channels, that all together affect skill premium. Therefore, the intensity of sectoral GVCs participation is crucial in determining the shifts in labour demand and wages across sectors and production stages.

Zi (2020) starts with a traditional North-South setting to further extend it to a model with one North and many South economies. The approach is similar to Costinot et al. (2013). However, it incorporates iceberg trade costs which account for the position of a particular production stage in the chain (more upstream or more downstream) and the geographical distance between countries. In several distinguished scenarios, the impact on real wages and also on the wage inequality between North and South is explained. Production may be realised in a traditional or fragmented way, where fragmented production involves a continuum of sequential stages, and initially, only North is capable of fragmentation. Because failure at late stages would be more costly, the South may join international fragmentation, only performing the most upstream stages, while the North will be specialised in downstream production. In the case of incomplete industrialisation (a part of South labour is still employed in traditional production), wages in the South may not rise to sustain incentives for offshoring. At the same time, the North benefits from international fragmentation, particularly in terms of wage rise, and so wage inequality between North and South increases. When the South reaches full industrialisation, it starts to benefit in terms of wages due to a process similar to labour-augmenting technological progress. However, there is no agreement between Zi (2020) and Costinot et al. (2013) when it comes to the effect on the wage gap between countries.

The model extended to multi-country setting continues the reasoning that the intermediates flow from less to more productive countries. Therefore, if we assume the same technology for all South countries, the global production is in a "spider" configuration (called hub-and-spoke by Zi) with headquarters in the North. In this case, the whole group of South countries may be treated as one economy, so the implications from the two-countries model apply. Moreover, a new South country joining the GPNs worsens the wages for earlier participants, as this situation is equivalent to if the labour supply of the South increased. The wages increase only after all participating South countries are completely industrialised (as above in the simple model). The last analysed case allows for a learning-by-doing mechanism and so for the changes in South technologies. This implies a "snake" configuration of GPNs, as the earlier participants will be of respectively higher productivities (yet, always below North productivity). The implications for wages in the case of full industrialisation still hold. With incomplete industrialisation, the effect on wages depends on the strength of the learning effect, emphasising the importance of technology spillovers in capturing the gains from GPNs in developing countries.

Wang, Thangavelu and Lin (2021) operate on a model of multiple countries with identical factor endowments (low- and high-skill labour) to investigate the impact of GVCs on skill premium. They use a firm-level perspective in the spirit of Melitz (2003), assuming the fair wage hypothesis similar to the abovementioned Egger and Kreickemeier (2017). By assumption, high-skill labour has the bargaining

power to force higher wages if the profit of a firm increases, while low-skill workers accept the minimum wages. GVCs firms are defined as those which use imported intermediates for the production of exports. This framework allows to observe the profit effect, as becoming a GVCs firm leads to costs reduction and higher profits. This, according to the prior assumption, raises high-skill wages. Simultaneously, imported intermediates will either substitute (the well-known substitution effect) or complement (in the sense of, e.g., complementarity between technology and skills) one type of workers. As a result, the impact on skill premium is ambiguous as this effect may counteract and enhance the profit effect. Furthermore, this paper considers not only GVCs participation but also the position in the chain. Since improving the position (by moving to one where more value-added is generated) is costly, relatively more profitable firms will achieve it, and those are the firms paying higher wage premium (by the profit effect). It is an important result linking GVCs position with a wage premium. However, Wang, Thangavelu and Lin (2021) present a linear point of view on the value-added creation along the value chain, which contradicts the smile curve concept.

The relationship between GVCs position and the wage gap is also studied by Cai et al. (2023) with similar results. Their focus is generally on income inequality, but following Daudey and García-Peñalosa (2008), they decompose it distinguishing the wage gap and labour share in the total output among possible income inequality determinants. They show that both these channels are launched when the GVCs position of a country changes. The model consists of an open economy of many countries, but the implications are drawn from a developing country's perspective (low-skill- and capital-abundant). Production takes place in a continuum of stages. Stages may be ordered by their value-added contribution, where higher value-added means a higher position in GVCs. As the country of interest is a developing one, by its endowment it is assumed that it takes a relatively low position in the production chain. The model shows that upgrading its position will increase the labour share in total output and also widen the wage gap between skilled and unskilled.

The collected reports are summarised in Table 2.

[Table 2 about here]

3.2. Less related studies

Among the studies selected as the ones bringing lesser theoretical contribution in the context of this SLR's research question but still providing some relevant insights, the work by Kam (2013) extends the theoretical framework by Grossman and Helpman (1992). The original proposition proved greater intermediates differentiation and production specialisation to improve productivity growth. However, it did not allow for trade in intermediates between countries. Kam (2013) relaxes this assumption and suggests that the positive impact on productivity stems from the same two channels defined by Grossman and Helpman (1992) for the simplified case. The first one is called the foreign direct investment (FDI) channel, and it is explained by knowledge spillovers, linkages creation, and greater competition of local suppliers. The second one is called the international trade channel, and it is related to simple comparative advantage gains through specialisation, learning through importing/exporting, greater variety and quality of inputs, and increased competition that forces higher efficiency or else makes unproductive firms leave the market.

The relation between GVCs and productivity also appears in the conceptual framework by Mehta (2022), who analyses the process of upgrading within GVCs. Upgrading is here defined as “transformation from participation in GVC with increasingly backward linkages to participation in

GVCs with increasingly forward linkages at increasingly productivity growth” (Mehta, 2022, p.582). A good utilisation of the learning opportunities and technology spillovers offered by GVC participation is argued to be crucial on the way from an initially low position in GVCs (with a low productivity level) to achieving higher productivity and a GVCs position where more value-added is generated.

Yülek and Santos (2022) refer to the GVCs position through the concept of the smile curve in explaining the possible hardship for developing countries to obtain greater gains from participation in GVCs. Here appears again the argument that leading GVCs firms, located at the most value-added generating production stages (high ends of the smile curve), have the power to harvest most of the profits generated by the GVCs. Developing countries, on the contrary, may be stuck performing production parts at the bottom of the smile curve where little value added is generated. It may lead to low productivity and wages trap for developing countries and an increasing gap between advanced and emerging economies, which is illustrated by the deepening smile curve (greater difference between high ends and the middle of the chain). Once again, the importance of enhancing the technological capabilities and engaging in more value-added intense activities (like R&D, branding or marketing) is evoked. The asymmetry of value capture and its uneven consequences for developed and developing countries is also discussed by Nathan (2021) from the perspective of GVCs as a form of monopsony market of lead firms having the power to shape the wages and prices of inputs. They deliver a classification of monopsony power levels related to particular skill employment, pay levels and working conditions.

Mukherjee (2017) studies the impact of the import flow of technology-intensive intermediate inputs to developing country, using a rich in detail assumptions small open economy model with four sectors of various characteristics and different factors of production. The direct effect is the increase in demand for skilled workers (a complementarity effect of technology advance and high skills) and the following rise in their wages. Additionally, the model traces the indirect effects spread to other sectors and transmitted through the demand-supply forces regarding produced goods. For instance, there is an ambiguous change in wage and employment of informal labour depending, i.e. on the elasticity of substitution between skilled labour and capital.

The nexus between GVCs and employment of workers with a particular skill level is also explored by Gammelgaard et al. (2009) but from a very different perspective. According to their strategic role in GVCs, three types of subsidiaries are: local implementers, specialised contributors, and world mandates. Local implementers are expected to have the lowest proportion of skilled labour of all three, as they have the lowest autonomy and least complex linkages with other organisational units. Specialised contributors are much more involved in intra-organisational relationships. Therefore they need a higher share of skilled labour to manage it. On the other hand, world mandates will also hire a relatively high share of skilled labour since this kind of subsidiary is characterised by higher autonomy, corresponding to, e.g. innovative activities. Summarising, specific roles taken by the subsidiary companies participating in GVCs may lead to different shifts in the proportions of employment of workers with particular skill levels.

Van Assche and Gangnes (2019) briefly comment on labour market outcomes driven by GVCs in a North-South model built in the spirit of Melitz (2003), therefore with a particular focus on firms with different productivity levels. Originally, Melitz's (2003) contribution regarded aggregate productivity increase after exposure to international trade. However, Melitz (2003) does not explicitly consider trade in intermediates, while Van Assche and Gangnes (2019) assume that some production stages

may be offshored. They illustrate again the negative substitution effect of low-skills offshoring on low-skill labour demand in the North and the opposite effect for high-skilled labour. The paper presents a limited point of view of the North economy only. However, it brings to light the critical role of the state and policies in helping the displaced workers to adjust and assuring that the losses will not exceed the gains in the aggregate terms. If this role is well fulfilled, then trade liberalisation will be fully beneficial.

In the presence of concerns that progressing specialisation and international division of tasks may wipe out certain occupations from certain countries, Brakman and Van Marrewijk (2022) propose a multi-country model that tests this possibility. In their model, production is performed sequentially in a continuum of tasks, and each task requires input from a specific subset of occupations (with more detailed classification possible than just high- and low-skill division). They show constraints on minimal and maximal demand for each occupation in a given country. Therefore the concern mentioned above is groundless. The results hold both for accounting for fragmentation costs and for the case of zero costs of fragmentation and coordination.

Alternatively, one may consider the changes in employment not by skill level or tasks performed but with the distinction of an employment sector. Kühn and Viegelaahn (2019) study the impact of lowered trade costs on the number of jobs in a two-countries world where intermediaries may be sourced domestically or from abroad. Two sectors are considered: manufacturing and private services (as public services are said to be less tradable, if tradable at all). The model's parameters are calibrated to the real data regarding, e.g. share of each sector's intermediates used for production. Reduction in trade barriers to exports from a given sector (manufacturing or services) leads to job creation in that sector, and through so-called cross-effect also (but to less extent) in the other sector that is assumed to be input supplier. Additionally, the cross-effect that is a response to trade cost reduction directly regarding services is weaker than the cross-effect caused by similar shock directly targeting manufacturing. Therefore, this work emphasises that when production is organised in GVCs, any shock, e.g. trade cost shock impacts not only the targeted country-sector but also other GVCs' participants.

Partially related studies are also those tackling the phenomenon of economic and social upgrading in relation to GPNs. This matter is most often discussed with a focus on developing countries. Economic upgrading, with regard to GPNs, may be defined⁷ as “a move to higher value-added activities in production, to improve technology, knowledge and skills, and to increase the benefits or profits deriving from participation in GPNs” (Barrientos, Gereffi & Rossi, 2018, p. 232). In the literature one may find four types of economic upgrading: process upgrading, product upgrading, functional upgrading, and chain upgrading. Barrientos et al. (2018) point out that each may bring different implications for workers. For instance, process upgrading means increased efficiency of the production process due to, e.g. automation, which may reduce the demand for some types of workers. The general conclusion in this matter would be that any type of upgrading may be related to some shifts in demand for different skills. Therefore, changes in employment and productivity are embodied in the analysis of economic upgrading in GPNs. Social upgrading refers to “improvement in the rights and entitlements of workers as social actors, which enhances the quality of their employment” (Barrientos et al., 2018, p. 233). One of the measurable standards of social upgrading is wage level, which also makes social upgrading a relevant topic for this literature review. There is an

⁷ For a review of economic and social upgrading definitions and types, see, e.g. Salido and Bellhouse (2016).

expected pass-through from economic to social upgrading. However, many sources (e.g. Milberg & Winkler, 2010; Barrientos et al., 2018) argue that economic upgrading does not necessarily lead to social upgrading. Again, the relevance of a more or less advantageous position in GPNs appears as one of the influencing factors. Based on the typology of work performed (characterised by required skills, knowledge and technology intensity, (in)formality, etc.), Barrientos et al. (2018) sketch different upgrading paths. For instance, if economic upgrading relies on high quality (of product, but also production standards) and rising productivity, it may lead to a rise in workers' wages (social upgrading). Social downgrading is possible if, e.g., competitiveness is achieved through cutting costs with simultaneous harm to working conditions (including wage level).

Gereffi and Lee (2018) also propose different scenarios for social upgrading through GVCs but from the perspective of types of governance, therefore referring to the vast literature on GVCs' organisation and governance (see, e.g. Gereffi, Humphrey & Sturgeon, 2018). The concern mentioned above about lead firms' impact on profits and gains distribution in GPNs is evoked together with highlighting the importance of other actors and institutions, like, e.g. labour unions or environmental policies. The role of institutional environment like regional- and national innovation systems in supporting the upgrading in GPNs in developing countries is also emphasised by Naqvi and Memon (2018). GPNs and knowledge networks mutually reinforce the learning potential leading to upgrading and potentially positive labour market outcomes.

The abovementioned studies are listed in Table 3.

[Table 3 about here]

3.3. Reviews

While conducting the SLR, I identified several papers with a lack or very limited own theoretical contribution but which deliver reviews on literature connecting GVC with implications for labour markets (Nathan & Sarkar, 2011; Gries et al., 2017, 2018; Ernst, 2018; Chor, 2019; Franssen, 2019; Wang et al., 2021; Selwyn & Leyden, 2022; Drapkin et al., 2022). One of the most insightful among them is the article by Franssen (2019) who, first, provides a systematic summary of findings regarding the demand for low-skill labour stemming from the early North-South models (up to the seminal paper by Grossman and Rossi-Hansberg, 2008). Further, he lists the main channel of GVCs' impact on relative demand for skilled workers. Finally, he proposes a geometrical synthesis of the previous developments, illustrating several channels of offshoring impact on labour market outcomes (for instance, the three main channels separated by Grossman and Rossi-Hansberg, 2008). The study by Chor (2019) provides an overview of models linking micro-level decisions of firms involved in international fragmentation with macro-level outcomes related to the labour market, inequality, and welfare (among others).

Just to comment on a few other studies, for instance, in Gries et al. (2017), one may find a review of, among others, the possible channels of how international value networks impact productivity in developed countries. This work is followed by a similar one focused on the same topic but from the perspective of developing economies (Gries et al., 2018). Ernst (2018), based on previous literature development, describes four scenarios of how integration in GPNs may bring productivity-enhancing innovations. Wang et al. (2021) trace back theories explaining wage inequality between different skills, including also a branch of international trade theory. Selwyn and Leyden (2022) confront several trade theories with GVCs' reality. Among some additional subjects not raised in the works

described in detail in previous sections, one could also mention: wage rise due to consumers demanding higher labour standards (Nathan & Sarkar, 2011) or higher quality products (Wang et al., 2021); jobs creation for those who so far only worked in the informal sector (e.g. higher woman participation in the labour market) (Nathan & Sarkar, 2011); distribution of gains due to whether it is a buyer- or supplier-driven GVCs (Gries et al., 2018; Nathan & Sarkar, 2011); wage inequality between firms (Wang et al., 2021); smile-shaped total factor productivity curve of GVCs' firms (Drapkin et al., 2022).

3.4. Summary of the results and discussion

To summarise the results of this SLR, I propose a figure built in a similar manner as a graph provided by Milberg and Winkler (2010) where the authors presented four mechanisms affecting labour demand. Here, in Figure 2 I present the main channels identified by this SLR showing the possible impact of GVCs participation on wages, employment demand, and productivity. For brevity the details and assumption of the source models are not presented in the graph but they can be found in the previous tables.

[Figure 2 about here]

The most straightforward consequence of GVCs participation is the substitution effect of lower demand for the workers who are now replaced by offshoring. Only because the possible threat of losing their jobs they may be willing to accept lower wages (threat effect) but if one sees the international integration similar to additional supply of particular type of labour, then it may also bring their wages down (labour-supply effect). Since the replaced skills and the imported inputs may be complementary to some other skills and products, by the complementarity effect (also called cross-effect) other sectors may face jobs creation/loss and changes in wages, moderating or enhancing the direct effects of GVCs on the level of whole economy.

The main motivation for GVCs engagement is to seek cheaper inputs. It depends on market structure and chain structure whether lower input price will transfer into lower output price or to higher profits, enabling the profit- (or markup-) effect. In the presence of sufficient bargaining power some of the profits may go to workers and bring a wage rise. If the extra profits turn to investment, higher output will create higher demand for labour, but on the other hand, increase in productivity will bring the labour demand down through productivity effect. The productivity effect, although, may be positive for wages. If the extra profits are not shared with workers, this together with other negative GVCs' consequences will reduce domestic income and create deficiency in domestic demand, deepening the negative effect on employment through the negative expenditure-effect.

The other scenario is when the output price goes down. The negative relative-price on wages is a mechanism similar to the Stolper-Samuelson effect. Lower output price will boost the demand for output, raising the investment, and further also output and productivity, leading to the employment effects with opposite signs. Lower output price may also generate increased demand for the output abroad increasing production for exports (competitiveness effect). Higher exports repair domestic incomes, and further also domestic demand, enabling a positive expenditure effect. These two positive employment effect are components of scale-effect on employment.

There is also a group of positive direct effects of GVCs on productivity. They are related to the challenges and opportunities offered by GVCs participation like increased competition, access to

higher quality and variety of inputs, technology embedded in them, knowledge spillovers, linkages creation and cooperation, and many more. The important feature of these channels is the feedback they bring, as further GVCs involvement becomes easier when e.g. some linkages are already created or coordination services are already employed to manage the international production. It is important to mention that most of these mechanism are at play regardless of the situation we consider (North vs South perspective, which tasks are traded, etc.).

All these potential scenarios presented in the Figure 2 happen in a particular environment. The review shows that external actors and institutions may also shape labour market response to GVCs. One could list the state (and various policies, like e.g. employment benefits), unions (with a great impact on e.g. labour standards in GVCs, including the level of wages), society (with its preference toward e.g. fair wages), and consumers (e.g. forcing environmental responsibility or decent work standards on GVCs' firms, with consequence for their employees). Among important factors shaping the final picture there is also the structure of GVCs. It may regard the type (snake, spider, mixed) of GVCs, the role of a particular participant and a power attached to it.

As the models relating GVCs position to labour market outcomes are much more scarce, there is no such summary provided for this part of the literature. Sufficient to say that there is no agreement on the characteristics of the various production stages along the chain, and therefore, on the definition of upgrading the position. For instance, both Venables (1999) and Wang et al. (2021) present a linear definition of production chain but with rather contradictive assumption about which of the ends (downstream or upstream) means higher position. The linear perspective is also shared by Zi (2020). On the other hand, the models proposed by Ma et al. (2019) or Cai et al. (2023) allow for the production chain to take a shape of a smile curve, which may be more elastic approach and more realistic assumption. Upgrading the GVCs position would simply mean moving to stages with higher value-added. Hence, it would depend on the particular value chain whether it was moving upstream or downstream from the starting position taken by the given industry or firm.

Among the limitations of this review, there certainly is the one that some related topics had to be neglected to limit the number of records for screening reasonably. For instance, this study discusses the impact of GVCs on labour divided by skills, while also other dimensions and special cases could be explored, like gender dimension, formal vs informal employment, child labour, etc. The theory on the connection between GVCs, economic and social upgrading is also a vast subject and deserves to be a direction of further research.

4. Conclusions

This study presents a systematic review to provide fellow researchers and policymakers with a collection of theories explaining the possible impact of global value chains on labour market outcomes. The research question was: How do GVCs affect wages, employment demand, and productivity? The theory provides different mechanisms and channels leading to ambiguous overall results, as presented in the Figure 2. The complexity of the picture stems from the fact that the three examined aspects: wages, employment, and productivity are interconnected, and changes in one may alter another. Due to the very nature of the analysed phenomenon - a complex structure of actors and relations - many additional indirect effects are at play. Considering all the above, a slight change in the assumptions of theoretical models may lead to different predictions, as shown in the

review. The more, this study may be useful for theorists, empirical economists, and policy makers as an up-to-date overview of theoretical developments and convenient map of potential outcomes expected from involvement in international production sharing.

The study shows the shortcomings of the existing theories. Many models are built as North-South models, yet the conclusions are drawn only for the developed country. Originally it was motivated mostly by perceived threats for low-skill workers, whose jobs were offshored to developing countries. Models with settings like North-North are rare, and even rarer are South-South models, while nowadays the intermediate trade occurs in many forms, affecting various actors. This shows a clear research gap for theoretical studies to fill in. Moreover, only one study (Zi, 2020) explicitly distinguishes different types of GVCs (spider vs snake) when analysing labour market response to GVCs. Less aggregated levels of analysis could constitute a great input to the discussion, as it is clear that the labour market effects can be very specific. Among few exceptions there are: employing either a worker perspective (e.g. the fair wage concept in Egger & Kreickemeier, 2017; or Roy channel in Lee & Yi, 2018) or firm-level perspective (e.g. Wang et al., 2021; or Van Assche & Gangnes, 2019).

Furthermore, this review contributes to the understanding of different dimensions of GVCs, like participation or position, and the importance of distinguishing them in examining labour market outcomes. Theoretical literature analysing the labour market effects of both GVCs participation and position is relatively scarce and seems to lag behind empirical evidence on this topic. According to the results of this SLR, it is another research direction which seems to be underdeveloped. The understanding of relation between GVCs position and labour market is especially worth further exploration as the review showed that existing evidence adopt different and even contradicting perspectives on the definition of upgrading the GVCs position. This remark may be particularly relevant for policymakers to find an effective path toward improvement of industries' position. From the policy point of view, there are two issues appearing in the analysed studies most often as crucial for mitigation of negative GVCs' effects/enhancement of positive effects. One is labour mobility between industries which helps to enable the positive complementarity effect. The other concerns technology absorption and learning through participation in a network. These are the channels which should be supported.

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Tables

Table 1: Review protocol table

Purpose of the study	
This literature review aims to identify theoretical contributions to answer the research question: What is the impact of GVCs on labour market outcomes: wages, employment demand, and productivity?	
Search strategy	
Keywords*	1) GVCs-related: <i>gvc OR gpn OR gcc OR (global* OR international* AND "value chain*" OR "production network*" OR "commodity chain*" OR (production W/2 fragment*)) AND</i> 2) related to labour market outcomes: <i>(labor OR labour) OR wage* OR salar* OR (cost* W/2 employ*) OR employment OR productiv* OR ((creat* OR destruct* OR demand OR los* OR new OR reduct* OR fall* OR declin* OR decreas* OR increas* OR expan* OR boost* OR gain* OR develop* OR grow* OR rise*) W/2 (job* OR work* OR employ*))</i>
Searched fields	title, abstract, and keywords
Database	Scopus
Language	English
Subject areas	Economics, Econometrics and Finance Business, Management and Accounting
Document type	Article, Book, Book chapter
Time period	No restrictions
Inclusion criteria	
To be included in the review, all of the following criteria must have been met: Ia) Does this report regard GVCs? Ib) Does this report regard at least one of the following labour market outcomes: wages, employment demand, or productivity? II) Does it regard the impact of GVCs on the labour market outcomes? III) Does it provide any theoretical contribution? (Does it extend the existing theory on the topic?) (Exception: theoretical literature reviews with no own theoretical contribution also included)	
Quality assessment	
No further quality constraints were forced. Limiting the search to the Scopus database was the initial quality restriction.	

Notes: Additionally, I excluded records containing the phrase "Gulf Cooperation Council" (abbreviated as "GCC") to limit the number of off-topic search results.

Source: own elaboration.

Table 2: Main findings from the systematic literature review.

Authors	Year	Impact of...	on...	References to previous theoretical models	Main characteristics of the theoretical model	Predictions from the model
Arndt	1998b	offshore sourcing	wages, employment	Heckscher-Ohlin (H-O) model; Arndt (1997, 1998a); Jones & Kierzkowski (2001b)	Advanced country perspective; two industries (one capital-intensive, one labour-intensive), two components of production; two factors of production (capital and labour) where labour is homogeneous and perfectly mobile.	When import-competing industries abandon the production of labour-intensive components, wages rise and employment expands.
Venables	1999	production fragmentation	wages	Helpman (1984, 1985); Markusen et al. (1996); Markusen (1997); Feenstra & Hanson (1996)	Two economies (one with low- and the other with a high wage-rental ratio), two factors, and two industries, one of which can fragment into two components.	The wage effects of fragmentation depend on the relative factor intensities of different stages of the production process. The effects may be either positive or negative for both countries.
Jones	2005	international outsourcing	wages	Jones & Kierzkowski (2001)	Two factors of production, three goods produced with a possibility of fragmentation.	The wage effects of international outsourcing depend on the relative factor intensities of the production activities and on countries' factor endowments. The effects may be either positive or negative for both countries.
Milberg & Winkler	2010	GVCs, offshoring	wages, employment, productivity	(broad literature review)	Narrative approach; asymmetric market power, static and dynamic gains from offshoring, institutional perspective.	The markup effect may lower the magnitude of positive productivity and scale effects. Furthermore, the institutional environment moderates the impact of offshoring on labour market outcomes.
Dluhosch & Hens	2016	offshoring	employment, wages	Jones, Kierzkowski & Lurong (2005); Deardorff (2005); Melitz (2003); Tobal (2012); Grossman & Rossi-Hansberg (2012)	North-North model (same factor proportions), two factors (low- and high-skilled labour), two production sectors (where one fragmented) plus business services sector.	For the particular case of business services offshoring, the net effect on labour results from three mechanisms: traditional trade vs technology impacts and additional productivity-enhancing effect working in favour of high-skilled labour.
Egger & Kreickemeier	2017	international fragmentation, outsourcing	employment	Jones (2000); Jones & Kierzkowski (2001); fair wage concept by Akerlof & Yellen (1990)	Small open economy, two inputs (skilled and unskilled labour), three sectors of production (fragmentation can occur only in the sector with intermediate skill intensity); allowing for labour market imperfections (efficiency wages, involuntary unemployment) and controlling for unemployment benefits.	There is a critical value of the endowment ratio above (below) which the increase in international fragmentation decreases (increases) unemployment. In egalitarian economies, international fragmentation is more beneficial (in terms of unemployment level).
Lee & Yi	2018	GVCs	wages (skill premium)	Antràs & de Gortari (2020); de Gortari (2019); Lee (2020)	Multiple countries, multiple sectors (comprised of a continuum of final goods, each produced in a production chain), multiple factors of production (occupations), heterogeneous workers with Roy	GVC magnifies the effects of trade shocks on aggregate outcomes like wages, acting as an additional propagation mechanism for the Ricardian, Heckscher-Ohlin, and Roy channels, that all together affect skill premium.

					selection effect.	
Li & Liu	2018	offshoring, production fragmentation	wages, productivity	broad literature in three branches: offshoring, industrial cycles, learning-by-doing	North-South model, one good produced using a continuum of tasks which differ in technology requirements, efficiency of conducted tasks depends on the available technology.	Offshoring to the South provides an opportunity for improvements through learning by doing, positively impacting productivity and closing the technological gap. Rising wages diminish the incentive for offshoring. But as the technological capability of the South rises, an opportunity for other tasks to be offshored arises.
Ma, Liang & Zhang	2019	position in GVCs	employment	Feenstra & Hanson (1996); Maskin (2005)	North-South model, single final good assembled with a continuum of intermediate inputs differing in technology content, average skill level of unskilled workers in the North is no less than that of skilled workers in the South, North is the source of innovation;	The closer to one of the ends is the GVC position, the greater the demand for skilled workers.
Mitra & Gupta	2020	(international) fragmentation	wages (skill premium)	Marjit et al. (2004)	Small open economy, four sectors with some mobility of labour and capital allowed between them, international fragmentation possible for selected sectors, the possibility of skill formation.	Developing country perspective; there is a positive relation between higher fragmentation and a lower wage gap.
Schröder	2020	offshoring	demand-deficient unemployment	broad literature on models in the spirit of Keynes-Kalecki	Demand-constrained small-open-economy model, offshoring treated as labour-saving import-using technical change.	The net effect of offshoring on employment with the assumption of constant markups depends on the price elasticity of export demand, which needs to be sufficiently high for a positive change in employment to occur. If firms raise markups, employment drops.
Zi	2020	GVCs	wage, wage inequality	Costinot et al. (2013)	North and (many) South(s), one factor of production – labour, one final good, iceberg trade costs, a traditional and fragmented way of production, where fragmented involves a continuum of sequential stages.	The effect on wages and the wage gap between North and South depends on the South's characteristics regarding the level of industrialisation, productivity levels, and potential technology spillovers.
Cheng & Xiao	2021	GVCs	productivity	Francois (1990); Romer (1990); Young (2014)	One-sector economy, one production factor (labour), many product varieties, many technologies, where higher technology means higher fragmentation.	Productivity of final production grows with the growth of producer services forced by GVC expansion.
Wang, Thangavelu & Lin	2021	GVCs (importing intermediates for the production of exports)	wages (skill premium)	Melitz (2003); Amiti & Davis (2011); Chen et al. (2017); Egger & Kreckemeier (2009); Akerlof & Yellen (1990)	Multiple countries with identical factor endowments (low- and high-skill labour), many firms facing different uncertainties of production, fair wage hypothesis for high-skill labour, minimum wages for low-skilled.	The profit effect of GVC increases wage premium (by the increase of high-skill wage). Additionally, substitution or complementarity effect may make the overall result ambiguous.

Cai, Zhang, Wang & Liu	2023	GVCs position	wages (skill premium)	Daudey & García-Peñalosa (2008)	Open economy of many countries, three factors of production (low-skill and high-skill labour, capital), production takes place in a continuum of stages, stages may be ordered by their value-added (VA) contribution: higher VA means a higher GVC position.	Developing country perspective. Upgrading the GVCs position will increase the labour share in total output and also widen the wage gap between skilled and unskilled.
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Source: own elaboration.

Table 3: Less related studies.

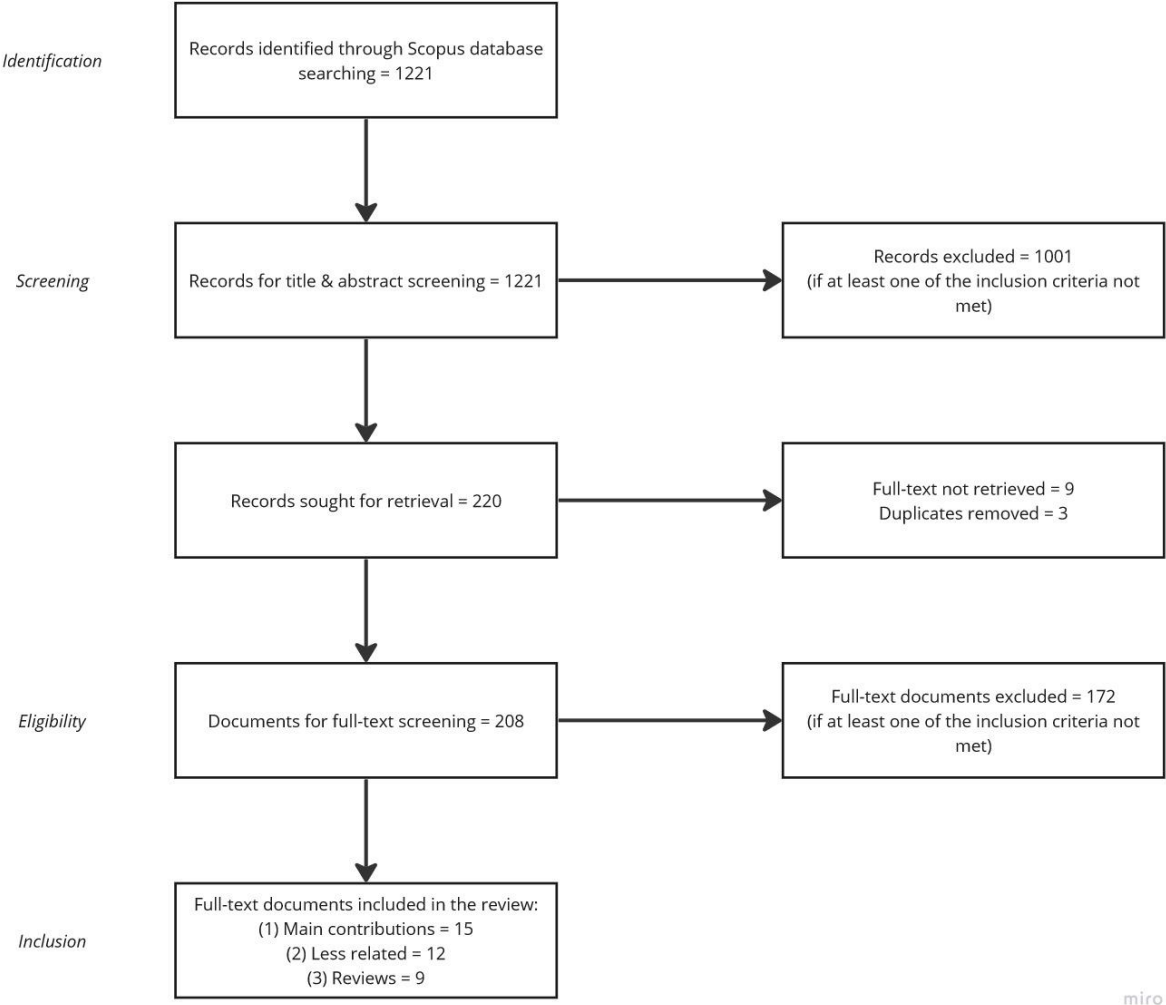
Authors	Year	Impact of...	on...	References to previous theoretical models	Main characteristics of the theoretical model	Predictions from the model
Kam	2013	international production fragmentation	productivity	Grossman & Helpman (GH) (1992)	An extension of the GH model and its implications to the case when intermediate goods are traded between countries.	The positive impact of international production fragmentation on productivity may be explained by: a) the FDI channel, or b) the international trade channel.
Mukherjee	2017	trade in intermediate inputs	wages, employment	(broad reference)	Small open economy with four sectors of various characteristics and different factors of production.	Direct and indirect effects, e.g. dependent on the elasticity of substitution between skilled labour and capital.
Van Assche & Gangnes	2019	GVCs, offshoring	employment, wages	Melitz (2003)	North-South model, a continuum of firms with different productivities, headquarters services (only North) and manufacturing (upon offshoring).	The North perspective of low-skill manufacturing offshoring: negative for low-skill, positive for high-skill. Trade is beneficial with good policies helping to distribute the gains.
Brakman & Van Marrewijk	2022	international production fragmentation	employment	Kremer (1993)	Many countries differing in technologies, sequential production consisting of a continuum of tasks, completion of a task requires a finite number of occupations (e.g. characterised by skills), case of costly fragmentation and zero-cost fragmentation.	With increasing international fragmentation, demand for certain occupations does not fall to zero for any country.
Mehta	2022	GVCs, backward linkages, forward linkages	productivity (upgrading)	(broad reference)	It distinguishes the GVC involvement through backward- and forward linkages in the process of upgrading (i.e. moving to higher value-added positions).	Learning opportunities and technology spillovers stemming from GVCs participation are crucial in improving productivity and GVCs position.
Gammelgaard, McDonald, Tüselmann, Dörrenbächer & Stephan	2009	international value-chains	employment (share of skilled labour)	Birkinshaw & Morrison (1995)	Subsidiary firms in GVC differ in the levels of autonomy and intra-organisational relationships.	Different roles taken by the subsidiary companies participating in GVCs may lead to different shifts in the proportions of employment of workers with particular skill level.
Kühn & Viegelahn	2019	trade costs shock in global supply chains	employment (manufacturing, services)	Uy, Yi & Zhang (2013); Obstfeld & Rogoff (2000); Corsetti & Pesenti (2001)	Two countries, two sectors: manufacturing vs (tradable) services.	Reduction in trade barriers leads to job creation in the targeted sector and weakly also in the other sector. The cross-effect is weaker when it stems from decreased barriers to trade in services (compared to manufacturing).
Yülek & Santos	2022	GVCs (position)	productivity	(broad reference)	Based on the smile curve concept of unequal value-added distribution along the production chain.	The developing economy needs to enhance its technological capabilities to not stuck in a low value-added position in GVCs.
Nathan	2021	GVCs	labour market	(broad reference)	Introduction of three different levels of monopsony power of lead firms on GVC.	Monopsony power level corresponds to particular skill employment, pay levels, and working conditions.
Barrientos, Gereffi & Rossi	2018	GPNs	economic and social upgrading	(broad reference)	Introduction of typology of workforce composition.	Social upgrading is not always guaranteed by economic upgrading. Typology of work matters in achieving social upgrading in GVCs.

Gereffi & Lee	2018	GVCs	economic and social upgrading	Puppim de Oliveira's (2008)	The perspective of types of governance of GVC.	Type of governance matters in achieving social upgrading in GVCs.
Naqvi & Memon	2018	GPNs	upgrading	(broad reference)	A bridge between GPN theory and theory of innovations systems and industrial clusters.	Knowledge links between GPNs and innovation systems create opportunities for upgrading.

Source: own elaboration.

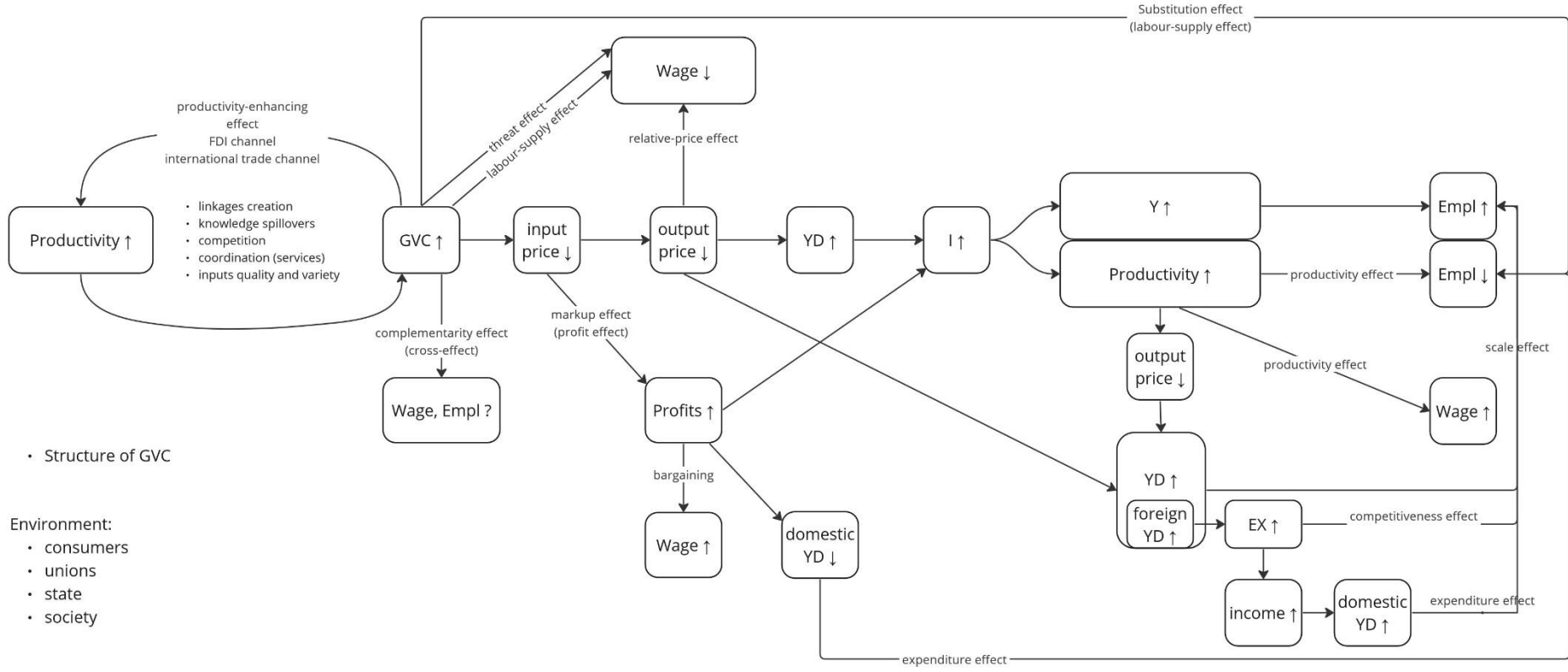
Figures

Figure 1: PRISMA flow chart.



Source: own elaboration.

Figure 2. Summary of possible channels of GVCs participation impact on wages, employment, and productivity.



Source: own elaboration.
 Notes: For brevity the graph does not specify the details and assumptions of theoretical models from which the presented channels of impact come from. For more details please see Table 2 and 3.

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