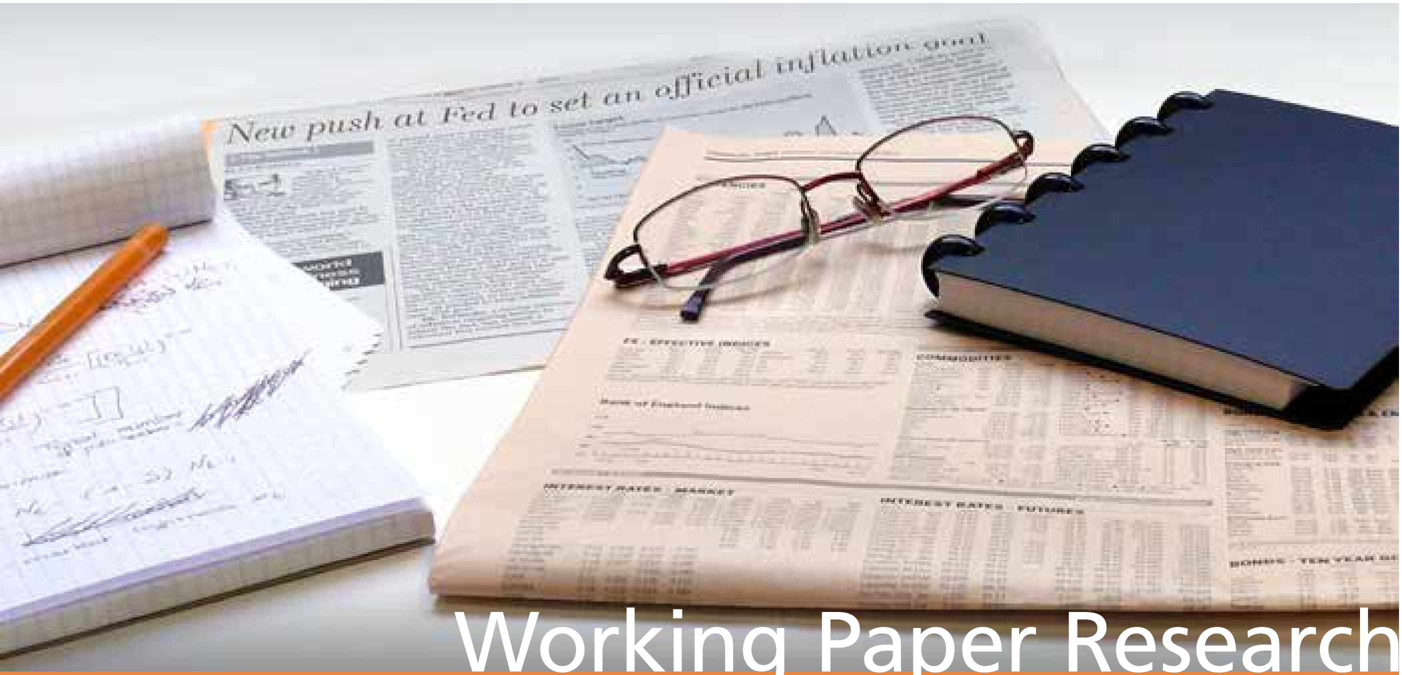
Upstreamness, social upgrading and gender: Equal benefits for all?



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Abstract

This paper examines social upgrading related to firms' participation in Global Value Chains (GVCs) from a developed countries' perspective. Merging detailed matched employer-employee data relative to the Belgian manufacturing industry with unique information on firm-level upstreamness, we investigate whether workers on the upstream stage of GVCs benefit from higher wages. We also enrich our analysis with a gender dimension. Unconditional quantile regressions and decomposition methods reveal that firms' upstreamness fosters workers' social upgrading. Nevertheless, gains are found to be unequally shared among workers. Male top-earners are the main beneficiaries; whereas women, irrespective of their earnings, appear to be unfairly rewarded.

JEL codes: F61, F66, J16, J31.

Keywords: Social upgrading, Global value chains, Wages, Gender, Developed countries.

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1. Introduction

The structure of the global economy has evolved dramatically over the past few decades. Recent improvements in transport and communication technologies, along with advances in trade liberalization, have prompted a wide geographical dispersion of production processes. Industries and firms across the globe are today increasingly intertwined within networks of Global Value Chains (GVCs), which embody 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). Consequently, products/services undergo multiple stages and cross borders several times, before reaching final consumers. According to UNCTAD (2013), almost 80% of global trade occurs in GVCs through exchanges of intermediate inputs.

The strategy of deepening integration (or upgrading) into GVCs is typically associated to an opportunity for firms and countries to acquire greater access to global markets, increase their competitiveness (Bamber and Staritz, 2016; Gereffi and Fernandez-Stark, 2016), improve employment (Farole, 2016; OECD, 2013), and foster income growth (OECD, 2012). Gereffi (2005: 171) defines upgrading as: "the process by which economic actors - nations, firms, and workers - move from low-value to relatively high-value activities in global production networks".[1] Growing evidence suggests that high-value upstream (e.g. R&D/innovation) and downstream (e.g. marketing/branding) production stages are often retained in more advanced economies, while less profitable activities (e.g. manufacturing/assembly), generally located in the middle of the value chain, remain mostly concentrated in transition/developing economies (Gereffi and Fernandez-Stark, 2016). This task-disaggregation process, apparently in the form of a smile (Baldwin et al., 2014; Mudambi, 2008, Rungi and Del Prete, 2018; Shih, 1996), is key to understand how firms and countries secure their competitive advantage and wealth over time (Serpa and Krishnan, 2018). At the same time, it casts serious doubts on whether GVCs' integration benefits are fairly distributed across countries and workers.

Accordingly, recent researches have been focusing on the *social* dimension of upgrading. The latter refers to the portion of the gains (in terms of e.g. wages, labour standards or wellbeing) that is captured by workers at the different stages of global supply chains (Salido and Bellhouse, 2016).[2] The social impact of GVC integration has been examined on employment (Farole, 2016; OECD, 2013), jobs and wage inequality (Gonzales et al., 2015; Milberg and Winkler, 2013), and – though to a limited extent and only for developing countries – on gender equality (Bamber and Staritz, 2016; Barrientos et al., 2011; Carr et al., 2000; Rossi, 2013; Salido and Bellhouse 2016; Staritz and Reis, 2013; Tejani and Milberg, 2010). Yet, access to and participation in GVCs is closely related to gender issues (Staritz and Reis, 2013). GVCs can indeed be considered as gendered structures, due to differences in the allocation of women and men across sectors, jobs and stages of supply chains. These differences are rooted in the roles women and men assume in households and communities, typically determined by social norms rather than by one's potential. Despite significant heterogeneity, this holds true in both developed and developing economies.

When considering social upgrading in terms of gender and wages, research for developing countries (Barrientos et al. 2011; Carr et al., 2000; Rossi, 2013; Salido and Bellhouse, 2016) shows that GVC integration can, but does not necessarily lead to higher remuneration for female workers. GVCs seem actually to exacerbate the gender wage gap and to take advantage of existing gender norms to employ women in unskilled stages of the production chain, thus relying on artificially low wages as a source of export competitiveness (Barrientos, 2014). A recent study by Chen (2017) examines the impact of trade exposure on wage inequality within Chinese firms. Results show that in downstream activities, intensively using unskilled labour engaged in processing and assembly work, trade reduces within-firm wage inequality. However, trade is also found to generate pro-competitive effects mainly benefitting to exporters and skilled labour (i.e. mainly to men). In the case of developed countries, the issue of the gender wage gap has received a great deal of attention in the context of trade liberalization (Ben Yahmed, 2013; Black and Brainerd, 2004; Bøler et al., 2015, 2018; Busse and Spielmann, 2006; Juhn et al., 2014; Kongar, 2006; Oostendorp, 2009). However, an in-depth analysis of social upgrading and gender wage inequality through the lens of GVCs is still missing.

The present paper aims to partially fill this gap in the context of a developed economy. More precisely, we provide first evidence on the impact of a *direct* measure of firm-level upstreamness (i.e. the steps – weighted distance – before the production of a firm meets either domestic or foreign final demand) on workers' wages. We also add to the existing literature by investigating whether results vary for men and women and, more generally, how upstreamness contributes to explaining the gender wage gap at different points of the earnings' distribution. To do so, we rely on matched employer-employee data, covering more than 250,000 workers, that are representative of the Belgian manufacturing sector and that have been merged with a unique Firm-Upstreamness data set derived from the National Bank of Belgium business-to-business (NBB B2B) transactions data set, developed by Dhyne et al. (2015). The latter provides a direct and accurate measure of firm-level upstreamness for all years from 2002 to 2010.[3,4]

Our empirical strategy boils down to regressing individual workers' wages on upstreamness, while controlling for group effects in the residuals (Greenwald, 1983; Moulton, 1990), time fixed effects, and a large set of covariates reflecting worker, job and firm characteristics. We also address the endogeneity of upstreamness using instrumental variables and appropriate diagnoses tests. The consequences of being employed in more upstream firms is investigated for women and men at the mean value of the earnings' distribution but also at different quantiles. Using both conditional (CQR) (Machado and Mata, 2005; Melly, 2005) and unconditional quantile regressions (UQR - Firpo et al., 2009), we thus investigate: i) whether the gains associated to upstreamness are shared equally between high- and low-wage workers, and ii) whether the wage-upstreamness elasticity evolves in similar way for women and men along the earnings' distribution. To estimate the contribution of the upstreamness variable to the gender wage gap at each quantile, we apply an extension of the Oaxaca-Blinder (1973) decomposition based on UQR techniques, namely the methodology developed by Fortin et al. (2011). Doing this, we compute the share of the gender wage gap that can be attributed to: i) differences in mean values of firm-level upstreamness for women and men, and ii) gender differences in wage-upstreamness elasticities. This is done at different points of the earnings' distribution. Finally, we test the sensitivity of our estimates focusing on different components of workers' wages (e.g. base pay, overtime compensation, premia for shift/night/weekend work, bonuses).

Belgium represents a particularly interesting case study to examine the interaction between social upgrading and gender wage inequality along the GVC. Indeed, it is a very open and integrated economy with increasingly diversified trading partners. This is notably illustrated by the GVC participation index, showing that Belgium sources more inputs from abroad and produces more inputs used in GVCs than most other OECD countries (OECD, 2012). Estimates of Dhyne et al. (2015) further indicate that 82% (99%) of commercial firms in Belgium, between 2002 and 2012, have been producing (consuming) goods and services that were either directly or indirectly exported (imported). One of the most fragmented sector, with a particularly high GVC participation rate, is the manufacturing industry: 91.6% (99.5%) of firms operating in this industry are found to be directly or indirectly involved in exports (imports). This industry is thus an ideal candidate to investigate the consequences of upstreamness on workers' wages.

The Belgian labour market is also characterised by substantial earnings' differences between women and men. The gross monthly gender wage differential (excluding annual and irregular bonuses) is estimated at around 22% in the private sector, and at a similar level in the manufacturing industry (Institut pour l'égalité des Femmes et des Hommes, 2014). While most of this gap can be accounted for by differences in worker, job and firm attributes, there still seems to persist a significant gap (though relatively small with respect to what is observed in other EU countries) that cannot be accounted for by standard observables (Garnero et al., 2014; Kampelmann et al., 2018; Rycx and Tojerow, 2002, 2004). This persistent inequality harms women's labour market situation and career development as well as their social and personal promotion. Furthermore, although numerically speaking, women nowadays practically level with men on the labour market, recent research has shown that domestic and childcare activities remain a haven largely avoided by the latter (Blau and Kahn, 2017; Meulders and O'Dorchai, 2004). As a result, women are still far from reaching a work status which equals that of men in qualitative terms (Del Boca and Repetto-Alaia, 2003; Redmond and McGuinness, 2017). While substantial research has been devoted to the estimation and explanation of the gender wage gap, very little is known regarding the role of GVCs, and of firms' upstreamness as a cause of such wage inequalities. Consequently, the latter is the main point of interest in this paper.

The remainder of this paper is organised as follows. Section 2 presents our data set and corresponding descriptive statistics. Our estimation strategy and main econometric results are described in Section 3. Section 4 provides some sensitivity analyses and the last section concludes.

2. Data and descriptive statistics

2.1 Data

The present study relies on two large-scale data sets. The first is the Structure of Earnings Survey (SES). This matched employer-employee survey provides detailed information on a large representative sample of workers employed in the manufacturing industry (i.e. section C of the NACE Rev. 2 nomenclature) over the period 1999-2010.[5] Specifically, it contains a wealth of information, provided by the human resource departments of firms, both on the characteristics of the latter (e.g. type of economic and financial control, number of workers, level of collective wage bargaining) and on the individuals working there (e.g. age, education, tenure, gross earnings, working hours, gender, occupation).

Data on workers' wages (and different components thereof) and working hours are known to be particularly precise and reliable in the SES. Yet, this data set contains no information on firms' position in GVCs. Therefore it has been merged, by Statistics Belgium in collaboration with the National Bank of Belgium (NBB), with a unique Firm-Upstreamness data set derived from the NBB B2B transactions data set, developed by Dhyne et al. (2015). The latter, following the methodology presented in Antras et al. (2012), enables us to have a direct measure of the upstreamness of (almost) each manufacturing firm surveyed in the SES in each year. Information on upstreamness is not available prior to 2002. Hence, our merged SES/Firm-Upstreamness sample covers all years from 2002 to 2010. Our final sample consists of a pooled cross-sectional data set of 252,550 observations. It is representative of all workers employed in manufacturing firms (employing at least 10 workers) over the period 2002-2010.

2.2 Descriptive statistics

[Insert Table 1 here]

Table 1 presents the means and standard deviations of selected variables for the overall sample and by gender. We notice a clear-cut difference in average working conditions of male and female workers. On average, the total gross hourly wage is lower for women (14.9 EUR) than for men (17.5 EUR).[6] The gender wage gap stands at 17.5%. Women are somewhat younger than men in our sample. On average, they also have less years of tenure than their male counterparts, but more years of education. Women are more likely to have a fixed term employment contract (4 vs. 3%) and especially to work part-time (27 vs. 13%). Regarding occupations, we observe a larger share of men among managers, professionals, craft and machine operators. In contrast, women are overrepresented in elementary occupations and, particularly, among clerks. The share of workers covered by a firm-level collective agreement is somewhat higher among men than among women (46 vs. 40%). As regards upstreamness, the mean number of steps before the production of a firm meets either domestic or foreign final demand is equal to 2.76 for men and slightly lower for women (2.66).

3. Estimation strategy and results

In the remainder of this paper, we estimate the consequences of firm-level upstreamness on workers' wages. We also investigate whether women and men, located at different points of the earnings' distribution, benefit equally from potential gains associated to upstreamness. Put differently, we provide first evidence on how upstreamness contributes to the gender wage gap along the earnings' distribution.

Our benchmark specification to address these key questions corresponds to the following semi-logarithmic wage equation:

$$\ln w_{ijt} = \beta_0 + \beta_1 up_{jt} + \beta_2 X_{it} + \beta_3 Z_{jt} + \delta_t + \omega_{ijt} \qquad (1)$$

where w_{ijt} represents the gross hourly wage (including base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses) of worker i employed in firm j at time t. Our main variable of interest, up_{jt}, is firm's j level of upstreamness at time t. It measures the steps (weighted distance) before the production of firm j at time t meets either domestic or foreign final demand (see Dhyne et al. (2015) for more details). X_{it} is a vector of worker and job characteristics (six dummies for education, three dummies for tenure, eight dummies for age, a dummy for gender, a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies); Z_{jt} includes firm characteristics (the logarithm of firm size (i.e. the number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and 3 dummies for firms' sectoral affiliation); δ_t is a set of 8 year dummies, β_0 is the intercept; β_1, β_2 and β_3 are the parameters to be estimated, and ϖ_{ijt} is the error term.

Table 2 summarizes the different steps of our empirical strategy.

[Insert Table 2 here]

3.1. Benchmark estimates

Model 1 (see Table 2) is our baseline specification. In this model, we regress the logarithm of individual gross hourly wages solely on the upstreamnnes variable. This is done using ordinary least squares (OLS), with HAC (heteroscedasticity and autocorrelation consistent) standard errors, on the full sample of 252,550 observations covering the period 2002-2010. As shown in column (1) of Table 3, results highlight the existence of a significant positive relationship between upstreamness and workers' wages (coefficient = 0.048).

[Insert Table 3 here]

A first potential bias derives from the simultaneous use of grouped observations and individual data. Indeed, the upstreamness variable is measured at the firm level while wages are observed for individual workers. To account for these group effects, which might distort the significance of our estimate, Model 2 applies the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). This correction transforms the covariance matrix of the errors but leaves the point estimates and the determination coefficient unaffected. Therefore, our second model has the same estimated coefficient than our baseline model, but a different t-statistic. Findings, reported in column (2) of Table 3, support the overestimation phenomenon demonstrated by Moulton (1990). However, the regression coefficient for upstreamness remains significant at the 1 percent level. Therefore, it appears that the significant positive relationship between wages and upstreamness cannot be attributed to group effects.

The omitted variable bias is obviously another important issue that has to be investigated. Model 3 accounts for this issue by controlling for the full set of detailed worker, job and firm characteristics presented in equation (1). To address business cycle effects, year dummies are also included in the regression. Results, presented in column (3) of Table 3, show that the wage-upstreamness coefficient remains highly significant but drops to 0.025 when adding these covariates. Economically speaking, this coefficient suggests that if firms' upstreamness increases by one step (i.e. if a firm moves one step further away from the final consumer), workers' wages rise on average by 2.5 percent.

Although Model 3 seems quite accurate, estimates might be biased due to the endogeneity of upstreamness. Endogeneity might be an issue due to: i) the possible correlation between upstreamness and the export behaviour of firms (i.e. the number of steps before firms' production meets final demand is likely to be bigger among exporting firms), and ii) evidence supporting reverse causality between the export behaviour of firms and workers' wages (i.e. more productive firms pay higher wages and are more likely to export).[7] To address this potential issue, we re-estimated Model 3 by two-stage least squares (2SLS) using as instrumental variables the one- and two-year lagged values of the upstreamness variable, in addition to all other covariates included in Model 3. 2SLS estimates are reported in column (4) of Table 3. They show that the wage-upstreamness coefficient becomes insignificant and reaches a magnitude of 0.078.

To assess the soundness of the 2SLS approach, an array of diagnoses tests have been performed. The latter are reported at the bottom of column (4) in Table 3. First-stage estimates indicate that current and lagged values of upstreamness are positively and significantly correlated. They thus suggest that our IVs are not weak, which is also corroborated by the Kleibergen-Paap rk Wald F statistic for weak identification. The latter is indeed bigger than 10.[8] Moreover, we can reject the null hypothesis that our first-stage equation is under-identified. The Kleibergen-Paap rk LM statistic is indeed found to be highly significant. Concerning the quality of our instruments, we further find that the p-value associated to the Hansen's J overidentification test is equal to 0.507. This implies that our instruments are valid, i.e. we cannot reject the exogeneity of the latter. Finally, as regards the endogeneity test, the p-value associated to the Chi-squared statistic is equal to 0.280.[9] This outcome suggests that the null hypothesis of no endogeneity should not be rejected. Estimates thus indicate that our main explanatory variable, i.e. firm-level upstreamness, is actually not endogenous and that OLS estimates (reported in column (3) of Table 3) should be preferred to those obtained by 2SLS.

To test for a potential non-linear relationship between upstreamness and workers' wages, we further estimate the following variant of equation (1):

$$\ln w_{ijt} = \beta_0 + \beta_{1.1}\, upD1_{jt} + \beta_{1.2}\, upD2_{jt} + \beta_2\, X_{it} + \beta_3\, Z_{jt} + \delta_t + \omega_{ijt} \quad (2)$$

where $upD1_{jt}$ ($upD2_{jt}$) is a dummy variable equal to one if firm j's level of upstreamness at time t ranges between 2.5 and 4.5 steps (is greater than 4.5 steps). The reference category in this equation is thus composed of workers employed in firms with a level of upstreamness below 2.5 steps. OLS estimates of equation (2) are reported in Appendix Table A1. They support the existence of a fairly linear and upward-sloping relationship between upstreamness and wages. Indeed, workers employed in firms with a level of upstreamness ranging between 2.5 and 4.5 steps (above 4.5 steps) are found to have a significant wage premia of around 2.9% (5.2%) with respect to the reference category.[10]

3.2 Estimates along the wage distribution and by gender

[Insert Table 4 here]

So far, the consequences of firm-level upstreamnness have been investigated at the mean value of the earnings' distribution. However, the gains associated to upstreamness might be significantly different for high- and low-wage workers. To examine this issue, we rely on Unconditional Quantile Regressions (UQR) with block-bootstrapped standard errors (Cameron et al., 2008; Daouli et al., 2013; Firpo et al., 2009; Fitzenberg and Kurz, 2003). As a robustness test, we also apply the more conventional Conditional Quantile Regressions' (CQR) approach (Koenker and Basset, 1978; Machado and Mata, 2005; Melly, 2005), though adapted to clustered data as suggested by Parente and Silva (2016). Results, reported in Table 4, show that UQR and CQR estimates are relatively close to each other. They both indicate that the wage-upstreamness coefficient increases monotonically along the earnings' distribution. Indeed, UQR (CQR) estimates vary from 1.2 (1.4) for people located at the 25th percentile of the earnings' distribution to 4.5 (2.2) for those at the 75th percentile. High-wage workers are thus found to benefit significantly more from being employed in more upstream firms than their lower-wages counterparts.

[Insert Table 5 here]

[Insert Table 6 here]

Another important issue is whether the gains associated to upstreamness are shared equally between women and men. Results reported in column (1) of Tables 5 and 6 indicate that upstreamness is beneficial for both groups of workers. However, they also show that the gains are much smaller for women than for men. When firms' upstreamness increases by one step, men' wages are found to rise on average by 2.9 percent. For women, the corresponding wage increase is only equal to 0.6 percent.[11] Turning to quantile estimates by gender, we observe again a striking difference in the magnitude of regression coefficients for women and men. Findings, presented in columns (2) to (4) of Table 5, show that the wage-upstreamness coefficient for men follows a similar pattern than for the overall sample: it increases significantly along the wage distribution (from 0.013 to 0.036 when moving from the 25th to the 75th percentile). The situation for women is quite different (see columns (2) to (4) of Table 6): the elasticity is very small (0.002 at the 25th percentile) and increases only slightly (0.005) at higher quantiles.

Overall, results suggest that the gains associated to upstreamness are very unequally shared among workers. Most of the gains are for high-wage men. Low-wage men and especially women (irrespective of their level of earnings) benefit much less from being employed in more upstream firms.

3.3. Upstreamness and the gender wage gap

To estimate the contribution of the upstreamness variable to the gender wage gap at each quantile, we apply an extension of the Oaxaca-Blinder (1973) decomposition based on UQR techniques, namely the methodology developed by Fortin et al. (2011). Our purpose is to estimate, at each quantile of the wage distribution, which proportion of the overall gender wage gap can be attributed to: i) differences in mean values of upstreamness for women and men (i.e. the compositional effect or explained part); and ii) gender differences in wage-upstreamness coefficients (i.e. the wage structure effect or unexplained part). Mean and quantile decompositions are presented in Table 7.

[Insert Table 7 here]

The first row of Table 7 reports the overall gender wage gap, measured as the difference between mean log wages of male and female workers. The mean log wage differential is equal to 0.147. It does not vary substantially across quantiles. Table 7 also reports the contribution of upstreamness (both the compositional and wage structure effects) to the gender wage gap in percentage points ('Magnitude') and as a percentage of the overall gender wage gap ('%"). At the mean, only 1.36 percent of the gender wage gap is due to male-female differences in the level of upstreamness. In contrast, almost 41 percent of the gap can be attributed to differences in the wage-upstreamness semi-elasticity for women and men. This wage structure effect (or unexplained part) is often taken to reflect discrimination (i.e. factors not related to differences in endowments/productivity).[12]

Moving to the quantile decomposition, we find that results are in line with mean-based findings, yet more heterogeneous. The explanatory power of the compositional effect is very limited. Even at the 75th percentile of the earnings' distribution, it accounts for less than 4 percent of the overall gender wage gap. As regards the wage structure effect, its explanatory power is quite substantial and increases along the wage distribution. Gender differences in wage premia associated to upstreamness are thus found to explain a substantial part of the earnings gap between women and men at the bottom and, even more, at the top of the distribution.

4. Sensitivity tests

In this section, sensitivity tests are performed using different components of workers' wages. We first aim to identify the role of compensating differentials associated to longer and more atypical hours (i.e. over-time and shift/night/weekend work) to explain gender differences in wage-upstreamness semi-elasticities.[13] Therefore, we re-estimate our benchmark equation by gender and quantile using as dependent variable the log of individual gross hourly wages, *excluding* overtime compensation and premia for shift/night/weekend work.

OLS estimates for the overall sample are in line with our benchmark scenario (see upper part of Appendix Table A2). We find a positive and significant relationship between upstreamness and workers' wages. However, the magnitude of the wage-upstreamness coefficient is somewhat smaller when excluding compensation for overtime, shift/night/weekend work. It is now equal to 0.020 (as opposed to 0.025 in our benchmark specification). Results by gender show a drop in the coefficient for men (from 0.029 in the benchmark to 0.023), while that for women remains almost unchanged (0.007 instead of 0.006). Yet, differences in coefficients for women and men are still substantial. In addition, estimates by quantile are smaller than in the benchmark, especially for men. However, they deliver a similar message. The wage-upstreamness semi-elasticity increases along the wage distribution for men (from 0.011 at the 25th percentile to 0.023 at the 75th percentile) and is much smaller for women (around 0.003), irrespective of their earnings. As regards the wage decomposition, results are overall in line with our benchmark analysis (see Appendix Table A3). Gender differences in wage-upstreamness semi-elasticities still explain around 35 percent of the overall gender wage gap and the contribution of this unexplained part increases along the earnings' distribution.

We also test the robustness of our findings with alternative definitions of wages. As an illustration, Appendix Table A4 shows quantile regression estimates by gender using workers' base pay (i.e. gross hourly wages *excluding* overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses). Results are in line with our benchmark specification. Indeed, they show that the wage-upstreamness semi-elasticity is significantly bigger for (high-wage) men than for women. Interestingly, this is also the case when focusing on alternative components of workers' wages (e.g. annual and irregular bonuses).[14] In addition, Appendix Table A5 shows that almost 30 percent of the gender wage gap in base pay is due to differences in wage-upstreamness semi-elasticities for women and men, and that the contribution of this unexplained component increases at upper quantiles.

Overall, sensitivity tests indicate that the larger wage premium obtained by (male high-wage) workers employed in more upstream firms is not solely driven by differences in overtime hours and shift/night/weekend work, but also by differences in other pay components, including basic pay and bonuses.

5. Conclusion

This paper provides an original contribution to the literature on social upgrading related to firms' participation in Global Value Chains (GVCs). More precisely, it is the first to estimate the impact of a *direct* measure of firm-level upstreamness (i.e. the steps – weighted distance – before the production of a firm meets either domestic or foreign final demand) on workers' wages. It also adds to the existing literature by examining whether results vary for women and men and, more generally, how upstreamness contributes to the explanation of the gender wage gap along the earnings' distribution. To do so, we rely on detailed matched employer-employee data relative to the Belgian manufacturing sector that have been merged with a unique Firm-Upstreamness data set derived from the NBB B2B transactions data set, developed by Dhyne et al. (2015). The latter provides a direct and accurate measure of firm-level upstreamness for all years from 2002 to 2010.

Our findings show that workers earn significantly higher wages when being employed in more upstream firms (i.e. in firms that are further away from the final consumer), even after controlling for group effects in the residuals, a large set of individual, job and firm characteristics, time fixed effects, as well as for the endogeneity of upstreamness. Our most robust estimate suggests that if firm-level upstreamness increases by one step (i.e. by approximately one standard deviation), workers' gross hourly wages rise on average by 2.5 percent. Yet, the gains from upstreamness are found to be very unequally distributed among workers. The wage-upstreamness semi-elasticity is almost five times bigger for men than for women (0.029 vs. 0.006). Moreover, quantile regressions indicate that high-wage men benefit substantially more from upstreamness than their low-wage counterparts. For women, the benefits of working in more upstream firms appear to be very limited, irrespectively of how much they earn. A quantile decomposition of the gender wage gap further shows that differences in mean values of upstreamness for women and men only modestly contribute to the overall gender wage gap. On the contrary, gender differences in wage premia associated to upstreamness are found to explain a substantial part of the earnings gap, especially at the top of the earnings distribution.

Sensitivity tests, focusing on different components of workers' wages, indicate that the higher wage-upstreamness semi-elasticity for (high-wage) men is partly driven by differences in over-time and shift/night/weekend work. However, this is not the whole story. Indeed, the wage premium associated to upstreamness is still found to be substantially larger for (high-wage) men than for women when considering other pay components, such as base pay or irregular/annual bonuses. This suggests that rents generated by more upstream firms are unfairly distributed between (high-wage) men and women. Put differently, it appears that the unexplained part of the gender wage gap, associated to upstreamness, is at least partly reflective of non-productive factors. The latter might be related to power and authority associated to certain higher-level occupations, more likely to be held by high-wage men (Bebchuk and Fried, 2003; Osterman et al., 2009). A complementary interpretation, provided by Card et al. (2015: 634), is that women, in a given occupation, "are less likely to initiate wage bargaining with their employer and are (often) less effective negotiators than men".[15] Interestingly, these arguments echo the estimates of Garnero et al. (2014) showing that women generate employer rents in the Belgian private sector and that these rents derive from the fact that women earn less than men at any given level of productivity.

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Notes

1. Humphrey and Schmitz (2002) categorize four different types of economic upgrading: i) process upgrading, where inputs are transformed into outputs through a more efficient production process; ii) product upgrading, which implies a shift towards more sophisticated product lines; iii) functional upgrading, which implies increasing the overall skill content of activities by acquiring new (or abandoning old) functions; iv) chain or inter-sectoral upgrading, where firms move from one industry to another (often related).
2. The ILO Report IV on Decent work in global supply chains (ILO, 2016), defines social upgrading as "the gradual process leading to decent work in global supply chains" and it is measured through four pillars of the ILO Decent Work Agenda: employment, social protection, social dialogue and rights at work, alongside gender equality and non-discrimination as crosscutting objectives.
3. A few i) micro enterprises, which are almost sole traders and who do not have to fill VAT declarations, and ii) firms that have no enterprise-to-enterprise transactions inside Belgium (i.e. they only import, export or sell to final demand) are not included in Dhyne et al.'s (2015) dataset. Also note that the upstreamness measure only considers production steps that involve a transaction between two firms. Initial production steps such as R&D or design may typically not imply a transaction between the firm that makes those steps and the contractor that produces the good.
4. We had access to a fully anonymized version of the merged data which prevents from directly identifying an individual firm.

5. The SES is a cross-sectional data set, i.e. it does not enable to follow workers over time. It is representative of all firms in the manufacturing industry employing at least 10 workers. For an extended discussion see Demunter (2000).
6. Our measure of workers' gross hourly wage includes: base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses.
7. See e.g. Macis and Schivardi (2016).
8. As suggested by van Ours and Stoeldraijer (2011), we rely on the standard 'rule of thumb' that weak identification is problematic for F statistics smaller than 10.
9. The test is based on the difference of two Sargan-Hansen statistics: one for the equation in which the upstreamness variable is treated as endogenous, and one in which it is treated as exogenous. If the null hypothesis of this test cannot be rejected, then instrumentation is actually not necessary.
10. Alternative specifications, including polynomials of the upstreamness variable, have been tested too. The inclusion of the upstreamness variable as a polynomial of order 2 in equation (2) led to strong multicollinearity issues. Therefore, we have chosen to report regression results using dummy variables identifying firms with varying upstreamness levels.
11. We tested for the endogeneity of the upstreamness variable in regressions estimated separately for women and men (following the same approach as in section 3.1). Post-estimation tests again indicate that our variable of interest is not endogenous (p-values associated to the endogeneity tests are respectively equal to 0.62 and 0.26 in the 2SLS regressions for men and women, respectively). We have confidence in the validity of these tests since the instruments used in the 2SLS (i.e. one and two-year lagged values of upstreamness) are sound: the tests for weak-, over-, and under-identification imply that the instrumentation is satisfactory. Therefore, as in our benchmark specification, the OLS estimator is to be preferred.
12. Yet, the unexplained part might also reflect differences in unobserved productivity-related characteristics.
13. Descriptive statistics, reported in Table 1, show than men are more likely to receive overtime compensation and premia for shift/night/weekend work than women.
14. The full set of results for the different components of workers' wages is available upon request.

15. Gender segregation and/or discrimination in performance-related pay might also be part of the explanation (for a discussion see McGee et al. (2015) and Xiu and Gunderson (2013)).

Table 1: Means (standard deviations) of selected variables, 2002-2010

Variables	Overall	Men	Women
Gross hourly wage (in EUR)[a]	16.9	17.5	14.9
	(7.7)	(8.0)	(6.0)
Upstreamness (in steps)[b]	2.74	2.76	2.66
	(89.5)	(89.8)	(88.1)
Age structure of workforce (% workers)			
20-24 years	5.9	6.1	5.5
25-29 years	11.4	11.1	12.6
30-34 years	13.8	13.2	16.1
35-39 years	16.4	15.9	18.2
40-44 years	17.1	17.2	17.0
45-49 years	15.3	15.5	14.4
50-54 years	12.3	12.9	10.2
55-59 years	5.7	6.1	4.3
60 years and more	1.0	1.1	0.7
Education (% workers)			
Lower secondary	24.8	25.5	22.4
General upper secondary	18.7	17.3	24.1
Technical/Professional upper secondary	26.2	29.0	16.0
Higher non-university, short-type	12.5	10.6	19.5
University and non-university higher education, long-type	9.0	9.0	9.1
Post-graduate	0.5	0.9	0.5
Seniority in the company (% workers)			
0-1 year	15.4	14.6	18.0
2-4 years	17.5	17.0	19.2
5-9 years	19.3	18.9	20.9
10 years or more	47.6	49.3	41.7
Type of employment contract (% workers)			
Permanent contract	96,2	96.4	95.4
Fixed-term contract	3.1	2.9	3.8
Other contract	0.6	0.6	0.6
Part-time (% workers)[c]	16.3	13.4	26.7
Overtime compensation (Yes, % workers)	6.4	7.4	2.5
Premia for shift/weekend/night work (Yes, % workers)	25.6	28.9	13.3
Occupations (% workers)			
Managers	3.0	3.3	1.9
Professionals	7.6	7.6	7.3
Technicians and Associate Professionals	8.6	8.6	8.4
Clerks	11.5	7.4	26.4
Craft	25.0	27.2	16.6
Machine operators	28.6	30.4	22.2
Service	1.3	1.1	1.9
Elementary occupations	5.9	5.4	7.5
Firm-level collective agreement (Yes, % workers)	44.4	45.6	40.2
More than 50% privately-owned firm (Yes, % workers)	97.7	97.5	98.2
Number of observations	252,550	195,683	56,867

Notes: The descriptive statistics refer to the weighted sample. [a] At 2004 constant prices. It includes base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses. [b] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [c]Less than 30 hours per week.

Table 2: Different steps of the empirical strategy

Models	Specifications
Model 1	Estimation of equation (1), without any control variables, by OLS with HAC (heteroscedasticity and autocorrelation consistent) standard errors
Model 2	Model 1 + correction for group effects in the residuals
Model 3	Model 2 + control for year fixed effects & individual, job and firm characteristics
Model 4	Model 3 estimated by 2SLS, using one- and two-year lagged values of upstreamness as instruments
Model 5	Model 3 estimated using conditional and unconditional quantile regressions
Model 6	Model 5 estimated separately for women and men
Model 7	Oaxaca-Blinder decomposition of the gender wage gap at different quantiles
Model 8	Sensitivity tests of Models 6 and 7 using different components of workers' wages

Table 3: Log wage equation, OLS and 2SLS, overall sample

	OLS	OLS	OLS	2SLS
Variables	(1)	(2)	(3)	(4)
Upstreamness[a]	0.048***	0.048***	0.025***	0.078
	(0.000)	(0.004)	(0.002)	(0.049)
Individual and job characteristics[b]	No	No	Yes	Yes
Firm characteristics[c]	No	No	Yes	Yes
Year dummies	No	No	Yes	Yes
Group effects[d]	No	Yes	Yes	Yes
Adjusted R^2	0.016	0.016	0.567	0.550
Model significance:				
p-value of F test	0.000	0.000	0.000	0.000
Underidentification test[e]:				
p-value Kleibergen-Paap rk LM statistic				0.000
Weak identification test[f]:				
Kleibergen-Paap rk Wald F statistic				13.56
Overidentification test[g]:				
p-value of Hansen J statistic				0.507
Endogeneity test[h]:				
p-value associated to Chi-squared statistic				0.280
First-stage estimates of 2SLS *(Dependent variable: upstreamness$_{ij}$ at time t)*				
Upstreamness – lagged by one year (at time t-1)				0.012***
				(0.002)
Upstreamness – lagged by two years (at time t -2)				0.005**
				(0.002)
Model significance, first stage:				
p-value of *F* test				0.000
Number of observations	252,550	252,550	252,550	252,548
Number of groups	-	4,660	4,660	4,660

Notes: The dependent variable is the logarithm of the individual gross hourly wage, which includes base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses. Robust standard errors are reported between brackets. [a] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for gender, a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). [e] The Kleibergen-Paap rk LM statistic for under-identification tests whether the equation is identified, i.e. whether the excluded instruments are all relevant. The null hypothesis in this test is that the equation is under-identified. [f] Kleibergen-Paap rk statistic for weak identification is a Wald F statistic testing whether the excluded instruments are sufficiently correlated with the endogenous regressor. The null hypothesis is that the instruments are weak. According to the standard 'rule of thumb', weak identification is problematic for F statistics smaller than 10 (as suggested by van ours and Stoeldraijer (2011)). [g] The Hansen J statistic tests the null hypothesis that the instruments are valid, i.e. uncorrelated with the error term. [h] The endogeneity test is based on the difference of two Sargan-Hansen statistics: one for the equation in which firm-level upstreamness is treated as endogenous, and one in which it is treated as exogenous. If the null hypothesis of this test cannot be rejected, then instrumentation is actually not necessary, i.e. upstreamness can actually be considered as exogenous. ***/**/*: significance at the 1, 5 and 10 per cent, respectively.

Table 4: Log wage equation, OLS, UQR and CQR, overall sample

	Overall sample			
	OLS	Quantile estimates		
	(1)	(2)	(3)	(4)
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.025***	0.012***	0.022***	0.045***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.003)
	(Mean)	*(.25)*	*(.50)*	*(.75)*
Conditional Quantile Regression (CQR)	0.025***	0.014***	0.017***	0.022***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.001)
Individual and job characteristics[b]	Yes	Yes	Yes	Yes
Firm characteristics[c]	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Group effects[d]	Yes	Yes	Yes	Yes
Number of observations	252,550	252,550	252,550	252,550
Number of groups	4,660	4,660	4,660	4,660

Notes: The dependent variable is the logarithm of the individual gross hourly wage, which includes base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses. Clustered and block bootstrapped standard errors (100 replications), corrected for heteroscedasticity, are reported in parentheses for OLS/CQR and UQR, respectively. [a] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for gender, a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). ***/**/* Significance at the 1, 5 and 10 per cent, respectively.

Table 5: Log wage equation, OLS, UQR and CQR, men

	Men			
	OLS	Quantile estimates		
	(1)	(2)	(3)	(4)
Variables:	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.029***	0.013***	0.019***	0.036***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.003)
	(Mean)	*(.25)*	*(.50)*	*(.75)*
Conditional Quantile Regression (CQR)	0.029***	0.017***	0.020***	0.026***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.002)
Individual and job characteristics[b]	Yes	Yes	Yes	Yes
Firm characteristics[c]	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Group effects[d]	Yes	Yes	Yes	Yes
Number of observations	195,683	195,683	195,683	195,683
Number of groups	4,649	4,649	4,649	4,649

Notes: The dependent variable is the logarithm of the individual gross hourly wage, which includes base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses. Clustered and block bootstrapped standard errors (100 replications), corrected for heteroscedasticity, are reported in parentheses for OLS/CQR and UQR, respectively. [a] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). ***/**/* Significance at the 1, 5 and 10 per cent, respectively.

Table 6: Log wage equation, OLS, UQR and CQR, women

	Women			
	OLS	Quantile estimates		
	(1)	(2)	(3)	(4)
Variables:	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.006**	0.002**	0.005***	0.005**
Upstreamness[a]	(0.002)	(0.003)	(0.002)	(0.004)
	(Mean)	*(.25)*	*(.50)*	*(.75)*
Conditional Quantile Regression (CQR)	0.006**	0.003*	0.003*	0.006**
Upstreamness[a]	(0.002)	(0.002)	(0.002)	(0.002)
Individual and job characteristics[b]	Yes	Yes	Yes	Yes
Firm characteristics[c]	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Group effects[d]	Yes	Yes	Yes	Yes
Number of observations	56,867	56,867	56,867	56,867
Number of groups	4,462	4,462	4,462	4,462

Notes: The dependent variable is the logarithm of the individual gross hourly wage, which includes base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses. Clustered and block bootstrapped standard errors (100 replications), corrected for heteroscedasticity, are reported in parentheses for OLS/CQR and UQR, respectively. [a] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). ***/**/* Significance at the 1, 5 and 10 per cent, respectively.

Table 7: Mean and quantile decomposition of the gender wage gap

	OLS	Quantile estimates		
	(Mean)	*(.25)*	*(.50)*	*(.75)*
Overall gender wage gap	0.147	0.143	0.139	0.140
Decomposition:				
Magnitude:				
Compositional effect of upstreamness	0.002	0.001	0.002	0.005
Wage structure effect of upstreamness	0.060	0.034	0.053	0.123
% of the overall gender wage gap explained by:				
Composition effect of upstreamness	1.36	0.69	1.43	3.57
Wage structure effect of upstreamness	40.8	23.7	38.1	87.8

Notes: Decompositions are based on Unconditional Quantile Regression (UQR) estimates. For the sake of clarity, the 'magnitude' and the 'percentage of the overall gender wage gap' have only been reported for the upstreamness variable.

Table A1: Log wage equation, OLS, sensitivity test 1
(Non-linear specification)

	OLS
Variables	
Upstreamness between 2.5 and 4.5 steps[a]	0.029***
	(0.004)
Upstreamness above 4.5 steps[a]	0.052**
	(0.016)
Individual and job characteristics[b]	Yes
Firm characteristics[c]	Yes
Year dummies	Yes
Group effects[d]	Yes
Adjusted R^2	0.565
Model significance:	
p-value of F test	0.000
Number of observations	252,550
Number of groups	4,660

Notes: The dependent variable is the logarithm of the individual gross hourly wage, which includes base pay, overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses. Robust standard errors are reported between brackets. [a] The control group is composed of firms whose upstreamness is below 2.5. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for gender, a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). ***/**/*: significance at the 1, 5 and 10 per cent, respectively.

Table A2: Log wage equation, OLS, UQR and CQR, sensitivity test 2
(Gross hourly wages excluding compensation for overtime and shift/night/weekend work)

		Overall		
	OLS	Quantile estimates		
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.020***	0.013***	0.021***	0.028***
Upstreamness[a]	(0.002)	(0.001)	(0.002)	(0.002)
Conditional Quantile Regression (CQR)	0.020***	0.011***	0.012***	0.016***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.001)
		Men		
	OLS	Quantile estimates		
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.023***	0.011***	0.018***	0.023***
Upstreamness[a]	(0.002)	(0.002)	(0.001)	(0.002)
Conditional Quantile Regression (CQR)	0.023***	0.013***	0.015***	0.019***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.002)
		Women		
	OLS	Quantile estimates		
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.007**	0.003**	0.003**	0.003*
Upstreamness[a]	(0.002)	(0.004)	(0.003)	(0.003)
Conditional Quantile Regression (CQR)	0.007**	0.003	0.003*	0.005**
Upstreamness[a]	(0.002)	(0.002)	(0.002)	(0.002)
Individual and job characteristics[b]	Yes	Yes	Yes	Yes
Firm characteristics[c]	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Group effects[d]	Yes	Yes	Yes	Yes
Number of observations for:				
Overall	252,550	252,550	252,550	252,550
Men	195,683	195,683	195,683	195,683
Women	56,867	56,867	56,867	56,867
Number of groups for:				
Overall	4,660	4,660	4,660	4,660
Men	4,649	4,649	4,649	4,649
Women	4,462	4,462	4,462	4,462

Notes: The dependent variable is the gross hourly wage, excluding compensation for overtime and shift/night/weekend work (ln). Clustered and block bootstrapped standard errors (100 replications), corrected for heteroscedasticity, are reported in parentheses for OLS/CQR and UQR, respectively. [a] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for gender (only for overall sample), a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). ***/**/* Significance at the 1, 5 and 10 per cent, respectively.

Table A3: Mean and quantile decomposition of the gender wage gap, sensitivity test 3
(Gross hourly wages excluding compensation for overtime and shift/night/weekend work)

	OLS	Quantile estimates		
	Mean	*(.25)*	*(.50)*	*(.75)*
Overall gender wage gap	0.118	0.129	0.100	0.098
Decomposition:				
Magnitude:				
Compositional effect of upstreamness	0.002	0.001	0.002	0.003
Wage structure effect of upstreamness	0.041	0.021	0.050	0.071
% of the overall gender wage gap explained by:				
Compositional effect of upstreamness	1.69	0.77	2.00	3.06
Wage structure effect of upstreamness	34.7	16.2	50.0	72.4

Notes: Decompositions are based on the Unconditional Quantile Regression (UQR) estimates. For exposition purposes, the magnitude and the percentage (of the overall gender wage gap) only for the variable of upstreamness have been reported.

Table A4: Log wage equation, OLS, UQR and CQR, sensitivity test 4
(Gross hourly base pay, excluding any additional component)

	Overall			
	OLS	Quantile estimates		
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.015***	0.010***	0.019***	0.026***
Upstreamness[a]	(0.002)	(0.002)	(0.002)	(0.002)
Conditional Quantile Regression (CQR)	0.015***	0.007***	0.009***	0.012***
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.001)
	Men			
	OLS	Quantile estimates		
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.017***	0.008***	0.014***	0.022***
Upstreamness[a]	(0.003)	(0.001)	(0.001)	(0.002)
Conditional Quantile Regression (CQR)	0.017***	0.009***	0.012***	0.015***
Upstreamness[a]	(0.003)	(0.001)	(0.001)	(0.001)
	Women			
	OLS	Quantile estimates		
Variables	*(Mean)*	*(.25)*	*(.50)*	*(.75)*
Unconditional Quantile Regression (UQR)	0.005**	0.003**	0.003**	0.002
Upstreamness[a]	(0.002)	(0.002)	(0.002)	(0.003)
Conditional Quantile Regression (CQR)	0.005**	0.002	0.002	0.004**
Upstreamness[a]	(0.002)	(0.001)	(0.001)	(0.002)
Individual and job characteristics[b]	Yes	Yes	Yes	Yes
Firm characteristics[c]	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Group effects[d]	Yes	Yes	Yes	Yes
Number of observations for:				
Overall	252,529	252,529	252,529	252,529
Men	195,662	195,662	195,662	195,662
Women	56,867	56,867	56,867	56,867
Number of groups for:				
Overall	4,660	4,660	4,660	4,660
Men	4,649	4,649	4,649	4,649
Women	4,462	4,462	4,462	4,462

Notes: The dependent variable is the gross hourly base pay, excluding overtime compensation, premia for shift/night/weekend work, performance-related pay and commissions, and annual and irregular bonuses (ln). Clustered and block bootstrapped standard errors (100 replications), corrected for heteroscedasticity, are reported in parentheses for OLS/CQR and UQR, respectively. [a] Steps (distance) before the production of a firm meets either domestic or foreign final demand. [b] Individual and job characteristics include: six dummies for education, three dummies for tenure, eight dummies for age, a dummy for gender (only for overall sample), a dummy for part-time, two dummies for the type of employment contract, and seven occupational dummies. [c] Firm characteristics include: the logarithm of firm size (number of workers), a dummy for the type of financial and economic control, a dummy for the level of collective wage bargaining, and three sectoral dummies based on Eurostat's (2012) HT-KIS nomenclature: a dummy for medium-high-technology manufacturing industries, a dummy for medium-low-technology manufacturing industries, and a dummy for low-technology manufacturing industries (the reference category is high-technology manufacturing industries). [d] Group effects estimations use the correction for common variance components within groups, as suggested by Greenwald (1983) and Moulton (1990). ***/**/* Significance at the 1, 5 and 10 per cent, respectively.

Table A5: Mean and quantile decomposition of the gender wage gap, sensitivity test 5
(Gross hourly base pay, excluding any additional component)

	OLS	Quantile estimates		
	Mean	*(.25)*	*(.50)*	*(.75)*
Overall gender wage gap	0.108	0.121	0.097	0.084
Decomposition:				
Magnitude:				
Compositional effect of upstreamness	0.001	0.001	0.002	0.003
Wage structure effect of upstreamness	0.032	0.018	0.046	0.071
% of the overall gender wage gap explained by:				
Compositional effect of upstreamness	0.92	0.82	2.06	3.57
Wage structure effect of upstreamness	29.6	14.8	47.4	84.5

Notes: Decompositions are based on the Unconditional Quantile Regression (UQR) estimates. For exposition purposes, the magnitude and the percentage (of the overall gender wage gap) only for the variable of upstreamness have been reported.

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