TRADE, GVCS, AND WAGE INEQUALITY: THEORETICAL AND EMPIRICAL INSIGHTS

Nicola Gagliardi, Benoît Mahy, François Rycx

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Trade, GVCs, and wage inequality: Theoretical and empirical insights
Nicola Gagliardi 1, Benoît Mahy 2 and François Rycx 3

Abstract – A prominent issue in current debates is the coincidence between growing within-country disparities in the labor income distribution and countries’ increasing exposure to globalization. This article contributes to such discussions by providing an overview of the main theoretical and empirical literature on the link between globalization and a component of income inequality: wage inequality. Specific attention is paid to the role of trade, in the form of exports and imports, and global value chains (GVCs). This review emphasizes that in-depth consideration of several intertwined mechanisms is necessary in order to accurately address trade-induced inequality concerns.

Keywords: trade, global value chains, labor markets, wage inequality
JEL Classification: F11, F12, F14, F16, F66, J31

Résumé – Une question importante dans les débats actuels concerne la concomitance entre la croissance des inégalités de revenus au sein des économies avancées et l’exposition croissante de ces économies au commerce international. Cet article contribue à ces débats en fournissant une synthèse de la littérature théorique et empirique traitant de l’influence de la mondialisation sur un aspect particulier des disparités de revenus, à savoir les inégalités salariales. Une attention particulière est accordée au rôle du commerce, en particulier aux exportations et aux importations, ainsi qu’aux chaînes de valeur mondiales. L’analyse souligne la nécessité d’examiner...
en profondeur plusieurs mécanismes interdépendants pour répondre avec précision aux préoccupations en matière d’inégalités induites par le commerce.

**Mots-clés:** Commerce, chaînes de valeur mondiales, marché du travail, inégalité salariale

**Classification JEL:** F11, F12, F14, F16, F66, J31

## 1 INTRODUCTION

Recent decades have witnessed a widespread increase in within-country inequality across many OECD countries and some emerging economies (Lopez Gonzalez et al., 2015; OECD 2015). Based on recent data, the Gini coefficient associated with the distribution of OECD disposable income stands at an average of 0.315; a marked increase compared to the 0.29 average in the mid-1980s (Thévenot, 2017; OECD, 2015). Interestingly, such trend has emerged in countries with both historically high and low levels of inequality (Thévenot, 2017).

A declining labour income share and growing disparities in the labour income distribution are commonly recognized as relevant sources of rising inequality (Helpman et al. 2018; Goldin and Katz, 2007; Autor and Katz, 1999). The world labour share of income has indeed decreased by -4.3 per cent between 2005 and 2017. Moreover, such income remains very unequally distributed. In 2017, the top decile earned 48.9 per cent of all labour income, whereas the poorest ten per cent of the global workforce earned 0.1 per cent (Gomis, 2019).

Over time, several factors (i.e. skill-biased technological change, macroeconomic policies, de-unionization, between-firm heterogeneity) have been identified as potential drivers of wage inequality (Baumgarten et al., 2020; Biewen and Seckler, 2019; Goldin and Katz, 2008; DiNardo et al., 1996; Katz and Murphy, 1992). Nevertheless, concerns over the role played by international trade remain prominent in current debates. Such latter interest has been particularly revived by the recent expansion of trade in intermediates and global production sharing. According to UNCTAD (2013), almost 80% of global trade occurs in GVCs through exchanges of intermediate inputs.

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4. The average is based on 2017 (or latest available year) data from the OECD Income distribution and poverty database: https://data.oecd.org/inequality/income-inequality.htm.

5. Labour income includes the compensation of employees and part of the income of the self-employed. Self-employed workers earn from both their work and capital ownership. Total compensation of employees refers to the remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period. The labour income of self-employed is imputed on the basis of a statistical analysis of employees of similar characteristics (Gomis, 2019).
Indeed, due to a combination of developed countries’ managerial and/or technical expertise with developing countries’ low-cost labour, comparative advantages have been de-nationalized. This ensures a smooth and cost-efficient international production, while guaranteeing high quality of products. However, this also allows globalisation to operate with a much finer degree of resolution (Baldwin, 2016). International competition, along with advances in ICTs, appear to affect national economies at the stage- and/or job-level. This makes globalisation more unpredictable and less controllable (Baldwin, 2016).

Addressing the accuracy of trade-induced inequality concerns is of pivotal importance to foster sound evidence-based policies. This article attempts to provide an overview of the main theoretical and empirical evidence on the impact of standard international trade exposure (Section 2) and GVCs-based trade (Section 3) on wage inequality. For the purpose of this review, we mostly focus on a standard measure of wage inequality—the wage skill premium (i.e. the relative wage of high- to low-skilled workers). Section 4 summarizes the main findings and concludes.

2 TRADE AND WAGE INEQUALITY

2.1 Theoretical Insights

Traditional (or neoclassical) theoretical trade (i.e. Heckscher-Ohlin (HO) also known as Factor Proportions model—Heckscher-Ohlin, 1991; Heckscher, 1919; Ohlin, 1933;) points to inter-industry specialization as a channel of wage inequality. In its simplest form, this model predicts between-countries trade occurring due to differences in relative factor endowments (i.e. comparative advantages). Hence, countries partially specialize to export products of those industries that use the country’s abundant factor intensively.

A canonical implication of the HO model—the Stolper-Samuelson Theorem (Stolper and Samuelson; 1941)—is that such trade patterns (and the following change in relative prices) generate distributional outcomes across factors within each country. According to the Theorem, trade increases the real returns of the relatively abundant factor but reduces the real returns to the other (relatively scarce) factor. This implies that within-country wage inequality (skill premium) should move accordingly with country-specific relative factor endowments.

6. The model is also commonly referred to as the HOS (Heckscher-Ohlin-Samuelson) model, following further elaborations from Paul Samuelson. A multi-good, multi-factor extension of the model (Vanek, 1968) is referred to as the Heckscher-Ohlin-Vanek (HOV) model.
(i.e. higher inequality in high-skill-abundant countries; lower inequality in low-skill-abundant countries)\(^7\).\(^8\).

Over the years, the HO model has been confronted with several limitations. A first criticism stems from its inconsistency with evidence of increased inequality in some developing countries (i.e. higher wages for skilled workers—contrary to its predictions), particularly after trade reforms episodes in the latter (Goldberg and Pavcnik, 2007a,b; Topalova, 2007). In addition, some evidence (Lawrence and Slaughter, 1993) reports a rise in within-industry (rather than between-industry—as predicted by the HO model) demand for skilled workers. Thirdly, the HO model relies on a highly stylized setting, which is unable to justify trade between countries with similar factor endowments (i.e. intra-industry trade)\(^9\). Finally, and most importantly, traditional trade theory predictions are at odds with evidence of within-industry firm heterogeneity, and with evidence of the latter as potential driver of trade-related wage inequality. Within a given industry, not all firms engage in exporting activities. Besides, exporters appear to be larger, more productive, and pay systematically higher wages than domestically oriented firms (Bernard and Jensen, 2007).

A recent strand of trade theory, formally initiated by Melitz (Melitz, 2003)\(^10\), places heterogenous firms (captured by inter-firm productivity differences)\(^11\) at

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7. To exemplify the outcome of the Stolper-Samuelson Theorem in terms of wage inequality, we can define relative factor endowments in terms of skills (i.e. high-skilled vs. low-skilled workers). Assume we have two countries, Country 1 (high-skill-abundant) and Country 2 (low-skill-abundant), not initially engaged in free trade. When trade liberalization occurs, consistently with the HO Theorem, Country 1 (Country 2) exports the high-skill- (low-skill)-intensive product. Consequently, in Country 1, the price of its exported (high-skill-intensive) products will rise, while the price of its imported (low-skill-intensive) products will fall. The higher prices in the exporting industry will foster a production expansion. In the import-competing industry, prices will fall, and production will contract; thus, exerting downward pressure on low-skilled workers’ wages. However, during its expansion transition, the exporting industry will create an excess demand for high-skilled workers (thus boosting their wages). Thus, wage inequality between high- and low-skilled workers will increase. A symmetrical (but opposite) argument applies to Country 2; where trade should lead to less wage inequality.

8. The HO model draws upon strong assumptions, among which fully mobile homogenous factors across industries (but not countries) and provides an insight of the impact of trade on the distribution of wages in the long run. The Specific-Factor (or Ricardo-Viner) model (Jones, 1971; Mussa, 1974) is commonly considered as the short-run version of the HO model. In the latter case, some factors are assumed to be immobile (i.e. specific) across industries. Assuming high- and low-skilled workers as the specific (and, respectively, relatively abundant and relatively scarce) factors in a given country, the short and long-run implications on wage inequality are consistent. The two models’ predictions diverge on the effects of trade on the mobile (i.e. non-specific) factor in the short run (depending on the factor’s consumption of the exported vs. the imported products).

9. This is due to two main assumptions of traditional trade theory models: constant returns to scale and perfect competition. However, relaxing such assumptions, and therefore interacting the presence of economies of scale with a different market structure (i.e. monopolistic competition) can provide an explanation for both trade between countries with similar factor endowments as well as for intra-industry trade (Feenstra, 2015—for a review).


11. A key assumption of the model is that all firms must incur fixed costs to entry the market and to start producing. The productivity level of a given firm is revealed only after the latter has entered the market (i.e. when entry costs are sunk).
the centre of the analysis. The main implication of the Melitz model is that, out of all entrants in the industry, firms exceeding a certain productivity cut-off level manage to become profitable and serve the domestic market. However, as exporting further entails fixed costs, only firms with sufficiently higher productivity level will expand output and export. In sum, the most productive firms will self-select into the export markets; they will also be bigger, and more productive (Melitz, 2003).

This novel approach lays the groundwork to explain some of the aforementioned phenomena. Nevertheless, its labour homogeneity assumption (i.e. all workers receiving the same wage) precludes any potential implication on wage inequality. Similarly, the assumption of frictionless labour market is rarely verified in practice. More recent studies have tried to reconcile the heterogenous firm framework with structures of worker heterogeneity and labour market frictions, respectively.

In the former case, trade-related wage inequality can arise due to differences in workforce composition. An early contribution is provided by Yeaple (2005), followed by Verhoogen (2008), Bustos (2011) and Sampson (2014). One commonality across such studies is that trade can affect the matching of heterogeneous workers (i.e. workers with different skills) across heterogeneous firms. Furthermore, relying on a common assumption of competitive labour markets, they highlight the consequences of trade-induced matching on the earnings distribution.

In this framework, the monopolistically competitive structure of the industry (and the export-related fixed costs) ensure that only the most productive (i.e. higher/better technology) firms manage to serve foreign markets. Due to complementarity between workers’ skills and firms’ technology, more skilled workers are matched with the better technology. Consequently, labour productivity acts as a vector of wage inequality—as the skill premium is expected to rise both across (exporters vs. domestically oriented firms) and within firms (skill premium in high-tech/technologically sophisticated firms). However, this strand of literature assumes perfect (i.e. frictionless) labour markets. In practice, similar workers can be paid different wages by different firms. Residual wage inequality (i.e. wage inequality unexplained by observable worker characteristics) has been widely recognized as significant driver of rising income inequality and wage

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12. Based on the logic of Positive Assortative Matching (PAM) (Becker, 1973). For PAM to occur, complementarity between two sides of a match is needed. In a firm-worker context, complementarity is referred to as log supermodularity. This implies that high-skilled workers are relatively more productive when using, say, more sophisticated technologies. In turn, better workers (e.g. high-skilled) should be matched with better (e.g. high-tech) firms (Helpman, 2016; Grossman, 2013).

13. Just as in Melitz (2003), firms are assumed to operate in a monopolistically competitive industry. In the Melitz model, firm heterogeneity is captured by an exogenous distribution of technologies among firms. Namely, firms discover their productivity level only after incurring a fixed entry cost to acquire a given production technology. Yet, they cannot choose to invest to improve their technology set. Firm heterogeneity is introduced through endogenous technological choice in Yeaple (2005), Bustos (2011), and Sampson (2014), and through exogenously fixed entrepreneurial ability/technical know-how in Verhoogen (2008).
dispersion (Akerman et al., 2013; Autor et al., 2008; Lemieux, 2006; Katz and Murphy, 1992); including in trade liberalization scenarios (Menezes-Filho et al., 2008; Attanasio et al., 2004). In this respect, labour market frictions appear to play a role, given persisting differences in cross-country labour market institutions (Helpman et al., 2011).

An innovative theoretical literature addresses the issue of labour market imperfections. The latter are modelled through search and matching frictions (Helpman et al., 2017; Helpman et al., 2010; Davidson et al. 2008) on the one hand, and efficiency and fair wages (Amiti and Davis, 2012; Davis and Harrigan, 2011; Egger and Kreickemeier, 2009), on the other. The underlying intuition being that, in a setting of heterogeneous firms, trade (via selection into exporting) can affect residual wage inequality because of the interaction between labour market frictions, within-industry productivity (and profitability) dispersion, and firm wage-size premia (Helpman, 2018).

The work of Helpman et al. (2010) (and their later extension—Helpman et al., 2017) embody the most ambitious theoretical approach to explain the role of search and matching frictions in shaping trade-related wage inequality. In the former, after an entry process à la Melitz (2003), firms deciding to operate in the industry post vacancies to be filled by ex-ante identical workers, endowed with unobserved match-specific ability. Complementarities between workers’ abilities and firms’ production technologies induce more productive firms into costly screening to recruit higher-ability workers. Search and matching frictions, coupled with wage bargaining mechanisms, ensure that such workers also receive higher wages. Selection into exporting exacerbates these mechanisms, and

14. Following the setup à la Mortensen and Pissarides (1994) and Diamond (1982). In the standard setting, firms need to post a vacancy to be able to match with an unemployed worker. A one-to-one matching between a firm and a potential worker exists. Once matched, because of labour market frictions, workers are not paid their marginal product. On the contrary, workers and firms engage into bilateral wage bargaining. Both parties are keen on finding an agreement, as a failed match would result into more unfilled vacancies and more unemployed workers.

15. As shown in Oi and Idson (1999), a positive correlation is found between firm size and wages.

16. In Helpman et al. (2017), firms are assumed to be heterogeneous in terms of productivity but also in their fixed costs of exporting and in their costs of screening workers.

17. Davidson et al., (2008) provide a first theoretical attempt. They extend the work of Yeaple (2005) to include search and matching frictions. Although their predictions are mostly in line with those of Helpman et al., (2010), they assume a one-to-one matching between a firm and a potential worker, in line with the standard search and matching frictions models (Mortensen and Pissarides, 1994 and Diamond, 1982). Furthermore, only two types of firms (high-tech vs. low-tech) and workers (low-skilled vs. high-skilled) are assumed. Helpman et al. (2010) extend the analysis to include firm matching with multiple workers, as well as continuous distributions of firm productivity and workers’ abilities. Unlike Davidson et al. (2008), in Helpman et al. (2010), heterogeneity is introduced in both sides of the market (i.e. product and labour market).

18. See Footnote 8 above.

19. The model assumes that, due to search and matching frictions, workers outside the firm and those inside it are imperfect substitutes. Therefore, firms engage into wage bargaining with their matched workers in order to retain those with the best fit.
exporters end up paying higher wages relative to non-exporters. Hence, residual wage inequality rises.20

Labour market imperfections, in the form of fair and efficiency wages, provide another instance of why trade could engender wage differential across similar workers. Amiti and Davis (2012) and Egger and Kreickemeier (2009) introduce rent-sharing motives into models of heterogenous firms through a fair wage-effort mechanism. Their core intuition is that workers form a notion of a wage they consider to be fair, and exert their effort based on the latter. In Amiti and Davis (2012) wage fairness is set as an increasing function of the firms’ profits, while in Egger and Kreickemeier (2009) it depends on the productivity level (i.e. the economic success) of the employer. Because of such mechanisms, different wages are paid to initially assumed identical workers, across more productive (more profitable) firms. Consequently, selection into exporting (in line with Melitz, 2003) results into higher within-group inequality.

An alternative scenario is illustrated in the trade model of Davis and Harrigan (2011), based on efficiency wages as a means to foster workers’ effort. Homogenous workers can decide to shirk on the job and/or exert less effort, and they can be fired if they are caught. To prevent such situation, in equilibrium, heterogenous firms (à la Melitz, 2003) decide to pay efficiency wages. However, as firms also differ in their monitoring ability, and efficiency wages are assumed to depend on the latter, wages will also differ across firms. In this model, residual wage inequality predictions depend on the correlation between a firm’s productivity and its monitoring ability.

2.2 Empirical insights

Initial studies (Borjas et al. 1997; Katz and Murphy, 1992) tried to empirically verify the contribution of trade to wage inequality through factor proportion theory, although their conclusions only pointed to a very limited impact of trade. Yet, given the difficulty of the HO framework to reconcile most of theoretical underpinnings with different stylized facts (Feenstra 2015; Goldberg and Pavcnik, 2007a,b; Topalova, 2007; Lawrence and Slaughter, 1993), empirical trade-induced wage ineq...
inequality discussions have been primarily steered towards firm-level analyses. Pioneering evidence of within-industry firm heterogeneity (Bernard and Jensen, 2007—for a review) unveiled positive correlations between export status and firm-specific outcomes, such as wages and employment. This paved the way for research on dimensions of (trade-induced) between- and within-firm wage inequality.

Predating the theoretical setting from Melitz (2003), Bernard and Jensen (1999; 1997; 1995) highlight the impact of trade in shaping between-firm wage inequality (i.e. exporter wage premium). Using plant-level data, they show that exporters appear to be larger, more productive, and pay systematically higher wages than domestically oriented firms. Over time, several empirical works have corroborated such findings25. However, the structure of their data does not account for worker characteristics. This makes it difficult to disentangle the role of exports from cross-firm differences in types of employed workers (i.e. self-selection of workers with different characteristics across firms).

Schank et al. (2007) address this shortcoming with a linked employer-employee dataset on Germany. Including both firm and worker characteristics as controls, they still find a positive, albeit smaller, exporter wage premium.26. Baumgarten (2013a) reaches a similar conclusion. On the contrary, Breau and Rigby (2006) find no evidence of export wage premia after employer and employees characteristics are considered. Two theories (i.e. firms’ self-selection vs. learning by exporting) are generally contrasted to uncover the underlying drivers of the export wage premium—although evidence appears to tilt more favourably towards the former27. For instance, Schank et al. (2010) argue that the exporter wage premium reflects self-selection of more productive firms with higher wages into export markets (i.e. firms already pay higher wages before exporting). To explain such patterns, several other mechanisms have been explored.

Demand for skilled labour stands as first suitable candidate. As shown in Verhoogen (2008), exports-driven product quality-upgrading may induce firms to employ higher-quality (i.e. higher-skilled) workers and, consequently, remunerate them with higher wages relative to non-exporters. The role of human capital is also investigated in Munch & Skaksen (2008). Using Danish linked employer-employee data, they find that firms with higher export intensities pay higher wages, and that the size of the export premium is increasing in the skill intensity of the firm. For German manufacturing firms, Klein et al. (2013) examine how wages differ across exporters and non-exporters at different skill levels and find evidence of an export wage premium for higher-skilled workers. Brambilla et al. (2015) provide an encompassing evidence of the role played by skilled labour utilization, technology sophistication, imported input use, and productivity.

Alternative structures are also examined. Frias et al. (2009) find that nearly all the differential within-industry wage change due to an export shock is explained by changes in wage premia, rather than skill composition; thereby pointing to

26. In particular, Schank et al. (2007) report that it is the export share (i.e. ratio of exports to total sales) that is positively related with wages.
27. See Brambilla et al. (2015) for a review of evidence on both theories.
the relevance of some form of labour market imperfections. Similarly, Macis and Schivardi (2016) find that the increased wages following an increase in the export activity are entirely due to rent-sharing, and not to changes in the skill composition. Among others, Martins and Oproomolla (2009) employ matched firm-worker panel data from Portugal to highlight the role played by imports and type of exported/imported product in determining the export wage premium. In addition, Alcalá and Hernández (2010) use Spanish matched employer-employee data to show that export wage premia increase with market-remoteness (i.e. exports destination market) as well as employee education.

Demand for skilled labour may be also relevant in contexts of within-firm wage inequality. Verhoogen (2008) suggests that export-driven quality upgrading wage differentials are greater for white-collar than for blue-collar workers. In the case of Germany, Klein et al. (2013) finds that, within exporting firms, a wage premium only accrues to higher skilled workers, while a wage discount is found for lower skilled workers. Meschi et al. (2016) use data on Turkish manufacturing firms to show that trade openness, and the resulting technological upgrading, lead to an increase in the within-firm skill-wage premium.

Other studies focus on the role of imports and/or alternative wage inequality measures. Amiti and Cameron (2012) examine the impact of a reduction in input tariff for intermediate goods on the within-firm wage skill premium in Indonesia. Caselli (2014) reports evidence of a rise in the skill premium for Mexican manufacturing plants, when cheaper inputs are available through imports. On a broader inequality perspective, Frías et al. (2012) find that exports stretch within-plant wage distributions, although not uniformly across quantiles. More recently, Georgiev and Henriksen (2020) focus on Danish manufacturing firms and illustrate that export demand shocks increase within-firm inequality, identifying within-components of occupational and educational groups as the underlying drivers.

### 3 GLOBAL VALUE CHAINS (GVCS) AND WAGE INEQUALITY

#### 3.1 Theoretical insights

The proliferation of global value chains (GVCs) has not only fundamentally altered the geography of production, but also its complexity (Lopez Gonzalez et al., 2015). The use of more sophisticated ICTs has lowered coordination, communication, and monitoring costs across organizational boundaries. This has made it easier to fragment and coordinate different stages of the production processes across greater distances. International production currently involves multidimensional cross-border flows of intermediate inputs, know-how, investment, information, services, and people (Saito et al., 2013). Such a phenomenon, generally referred to as “trade in tasks” (Grossman and Rossi-Hansberg, 2008) or “globalisation’s second unbundling” (Baldwin, 2012), has had major repercussions on the world economy. By shifting competition from a sector-by-sector type to
a stage-by-stage one (Baldwin, 2016), offshoring trade in tasks has also further complicated the globalisation-wage inequality nexus.

In this context, a great deal of literature has been devoted to the labour market implications of offshoring (Hummels et al., 2018 for a review). Nevertheless, the theoretical impact on wage inequality remains ambiguous. In this respect, most focus has been on the distribution of labour demand across skills, and its consequent impact on the skill premium. An early theoretical contribution, rooted in the factor proportion theory framework, is provided by Feenstra and Hanson (1996; 1997; 2003). In their standard model, countries differ in their skill abundance (i.e. North, skill-labour abundant; South, unskilled labour abundant). Production requires a continuum of intermediate inputs, which differ in their relative skill intensity (skilled to unskilled labour). Assuming \textit{ex-ante} relative wage differences across countries, once offshoring becomes possible, the North will relocate the least skill-intensive activities to the South (where wages of low-skilled workers are lower). However, the activities originally performed in the skill-rich country are perceived as more skill intensive in the skill-poor country. As a result, demand for skilled labour (hence, the skill premium\-wage inequality) rises in both countries.

More recently, Grossman and Rossi-Hansberg (2008) model offshoring as a positive technological change introduced as a cost of coordination (Jones and Kierzkowski, 1990; Deardoff, 2001) and predict the impact of wage inequality (in the offshoring country) to depend on the type of task (i.e. high- vs. low-skilled) that is offshored. In their framework, a continuum of tasks (performed with different intensities by skilled and unskilled workers) are needed to obtain a final good. Tasks differ in their offshoring costs. Given two countries, North and South, with an initial relative wage difference (e.g. higher relative wage in unskilled tasks in the North, equal wages for skilled tasks in both countries), a fall in offshoring costs for low-skilled tasks would induce Northern firms to move the latter abroad. In turn, wage inequality in the offshoring country would decrease. This is due to a \textit{productivity-enhancing} effect that may raise firms’ relative demand for unskilled

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28. Hummels \textit{et al.} (2018, p. 983) define offshoring as “the process of changing the geographic assignment of the mix of tasks needed to produce a single final good or service. Where once design and component production and assembly were colocated domestically, now component production may be assigned to a second, foreign, location, and assembly to a third”.

29. Their model, however, is based on two strong assumptions: there is only one sector, and the offshoring costs are the same for all inputs. (Hummels \textit{et al.} 2018).

30. Baldwin and Robert-Nicoud (2014) provide a recent theoretical extension of such a framework.

31. For instance, in terms of communication and transportation technology.
labour, thus raising low-skilled wages\textsuperscript{32,33}. An opposite impact may be possible if high-skilled tasks are offshored; whereas the impact may be ambiguous if both skilled and unskilled tasks are offshored.

3.2 Empirical insights

A trove of empirical works has followed and, most of the times, predated such theoretical predictions. Hummels et al. (2018) categorize those examining the wage/wage inequality impact of offshoring into three main waves, according to the underlying structure of their data. In particular, we find works based on: i) industry-level data (Amiti and Wei, 2009; Hsieh and Woo, 2005; Feenstra and Hanson, 1999; 1997); ii) firm-level data (Mion and Zhu, 2013; Amiti and Davis, 2012); iii) worker-level/matched employer-employee data (Liu and Trefler, 2019; Hummels et al., 2014; Ebenstein et al., 2011). In the latter case, we also find contributions from Görg and Görlich (2015), Baumgarten et al. (2013b); Borghi and Crinò (2013); Geishecker and Görg (2013; 2008), Geishecker et al. (2010).

However, such literature suffers from several limitations. Firstly, by using proxies for offshoring, it does not clearly reflect the complexity of today’s international production fragmentation, mainly characterized by GVCs\textsuperscript{34,35}. Secondly, the interaction between specific GVCs measures and trade exposure (i.e. exporting/importing activities) is largely unexplored. Thirdly, none of the studies expressly focuses on GVC-linked intra-firm inequality concerns. Finally, only very few studies (Hummels et al., 2014; Baumgarten et al., 2013b; Becker et al., 2013; Ebenstein et al., 2011; although using different proxies for offshoring) decouple skills from tasks (Autor, 2015; Autor et al., 2003; Blinder, 2009)\textsuperscript{36}. In fact, educational or skill endowments do not fully explain the fragmentation of production and the type of activities in which countries specialise (Marcolin et al., 2016a).

32. A fall in the offshoring costs for low-skill tasks generates three effects. Offshoring low-skilled tasks allows Northern firms (particularly those specialized in more low-skill intensive tasks) to become more productive and expand production, which boosts demand for unskilled workers and raises their wages (i.e. productivity-enhancing effect). However, two additional effects may offset this outcome. First, offshoring also increases the supply of workers whose task has been offshored (i.e. labour-supply effect). Secondly, offshoring-driven reductions in production costs lower relative product prices (i.e. relative-price effect). Higher wages for unskilled workers can materialize in the offshoring country, provided the productivity-enhancing effect outweighs the combined labour-supply and relative-price effects (Grossman and Rossi-Hansberg, 2008).

33. On the contrary, Zhu and Trefler (2005) develop a framework in which offshoring may lead to higher inequality in both the offshoring and offshored country.

34. This is due to the scarcity of accurate measures of a country’s involvement into GVC (only produced recently, thanks to the emergence of databases such as the OECD-WTO TiVA and the WIOD), as well as of a firm’s position along GVCs, that have only been designed recently (see Antràs et al., 2012), and whose data are particularly difficult to obtain.

35. GVCs can be defined as: “the full range of activities that firms undertake to bring a product/service from its conception to its end use by final consumers” (OECD, 2012).

36. Autor et al. (2003) introduced a framework to analyze the labour market using information on tasks performed by individual workers at the occupational levels (i.e. routine vs. non-routine tasks), Blinder (2009) distinguishes tasks between personal and impersonal services.
This is particularly relevant in a context of GVCs. The latter, along with technological change and ICTs, have seemingly contributed to labour market polarization and (job) offshoring based on the degree of automation and codification of tasks (Goos et al., 2014; Autor, 2010). Non-routine tasks are nowadays performed at both ends of the skill distribution (high- and low-skilled workers). Routine tasks (typically assigned to medium-skilled workers) have become particularly subject to offshoring (Marcolin et al., 2016a,b; Ottaviano, 2015; Goos et al., 2014). Yet, offshored tasks might also include a mix of high- and low-skilled labour (Lopez Gonzalez et al., 2015). Such new setting therefore requires a deeper understanding of GVC-driven wage inequality, and the specific role played therein by the task-content of occupations.

Against this background, recent works provide insights on wage inequality/wage impacts of GVC integration/participation. In a country-level analysis, Lopez Gonzalez et al. (2015) show that involvement in GVCs does not appear to drive wage inequality. On the contrary, a higher degree of backward participation (a higher share of FVA embodied in exports) is associated to lower wage inequality. In addition, in line with Grossman and Rossi-Hansberg (2008), offshoring low-skilled tasks is associated with lower levels of wage inequality (the reverse holds for high-skilled tasks). Parteka and Wolzczak-Derlacz (2018) use multi-country linked worker-industry data and examine the relationship between individual workers’ wages and industry ties into GVCs, while also accounting for task heterogeneity across workers. They find an inverse (although weak) correlation between industries’ involvement in GVCs and wages. Workers employed in routine occupations are found to earn less; even though such finding is not attributable to GVC involvement.

Such strand of literature has been recently complemented by (little) evidence on the role played by countries/industries/firms’ position along the GVC. The need for such a focus is emphasized by Shen and Silva (2018), who find the effects of an increase in U.S. exposure to value-added exports from China on average wages and unemployment levels to depend upon the position of the Chinese industry in the global value. In a recent paper, using data on Central and Eastern European countries, Szymczak et al. (2019) examine the effect of industries’ upstreamness on workers’ wages. Their results show that workers earn higher wages when employed in industries located either at the beginning or at the end of the value chain.

Gagliardi et al. (2019; 2020) examine a similar question at the firm level, with detailed matched employer-employee data relative to the Belgian manufacturing industry. They find that workers earn significantly higher wages when being employed in relatively more upstream firms. In addition, the wage-upstreamness

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37. GVC participation is commonly measured as the share of foreign value added (FVA) embodied in a country/industry/firms’ exports. Lopez-Gonzales et al. (2015) retrieve such information through the OECD Inter-Country Input-Output (ICIO) model.

38. Recent theoretical insights (Antràs et al., 2012) and better availability of data have allowed to construct accurate measures of the position of industries/firms along the GVC. An upstream position is measured as the number of steps (weighted distance) before the production of an industry/a firm meets either domestic or foreign final demand.
elasticity appears to increase monotonically along the earnings distribution, but particularly so for male workers. Such results are in line with Mahy et al. (2019), who provide findings for the Belgian economy and suggest that productivity gains obtained by firms operating more upstream on the GVC are shared equally between profits and total wage costs.

Finally, Chen (2017) investigates (in the context of China, and in a within-firm setting) wage inequality with respect to both a firm’s position along the GVC and its trade exposure. The analysis across heterogeneous industries holding different positions in the domestic value chain of the Chinese manufacturing industry reveals that wage inequality is more pronounced in upstream industries than in downstream ones, and among firms with greater exposure to international trade. However, exporting firms in upstream industries appear to have less wage inequality compared to their downstream counterparts.

4 DISCUSSION AND CONCLUSIONS

Recent decades have witnessed soaring within-country inequality progressively contributing to the rise in global inequality (Alvaredo et al., 2018). Over time, many factors have been identified to explain such patterns (OECD, 2015). Yet, a prominent issue in current debates is the concomitance of growing disparities in the labour income distribution (one of the main drivers behind rising inequality) with countries’ increasing exposure to globalisation (Helpman et al., 2018; Pavcník, 2011). This article aims to contribute to such discussions by providing an overview of the main theoretical and empirical literature on the link between globalisation and a specific component of income inequality—i.e. wage inequality. We examine globalisation by focusing on the role of trade (in terms of exporting/importing activities) and offshoring GVCs.

On a theoretical level, as illustrated in Section 2, trade literature has long relied on factor proportion theory and its implications through the Stolper-Samuelson Theorem; which overall predicts a trade-induced rise in inequality in advanced economies, but a decline in developing ones. This is at odds with evidence of a rise in wage inequality in developing countries following trade liberalization episodes (Goldberg and Pavcník, 2007a,b; Topalova, 2007). Moreover, traditional trade theory implications do not match with findings of increased within-industry wage inequality and residual wage inequality (Helpman et al., 2017). Recent trade models combine elements of firm heterogeneity (as initiated by Melitz, 2003) with structures of worker heterogeneity and labour market frictions to provide more consistent explanations in this sense. A trove of empirical works corroborate such predictions via analyses of both trade-driven between- and within-firm wage inequality.

39. Downstream industries in China are typically involved in processing and assembly requiring intensive unskilled labour input. In line with HO model predictions, trade increases the returns to this factor. However, following new trade theories, trade also induces pro-competitive effects which benefit exporters and skilled workers (Chen, 2017).
As shown in Section 3, the advent of offshoring with the subsequent rise of GVCs have further complicated the globalisation-wage inequality nexus. The theoretical contributions of Feenstra and Hanson (1996; 1997; 2003) and, more recently, Grossman and Rossi-Hansberg (2008) provide different intuitions on how the fragmentation of production may shape factor prices and inequality. A considerable number of works have been produced to provide empirical verifications (Hummels et al., 2018). However, only very recent empirical studies have been able to consider proper measures of production fragmentation in the form of GVCs (e.g. GVC participation, firms’ position along the GVCs), as well as relevant features such as the decoupling of skills from tasks (Autor, 2015; Autor et al., 2003; Blinder, 2009), and GVCs-driven intra-firm wage inequality concerns (Chen, 2017).

In sum, this review emphasizes that, despite the impressive amount of works produced thus far, understanding the link between globalisation and wage inequality requires deep consideration of several intertwined mechanisms. In addition, it provides relevant insights to nurture future research works on how specific labour and product market features may interact with new challenges introduced by the evolving organization of world production across sectors to shape trends in wage inequality.

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