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What's a woman's job? Mapping the contribution of feminisation to gender gaps across Europe

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Mapping the contribution
of feminisation to gender gaps
across Europe

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Contents

Abstract.....	4
1. Introduction.....	5
2. Background.....	7
2.1 Men and women do not work in the same jobs.....	7
2.2 Negative association between more women in a job and pay.....	8
2.3 Beyond money.....	9
2.4 Conceptual framework and expectations.....	9
3. Segregation into industries, occupations and workplaces.....	11
3.1 Measuring segregation.....	11
3.2 Segregation across Europe.....	12
3.3 Do women also work in lower-paying sectors and workplaces?.....	14
4. Devaluation of jobs.....	19
4.1 Identifying devaluation with the Labour Force Survey (LFS).....	19
4.2 Devaluation of jobs.....	21
4.3 Robustness test using more detailed occupational groupings.....	24
4.4 Variation in devaluation.....	25
5. Discussion and conclusion.....	28
References.....	30
Appendix.....	33

Abstract

Despite some progress, women are still disadvantaged on the labour market. While most policies – pay transparency, awareness raising or anti-discrimination legislation – address the pay gaps between men and women in the same job, less attention is generally given to men and women working in different jobs. Crucially, such segregation is large and can actually widen the gaps as the sheer presence of women in a job seems to lead to a devaluation of those jobs and a reduction in how they are viewed and rewarded. The problem also goes beyond the wage as women also face disadvantage in terms of conditions of work.

This paper addresses two issues concerning the horizontal segregation of men and women into different jobs. First, it maps the extent of the separation in jobs and workplaces between men and women and its relationship with gender pay gaps. Second, it shows how this segregation dynamically affects pay and non-monetary working conditions in these more feminised jobs. By taking a longitudinal view, it also becomes clear that several aspects of a job – such as the contract conditions, supervisory responsibilities and pay – become worse over time as more women work in such jobs.

The paper points to a need to consider gender equality more widely, not only by focusing on pay differences between men and women in the same job but also on what processes lead to ‘feminine jobs’ being valued lower. Devaluation seems to be worse in contexts where women are more disadvantaged – as the gender pay gap is higher – and where employers have more discretion in setting pay and working conditions.

1. Introduction

A key trend in most industrial countries has been the much greater involvement of women in the labour market since the 50s and 60s. Over time, there has been a greater share of women working and especially a greater retention of women through more flexible working time and paid maternity leave. However, women still face disadvantage in terms of pay, earning around 13% less than men across the EU27, but also in terms of aspects of job quality and access to supervisory positions (Dämmrich and Blossfeld 2017; Franklin et al. 2022; Penner et al. 2023).

Tackling these gender pay gaps is a key policy goal with significant attention paid to the issue of pay discrimination against women and the need for regulation, such as through the Pay Transparency Directive in the EU and by tackling discrimination. Much attention is, justifiably, devoted to closing the gaps between men and women doing the same job, but a sizeable part of this gap can be attributed to segregation into lower paying sectors¹ and even lower paying firms (Card et al. 2016; Goldin et al. 2017).

Such separation is both horizontal – with women working in different sectors including, for instance, more in the public sector and far fewer in IT – and vertical as there is still a glass ceiling within a company limiting women's progression to the highest jobs (Rubery 2015). This issue of separation into different types of jobs and employers is often explained away as a difference in choices, but it should be noted these are constrained choices which restrict women's opportunities. Segregation along sectoral and occupational lines is seen as one key contribution to the continuing inequalities faced by women on the labour market (ILO 2016).

Problematically, it is not just that women work in positions that are valued less, but also that there may be a dynamic impact where jobs actually worsen as a greater share of women work in them (England et al. 2007; Levanon et al. 2010; Murphy and Oesch 2016). There is a growing body of evidence that more feminised jobs offer, as a result, lower wages and poorer working conditions over time (e.g. Addison et al. 2018; Busch 2020; England et al. 2007; Harris 2022; Levanon et al. 2010; Mandel 2013; de Ruijter et al. 2003). Such devaluation points to the importance of also addressing the separation of men and women in different jobs as this can have longer-lasting detrimental effects on women's outcomes.

1. https://ec.europa.eu/info/policies/justice-and-fundamental-rights/gender-equality/equal-pay/gender-pay-gap-situation-eu_en#:~:text=Sectoral%20segregation%3A%20Around%2024%25%20of,tend%20to%20be%20systematically%20undervalued.

This paper provides an overview of the contribution of gender segregation to gaps on the labour market by addressing two issues using large cross-nationally representative datasets: the EU Labour Force Survey (EU LFS) and the Structure of Earnings Survey (SES). It first describes the extent to which men and women work in different industries, occupations and workplaces across Europe and how this is linked to pay and gender gaps. Indeed, a higher degree of gender segregation contributes to higher gender pay gaps as the sectors and workplaces with more women also tend to have substantially lower earnings than those with more men. Partly, this is due to women working in workplaces that pay less on average to their workers, reflecting variations in how firms share rents with workers and indicating generally lower bargaining power (Cardoso et al. 2016; Zwysen 2021). This descriptive analysis contributes to a growing literature on segregation not only between industries and occupations, but also between workplaces, by showing cross-nationally comparable evidence on the extent to which this matters across the EU (Card et al. 2016; Cardoso et al. 2016; Penner et al. 2023). This paper describes the extent of the separation of men and women into different industries, occupations and workplaces but does not address the question of what individual and societal factors are driving this segregation.

Second, it takes a longitudinal view and analyses how such separation between men and women in different jobs is associated with worsening outcomes for women over time. It analyses the link between feminisation and job quality – in terms of pay, but also in patterns of working time and supervisory responsibilities where women may face disadvantage – between countries and sectors and over time. To test whether the devaluation of jobs seen as more feminine can drive such changes over time, the paper tests whether outcomes worsen for both men and women, and also tests the variation between countries and sectors depending on the level of employer discretion in setting pay (Murphy and Oesch 2016). Indeed, the quality of jobs tends to worsen as jobs become more feminised. This relation holds for both men and women, and is stronger in contexts where employers have greater discretion, as in the private sector and when not covered by collective agreements. This paper is the first to link such segregation to pay and job quality over time across the European Union and to consider the variation in the extent to which devaluation holds between countries and sectors. It then indicates some support for the devaluation of jobs with more women, and points to the role of context.

The main question set forth is whether labour market outcomes – generally pay but also some non-monetary aspects of job quality – have become worse as a consequence of feminisation. If so, how can equality be achieved?

2. Background

2.1 Men and women do not work in the same jobs

Recent studies have shown a renewed interest in the role of firms and organisations in shaping inequalities and show that widening inequality mainly occurs between rather than within firms (Card et al. 2017; Criscuolo et al. 2020; Song et al. 2019; Tomaskovic-Devey et al. 2020; Zwysen 2022b). Several studies have also considered the role of firms in shaping gender pay gaps. Indeed, part of the gender pay gap is due not only to sorting into lower-paying industries but also to women generally working for lower-paying firms than men. This gap could come about through a weaker bargaining position of women on average, resulting from their lower job mobility and the extent to which job moves are less often voluntary among women (Card et al. 2016).

Estimates of the importance of segregation into firms varies over studies and countries. The role of segregation seems to be relatively small in the UK where differences in whether employers pay high or low contribute at most to 6% of the overall gender pay gap (Jewell et al. 2020). Sorkin (2017) finds it matters much more in the US context where sorting accounts for up to a quarter of the gap, identifying the responsible factor as disadvantage in opportunities for women in particular. In Portugal, Cardoso et al. (2016) attribute up to a fifth of the gender pay gap to segregation across firms, with a further fifth arising from segregation into specific jobs within the firm. In a recent cross-national study using linked employer-employee data, the OECD (2021) finds that about one quarter of the overall gender pay gap occurs between firms, with the remaining part representing different positions within the firm and differences in pay for the same jobs. These studies point to an important role for sorting both into sectors and firms, and into jobs within firms, where women tend to work in those firms or jobs that pay less well. In an interesting paper using linked employer-employee data on 15 wealthy countries, Penner et al. (2023) find that, while the majority of gender pay gaps occur within jobs, sorting is becoming increasingly important over time as within-job pay gaps decline relatively faster.

A large volume of literature offers differing explanations for this segregation. First, there may be discrimination against women in hiring decisions, particularly in some jobs that are seen as more masculine. However, evidence suggests that such hiring discrimination is rather low and declining (Birkelund et al. 2022; Schaerer et al. 2023). Second, women still face most of the burden of childcare, and gender pay gaps are found to widen sizably with the advent of children, the so-called 'motherhood penalty' (Deming 2022). Third and related, women are more

often constrained in their mobility, through childcare needs or as the partner's decisions take priority, which limits their choice of employers and their bargaining power (Card et al. 2016; Cardoso et al. 2016). While these drivers are definitely important, this paper focuses on the extent to which there is separation, rather than addressing the behavioural and institutional reasons for it.

2.2 Negative association between more women in a job and pay

Segregation is not only problematic in itself, but can also be associated with a further worsening in labour market positions for women. There is a consistent relationship between the share of women in jobs or occupations and overall earnings (Bartnik et al. 2022; Busch 2018; Grönlund and Magnusson 2013; Leuze and Strauß 2016; Levanon et al. 2010; Murphy and Oesch 2016). Several possible reasons are put forward in the literature. First, they may reflect an increase in part-time work or a reduction in overtime which are seen as more female-specific work patterns (Leuze and Strauß 2016). Second, the association could reflect unmeasured characteristics of those jobs that would require less human capital or provide lower returns (Grönlund and Magnusson 2013; Reskin and Roos 1990). Third, the sheer presence of women may lead people to devalue the prestige of jobs and this may lead to worse labour market outcomes (Busch 2018; England et al. 2007; Levanon et al. 2010; Murphy and Oesch 2016).

In a recent study based on US data, Harris (2022) finds that incumbents within an occupation experience lower wages when more women enter that occupation. Over a span of 10 years, a 10 percentage point increase in the share of women in an occupation is associated with a 9% decrease in male wages and a 14% decrease for women. This is driven partly by greater hours flexibility and those jobs having lower prestige. Several studies have asked about prestige directly, with somewhat mixed results. In a Spanish study, more segregated jobs are evaluated as having somewhat lower prestige, both when dominated by men and by women (García-Mainar et al. 2018), while a study in the US found gender-segregated jobs are seen as more valued, with men valuing the male-dominated ones more and women the women-dominated ones more (Valentino 2020). This would generally be problematic for women, as men are still more often in supervisory positions (Dämmrich and Blossfeld 2017). In an interesting study, Freeland and Harnois (2020) find that people evaluate those jobs more highly that are associated with power, strength and competency – seen as more masculine qualities.

While the research is quite clear that there is an association between feminisation and worse wages, and also tends to indicate that this relationship is caused by the share of women, it is not completely clear what the mechanism is. However, there does seem to be a clear link that conditions worsen because more women enter an occupation, and that this affects both men and women. While there could, in principle, also be a reverse trend, where women move towards lower paying jobs that may offer better non-wage benefits, there is little evidence of such a relationship with most studies indicating that greater shares of women lead to lower wages rather than the other way around (England et al. 2007).

Devaluation would also entail that the effect depends on context – the extent to which women are valued in general and the freedom employers have in setting wages and work conditions. Busch (2018) posits that such devaluation represents the interplay of specific occupational stereotypes within a clear historical context and is therefore not likely to be universal. This makes it all the more important to consider variation over national contexts. In their interesting study Murphy and Oesch (2016), using longitudinal data from Britain, Switzerland and Germany, show that moving to a feminised occupation leads to lower wages and, crucially, that this is stronger in the private than the public sector, indicating that the wage setting discretion of employers is an important driver. Similarly, Zucco (2019) finds greater wage differences in the private than the public sector.

2.3 Beyond money

Most studies are focused on the pay gaps between men and women, and this has strong relevance. However, there are many non-monetary aspects of job quality which also matter greatly and which should be taken into account (Green et al. 2013; Muñoz de Bustillo 2011). Job quality is a more complex and multidimensional concept, of which pay is one – not unimportant – aspect. Other aspects include the quality of the employment contract, the conditions of work itself – the type of work and the physical environment – working time and work-life balance, and prospects in terms of promotion, job security and training, as well as interest representation (Piasna 2023). While not all these aspects are addressed here, in analysing the devaluation hypothesis what this paper attempts to capture is other aspects such as contract type and prospects for work-life balance.

It is particularly important to consider job quality more widely in order to test whether reduced pay in more feminised jobs is offset by other characteristics of the job. For instance, Botassio and Vaz (2022) find some indication that these other aspects may offset the pay penalty in feminised jobs in Brazil; Bächmann (2022) finds that, in recent decades in Germany, the risk of unemployment tends to be lower in more feminised jobs; and more feminised jobs also have more part-time work and less overtime which itself can affect earnings (Leuze and Strauß 2016). However, women generally also face disadvantage in some of these other aspects, as for instance in temporal job quality (Franklin et al. 2022).

2.4 Conceptual framework and expectations

This paper seeks to explore the role of gender segregation and its impact on job quality and wages across Europe. A first descriptive question is to indicate the extent to which men and women working in different jobs contributes to differences in labour market outcomes. A key contribution is this paper's use of cross-nationally comparable EU data to consider sorting and the segregation of women at different levels – occupation and industry, but also workplace. This shows that, across Europe, women generally find themselves in lower-paying firms, in line with research from single country studies (e.g. Cardoso et al. 2016), adding also to the volume of studies on within-firm wage gaps across countries

(e.g. Penner et al. 2023). As wage inequality between firms widens (Zwysen 2022a), this sorting can become increasingly problematic. While descriptive, this section highlights the extent of the issue across Europe and provides the necessary contextual background to understand the relationship between gender pay gaps and segregation.

Gender segregation into occupations is not only a part of the overall wage gap, but may also contribute actively to widening that wage gap. The key analytical question to answer is the extent to which such widespread separation of men and women in different jobs itself leads to worse conditions in those jobs, and then to worse gender gaps. That is the process of devaluation – where feminisation itself has a negative impact on wages or other aspects of the quality of jobs.

Based on this literature review I would expect that jobs indeed deteriorate in their conditions as more women enter them. As the literature suggests this comes about through cultural beliefs and power relations, I also expect variation between countries and sectors in the extent to which such a process holds. First, in countries with greater gender pay gaps – where women’s work is generally valued less – I expect a greater stigma linked to such work and greater devaluation. Second, I expect that, in situations where work conditions are more constrained, as in the public sector or when covered by collective agreements, employers’ attitudes matter less and there would be less devaluation.

If jobs that are more feminised are indeed devalued and thereby offer worse remuneration I would expect this to affect both men and women within the sector, in contrast to where it reflects simply the sorting of women into these jobs (Hausmann et al. 2015). Furthermore, if devaluation is mainly due to a decline in the prestige of jobs I would expect this relationship between feminisation and worsening conditions to be stronger in contexts where there is more discretionary power over wages: a greater use of variable pay (Zwysen 2021), no or only firm-level pay agreements, weaker trade unions or in the private sector (Criscuolo et al. 2020; Gruetter and Lalive 2009; Zwysen 2022b).

3. Segregation into industries, occupations and workplaces

This section makes use of detailed cross-national data on workers within workplaces in Europe in 2018 to describe the extent to which men and women work in different sectors. The aim is to describe the link between segregation and gender pay gaps and highlight the variation across Europe. It particularly shows that sorting occurs at different levels, with women working in lower-paying occupations and industries, but also in lower-paying workplaces within an industry.

It contributes to an understanding of gender gaps by providing an overview of the situation in Europe. It asks the question of the extent to which men and women work in different jobs across Europe; and whether such segregation contributes to gender pay gaps. It does not seek to explain the variation in segregation, which can result from different individual and structural sources, but rather seeks to highlight the important role this process plays. It then provides the stepping stone for the analysis of devaluation and the extent to which feminisation contributes to the gaps.

3.1 Measuring segregation

To analyse segregation and wages directly, this paper uses Structure of Earnings Survey (SES) data from 2018; this is a cross-national study in Europe providing harmonised information on wages and the time spent working for employees nested within local units. The data is collected every four years by national statistical offices following a Eurostat framework and generally consists of a two-step sample where workers are sampled within local units. For simplicity's sake, this paper refers to firms or local units interchangeably. Table A1 describes the sample of the SES 2018; and Table A2 summarises the sampling strategy for each country as taken from the national quality reports.

The descriptive analyses of the SES are based on a sample of full-time workers who worked at least 40 weeks in the previous year. For a description of workplace segregation, the analysis is restricted to those who are in workplaces where at least three employees are observed, in order to be able to estimate gender composition in those workplaces, and excludes those working in public administration and defence, agriculture and mining. The sampling rules of workers within establishments differ between countries, with samples being for instance much smaller in the UK and the Netherlands. Table A3 shows the median size of workplaces before and after the restrictions. As workers are sampled in

the workplace there is a measurement error on gender segregation measures at that level which may affect countries where fewer workers are sampled more than others. These issues notwithstanding, this data is the best available cross-national dataset to address the role of workplaces within labour markets in Europe.

Segregation at the level of industries (27 groups) and workplaces is looked at in several ways. As a first description, an index of segregation is estimated as a function of how the shares of men ‘m’ and women ‘f’ differ within industry ‘i’ from the country-level average. There is a similar estimation of how the composition of workplaces differs across countries.

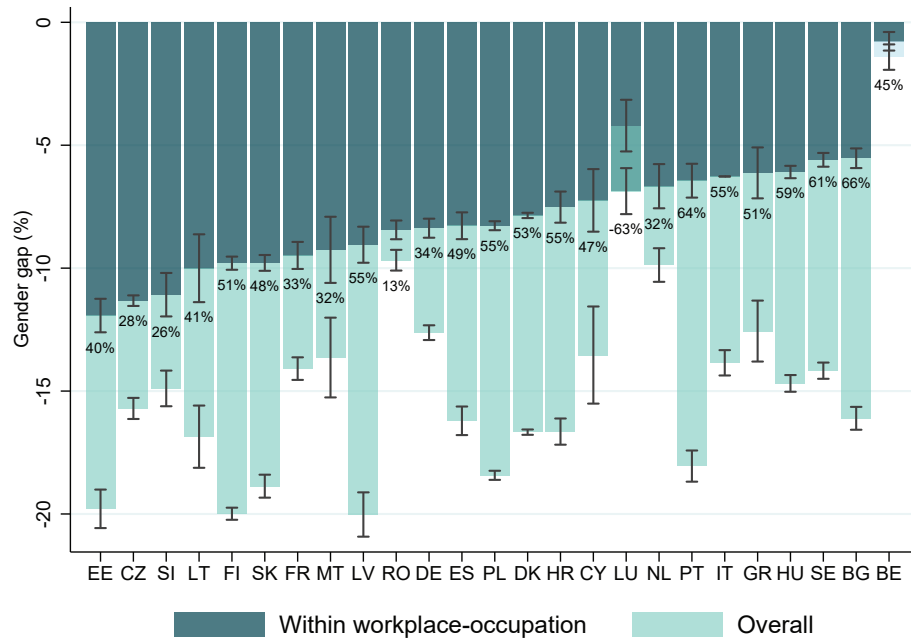
$$\text{Equation 1: } \frac{1}{2} \sum_{i=1}^N \left| \frac{m_i}{M} - \frac{f_i}{F} \right| \text{ (Duncan and Duncan 1955)}$$

3.2 Segregation across Europe

Figure 1 shows the gender pay gaps among full-time workers as estimated from the 2018 SES. These depend strongly on the level at which men and women are compared – overall, within firms or within specific jobs. The results under different models, varying the extent to which similar men are compared with similar women and segregation into jobs, sectors and workplaces is accounted for, are shown in Table A4. On average, across 25 European countries, women earn about 14% less in terms of hourly pay compared to men with similar tenure, working time, age and education. However, accounting for their occupation brings this down to 11%, while including occupation by sector reduces it to 10% on average. Finally, in models accounting for occupation and workplace women are estimated to earn 7.8% less than men within the same workplace and type of job. This means that around 45% of the total gap has to do with the separation of men and women into different jobs. This finding of somewhat over half the gap being within jobs is comparable to that of a recent study using detailed linked employer-employee data (Penner et al. 2023).

In countries with a relatively lower gender pay gap, such as Belgium, Hungary, Bulgaria and Portugal, the share that occurs within workplaces is relatively smaller. Such a variation across countries can also reflect structural factors such as industry make-up and size of firm.

Figure 1 Slightly over half the gender pay gap occurs within the same broad occupation and workplace



Note: estimated gender pay gap overall for women compared to men estimated from regression on log wage controlling for age, education, the interaction of age and education, years of tenure with the firm, hours worked and weeks worked, for full-time workers working at least 40 weeks per year (Overall); and with the addition of broad occupation (2-digit) by local unit (Within workplace-occupation) with 95% C.I. The figure shows the percentage of the total gender pay gap that is explained by including occupation and local unit effects. Workplace is missing for Finland, Luxembourg and Slovenia. Source: SES 2018.

Figure 2 directly shows this separation of men and women into different industries and workplaces. Belgium stands out as having relatively low segregation between men and women, particularly when it comes to larger industry groupings; while this is, for instance, relatively high in Sweden, Denmark and Portugal. The overall separation of men and women into different workplaces seems particularly large for the three Baltic states – Latvia, Estonia and Lithuania – as well as for France, Portugal, Spain and Germany. This may also indicate more relatively small companies that have a greater gender division through having rather few people. Partly, this may also reflect variation between countries in the sampling structure.

The key takeaway, however, is that segregation does not only occur between sectors but is also sizeable between workplaces within industries, which accounts for about half as much separation again as between industries.

Figure 2 Segregation is also important between workplaces within industries



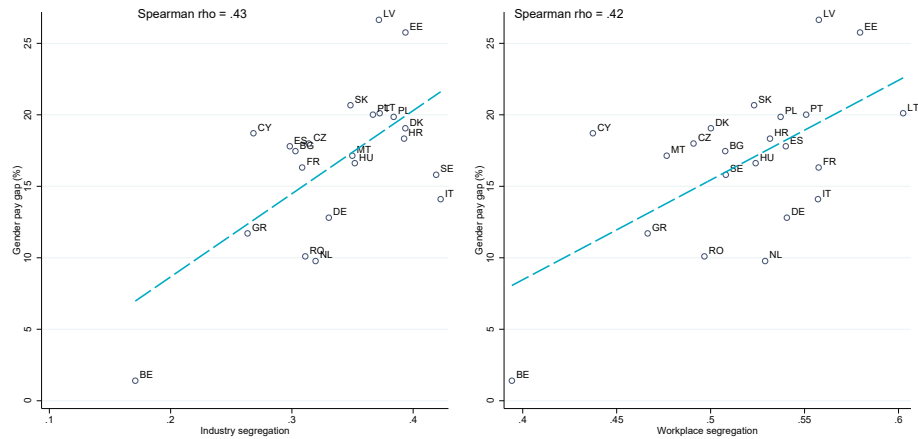
Note: estimated segregation index between men and women in local units within countries, and industries within countries.

Source: SES 2018.

3.3 Do women also work in lower-paying sectors and workplaces?

Men and women working in different sectors would not have to be a problem as long as it results from free choice, but it is particularly problematic if there are also differences in job quality and working conditions in those sectors. The left-hand panel of Figure 3 indicates that there is indeed a strong positive association between the gender pay gap in a country and the extent to which men and women work in different sectors. At the lowest point is Belgium, with substantially lower segregation and lower gender pay gaps than the others, followed by Greece. Romania and the Netherlands have relatively low gender pay gaps given the higher rates of segregation, as do Italy and Sweden, which can indicate that wage differences between more and less segregated sectors are less large in these countries. On the other hand, Latvia and Estonia show high gender pay gaps and high segregation between sectors and workplaces. The right-hand panel shows that there is somewhat more variation between countries in the extent to which there is segregation between workplaces. While there is a clear positive relationship with the gender pay gap, there is also a wide spread as, for instance, Italy, France and Latvia have similar rates of workplace segregation but gender pay gaps of around 14, 16 and 27% respectively on the basis of this data.

Figure 3 Relationship between segregation in industry by country (left) and in workplace by country (right) in terms of the gender pay gap



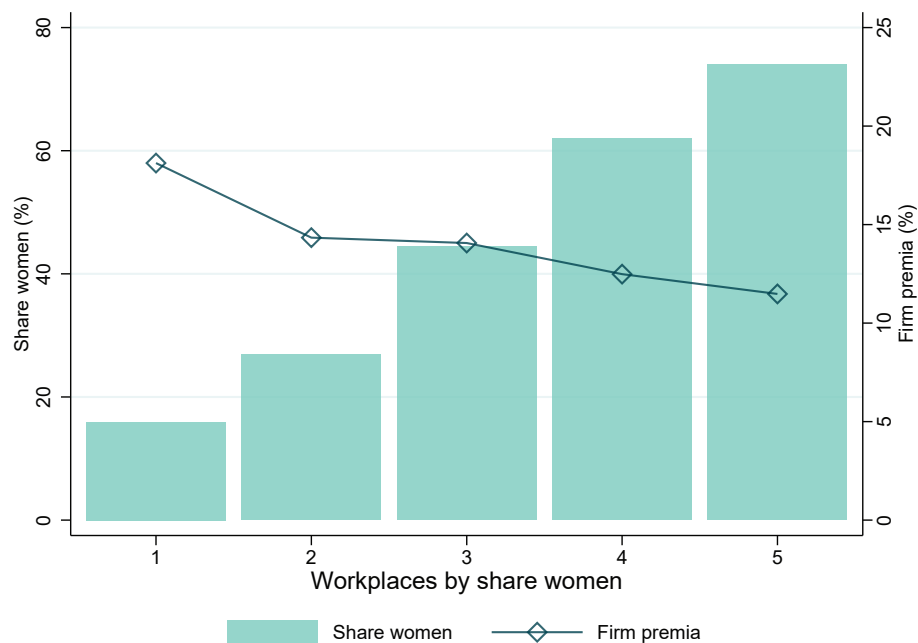
Note: gender pay gap accounting for education, age, tenure in firm, hours worked and weeks worked in the year.
Source: SES 2018.

The next question is whether such segregation itself also reflects differences in pay. The link with pay is made by comparing segregation and the share of women in a job with average pay, comparing it to the country-specific average. For the role of workplaces, firm premia are estimated at workplace level, as an indication of the firm-specific wage differential that can indicate rent sharing with employees (Barth et al. 2016; Card et al. 2016, 2017). These are estimated as fixed effects for each local unit ($\zeta_{workplace}$) through OLS regression with country and workplace dummies controlling for a vector X of controls (sex, age by education, hours worked, years with the firm and annual weeks worked), and then weighted, as shown in Equation 2. A higher firm premium means the workplace generally pays more to otherwise similar workers than other workplaces.

$$\text{Equation 2: } \ln(y) = \alpha + \beta * X_{controls} + \zeta_{workplace} + \theta_{country} + \varepsilon$$

Figure 4 divides workplaces by their share of women in the job. It shows the average firm premia – the extent to which a workplace is associated with generally higher pay for workers regardless of their sociodemographic characteristics and work arrangements – for each quintile. Table A5 summarises this relationship by country. This shows very clearly that workplaces with more women differ from those with fewer women in what they pay, accounting for sex, age, qualifications, tenure and full-time workers.

Figure 4 Workplaces with more women generally pay less



Note: the figure shows the average share of women and the average firm premia estimated from a joint regression of the log wage on sex, age by education, years of tenure, hours worked and weeks worked per week, with firm fixed effects (the premia) and country fixed effects. Only those workplaces where at least three employees are observed are included.

Source: SES 2018.

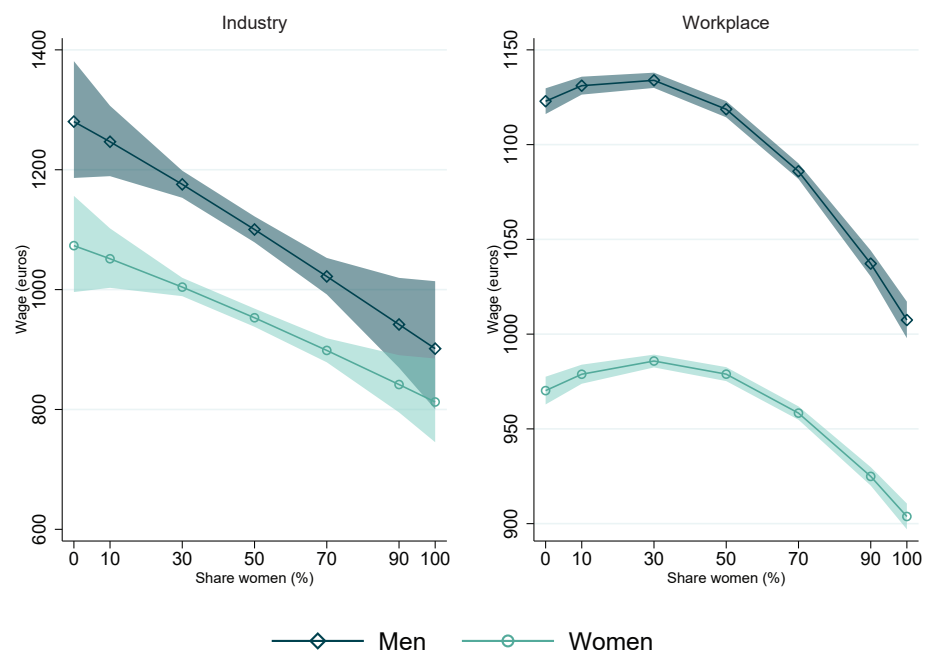
Of course, such a relationship could simply reflect the existing gender pay gap – women earning less than men and therefore workplaces or industries with more women having a lower average wage. It is therefore useful to look also at the wages of men and women separately. In a further step, the 2018 SES is used to analyse the link between workers’ wages and the share of women in the industry/workplace directly, as shown in Equation 3. This is done by regressing the log wage on the share of women among other workers (leaving out the person themselves) in the industry or in the workplace. The models control in the workplace analysis for a vector X of individual characteristics, occupation and firm size, as well as country fixed effects and industry fixed effects. Analyses are carried out separately for men and women and include all workers.

$$\text{Equation 3: } \ln(y) = \alpha + \beta * X_{controls,i,j} + \gamma_2 * Share_{women-i,j} + \gamma_2 * Share^2_{women-i,j} + \theta_{country} + \eta_{industry} + \varepsilon_{i,j} | sex$$

Figure 5 shows this average relation with the left panel showing that workers’ wages are generally relatively lower, accounting for their individual profile, where there are more women in the industry. This downward path is rather linear and even steeper for men than women – who experience a gender pay gap at all levels of feminisation in an industry. The right panel shows the relation between wages and women in the workplace. This shows that there is little relationship between pay

and the share of women when there are relatively few women (fewer than 30%). However, wages are generally lower the more women work in such workplaces above this 30% figure. These numbers are suggestive of a wage penalty linked to working in more feminised workplaces or industries. To put this in perspective, a change from 30% women to 70% women in an industry is associated with average wages being 12% lower for men and 10% lower for women; while such a change in workplace, controlling for industry, is associated with wages being 3% lower for men and 2% lower for women.

Figure 5 Negative association between the share of women in an industry or workplace and the wage for both men and women



Note: predicted wage with 95% C.I. from regression of the log wage on gender, interacted with the squared share of women in the industry (left) or squared share of women in the workplace (right), controlling for age, education, hours worked, years of tenure, weeks worked in the year and size of firm in categories, 2-digit occupation and country. The analysis at workplace level also includes industry fixed effects. Standard errors are clustered at country-industry (Industry) and country-industry-workplace (Workplace). Only those workplaces where at least three employees are observed are included. Source: SES 2018.

As there is variation between countries in workplace sampling – introducing varied measurement error – this analysis was re-estimated for a subsample of workers in large firms of at least 250 employees, where more workers are sampled and more accurate measures are possible. Figure A1 shows these results. While the average wage for these employees is somewhat higher, the relationship between the share of women in the workplace and the industry is similar.

As a first step, this section clearly establishes that sorting and segregation are an important aspect of the gender pay gap and gender discrimination on the labour market in general. Men and women work in different jobs, as well as different

workplaces. This matters as the sectors and workplaces with relatively more women tend to pay less, both to men and women alike. While important, these analyses are only descriptive.

4. Devaluation of jobs

Descriptively then, there is a clear issue, as is well known, that men and women work in different jobs with different conditions. There is a large volume of literature addressing the question of what drives such segregation, focusing on potential gender discrimination, constraints on women's opportunities particularly linked to family life, and reduced bargaining power. However, the devaluation hypothesis contends that this segregation itself can further worsen the position of women by devaluing the jobs in which they are more represented. This is not yet fully tested across Europe and is an important aspect to consider.

4.1 Identifying devaluation with the Labour Force Survey (LFS)

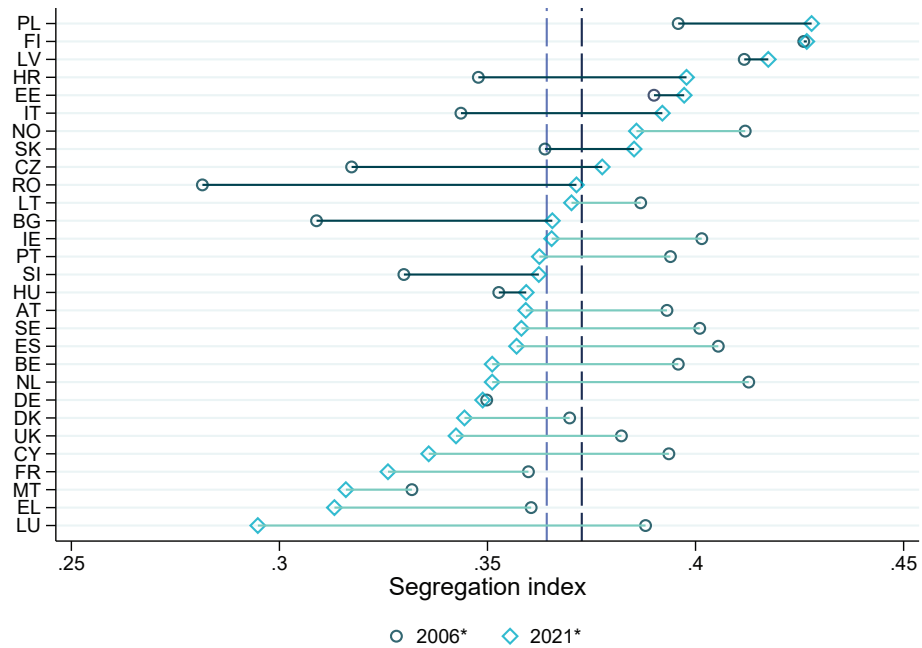
As this analysis requires a longitudinal view, the EU Labour Force Survey (LFS) from 2006 to 2020 is used, weighted and aggregated to the level of jobs.² This paper defines jobs as the combination of 1-digit sector and main occupational skill group (3 levels) to capture the extent to which relatively similar tasks are carried out³ within a country for a given year. These are still very large groups and some variation will occur within them. For that reason, a robustness test is also carried out using 2-digit occupational codes for the subset of years where ISCO-08 codes are available. At this level of the job, the relationship between the quality of jobs and the share of women within a job is studied. The sample is restricted to employed people aged 16-65.

Figure 6 shows the estimated rate of segregation into larger sectors and occupation groups in 2006 and 2021. As the definition of industry differs somewhat and

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2. Cells by country-year-industry-occupational group in which fewer than five people are observed are dropped.
 3. Occupation is measured as ISCO-88 up to and including 2010 and ISCO-08 from 2011 onwards. This maps to the same 1-digit classification of managers; professionals and associate professionals; technicians; clerical support workers; service and sales workers; skilled agricultural, forestry and fishery workers; craft and related trades; plant and machine operators; elementary occupations; and those in the armed forces. Industry is measured through NACE rev1 up to and including 2007 and NACE rev2 afterwards. The 1-digit sectoral codes are combined into 14 groups: agriculture, hunting and forestry; mining and quarrying; manufacturing and industry; electricity, gas and water; construction; wholesale and retail trade and repair; hotels and restaurants; transport, storage and communications (including ICT); financial intermediation; real estate, renting and business services; public administration and defence; education; health and social work; other services. There are on average 3,159 workers observed per job, with the 10th percentile being 38, the median 457 and the 90th percentile 6,995.

occupation is included they cannot readily be compared to the results in the previous section. However, it does show a generally improving trend where segregation tends to come down over time. Luxembourg, Malta and Greece stand out as having very low estimated job segregation on this basis.

Figure 6 Gender segregation into different jobs has generally improved over time



Note: estimated segregation index of industry-occupations (Duncan index) by country in 2006 and 2021.
 *: start year is 2009 for Malta; end year is 2019 for the United Kingdom.
 Source: EU LFS 2011-2021.

To capture devaluation it is also important to go beyond only the monetary aspects of remuneration (Piasna 2023). While not all aspects of the multidimensional job quality concept can be captured with the LFS, the following are included: the share of people working as a supervisor, to capture an aspect of working conditions; the share of people working part-time because they cannot find a full-time position (under-employed PT), and the share of people working on a temporary contract as they cannot find a permanent contract (under-employed temporary), to capture non-standard employment; and the share of people working in shifts and the share of people working at least two of evenings, nights, Saturdays or Sundays (unsociable hours), to capture working time and work-life balance. Finally, the share of working people whose earnings lie in the lowest three deciles of the country-specific income distribution, together with the share of working people whose earnings lie in the top two deciles and the average position on the 10-point scale of income deciles, are used to capture pay. Unfortunately, the wage variables are only available from 2009 to 2020 inclusive. Compositional controls are also included for the share of age groups (16-34; 35-54; 55-69); the share by highest level of qualification (at most lower secondary; upper secondary or post-secondary

non-tertiary; and tertiary); and the share who are cohabiting. Table A6 shows the demographics of this sample.

This data allows for a study of the association between women in the job and labour market conditions over time. This is estimated through a random effects multilevel model at country-year level with normally distributed random error terms at country-year level ($\zeta_{(j,o,c)}$), as shown in Equation 4, for different outcomes 'y'. To account for correlations with random error, the Mundlak correction is applied where all the time-varying variables are introduced in two ways: the group-level average to capture the between-group effect; and the deviation from the group-level average as the within-group effect (Bell and Jones 2015). The within-group effect can be interpreted as a true longitudinal one – how changes in the share of women are related to changes in job quality – while the between-group part captures the cross-sectional variation. These models also control for fixed effects for year and for compositional factors (age, education, cohabiting, living in a big city). All outcomes are estimated as linear probability models. This analysis is the most appropriate as it differentiates how jobs and countries differ from each other (between) but also how they change over time (within) (Haapanala et al. 2023). The estimates may, however, still be confounded by other changes occurring within jobs over time that are not captured by the composition of jobs or the time dummies.

$$\text{Equation 4: } y_{j,o,c,t} = \alpha + \gamma_1 * (\overline{\text{share_women}_{j,o,c,t}}) + \gamma_2 * (\text{share_women}_{j,o,c,t} - \overline{\text{share_women}_{j,o,c,t}}) + \beta_1 * (\overline{X_{j,o,c,t}}) + \beta_2 * (X_{j,o,c,t} - \overline{X_{j,o,c,t}}) + \zeta_{j,o,c} + \theta_t + \varepsilon_{j,o,c,t}$$

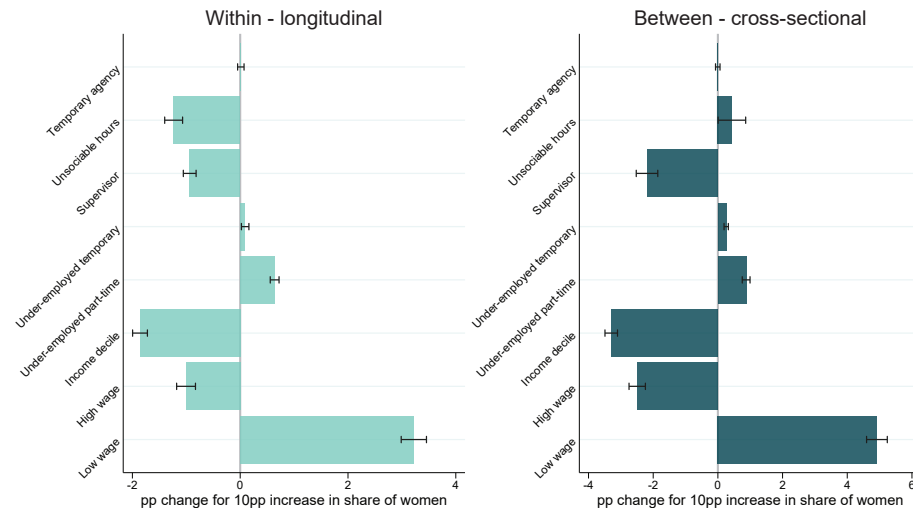
4.2 Devaluation of jobs

The big question is whether more feminised jobs also differ from others in terms of a more widely defined job quality. Figure 7 shows the relation between the share of women and job quality, both within a specific type of job (left-hand panel) and to explain the differences between jobs (right-hand panel). Full coefficients are shown in Table A7.

Looking at the average characteristics of jobs with more rather than fewer women (right-hand panel), it is clear that jobs where more women work also tend to have relatively worse conditions: a higher incidence of unsociable hours; fewer supervisors; more people on involuntary part-time or temporary contracts; and generally lower wages. This does not necessarily mean these conditions are due to the greater share of women but, by looking at changes over time (within), we can examine how conditions change when the share of women in a job increases. On average, this is associated with somewhat fewer people working unsociable hours. On the other hand, jobs where the share of women increases tend also to see a decline in the share of supervisors and an increase in the share of workers who are on involuntary temporary or part-time contracts. Crucially as well, average earnings in these positions tends to decline, as does the share of workers in the

two highest income deciles, while the share of workers who are worst off (in the lowest 30%) increases.

Figure 7 **Jobs with more women generally offer worse pay, less responsibility and greater under-employment**

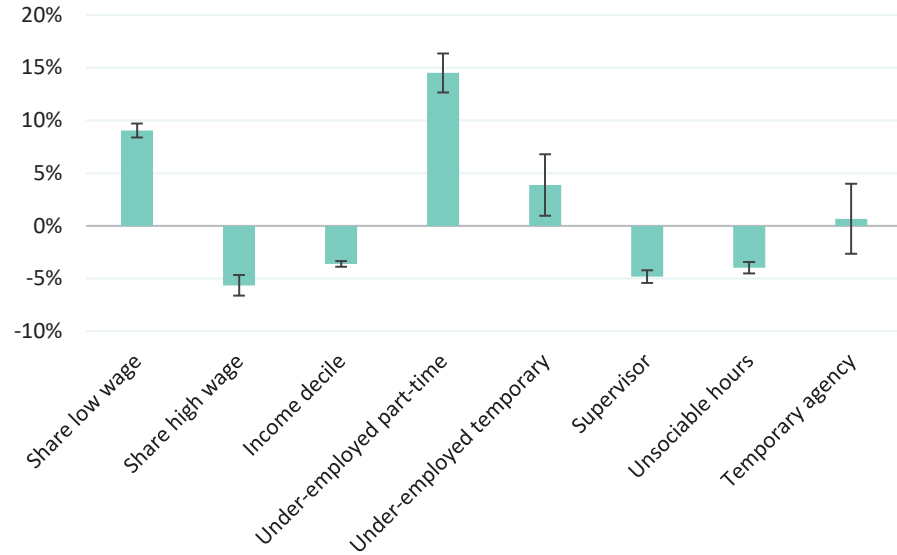


Note: the figure shows the estimated association and 95% C.I. between a 10 percentage point higher share of women in country-industry-occupation group with the share or level of different outcomes, both when comparing groups to each other (between: right) and when considering only variation within a group over time (within: left). Each outcome variable is estimated separately through a linear probability random effects model where the time-varying variables are introduced as the group-specific mean to capture the between-group effect, and as the deviation of the group mean to capture the within-group effect. Source: EU LFS 2006-2021.

Figure 8 expresses these changes within a job relative to the average outcomes within a job. This shows how conditions are expected to change within an aggregate job when the share of women in that job increases. It indicates that an increase in the share of women in a job by 10 percentage points is associated with a 9% increase in the share of low-waged workers and a 6% reduction in the share of high-waged workers. The share of workers who are working on a part-time contract because they could not find a full-time position is, on average, 14.5% higher and the share of workers who work on a temporary contract because they could not find a permanent contract is, on average, 3.9% higher relative to the average. On average, there are 4.8% fewer supervisors. The share of workers on unsociable hours is generally lower, when more women work within a job, by 4%.

These findings put in perspective that the relationship between the share of women and the overall conditions of work is relatively strong. In particular, the risks of working on low wages and working on an involuntary part-time basis are substantially higher.

Figure 8 Relative change within a job

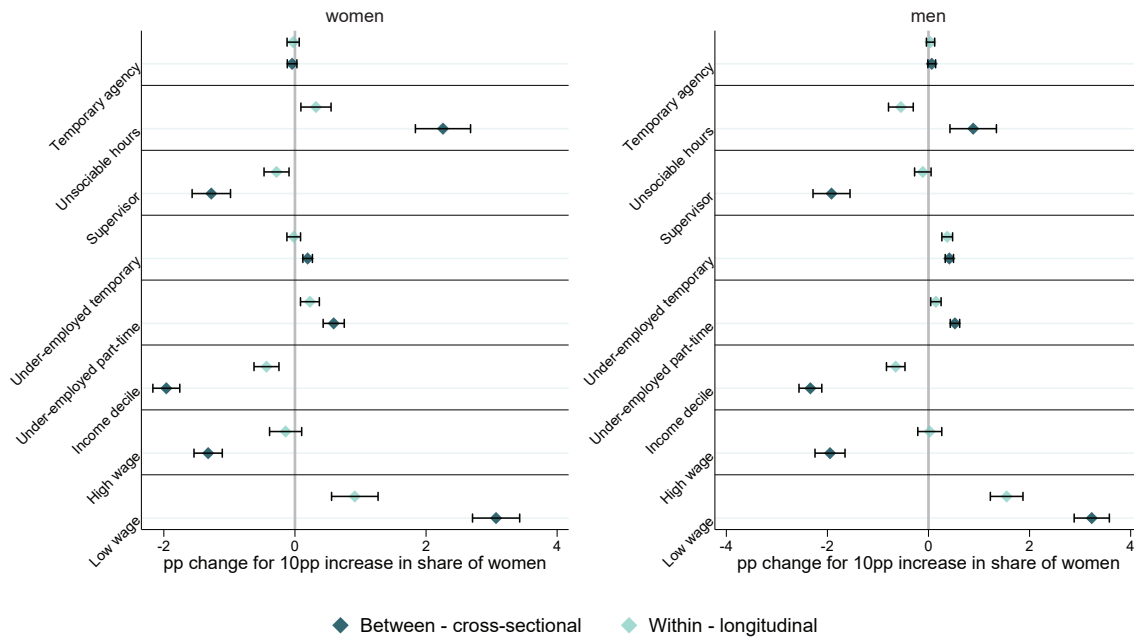


Note: the figure expresses how a 10 percentage point increase in the share of women within a job is associated with average labour market outcomes within a country-industry-occupation-year, relative to the average value of each outcome across the sample. It shows the relative change with 95% C.I. Each outcome variable is estimated separately through a linear probability random effects model where the time-varying variables are introduced as the group-specific mean to capture the between-group effect, and as the deviation of the group mean to capture the within-group effect.
Source: EU LFS 2006-2021.

These results indicate that pay, supervisory responsibilities and under-employment are generally worse in jobs with more women; also that this deteriorates over time. If this is due to a devaluation of these jobs, it would affect both men and women working in them. Figure 9 shows these results when splitting the data separately for men and women. Generally, the associations between jobs (right-hand panel) and within jobs (left-hand panel) are similar for men and women, which indicates they are not only driven by women experiencing worse outcomes but also that they indicate something about the jobs themselves.

Focusing on the longitudinal findings in the left-hand panel shows that men's wages are indeed affected more by the share of women, which could indicate that declining prestige drives this finding (Harris 2022). Interestingly, while an increase in the share of women is associated with more involuntary part-time work for men and women, only men are more at risk of involuntary temporary jobs. A greater share of women also affects the risk of unsociable hours differently for men and women. While on average there is an association with fewer people working on unsociable hours as more women enter a job, this seems to be the case only for men. For women there is a risk of more non-standard hours, which could indicate that the worse positions are then more concentrated on women.

Figure 9 Negative associations with feminisation and job quality generally hold for men and women



Note: the figure shows the estimated association and 95% C.I. between a 10 percentage point higher share of women in the country-industry-occupation group with the share or level of different outcomes, both when comparing groups to each other (between) and when considering only variation within a group over time (within), and separately for men and women. Each outcome variable is estimated separately through a linear probability random effects model where the time-varying variables are introduced as the group-specific mean to capture the between-group effect, and as the deviation of the group mean to capture the within-group effect. Source: EU LFS 2006-2021.

4.3 Robustness test using more detailed occupational groupings

In this analysis, jobs are defined as the combination of occupational grouping within an industry in order to capture groups of workers doing similar tasks and to deal with changes in variable coding over time. There is still a large amount of variation within these groupings. For that reason, the analysis on devaluation is repeated using a much stricter definition of ‘job’ as a combination of broad industry groupings (21) and 2-digit occupational groups. Figure A2 shows how a change in the share of women is associated with cross-sectional and longitudinal differences in job quality at this more detailed level.

With the exception of the probability of working on unsociable hours – which is negatively associated with the share of women both cross-sectionally and longitudinally – the sign and size of the effects is comparable. This indicates that, even with a stricter job definition, there is a clear association where an increase in the share of women within a job is associated with a reduction in the share of supervisors, an increase in the share of under-employed workers and, particularly, a reduction in pay. When disentangling this by gender (Figure A3), it is important to note that the reduction in pay within groups of occupation and industry is mainly

driven by men rather than women. Of course, this analysis uses less variation over time as it is restricted to 2011-2021, so there is less variation to capture.

4.4 Variation in devaluation

The previous section indicates that there is indeed some relation between the share of women within a job and the extent to which conditions in the job change. The cross-national data allows for testing whether this relation is constant over different contexts.

The key question here is whether devaluation is worse in a context where there is greater discretion in pay setting for the employer. This is estimated by allowing for the within-group effect of a change in the share of women to differ by job-level characteristics. These mainly serve to capture constraints on wage setting. From the SES rounds in 2006, 2010, 2014 and 2018 (intrapolated for the missing years), the share of bonuses in total annual earnings is calculated to capture the extent of employers' discretion in pay setting (Zwysen 2021); as is the share of workers in workplaces in the public sector and the presence of a collective pay agreement (either any or, alternatively, a multi-employer, centralised agreement). Trade union density is used at country level via the OECD/AIAS ICTWSS dataset, while Eurostat gender pay gap data is also introduced to explore the link between feminisation and overall gender pay gaps.

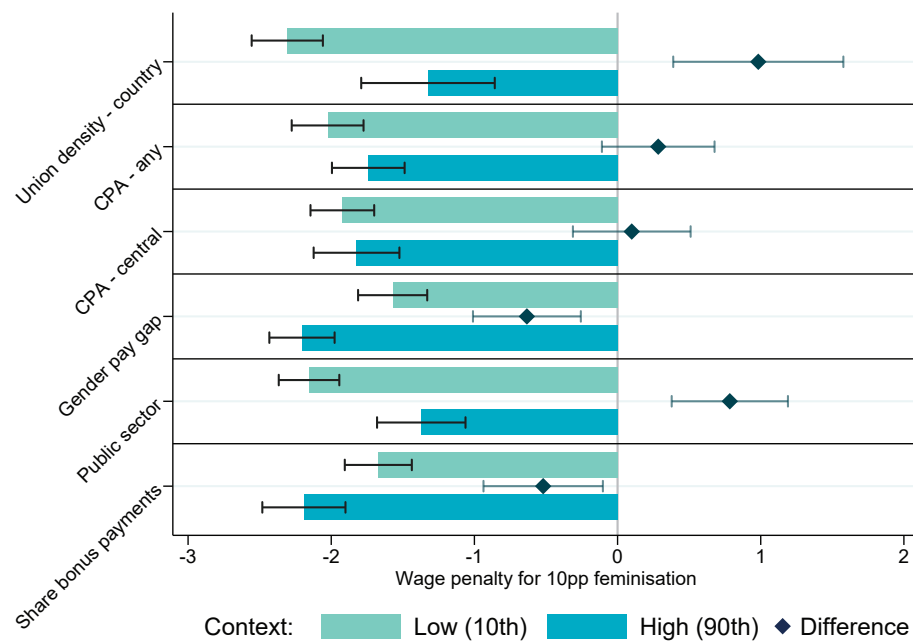
Equation 5 shows this relation where each contextual factor is added separately and interacted with the share of women in a job. It includes a random error for the intercept, and analyses are weighted.

$$\begin{aligned} \text{Equation 5: } wage_{j,o,c,t} = & \alpha + \gamma_1 * (\overline{share_{women_{j,o,c,t}}}) + \\ & \gamma_2 * (\overline{share_{women_{j,o,c,t}}} - share_{women_{j,o,c,t}}) + \\ & \delta_1 * Context_{j,c,t} + \delta_2 * Context_{j,c,t} * (\overline{share_{women_{j,o,c,t}}}) + \\ & \delta_3 * Context_{j,c,t} * (\overline{share_{women_{j,o,c,t}}} - share_{women_{j,o,c,t}}) + \\ & \beta_1 * (\overline{X_{j,o,c,t}}) + \beta_2 * (X_{j,o,c,t} - \overline{X_{j,o,c,t}}) + \zeta_{j,o,c} + \theta_t + \varepsilon_{j,o,c,t} \end{aligned}$$

The idea is that the influence on the actual pay and conditions of how prestigiously a job is viewed would be more apparent where there is greater employer discretion in setting work conditions. Where employers have freedom to set conditions, as in the absence of collective agreements or where pay is more variable and dependent on the employer, I expect it to be more likely that conditions and wages stagnate or worsen over time with a job being progressively viewed as less worthy or prestigious. In the presence of stricter regulation of wage setting and work conditions, as with collective pay agreements, stronger trade unions or in the public sector, I would expect this channel to be less important. The gender pay gap is included as an indication of how strongly women are devalued on the labour market within a country. The results of this cross-level interaction, where the effect of an increase in the share of women is interacted with the contextual factors – namely trade

union density at country level, the coverage rate by any collective pay agreement or a centralised agreement at industry level, the country-level gender pay gap, the share of workers within a sector who work in the public sector and the share of bonus payments within average pay – are shown in Figure 10.

Figure 10 **Feminisation is worse where there is a greater pay gap and more use of bonus payments; but better with stronger unions, collective agreement coverage and in the public sector**



Note: the figure shows the extent to which the effect on outcomes of an increase in the share of women varies with changes in the contextual factor – trade union density (OECD), the collective bargaining coverage rate overall or under a centralised agreement, the overall gender pay gap, the share of workers in the public sector and the share of bonus payments in average pay. It shows the change in wages (percentiles) when feminisation increases by 10 percentage points either at a low (10th percentile) or a high (90th percentile) of the contextual variable and the difference with a 95% C.I. Each interaction is estimated separately through a linear probability random effects model where the time-varying variables are introduced as the group-specific mean to capture the between-group effect, and as the deviation of the group mean to capture the within-group effect. This figure shows the interaction of the within-group share of women with the contextual factor. It controls for year of survey, shares of age groups, qualifications levels, living in cities and those cohabiting. Source: EU LFS 2009-2020, augmented with data from ESS (trade union density) 2010-2020 and SES (collective pay agreement coverage and public sector) 2010-2018.

The figure shows that the impact of feminisation on wages differs over countries, sectors and time. It is generally more negative where union density is relatively low, while there is a less negative effect where union density is higher. While there is a similar relationship with collective agreement coverage, the difference between sectors with low or high agreement coverage is not statistically significant ($p < 0.05$). However, devaluation does clearly seem worse where there is only a low weight of the public sector rather than a large share, which indicates more rigid wage setting may indeed be linked with less devaluation. Industries where bonuses make up a greater share of payments are also more susceptible to such devaluation, which is in line generally with variable pay increasing gender pay

gaps (Arabadjieva and Zwysen 2022). Finally, in countries with a higher gender pay gap on average, there is indeed a stronger negative association between the share of women in a job and average earnings than in those jobs where the gender pay gap is weaker.

5. Discussion and conclusion

Women generally work under poorer conditions and earn less on average than men in almost all European countries, although the problem is substantially greater in some countries than others. Gender pay gaps partly represent cases where women earn less than their colleagues for the same tasks, and which is the target of approaches such as pay transparency, awareness-raising initiatives and (where needed) anti-discrimination legislation, but this is not the only important part. A sizeable component of the difference in pay reflects inequality between occupations, sectors and workplaces. This paper maps this segregation, where men and women work in different jobs with different average pay, across Europe and substantiates its contribution to an analysis of the gender pay gap. Slightly under half of the overall gender pay gap reflects men and women working in different firms and industries, while such segregation is clearly associated both with higher gender pay gaps and with individual workers – whether men or women – with more female colleagues generally having lower wages than their peers, even within the same industry.

Crucially, however, there is a larger issue where the sheer presence of women in a job seems to lead to a devaluation of these jobs, alongside a reduction in how that job is viewed and how it is rewarded. This paper documents that, from 2006 to 2021, there is a negative relationship between the share of women in a job and overall job quality – in terms of pay, supervisory responsibilities and the extent of involuntary part-time or temporary contracts – for both men and women. It then points to the need to consider gender equality more widely by not only focusing on the pay differences between men and women in the same job, but also on what processes lead to ‘feminine jobs’ being more poorly rewarded.

Part of the worse working conditions and disadvantage on the labour market faced by women is due to a devaluation of women’s work. This seems to be the case across Europe, where changes in the composition of jobs over time depresses conditions. Similarly, pay tends to be lower in firms or sectors with greater shares of women. This points to the importance of paying specific attention to the issue of segregation on the labour market which not only contributes to the overall pay gap but also tends to be associated, through stereotyping, to reducing levels of working conditions in those sectors as a whole. This means it is crucial to consider women’s working conditions more widely, in addition also to demanding equal pay for equal work.

This process of the devaluation of ‘feminine jobs’ seems clearly associated with an overall worse gender pay gap – and, therefore, with a likely lower evaluation of

women overall. Indeed, there is some indication that, in settings where employers have more discretion over pay setting – where trade unions are weaker, in the private sector and where variable pay is more important – such devaluation is stronger.

We thus need to look in more detail at what is driving this segregation of women into different jobs than men. This requires looking at what jobs are considered appropriate for men and women, discrepancies in education and training, and possible discrimination which is turning women away from relatively better jobs. We also need to take a longitudinal view to ensure jobs are remunerated appropriately and not based on subjective values such as the prestige offered by type of job. As women are often tied and have less bargaining power on the labour market, regulation must ensure that they are not exploited. Ways of doing this can be by having stronger collective agreements regulating standards for jobs rather than leaving it up to individual bargaining or employers' discretion.

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All links were checked on 20.12.2023.

Appendix

Table A1 Description of SES 2018

Variable	Obs.	Mean	Std. dev.	Min	Max
Inwage	8,056,381	2.4	0.7	-2.5	7.7
Female	8,056,381	0.4061	0.4911	0	1
Age: 14-19	8,056,381	0.0099	0.0988	0	1
Age: 20-29	8,056,381	0.1250	0.3307	0	1
Age: 30-39	8,056,381	0.2375	0.4255	0	1
Age: 40-49	8,056,381	0.2809	0.4494	0	1
Age: 50-59	8,056,381	0.2716	0.4448	0	1
Age: 60+	8,056,381	0.0751	0.2636	0	1
Education: low	8,056,381	0.1542	0.3612	0	1
Education: intermediate	8,056,381	0.4908	0.4999	0	1.00
Education: high	8,056,381	0.4	0.5	0	1
Hours worked per month	8,056,381	171.2444	17.8177	4	1188
Years with the firm	8,056,381	2.8971	0.8800	1	4
Weeks in the year	8,056,381	51.5696	1.8598	40	66.72
Firm size: 1-49	8,056,381	0.2649	0.4413	0	1
Firm size: 50-249	8,056,381	0.2369	0.4252	0	1
Firm size: 250+	8,056,381	0.4794	0.4996	0	1
Firm size: all	8,056,381	0.0188	0.1357	0	1
CPA: none	8,014,158	0.2923	0.4548	0	1
CPA: national/sectoral	8,014,158	0.5119	0.4999	0	1
CPA: firm-level	8,014,158	0.1374	0.3443	0	1
CPA: other	8,014,158	0.0584	0.2344	0	1
Public control	7,833,049	0.3000	0.4582	0	1
Private control	7,833,049	0.7000	0.4582	0	1

Source: SES 2018.

Table A2 Summary of structure of SES by country, based on national quality reports

	Administrative, survey or both	Sampling strategy	Breaks
Belgium	Administrative data from social security and businesses, with a questionnaire for additional information	Two-stage stratified sample of local units and employees within strata within local units	No important breaks
Bulgaria	Survey	Two-stage sample: within local units all employees included if the local unit has fewer than 49 employees, one quarter for 50-249; 20% for 250-499; 12.5% for 500-999; 10% for over 1000; and 5% when over 2000	Extension of coverage from 2002 to 2006 to include units with fewer than 10 employees
Czechia	Surveys	Two-stage sample including all workers in the second stage	Extension of coverage to smaller local units after 2006 and to non-profit and household sectors from 2010 with changes in the weighting
Denmark	Administrative	Census based on administrative data	Changes in educational codes in 2014 resulted in relatively many observations excluded
Germany	Survey, augmented with social security administrative data	Survey	Break in 2014 as coverage was extended and inclusion of part-time, marginal jobs was improved.
Estonia	Survey	Two-stage sample with a random sample within workplaces including all managers, all employees in smaller firms (under 150) and around 10% based on birthdates in bigger workplaces	No important breaks
Ireland	Administrative, with survey for additional information	One-stage random sample within strata of activity, gender and earnings bands	2010 and 2014 used fully administrative data; 2018 with an employee survey to top up administrative data
Greece	Survey	Two-stage stratified sample with a sample (rate of around 6.1%) for employees	No important breaks
Spain	Administrative data	Two-stage stratified sample	Extensions to smaller enterprises in 2006; generally comparable
France	Surveys supplemented with administrative data on businesses and social security	Two-stage stratified sample with a minimum of units within each stratum (20 sectors, 5 firm size groups, 6 establishment size groups, 14 regions) and a maximum of 24 employees to be sampled per establishment	Changes in imputation of variables and new stratification in 2018 compared to 2014, but generally comparable; expansion to public administration from 2010
Italy	Administrative data, with survey for additional information	Two-stage sample including 3 employees per enterprise with fewer than 19 workers, 5 for 20-49, 7 for 50-99 and then an extra 2 sampled workers for every 100 more employees up to 1,199; 35 sampled for firms of 1,200-1,399 employees with an extra 5 sampled for every 200 more until 1,999; 70 sampled for 2,000-2,999 and an extra 15 for every 1,000 up until 9,999. Sample is 200 employees in firms with 10,000 to 19,999 workers; and 250 in firms with more than 20,000 employees	Break in 2014 as administrative data is used, broadly comparable with 2010 and before
Cyprus	Survey enriched with administrative data	Survey with administrative data	Expansion of coverage from 2006 to all NACE and all sizes, while in 2002 only enterprises with two or more employees were covered

	Administrative, survey or both	Sampling strategy	Breaks
Latvia	Survey, enriched with administrative data		A change from 2002 to 2006 in the unit from enterprise to local unit
Lithuania	Survey	Two-stage sample with around 5% of local units and 3.4% of employees within strata of economic activity and local unit size. All employees sampled in local units with 1-4 people; 4 where there are 5-9; 5 for 10-49; 10 for 50-99; 15 for 100-249; 20 for 250-499; 50 for 500-999; and 100 for 1,000 or more	
Hungary	Survey	Two-stage sample including 20% of all smaller local units (50 employees), 8% representative sample of micro enterprises and all local units with more than 49 employees. Employers with fewer than 50 employees provide data on all employees and those with over 50 provide data on those born on the 5th, 15th or 25th of any month (white collar), or 5th or 15th (blue collar), resulting in 10% and 7% sampling ratios.	SES is generally comparable
Malta	Survey	Stratified sample of enterprises. Two employees are selected for 10-25; 4 for 26-52; 7 for 53-102; 14 for 103-195; 26 for 195-351; 50 for 352-748; 161 for 749-7,631	
Netherlands	Combination of sources: mainly administrative, with some survey data from LFS for additional data	Combination of multiple administrative sources and a dedicated survey	Changes from 2002 to 2006 in the source. Small changes are made to codes but the data is largely comparable over time
Austria	Survey	Stratified sample of enterprises from the business register (around a quarter) and a random sample with at most 80 persons per firm. Every 1st element selected from 10-19; every 2nd in firms from 20-49; every fifth in firms from 50-99; and every 10 th in enterprises of 100 and more. This is drawn at enterprise level, not local unit	Change from 2002 to 2006 in the units (enterprise to workplace)
Poland	Survey	Two-stage stratified sample	Comparable from 2002 onwards
Portugal	Administrative data on payments, survey to complement missing variables	A survey based on register data (Quadros de Pessoal) with a sample of employees within units based on birth months (all for 1-4; 10 for 5-9, 7 for 10-19, 4 for 20-49, 3 for 50-99, 1 for 100-499, 2 for 500-999 and 1 for 1000+), meaning the sampling rate varies from all to one third for units with fewer than 50 employees, a quarter for 50-99 and between a twelfth and a sixth for workplaces over 100 employees	No breaks
Romania	Survey, with some administrative data on businesses	Survey	No breaks
Slovenia	Survey	Businesses were sampled and data reported for all employees in that sample	From 2006 the coverage was expanded to all employees and more checks were carried out.
Slovakia	Survey	Random stratified sample of businesses, including all with 100 or more employees	Enlargement of the sample from 2002 to 2018 to create better representativeness, comparability and comprehensiveness

	Administrative, survey or both	Sampling strategy	Breaks
Sweden	Administrative for public sector; survey of enterprises for private sector	Stratified random sample of enterprises and simple random sample of employees	No breaks, but inclusion of the public sector since 2006 and an expansion from 18-64 to 18-66 year olds in 2014
Norway	Administrative		Break from 2014 to 2018 as census data was moved from a-ordningen, with sample surveys used for all prior years. Advised that comparisons can be made
United Kingdom (2014)	Administrative	Administrative data from ASHE which is a 1% sample of employees	No breaks – not included in 2018.

Table A3 Number of employees and workplaces prior to and after restricting sample by no. of employees, SES 2018

	No restriction			Restricted to workplaces with at least three employees		
	Number employees	Number establishments	Employees sampled in median workplace	Number employees	Number establishments	Employees sampled in median workplace
BE	124,884	7,914	8	124,047	7,362	10
BG	163,349	13,969	3	154,955	7,507	11
CY	22,722	1,223	2	21,879	641	5
CZ	1,700,821	18,460	2	1,696,569	15,608	6
DE	582,255	48,065	4	546,366	34,774	7
DK	1,124,987	51,242	7	1,109,866	40,474	11
EE	111,322	5,430	2	106,713	3,832	8
ES	158,540	22,221	3	150,382	16,308	5
FR	196,588	34,087	2	174,126	16,835	4
GR	30,029	4,801	2	27,405	2,751	7
HR	71,164	2,531	24	71,141	2,517	24
HU	749,390	23,557	5	743,252	19,138	7
IT	173,327	33,649	2	152,463	19,397	5
LT	29,016	4,089	4	27,476	3,095	4
LV	128,509	6,601	3	126,114	4,852	7
MT	34,024	1,513	2	32,784	682	5
NL	69,148	27,400	1	42,521	4,645	4
PL	731,600	23,357	16	729,170	21,706	17
PT	84,691	9,276	5	82,232	7,625	7
RO	305,210	19,631	12	300,185	15,837	16
SE	177,038	4,612	8	176,701	4,409	9
SK	757,159	8,089	4	756,289	7,514	8

Table A4 Estimated gender pay gap in SES 2018 in different models

	M1_all	M2_demo	M3_work	M4_occ	M5_industry	M6_firm
BE	0.003 (0.005)	0.008 (0.003)*	-0.014 (0.003)*	-0.01 (0.002)*	-0.009 (0.002)*	-0.008 (0.002)*
BG	-0.081 (0.003)*	-0.171 (0.003)*	-0.176 (0.003)*	-0.112 (0.003)*	-0.087 (0.003)*	-0.057 (0.002)*
CY	-0.071 (0.014)*	-0.105 (0.012)*	-0.146 (0.012)*	-0.077 (0.01)*	-0.079 (0.01)*	-0.075 (0.007)*
CZ	-0.17 (0.003)*	-0.18 (0.003)*	-0.171 (0.003)*	-0.142 (0.003)*	-0.132 (0.003)*	-0.12 (0.001)*
DE	-0.175 (0.002)*	-0.127 (0.002)*	-0.135 (0.002)*	-0.136 (0.002)*	-0.122 (0.002)*	-0.087 (0.002)*
DK	-0.153 (0.001)*	-0.192 (0.001)*	-0.182 (0.001)*	-0.123 (0.001)*	-0.105 (0.001)*	-0.082 (0.001)*
EE	-0.185 (0.005)*	-0.223 (0.005)*	-0.221 (0.005)*	-0.167 (0.006)*	-0.154 (0.006)*	-0.127 (0.004)*
ES	-0.073 (0.004)*	-0.151 (0.004)*	-0.177 (0.004)*	-0.132 (0.004)*	-0.119 (0.004)*	-0.086 (0.003)*
FI	-0.161 (0.002)*	-0.218 (0.002)*	-0.223 (0.002)*	-0.133 (0.002)*	-0.106 (0.002)*	-0.103 (0.002)*
FR	-0.124 (0.003)*	-0.16 (0.003)*	-0.152 (0.003)*	-0.127 (0.003)*	-0.111 (0.003)*	-0.1 (0.003)*
GR	-0.055 (0.01)*	-0.1 (0.008)*	-0.134 (0.007)*	-0.125 (0.007)*	-0.107 (0.007)*	-0.063 (0.006)*
HR	-0.099 (0.004)*	-0.178 (0.003)*	-0.182 (0.003)*	-0.154 (0.004)*	-0.128 (0.004)*	-0.078 (0.003)*
HU	-0.09 (0.002)*	-0.168 (0.002)*	-0.159 (0.002)*	-0.122 (0.002)*	-0.092 (0.002)*	-0.063 (0.001)*
IT	0.034 (0.004)*	-0.085 (0.003)*	-0.149 (0.003)*	-0.109 (0.003)*	-0.093 (0.003)*	-0.065 (NA)
LT	-0.12 (0.009)*	-0.178 (0.008)*	-0.185 (0.008)*	-0.125 (0.009)*	-0.126 (0.009)*	-0.106 (0.008)*
LU	0.008 (0.007)	-0.031 (0.006)*	-0.043 (0.006)*	-0.084 (0.005)*	-0.076 (0.005)*	-0.071 (0.005)*
LV	-0.167 (0.006)*	-0.222 (0.006)*	-0.223 (0.006)*	-0.156 (0.007)*	-0.136 (0.007)*	-0.095 (0.004)*
MT	-0.088 (0.011)*	-0.138 (0.01)*	-0.147 (0.01)*	-0.128 (0.01)*	-0.116 (0.009)*	-0.097 (0.008)*
NL	-0.079 (0.005)*	-0.097 (0.004)*	-0.104 (0.004)*	-0.097 (0.004)*	-0.091 (0.004)*	-0.069 (0.005)*
PL	-0.063 (0.001)*	-0.186 (0.001)*	-0.204 (0.001)*	-0.157 (0.001)*	-0.128 (0.001)*	-0.086 (0.001)*
PT	-0.065 (0.006)*	-0.19 (0.004)*	-0.199 (0.004)*	-0.146 (0.004)*	-0.119 (0.004)*	-0.067 (0.004)*
RO	-0.005 (0.003)	-0.093 (0.002)*	-0.102 (0.002)*	-0.101 (0.002)*	-0.1 (0.002)*	-0.088 (0.002)*
SE	-0.094 (0.002)*	-0.148 (0.002)*	-0.153 (0.002)*	-0.094 (0.002)*	-0.07 (0.002)*	-0.058 (0.002)*
SI	-0.052 (0.005)*	-0.157 (0.005)*	-0.161 (0.004)*	-0.137 (0.005)*	-0.121 (0.005)*	-0.117 (0.005)*
SK	-0.177 (0.003)*	-0.205 (0.003)*	-0.209 (0.003)*	-0.156 (0.004)*	-0.149 (0.004)*	-0.103 (0.002)*

Note: estimated gender pay gap (%) with SE in the log hourly wage, controlling for age category by education [M2_demo], tenure by firm, hours worked and annual weeks [M3_work], occupation [M4_occ: 2-digit], occupation by industry [M5_industry] and occupation-place of work [M6_firm].

*: p<=0.05

Source: SES 2018.

Table A5 Average relative wage by segregation of workplace and country

Country	Fewest women	2	3	4	Most women	Total	Difference between least and most women
BE	-3.5	-0.4	0.1	1.6	3.0	0.2	-6.5
BG	9.2	-8.9	-7.0	-10.9	0.4	-3.4	8.8
CY	-1.9	-14.8	-6.3	-10.7	7.8	-5.2	-9.7
CZ	4.5	-3.2	-1.8	-2.4	-6.0	-1.8	10.5
DE	6.5	-5.4	-3.9	-7.1	-4.5	-2.9	11.0
DK	9.7	-0.6	-4.3	-6.9	-6.2	-1.7	15.9
EE	9.4	8.0	7.5	-7.2	-8.9	1.8	18.3
ES	-2.3	-1.4	0.8	2.3	1.8	0.3	-4.0
FR	0.8	12.3	15.3	5.3	-10.7	4.6	11.5
GR	-7.7	-4.0	4.6	-0.9	8.0	0.0	-15.7
HR	4.6	2.7	2.7	1.7	-7.2	0.9	11.8
HU	1.7	-1.5	-4.0	-2.4	-0.4	-1.3	2.1
IT	-8.4	-3.8	7.7	16.5	6.5	3.7	-14.9
LT	4.5	9.5	8.8	4.2	-8.7	3.7	13.3
LV	13.6	0.0	-5.9	-5.7	-10.1	-1.6	23.8
MT	-0.3	2.4	-9.7	0.2	1.6	-1.1	-1.9
NL	-2.4	-2.1	4.7	2.5	1.2	0.8	-3.6
PL	3.7	-9.9	-3.2	1.5	-0.1	-1.6	3.8
PT	-3.3	1.4	4.8	8.2	0.8	2.4	-4.1
RO	-4.8	1.6	3.0	3.5	2.9	1.2	-7.7
SE	2.6	3.5	6.1	6.3	-4.8	2.7	7.4
SK	8.5	0.7	-3.3	-6.8	-6.7	-1.5	15.1
Total	2.0	-0.6	0.8	-0.3	-1.8	0.0	3.9

Note: Table shows the average wage (relative to country average) for workplaces divided by quintile of segregation from most women to most men.

Source: SES 2018.

Table A6 Description of LFS sample 2006-2021

Variable	Obs.	Mean	Std. dev.	Min	Max
Age	15,668	41.2	3.9	19.3	58.6
Share age 15-29	18,826	0.2046	0.1218	0	0.949345
Share age 30-49	18,826	0.5089	0.1118	0	1
Share age 50-65	18,826	0.2865	0.1202	0	1
Share low qualified	18,826	0.2296	0.2288	0	1
Share intermediate qualified	18,826	0.4954	0.2208	0	1
Share high qualified	18,826	0.2750	0.2767	0	1
Living in city	18,495	0.3974	0.1914	0	1
Share cohabiting	17,877	0.6319	0.1306	0	1
Share temporary agency	18,826	0.0179	0.0365	0	0.76

Variable	Obs.	Mean	Std. dev.	Min	Max
Under-employed part-time	18,826	0.0441	0.0685	0	0.96036
Under-employed temporary	18,826	0.0238	0.0439	0	0.89
Income decile	12,961	5.1	1.9	1	10
Share low wage (1-3 deciles)	12,961	0.3564	0.2637	0	1
Share high wage (top 2 deciles)	12,961	0.1777	0.1938	0	1
Share working shifts	18,784	0.1772	0.1599	0	1
Share unsociable hours	18,784	0.3105	0.1945	0	1
Share supervisor	18,665	0.1943	0.1945	0	1
AT	18,826	0.0356	0.1854	0	1
BE	18,826	0.0348	0.1834	0	1
BG	18,826	0.0353	0.1846	0	1
CY	18,826	0.0348	0.1834	0	1
CZ	18,826	0.0349	0.1835	0	1
DE	18,826	0.0353	0.1845	0	1
DK	18,826	0.0352	0.1843	0	1
EE	18,826	0.0346	0.1829	0	1
EL	18,826	0.0356	0.1853	0	1
ES	18,826	0.0351	0.1839	0	1
FI	18,826	0.0333	0.1793	0	1
FR	18,826	0.0352	0.1842	0	1
HR	18,826	0.0345	0.1824	0	1
HU	18,826	0.0356	0.1854	0	1
IE	18,826	0.0355	0.1850	0	1
IT	18,826	0.0357	0.1855	0	1
LT	18,826	0.0350	0.1837	0	1
LU	18,826	0.0306	0.1724	0	1
LV	18,826	0.0347	0.1831	0	1
MT	18,826	0.0274	0.1631	0	1
NL	18,826	0.0348	0.1833	0	1
NO	18,826	0.0342	0.1818	0	1
PL	18,826	0.0357	0.1855	0	1
PT	18,826	0.0352	0.1842	0	1
RO	18,826	0.0357	0.1855	0	1
SE	18,826	0.0350	0.1838	0	1
SI	18,826	0.0345	0.1824	0	1
SK	18,826	0.0352	0.1843	0	1
UK	18,826	0.0310	0.1734	0	1

Source: LFS 2006-2021.

Table A7 Relation between industry-occupation-country-year composition and labour market outcomes

	Temporary agency	Under-employed part-time	Under-employed temporary	Income decile	Low wage	High wage	Unsocial hours	Supervisor
Average: share women	-0.000381 (0.00354)	0.0873*** (0.00614)	0.0257*** (0.00339)	-3.298*** (0.0989)	0.492*** (0.0163)	-0.249*** (0.0129)	0.0433** (0.0217)	-0.219*** (0.0170)
Average: young	0.0385*** (0.0135)	-0.0131 (0.0231)	0.145*** (0.0131)	-2.804*** (0.412)	0.306*** (0.0681)	-0.337*** (0.0538)	0.236*** (0.0807)	-0.125** (0.0629)
Average: older	-0.0181 (0.0117)	0.0521*** (0.0202)	0.0492*** (0.0113)	-2.131*** (0.327)	0.339*** (0.0540)	-0.154*** (0.0427)	-0.242*** (0.0712)	-0.160*** (0.0556)
Average: low qualified	0.0220*** (0.00461)	0.112*** (0.00798)	0.0135*** (0.00440)	-2.017*** (0.127)	0.302*** (0.0210)	-0.135*** (0.0166)	-0.199*** (0.0283)	-0.0305 (0.0221)
Average: high qualified	-0.0122*** (0.00431)	-0.0160** (0.00746)	0.00436 (0.00412)	3.454*** (0.120)	-0.387*** (0.0199)	0.394*** (0.0157)	-0.225*** (0.0265)	0.440*** (0.0207)
Average: live in city	-0.00328 (0.00520)	0.0301*** (0.00901)	-0.0461*** (0.00498)	0.742*** (0.145)	-0.0865*** (0.0240)	0.0905*** (0.0190)	-0.0274 (0.0320)	0.00272 (0.0250)
Average: cohabiting	0.0327*** (0.00959)	-0.0516*** (0.0161)	-0.00471 (0.00945)	2.248*** (0.353)	-0.373*** (0.0583)	0.116** (0.0460)	-0.237*** (0.0544)	-0.0385 (0.0423)
Deviation: share women	0.00119 (0.00304)	0.0639*** (0.00417)	0.00922*** (0.00354)	-1.859*** (0.0699)	0.322*** (0.0120)	-0.100*** (0.00892)	-0.123*** (0.00846)	-0.0937*** (0.00606)
Deviation: young	0.0168*** (0.00380)	-0.0147*** (0.00522)	0.0493*** (0.00443)	-0.703*** (0.0879)	0.0856*** (0.0150)	-0.0737*** (0.0112)	0.0522*** (0.0106)	-0.0638*** (0.00762)
Deviation: older	-0.000330 (0.00309)	-0.00592 (0.00424)	0.0111*** (0.00360)	0.216*** (0.0690)	-0.0179 (0.0118)	0.0386*** (0.00881)	-0.0269*** (0.00861)	0.0355*** (0.00617)
Deviation: low qualified	-0.0151***	0.0186***	-0.0148***	-0.579***	0.0714***	-0.0108	-0.0920***	-0.0509***

	Temporary agency	Under-employed part-time	Under-employed temporary	Income decile	Low wage	High wage	Unsocial hours	Supervisor
Deviation: high qualified	(0.00314) 0.0172*** (0.00364)	(0.00431) -0.0100** (0.00500)	(0.00366) -0.0142*** (0.00425)	(0.0726) 0.652*** (0.0849)	(0.0124) -0.0508*** (0.0145)	(0.00927) 0.160*** (0.0108)	(0.00874) -0.0982*** (0.0101)	(0.00627) -0.0192*** (0.00726)
Deviation: city	-0.000546 (0.00235)	-0.0152*** (0.00322)	-0.00529* (0.00273)	0.189*** (0.0549)	-0.0107 (0.00939)	0.0340*** (0.00700)	-0.0181*** (0.00653)	-0.0215*** (0.00470)
Deviation: cohabiting	0.00120 (0.00248)	-0.00763** (0.00340)	-0.00287 (0.00289)	0.0653 (0.0609)	0.00271 (0.0104)	0.00831 (0.00777)	0.00141 (0.00689)	0.0285*** (0.00495)
Year: 2007	0.00103 (0.00113)	-0.00377** (0.00155)	0.000894 (0.00132)				-0.00709** (0.00314)	-0.00336 (0.00229)
Year: 2008	0.00298*** (0.00113)	-0.00504*** (0.00155)	0.00193 (0.00132)				-0.0123*** (0.00318)	-0.00385* (0.00228)
Year: 2009	0.00157 (0.00111)	0.00340** (0.00152)	0.000887 (0.00129)				-0.0105*** (0.00308)	-0.00708*** (0.00223)
Year: 2010	0.00233** (0.00111)	0.00603*** (0.00153)	0.000341 (0.00130)	-0.0234 (0.0201)	0.00547 (0.00344)	-0.00155 (0.00256)	-0.00888*** (0.00310)	-0.00675*** (0.00224)
Year: 2011	0.00316*** (0.00111)	0.0118*** (0.00152)	0.00140 (0.00129)	-0.0893*** (0.0200)	0.00882*** (0.00342)	-0.00699** (0.00255)	-0.0140*** (0.00308)	-0.00633*** (0.00223)
Year: 2012	0.00272** (0.00113)	0.0167*** (0.00155)	0.000133 (0.00132)	-0.110*** (0.0206)	0.0163*** (0.00353)	-0.00576** (0.00263)	-0.0151*** (0.00314)	-0.00864*** (0.00228)
Year: 2013	0.00163 (0.00114)	0.0175*** (0.00156)	0.000141 (0.00133)	-0.149*** (0.0206)	0.0212*** (0.00353)	-0.00674** (0.00263)	-0.0178*** (0.00317)	-0.0117*** (0.00230)
Year: 2014	0.00260** (0.00114)	0.0194*** (0.00156)	8.95e-05 (0.00133)	-0.204*** (0.0206)	0.0280*** (0.00353)	-0.0144*** (0.00263)	-0.0165*** (0.00317)	-0.0137*** (0.00230)

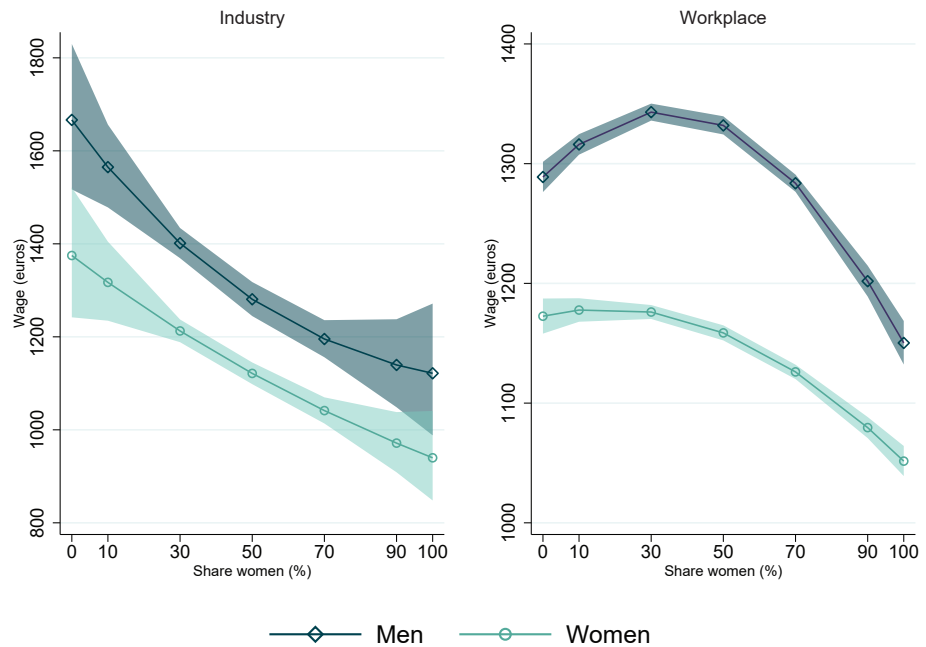
	Temporary agency	Under-employed part-time	Under-employed temporary	Income decile	Low wage	High wage	Unsocial hours	Supervisor
Year: 2015	(0.00115) 0.00381***	(0.00158) 0.0177***	(0.00134) 0.00132	(0.0208) -0.133***	(0.00356) 0.0208***	(0.00266) -0.00742***	(0.00320) -0.0197***	(0.00232) -0.0137***
Year: 2016	(0.00116) 0.00238**	(0.00159) 0.0157***	(0.00135) 0.00353***	(0.0210) -0.145***	(0.00360) 0.0195***	(0.00268) -0.00802***	(0.00322) -0.0181***	(0.00234) -0.0132***
Year: 2017	(0.00116) 0.00434***	(0.00160) 0.0137***	(0.00136) 0.00511***	(0.0211) -0.109***	(0.00362) 0.0128***	(0.00270) -0.00821***	(0.00324) -0.0195***	(0.00235) -0.0108***
Year: 2018	(0.00117) 0.00527***	(0.00161) 0.00744***	(0.00137) 0.00616***	(0.0213) -0.105***	(0.00365) 0.0154***	(0.00272) -0.00637**	(0.00326) -0.0249***	(0.00237) -0.0142***
Year: 2019	(0.00119) 0.00684***	(0.00163) 0.00549***	(0.00138) 0.00698***	(0.0221) -0.0889***	(0.00377) 0.0123***	(0.00281) -0.00618**	(0.00330) -0.0244***	(0.00239) -0.0142***
Year: 2020	(0.00119) 0.00751***	(0.00163) 0.00449***	(0.00138) 0.00488***	(0.0219) -0.276***	(0.00375) 0.0340***	(0.00279) -0.0264***	(0.00330) -0.0447***	(0.00240) -0.0168***
Year: 2021	(0.00121) 0.0139***	(0.00166) 0.00303*	(0.00141) 0.0565***	(0.0227) 5.731***	(0.00389) 0.265***	(0.00290) 0.224***	(0.00337) 0.598***	(0.00245) 0.286***
Constant	(0.0103) -0.00938	(0.0174) -0.0192	(0.0101) -0.0208**	(0.347) 12,874	(0.0574) 12,874	(0.0453) 12,874	(0.0596) 17,667	(0.0464) 17,630
Observations	17,709	17,709	17,709	12,874	12,874	12,874	17,667	17,630
Number in group	1,212	1,212	1,212	1,130	1,130	1,130	1,212	1,212

Note: coefficients from separate random effects models on average outcome within groups of sector, occupation group and country over time. Each variable is introduced as the group-specific average and the deviation of that average within groups made up of country-sector-occupational group.

*** p<0.01, ** p<0.05, * p<0.1

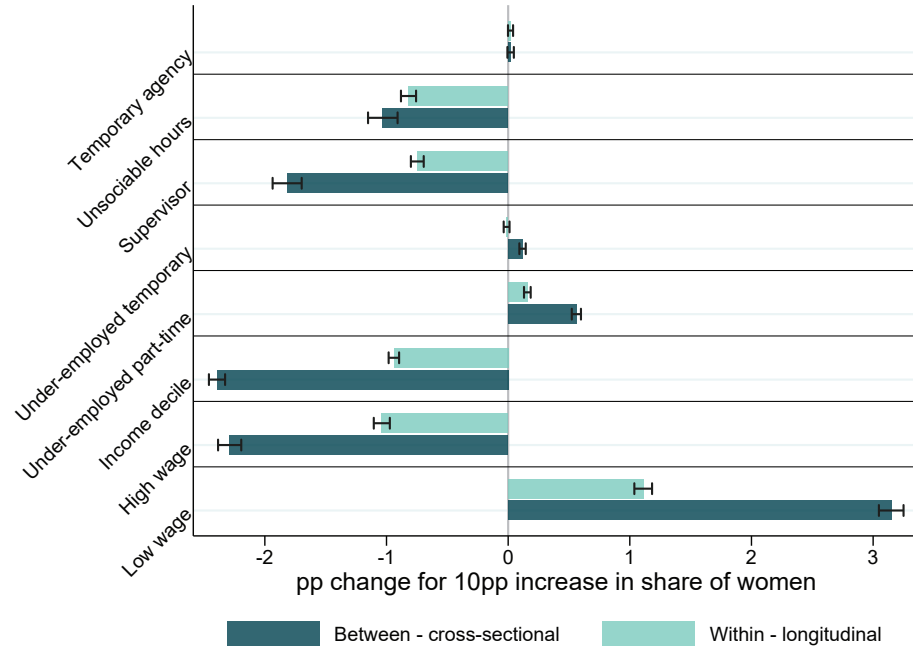
Source: LFS 2006-2021.

Figure A1 Relation between wages of men and women by share of women in the industry or workplace with 95% C.I. in large workplaces



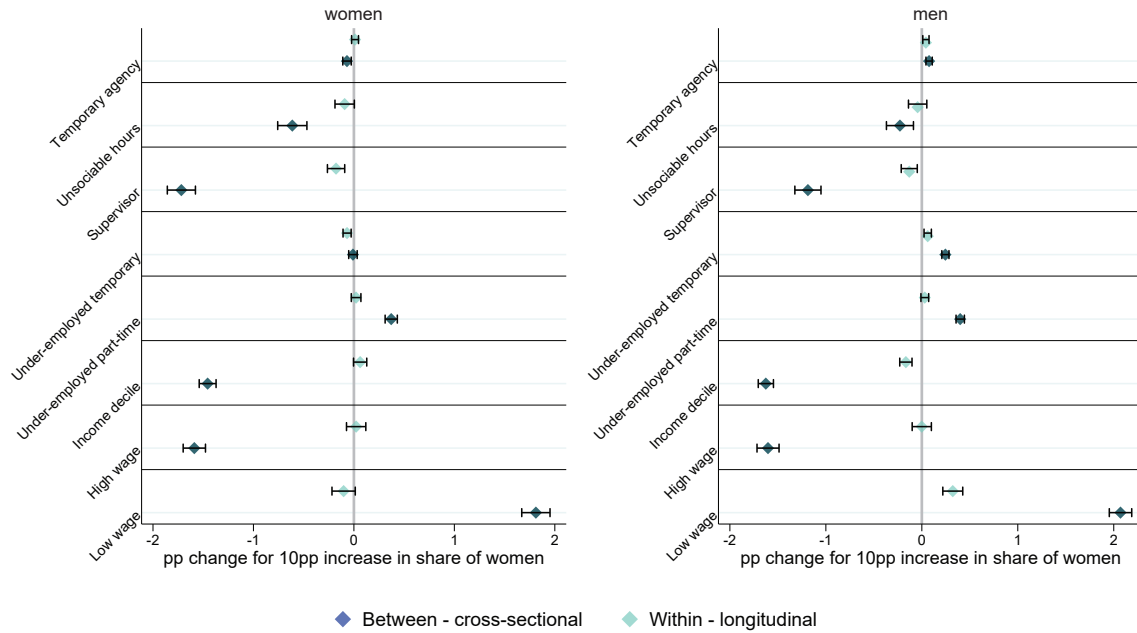
Note: predicted wage from regression of log wage on gender, interacted with the squared share of women in the industry (left) or squared share of women in the workplace (right), controlling for age, education, hours worked, years of tenure, weeks worked in the year, size of the firm in categories, 2-digit occupation and country. The analysis at workplace level also includes industry fixed effects. Standard errors are clustered at country-industry (Industry) and country-industry-workplace (Workplace). The analysis is restricted to workplaces with at least 250 employees.
Source: SES 2018.

Figure A2 Devaluation in industry-detailed occupation cells



Note: the figure shows the estimated association between a 10 percentage point higher share of women in the country-industry-occupation group with the share or level of different outcomes, both when comparing groups to each other (between) and when considering only variation within a group over time (within). Each outcome variable is estimated separately through a linear probability random effects model where the time-varying variables are introduced as the group-specific mean to capture the between-group effect and as the deviation of the group mean to capture the within-group effect. Jobs are defined here as the combination of 2-digit ISCO-08 codes and industry NACE codes.
 Source: EU LFS 2011-2021.

Figure A3 Estimated relation between share of women and job quality from random effects model by gender, with detailed occupation



Note: the figure shows the estimated association between a 10 percentage point higher share of women in the country-industry-occupation group with the share or level of different outcomes, both when comparing groups to each other (between) and when considering only variation within a group over time (within), and separately for men and women. Each outcome variable is estimated separately through a linear probability random effects model where the time-varying variables are introduced as the group-specific mean to capture the between-group effect and as the deviation of the group mean to capture the within-group effect. Jobs are defined here as the combination of 2-digit ISCO-08 codes and industry NACE codes. Source: EU LFS 2011-2021.

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