Working apart: Polarisation driven by widening firm gaps and outsourcing

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Abstract

The labour market position of the lower skilled is increasingly under pressure in most high income countries. Their bargaining position is declining under the twin pressures of globalisation and technological change; and they are at risk of losing access to better positions as firms' pay and conditions arrangements increasingly drift apart. These rising between-firm differences partly come about through the increasing separation of lower skilled workers into lower-paying firms with worse conditions, thereby reducing their opportunities further. One mechanism driving this is the process of (domestic) outsourcing where main firms take certain tasks that are seen as non-core out of their payroll, instead purchasing those same tasks from another official employer while being able to retain control. Workers who see their jobs outsourced generally have to work under worse conditions and for lower pay. This paper uses cross-national European data (LFS and SES) along with contextual data to study how the labour market position of lower qualified workers is changing over time and how outsourcing and between-firm segregation is contributing to this gap. I find that (1) domestic outsourcing is increasing over time and leading to greater differences in where the lower and higher qualified work; (2) outsourced workers are working under worse conditions with generally lower wages; and (3) wage gaps by qualifications are increasingly due to between-firm segregation, helped along by this process. However, the process is not universal: it hits harder in sectors with greater technological innovation and can be alleviated by union density and worker representation.

Introduction

Are lower and higher qualified workers increasingly working in different jobs and for different employers? Such segregation risks cementing inequalities on the labour market, where better conditions and pay are offered to those with higher qualifications at the better firms while lower qualified workers are increasingly at risk of insecure and low-quality work. It can also have repercussions for social cohesion as contact between groups lessens. This paper studies this process of segregation and sorting, in which higher-paid workers increasingly work with each other and in the better-paying firms (Card et al. 2017; Song et al. 2019; Zwysen 2022a), and links it to the process of where lower skilled or qualified jobs are often moved away from higher-paying firms through domestic outsourcing (OECD 2021).

The labour market position of the lower educated is increasingly under pressure in western countries. Their bargaining position is declining under the twin pressures of globalisation and technological change which reduces demand for lower-skilled, often routine, labour while increasing the demand for higher-skilled workers (Autor, Levy and Murnane 2003; Goos and Manning 2007; Kalleberg 2011; Michaels et al. 2013).

At the same time, and partly through these same pressures, inequalities between firms are rising through differences in the sharing of productivity rents and through increasingly homogenous workforces (Criscuolo et al. 2020; Wilmers and Aeppli 2021; Zwysen 2022a). This is leading to greater segregation and a higher risk that the lower qualified will no longer be able to access better-paying firms and share in the wealth created.

Increasing attention is given to one way in which firms are becoming more homogeneous, namely the process of the outsourcing of certain tasks. Jobs that are not considered core to a specific firm are moved from within that firm's wage structure to an outside firm or contractor (Weil 2014; OECD 2021). Through this outsourcing the firm still controls the way the task is done but it can differentiate wages more and generally reduce employee costs – by cutting out these non-core job profiles from higher rewards and benefits. This matters as internal wage structures need also to be seen to be fair by employees but, when moving less competitive profiles away and changing from a pay-setting logic to a pricing one, such concerns no longer hold (Weil 2019). Outsourcing generally lowers the wages and conditions of the outsourced workers. This process is further widening the differences between the more secure, often with higher qualifications, workers and those at risk of being outsourced.

This paper uses cross-national micro-data covering EU Member States to analyse whether lower and higher qualified workers are increasingly working in different firms. First, there is indeed evidence of the greater segregation of workers by qualification level and more use of domestic outsourcing over time which primarily affects the lower qualified. Second, this segregation of workers affects wage differences, as wages tend to be higher in workplaces with more highly qualified workers while the lower qualified are increasingly concentrated in lower-paying firms. The issue goes beyond pay though, as there is a clear relationship between being outsourced and having lower quality jobs, in line with the literature. Third, I show that common global trends, particularly digitalisation, are associated with greater segregation and outsourcing. On the other hand, in sectors with stronger trade unions and where more workers are covered by multi-employer collective agreements there is less of such outsourcing and segregation.

This paper suggests that the outsourcing, particularly of lower qualified workers, is one way in which the inequalities between workers, and especially between firms (Zwysen 2022a), have increased over time in Europe. The next section describes the process of outsourcing and the reasons for looking at it as a driver of inequality. Then I describe the two main datasets used in this paper – the EU Labour Force Survey and the Structure of Earnings Survey – as well as the use of contextual data at sectoral level to describe wider trends and institutional factors; and explain the methodology. Finally I show the findings, discuss and conclude.

1. Conceptual framework

1.1 Greater segregation by pay and skills in firms is driving inequality

The main question addressed here is how the labour market position of those with higher, university level qualifications increasingly differs from those without them, through the widening of the differences in where they work.

As inequality is rising across highly developed countries, this brings with it a greater risk of polarisation in the labour market, with especially those without higher qualifications at risk of being trapped in worse positions with lower job quality and lower wages. This process is helped along by the greater use of digital technologies which are generally increasing the demand for, and the bargaining position of, higher skilled workers (Autor et al. 2003).

A key driver of rising inequality is a greater dispersion of wages and conditions in different firms (Criscuolo et al. 2020; Tomaskovic-Devey et al. 2020; Zwysen 2022b, 2022a). Wages for similar workers can differ between firms and organisations as they may contain rents shared by the employer with employees (Barth et al. 2016; Card et al. 2017; Tomaskovic-Devey and Avent-Holt 2019) or because wage setting also reflects the frictions involved with job search (Mortensen 2003). In both cases, wage differences to some extent reflect differences in the bargaining power of workers relative to the firm and are likely to increase gaps by qualifications and skills.

These inequalities are partly driven by common global trends in the labour market that are threatening the position of lower educated workers specifically. First, new technologies are increasing the demand for high-skilled workers and can contribute to wage polarisation (Autor et al. 2003; Goos et al. 2014). As firms differ in their ability to take up new technologies, productivity differences also grow, in turn raising divergence in firm premia and increasing inequality overall (Berlingieri et al. 2017; Faggio et al. 2010). Second, globalisation and trade affect wage differences by skill as tasks can be offshored and replaced by the import of intermediate products from countries where labour costs are lower (Autor et al. 2016; Kramarz 2017; Michaels et al. 2013). Further, international trade provides opportunities for exporting firms which increases their incentives to offer higher pay for high-skilled workers, increasing the firm premia overall. Third, institutions that should protect workers and compress the differences between workers and firms, such as collective agreements and trade unions, have declined in

impact over time (Tomaskovic-Devey et al. 2020; Zwysen 2022a; Zwysen and Drahokoupil 2022).

1.2   Segregation and outsourcing

Over time and under pressure from these trends, firms are also becoming more homogenous in whom they employ (Godechot et al. 2020; Handwerker 2020; Wilmers and Aeppli 2021). These differences are also exacerbated as workers with higher earning potential also increasingly work for the better employers on better conditions (Andrews et al. 2012; Borovičková and Shimer 2017; Card et al. 2017; Song et al. 2019). This then leads to a growing divide in the labour market with lower qualified workers increasingly kept out of the better positions which, along with higher pay, also offer superior and more stable conditions (Kristal 2017; Wilmers and Aeppli 2021).

These trends – which mean lower qualified workers have less access to better paying positions and will more often be clustered together in firms with less attractive conditions – are consistent across countries, but less is known about what is driving them.

1.3   Domestic outsourcing as one channel of more homogenous firms

One potential channel is domestic outsourcing – the situation where a worker is legally employed by one firm but, in practice, working for another (the lead firm). This lead firm has a continuing need for these workers, and exerts significant supervision or control, but is not the legal employer (OECD 2021). This is one route to wage discrimination at firm level (Goldschmidt and Schmieder 2017). This situation falls within what Weil (2014) named the fissured workplace – where firms increasingly focus on their own core tasks and use different set-ups to outsource tasks to flexible contractors, or franchisees, who have to follow strict standards set by the lead firm but are not legally employed by that firm. Of course, outsourcing can also happen across borders (referred to here as offshoring), but the focus here is on the process where the job itself does not leave the country, but is taken out of the company.

1.4   Why outsource some positions

Outsourcing, and more generally the complex network of firms entailed in fissuring, could increase over time due to the new digital tools and legal constructions which allow for it and under the incentives of the financial markets which have rewarded downsizing and restructuring (Weil 2019).

There are several benefits to employers. First, outsourcing can provide flexibility, allowing employers to make use of specialised labour which they not have to keep as staff when it is not being used. Second, and related, outsourcing can be a way to cut costs, even though the cost of outsourced labour includes both personnel costs and the company overhead. Costs are cut because, through outsourcing, workers that are deemed less competitive are excluded from common wage policies (Weil 2019). In pay setting, workers perceive that the differences between and among roles should be fair, but such considerations no longer hold when purchasing a service. By changing the logic of pay setting to one of paying for a service, these workers are generally excluded from any form of premia, also called rent sharing, through which workers participate in their firms' profitability or productivity.

Over time, outsourcing has become both more attractive and easier. First, new technologies make it more easily possible to monitor workers, making it easier to outsource certain tasks to other companies since standards can more easily be maintained (Fort 2016; Bergeaud et al. 2021). Second, rising productivity differences and firm premia, increased by open trade and the adoption of new technologies (Berlingieri et al. 2017; Zwysen 2022a), make it more attractive to differentiate between workers in terms of who receives the firm premia. Such differentiation is made easier by an overall decline in worker representation. Those firms that are most productive and generally pay wages above market rates are then also the most likely to limit the pool of workers benefiting from these conditions.

1.5   Effects of outsourcing on workers

Indeed, several studies that identify the impact of outsourcing on outsourced workers' pay and conditions find that their wages tend to decline relative to those not outsourced. This penalty is estimated at between 4 per cent (Bergeaud et al. 2021) and 12 per cent (Bilal and L'Huillier 2021) in France, 8-19 per cent for temporary agency workers in Argentina (Drenik et al. 2020), 4-7 per cent, or 8-24 per cent for specific profiles, in the United States (Dube and Kaplan 2010), and around 10 per cent in Germany (Goldschmidt and Schmieder 2017). Where it is possible to measure this, these pay losses are almost completely due to outsourced workers losing out on firm or industry premia and rents (Dube and Kaplan 2010; Goldschmidt and Schmieder 2017; Drenik et al. 2020). Conditions as measured by the risk of job separation also worsen, reflecting that these outsourced jobs are generally worse (Goldschmidt and Schmieder 2017).

1.6   Expectations

The questions this paper seeks to answer is, first, how is the position of lower qualified workers in the European labour market changing; and second, to what extent are differences between firms – with domestic outsourcing one possible channel – driving these changes.

The paper sets forth three main expectations regarding the gap over time in Europe in the labour market positions of higher qualified workers – here defined as those with a university degree – and of those with lower qualifications.

First, I expect (1) an increase in the outsourcing of lower qualified workers; and (2) consequently that the lower and higher qualified are increasingly working in different workplaces.

Second, these processes of outsourcing are expected to affect lower qualified workers' labour market positions, primarily negatively.

Third, contextual factors are influencing this process of segregation and outsourcing. In sectors more exposed to technological change and globalisation, the differences are expected to increase; although institutional protections can limit this inequality.

2. Data and methods

This paper makes use of two cross-national datasets of European countries to (1) describe trends in domestic outsourcing; and (2) link this to workplace segregation and earnings. The Structure of Earnings Survey (SES) contains detailed data on earnings and allows for an analysis of trends within workplaces, but is only held every four years; while the EU Labour Force Survey (LFS) has representative yearly data and allows for an operationalisation of domestic outsourcing. Descriptive statistics of all key variables for the SES are shown in Table A 1, and for the LFS in Table A 2.

2.1 Contextual factors

The data is enriched with external data at country-industry level to capture macroeconomic and institutional factors. Industry is measured in 20 categories in the SES and 12 large sectors in the LFS. The importance of trade in an industry is captured through trade openness – measured as imports plus exports over value added in an industry per country and year (Michaels et al. 2013). To flatten out single-year shocks the three-year average (the year of the SES survey and the years prior to and following it) is taken when merging it into the SES, which is undertaken every four years. The data is merged at the yearly level to the LFS. It is available up to 2018.

Technological innovation is captured through the industry-specific investment in ICT equipment including software and databases, expressed as a share of non-residential gross fixed capital formation (Michaels et al. 2013; Kristal and Cohen 2017; Calvino et al. 2018). This measures the investment in new technologies which can then be used for production. Where possible the data is obtained from national accounts data provided through the OECD but, where this is not available, data was obtained through the 2018 update of the 2017 EUKLEMS data. This data is again averaged over three years (the year of the SES survey and the years prior to and following it) before merging to the SES, and at yearly level to the LFS. It is generally available until 2017.

Union density is taken from the Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS version 6.1) by country, sector (12 large groups)[1] and year (Visser 2019), available up to 2018. Data on the share of workers covered by a central, decentralised or no collective pay agreement is taken from the SES itself. These are aggregated to country-sector-year level and only retained where at least 5 per cent of workers are covered (Zwysen and Drahokoupil 2022).

2.2 SES – wage gaps and workplace segregation

2.2.1 Detailed data on employees within workplaces

First, the SES, a harmonised European dataset linking employees to local units with commonly defined concepts on earnings, hours paid and annual days of paid holiday and leave, is collected every four years under European regulations by national statistical agencies. It is set up to be representative of and cover establishments with at least 10 employees in all areas of the economy except for agriculture and public administration – although some countries provide greater coverage. The data refers to the situation of employees in a reference month (generally October). Eurostat defines the main concepts and structure – a two-tiered sample of workers within workplaces – and national statistical institutes are responsible for gathering the data according to the guidelines, forwarding the results and reporting on the exercise. This common frame notwithstanding, there is variation between countries in how workplaces are defined and how the sample is collected. Table A 3 provides an overview of the data collection per country in terms of the source, the coverage and the definition of the local unit based on the national quality reports as obtained from Eurostat. To increase consistency, public administration is excluded.

For the purpose of this analysis, 19 EU Member States as well as Norway and the UK are included, covering the period from 2002[2] to 2018.[3] The main benefit of using the SES in this context is the ability to include the workplace, meaning the composition of workplaces in terms of worker qualifications as well as wage gaps within the workplace can be estimated. While this relies

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1. Union density is averaged over the five closest years to the year in which the ICTWSS is matched to SES. For 72 per cent of the country-industry-years in our dataset, the information came from the smallest sectoral level in the ICTWSS. For the remaining country-industry-years, union density at a higher level of aggregation was taken (all industry, commercial services or country-wide).
2. The 2002 wave differs slightly from the other waves in terms of which industries are included in each of the countries and, as the provided weights assume all industries are included, the weights have to be adjusted in order to be comparable.
3. 27 countries are included in the SES overall but, after restriction to those countries that are included over enough waves and have non-missing information, 21 are retained: (2002-2018) BE, BG, CY, CZ, EE, ES, FR, GR, HU, IT, LV, NL, PL, PT, RO, SE, SK; (2006-2018) DE; (2002-2014) LT, NO; (2006-2014) UK. For the final analysis linking to contextual factors, only 18 countries are retained.

on samples of workers within the workplace, of different sizes in different countries, it can still provide very useful information on overall trends. Table A4 shows the sample size per country and year.

Two main outcomes are studied in the SES. First, the log hourly wage, with the bottom 1 per cent dropped and the top 1 per cent winsorised to limit the impact of outliers. Second, the share of co-workers with low (at most lower secondary), intermediate (upper secondary or post-secondary non-tertiary) or high (tertiary) qualifications with are included to measure segregation. Furthermore, the SES has information on occupation (nine categories), tenure with the firm (four categories), average hours worked, age (six categories) and weeks worked per year, as well as gender; and information on the firm itself (firm size and whether majority privately or publicly controlled). As the sampling within workplaces differs between countries and over time, I generally restrict the sample to only those workplaces where at least three workers are observed, of whom at least one has university qualifications and at least does not. Table A5 shows how the percentage of workers covered varies after this restriction.[4]

2.2.2 Workplace segregation and wage gaps

The SES is used to analyse whether there is a change over time between workers by qualifications in where they work. This is first done by estimating the role workplaces play in wage differences between higher and lower qualified workers. To this end I estimate a stepwise linear regression of the log hourly wage for individual i in industry j, differentiating by being university qualified rather than having lower qualifications ($Qual_{high}$), separately by country c and at year t. The analysis is weighted and controls for a person's age and gender, allowing for them to interact (X). In the second equation, fixed effects for each workplace are added to capture the contribution of workplaces to wages. Using these different estimates provides an indication of the importance of workplaces and/or jobs in explaining wage gaps. β_1 is an estimate of the wage premium for higher qualified workers compared to lower qualified ones of the same gender and age. β_2 then indicates the difference between higher and lower qualified workers within the same workplace. The difference between them gives an indication of how much working in different workplaces contributes to the overall difference in pay by qualifications.

Equation 1: $Log(y_{ijct}) = \alpha_1 + \beta_1 * Qual_{high} + \gamma_1 * X + \varepsilon_{ij,1} \mid country = c, year = t$

Equation 2: $Log(y_{ijct}) = \alpha_2 + \beta_2 * Qual_{high} + \gamma_2 * X + \psi_j + \varepsilon_{ij,2} \mid country = c, year = t$

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4. The share of employees that are retained varies greatly between countries. It is by far the lowest in the United Kingdom, at 65 per cent in 2006 and 32 per cent in 2014, where few workers were sampled. In 2018 it ranged between 62 per cent for the Netherlands to 99 per cent in Slovakia. In the most recent year, more than 90 per cent of employees were retained in 11 of the 21 countries. While there is some variation within countries, it is generally consistent, indicating that a comparison over time within countries is not problematic.

As the SES contains data on workers within workplaces it is also possible to analyse the role of segregation directly by studying whether, besides a worker's own qualifications, the share of low and high skilled co-workers affects their wages. As this relationship may not be linear – for instance if productivity and wages benefit from diversity in skills (Iranzo et al. 2008) – these are introduced squared. This is estimated through a linear regression, weighted, of wages for individual i in industry j and country c, done separately by year t. Besides age and gender, I also include variables on work conditions (hours worked, weeks worked in a year, working on a temporary contract – all interacted with gender) and the firm (firm size and whether the company is majority privately or publicly controlled) in vector X_2. To account for differences in pay, I include fixed effects for the combination of country and industry ($\zeta_{c,j}$).

Equation 3: $Log(y_{ijct}) = \alpha_1 + \beta_1 * Qual_{middle} + \beta_2 * Qual_{high} + \delta_{1a} * Share_{low} + \delta_{1b} * Share_{low}^2 + \delta_{2a} * Share_{high} + \delta_{2b} * Share_{high}^2 + \gamma_1 * X_2 + \zeta_{c,j} + \varepsilon_{ijct,1} \mid year = t$

Finally, segregation can also be addressed more directly by analysing the differences between workers, differentiating (for reasons of simplicity) university-qualified workers from those without university qualifications, in the share of other workers in the same workplace that do not have university qualifications. In this model, I analyse whether contextual drivers, such as ICT capital, trade intensity, collective pay agreement coverage and union density affect such segregation, which would be shown through a negative coefficient (β_3) – reducing the probability of university qualified workers working alongside non-university qualified co-workers. Each contextual driver is introduced separately and the analyses are weighted and carried out separately by country c, allowing for variations over industry and time which are introduced as fixed effects.

Equation 4: $Share_{lower_{ijct}} = \alpha + \beta_1 * Qual_{university} + \beta_2 * Context + \delta * Qual_{university} * Context + \delta * X_2 + \zeta_t + \eta_j + \varepsilon_{ijt} \mid country = c$

2.3 LFS – outsourcing and job quality

The EU Labour Force Survey (LFS) is a European micro-dataset carried out quarterly with information on the labour market situation of a representative sample of the EU population. This paper uses data from 2001 to 2020 to study the trends in proxies for outsourcing and their impact on job quality for EU Member States plus Norway and the UK.[5]

Ideally, outsourcing events are measured using longitudinal linked employer-employee data as this allows the registration of when a large group of

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5. All 27 EU Member States plus UK and Norway are included in the LFS, which generally covers 2001-2020. Greece and Croatia are covered between 2002 and 2020; Malta 2009 and 2020; and the United Kingdom 2001 and 2019.

employees is shifted from one legal employer to another while remaining at work on the premises of the original employer (Goldschmidt and Schmieder 2017; Bertheau et al. 2020). Unfortunately, such data is not available cross-nationally. Following work by the OECD (2021), I proxy the rise in domestic outsourcing through the share of workers who are employed in the sector providing business services (K in NACEr1, and N in NACEr2). This captures an indication of the importance of business services being outsourced to other businesses, but it is a crude measure and will capture some workers who are not outsourced as well as miss some outsourced workers. As a second approximation of outsourcing, I make use of the share of workers who are employed through a temporary employment office. Temporary employment agencies are interesting as they also constitute a rather heavily regulated set of workers across many of the countries studied here (OECD 2021).

Besides describing the extent to which workers are outsourced, this paper also addresses the association between outsourcing and job quality. Job quality is captured through four outcomes: income in deciles (available from 2009); occupational status (ISEI), recoded from 3-digit ISCO codes (Ganzeboom and Treiman 1996); a dummy variable for being on a temporary contract because no indefinite contract was available; and a dummy variable for reporting having at least two types of non-standard work in the regular job (working evenings, nights, Saturdays or Sundays, or working in shifts).

Each job quality outcome is linearly regressed on indicators of qualifications, a dummy variable proxying outsourcing, and the interaction between qualifications and outsourcing for individuals i in occupation o, industry j, country c and at time t, controlling for individual characteristics X (gender, age, gender by age and cohabiting status) and country by year fixed effects. The job quality of workers who move from any sector into business services is analysed first (equation 5). By including fixed effects for the combination of country, occupation and industry at t-1, I compare those who had moved to a sector providing services to other businesses with those who had stayed in the same sector.

Second, the job quality of workers who work for a temporary employment agency is compared to that of those who do not but who work in the same industry, occupation and country at time t.

Equation 5: $y_{icot} = \alpha + \beta_1 * Qual_{middle} + \beta_2 * Qual_{high} + \beta_3 * Move\_BS + \gamma_1 * Qual_{middle} * Move\_BS + \gamma_2 * Qual_{high} * Move\_BS + \delta_1 * X + \zeta_{ct} + \eta_{coj,t-1} + \varepsilon_{ict}$

Equation 6: $y_{icot} = \alpha + \beta_1 * Qual_{middle} + \beta_2 * Qual_{high} + \beta_3 * Temp + \gamma_1 * Qual_{middle} * Temp + \gamma_2 * Qual_{high} * Temp + \delta_1 * X + \zeta_{ct} + \eta_{coj,t} + \varepsilon_{ict}$

Finally, I test whether contextual drivers – globalisation, digitalisation and worker representation – are shaping this process. Using the LFS I merge contextual data by year, 1-digit industry and country, and analyse the probability of moving to the business services sector from t-1 to t, or of working in a temporary employment agency (outsourced), controlling for

other characteristics *X* (gender, age, gender by age, cohabiting status and level of qualifications) to isolate the contribution of one's own qualifications as opposed to other factors on which people may sort, and fixed effects for country (ϑ_c), year (ζ_t), industry (η_j: at *t*-1 for business services and at *t* for temporary employment agency), and occupation (o_o). The four contextual variables are introduced jointly and interacted with qualifications. The analyses are weighted and standard errors are clustered at country, appropriate sector and year.

Equation 7: $Outsource_{ijcot} = \alpha + \beta_1 * Qual_{middle} + \beta_2 * Qual_{high} + \beta_3 * Context + \gamma_1 * Qual_{middle} * Context + \gamma_2 * Qual_{high} * Context + \delta * X + \vartheta_c + \eta_j + \zeta_t + o_o + \varepsilon_{ijcot}$

3. Findings

3.1 Segregation and the outsourcing of lower qualified workers

Are workers of different educational levels increasingly working in different places? As a first description, Figure 1 shows the evolution of the estimated gap by level of qualification from 2002 to 2018 over the different countries. First of all, the gaps between intermediate and high qualified workers compared to those with lower qualifications, and, to a lesser extent, of high qualified compared to intermediate ones, dropped steeply from 2010 to 2014 and then rose again somewhat up to 2018. That rise from 2014 to 2018 was disproportionally driven by greater disparities in the workplace: lower qualified workers were, over time, less likely to work alongside higher qualified ones. Actually, over the whole period, the relative importance of the place where someone works – measured as the extent to which information on co-workers' qualifications explains the wage gap – increased relatively from 13-14 per cent to 20-21 per cent. The estimated coefficients are shown in Table A 6.

Figure 2 shows the average difference in hourly wages between university and non-university qualified workers across Europe, adjusting for differences in gender or age, and compares the overall wage premia for university qualified personnel with that operating within workplaces. The returns to a higher qualification are particularly high in Portugal, Romania and Luxembourg; and much lower in the more egalitarian Nordic countries (Denmark, Sweden, Norway and Finland) (Esping-Andersen 1990). Generally, between one-quarter and one-half of the total wage difference by qualifications lies in higher qualified workers working in different workplaces to lower qualified ones, with the average being around 38 per cent.
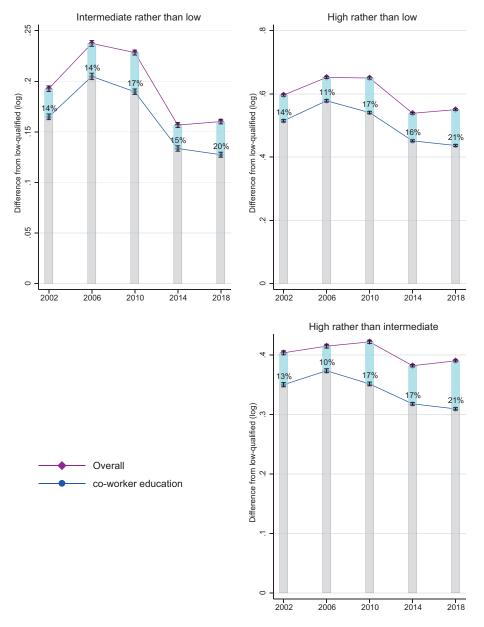
Figure 1   **Estimated gap in log wage by highest qualification over time**

Note: Estimated difference in log wage of lower qualified workers compared to intermediate (left) and higher qualified (centre) ones, and higher qualified workers to intermediate qualified (right) ones overall, controlling for co-workers' qualifications (squared share of lower qualified and higher qualified workers), weighted and controlling for country by industry and for age, hours worked, weeks worked in the year and working on a temporary contract, all interacted with gender, firm size and private control. The Y-scales differ.
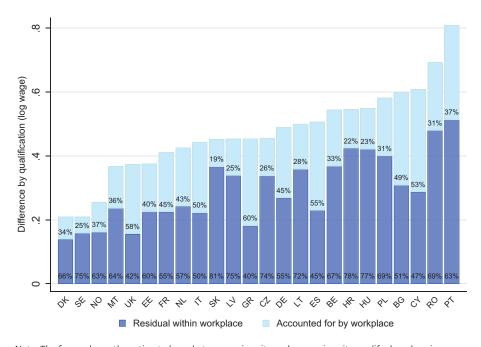Source: SES 2002-2018.

Figure 2   **Wage gap between university and non-university qualified in Europe**

Note: The figure shows the estimated gap between university and non-university qualified workers in a country parts in the most recent available year – 2018 overall (2014 for Lithuania and the UK), split in the part accounted for by the workplace and the residual gap within workplaces.
Source: SES 2014-2018.

Figure 3 then looks at changes over time in this gap. First, the pay gap between lower and higher qualified workers is declining on average across Europe. This is being completely driven by a decline in pay gaps within workplaces, while on average the pay gap between workplaces has remained stable. This means that, relatively, the workplace is becoming more important over time. However, this overall trend hides quite some variation. Pay gaps are rising overall in seven EU Member States (Cyprus, Bulgaria, Hungary, Netherlands, Norway, Belgium and Italy). In 10 EU Member States, qualification gaps by workplace are rising – meaning there is an increasing trend towards a sorting of lower qualified workers into lower-paying firms. In 13 of the 21 countries studied here, differences in pay by qualification level grew relatively more between workplaces than within them.
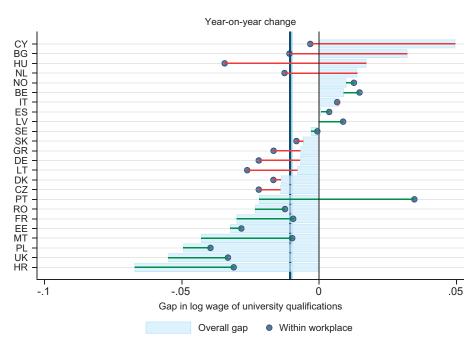
Figure 3   Average change in log wage difference between university and non-university qualified workers over time

Note: The figure shows the average yearly change from the first to the last year of the survey in the overall gap in log wage by qualifications and the gap within workplaces. A green line indicates that the change in university qualification premia within workplaces was more positive than the overall, and therefore higher than the between-workplace part; while a red line indicates the evolution in pay disparity within workplaces was more negative than within overall.
Source: SES 2002-2018.

These descriptive results indicate that, although wage gaps have gone down on average, particularly in the period directly following the great recession, differences in pay by qualification level are increasingly due to people with different qualifications working in different workplaces. Figure 4 shows descriptively how the qualifications of co-workers have changed on average over time for lower qualified, intermediate and higher qualified workers. This shows first that lower qualified workers are much more likely to work with other lower qualified workers while higher qualified workers are more likely to work alongside other higher qualified co-workers. This overrepresentation stands at about 20 percentage points more likely than would be expected given the shares of qualification groups. Importantly, lower qualified workers are increasingly isolated – working more with other lower qualified workers and much less with higher qualified workers over time. To a lesser degree, this also holds for workers with intermediate qualifications being increasingly likely to work alongside similarly qualified workers.

This indicates that workplaces across Europe indeed seem to have become more homogenous in terms of the qualifications of their workforce. This segregation is likely to contribute to inequality between workplaces (Song et al. 2019; Criscuolo et al. 2020). It also carries the risk of lower qualified workers, increasingly co-located in relatively lower-paying firms together

with other lower qualified workers, having declining bargaining power and increasingly losing out on job quality and wages.

Figure 4 **Average share of co-workers with low (left), intermediate (centre) and high (right) qualifications over time by qualifications**

Note: This figure shows the average share of co-workers (excepting the individual) in local units with at least three workers, by qualification from 2002-2018, as a difference from the national average share of qualification groups. To keep a consistent group of countries the values of 2006 are repeated for 2002 in UK and DE; and the 2014 values for UK and NO in 2018. The dataset consists of 21 countries: BE, BG, CY, CZ, DE, EE, ES, FR, GR, HU, IT, LT, LV, NL, NO, PL, PT, RO, SE, SK and UK.
Source: SES 2002-2018.

One possible explanation of how this segregation comes about may be a greater use of outsourcing over time. This would mean that the services and tasks carried out by lower qualified workers would be being moved externally rather than kept within the firm. The risk of this is that employment agencies and business service providers operate in a more competitive environment and contend with each other on conditions and price, resulting in relatively worse working conditions for the outsourced workers (Goldschmidt and Schmieder 2017; OECD 2021).

Using the LFS, Figure 5 shows that the share of the workforce employed in the business service sector has indeed increased overall. While the levels are highest for lower qualified workers, with around 4.5 per cent working in the business services sector compared to 2.5 per cent of those with tertiary qualifications, for both groups there has been a sizeable rise over time. Second, the share of workers in temporary employment agency jobs has increased over time particularly for the lower qualified. Temporary employment agency jobs increased overall until 2008, although it did decline sharply from 2008 to 2009. Since then, their use rather stagnated up to 2015, particularly for intermediate and higher qualified workers. Between 2010 and 2017, however, there was a sharp increase among those with lower and intermediate levels of qualification and then a rapid increase by 2020 for the lower qualified of up to 9%.
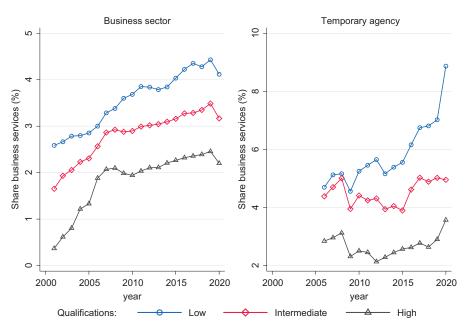
Figure 5   **Trends in outsourcing as proxied through business services sector workers and temporary agency staff**

Note: Estimated average from EU LFS for EU countries, weighted. Series adjusted for break in 2007 with industry switch from NACE1 to NACE2.
Source: LFS 2001-2020, EU27 + NO, UK.

Combining these two findings indicates that relatively more lower and intermediate qualified workers are working in jobs that are at risk of being outsourced and that this share has increased over time across Europe.

Figure A1 shows these results by country and highlights the increase in business services almost everywhere, and almost universally more so for the lower qualified than the higher. The trend for temporary agency workers is less clear but, there too, more changed for those with lower than those with university qualifications. Part of the reason for these country differences may be that the use of temporary employment agencies is much more heavily regulated.

In summary, this section shows that the workplace plays an important role in understanding wage differences between higher and lower qualified workers and that this role is becoming relatively more prominent over time. Increasingly, lower qualified workers are working, right across Europe, in different workplaces to higher qualified workers. Coinciding with this trend is an increase in domestic outsourcing, with more lower qualified workers now working in sectors providing services to other businesses or working for temporary employment agencies.
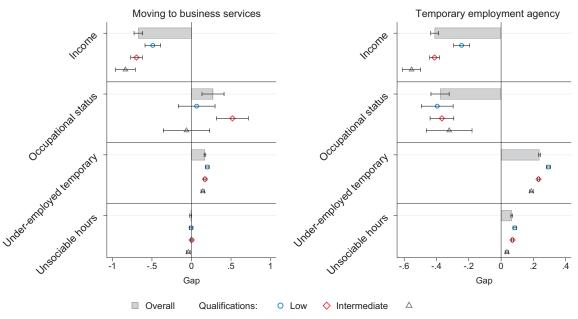
3.2   Relationship between outsourcing and job quality

The next question is then whether such segregation and possible outsourcing is affecting the labour market outcomes of workers as well. Segregation itself would not necessarily be a problem, although there is value in meeting people with different skills and characteristics at work, but if this is also associated with worse labour conditions it can point to widening inequalities over time. I address this in two ways – first by using the LFS to investigate directly whether job quality is associated with a risk of being outsourced; and then by using the SES to show the relationship between the skills of co-workers and one's own wage.

The left panel of Figure 6 compares workers who have recently moved from somewhere else to the business services sector with comparable workers who worked in the same sector the year before but had not moved to business services. Moving to the business services sector – which carries a risk of having been outsourced – is associated with earning relatively less than those who had not moved. The gap is somewhat higher for the better qualified, which is likely to reflect the greater variation in pay scales for those groups. However, they tend to work in somewhat higher-status jobs, particularly among those with intermediate qualifications. They are more likely to be on involuntary temporary contracts although there is little difference in working non-standard times. Overall then, a move to the business services sector is associated with relatively worse conditions than not moving. The right panel shows that workers who work for a temporary employment agency generally have lower income and occupational status than their peers in the same industry and broad occupation, and are much more likely to work on

involuntary temporary contracts and with unsociable hours. The results are shown in Table A7 and Table A8.

Figure 6   **Estimated impact of moving to the business services sector, or working in a temporary employment agency, 95 per cent C.I.**

Note: Estimated impact and 95 per cent C.I. from LFS, controlling for couple, age by gender and fixed effects for country by year, and country by occupation (1 digit) by industry (previous – business sector; or current – temporary).
Source: LFS 2001-2020.

Using the SES, Figure 7 shows the estimated wage gain of having more university qualified colleagues. First – even when accounting for own qualifications, age, hours worked, size and ownership of the firm and contract type – there is a sizeable wage difference between workers depending on their colleagues' qualifications. Going from a low (25th percentile) to a high (75th percentile) share of high-skilled colleagues is associated with a wage gain of between 6 per cent and 16 per cent – that is, this premium has almost tripled since 2006. This indicates that the segregation that is happening – where lower qualified workers and intermediate ones are, over time, less likely to work alongside higher qualified ones – is also associated with a wage loss.

These analyses suggest that increased segregation is a problem as it tends to exacerbate the weak labour market position of lower educated workers. In summary, this greater segregation and possible domestic outsourcing are linked to receiving relatively lower wages as well as somewhat worse labour market conditions among lower qualified workers.
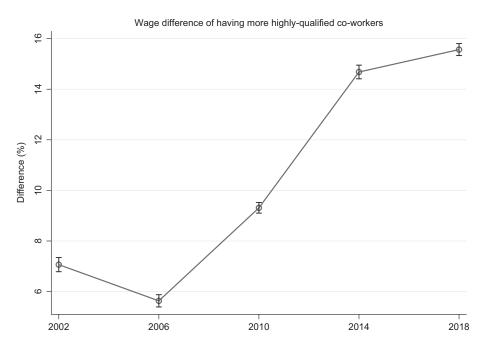
Figure 7   **Estimated wage gains from having more higher qualified co-workers over time, with 95 per cent C.I.**

Wage difference of having more highly-qualified co-workers

Note: Estimated difference in hourly wages for workers when the share of university qualified co-workers increases from the 25th to the 75th percentile of the overall distribution, estimated from regression controlling for own qualification, co-workers' qualifications composition (squared share of lower qualified workers and higher qualified ones), weighted, and controlling for country by industry and for age, hours worked, weeks worked in the year and working on a temporary contract, all interacted with gender, firm size and private control.
Source: SES 2002-2018.

3.3   What is driving segregation and outsourcing?

What then is driving these patterns of segregation and possible domestic outsourcing; and is this a pervasive and common trend?

Figure 8 shows the relationship between the contextual factors and the probability of moving from a different sector to business services – as a proxy for outsourcing – or the probability of being a temporary agency worker. In sectors with greater ICT capital investment, the probability of lower skilled and intermediate workers being employed on a temporary agency contract, or of them moving to the business services sector, is higher. Globalisation is less clear-cut, however. On the one hand, a greater involvement in global value chains at country level is indeed associated with a greater risk of moving to the business services sector among lower qualified workers, and with working in temporary employment agencies for everyone; while trade intensity is associated with a greater risk of working in temporary employment agencies for the lower qualified. On the other hand, however, greater trade intensity in the sector is associated with a greater risk of moving to the business services sector among the higher qualified – which can, of course, also be a type of outsourcing.
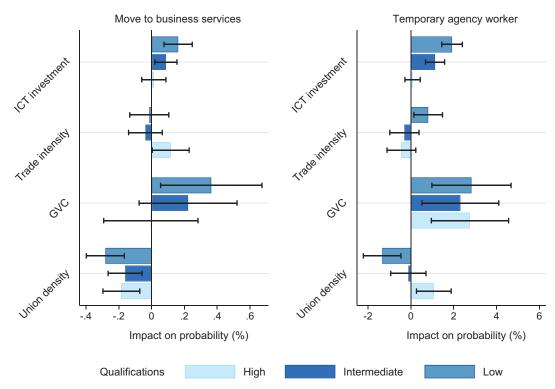
Figure 8 Macroeconomic and institutional factors driving possible outsourcing,
with 95 per cent C.I.

Note: Estimated average from EU LFS, weighted, showing the estimated change in contextual factors (10th to 90th percentile) on the share of workers moving from a sector [t-1] to the business services sector, or being employed in temporary agency work, with a 95 per cent C.I. Estimated from a regression of the contextual factors, controlling for gender, age, qualification, part-time and temporary contract work, with fixed effects for country, sector, year and occupation, and standard errors clustered at country-sector-year
Source: LFS 2001-2020.

While these macroeconomic trends seem to be driving a greater risk of outsourcing, union density can provide protection. In sectors with stronger trade unions there is a substantially lower risk of any worker, but particularly lower qualified ones, moving to the business services sector. Similarly, in sectors with stronger trade unions, fewer lower qualified workers are working for temporary employment agencies.

Finally, Figure 9 links these contextual factors directly to the composition of workplaces. It shows how the average difference in the share of non-university qualified co-workers differs between workers by their own qualifications depending on whether the macroeconomic factors (digitalisation or globalisation) or the institutional ones (union density or level of collective pay agreement coverage at industry level) are one standard deviation higher. The country-specific associations on which the figure is based are shown in Figure A2. On average, university qualified workers have fewer non-university qualified co-workers than non-university qualified workers. This difference becomes more negative –in most countries – in sectors or years with higher levels of ICT investment. On the other hand, trade openness and

union density are associated with this gap closing somewhat, as is the case in workplaces covered by a multi-employer (central) collective pay agreement. There is no clear pattern between countries in terms of the association with decentralised agreements, although this does seem to be worse than central collective pay agreements.

These results indicate quite starkly that the segregation of higher and lower qualified workers into different workplaces – which could be linked to outsourcing – is more widespread where there is more ICT capital; while worker representation, especially when occurring at sectoral level, is associated with more heterogenous workplaces.
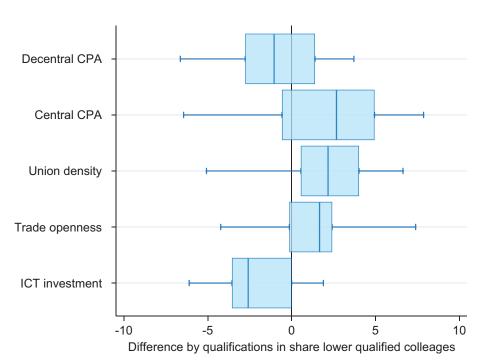
Figure 9   Summary of how contextual factors affect the university gap in working with non-university qualified co-workers

Note: Figure shows the distribution between countries (minimum – 1st quartile – median – 3rd quartile – maximum) of the estimated association between a shift in the contextual factors and the difference in the predicted share of non-university qualified co-workers between a university and a non-university qualified worker. Effect is estimated from separate regressions per country, controlling for age, hours and weeks worked, and working on a temporary basis, all interacted with gender and firm size, with year and industry fixed effects. Being higher qualified is interacted with ICT investment, trade openness and sectoral union density (all standardised), and with collective pay agreement coverage relative to no coverage (or decentralised if the figure for no coverage is absent) in those cases where at least 5 per cent of workers in a sector are covered; these interaction terms are shown in the figure (with 95 per cent C.I.). The outcome is the share of lower skilled colleagues (other than the individual) for higher qualified workers compared to lower-qualified (non-tertiary) ones.
Source: SES 2002-2018.

Importantly then, these trends towards greater segregation and domestic outsourcing are not universal. It is entirely in line with our findings that greater inequality between firms – helped along by segregation and the sorting of higher-paid workers into high-paying firms – is shaped by institutional differences; and that declining worker representation is one particular driver allowing for greater differentiation between firms (Tomaskovic-Devey et al. 2020; Zwysen 2022a).

4.   Discussion

This paper aims to describe trends in outsourcing and the weakening labour market position of lower educated workers across Europe. The findings do indeed suggest that there is growing polarisation by qualification level across Europe. The lower qualified are more often working on a more segregated basis, alongside other low qualified workers, and seem more at risk of being outsourced which can have negative effects on wages and job security.

While suggestive, this paper uses a variety of data sources and the analyses are not completely comparable. It is therefore not possible to say whether outsourcing lies at the heart of the greater polarisation and wage differentiation, as further research is needed for this. Similarly, the data clearly suggests that segregation by qualifications is larger in more digitalised sectors and those with less institutional protection, but it is not possible to say whether this is happening at firm level. For this reason, more research using detailed firm level data is needed.

Conclusions

Differences between firms in their pay setting arrangements and who they hire are the driving force behind much of the growth in inequality in wealthy countries (Lazear and Shaw 2009; Tomaskovic-Devey and Avent-Holt 2019; Criscuolo et al. 2020; Zwysen 2022a). This means that it is all the more important to study these differences in the workforce over time and the processes behind segregation and growing inequality.

This paper describes how workers with different levels of qualifications across Europe are increasingly working in separate workplaces, alongside more co-workers of the same level of qualification. This also means that the workplace is an increasingly important determinant of wages and of wage differences between workers with different qualifications.

At the same time this paper shows that lower and intermediate qualified workers are increasingly at risk of being outsourced – meaning they are providing services and working on the premises of an employer that is not their own. This matters as such domestic outsourcing is associated with relatively lower wages and worse working conditions.

Crucially, this paper uses the variation between countries, sectors and over time to show that this process is not universal. Such outsourcing and segregation by qualification level is more present in sectors that use more digital technologies and that are more open and involved in global value chains. These wider trends, that all countries face, on the one hand help firms to outsource tasks more easily while still using digital technologies to control workers; and, on the other, to increase the incentives to do so and to focus on their core tasks. However, more outsourcing and polarisation is not a foregone conclusion; this occurs less in countries and sectors characterised by stronger trade unions and more multi-company collective pay agreements.

In conclusion then, strengthening the institutional factors protecting workers across Europe can also serve to limit the greater precariousness and the race to the bottom that greater outsourcing and segregation implies for lower qualified workers – already vulnerable and facing worse conditions – when pushed away from the better and more protected firms.

References

Andrews M.J. et al. (2012) High wage workers match with high wage firms: clear evidence of the effects of limited mobility bias, Economics Letters, 117 (3), 824–827, https://doi.org/10.1016/j.econlet.2012.07.033

Autor D.H., Dorn D. and Hanson G.H. (2016) The china shock: learning from labor-market adjustment to large changes in trade, Annual Review of Economics, 8 (1), 205–240, https://doi.org/10.1146/annurev-economics-080315-015041

Autor D.H., Levy F. and Murnane R.J. (2003) The skill content of recent technological change: an empirical exploration, The Quarterly Journal of Economics, 118 (4), 1279–1333

Barth E. et al. (2016) It's where you work: increases in the dispersion of earnings across establishments and individuals in the united states, Journal of Labor Economics, 34 (S2), S67–S97, https://doi.org/10.1086/684045

Bergeaud A. et al. (2021) Technological change and domestic outsourcing, SSRN Scholarly Paper ID 3900865, Social Science Research Network., https://doi.org/10.2139/ssrn.3900865

Berlingieri G., Blanchenay P. and Criscuolo C. (2017) The great divergence(s),39, OECD.

Bertheau A., Bunzel H. and Vejlin R. (2020) Employment reallocation over the business cycle: evidence from danish data, IZA Discussion Paper Series [Preprint], (13681)

Bilal A.G. and L'Huillier H. (2021) Outsourcing, inequality, and aggregate output, NBER Working Paper 29348, NBER.

Borovičková K. and Shimer R. (2017) High wage workers work for high wage firms,w24074, National Bureau of Economic Research., https://doi.org/10.3386/w24074

Calvino F. et al. (2018) A taxonomy of digital intensive sectors, OECD Science, Technology and Industry Working Papers 2018/14, OECD Publishing.

Card D. et al. (2017) Firms and labor market inequality: evidence and some theory, Journal of Labor Economics, 36 (S1), S13–S70, https://doi.org/10.1086/694153

Criscuolo C. et al. (2020) Workforce composition, productivity and pay: the role of firms in wage inequality,1603, OECD.

Drenik A. et al. (2020) Paying outsourced labor: direct evidence from linked temp agency-worker-client data, Working Paper 26891, National Bureau of Economic Research., https://doi.org/10.3386/w26891

Dube A. and Kaplan E. (2010) Does outsourcing reduce wages in the low-wage service occupations? evidence from janitors and guards, ILR Review, 63 (2), 287–306, https://doi.org/10.1177/001979391006300206

Esping-Andersen G. (1989) The three worlds of welfare capitalism. 1 edition,Cambridge, UK, Polity Press.

Faggio G., Salvanes K.G. and Van Reenen J. (2010) The evolution of inequality in productivity and wages: panel data evidence, Industrial and Corporate Change, 19 (6), 1919–1951, https://doi.org/10.1093/icc/dtq058

Fort T. (2016) Technology and production fragmentation: domestic versus foreign sourcing,22550, NBER.

Ganzeboom H.B.G. and Treiman D.J. (1996) Internationally comparable measures of occupational status for the 1988 international standard classification of occupations, Social Science Research, 25 (3), 201–239, https://doi.org/10.1006/ssre.1996.0010

Godechot O. et al. (2020) The great separation, MaxPo Discussion Paper 20/3,
    Max Planck Sciences Po Center on Coping with Instability in Market Societies.

Goldschmidt D. and Schmieder J.F. (2017) The rise of domestic outsourcing and the
    evolution of the german wage structure*, The Quarterly Journal of Economics,
    132 (3), 1165–1217, https://doi.org/10.1093/qje/qjx008

Goos M. and Manning A. (2007) Lousy and lovely jobs: the rising polarization of work in
    britain, The Review of Economics and Statistics, 89 (1), 118–133

Goos M., Manning A. and Salomons A. (2014) Explaining job polarization: routine-
    biased technological change and offshoring, American Economic Review, 104 (8),
    2509–2526

Barth E E.W. (2020) Outsourcing, occupationally homogeneous employers, and growing
    wage inequality in the united states, BLS Working Papers 522, U.S. Bureau of Labor
    Statistics.

Iranzo S., Schivardi F. and Tosetti E. (2008) Skill dispersion and firm productivity: an
    analysis with employer‐employee matched data, Journal of Labor Economics,
    26 (2), 247–285, https://doi.org/10.1086/587091

Kalleberg A.L. (2011) Good jobs, bad jobs: the rise of polarized and precarious
    employment systems in the united states, 1970s-2000s. 1st edn,New York,
    Russell Sage Foundation. (Rose Series in Sociology)

Kramarz F. (2017) Offshoring, wages, and employment: evidence from data matching
    imports, firms, and workers, in Fontagné L. and Harrison A. (eds) The Factory-Free
    Economy: Outsourcing, Servitization, and the Future of Industry,Oxford

Kristal T. (2017) Who gets and who gives employer-provided benefits? evidence from
    matched employer-employee data, Social Forces, 96 (1), 31–64,
    https://doi.org/10.1093/sf/sox048

Kristal T. and Cohen Y. (2017) The causes of rising wage inequality: the race between
    institutions and technology, Socio-Economic Review, 15 (1), 187–212

Lazear E.P. and Shaw K.L. (2009) Wage structure, raises and mobility: an introduction
    to international comparisons of the structure of wages within and across firms,
    in Lazear E.P. and Shaw K.L. (eds) The Structure of Wages,Chicago, University of
    Chicago Press.

Michaels G., Natraj A. and Van Reenen J. (2013) Has ict polarized skill demand?
    evidence from eleven countries over twenty-five years, The Review of Economics
    and Statistics, 96 (1), 60–77, https://doi.org/10.1162/REST_a_00366

Mortensen D.T. (2003) Wage dispersion: why are similar workers paid differently? 1st
    edn,The MIT Press.

OECD (2021) Chapter 4: the rise of domestic outsourcing and its implications for low-
    pay occupations, in OECD Employment Outlook 2021: Navigating the Covid-19 crisis
    and recovery,Paris, France, OECD Publishing.

Song J. et al. (2019) Firming up inequality*, The Quarterly Journal of Economics, 134 (1),
    1–50, https://doi.org/10.1093/qje/qjy025

Tomaskovic-Devey D. et al. (2020) Rising between-workplace inequalities in high-
    income countries, Proceedings of the National Academy of Sciences [Preprint]

Tomaskovic-Devey D. and Avent-Holt D. (2019) Relational inequalities: an
    organizational approach. 1st edn,Oxford University Press.

Visser J. (2019) ICTWSS database. version 6.1,Amsterdam, Amsterdam Institute for
    Advanced Labour Studies (AIAS). University of Amsterdam.

Weil D. (2014) The fissured workplace: why work became so bad for so many and what
    can be done to improve it,Harvard University Press.

Weil D. (2019) Understanding the present and future of work in the fissured workplace context, RSF: The Russell Sage Foundation Journal of the Social Sciences, 5 (5), 147–165, https://doi.org/10.7758/RSF.2019.5.5.08

Wilmers N. and Aeppli C. (2021) Consolidated advantage: new organizational dynamics of wage inequality, American Sociological Review, 86 (6), 1100–1130, https://doi.org/10.1177/00031224211049205

Zwysen W. (2022a) Global and institutional drivers of wage inequality between and within firms, Socio-Economic Review, , mwac054, https://doi.org/10.1093/ser/mwac054

Zwysen W. (2022b) Wage inequality within and between firms: macroeconomic and institutional drivers in europe, ETUI working paper 2022.02, ETUI.

Zwysen W. and Drahokoupil J. (2022) Are collective agreements losing their bite? collective bargaining and pay premia in europe, 2002-2018, ETUI Working Paper 2022.07, ETUI.

Appendix

Table A1 Summary statistics – SES

	All	Low qualifications	Intermediate qualifications	High qualifications
Wage	6.27	6.05	6.19	6.60
Control: private	0.74	0.84	0.78	0.59
CPA: central	0.56	0.71	0.50	0.57
CPA: decentralised	0.16	0.12	0.17	0.15
CPA: none	0.28	0.17	0.33	0.27
Hours worked in month	153.15	150.57	153.61	154.23
Weeks worked in year	48.53	47.76	48.59	49.03
High qualifications	0.26	0.00	0.00	1.00
Intermediate qualifications	0.53	0.00	1.00	0.00
Low qualifications	0.20	1.00	0.00	0.00
Age (categorical)	3.37	3.40	3.34	3.40
Temporary contract	0.45	0.52	0.41	0.49
Female	0.47	0.41	0.47	0.51
Share lower qualified co-workers	0.20	0.48	0.14	0.09
Share intermediate qualified co-workers	0.53	0.38	0.66	0.38
Share higher qualified co-workers	0.27	0.14	0.20	0.53
Firm-size: 1-49	0.25	0.30	0.26	0.18
Firm-size: 50-249	0.22	0.24	0.23	0.21
Firm-size: 250+	0.52	0.45	0.51	0.59
Firm-size: all	0.00	0.00	0.00	0.00
Share ICT	0.39	0.37	0.39	0.40
Trade intensity	0.95	0.99	1.04	0.73
Union density	23.04	22.06	23.04	23.81

Note: Weighted average over SES sample.

Table A2   **Summary statistics – LFS**

	All	Low qualifications	Intermediate qualifications	High qualifications
Income	5.60	4.27	5.16	6.97
Occupational status (ISEI)	44.48	32.10	39.55	60.31
Under-employed temporary	0.06	0.09	0.05	0.06
Unsociable hours	0.33	0.32	0.36	0.30
Share ICT	0.46	0.46	0.46	0.46
Trade intensity	0.77	0.82	0.88	0.56
GVC	44.81	42.86	45.57	44.91
Union density	24.56	24.64	24.13	25.24
Low qualifications	0.26	1.00	0.00	0.00
Intermediate qualifications	0.48	0.00	1.00	0.00
High qualifications	0.27	0.00	0.00	1.00
Female	0.50	0.50	0.48	0.52
Age	41.80	44.80	40.70	40.88
Move to business services sector	0.0036	0.0039	0.0035	0.0036
Temporary employment agency	0.02	0.03	0.02	0.01
Work in business services sector	0.04	0.04	0.04	0.05

Note: Weighted average by educational level from LFS, 2001-2020.

Table A3   Description of key characteristics of SES per country

	Administrative survey or both	Covers public administration	Covers establishments under 10	Definition of local unit	Comments
Belgium	Administrative data from social security and businesses, with a questionnaire for additional information	No	Yes	Local unit	
Bulgaria	Survey	Yes	Yes	Local unit	
Czechia	Surveys	Yes	Yes	Local unit	Since 2010 also small entrepreneurs and non-profit; and, in 2018, fewer than 10 employees
Denmark	Administrative	Yes	All public sector; in the private sector at least 10 employees	Enterprise	
Germany	Survey, augmented with social security administrative data	No	No	Local unit	
Estonia	Survey	No	No	Local unit	
Ireland	Administrative, with survey for additional information	Yes	Yes	Combination of enterprise and industry	One-stage sample of employees
Greece	Survey	No	No	Local unit, but selection on enterprise	Coverage of sectors changes by year
Spain	Administrative data	Yes	Yes	Intersection of employer by province and activity	From 2006, small units are included and, since 2010, public administration
France	Surveys supplemented with administrative data on businesses and social security	Yes	No	Establishments	
Italy	Administrative data, with survey for additional information	Yes	No	Enterprise	Source changed since 2014, with the current use of new integrated system of registers
Cyprus	Survey enriched with administrative data	Yes	Yes	Enterprise	
Latvia	Survey, enriched with administrative data	Yes	Yes	Local unit	Includes second jobs as well so people may be double counted
Lithuania	Survey	Yes	Yes	Local unit	

	Administrative survey or both	Covers public administration	Covers establishments under 10	Definition of local unit	Comments
Hungary	Survey	Yes	Yes	Organisation	Only report for establishments with at least five employees. Reference month is May
Malta	Survey	Yes	No	Enterprise	
Netherlands	Combination of sources: mainly administrative; with some survey data from LFS for additional data	Yes	No	Enterprise by geographical location	
Austria	Survey	Yes	No	Local unit	
Poland	Survey	Yes	No	Local unit	
Portugal	Administrative data on payments; survey to complement missing variables	No	No	Local unit	
Romania	Survey, with some administrative data on businesses	Yes, but not armed forces	Yes	Enterprise	
Slovenia	Survey	Yes	Yes	Local unit by activity	One-stage survey
Slovakia	Survey	Yes	No	Local unit by activity	
Sweden	Administrative for public sector; survey of enterprises for private sector	Yes	No	Enterprise	Reference month is September
Norway	Administrative	Yes	Yes	Establishment	Switched in 2015 to a new set of administrative data

Note: Table describes some key characteristics of the national SES data, as obtained from EU and national data quality reports obtained through Eurostat.

Table A4 **Employees included in each wave of the SES and the share retained**

Country	No. workers					% retained				
	2002	2006	2010	2014	2018	2002	2006	2010	2014	2018
FR	96 997	84 315	163 678	212 265	193 707	80%	74%	74%	79%	75%
LV	177 532	257 287	191 380	153 908	170 318	92%	86%	86%	89%	90%
PT	29 839	62 752	78 140	61 289	69 859	48%	60%	65%	72%	73%
EE	72 688	115 215	105 466	116 933	148 301	93%	91%	88%	95%	96%
BE	81 921	96 101	86 898	111 500	161 771	73%	58%	63%	79%	87%
RO	199 847	228 703	237 893	253 496	294 346	87%	88%	85%	88%	89%
ES	145 475	145 318	147 066	143 960	140 847	67%	62%	68%	69%	64%
GR	33 012	32 799	22 104	25 600	26 347	67%	68%	55%	65%	68%
UK		85 234	60 854	56 077			64%	34%	32%	
CY	11 781	17 481	26 502	28 043	24 742	89%	66%	81%	89%	84%
BG	144 599	141 709	160 898	162 937	176 311	95%	76%	78%	81%	81%
SK	413 436	656 047	752 556	867 274	941,035	99%	97%	97%	98%	98%
NL	65 743	86 549	106 689	98 047	105 852	79%	56%	62%	63%	62%
HU	419 647	722 942	725 607	815 503	824 057	88%	92%	87%	92%	94%
PL	594 469	511 414	610 165	685 432	812 260	92%	78%	89%	95%	94%
CZ	1 015 858	1 871 151	1 918 242	2 132 606	2 369 232	99%	95%	96%	97%	97%
IT	38 361	71 073	121 484	132 446	189 007	47%	46%	46%	70%	76%
DE		2 401 125	1 429 212	709 664	696 607		75%	76%	70%	70%
SE	948 569	265 456	270 241	252 400	267 138	95%	93%	95%	96%	97%
LT	135 465	113 236	30 680	36 187	34 025	93%	86%	80%	81%	79%
NO	515 530	610 027	708 252	1 370 686		86%	62%	50%	92%	

Note: The number of workers retained with no missing values, and in workplaces with at least three workers of which at least one has a university qualification and at least one does not.

Table A5 Share of employees in workplaces with at least one lower and one higher qualified worker and three employees

	2002	2006	2010	2014	2018
BE	73.9%	58.8%	64.0%	80.3%	88.1%
BG	95.5%	76.7%	79.3%	82.0%	81.9%
CY	90.3%	66.7%	82.2%	89.5%	85.1%
CZ	99.5%	95.9%	97.2%	97.8%	98.3%
DE		79.4%	76.4%	70.3%	70.6%
DK				88.5%	94.5%
EE	94.0%	92.0%	89.4%	96.3%	96.7%
ES	67.7%	62.4%	68.5%	69.4%	65.0%
FR	80.9%	74.9%	75.0%	80.2%	76.3%
GR	67.8%	69.1%	56.1%	66.0%	68.3%
HU	91.8%	93.9%	93.5%	93.4%	95.0%
IT	47.3%	46.3%	46.4%	70.7%	76.7%
LV	93.4%	86.7%	86.6%	90.1%	91.2%
NL	79.8%	56.5%	62.1%	63.6%	62.3%
NO	87.0%	62.3%	50.6%	92.7%	
PL	92.9%	79.1%	90.4%	95.7%	95.2%
PT	48.2%	60.6%	65.4%	72.7%	73.3%
RO	87.7%	89.2%	86.4%	89.3%	89.9%
SE	98.2%	94.2%	95.7%	97.5%	97.8%
SK	99.5%	98.3%	98.2%	98.8%	98.6%
UK		64.6%	34.3%	32.3%	

Note: Table shows what percentage of observations are retained when restricting to workplaces with at least three observations, of which at least one is lower qualified and at least one higher qualified (university qualifications).
Source: SES 2002-2018.

Table A6 Estimated association between log hourly wage and workplace composition – SES

VARIABLES	2002 M1	2002 M2	2006 M1	2006 M2	2010 M1	2010 M2	2014 M1	2014 M2	2018 M1	2018 M2
Highest qualification (ref=low)										
Intermediate	0.193***	0.165***	0.237***	0.205***	0.228***	0.190***	0.157***	0.134***	0.160***	0.127***
	(0.00141)	(0.00145)	(0.00147)	(0.00164)	(0.00125)	(0.00141)	(0.00126)	(0.00138)	(0.00117)	(0.00128)
High	0.596***	0.515***	0.652***	0.578***	0.650***	0.541***	0.539***	0.451***	0.550***	0.437***
	(0.00190)	(0.00203)	(0.00192)	(0.00214)	(0.00175)	(0.00199)	(0.00145)	(0.00164)	(0.00133)	(0.00152)
Share lower skilled co-workers		-0.114***		-0.191***		-0.186***		-0.227***		-0.254***
		(0.0103)		(0.00767)		(0.00651)		(0.00611)		(0.00571)
Share lower skilled ^2		0.0761***		0.137***		0.143***		0.264***		0.282***
		(0.00889)		(0.00812)		(0.00677)		(0.00694)		(0.00664)
Share higher skilled co-workers		0.508***		0.494***		0.652***		0.513***		0.503***
		(0.00912)		(0.00829)		(0.00696)		(0.00558)		(0.00521)
Share higher skilled ^2		-0.240***		-0.280***		-0.363***		-0.232***		-0.206***
		(0.0106)		(0.0101)		(0.00776)		(0.00591)		(0.00536)
Dummy: woman	-0.0960***	-0.0788***	-0.0570***	-0.0529***	0.0386***	0.0546***	0.0740***	0.0826***	0.0423***	0.0539***
	(0.0141)	(0.0141)	(0.0110)	(0.0109)	(0.00802)	(0.00803)	(0.00818)	(0.00818)	(0.00718)	(0.00712)
Age	0.0110***	0.0110***	0.0101***	0.0101***	0.0159***	0.0160***	0.00844***	0.00856***	0.00727***	0.00740***
	(7.14e-05)	(7.23e-05)	(6.76e-05)	(6.74e-05)	(0.000110)	(0.000109)	(5.40e-05)	(5.35e-05)	(4.94e-05)	(4.88e-05)
Hours worked	-0.000956***	-0.000983***	-0.000836***	-0.000878***	0.000192***	0.000132***	0.000864***	0.000782***	0.000917***	0.000786***
	(4.88e-05)	(4.93e-05)	(3.39e-05)	(3.33e-05)	(2.47e-05)	(2.43e-05)	(2.218e-05)	(2.15e-05)	(2.15e-05)	(2.11e-05)
Weeks worked	0.0320***	0.0319***	0.0310***	0.0309***	0.0338***	0.0335***	0.0319***	0.0317***	0.0305***	0.0303***
	(0.000137)	(0.000136)	(0.000110)	(0.000109)	(9.36e-05)	(9.36e-05)	(9.91e-05)	(9.95e-05)	(7.88e-05)	(7.80e-05)
Temporary contract	-0.202***	-0.194***	-0.230***	-0.226***	-0.245***	-0.240***	-0.247***	-0.241***	-0.212***	-0.202***
	(0.00337)	(0.00333)	(0.00271)	(0.00271)	(0.00296)	(0.00299)	(0.00203)	(0.00202)	(0.00173)	(0.00172)
Temporary – missing	-0.0573***	-0.0463***			-0.0882***	-0.0991***				
	(0.00761)	(0.00740)			(0.0219)	(0.0215)				
Woman * age	-0.00191***	-0.00203***	-0.00242***	-0.00239***	-0.00349***	-0.00375***	-0.00209***	-0.00220***	-0.00125***	-0.00136***
	(0.000103)	(0.000104)	(0.000100)	(9.95e-05)	(0.000149)	(0.000150)	(7.87e-05)	(7.88e-05)	(6.79e-05)	(6.73e-05)
Woman * hours	-9.88e-05*	-0.000203***	0.000468***	0.000424***	-0.000298***	-0.000430***	-0.000472***	-0.000554***	-0.000654***	-0.000738***
	(5.30e-05)	(5.32e-05)	(4.02e-05)	(3.98e-05)	(2.99e-05)	(2.95e-05)	(2.52e-05)	(2.50e-05)	(2.45e-05)	(2.42e-05)

VARIABLES	2002		2006		2010		2014		2018	
	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
Highest qualification (ref=low)										
Woman * weeks worked	0.000280	0.000355*	-0.00203***	-0.00202***	-0.000973***	-0.000819***	-0.000972***	-0.000818***	-0.000334***	-0.000207*
	(0.000196)	(0.000195)	(0.000163)	(0.000162)	(0.000126)	(0.000125)	(0.000141)	(0.000142)	(0.000107)	(0.000106)
Woman * temporary	0.0446***	0.0420***	0.0428***	0.0416***	0.0564***	0.0576***	0.0496***	0.0496***	0.0317***	0.0302***
	(0.00473)	(0.00470)	(0.00387)	(0.00386)	(0.00362)	(0.00364)	(0.00272)	(0.00272)	(0.00228)	(0.00226)
Woman * temporary missing	0.0348***	0.0326***	0.0130***	0.00898***	0.0291***	0.0257***	0.0345***	0.0296***		
	(0.00219)	(0.00213)	(0.00310)	(0.00305)	(0.00298)	(0.00295)	(0.00345)	(0.00338)		
2.firmsize_full	0.0980***	0.0894***	0.0883***	0.0829***	0.110***	0.103***	0.131***	0.124***	0.119***	0.117***
	(0.00140)	(0.00142)	(0.00149)	(0.00149)	(0.00119)	(0.00120)	(0.00115)	(0.00116)	(0.00117)	(0.00117)
3.firmsize_full	0.185***	0.170***	0.177***	0.167***	0.208***	0.192***	0.237***	0.223***	0.215***	0.208***
	(0.00155)	(0.00162)	(0.00156)	(0.00155)	(0.00117)	(0.00118)	(0.00109)	(0.00111)	(0.00109)	(0.00110)
9.firmsize_full	0.0450***	0.0387***	0.0597***	0.0540***	0.116***	0.0894***	0.105***	0.0927***	0.0702***	0.0635***
	(0.00608)	(0.00614)	(0.00855)	(0.00887)	(0.00384)	(0.00384)	(0.00400)	(0.00397)	(0.00457)	(0.00457)
Private control	-0.0645***	-0.0618***	-0.0628***	-0.0505***	-0.0743***	-0.0646***	-0.0578***	-0.0451***	-0.0776***	-0.0594***
	(0.00237)	(0.00238)	(0.00196)	(0.00195)	(0.00185)	(0.00187)	(0.00153)	(0.00153)	(0.00134)	(0.00135)
Constant	3.958***	3.928***	4.342***	4.326***	3.998***	3.973***	4.023***	3.954***	4.238***	4.171***
	(0.0116)	(0.0116)	(0.00880)	(0.00887)	(0.00708)	(0.00724)	(0.00700)	(0.00707)	(0.00619)	(0.00629)
Observations	5 301 089	5 301 089	8 442 544	8 442 544	9 081 159	9 081 159	8 803 330	8 803 330	8 085 953	8 085 953
R-squared	0.858	0.861	0.790	0.794	0.785	0.792	0.779	0.786	0.767	0.777

Note: Country by industry fixed effects; M2 includes share of lower and higher skilled workers; robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A7   **Impact on job quality of moving to business services sector**

Move to business services sector	Income decile		Occupational status (ISEI)		Under-employed temporary		Unsociable work times	
Qualifications (ref=low)								
Intermediate	0.450***	(0.00364)	0.543***	(0.00889)	-0.00666***	(0.000440)	0.0307***	(0.000799)
High	1.181***	(0.00487)	1.488***	(0.0125)	-0.00395***	(0.000541)	0.0251***	(0.00102)
Outsource	-0.489***	(0.0503)	0.0655	(0.119)	0.201***	(0.0114)	-0.00514	(0.0119)
Intermediate * outsource	-0.207***	(0.0626)	0.453***	(0.156)	-0.0304**	(0.0136)	0.00729	(0.0146)
High * outsource	-0.346***	(0.0810)	-0.128	(0.191)	-0.0570***	(0.0161)	-0.0347**	(0.0167)
Dummy: woman	-0.604***	(0.0109)	-0.274***	(0.0289)	0.0210***	(0.00161)	-0.0316***	(0.00243)
Age: ref = 18-24								
Age 25-29	0.809***	(0.00926)	-0.0390*	(0.0230)	-0.0222***	(0.00117)	0.0145***	(0.00196)
Age 30-34	1.332***	(0.00893)	-0.0455**	(0.0225)	-0.0411***	(0.00113)	0.0179***	(0.00191)
Age 35-39	1.661***	(0.00885)	0.0141	(0.0223)	-0.0521***	(0.00110)	0.0213***	(0.00189)
Age 40-44	1.864***	(0.00885)	0.0711***	(0.0223)	-0.0586***	(0.00108)	0.0179***	(0.00189)
Age 45-49	1.987***	(0.00879)	0.0465**	(0.0221)	-0.0637***	(0.00107)	0.0118***	(0.00188)
Age 50-54	2.034***	(0.00886)	0.0370*	(0.0223)	-0.0674***	(0.00107)	-0.00130	(0.00189)
Age 55-59	1.969***	(0.00907)	0.0513**	(0.0228)	-0.0708***	(0.00107)	-0.0240***	(0.00193)
Age 60-64	1.705***	(0.0106)	0.223***	(0.0262)	-0.0720***	(0.00112)	-0.0619***	(0.00217)
Woman * 25-29	-0.318***	(0.0132)	-0.0345	(0.0351)	0.000395	(0.00188)	-0.0407***	(0.00292)
Woman * 30-34	-0.620***	(0.0127)	0.0553	(0.0340)	-0.00752***	(0.00179)	-0.0631***	(0.00281)
Woman * 35-39	-0.807***	(0.0125)	0.0377	(0.0334)	-0.0100***	(0.00174)	-0.0709***	(0.00275)
Woman * 40-44	-0.866***	(0.0124)	0.0220	(0.0330)	-0.0133***	(0.00170)	-0.0642***	(0.00273)
Woman * 45-49	-0.840***	(0.0122)	0.0179	(0.0326)	-0.0163***	(0.00168)	-0.0596***	(0.00271)
Woman * 50-54	-0.794***	(0.0123)	0.0151	(0.0328)	-0.0199***	(0.00168)	-0.0550***	(0.00272)
Woman * 55-59	-0.690***	(0.0127)	0.0694**	(0.0334)	-0.0238***	(0.00168)	-0.0440***	(0.00277)
Woman * 60-64	-0.613***	(0.0152)	0.0362	(0.0383)	-0.0276***	(0.00177)	-0.0247***	(0.00313)
Cohabiting	0.0399***	(0.00258)	0.0263***	(0.00699)	-0.00980***	(0.000269)	-0.0177***	(0.000555)
Constant	4.192***	(0.00833)	44.16***	(0.0200)	0.110***	(0.00106)	0.359***	(0.00174)
Observations		10 222 056		10 205 715		10 219 670		10 214 469
R-squared		0.458		0.936		0.125		0.202

Note: Robust standard errors in parentheses; includes fixed effects for country by year and country by occupation by industry.
*** p<0.01, ** p<0.05, * p<0.1.
Source: LFS.

Table A8   **Impact on job quality of working for temporary employment agency**

Temporary employment agency	Income decile		Occupational status (ISEI)		Under-employed temporary		Unsociable work times	
2.educ_short	0.444***	(0.00389)	0.628***	(0.00921)	-0.00626***	(0.000489)	0.0288***	(0.000832)
3.educ_short	1.169***	(0.00525)	1.666***	(0.0132)	-0.00351***	(0.000619)	0.0181***	(0.00106)
Outsource	-0.245***	(0.0250)	-0.395***	(0.0501)	0.293***	(0.00590)	0.0845***	(0.00544)
Intermediate * outsource	-0.168***	(0.0293)	0.0288	(0.0620)	-0.0613***	(0.00685)	-0.0141**	(0.00642)
High * outsource	-0.310***	(0.0377)	0.0740	(0.0875)	-0.106***	(0.00821)	-0.0482***	(0.00787)
Dummy: woman	-0.708***	(0.0120)	-0.244***	(0.0314)	0.0320***	(0.00197)	-0.0292***	(0.00257)
Age: ref = 18-24								
Age 25-29	0.714***	(0.0100)	-0.0748***	(0.0242)	-0.0283***	(0.00136)	0.0108***	(0.00203)
Age 30-34	1.234***	(0.00968)	-0.0956***	(0.0237)	-0.0492***	(0.00131)	0.0157***	(0.00198)
Age 35-39	1.568***	(0.00958)	-0.0342	(0.0235)	-0.0611***	(0.00128)	0.0187***	(0.00196)
Age 40-44	1.780***	(0.00960)	0.0203	(0.0236)	-0.0677***	(0.00126)	0.0143***	(0.00197)
Age 45-49	1.903***	(0.00953)	0.00319	(0.0234)	-0.0726***	(0.00125)	0.00779***	(0.00196)
Age 50-54	1.961***	(0.00960)	-0.00453	(0.0236)	-0.0770***	(0.00125)	-0.00576***	(0.00197)
Age 55-59	1.907***	(0.00980)	0.0214	(0.0241)	-0.0805***	(0.00125)	-0.0292***	(0.00200)
Age 60-64	1.687***	(0.0114)	0.221***	(0.0278)	-0.0832***	(0.00132)	-0.0663***	(0.00225)
Woman * 25-29	-0.242***	(0.0143)	-0.0142	(0.0376)	-0.00496**	(0.00227)	-0.0356***	(0.00306)
Woman * 30-34	-0.530***	(0.0138)	0.0669*	(0.0365)	-0.0155***	(0.00216)	-0.0595***	(0.00296)
Woman * 35-39	-0.707***	(0.0136)	0.0535	(0.0358)	-0.0191***	(0.00211)	-0.0691***	(0.00290)
Woman * 40-44	-0.769***	(0.0135)	0.0485	(0.0354)	-0.0234***	(0.00207)	-0.0619***	(0.00288)
Woman * 45-49	-0.739***	(0.0133)	0.0531	(0.0350)	-0.0276***	(0.00204)	-0.0570***	(0.00285)
Woman * 50-54	-0.691***	(0.0134)	0.0621*	(0.0352)	-0.0314***	(0.00204)	-0.0522***	(0.00286)
Woman * 55-59	-0.573***	(0.0137)	0.120***	(0.0358)	-0.0359***	(0.00204)	-0.0411***	(0.00291)
Woman * 60-64	-0.493***	(0.0164)	0.0816**	(0.0410)	-0.0405***	(0.00215)	-0.0218***	(0.00328)
Cohabiting	0.0437***	(0.00270)	0.00988	(0.00723)	-0.0100***	(0.000303)	-0.0167***	(0.000568)
Constant	4.337***	(0.00920)	43.51***	(0.0215)	0.122***	(0.00125)	0.357***	(0.00184)
Observations		9 713 637		9 697 671		9 712 262		9 706 431
R-squared		0.444		0.936		0.140		0.209

Note: Robust standard errors in parentheses; includes fixed effects for country by year and country by occupation by industry.
*** p<0.01, ** p<0.05, * p<0.1.
Source: LFS.

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