Working conditions in Global Value Chains.

Evidence for European employees

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Abstract

This article studies a sample of almost 9 million workers in 24 European countries in 2014 to investigate how involvement in Global Value Chains affects working conditions. We use employer-employee data from the Structure of Earnings Survey merged with industry-level statistics on GVCs based on the World Input-Output Database. Given the multidimensional nature of the dependent variable, we compare Mincerian wage model estimates with zero-inflated beta regressions focused on other aspects of working conditions (overtime work and bonus payments). Wages prove to be negatively related to involvement in GVCs: workers in the more deeply involved sectors have lower and less stable earnings, implying worse working conditions. However, they are also less likely to have to work overtime. We confront the social implications of increasing involvement of countries in global production, comparing the purely economic effects of GVCs with complex changes in workers' well-being.

Keywords: Global Value Chains, social upgrading, well-being of workers, working conditions

JEL: F16, F66, J81

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1. Introduction

The proliferation of Global Production Networks (GPNs) or Global Value Chains (GVCs),[1] which now account for more than two-thirds of world trade (World Trade Organization, 2019), has profoundly altered industrial relations between countries. Unsurprisingly, the bulk of research in this field concerns the economic impact of GVCs on countries and firms (among others: Gereffi and Fernandez-Stark, 2016). Scholars have paid less attention to the effects on workers, while typically indicating the social impact of production fragmentation as a promising research topic (among others: Posthuma, 2010; Barrientos et al., 2011). Many works study the way in which production fragmentation affects the demand for skills, the task composition of the labour force, or labour market polarisation (among others: Autor and Dorn, 2013; Baumgarten et al., 2013; Murphy and Oesch, 2017). However, the labor-market outcomes of globalisation still remain largely unexplained, either by trade or by technology (for a meta analysis see Muendler, 2017). Much less attention has been paid to how inclusion in globally integrated value chains affects working conditions. This article seeks to fill this gap.

Participation in GVCs brings economic benefits, but their translation into better working conditions is not automatic or self-evident. Where early studies on GVCs suggested a straightforward relationship between economic and social upgrading[2] (Kabeer and Mahmud, 2004; Nadvi *et al.*, 2004), more recent research holds that this relationship is not fully demonstrated (Bernhardt and Pollak, 2016). On the one hand, cross-border production links may create job opportunities for marginalised workers, making possible the intgegration of typically discriminated groups such as women and the unskilled. On the other hand, it may increase the pressure to cut labour costs, which often means worsening working conditions and less respect for labour standards (Plank et al., 2012). Moreover, the geographical dispersion of production in GVCs may also be an important determinant of precarious employment (Siegmann and Schiphorst, 2016).

The literature has a number of shortcomings. First of all, research on the economic and social upgrading of workers within globalised structures of production relates mainly to developing countries (Barrientos et al., 2011; Nadvi, K. et al. 2004, Milberg and Winkler, 2011),[3] such specific problems as human rights in GVCs (Buhmann *et al.*, 2019), or, recently, the risks connected with technological advances within GVCs (World Trade Organization, 2019). Studies of developed countries are comparatively rare (Smith and Pickles, 2015). In particular, there is hardly any research on the social impact of GVCs in Europe beyond the purely economic effects on employment, productivity or wages. Yet we know that in recent decades working conditions in many European countries have changed, and not necessarily for the better. For instance, the share of part-time employment has grown significantly[4] (Pirani and Salvini, 2015). 'Made in Europe' is not automatically equivalent to 'fair labour conditions': for instance many garment workers in East and South-East Europe earn less than the actual living wage, and the Clean Clothes Campaign's November 2017 report found 1.7 million garment workers living in poverty, with poor working conditions or overtime work.[5] Thus working conditions in Europe may well be an issue, but it is by no means clear whether or not the proliferation of GVCs has been a factor in lowering labour standards.

Secondly, there are methodological problems. Empirically, the concept of 'social upgrading' has been quantified mostly using country-level data (hence losing the individual, worker-specific dimension) based exclusively on wages (Bernhardt and Pollak, 2016). This is an oversimplification, as the quality of employment depends not only on wage levels but also on such factors as non-standard payments, working hours and overtime, freedom of association, and workplace safety. Moreover, as the recent GVC literature notes (e.g. IBRD/World Bank, 2017), precise indicators are needed to capture all the dimensions of cross-border production links, including industries' position within the production chain.

This article addresses these shortcomings, focusing on GVCs as one potential determinant of working standards in a sample of almost 9 million workers in 24 European

countries. The question is how the inclusion of a domestic industry in a GVC, or its position within the chain, affects the working conditions of its employees. At the same time, account is taken of other factors that help determine employment and wages, such as workers' individual characteristics and the degree of job routinisation. To this end, linked employee-employer data from the Structure of Earnings Survey (2014) is merged with industry level measures of GVC involvement from the World Input-Output Database. Thanks to the joint coverage of both enterprises and workers' characteristics, it is possible to quantify various aspects of employment conditions, such as wages, overtime work, and bonus payments as a share of total earnings. GVC involvement is measured by the novel concepts of global import intensity (Timmer et al., 2016) and 'upstreamness' (Antràs et al., 2012).

Section 2 presents the key concepts and reviews the literature on GVCs, social upgrading, decent work and working conditions. Section 3 describes the data and the methodology. Section 4 reports and discusses the estimation results, and Section 5 concludes.

2. Social upgrading and decent work - key concepts and past evidence on the impact of GVCs on working conditions

Labour rights, closely related to human rights, are of interest to sociologists and economists, as a major factor in social transparency, accountability and cohesion (ILO, 2016), understood as 'working toward the well-being of all the members of a society' (Taglioni and Winkler, 2016, p. 200). The issue of labour rights may be embedded within integrative social contract theory (ISCT), as in Donaldson and Dunfee (1994), extending society's principial ethical foundations to business contexts. ICTC can be applied to identify the global hypernorms governing labour standards (Hartman et al., 2003).

However, these general rights need to be analysed in a more detailed way to allow their measurement within the sociology of global production. The geographical dispersion of production implies the need to integrate the labour processes into the GVCs, going beyond the

governance of interfirm relations, as the fragmentation of value chains significantly affects skills, flexibility, work organisation and the security of employment (Flecker et al., 2013). Taglioni and Winkler (2016) stress the impact of integration into GVCs on living standards (wages, working conditions, economic security) where a country's position within the chain is one of the determinants of opportunities for social upgrading.

Notwithstanding these efforts to integrate social values into GVC analysis, a number of lacunae remain. Selwyn (2013) mentions three main limitations: first, the ILO's concept of social upgrading[6] has limited power and its real impact on companies' behaviour is modest; second, little is said about the processes and mechanisms for social upgrading; and lastly, the exploitation of labour tends to be downplayed, concentrating instead on institutional arrangements between state, capital and labour, which ignores the real reasons for labour inequalities. Wages alone are not a sufficient indicator of social upgrading, and are not a reliable gauge of working conditions in the broader sense (Bernhardt and Pollak, 2016). A broader view has been taken, among other,s by: Lee et al., (2016), who consider, in addition to wages, hours, overtime, hiring and contract practices, and health and safety conditions; by Kabeer and Mahmud (2004), who instrument working conditions with permanent job status, maternity benefits, paid leave, accommodations, medical care, and overtime pay; by Barrientos et al. (2015), who define social upgrading by work opportunities, measurable labour standards and enabling rights; by Bair and Gereffi (2001), who focus on safety, exploitation, compliance with local labour laws, and sanitary conditions at the workplace; and by Rossi (2013), who considers work environment, overtime, job and social security, and enabling rights. The range of aspects affecting the quality of work is thus quite considerable.

The empirical literature on the social consequences of trade (and globalisation in general) and the proliferation of GVCs has produced contrasting findings. While some studies confirm a positive relationship (Bair and Gereffi, 2001; Nadvi et al., 2004), others assert that economic upgrading (a gain in productivity for a firm or an industr) does not necessarily translate into social

upgrading for workers. This thesis, typical of institutionalist political economy, is consistent with the ILO's Decent Work Agenda. Economic upgrading within GVCs may even be coupled with deterioration in working conditions, insofar as relocation in the labour-intensive sectors where offshoring is typical may be driven by low wages, worse employment arrangements and precarious working and employment conditions (Barrientos et al., 2011). Knorringa and Pegler (2006) argue that GVC participation may have an adverse effect on labour conditions owing to segmentation, job insecurity and longer hours.

Another strand of work consists in case studies, again mostly concluding that economic upgrading is no guarantee of social upgrading (among others: Flecker and Meil, 2010; Barrientos et al., 2011, 2015). In short, the bulk of the literature on trade integration, GVCs and labour standards refers to the developing countries, but there has been some work on the impact on workers in the developed world, with significant research on the US economy and the impact of globalisation on wages (among others, see Ebenstein et al., 2014; Shen and Silva, 2018).

The evidence for Europe is relatively limited. Among the few cross-country studies, Van Aerden et al., (2015), using the European Working Conditions Survey, find a clear relationship between working conditions and general well-being, contending that flexible and de-standardized work arrangements cannot ensure long-term employment sustainability. Some empirical research examines how GVCs affect wages in Europe (among others: Baumgarten et al., 2013; Geishecker et al., 2010; Author A)[7] taken as an imperfect indicator of social upgrading. Still, it is difficult to draw general conclusions on the question for Europe, because much of the research takes a narrow industry- or country-specific perspective.

The special issue of *Competition and Change* ('Putting Labour in its Place: Global Value Chains and Labour Process Analysis', Newsome et al., 2013)[8] focuses on the integration of labour process theory with international supply chain studies and describes some specific, but significant European case studies. Flecker et al., (2013) find an alarming state of labour processes in the Austrian parcel delivery industry (extremely fragmented, with large transnational companies at

one end and self-employed drivers at the other end of the value chain). That is, risk, costs and flexibility are shifted downwards along what the authors call 'risk-and-flexibility-transfer chains'. Labour law on working time, overtime and benefits is circumvented by abusing performance-based payment schemes, and ultimately the couriers' work is intensified and their jobs unstable. In the Romanian electronic industry (Pawlicki, 2013), local factors like the stability of the work force create upgrading opportunities, which in turn enable greater organisational and production efficiency. Weinkopf (2009) studied German financial service and utility call centres, showing that working conditions are worse at subcontractors than at in-house centres, owing to lack of institutional protection (e.g. collective bargaining agreements on wages). Hummels et al. (2016), with data on Denmark, find that workers in export firms more frequently suffer work accidents and illness. However, some positive aspects have been found too. Smith and Pickles (2015) document that workers in export-oriented companies in the Slovakian garment industry have higher wages and better working conditions (but are also more exposed to job loss due to external shocks). Lloyd and James (2008) weigh the impact of supply chains on occupational health and safety in the UK food processing industry, reporting a considerable decline in the number of accidents and moderate improvement in labour conditions, despite supply chain pressures.

Overall, given this fragmentary evidence, in our view the link between GVCs and social upgrading in Europe is a highly complex empirical question, requiring a broader methodological approach and a cross-country dataset, which we describe below.

3. Methodology and data

In order to determine the impact of GVCs on working conditions, we have built a combined worker-industry dataset, merging microdata from the Structure of Earnings Survey (SES) with industry-level statistics on GVCs based on the World Input-Output Database (WIOD). SES is a large, cyclical four-yearly international enterprise survey (conducted in 2002,

2006, 2010, 2014). It gives comparable information on the relationships between earnings and the individual characteristics of employees and of employers.[9] This study uses the latest wave of SES (reference year 2014), described in Eurostat (2014) and covering workers in 24 European countries (listed in Table A1 in the supplementary materials). The overall sample consists of 8,932,178 observations.

Given data availability and the conventions used in the literature, the dependent variables selected are the three SES indicators of working conditions: ln*wage* (average gross hourly earnings in relation to the sectoral mean), *overtimes* (share of overtime in total hours worked) and *bonus payments* (share of bonus payments in total earnings). The descriptive statistics (by country and industry) are presented in Table A2 and Table A3, detailed specification of variables in Table A5, and the correlations between various measures of working conditions in Table A4.

Higher wages, lower overtime share and lower bonus share are interpreted as signs of better working conditions.[10] This reading follows the literature, which generally holds that excessive overtime and longer hours, imposed by tight delivery schedules and cost-cutting, may worsen the well-being of workers (among others: Posthuma, 2010) and have an adverse impact on the quality of life (Drobnič et al., 2010). Long hours commonly proxy for destandardized working arrangements, which in turn are related to employment quality (Van Aerden et al.., 2015). For bonus payments, the assessment is less straightforward. Mkoka et al. (2015) note that unfair allocation of allowances and bonuses may undermine workers' morale and lower labour standards. A study based on the British Household Panel Survey (Pouliakas, 2010) finds instead that bonus payments have a fairly insignificant influence on job satisfaction and productivity. Importantly, Schweiker and Groß (2017), based on the German Structure of Earnings Survey, find that bonus payments may significantly increase wage inequality, and that this flexibilisation of pay may aggravate earnings insecurity. Against this background, it is considered that a larger share of bonus payments may engender insecurity and hence unsatisfactory working conditions.

As is shown in Figure 1, working conditions vary considerably across Europe. Salaries in western and northern Europe are much higher than in the central and eastern countries.[11] The highest average hourly wages are reported in Norway (€26.34), Sweden (€19.70), and Luxembourg (€19.79), the lowest in Romania (€3.34) and Bulgaria (€2.94). By sector (Table A3 in the supplementary materials), average hourly wages range from €9.73 in manufacturing to €12.77 in education. As to overtime, the highest shares are worked in the Czech Republic, Italy, France and Malta (more than 1.3% of total hours); workers in Lithuania, Belgium, Spain and Latvia show the smallest shares (less than 0.2%). The third proxy – share of bonus payments – is highest in Spain, Italy and Portugal, lowest in the Netherlands, Sweden and Norway.

[Figure 1 here]

To seek out the determinants of these proxies for working conditions, we consider individual, company, industry and country characteristics. The first two are derived from SES: sex, age, education, type of employment contract, seniority in the enterprise and size of enterprise. Table A5 presents the descriptive statistics for all these micro-variables, which also define the composition of our sample. Half the observations are men (51%), 53% are aged 30-49 and 18% under 30, and 48% have medium educational attainment. The large majority (83%) are full-time, 31% have worked in their enterprise for less than 4 years and 13% for less than 1 year, and 54% are employed in SMEs (under 250 employees). Following the task-based approach to labour market analysis (Autor et al., 2014; Baumgarten et al., 2013), we control for the degree of job routinisation using the routine task intensity index (*RTI*)[12] developed by (Lewandowski et al. (2019).

A crucial step in the construction of our database is matching individual worker data with the sectoral indicators of GVC derived from the World Input-Output Database (November 2016 release), as in Timmer et al. (2015). The WIOD has input-output data for 43 countries and 56 sectors according to the ISIC Rev. 4 classification (the list of WIOD sectors is in Table A6). SES shows the industry of the employee (according to NACE Rev. 2), so WIOD is matched with SES

on the basis of the statistical classification of economic activities.[13] This matching procedure allows us to check if GVC involvement is an important determinant of working conditions for European workers.

Two measures of international production fragmentation within GVCs, each of them both sector-specific and country-specific, are used. One is the index of global import intensity of production (*GII*) proposed by Timmer et al. (2016), which counts imports of goods and services from all stages of production, and thus traces the entire value chain, whereas the classic gauges of offshoring or such GVC measures as the share of foreign value added typically count only the final stage of production. Most recently *GII* has been used by Author C.[14] The index ranges from 0 to 1, values closer to 1 indicating greater dependence of domestic sectors on foreign inputs (hence greater GVC involvement). Our measure here is the relative change in *GII* between 2004 and 2014, to capture the increase in sectoral involvement in GVCs (Figure 2 shows considerable cross-country variability).

[Figure 2 here]

The recent literature makes it clear that in addition to the intensity of foreign inputs the relative position of an industry in the value chain is important as a wage determinant. Accordingly, as an additional control variable (our second measure of international production fragmentation) we use the *upstreamness* (*UP*) constructed by Antràs et al. (2012), i.e. the national industry's position in the global production chain. Obviously, the greater the upstreamness, the further the industry is from final output: *UP* of 1 designates a strictly downstream industry, i.e. one whose output is the final good.

4. Empirical analysis

4.1 Model specification

To determine the impact of GVCs on working conditions, the following regression is estimated:

$$y_{ijc} = \alpha + \beta Ind_i + \gamma Firm_i + \theta Sector_{jc} + \vartheta \Delta GVC_{jc} + D_c + D_j + \varepsilon_{ijc} \qquad (1)$$

where *i* denotes workers, *j* the sector of employment, *c* the country. The dependent variable y_{ijc} is the indicator of working conditions. Separate estimations for three different dependent variables are run: relative wages ln*wage* - average gross hourly earnings in the reference month expressed in relation to the sectoral mean;[15] *overtimes* – the share of overtime hours in total work hours; and *bonus payments* – share of bonus payments in total earnings.

Specifically, we have:

$$lnwage_{ijc} = \alpha + \beta Ind_i + \gamma Firm_i + \theta Sector_{jc} + \vartheta \Delta GVC_{jc} + D_c + D_j + \varepsilon_{ijc} \qquad (2)$$

$$overtimes_{ijc} = \alpha + \beta Ind_i + \gamma Firm_i + \theta Sector_{jc} + \vartheta \Delta GVC_{jc} + D_c + D_j + \varepsilon_{ijc} \qquad (3)$$

$$bonus\ payments_{ijc} = \alpha + \beta Ind_i + \gamma Firm_i + \theta Sector_{jc} + \vartheta \Delta GVC_{jc} + D_c + D_j + \varepsilon_{ijc} \qquad (4)$$

The independent variables include Ind_i – the set of individual worker characteristics (sex, age, education, job routinisation *RTI*); $Firm_i$ – firm characteristics (length of service in enterprise, size of enterprise, type of contract, either temporary or permanent;[16] $Sector_{jc}$ – productivity calculated as the ratio of value added to total number of hours worked, and upstreamness; and D_c, D_j – country- and sector-specific effects. The key causal variable posited is ΔGVC – the change in GVC involvement (measured by the *GII* index) between 2004 and 2014.[17] The production fragmentation measures are introduced as changes in GVC involvement over ten years, which should be long enough for any effects to materialise and should also help to overcome the problem of endogeneity.[18]

The estimation method chosen depends on the nature of the dependent variables. To estimate eq. (2) we use weighted regression with robust standard errors, clustered at the industry level, where the weights are based on the grossing-up factor for employees (from SES) normalised by the number of observations per country.[19] For models (3) and (4) we use two-part

models with zero-inflated beta regression (Buis, 2010), which is suitable for the characteristics of our variables expressed as proportions and bounded in the interval [0,1]. In addition, they contain a significant number of observations at the boundary values of zero (83% of overtime and 43% of bonus payment observations are equal to zero, designating workers who work no overtime, or receive no bonuses). In these cases, the models have two parts: a logistic regression model is estimated for the set of observations equal to 0 and a beta model for those between 0 and 1; and the change in production fragmentation can have different effects in the two parts.[20] In particular, we determine whether greater GVC involvement produces a greater probability of overtime work and bonus payments (using the logit model) and the way in which this involvement affects the shares of overtime and bonuses (beta regression).

4.2 The results

The results of regression (2) are reported in Table 1. The coefficients for all individual and firm-characteristics are of the expected sign. On average, men, older workers, better educated workers, those with more seniority and those performing less routine tasks earn more. Similarly, other things being equal the wages of those employed in large enterprises and on permanent rather than fixed-term or apprenticeship contracts are higher. Our special focus, however, is on the effects of the change in GVC involvement for a given industry. We can see that higher ΔGII is correlated with lower relative wages - the indication is that integration into GVCs may result in a worsening of working conditions, and wages in particular. In other words, the gains from trade intensification are not shared evenly and depend on the involvement of a given country and industry in the global production sharing process. The improvement in working conditions at lower-tier suppliers seems to be more uncommon than at the top tier. This may result in a negative correlation between economic upgrading (gauged by productivity growth) and social upgrading, or improvement in working conditions.

[Table 1 here]

In the next step, we have estimated equations 3 and 4, with the shares of overtime and bonus payments as dependent variables. We show the results separately for the beta model for these two sets (upper panel of Table 2) and the logit model predicting whether an employee will work overtime or receive a bonus (lower panel). In both models we use the same predictors – the same individual, firm and sectoral characteristics – as in eq. 2. We do not report them here, as again the focus is on the GVC variables. The results differ quite markedly between overtime share and bonus share. As production fragmentation (ΔGII) increases, the probability of reporting zero overtime work increases, while that of receiving zero bonus payments decreases. Although it has been hypothesised (see e.g. Posthuma, 2010) that pressure from buyers for fast delivery may impose greater labour flexibility and generate more overtime work, we find no evidence of this in our European sample countries. On the contrary, workers in the most highly fragmented sectors rarely have overtime hours, but they are more likely to receive bonus payments. Looking deeper, however, we find that for workers who are already receiving bonus payments, as GVC involvement increases the predicted share of bonus payments decreases.

[Table 2 here]

Moreover, GVC position may affect the indicators of working conditions in different ways. In the sectors further from the production of final goods (those with higher *UP*), we observe negative effects (the probability of zeros increases) on overtime and bonus payments but no effect on relative wages (the coefficient for *UP* is not statistically significant in Table 1). That is, our results indicate that heightened flexibility through non-standard employment is more significant in the downstream portions of the value chain (Flecker et al., 2013). In our case, worse working conditions are reflected in more overtime and a higher share of bonus payments, which makes renumeration less stable and jobs accordingly less desirable.

That is to say, our results suggest that the impact of GVC involvement on workers' well-being needs to be analysed from a broader perspective, that this definitely cannot be described as

a win-win situation. We find that greater dependence on foreign inputs may affect working conditions in diversified fashion, depending on the particular nature of the dependence. Workers in the sectors more closely involved in GVCs earn less, are less likely to work overtime, but are more likely to receive bonus payments. This may mean greater insecurity, insofar as wage stability is recognised as an important factor in decent working conditions. As to overtime work, however, our data provide evidence of a beneficial effect of integration into GVCs. That is, in the sectors more heavily engaged in global production sharing, overtime work is less common and less prolonged. In this way, we show that greater involvement in GVCs does not automatically result in social upgrading. One possible explanation relates to downward price pressure, with a negative social impact of economic mechanisms (Taglioni and Winkler, 2016).

Several extensions and a sensitivity analysis, plus robustness checks, are presented in Appendix B. We start from the institutionalist view that social upgrading may depend on the legal framework, including bargaining rights (Taglioni and Winkler, 2016). To inquire into the impact of GVCs on working conditions conditional upon cross-country institutional differences, we split our sample according to the prevalent wage bargaining schemes. Appendix B shows that the negative effect of global production on wages is found mainly in counties with centralised (thus less flexible) wage bargaining schemes, while for overtime and bonus payments the correlation is no longer present. Our further extensions indicate that the impact of GVCs on wages is stronger in the 'old' EU member states, while in the 'new' members it depends on country-specific institutional frameworks. We also considered different types of value chain, analysing separately the links with high-income countries and GVCs based on flows of intermediate inputs flows from developing countries; in the latter case, GVCs have a negative effect on wages.

5. Conclusions

This article looks at social upgrading from a value chain perspective. Previous studies of the effects of GVCs have tended to use purely economic indicators, making it difficult to draw

conclusions on a more broadly defined concept of socio-economic well-being. We contribute to the assessment of the social implications of increasing involvement in global value chains by testing the assumption, often made implicitly, that in addition to economic benefits, integration into GVCs also automatically improves workers' overall well-being.

We consider how GVCs affect working conditions in Europe. In most of the literature, this type of analysis has been conducted mainly for developing economies, tackling the problems typical of low-income countries, while for Europe the evidence is country- and/or industry-specific. We contribute extensive empirical data on workers in Europe, with several different proxies for working conditions. With almost 9 million observations based on detailed SES employee-employer data on 24 European countries in 2014, combined with WIOD sector-level data on the cross-border flows of intermediate inputs, we can quantify the magnitude of GVC involvement quite precisely. We gauge it by the global import intensity of production (*GII*), while also capturing the relative position of domestic industries within global production chains. Controlling for individual, sectoral, firm and occupational factors, we create a comprehensive framework for analysis of the sociological implications of global production. In addition, we address some of the methodological issues raised by the complexity of such socio-economic analysis, adopting alternative methods such as weighted regression and zero-inflated beta regression to estimate our various proxies of working conditions (namely wages, overtime work and bonus payments).

The main finding is that in the industries that experienced substantial increases in GVC involvement between 2004 and 2014, wage trends were worse than in those where the intensification was less significant. But when indicators other than pure hourly wage are considered, the relationship turns ambiguous. Workers in sectors with deeper GVC involvement (i.e., those that are more dependent on foreign inputs) are less likely to work overtime, which may benefit their well-being, but they are also more likely to have less stable remuneration. Yet for employees whose earnings already consist in part in bonus components, the share of bonuses

in total earnings drops as GVC participation intensifies, which may mean more stable earnings. Our sensitivity analysis for workers in different groups of European countries confirms that the effect of global production chains on workers' well-being may vary.

In short, our study demonstrates that the impact of GVCs on social upgrading is complex, not unambiguous. It is important to consider aspects of working conditions beyond wages alone, because the effect of production fragmentation on workers' socio-economic situation is not one-dimensional. Our study thus shows the usefulness, indeed the necessity, of discussing the sociological mechanisms triggered by global production structures. Unless we go beyond purely economic indicators, it is impossible to fully evaluate the implications of this global phenomenon for labour. As we concentrate on the quality of labour whithin the GVC framework and explore those interrelations empirically, we confront the social implications of countries' intensifying engagement in global production networks, comparing the purely economic effects of GVCs with the more complex changes in workers' overall well-being.

Endnotes:

[1] GVC is defined as 'the full range of activities that firms and workers perform to bring a product from its conception to end use and beyond. This includes activities such as research and development (R&D), design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms.' (Gereffi and Fernandez-Stark, 2016, p. 7)

[2] *Economic upgrading*, which fosters innovation and competitiveness, may be defined as 'embarking on a high road to competitiveness through productivity increases and quality improvements' (Bernhardt and Pollak, 2016 , p. 1224) while s*ocial upgrading* refers to 'the process of improvements in the rights and entitlements of workers as social actors, which enhances the quality of their employment' (Barrientos *et al.*, 2011, p. 324).

[3] See also *Capturing the Gains: Economic and social upgrading in Global Production Networks* (http://www.capturingthegains.org/project).

[4] The share of part-time in total employment increased by 7.2 percentage points in Western Europe (EU15) between 1995 and 2017 (https://ec.europa.eu/eurostat accessed on 3rd of January 2019).

[5] https://cleanclothes.org/livingwage/europe, accessed on 12th of September 2018.

[6] Core labour standards established by the ILO involve: (i) freedom of association and collective bargaining, (ii) elimination of forced labour, (iii) elimination of child labour, and (iv) elimination of discrimination in respect of employment and occupation (Kamata, 2014).

[7] Shen & Silva (2018) analyse the case of American workers: they study the relationship between involvement in GPNs (measured as the value added of exports from China) and wages in the U.S., finding that the effects depend on the position (upstreamness or downstreamness) of the Chinese industry in the GVC.

[8] The linkage between labour processes and GVCs are also the subject of the homonymous book *Putting Labour in its Place* (Newsome et al., eds. 2015). The integration of the labour process theory into the area of global production sharing is reflected in numerous case studies as well as theoretical work, but as they are not directly relevant to our social upgrading focus, for reasons of space we do not cite these works here.

[9] Access to the micro-level SES data was granted by Eurostat on an individual research proposal (Proposal 225/2016-EU-SILC-SES). For methodological aspects of SES and the microdata access procedures, see: https://ec.europa.eu/eurostat/web/microdata/structure-of-earnings-survey

[10] We use indicators that fit into the value chain perspective, but these cannot measure the actual dynamics in the employment relationship and the labour process, such as intensification of work, informal hours, etc. We are grateful to an anonymous referee for this valuable remark.

[11] This is in line with the slow wage convergence documented by Author B.

[12] We are grateful to Piotr Lewandowski from IBS Warsaw for sharing cross-country occupation-specific routinisation indices. We match them with workers' ISCO-08 occupation given in SES. For most countries and occupations we use 3-digit ISCO-08 codes, for some countries the 2-digit classification (a detailed description of the unification process is available on request). Further, for some countries where data are lacking, we take those of the most similar country (in terms of economic development, location, and size): for Luxembourg we use the values of Belgium; for Bulgaria, Hungary, and Romania, those of Poland; for Croatia, those of Slovenia; for Latvia, those of Lithuania; for Portugal, those of Spain; for Malta, Cyprus; and for Switzerland, Germany.

[13] In order to match SES with WIOD we have adjusted some sector/division classifications; in particular we use more highly aggregated levels of certain divisions. A detailed description of these transformations is available upon request.

[14] Their   code   to   compute   *GII*   with   WIOD   data   is   available   at: https://ezarzadzanie.zie.pg.gda.pl/apps/WorkingPapers/WP_GUTFME_A_53_code_accompanyingWP53_GII_56ind.R

[15] Alternatively we express relative wages in relation to the sectoral median. The results of this robustness check are reported in Table C4 in supplementary materials.

[16] Enterprise size and contract type are not available for all individuals; the data on firm size are lacking for Cyprus, Spain, Luxembourg and Malta, those on type of employment contract for Sweden.

[17] A similar approach to assessing the effects of trade shocks on workers has been used, among others, by Autor et al. (2014), who examine worker-level adjustment to trade with China. They compute their trade exposure variable as the change in import penetration in U.S. industries between 1991 and 2007.

[18] Endogenity may be connected to the two-way relationship between working conditions and production fragmentation. However, we argue that unlike the specification in which wages or other dependent variables are measured at a more highly aggregated level (say, sectoral), our specification is most unlikely to produce a situation in which the wage of an individual worker (working overtime hours and/or receiving bonus payments) can influence the decision of an entire industry concerning production fragmentation or GVC involvement. For a similar approach see e.g Baumgarten (2015), Ebenstein et al. (2014), Geishecker et al. (2010)). Nevertheless, casuality should be treated with caution.

[19] Specifically, we recalculate the grossing-up factor for employees (from SES) in such a way that for the pooled sample of 24 countries the observations from each country sum to 10 000 in order to give each country equal weight in the model. We thank Piotr Paradowski for the Stata codes; see more in: LIS Self Teaching Package 2018, Stata version: http://www.lisdatacenter.org/wp-content/uploads/files/resources-stata-Part-II.pdf

[20] As a robustness check, we also estimate equations (3) and (4) using the Tobit model (see Table C13 in Apendix). The results confirm that the greater the increase in *GII*, the lower the share of overtime hours and the higher the share of bonus payments in total earnings. However, the Tobit model is not fully appropriate because the data are not censored, but are defined over [0,1].

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Table 1. Estimation results – the impact of GVC on working conditions assessed via wages

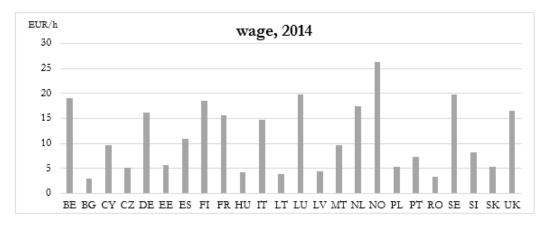| Dependent variable	lnwage: wage expressed in relation to the sectoral mean					
	(1)	(2)	(3)	(4)	(5)	(6)
sex (male=1)	0.114***	0.114***	0.116***	0.117***	0.120***	0.120***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
ageyoung	-0.150***	-0.150***	-0.149***	-0.149***	-0.144***	-0.144***
	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]
ageaverage	-0.027**	-0.027**	-0.024**	-0.024**	-0.023**	-0.023**
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
loweduc	-0.262***	-0.262***	-0.257***	-0.257***	-0.262***	-0.262***
	[0.012]	[0.012]	[0.009]	[0.009]	[0.010]	[0.010]
mededuc	-0.202***	-0.202***	-0.204***	-0.204***	-0.212***	-0.212***
	[0.007]	[0.007]	[0.006]	[0.006]	[0.007]	[0.007]
shortdur	-0.133***	-0.133***	-0.116***	-0.116***	-0.090***	-0.090***
	[0.007]	[0.007]	[0.006]	[0.006]	[0.005]	[0.005]
meddur	-0.092***	-0.092***	-0.080***	-0.080***	-0.071***	-0.072***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
RTI	-0.438***	-0.438***	-0.441***	-0.441***	-0.449***	-0.449***
	[0.014]	[0.014]	[0.013]	[0.013]	[0.013]	[0.013]
ln_Prod	-0.038***	-0.037***	-0.049***	-0.048***	-0.047***	-0.047***
	[0.009]	[0.009]	[0.012]	[0.012]	[0.012]	[0.012]
ΔGII	**-0.032****	**-0.028***	**-0.036*****	**-0.032****	**-0.039*****	**-0.035*****
	[0.015]	[0.015]	[0.012]	[0.012]	[0.012]	[0.012]
UP		-0.018		-0.017		-0.017
		[0.011]		[0.012]		[0.012]
Size_small			-0.161***	-0.161***	-0.169***	-0.169***
			[0.015]	[0.015]	[0.015]	[0.015]
Size_medium			-0.047***	-0.047***	-0.052***	-0.052***
			[0.013]	[0.013]	[0.014]	[0.014]
indefinite					0.077***	0.076***
					[0.008]	[0.008]
R²	0.24	0.24	0.25	0.25	0.26	0.26
N	8929690	8929690	8803884	8803884	8571469	8571469

Notes: Country and industry dummies included. Normalised weighted regression with robust standard errors, clustered at industry, the weights are based on grossing-up factor for employees (from SES) normalised by the number of observation per country (see main text for the details); Default categories: ageold, higheduc, large, temporary, longdur and vlongdur; *p ≤ .10, **p ≤ .05, ***p ≤ .01.
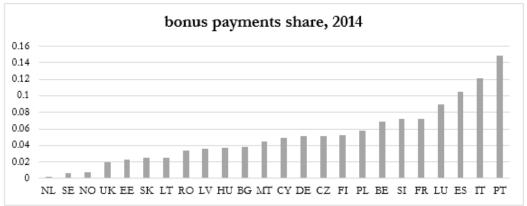Source: own elaboration based on data from SES and WIOD

Table 2. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments

Dependent variable	Share of overtime hours		Share of bonus payments	
	(1)	(2)	(3)	(4)
Proportion				
ΔGII	-0.009	-0.011	-0.039***	-0.049***
	[0.014]	[0.014]	[0.005]	[0.005]
UP		0.014		0.051***
		[0.011]		[0.005]
Probability of being zero				
ΔGII	0.274***	0.242***	-0.089***	-0.177***
	[0.020]	[0.020]	[0.014]	[0.015]
UP		0.171***		0.342***
		[0.015]		[0.013]
ll	-828241	-827649	4154726	4159051
N	8929690	8929690	8929654	8929654

Notes: Individual and firm characteristics as in specification (2) of Table 1. Country and industry dummies included. Zero-inflated beta regression, estimated with command ZOIB in STATA (Buis, 2010). Normalised weighted regression with robust standard errors, the weights are based on grossing-up factor for employees (from SES) normalised by the number of observation per country (see main text for the details). $*p \leq .10$, $**p \leq .05$, $***p \leq .01$. Source: own elaboration based on data from SES and WIOD

Figure 1. Working conditions in European countries
Source: Own elaboration based on SES 2014 data.
Note: variables described in the main text. Within-country sample averages weighted by grossing-up factor for employees (from SES)

Figure 2. Global import intensity (*GII*) growth rate 2004-2014

Notes: weighted by sectors' value added

Source: own elaboration based on WIOD 2014

Supplementary materials – not to be included in main text

Appendix A. Dataset description

Table A1. List of countries

Country code	Country name	Country code	Country name
BE	Belgium	LU	Luxembourg
BG	Bulgaria	LV	Latvia
CY	Cyprus	MT	Malta
CZ	Czech Republic	NL	Netherlands
DE	Germany	NO	Norway
EE	Estonia	PL	Poland
ES	Spain	PT	Portugal
FI	Finland	RO	Romania
FR	France	SE	Sweden
HU	Hungary	SI	Slovenia
IT	Italy	SK	Slovak Republic
LT	Lithuania	UK	United Kingdom

Table A2. Descriptive statistics of the dependent variables - by countries.

country	wages					overtimes share					bonus payments share				
	N	Mean	Sd	Max	Min	N	Mean	Sd	Max	Min	N	Mean	Sd	Max	Min
BE	132018	19.004	6.402	41.870	6.010	132018	0.001	0.009	0.205	0	132018	0.069	0.014	0.901	0
BG	121513	2.938	2.437	41.543	1.324	121513	0.003	0.014	0.255	0	121513	0.038	0.079	0.985	0
CY	27930	9.633	5.837	41.730	1.920	27930	0.005	0.020	0.299	0	27930	0.049	0.046	0.718	0
CZ	1994246	5.076	3.153	41.863	1.322	1994246	0.013	0.027	0.333	0	1994246	0.052	0.085	0.936	0
DE	881327	16.114	7.645	41.870	1.330	881327	0.004	0.020	0.714	0	881327	0.051	0.056	0.961	0
EE	114887	5.631	3.555	40.830	1.580	114887	0.003	0.015	0.352	0	114887	0.022	0.050	0.998	0
ES	199255	10.940	5.603	41.850	1.550	199255	0.001	0.010	0.394	0	199255	0.105	0.088	0.887	0
FI	288658	18.480	6.210	41.870	4.030	288658	0.004	0.014	0.388	0	288658	0.052	0.033	1.000	0
FR	211807	15.614	6.203	41.870	1.350	211807	0.014	0.030	0.386	0	211807	0.072	0.093	0.959	0
HU	867316	4.289	3.146	41.841	1.322	867316	0.005	0.019	0.231	0	867316	0.037	0.070	0.972	0
IT	173342	14.689	6.794	41.870	2.010	173342	0.014	0.029	0.372	0	173342	0.121	0.051	0.982	0
LT	39427	3.931	2.694	40.973	1.497	39427	0.001	0.007	0.156	0	39427	0.025	0.068	0.899	0
LU	19227	19.794	7.981	41.850	2.280	19227	0.006	0.019	0.360	0	19227	0.089	0.079	0.842	0
LV	152965	4.370	3.226	41.860	1.330	152965	0.002	0.011	0.333	0	152965	0.036	0.070	0.922	0
MT	36987	9.722	4.901	41.240	4.140	36987	0.016	0.031	0.379	0	36987	0.044	0.032	0.624	0
NL	133688	17.351	7.202	41.800	2.600	133688	0.004	0.022	0.321	0	133688	0.002	0.011	0.687	0
NO	1132466	26.336	6.402	41.875	5.985	1132466	0.005	0.016	0.406	0	1132466	0.008	0.033	0.976	0
PL	655035	5.272	3.822	41.818	1.745	655035	0.007	0.024	0.700	0	655035	0.058	0.089	0.942	0
PT	82711	7.283	5.240	41.710	1.560	82711	0.004	0.018	0.385	0	82711	0.149	0.053	0.964	0
RO	206913	3.335	2.757	41.551	1.321	206913	0.007	0.022	0.343	0	206913	0.033	0.071	0.872	0
SE	234774	19.703	5.553	41.839	7.547	234774	0.005	0.019	0.389	0	234774	0.007	0.029	0.993	0
SI	252896	8.272	4.536	41.790	1.360	252896	0.008	0.024	0.400	0	252896	0.072	0.069	0.985	0
SK	831476	5.245	3.338	41.870	2.020	831476	0.008	0.023	0.387	0	831476	0.025	0.056	0.941	0
UK	141278	16.582	7.837	41.867	2.531	141278	0.009	0.033	0.758	0	141278	0.020	0.060	1.000	0

Note: weights applied. based on grossing-up factor for employees (from SES)
Source: Own elaboration based on SES 2014 data.

Table A3. Descriptive statistics of the dependent variables - by industries.

NACE	wages					overtimes share					bonus payments share				
	N	Mean	Sd	Max	Min	N	Mean	Sd	Max	Min	N	Mean	Sd	Max	Min
B	77390	10.159	9.067	41.875	1.321	77390	0.013	0.029	0.294	0	77390	0.077	0.085	0.973	0
C	1742441	9.729	8.131	41.874	1.321	1742441	0.010	0.026	0.434	0	1742441	0.060	0.077	1.000	0
D E	219093	10.201	8.563	41.871	1.321	219093	0.009	0.023	0.379	0	219093	0.067	0.074	0.985	0
F	291436	10.795	8.226	41.873	1.321	291436	0.007	0.023	0.367	0	291436	0.042	0.071	1.000	0
S	5515019	11.510	8.435	41.875	1.321	5515019	0.005	0.020	0.750	0	5515019	0.051	0.072	1.000	0
P	1086799	12.766	9.868	41.874	1.321	1086799	0.003	0.016	0.758	0	1086799	0.041	0.053	1.000	0

Notes: B-mining and quarrying; C-manufacturing; DE-electricity. gas. steam and air conditioning supply and water supply; sewerage. waste management and remediation activities; F-construction; S-services (sectors G-O and Q R S); P –education. Normalised weights applied.

Source: Own elaboration based on SES 2014 data.

Table A4. Correlations between different measures of working conditions

	wages	overtimes share	bonus payments share
wages	1.000		
overtimes share	-0.082	1.000	
bonus payments share	-0.088	-0.003	1.000

Note: Sample of 8.932.178 workers from 24 European countries listed in Table A1

Source: Own elaboration based on SES 2014 data.

Table A5. Summary statistics of micro-level data.

	Variable	N	Mean	Sd	Min	Max
Working conditions	*wage (gross hourly wage per hour. in EUR)*	8932142	11.233	8.552	1.321	41.875
	overtimes_share	8932142	0.006	0.021	0	0.758
	bonus payments share	8932142	0.052	0.072	0	1.000
Personal characteristics	*sex (=1 if male)*	8932142	0.508	0.500	0	1
	ageyoung (=1 if below 30 years)	8932142	0.181	0.385	0	1
	ageaverage (=1 if between 30-49 years old)	8932142	0.528	0.499	0	1
	ageold (=1 if 50 years old or more)	8932142	0.292	0.455	0	1
	loweduc (=1 if less than primary. primary. lower primary)	8932142	0.166	0.372	0	1
	mededuc(=1 if upper secondary and post-secondary)	8932142	0.479	0.500	0	1
	higheduc(=1 if tertiary education)	8932142	0.355	0.476	0	1
Employment and firm characteristics	*shortdur(=1 if less than 1 year in the enterprise)*	8932142	0.128	0.334	0	1
	meddur(=1 if 1-4 years in the enterprise)	8932142	0.313	0.464	0	1
	longdur (=1 if 5-14 years in the enterprise)	8932142	0.376	0.484	0	1
	vlongdur (=1 if 15 or more years in the enterprise)	8932142	0.183	0.386	0	1
	small(=1 if 1-49 employees in the firm)	8806327	0.295	0.456	0	1
	medium(=1 if 50-249 employees in the firm)	8806327	0.246	0.431	0	1
	large (=1 if 250 or more employees in the firm)	8806327	0.459	0.498	0	1
	indefinite(=1 if indefinite duration of employment contract)	8697368	0.873	0.332	0	1

Notes: (1) values in a sample of 24 European countries listed in Table A1 (2014); (2) Normalised weights applied; (3) *Wages* and *bonus payments* as well as total earnings are given in national currency, which we convert into EUR using exchange rates from Eurostat. For *wages, overtimes* and total earnings we remove the extreme values (below the 1st and above the 99th percentile), which might distort the results; (4) for *overtimes share* we use the ratio of overtime hours paid in the reference month (i.e. hours worked above those of the normal or conventional working month) to the total number of hours actually paid (hours *actually* paid means normal and overtime hours worked and remunerated. Hours not worked but nevertheless paid are counted as "paid hours", e.g. for annual leave, public holidays, paid sick leave, paid vocational training, paid special leave etc. (Eurostat, 2014); (5) for *bonus payments share* we compute the ratio of bonus payments (periodic, irregular, ad-hoc and exceptional bonuses and other payments that do not occur in every pay period; typical examples are Christmas and holiday bonuses, 13th or 14th month payments, allowances for leave not taken, occasional commissions, productivity bonuses and profit-sharing premiums) to gross annual earnings in the reference year. Note that gross annual earnings also include all payments not occurring regularly in each (monthly) pay period, i.e. the bonus payments, Eurostat (2014); (6) for *sex* we use a binary variable (0 for female, 1 for male). *Age* is in cohorts: 14-19, 20-29, 30-39, 40-49, 50-59 and 60+ which we recode into: *ageyoung* (below 30), *ageaverage* (30-49) and *ageold* (50 and more). The education variable is the highest completed level of education according to the ISCED-2011 classification. We recode this variable into three variables: *loweduc, mededuc and higheduc*, corresponding respectively to the G1 level (less than primary, primary, lower secondary), the G2 level (upper secondary and post-secondary) and the G3 or G4 level (tertiary education up to 4 years and more than 4 years). Type of employment contract is expressed by 3 variables: *indefinite, temporary*, and *apprentice*. Seniority is recoded into 4 variables: *shortdur* for less than 1 year, *meddur* for 1 to 4 years, *longdur* for 5 to 14 years and *vlongdur* for 15 years and more; (7) we recode size of enterprise into 3 variables: *small, medium* and *large* for work force of respectively 1-49, 50-249, and 250 or more.

Source: Own elaboration based on SES 2014 data.

Table A6. List of sectors in WIOD database.

Sector code	Description
B	Mining and quarrying
C10-C12	Manufacture of food products. beverages and tobacco products
C13-C15	Manufacture of textiles. wearing apparel and leather products
C16	Manufacture of wood and of products of wood and cork. except furniture; manufacture of articles of str..
C17	Manufacture of paper and paper products
C18	Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24	Manufacture of basic metals
C25	Manufacture of fabricated metal products. except machinery and equipment
C26	Manufacture of computer. electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29	Manufacture of motor vehicles. trailers and semi-trailers
C30	Manufacture of other transport equipment
C33	Repair and installation of machinery and equipment
D35	Electricity. gas. steam and air conditioning supply
E36	Water collection. treatment and supply
E37-E39	Sewerage; waste collection. treatment and disposal activities; materials recovery; remediation activities
F	Construction
G45	Wholesale and retail trade and repair of motor vehicles and motorcycles
G46	Wholesale trade. except of motor vehicles and motorcycles
G47	Retail trade. except of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities
I	Accommodation and food service activities
J58	Publishing activities
J59_J60	Motion picture. video and television programme production. sound recording and music publishing activities
J61	Telecommunications
J62_J63	Computer programming. consultancy and related activities; information service activities
K64	Financial service activities. except insurance and pension funding
K65	Insurance. reinsurance and pension funding. except compulsory social security
K66	Activities auxiliary to financial services and insurance activities
M69_M70	Legal and accounting activities; activities of head offices; management consultancy activities
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73	Advertising and market research
M74_M75	Other professional. scientific and technical activities; veterinary activities
N	Administrative and support service activities
O84	Public administration and defence; compulsory social security
P85	Education
Q	Human health and social work activities
R_S	Other service activities

Appendix B. Extensions and sensitivity analysis

Assuming that national labour market arrangements may influence the relationship between GVC measures and working conditions, we also use an institutional labour market index derived from the ICTWSS database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (Visser, 2016). Specifically, we group countries according to the wage setting mechanism: wage bargaining at company level (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, United Kingdom); and predominantly industry-wide and centralised bargaining (Belgium, Germany, Finland, France, Italy, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden).[21] The results, reported in Table B1, indicate that the negative effect of change in GVC materialises mainly in countries with centralised wage bargaining, while a powerful company-level adjustment mechanism can offset the wage shock associated with rising *GII*.

Table B1. Estimation results – the impact of GVC on working conditions assessed via wages, sample of workers from countries with different wage bargaining schemes

Dependent variable	lnwage: wage expressed in relation to the sectoral mean							
	Wage bargaining = 0				*Wage bargaining =1*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	**-0.02**	**-0.014**	**-0.003**	**0.005**	**-0.057****	**-0.059****	**-0.063****	**-0.065****
	[0.021]	[0.019]	[0.021]	[0.023]	[0.023]	[0.025]	[0.024]	[0.026]
UP		-0.021		-0.029*		0.01		0.015
		[0.014]		[0.017]		[0.019]		[0.019]
R²	0.22	0.22	0.23	0.23	0.33	0.33	0.34	0.34
N	5209189	5209189	5124658	5124658	3720501	3720501	3679226	3679226

Notes: Individual and firm characteristics as in Table 1. Specifications: (3), (4), (7), (8) with additional firm's characteristics considering its size. Wage bargaining = 0 stands for predominant company level, Wage bargaining = 1 for predominant centralised wage bargaining scheme.

Source: own elaboration based on data from SES and WIOD

When working conditions are gauged by the shares of overtime and bonus payments, the effect is more complex (Table B2). The decreased probability of overtime work and increased of receiving bonus payments in sectors where GVC participation increases more sharply is sustained in

countries with different level of wage-setting mechanisms (coefficients on GVC in lower panel). However, for those workers who work overtimes, greater GVC integration results in a lower share of overtime hours in countries where collective bargaining is at the company level.. Importantly, collective bargaining either at industry/national or at company level allows for improvements in share of bonus payments for all workers in the industry (upper panel).

Table B2. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, countries split by different wage bargaining schemes

Dependent variable	*Wage bargaining=0*				*Wage bargaining=1*			
	Share of overtime hours		Share of bonus payments		Share of overtime hours		Share of bonus payments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Proportion								
ΔGII	-0.096***	-0.095***	-0.058***	-0.073***	-0.014	-0.003	-0.024***	-0.022***
	[0.019]	[0.019]	[0.007]	[0.007]	[0.015]	[0.015]	[0.004]	[0.004]
UP		-0.003		0.055***		-0.087***		-0.014**
		[0.014]		[0.007]		[0.020]		[0.006]
Probability of being zero								
ΔGII	0.248***	0.236***	-0.057***	-0.063***	0.130***	0.067**	-0.308***	-0.319***
	[0.027]	[0.027]	[0.018]	[0.019]	[0.028]	[0.029]	[0.018]	[0.018]
UP		0.046**		0.012		0.413***		0.044**
		[0.021]		[0.017]		[0.022]		[0.020]
ll	-529391	-528989	1005996	1007938	-283837	-282830	3140969	3140996
N	5209189	5209189	5209157	5209157	3720501	3720501	3720497	3720497

Notes: Individual and firm characteristics as in Specification 2 of Table 1 .*p ≤ .10, **p≤ .05, ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

As further sensitivity checks, we have also classified countries by various labour market measures, such as: articulation of enterprise bargaining (countries where bargaining is not under union control, those with supplementary wage bargaining restricted by law or sectoral agreement or under union control),[22] coordination of wage-setting,[23] and whether collective agreements contain general opening clauses.[24] The results confirm the general conclusions set out above.[25] Wages are affected mainly in countries with centralised coordination of wage bargaining, where collective agreements contain general opening clauses, and where supplementary company-level bargaining is under trade union control.

We have run separate regressions for "old" and "new" EU Member States. The old members (OMS) are Belgium, Germany, Finland, France, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom; the new (NMS) are Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, Slovenia. The wage impact of changing GVC involvement is confirmed for OMS rather than NMS (Table B3). When working conditions are assessed using our other two measures, the situation is different (Table B4). The probability of overtime work does not depend on national status as "old" or "new" EU member, but instable remuneration with the rise of GVC is more likely for workers from NMS. Additionally, there are some differences for workers who already have overtime hours and bonus payments. The negative correlation between rising production fragmentation and share of overtime hours is observed for workers in the new members, while in the old member states the correlation is positive.. Interestingly, the effect of an increase in global import intensity on the share of bonus payments differs between OMS and NMS. In the former, in sectors that are more import-dependent the share of bonus payments is lower, which may contribute to greater wage stability. In the latter, this relationship is reversed or not statistically significant and, in line with our previous results, confirms the negative effect of GVCs on wage stabilisation.

Table B3. Estimation results – the impact of GVC on working conditions assessed via wages, sample of workers from Old Member States versus workers from New Member States

Dependent variable	lnwage: wage expressed in relation to the sectoral mean							
	OMS				NMS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	**-0.038***	**-0.03**	**-0.067****	**-0.067****	**-0.023**	**-0.023**	**-0.002**	**0.002**
	[0.022]	[0.025]	[0.025]	[0.026]	[0.023]	[0.022]	[0.021]	[0.022]
UP		-0.026		0.002		-0.001		-0.015
		[0.027]		[0.020]		[0.016]		[0.021]
R²	0.33	0.33	0.35	0.35	0.22	0.22	0.23	0.23
N	2495680	2495680	2435178	2435178	5301556	5301556	5236252	5236252

Notes: as under Table B1.

Source: own elaboration based on data from SES and WIOD

Table B4. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, OMS versus NMS

	OMS				NMS			
	Share of overtime hours		Share of bonus payments		Share of overtime hours		Share of bonus payments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Proportion								
ΔGII	0.058***	0.067***	-0.092***	-0.087***	-0.194***	-0.194***	0.016**	0.005
	[0.019]	[0.021]	[0.007]	[0.006]	[0.021]	[0.021]	[0.007]	[0.007]
UP		-0.026		-0.021**		-0.005		0.058***
		[0.022]		[0.009]		[0.017]		[0.008]
Probability of being zero								
ΔGII	0.102***	0.144***	0.182***	0.045*	0.422***	0.417***	-0.075***	-0.060***
	[0.030]	[0.032]	[0.022]	[0.023]	[0.027]	[0.028]	[0.020]	[0.020]
UP		-0.123***		0.340***		0.076***		-0.056***
		[0.031]		[0.025]		[0.026]		[0.021]
ll	-213919	-213860	1906226	1906679	-507129	-507194	1447188	1505416
N	2495680	2495680	2495652	2495652	5301556	5301556	5301548	5301548

Notes: as under Table B2.

Source: own elaboration based on data from SES and WIOD

We also ran a number of robustness checks.[26] These involved measuring wages in relation to the median rather than the mean for the sector; calculating the mean for sectors at a lower level of aggregation (e.g. NACE); and calculating the change in GII for 5-year and 15-year intervals: 2014/2009 and 2014/2000. In all these cases the results are fairly similar to benchmark. For wages, the 5-year period does not give statistically significant results, which might reflect a slowdown in the advance of production fragmentation in the wake of the crisis (Timmer *et al.*, 2016). We also augmented the regression by additional country characteristics, namely size and openness. Finally, we eliminated observations country-by-country and sector-by-sector, to check whether the results are driven by some specific country or sector. Again the original findings are confirmed; that is, the relationship between changing GVC participation and working conditions is not straightforward. As for wages, there is a clear negative relationship with ΔGII. In sectors where production fragmentation has increased more, wages are relatively lower, which can be seen as a deterioration in working conditions due to GVC involvement. However, the effect of

ΔGII on the probability of overtime work and bonus payments for workers who already have them varies. In sectors with more growth of *GII*, workers usually are less likely to work overtime which can be seen as an improvement in working conditions but are more likely to receive bonuses (less stable remuneration) Finally, for employees who do have some overtime hours and/or bonus payments their share of the total in GII-intensive sectors, is heterogeneous in relation to the specific labour markets regulations.

Finally, we differentiate between value chains based on the intermediates coming from different source countries either from high income (GII^{HIC}) or from developing countries (GII^{DEV})[1]. As far as wages are considered, the negative effects is mainly materialised through the growth of GII^{DEV} while for other working conditions (overtime hours and bonus payments) the situation is more complex. The probability of not having overtime hours rises with the different types of GII while the proportion of overtime hours is lower when value chains are from high income countries. The proportions of bonus payments are lower for all kinds of GII while GII^{HIC} reduces the probability of zero bonus payments. (Table B5 and B6).

Table B5. Estimation results – the impact of GVC on working conditions assessed via wages, GII from high income countries (GII^{HI}) versus GII from developing countries (GII^{DEV})

	GII^{HI}		GII^{DEV}	
	(1)	(2)	(3)	(4)
ΔGII	-0.021	-0.017	-0.016***	-0.014***
	[0.017]	[0.016]	[0.004]	[0.004]
UP		-0.021*		-0.021*
		[0.011]		[0.011]
R²	0.24	0.24	0.24	0.24
N	8929690	8929690	8929690	8929690

Notes: Individual and firm characteristics as in Table 1.

Source: own elaboration based on data from SES and WIOD

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[1] *HIC (high income countries)*=AUS, AUT, BEL, CAN, HRV, CYP, CZE, DNK, EST, FIN, FRA, DEU, GRC, HUN, IRL, ITA, JPN, KOR, LVA, LTU, LUX, MLT, NLD, NOR, POL, PRT, SVK, SVN, ESP, SWE, CHE, TWN, GBR, USA; *DEV (developing countries)*= BRA, BGR, CHN, IND, IDN, MEX, ROM, RUS, TUR. The classification of countries is based on the World Bank's list of economies (July 2016).

Table B6. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, GII from high income countries (GII^{HI}) versus GII from developing countries (GII^{DEV})

	Share of overtime hours		Share of bonus payments	
	GII^{HI}	GII^{DEV}	GII^{HI}	GII^{DEV}
	(1)	(2)	(3)	(4)
Proportion				
ΔGII	-0.030**	0.005	-0.053***	-0.037***
	[0.012]	[0.008]	[0.005]	[0.003]
UP	0.016	0.012	0.050***	0.047***
	[0.011]	[0.011]	[0.005]	[0.005]
Probability of being zero				
ΔGII	0.092***	0.184***	-0.127***	0.033***
	[0.019]	[0.011]	[0.014]	[0.010]
UP	0.197***	0.182***	0.329***	0.288***
	[0.015]	[0.015]	[0.013]	[0.013]
ll	-828456	-826842	4157507	4157345
N	8929690	8929690	8929690	8929690

Notes: as under Table B2.

.   *p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

Appendix C. Robustness check

Table C1. Estimation results – the impact of GVC on working conditions assessed via wages, sample of workers from countries with different articulation of enterprise bargaining (Art)

	Art = 0				Art=1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	-0.022	-0.014	-0.032	-0.022	-0.042**	-0.043**	-0.041**	-0.043**
	[0.027]	[0.025]	[0.021]	[0.019]	[0.016]	[0.017]	[0.016]	[0.017]
UP		-0.036**		-0.041**		0.004		0.011
		[0.016]		[0.020]		[0.014]		[0.016]
R²	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27
N	4503561	4503561	4466296	4466296	4426129	4426129	4337588	4337588

Notes: Individual and firm characteristics as in Table 1. Specifications: (3). (4). (7). (8) with additional firm's characteristics considering its size. Art=0 if additional enterprise bargaining on wages when it happens is. formally or informally. also conducted by non-union bodies (not under union control) or the articulation does not apply; Art =1

if additional enterprise bargaining on wages when it happens is informal and suppressed or restricted by law or sectoral agreement or additional enterprise bargaining on wages is recognized and takes place under control of union

Source: own elaboration based on data from SES and WIOD

Table C2. Estimation results – the impact of GVC on working conditions assessed via wages, sample of workers from countries with different coordination of wage-setting (Coord)

	Coord = 0				Coord=1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	-0.022	-0.019	-0.019	-0.014	-0.046**	-0.045*	-0.047**	-0.047**
	[0.023]	[0.021]	[0.020]	[0.019]	[0.022]	[0.023]	[0.021]	[0.022]
UP		-0.013		-0.015		-0.009		-0.005
		[0.016]		[0.020]		[0.021]		[0.021]
R²	0.23	0.23	0.24	0.24	0.3	0.3	0.31	0.31
N	4672231	4672231	4587700	4587700	4257459	4257459	4216184	4216184

Notes: Individual and firm characteristics as in Table 1. Specifications: (3). (4). (7). (8) with additional firm's characteristics considering its size. Coord=0 for countries with mixed industry and firm-level bargaining. with no or little pattern bargaining and relatively weak elements of government coordination through the setting of minimum wage or wage indexation or fragmented wage bargaining. confined largely to individual firms or plants; Coord=1 for centralised or industry level bargaining.

Source: own elaboration based on data from SES and WIOD

Table C3. Estimation results – the impact of GVC on working conditions assessed via wages, sample of workers from countries with different general opening clauses in collective agreement (Ocg)

	Ocg = 0				Ocg=1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	-0.021	-0.017	-0.009	-0.004	-0.051**	-0.054**	-0.056**	-0.060**
	[0.020]	[0.019]	[0.022]	[0.022]	[0.021]	[0.023]	[0.023]	[0.025]
UP		-0.014		-0.018		0.017		0.02
		[0.013]		[0.016]		[0.017]		[0.018]
R²	0.23	0.23	0.24	0.24	0.33	0.33	0.34	0.34
N	5462089	5462089	5377558	5377558	3467601	3467601	3426326	3426326

Notes: Individual and firm characteristics as in Table 1. Specifications: (3). (4). (7). (8) with additional firm's characteristics considering its size. Ocg=0 for countries if agreements contain no opening clauses; Ocg=1 for countries if agreements contain general opening clauses. defined as renegotiation of contractual provisions at lower levels. under specified conditions

Source: own elaboration based on data from SES and WIOD

Table C4. Estimation results – the impact of GVC on working conditions assessed via wages, wage expressed in relation to the sectoral median

Dependent variable	lnwage: wage expressed in relation to the sectoral **median**					
	(1)	(2)	(3)	(4)	(5)	(6)
sex (male=1)	0.131***	0.131***	0.135***	0.135***	0.138***	0.138***
	[0.007]	[0.007]	[0.008]	[0.008]	[0.007]	[0.007]
ageyoung	-0.168***	-0.168***	-0.166***	-0.166***	-0.161***	-0.161***
	[0.016]	[0.016]	[0.017]	[0.017]	[0.017]	[0.017]
ageaverage	-0.029**	-0.029**	-0.025**	-0.025**	-0.024*	-0.024*
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]
loweduc	-0.303***	-0.303***	-0.299***	-0.299***	-0.305***	-0.305***
	[0.015]	[0.015]	[0.014]	[0.014]	[0.015]	[0.015]
mededuc	-0.240***	-0.240***	-0.244***	-0.244***	-0.255***	-0.255***
	[0.010]	[0.010]	[0.009]	[0.009]	[0.010]	[0.010]
shortdur	-0.154***	-0.154***	-0.135***	-0.135***	-0.107***	-0.107***
	[0.008]	[0.008]	[0.007]	[0.007]	[0.006]	[0.006]
meddur	-0.104***	-0.104***	-0.090***	-0.090***	-0.081***	-0.081***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
RTI	-0.511***	-0.511***	-0.515***	-0.515***	-0.526***	-0.526***
	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]	[0.019]
ln_Prod	-0.033***	-0.033***	-0.042**	-0.042**	-0.039**	-0.039**
	[0.011]	[0.011]	[0.016]	[0.016]	[0.016]	[0.016]
ΔGII	-0.051***	-0.052***	-0.054***	-0.056***	-0.059***	-0.062***
	[0.018]	[0.019]	[0.015]	[0.016]	[0.015]	[0.015]
UP		0.004		0.009		0.01
		[0.014]		[0.014]		[0.014]
Size_small			-0.185***	-0.186***	-0.195***	-0.195***
			[0.017]	[0.017]	[0.018]	[0.018]
Size_medium			-0.052***	-0.052***	-0.057***	-0.057***
			[0.015]	[0.015]	[0.016]	[0.016]
indefinite					0.085***	0.085***
					[0.010]	[0.010]
R²	0.23	0.23	0.24	0.24	0.25	0.25
N	8929690	8929690	8803884	8803884	8571469	8571469

Notes: Country and industry dummies included. Normalised weighted regression with robust standard errors. clustered at industry. the weights are based on grossing-up factor for employees (from SES) normalised by the number of observation per country (see main text for the details); Default categories: ageold. higheduc. large. temporary. longdur and vlongdur; *p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

Table C5. Estimation results – the impact of GVC on working conditions assessed via wages, wage expressed in relation to the sectoral (NACE level) mean

Dependent variable	lnwage: wage expressed in relation to the sectoral **mean**					
	(1)	(2)	(3)	(4)	(5)	(6)
sex (male=1)	0.113***	0.114***	0.116***	0.117***	0.119***	0.120***
	[0.006]	[0.006]	[0.007]	[0.007]	[0.006]	[0.007]
ageyoung	-0.151***	-0.151***	-0.149***	-0.149***	-0.144***	-0.144***
	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]
ageaverage	-0.028**	-0.028**	-0.024**	-0.024**	-0.023**	-0.023**
	[0.010]	[0.010]	[0.011]	[0.011]	[0.011]	[0.011]
loweduc	-0.263***	-0.263***	-0.258***	-0.258***	-0.262***	-0.262***
	[0.013]	[0.013]	[0.011]	[0.011]	[0.012]	[0.012]
mededuc	-0.204***	-0.204***	-0.206***	-0.206***	-0.214***	-0.214***
	[0.009]	[0.009]	[0.008]	[0.008]	[0.008]	[0.008]
shortdur	-0.135***	-0.135***	-0.117***	-0.117***	-0.090***	-0.091***
	[0.007]	[0.007]	[0.006]	[0.006]	[0.005]	[0.005]
meddur	-0.094***	-0.094***	-0.081***	-0.081***	-0.072***	-0.072***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.005]
RTI	-0.442***	-0.442***	-0.445***	-0.445***	-0.453***	-0.453***
	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]
ln_Prod	-0.016	-0.015	-0.022	-0.022	-0.021	-0.02
	[0.010]	[0.010]	[0.014]	[0.014]	[0.014]	[0.014]
ΔGII	-0.027*	-0.024	-0.029**	-0.026**	-0.033**	-0.029**
	[0.015]	[0.015]	[0.012]	[0.012]	[0.012]	[0.012]
UP		-0.015		-0.013		-0.015
		[0.010]		[0.011]		[0.010]
Size_small			-0.163***	-0.162***	-0.171***	-0.170***
			[0.015]	[0.015]	[0.015]	[0.015]
Size_medium			-0.046***	-0.046***	-0.051***	-0.051***
			[0.014]	[0.014]	[0.015]	[0.015]
indefinite					0.078***	0.078***
					[0.008]	[0.008]
R²	0.26	0.26	0.27	0.27	0.27	0.27
N	8929690	8929690	8803884	8803884	8571469	8571469

Notes: Country and industry dummies included. Normalised weighted regression with robust standard errors. clustered at industry. the weights are based on grossing-up factor for employees (from SES) normalised by the number of observation per country (see main text for the details); Default categories: ageold. higheduc. large. temporary. longdur and vlongdur; *p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

Table C6. Estimation results – the impact of GVC on working conditions assessed via wages, ΔGVC calculated between 2014-2000 and 2014 - 2009

	ΔGVC: 2014 – 2000		ΔGVC: 2014 - 2009	
	(1)	(2)	(3)	(4)
ΔGII	-0.027***	-0.024***	-0.02	-0.013
	[0.008]	[0.008]	[0.014]	[0.014]
UP		-0.018		-0.021*
		[0.012]		[0.012]
R^2	0.26	0.26	0.26	0.26
N	8571469	8571469	8571469	8571469

Notes: Individual and firm characteristics as in Table 1. Specifications with additional firm's characteristics considering its size.

Source: own elaboration based on data from SES and WIOD

Table C7. Estimation results – the impact of GVC on working conditions assessed via wages, additional country specific variables

	(1)	(2)	(3)	(4)	(5)	(6)
ΔGII	-0.032**	-0.028*	-0.032**	-0.028*	-0.032**	-0.028*
	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]
UP		-0.018		-0.018		-0.018
		[0.011]		[0.011]		[0.011]
ln(GDPpc)	0.219***	0.214***				
	[0.039]	[0.039]				
Exp/GDP			0.118***	0.119***		
			[0.025]	[0.025]		
Imp/GDP					0.129***	0.129***
					[0.018]	[0.018]
R^2	0.24	0.24	0.24	0.24	0.24	0.24
N	8929690	8929690	8929690	8929690	8929690	8929690

Notes: Individual and firm characteristics as in Table 1. Specifications with additional firm's characteristics considering its size.

Source: own elaboration based on data from SES and WIOD

Table C8. Estimation results – the impact of GVC on working conditions assessed via wages, min. average and max coefficients for estimations when country by country or sector by sector is eliminated

	Elimination country by country			Elimination sector by sector		
	Min	Average	Max	Min	Average	Max
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGII	-0.041	-0.030	-0.017	-0.04	-0.03	-0.02
UP	-0.028	-0.018	-0.008	-0.03	-0.02	-0.01
R²	0.24	0.24	0.25	0.23	0.24	0.25
N	6935478	8557620	8910463	7709994	8743655	8929109

Notes: Individual and firm characteristics as in Table 1. Specifications with additional firm's characteristics considering its size.

Source: own elaboration based on data from SES and WIOD

Table C9. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, sample of workers from countries with different articulation of enterprise bargaining (Art)

	Art=0				Art=1			
	Share of overtime hours		Share of bonus payments		Share of overtime hours		Share of bonus payments	
Proportion								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	0.051*	0.056**	0.005	-0.003	-0.106***	-0.117***	-0.062***	-0.057***
	[0.026]	[0.026]	[0.007]	[0.007]	[0.015]	[0.014]	[0.007]	[0.006]
UP		-0.018		0.067***		0.061***		-0.023***
		[0.014]		[0.007]		[0.016]		[0.007]
Probability of being zero								
ΔGII	0.178***	0.144***	-0.233***	-0.302***	0.181***	0.189***	-0.053***	-0.065***
	[0.034]	[0.034]	[0.020]	[0.020]	[0.024]	[0.024]	[0.020]	[0.021]
UP		0.143***		0.152***		-0.035*		0.052**
		[0.020]		[0.015]		[0.020]		[0.020]
ll	-404990	-404467	1269654	1270315	-399185	-399112	2882519	2882628
N	4503561	4503561	4503529	4503529	4426129	4426129	4426125	4426125

Notes: Individual and firm characteristics as in specification (2) of Table 1.. *p ≤ .10. **p ≤ .05. ***p ≤ .01.

Source: own elaboration based on data from SES and WIOD

Table C10. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, sample of workers from countries with different coordination of wage-setting (Coord)

		Coord=0			*Coord=1*			
	Share of overtime hours		Share of bonus payments		Share of overtime hours		Share of bonus payments	
Proportion								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	-0.031	-0.032	-0.082***	-0.100***	-0.078***	-0.076***	0.004	0.008**
	[0.020]	[0.020]	[0.007]	[0.007]	[0.011]	[0.011]	[0.004]	[0.004]
UP		-0.005		0.087***		-0.013		-0.038***
		[0.013]		[0.007]		[0.015]		[0.005]
Probability of being zero								
ΔGII	0.259***	0.241***	-0.108***	-0.147***	0.044**	0.015	-0.236***	-0.230***
	[0.027]	[0.028]	[0.018]	[0.019]	[0.022]	[0.022]	[0.016]	[0.016]
UP		0.076***		0.107***		0.277***		-0.037**
		[0.020]		[0.016]		[0.018]		[0.017]
II	-453075	-453344	1359054	1362810	-341406	-340910	3254134	3254282
N	4672231	4672231	4672199	4672199	4257459	4257459	4257455	4257455

Notes: Individual and firm characteristics as in specification (2) of Table 1. *p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

Table C11. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, sample of workers from countries with different general opening clauses in collective agreement (Ocg)

		Ocg=0			*Ocg=1*			
	Share of overtime hours		Share of bonus payments		Share of overtime hours		Share of bonus payments	
Proportion								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔGII	-0.103***	-0.102***	0.01	0.02	-0.073***	-0.087***	0.015***	0.022***
	[0.019]	[0.019]	[0.015]	[0.015]	[0.007]	[0.007]	[0.004]	[0.004]
UP		-0.003		-0.078***		0.048***		-0.065***
		[0.013]		[0.021]		[0.007]		[0.006]
Probability of being zero								
ΔGII	0.256***	0.239***	0.174***	0.120***	-0.061***	-0.064***	-0.236***	-0.213***
	[0.026]	[0.027]	[0.030]	[0.030]	[0.018]	[0.019]	[0.017]	[0.017]
UP		0.076***		0.304***		0.016		-0.097***
		[0.021]		[0.023]		[0.017]		[0.016]
II	-566828	-566856	-244562	-244038	1498336	1498449	2760299	2760701
N	5462089	5462089	3467601	3467601	5462053	5462053	3467601	3467601

Notes: Individual and firm characteristics as in specification (2) of Table 1.*p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

Table C12. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, additional country specific variables.

	Share of overtime hours			Share of bonus payments		
Proportion						
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGII	-0.011	-0.009	-0.012	-0.043***	-0.048***	-0.045***
	[0.014]	[0.014]	[0.014]	[0.005]	[0.005]	[0.005]
UP	-0.002	0.002	-0.003	0.031***	0.035***	0.027***
	[0.011]	[0.011]	[0.011]	[0.005]	[0.005]	[0.005]
ln(GDPpc)	-0.004			-0.001		
	[0.006]			[0.003]		
Exp/GDP		-0.121**			0.007	
		[0.047]			[0.022]	
Imp/GDP			-0.059			0.008
			[0.044]			[0.021]
Probability of being zero						
ΔGII	0.294***	0.271***	0.273***	-0.212***	-0.146***	-0.150***
	[0.021]	[0.021]	[0.021]	[0.015]	[0.015]	[0.015]
UP	0.119***	0.053***	0.066***	-0.084***	0.032**	0.022*
	[0.015]	[0.015]	[0.015]	[0.013]	[0.013]	[0.013]
ln(GDPpc)	0.044***			-0.046***		
	[0.009]			[0.007]		
Exp/GDP		1.462***			-2.707***	
		[0.073]			[0.057]	
Imp/GDP			1.102***			-2.103***
			[0.068]			[0.053]
ll	-833919	-830063	-831335	4104030	4141275	4133930
N	8929690	8929690	8929690	8929690	8929690	8929690

Notes: Individual and firm characteristics as in specification (2) of Table 1.*p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

Table C13. Estimation results – the impact of GVC on working conditions assessed via overtime hours and bonus payments, Tobit model

	Share of overtime hours		Share of bonus payments	
	(1)	(2)	(3)	(4)
ΔGII	-0.025***	-0.025***	0.001*	0.002***
	[0.001]	[0.001]	[0.000]	[0.000]
UP		0.000		-0.003***
		[0.001]		[0.000]
ll	-1795755	-1795754	285119.8	285292.9
N	8929690	8929690	8929690	8929690
Number of uncensored observations	1469036	1469036	5079179	5079179
Number of left-censored observations	7460654	7460654	3850469	3850469

Notes: Individual and firm characteristics as in specification (2) of Table 1.*p ≤ .10. **p≤ .05. ***p ≤.01.

Source: own elaboration based on data from SES and WIOD

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[21] Schäfer & Gottschall (2015) classified countries similarly in order to see how national wage-setting institutions shape the gender wage gap.

[22] We use variable *Art: Articulation of enterprise bargaining* derived from (Visser (2016) and recode the variables into a 0-1 variable, 1 representing countries where supplementary enterprise wage bargaining is informal and prohibited or restricted by law or sectoral agreement, or where it is recognized but under trade union control (Belgium, Bulgaria, Cyprus, Germany, Finland, Italy, Luxembourg, Netherlands, Norway, Slovakia, Slovenia, Spain, Sweden). The value 0 stands for countries where additional enterprise wage bargaining, when it occurs, is formally or informally conducted also by non-union bodies or where the articulation does not apply (Czech Republic, Estonia, France, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania and the United Kingdom)

[23] We use variable *Coord: coordination of wage-setting* derived from (Visser (2016) and recode it into a 0-1 variable. 0 is for countries with mixed industry and firm-level bargaining, little or no pattern bargaining and relatively weak government coordination through minimum wage or indexation or for fragmented wage bargaining, confined largely to individual firms or plants (Bulgaria, Cyprus, Czech Republic, Estonia, France, Hungary, Latvia, Lithuania, Malta,

Poland, Portugal, Romania, United Kingdom). The value 1 stands for centralised or industry level bargaining (Belgium, Finland, Germany, Italy, Netherlands, Norway, Slovak Republic, Slovenia, Spain, Sweden).

[24] We use variable *OCG: General Opening clauses in collective agreement* derived from Visser (2016), where 1 means that agreements contain general opening clauses, defined as renegotiation of contractual provisions at lower levels, under specified conditions (Belgium, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden) and 0 means that agreements contain no opening clauses (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania, Slovak Republic, Slovenia, United Kingdom).

[25] The detailed results are presented in the supplementary materials (Tables C1–C3).

[26] Detailed results available in supplementary materials (Table C4 –C13).