YES YOUNG ECONOMISTS SEMINAR

HRVATSKA NARODNA BANKA
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19th YOUNG ECONOMISTS' SEMINAR
TO THE 32nd DUBROVNIK ECONOMIC CONFERENCE

May 28 – 29, 2026, Dubrovnik, Croatia

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Draft version

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Abstract

Hospitality workers are among the lowest-paid employees in Europe. However, it remains unclear whether their lower wages are fully accounted for by differences in worker and firm characteristics or whether hospitality employment carries an additional sector-specific wage penalty. This paper investigates the presence and magnitude of this penalty in Western Europe by comparing hospitality workers with counterfactual workers employed in other sectors. Using matched employer–employee data and a reweighted decomposition method that adjusts for differences in the distribution of observable characteristics, we document a persistent wage penalty between 5 and 15 percent per hour in most countries. Estimates based on self-reported earnings survey data, which include tips, bonuses, and other near-cash benefits, reveal an even larger penalty. Overall, the results point to a clear and economically meaningful wage disadvantage associated with hospitality employment, with relevant implications for labour market policy and collective bargaining.

JEL codes: J16, J31, J71, L83

Keywords: hospitality, wage penalty, wage differentials, tourism

1. Introduction

Accommodation and food industry workers (hereafter, hospitality) are among the lowest-paid employees in Europe, consistently ranking at or near the bottom of all 17 NACE economic sectors across countries (Eurostat, 2025). Comparable patterns are observed in the United States, where wages in the hospitality sector are roughly half the national average (Dogru et al., 2019). This low level of remuneration in hospitality is not a recent development; wage disparities in the sector have persisted for decades. As a result, hospitality is often classified by researchers as a "*loser*" sector (Abowd et al., 2012).

Hospitality jobs are among the most vulnerable to economic shocks, often being the first to decline and the last to recover (Peng et al., 2015). For example, an estimated 62 million jobs were lost globally in the tourism sector during COVID-19, and the industry recovered more slowly than most others (WTTC, 2021). Hence, hospitality workers face disproportionate economic instability, limited opportunities for training and career advancement, and heightened job insecurity (Ladkin, 2011; Eurofound & ILO, 2019). In addition to these disadvantages, the hospitality sector offers the lowest hourly compensation, reinforcing its position as one of the least attractive segments of the labour market.

Industry wage differentials can be explained by firm-level characteristics such as profitability, productivity, market power, wage-setting policies, and national regulatory frameworks (Krueger & Summers, 1987, 1988; Abowd, 2012; Davis, 2022; Bassier et al., 2022). Krueger and Summers (1987, 1988) show that wage differentials persist even after controlling for worker characteristics, and they attribute part of these differences to rent-sharing practices in highly profitable industries. In such industries, firms share a portion of their economic rents with employees, thereby reducing turnover rates and improving their ability to attract new talent. Reduced turnover also limits production disruptions and supports higher productivity and efficiency wage mechanisms observed in high-wage firms (Card et al., 2023). By contrast, the hospitality sector generally does not engage in rent-sharing, partly because it operates with lower profit margins, relies heavily on lower-skilled labour and has lower technological adaptation (Handwerker, 2012; Autor & Dorn, 2013).

Hospitality wage differentials can also be explained by worker characteristics, including the concentration of less educated and less experienced workers in the sector, the role of non-monetary compensation, education and skill mismatch, and labour market segmentation.

Classical labour market theory suggests that workers sort into jobs not only according to observable job requirements, but also according to unobserved preferences (Becker, 1957). Because the hospitality sector tends to attract younger and less educated workers, this pattern of sorting contributes to widening wage gaps between groups of workers (Card et al., 2016; Arai, 2003). In addition, some workers may value the non-monetary amenities offered by the sector, such as flexible working hours or greater social interaction, and may therefore accept lower pay (Rosen, 1986; Riley & Szivas, 2003). At the same time, the sector often exhibits a relatively high share of overqualified workers, pointing to stronger education and skill mismatch (Lillo-Bañuls & Casado-Díaz, 2012, 2015; Marchante et al., 2007). Labour market composition may also shape wage differentials, as immigrants are often overrepresented in hospitality and are frequently found to accept lower wages (Mai & Cominetti, 2020).

Another strand of the literature emphasises institutional factors in explaining sectoral wage differentials. Unions, collective bargaining coverage, and minimum wage regulations play an important role in shaping pay levels, and sectors with weaker bargaining coverage and less extensive regulation tend to lag in terms of wages (Azar et al., 2024; Blau et al., 2023; Neumark & Wohl, 2024). Given the persistently low compensation levels in the hospitality sector, some scholars argue that the industry has effectively institutionalised a "*tolerance for low pay*," suggesting that wage determination extends beyond standard economic forces (Riley & Szivas, 2003). Alongside access to a large pool of low-skilled workers with low hiring costs, several non-economic factors may contribute to maintaining low wage levels, including job satisfaction, modest earnings aspirations, and preferences for flexible working arrangements. The sector's heavy reliance on part-time workers, first-time labour market entrants, and a largely non-unionised workforce further weakens bargaining power and limits upward pressure on wages. Consequently, a substantial share of workers perceive employment in hospitality as a stepping stone toward better-paid opportunities in the future (Richardson & Thomas, 2012).

In this paper, we examine whether lower wage levels in Western European hospitality are attributable to lower worker skills or to a sector-specific wage penalty. To date, only one study has examined the wage penalty exclusively among hospitality workers in Spain, finding no significant average penalty but evidence of a penalty among top earners (Casado-Díaz & Simón, 2016). However, this study does not account for the role of tips in wage differential, as wage measures typically exclude gratuities, which may represent a non-negligible share of income in the hospitality sector. This omission is particularly relevant in the context of Spain, where a tourism-driven economy and a relatively higher prevalence of cash transactions may

increase the importance of tips compared to less tourism-oriented economies. As a result, measured wages may understate actual earnings to a greater extent in Spain, potentially biasing estimates of the wage gap.

This paper investigates whether hospitality workers in Western Europe face a sector-specific wage penalty and makes four contributions to the literature. First, it documents the hospitality wage gap using matched employer–employee data, providing robust evidence on wage differences both relative to the rest of the economy and across comparable industries individually (e.g., retail). Second, using self-reported income measures, it examines the extent to which tips, allowances, bonuses, and other near-cash benefits account for the observed pay gap. Third, it assesses the contribution of cognitive and non-cognitive skills to wage differentials between hospitality and non-hospitality workers. Fourth, it estimates the returns to tourism-related education across the unconditional quantiles of the earnings distribution, thereby showing how different degrees affect returns across the wage distribution [will do the 3&4 with OECD data].

Standard wage decomposition methods, such as the Oaxaca–Blinder framework, decompose mean wage gaps into explained and unexplained components but remain limited to the mean. To explore whether the hospitality wage penalty varies across the earnings distribution, we apply more recent decomposition techniques based on unconditional quantile regressions (UQR), which allow us to analyse distributional patterns while reweighting groups to mitigate bias from differences in observable characteristics (Firpo et al., 2009, 2018).

Our benchmark results provide, to our knowledge, the first evidence that hospitality workers face an average hourly wage penalty in five of the seven countries examined, with the estimated penalty ranging from 5 to 15 percent. The UQR estimates further show that this penalty increases across the earnings distribution, suggesting that higher-earning hospitality workers experience a wage disadvantage in all countries. These findings remain robust when hospitality workers are compared with workers in individual sectors, when the sample is restricted to part-time workers, and when the analysis is limited to higher-educated workers, with only minor differences in the magnitude of the estimated penalty across comparison groups.

Contrary to our expectations, the unexplained wage gap widens when self-reported annual income is adjusted for tips. One possible explanation is that, although tips are relevant in hospitality, workers in other sectors may benefit more from bonuses, allowances, and other near-cash forms of compensation, which more than offset the role of tips and thus widen the

observed differential. [one paragraph about the role of cognitive and noncognitive skills in both selecting into hospitality and explaining the gap. Also about the tourism-related degrees returns]

The rest of the paper is organised as follows: Section 2 reviews the related literature; Section 3 outlines the identification strategy; Section 4 describes the data; Section 5 presents the empirical results; and Section 6 concludes.

2. Literature Review

Tourism is regarded as a luxury good, making demand highly sensitive to economic shocks (Peng et al., 2015). Workers in this sector face persistent uncertainty, characterised by low wages, irregular hours, limited opportunities for training and career advancement, and precarious employment conditions (Ladkin, 2011; Eurofound & ILO, 2019). The COVID-19 pandemic illustrates these vulnerabilities, with the hospitality sector experiencing a sharp decline in employment in 2020 (Eurostat, 2023b) and remaining the last sector to recover. Reflecting these structural weaknesses, many workers perceive hospitality jobs as temporary or transitional, often using them as a stepping stone to more stable and better-paid employment (Richardson & Thomas, 2012). Table 1 summarises eight main theoretical themes that explain wage differentials in the hospitality sector.

Table 1: Theoretical Framework Explaining Hospitality Sector Wage Differential

Theme	Explanation of Mechanism	References
Rent-sharing, industry profits and wage efficiency	Industries with higher profit share the rents with workers through higher wages. In return, high wages reduce turnover and improve productivity. Low-profit sectors, such as hospitality, engage less in rent-sharing, producing lower wage levels.	Krueger & Summers (1987, 1988); Blanchflower et al. (1996); Card et al. (2023)
Monopsony and labour market frictions	Employers with wage-setting power can pay wages below marginal productivity. High labour supply and low mobility in the hospitality sector increase monopsonistic power. Workers have lower “quit elasticity”.	Bassier et al., 2022; Langella & Manning (2021); Manning, 2013; Lamadon et al., 2022; Autor et al., 2024; Jha et al., 2025

Human capital sorting across industries	More educated and experienced workers sort into high-paying industries. Hospitality attracts younger and lower-experience workers, lowering average wages.	Abowd et al. (2012); Gittleman & Pierce (2011); Arai (2003)
Non-monetary compensation	Workers may accept lower wages in exchange for non-monetary job amenities, such as flexible hours or social interaction, which are common in hospitality jobs.	Rosen (1986); Borjas (2016); Riley & Szivas (2003)
Immigrant labour segmentation	Immigrant and minority workers are overrepresented in hospitality, often with weaker bargaining power and limited outside options, contributing to lower wages.	Baum (2012); Hotchkiss et al. (2012); Mai & Cominetti (2020)
Low returns to education and skill mismatch	Hospitality jobs often do not fully reward higher education, generating overqualification and lower returns to human capital.	Lillo-Bañuls & Casado-Díaz (2012, 2015); Marchante et al. (2007); Fernández et al. (2009)
Institutional wage setting and bargaining power	Unionisation, collective bargaining coverage, and labour market institutions (such as minimum wage) affect wage levels. Hospitality has lower union density and weaker bargaining institutions.	Azar et al. (2024); Eurofound (2012); Visser (2016); Blau et al., 2023; Derenoncourt & Montialoux (2021); (Neumark & Wohl, 2024).
Low technology adaptation	The hospitality sector is largely labour-intensive and thus exhibits less capital substitution than other sectors.	(Handwerker, 2012; Autor & Dorn, 2013)

2.1 How do sectors differ from each other?

Inter-industry wage differentials are a well-documented phenomenon in labour economics. Early empirical studies found these disparities to be both substantial and persistent (Krueger & Summers, 1987). Such differences are largely driven by firm-level factors, including profitability, market power, wage-setting policies, and national regulatory frameworks (Krueger & Summers, 1988; Blanchflower et al., 1996; Abowd, 2012; Davis, 2022). One common explanation is rent-sharing, whereby profitable firms pass on part of their economic rents to workers (Krueger & Summers, 1987). These wage premiums are typically associated with lower turnover rates, since high-paying industries can use efficiency wages to discourage quitting. By reducing turnover costs and preventing production disruptions, firms in high-wage

sectors effectively enhance both stability and performance (Krueger & Summers, 1988; Arai, 2003). Recent evidence shows that workers in industries with higher pay premiums also tend to have higher skill levels, reinforcing the link between wage premiums, efficiency wages, and productivity (Card et al., 2023).

Hospitality sector firms often possess greater monopsony power, which places downward pressure on wages. In monopsonistic labour markets, firms can exercise wage-setting power and offer wages below workers' marginal productivity, particularly when employer concentration and labour market frictions limit workers options (Bassier et al., 2022). Worker mobility constraints, information asymmetries, and job search frictions further weaken their bargaining power, allowing firms to set wages below competitive levels (Langella & Manning, 2021; Manning, 2013). High labour market concentration, a pattern frequently observed in hospitality labour markets, represents another channel through which firms can exercise wage-setting power (Azar et al., 2024), enabling them to capture economic rents (Lamadon et al., 2022). More recent evidence suggests that monopsony power can change over time. For instance, Autor et al. (2024) document that following the COVID-19 pandemic, employer monopsony power for low-wage workers in the US declined as workers became more responsive to wage differences across firms. This increased responsiveness captured by "quit elasticity" (which measures the sensitivity of worker separations to wages) reduces firms' ability to suppress wages (Jha et al., 2025).

Minimum wage policies are often seen as an effective instrument for reducing wage differentials affecting minorities and women (Derenoncourt & Montialoux, 2021). By establishing a wage floor, these policies limit firms' monopsony power, preventing employers from setting wages substantially below competitive levels in low-paid jobs. In the US, however, the minimum wage system distinguishes between the regular minimum wage and a lower tipped minimum wage that applies primarily to workers in the hospitality sector. Recent evidence suggests that a tipped minimum wage raises hourly wages for women (because they reduce working hours after an increase in minimum wage) but does not improve earnings for Black and Hispanic workers, while it negatively affects employment rates and hours of work (Neumark & Wohl, 2024). Consequently, some scholars and policy advocates argue that the tipped minimum wage should be eliminated, as it does little to reduce wage disparities among minorities and women (Boesch et al., 2021; National Women's Law Center, 2019). In contrast, increases in the regular minimum wage appear to be more effective in raising both hourly and weekly wages for hospitality workers (Neumark & Wohl, 2024).

Tourism is among the sectors that consistently offer lower levels of remuneration compared to others (Riley, Ladkin & Szivas, 2002). Building on this, Riley and Szivas (2003) introduced the concept of a "*tolerance for low pay*," arguing that low wages in tourism are structurally embedded through forces that extend beyond market dynamics alone. They contend that wage determination in hospitality and tourism emerges from the interaction of economic, structural, and psychological influences. Low human-capital requirements and easily transferable skills generate large labour pools, reducing employers' incentives to offer higher pay. Sectoral norms—such as the prevalence of entry-level job attributes and expectations of short job tenure—further shape wage structures. At the same time, workers may become complicit in sustaining low pay, as job satisfaction (e.g., working in tourist attractions), intrinsic motivations (e.g., meeting people, flexible schedules), and modest earnings aspirations influence their acceptance of prevailing wages. Over time, these shared assumptions among managers and workers reinforce an industry culture in which low pay becomes both economically rationalised and socially normalised.

2.2 How do workers differ

Classical labour market models predict that workers sort into roles that require higher observed abilities and unobserved preferences (Becker, 1957). This sorting contributes to a significant pay gap between industries, and the effects are more pronounced for low- and middle-skilled workers (Card et al., 2016); since workers with more experience and education tend to sort into more profitable firms (Arai, 2003). However, substantial wage differentials between industries persist even after accounting for both observed and unobserved worker characteristics (Gittleman & Pierce, 2011).

Studies using matched employer-employee datasets and decomposition methods have found that these wage differentials are more strongly driven by employer characteristics than by worker observed ability (Abowd et al., 2012). Workers and firms' characteristics together explain less than half of the overall wage gap (Caju, 2010); and within this explained portion, firm-specific factors account for roughly three-quarters of the variation in wages across industries (Gruetter, 2009).

Wages in some industries, like finance and hospitality, tend to deviate more significantly from the average compensation. Compensation in the finance industry is substantially higher,

particularly for top earners (Oyer, 2008; Goldin and Katz, 2008). Furthermore, after controlling for workers' observed abilities, average wages in the finance sector are around 50% higher than the overall average, and for those in the top percentiles of the earnings distribution, this difference can reach up to 250% (Philippon & Reshef, 2012). In a broader analysis of inter-industry wage differentials, Abowd et al. (2012) classify industries into "winners" and "losers" based on their relative wage levels. As expected, they confirm that finance dealers and brokers rank among the top "winners," earning substantially more than the average worker, while those in the hospitality sector rank among the top "losers," earning significantly less on average.

Job choice decisions would differ if workers based their choices entirely on wages, rather than on a broader set of job attributes (Taber & Vejlin, 2020). Some workers may choose employment in hospitality because they value non-pecuniary job characteristics such as flexible working hours, social interaction, or the lifestyle associated with the sector (Riley et al., 2003; Mas & Pallais, 2017; Wiswall & Zafar, 2018). These job amenities can increase overall job satisfaction and may lead some workers to accept lower wages. For example, job autonomy and customer interaction have been shown to influence employees' job satisfaction and well-being in hospitality occupations (Zhao et al., 2016). However, it is important to recognise that such preferences are not universal. Evidence also indicates that hospitality jobs frequently involve unfavourable working conditions and limited career progression (Kusluvan & Kusluvan, 2000).

The wage penalty for hospitality workers has received limited scholarly attention. Most existing studies on hospitality wages do not disaggregate the portion of the wage gap attributable to worker characteristics from the unexplained component. Consequently, the average wage gap reported in the literature often reflects differences in skills rather than a true penalty. To date, the only study in Europe that explicitly separates the explained and unexplained components is Casado-Díaz and Simón (2016). Their analysis of Spain shows that the overall wage gap between hospitality and other sectors is largely explained by observable worker characteristics, suggesting no significant penalty on average. However, when focusing on high-skilled workers (top quantile of earning distribution), they identify a clear wage penalty in hospitality, whereas for low-skilled workers, the observed gap is mainly attributable to differences in skills and the nature of their jobs.

2.3 Returns from education for tourism and hospitality workers are lower compared to other sectors

Another group of papers examine the returns to education for workers in the tourism sector, consistently showing that these returns are significantly lower compared to other sectors (Lillo-Bañuls and Casado-Díaz, 2012, 2015; Fernández et al., 2009; Marchante et al., 2007). Evidence from Spain shows that investments in human capital—particularly education—yield comparatively lower returns for tourism workers than for those in other sectors (Fernández et al., 2009). Within the tourism sector, the returns to education appear to be even lower in the hospitality subsector (Lillo-Bañuls & Casado-Díaz, 2010). In other words, the returns to education in tourism-related roles are relatively modest, which contributes to a significant prevalence of overeducation among workers in the sector. The presence of overeducation in the tourism sector indicates a mismatch between workers' qualifications and job requirements. Studies highlight a persistent such mismatch, resulting in limited wage progression and reduced job satisfaction (Lillo-Bañuls & Casado-Díaz, 2012, 2015). These mismatches have been linked to higher employee turnover, as workers often seek employment better aligned with their skills and qualifications (Marchante et al., 2007).

2.4. Gender wage gap

A substantial body of research on tourism-sector employment has examined gender-based wage gaps. Women represent more than 58% of the tourism workforce in Europe (Eurostat, 2023a), and, similar to other industries, they face an unexplained wage gap (de Castro Romero et al., 2025; García-Pozo et al., 2012; Muñoz-Bull, 2009; Santos & Varejão, 2007; Thrane, 2008; Casado-Díaz, Driha, & Simón, 2022; Kortt et al., 2018). Most studies report that the gender pay gap in tourism and hospitality is smaller than the overall gender gap observed in the wider economy (Campos-Soria et al., 2011a; Fernández et al., 2009; Lee & Kang, 1998; Santos & Varejão, 2007). However, some studies suggest that this smaller gap is not necessarily a sign of greater equality or lower discrimination, but rather a reflection of the sector's overall low wages (Campos-Soria et al., 2011; Casado-Díaz et al., 2020). When wages are uniformly low across the sector, the scope for a large gender pay gap is naturally limited. However, when focusing on the sector's top earners, the gender pay gap tends to widen (Marfil-Cotilla & Campos-Soria, 2021).

The gender wage gap in hospitality management positions varies considerably across European countries. A recent cross-country study reports that the adjusted gender pay gap in the European

Union ranges from approximately 5.1% to 23.8% (de Castro Romero et al., 2025). Although this gap decreases substantially when controlling for individual and job-related characteristics, it remains statistically significant in most countries. Importantly, the study also finds that the gender wage gap in hospitality management is, on average, lower than the gender gap observed in the broader economy.

2.5 Immigrants and ethnic minorities are overrepresented in low-paid roles and face higher penalty pay

The tourism sector is a major employer of immigrants and ethnic minorities in many developed countries. These groups are often overrepresented in lower-paid positions within the industry, which contributes to persistent wage disparities. In Spain, immigrant workers are heavily concentrated in low-wage industries such as tourism and hospitality. As a result, they consistently earn lower wages than native-born workers, even after controlling for education and other relevant qualifications (Simón et al., 2008). Industry segregation plays a central role in explaining these disparities, as many immigrants are granted work permits primarily for low-skilled, low-paid sectors where labour shortages are common. For example, in the US, there are strict quotas on the number of visas available for low-skilled immigrant workers, except in the agricultural sector, which faces more acute labour shortages and is exempt from such limits. Evidence shows that these low-skilled immigrant workers enhance firm performance without significantly affecting native employment (Clemens & Lewis, 2024).

In the UK, the risk of immigrant exploitation in the hospitality sector is increasing, driven by a high number of job vacancies and recent evidence of exploitation in the care sector (Work Rights Centre, 2025). Some firms reportedly surpass visa restrictions by hiring immigrants through skilled worker schemes, only to reassign them to lower-paid roles. Hence, although the hospitality sector is among the most ethnically diverse industries in the UK, a persistent ethnic pay gap exists (Mai & Cominetti, 2020). Non-white workers receive lower wages than their white counterparts, even when performing similar roles and possessing comparable demographic and job characteristics. The study also finds evidence of overqualification, suggesting that wages in the sector do not accurately reflect the educational levels of minority workers.

Improving working conditions and compensation in the tourism sector is progressing very slowly, and the high share of immigrant workers, who are paid less, may further slow the process. Across the EU, hotels and restaurants depend heavily on immigrant labour, yet improving working conditions remains a major challenge (Gerogiannis et al., 2012).

Immigrants often accept low-paid hospitality jobs as a gateway to better economic opportunities, but this can place them at a disadvantage in wage negotiations, a dynamic that employers may exploit (Baum, 2012; Joppe, 2016). Similar evidence from the US indicates that, regardless of legal status, immigrant workers are typically employed more often in poorly paid hospitality roles (Hotchkiss et al., 2012).

3. Econometric Methodology

We first estimate the hourly wage gap between hospitality workers and workers in all other sectors using a standard Mincer (1974) wage equation. We then perform pairwise comparisons between hospitality and selected benchmark sectors with similar job structures, particularly retail and manufacturing, separately for each survey wave[1]. Because the large majority of hospitality workers have secondary education as their highest qualification, we restrict the main sample to this group to improve comparability across sectors. We further examine whether the wage gap differs within more homogeneous subgroups by estimating the gap separately for workers whose highest qualification is tertiary education and for part-time workers. Throughout all subgroup estimations, we ask the following question: how would the hospitality wage distribution change if hospitality workers were paid according to the wage-setting structure observed in non-hospitality employment?

Given the heterogeneity of earnings across the wage distribution, we apply the unconditional quantile regression (UQR) approach proposed by Firpo, Fortin, and Lemieux (2009). This method transforms the dependent variable (log hourly wage) using the statistical concept of the influence function (IF), which is defined as follows:

$$IF(w; Q_\theta) = \frac{\theta - I(w \leq Q_\theta)}{f_w(Q_\theta)} \qquad [1]$$

where θ denotes the quantile of interest (e.g., the median, $\theta = 0.5$), $\mathbb{I}(\cdot)$is an indicator function equal to one if the condition holds and zero otherwise, $Q_\theta$is the θ-th percentile of the unconditional distribution of log hourly wages, and $f_w(Q_\theta)$is the density of log wages evaluated at that quantile. Intuitively, the IF captures how an individual observation contributes

[1] We exclude individuals in the following NACE sectors: education (P), IT (J), health (Q), finance (K), energy (D), professional services (M), and public administration and defense (O) since workers in these sectors have systematically different observable characteristics, and perhaps, unobservable as well.

to the position of the quantile: observations below the quantile exert a downward influence, while those above it exert an upward influence, with the magnitude depending on the density at that point. For example, the influence function of the population mean, μ, is simply the deviation of an individual's log wage from the mean, $Y - \mu$.

The IF itself cannot be used as a dependent variable, as it is centred around zero and captures only deviations from the statistic of interest. By adding back the distributional statistic Q_θ (i.e., the percentile), we obtain the recentered influence function (RIF), defined as:

$$\mathrm{RIF}(\mathrm{w}; Q_\theta) = w\_RIF\_\theta = Q_\theta + \frac{(\theta - I[p \leq Q_\theta])}{f_w(Q_\theta)} \qquad [2]$$

Unlike the IF, the expectation of the RIF equals the quantile, i.e., $E[RIF(w; Q_\theta)] = Q_\theta$, which allows it to be used as a dependent variable in regression analysis to study unconditional quantiles of log wages. The UQR framework then follows a standard OLS specification:

$$\mathrm{E}[\mathrm{RIF}(\mathrm{w};\ \mathrm{Q}\theta) \mid \mathrm{X}] \ = \ \mathrm{X}'\beta \qquad [3]$$

where the estimated coefficients β capture the effect of the covariates X on the unconditional θ- the percentile of log hourly wages.

After estimating separate regressions for the mean and for the quantiles of interest for both groups (i.e., hospitality and the rest of the sectors), we apply decomposition techniques that divide the wage gap into two components: the endowment effect (the part explained by differences in observed characteristics, known also as composition effect) and the treatment effect (the unexplained component, referred also as wage structure effect). The standard decomposition methods are limited to explaining differences at the mean of the wage distribution and cannot be directly extended to other percentiles (Oaxaca, 1973; Blinder, 1973).

To examine wage differentials between hospitality and non-hospitality workers across the unconditional wage distribution, this study applies the decomposition method proposed by Firpo, Fortin, and Lemieux (2018). This approach extends the traditional Oaxaca–Blinder decomposition beyond the mean and can be used to decompose the log wage across all percentiles. The method proceeds in two stages. In the first stage, a logistic regression method is used to construct a counterfactual wage distribution and to decompose the overall wage gap into an endowment and treatment effect. In the second stage, RIF regressions are used to allocate these two components across the explanatory variables.

More formally, denote sector affiliation, where $T = 1$for hospitality workers and $T = 0$ for non-hospitality workers. Let $F_{w,H}$ and $F_{w,NH}$ denote the distributions of log hourly wages for hospitality and non-hospitality workers, respectively. For a selected percentile $\nu(\cdot)$, the overall wage gap is defined as

$$\Delta^{\nu}_{\text{overall}} = \nu\left(F_{w,NH}\right) - \nu\left(F_{w,H}\right) = \nu_{NH} - \nu_{H} \quad [4]$$

Because the distribution of observed characteristics may differ across the two sectors, this overall gap can be decomposed into a wage structure component and a composition component:

$$\Delta^{\nu}_{\text{overall}} = [\nu_{NH} - \nu_{C}] + [\nu_{C} - \nu_{H}] = \Delta^{\nu}_{S} + \Delta^{\nu}_{X} \quad [5]$$

where $\nu_C$is the statistic evaluated at the counterfactual distribution. In the Firpo et al. (2018) framework, the counterfactual represents the wage distribution that would prevail if hospitality workers were paid according to the non-hospitality wage structure, while retaining the distribution of characteristics observed among hospitality workers. Under this normalization, Δ^{ν}_{S}measures differences in wage-setting structures across sectors, whereas Δ^{ν}_{X} captures differences in the distribution of observed characteristics.

Identification of the counterfactual relies on two assumptions: ignorability and overlapping support. Ignorability requires that, conditional on the observed covariates X, the unobserved determinants of wages are independent of sector affiliation. In other words, any unobserved factors relevant for wage determination must not systematically differ between hospitality and non-hospitality workers once we control for observables. A common justification for this assumption is that unobserved characteristics are often correlated with observed ones, making cross-group comparisons more credible. Overlapping support requires that workers with a given set of observable characteristics have a positive probability of being observed in both sectors. This condition is addressed in our analysis by restricting the sample to workers with comparable observable profiles.

Then, the reweighting procedure uses three weighting functions:

$$\widehat{\omega}_{H}(T) = \frac{T}{\hat{P}},\ \widehat{\omega}_{NH}(T) = \frac{1-T}{1-\hat{P}},\ \text{ and } \widehat{\omega}_{C}(T;x) = \left(\frac{1-T}{\hat{P}}\right)\left(\frac{\hat{P}(x)}{1-\hat{P}(x)}\right) \quad [6]$$

where $\hat{P} = \Pr(T = 1)$is the sample proportion of hospitality workers and $\hat{P}(X) = \Pr(T = 1 \mid X)$is the propensity score estimated from a logit model. The first two weighting functions recover the observed hospitality and non-hospitality wage distributions. The third weighting

function reweights the non-hospitality sample so that it has the same observable characteristics as the hospitality sample, thereby generating the counterfactual distribution. In the empirical implementation, these weights are standardized to sum to one.

In the second stage, the decomposition is linked to RIF regressions. For each statistic ν, the reweighted linear projections are estimated separately for hospitality workers, non-hospitality workers, and the counterfactual distribution:

$$\widehat{\gamma_H^{\nu}} = \left(\sum_{i=1}^{N} \omega_H^*(T_i)(X_i X_i')\right)^{-1} \sum_{i=1}^{N} \omega_H^*(T_i)\ \widehat{\mathrm{RIF}}(p_i; \nu_H, F_H)\, X_i \qquad [7]$$

$$\widehat{\gamma_{NH}^{\nu}} = \left(\sum_{i=1}^{N} \omega_{NH}^*(T_i)(X_i X_i')\right)^{-1} \sum_{i=1}^{N} \omega_{NH}^*(T_i)\ \widehat{\mathrm{RIF}}(p_i; \nu_{NH}, F_{NH})\, X_i \qquad [8]$$

$$\widehat{\gamma_C^{\nu}} = \left(\sum_{i=1}^{N} \omega_C^*(T_i)(X_i X_i')\right)^{-1} \sum_{i=1}^{N} \omega_C^*(T_i)\ \widehat{\mathrm{RIF}}(p_i; \nu_C, F_C)\, X_i \qquad [9]$$

These coefficients summarize how small changes in worker characteristics are associated with changes in the unconditional distributional statistic of interest. In the special case where $\nu$is a quantile, the RIF regression provides an approximation to the effect of covariates on that unconditional quantile.

The final decomposition form of the distributional statistics of interest is expressed as follows:

$$\widehat{\Delta}^{\mathrm{v}}_{\mathrm{overall}} = \underbrace{\left(\overline{X}^{C} - \overline{X}^{H}\right)\widehat{\gamma_H^{\nu}}}_{\text{Pure Endowment}} + \underbrace{\overline{X}^{C}\left(\widehat{\gamma_C^{\nu}} - \widehat{\gamma_H^{\nu}}\right)}_{\text{Specification Error}} + \underbrace{\overline{X}^{NH}\left(\widehat{\gamma_{NH}^{\nu}} - \widehat{\gamma_C^{\nu}}\right)}_{\text{Pure Treatment}} + \underbrace{\left(\overline{X}^{NH} - \overline{X}^{C}\right)\widehat{\gamma_C^{\nu}}}_{\text{Reweighting Error}} \qquad [10]$$

Here, the bars denote sample averages of the explanatory variables. The first term is the pure structure effect, which measures the part of the wage gap attributable to differences in the wage-setting process across sectors. The second term is a specification error, which arises because the RIF-regression decomposition is a first-order approximation. The third term is the pure composition effect, which captures the role of differences in worker characteristics between hospitality and non-hospitality employment. The fourth term is a reweighting error, which reflects any mismatch between the actual and reweighted covariate distributions. In practice, the last two terms should be relatively small; large values would indicate either poor common support or misspecification of the linear RIF regression.

4. Data and Descriptive Evidence

The study draws on matched employer–employee microdata from the Structure of Earnings Survey (SES), covering seven Western European countries: Belgium, Denmark, France, Germany, Luxembourg, the Netherlands, and the United Kingdom. These countries exhibit broadly similar labour market structures and institutional patterns. However, the significance of the hospitality sector among countries may still differ; hence, the estimation is conducted separately for each country.

Following a harmonised methodology, the SES is conducted every four years, and this study uses the four most recent waves available from Eurostat: 2010, 2014, 2018, and 2022. Economic activities are classified according to the NACE Rev. 2 system, which was introduced in 2010; therefore, earlier waves are excluded to maintain consistency in sectoral definitions. To ensure comparability across countries, we exclude sectors (*see footnote 1*) that do not meet the overlap condition and restrict the sample to individuals with at most secondary education, as over 90 percent of workers in the accommodation and food service sector fall within this educational group.

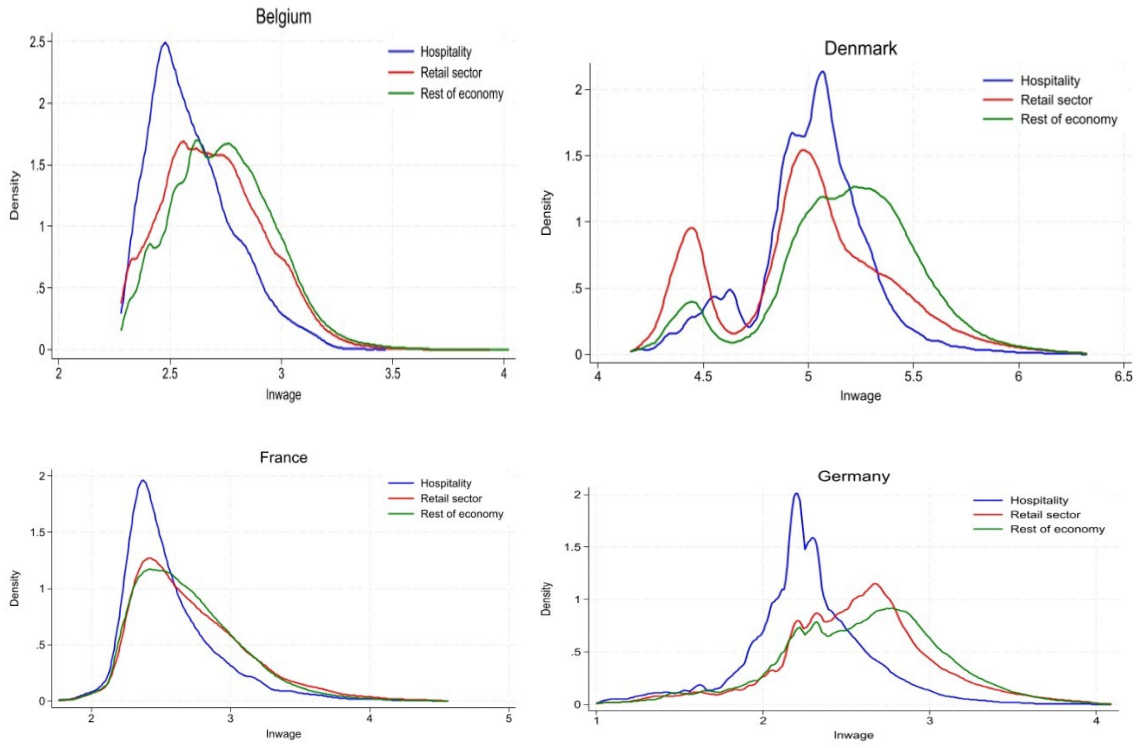
The SES provides detailed information on workers' characteristics, including sex, age, tenure, education, occupation, sector, type of contract, firm size, and type of collective agreement. The outcome variable, gross hourly wage, is calculated by dividing an employee's total monthly earnings for a given reference month (typically October) by the number of hours worked in that month. However, the hourly wage excludes tips—whether paid in cash or by card—which are often substantial for hospitality workers. Table A1 in the appendix shows the summary statistics by country with pooled SES waves.

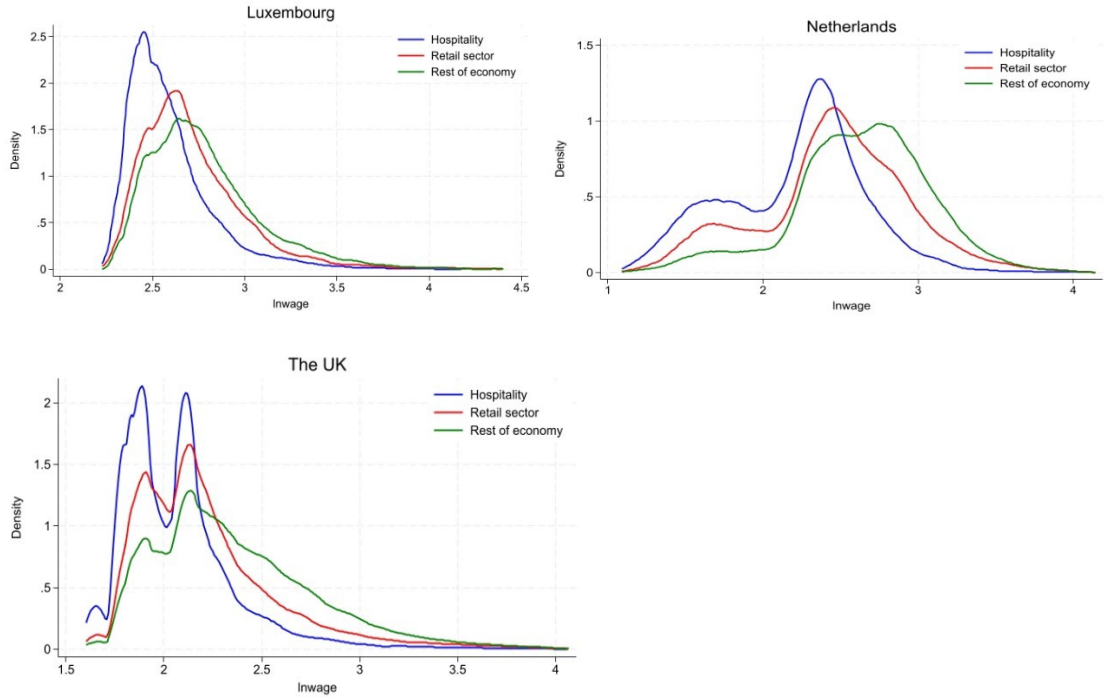
To account for the potential impact of tips on wage differentials, we complement the analysis with data from the EU-SILC survey for the same years. Unlike the SES, EU-SILC includes self-reported annual income measures that capture cash or near-cash income, including tips, as well as bonuses, allowances, and other similar benefits. Although this measure is less precise than the SES-based hourly wage, it serves as a robustness check to assess the role of tips in explaining the wage gap.

Hospitality workers represent the largest share of low-wage earners across the European Union (Eurostat, 2025). Consistent with this broader pattern, the countries included in our analysis also display systematically lower hourly remuneration. Using the SES database, Table A1 reports the logarithm of wages across percentiles for hospitality workers and comparable industries. In all countries, a clear raw wage gap emerges between hospitality workers and

those employed in the rest of the economy. Figure 1 further illustrates this pattern: the hospitality sector consistently exhibits the lowest wage distribution, with densities concentrated toward the lower end of the wage range. Comparable sectors such as retail show somewhat higher wage levels, while the distribution for the rest of the economy is shifted further to the right. Unlike the broader economy—where wages display greater dispersion—the wage distribution in hospitality is notably compressed around its mean. Overall, Figure 1 highlights a persistent raw wage gap between hospitality and other sectors, after excluding highly educated workers and high-paying sectors listed in Footnote 1.

Figure 1: Kernel density of lnwage for hospitality, retail and the rest of the sectors





Hospitality workers also differ markedly from employees in other sectors across several observable characteristics. As shown in Table A1, the hospitality sector has the highest concentration of low-educated workers, with approximately 80–95 percent holding only secondary education or less. The sector is slightly female-dominated in most Western European countries, except for France. Hospitality also attracts a larger proportion of first-time entrants to the labour market, which is reflected in the sector's younger average workforce and the lowest average job tenure. Consistent with the nature of the industry, most occupations are classified as low-skilled, with relatively few workers employed in managerial or professional roles. Substantial differences also emerge in other workers and firms' characteristics: hospitality workers are more frequently employed part-time, have lower coverage under collective agreements, and are more often employed in small firms.

5. Results

5.1. Unexplained pay gap: accommodation vs the rest of the sectors

Beyond persistent low wages, irregular working hours, limited opportunities for training and career advancement, and generally precarious employment conditions (Ladkin, 2011; Eurofound & ILO, 2019), our results indicate that hospitality workers also experience a wage penalty across most Western European countries. The pure unexplained hourly wage differential, estimated using the reweighting procedure of Firpo et al. (2018), captures the

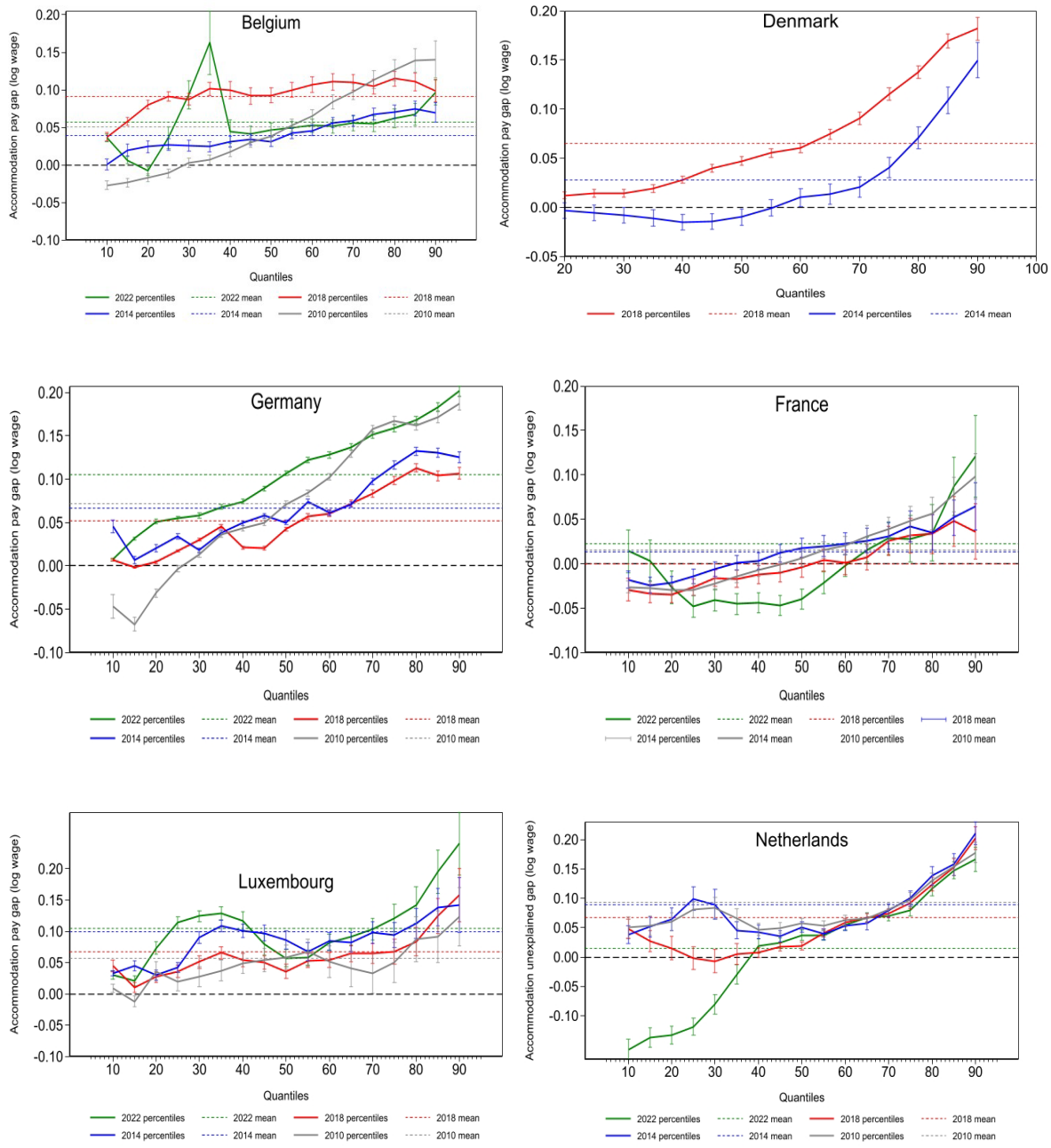
difference in characteristics of hospitality workers after reweighting them to match the distribution of characteristics among non-hospitality workers. On average, this coefficient remains statistically significant in all countries except Denmark and France, and typically ranges 5 to 15 percent per hour. These findings suggest that the hospitality sector is a relative "loser" not only because of its low average wages (Abowd et al., 2012), but also due to the wage penalty faced by its workers.

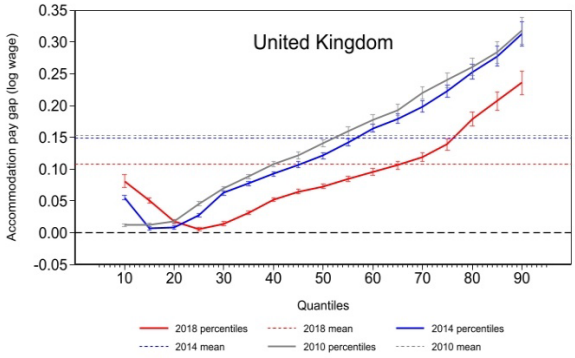
The wage penalty in the hospitality sector remains persistent across all three survey waves, consistent with the long-term wage differential patterns documented in classic studies (Krueger & Summers, 1987). This persistent penalty may be partly explained by sector-level characteristics, such as low productivity (Abowd, 2012). Furthermore, hospitality is not among the sectors that Krueger and Summers (1987) classify as engaging in rent-sharing, where firms distribute a portion of economic rents to their workers. The hospitality sector relies heavily on a less-educated and lower-skilled workforce, which implies that hiring and replacement costs may be lower than in other industries. Moreover, the skills required in hospitality are often more easily transferable among workers, further reducing the incentive for firms to engage in rent-sharing.

Examining the unconditional pay distribution reveals a consistent upward unexplained pattern across all countries, indicating that hospitality workers in the higher income percentiles experience the largest penalty. This finding aligns with previous evidence from Spain, where although no average significant results, high-percentile earners were found to face a treatment effect (Casado-Díaz, 2016). In contrast, workers in the lower half of the wage distribution exhibit smaller gaps, which in some cases become statistically insignificant or even reverse into a wage premium, as observed in France and Denmark. The treatment patterns across percentiles remain broadly consistent across survey waves, showing no clear temporal trend of either widening or narrowing wage differentials.

UQR results suggest that the "*tolerance for low pay*" described by Riley and Szivas (2003) may extend beyond the bottom or average of the wage distribution. In other words, high-percentile earners in hospitality (e.g., managers) experience a larger treatment effect compared to low-percentile earners. This implies that the sector under-rewards not only entry-level workers with little/no tenure but also experienced and higher-skilled workers at the top of the distribution. The pattern is further confirmed when the analysis is restricted to highly educated workers.

Figure 2: The pure unexplained coefficients (treatment effect)





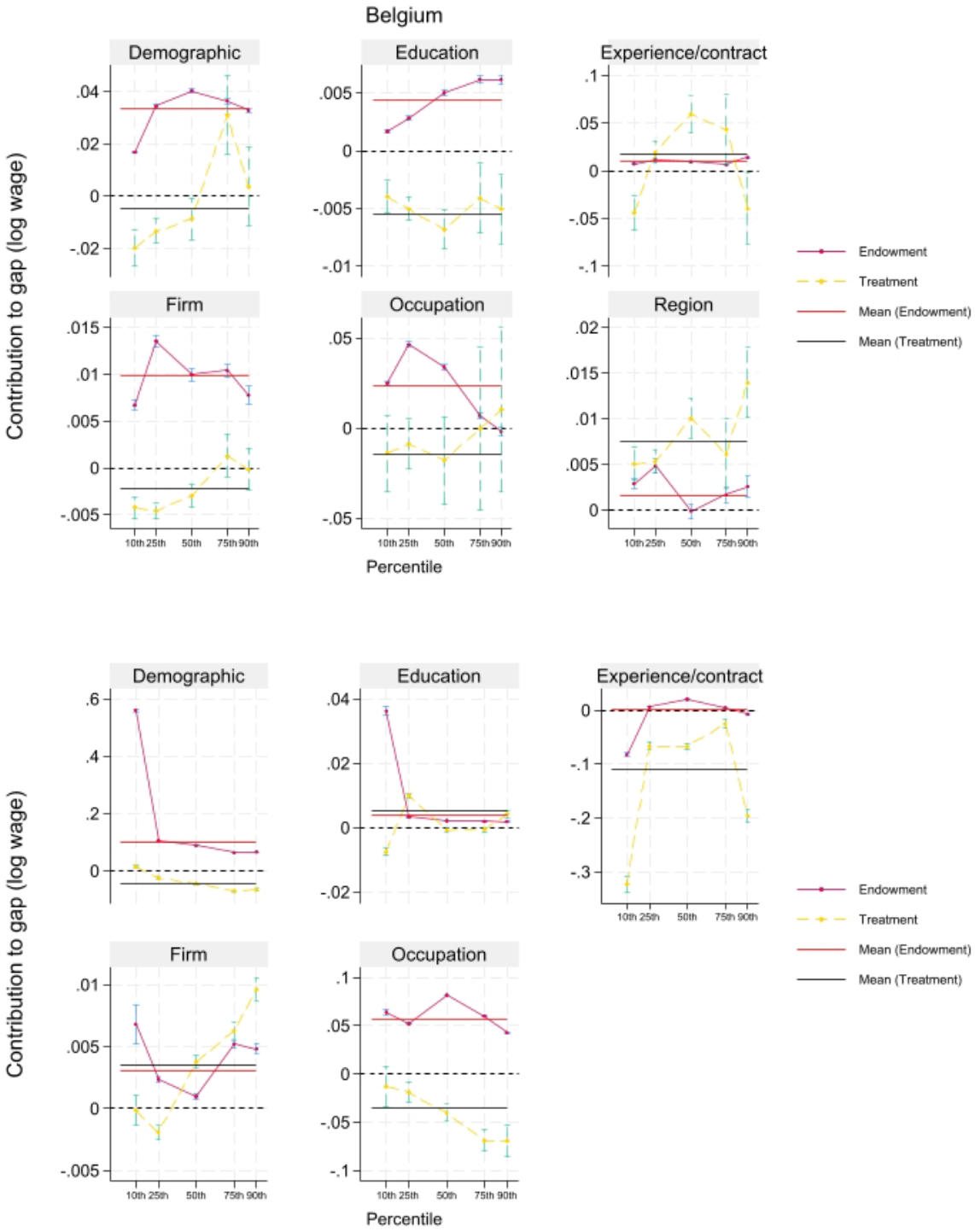
Although top-percentile earners face the largest pay penalty, substantial cross-country differences remain. In Belgium, the average unexplained term increases in the most recent wave, although the slope becomes flatter. In Germany, the upward trend in the unexplained component continues over time; however, there is a notable reduction at the 90th percentile of about ten log points between 2010 and 2018. A similar rising pattern after the 50th percentile is observed in Luxembourg, the Netherlands, and the UK. In the UK, top-percentile earners experience the largest wage gap, with workers at the "*glass ceiling*" facing an unexplained penalty of up to 35 percent per hour. In Denmark, the average unexplained gap is close to zero across most of the distribution, but it becomes significant after the 60th percentile, reaching log values of up to 0.1. France displays a particularly interesting pattern: hospitality workers earn more than workers in other sectors up to the 30th percentile, there is no significant difference between the 30th and 60th percentiles, and beyond the 60th percentile the pay gap shifts into a penalty.

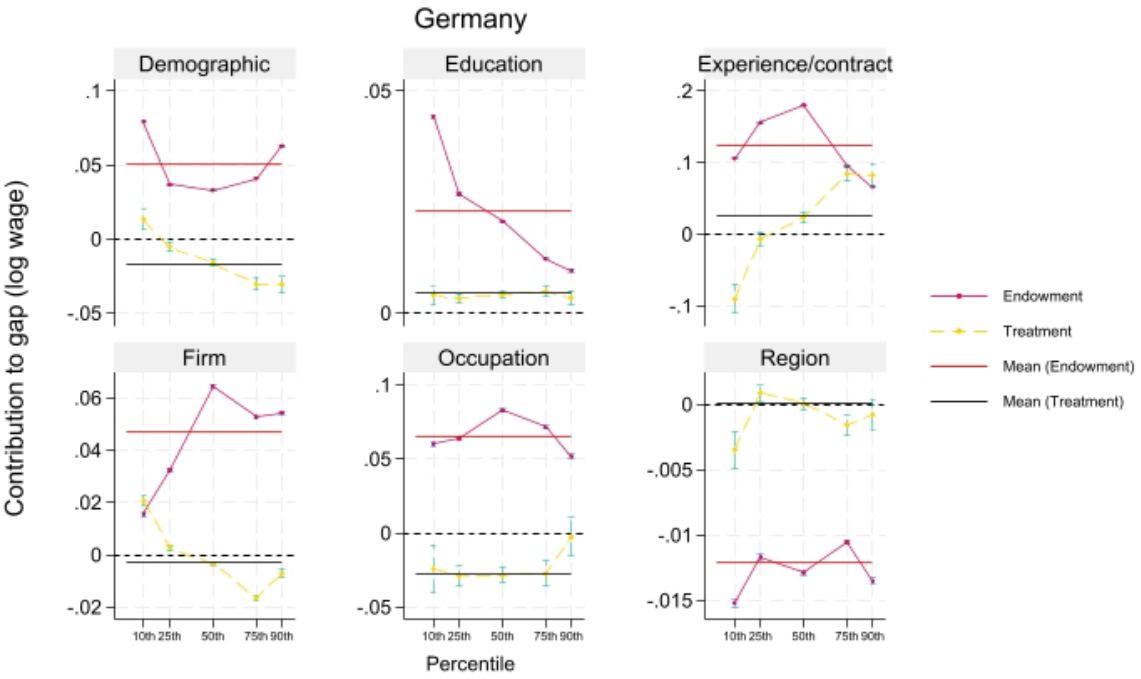
5.2.Drivers of the gap

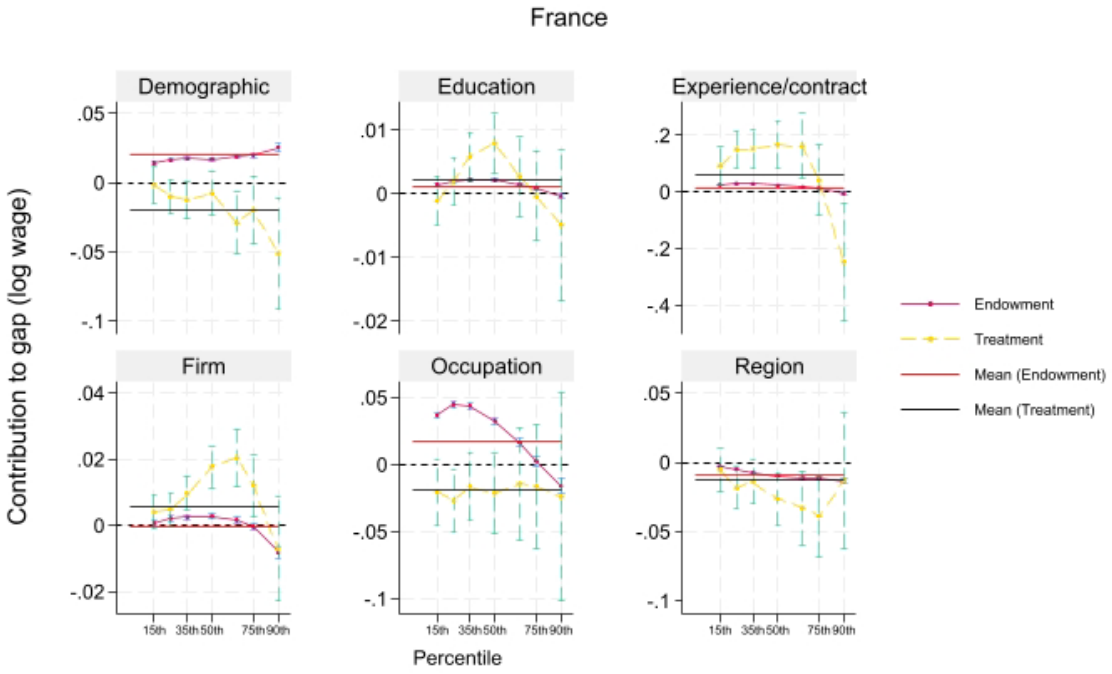
Drivers of the pay gap are identified using the Firpo et al. (2018) decomposition and grouped into six categories: demographics, education, experience and contract, firm characteristics, occupation, and region. For each group, the figure reports the corresponding endowment (composition) and treatment (wage-structure) effects at the 10th, 25th, 50th, 75th, and 90th percentiles. This shows not only the overall importance of each block of variables for the wage gap, but also how its contribution varies across the wage distribution. A positive endowment effect indicates that differences in observed characteristics between hospitality and non-hospitality workers widen the wage gap; a negative endowment effect indicates that these differences narrow the gap. A positive treatment effect indicates that the same characteristics receive higher returns in non-hospitality than in hospitality, thereby increasing the gap, whereas

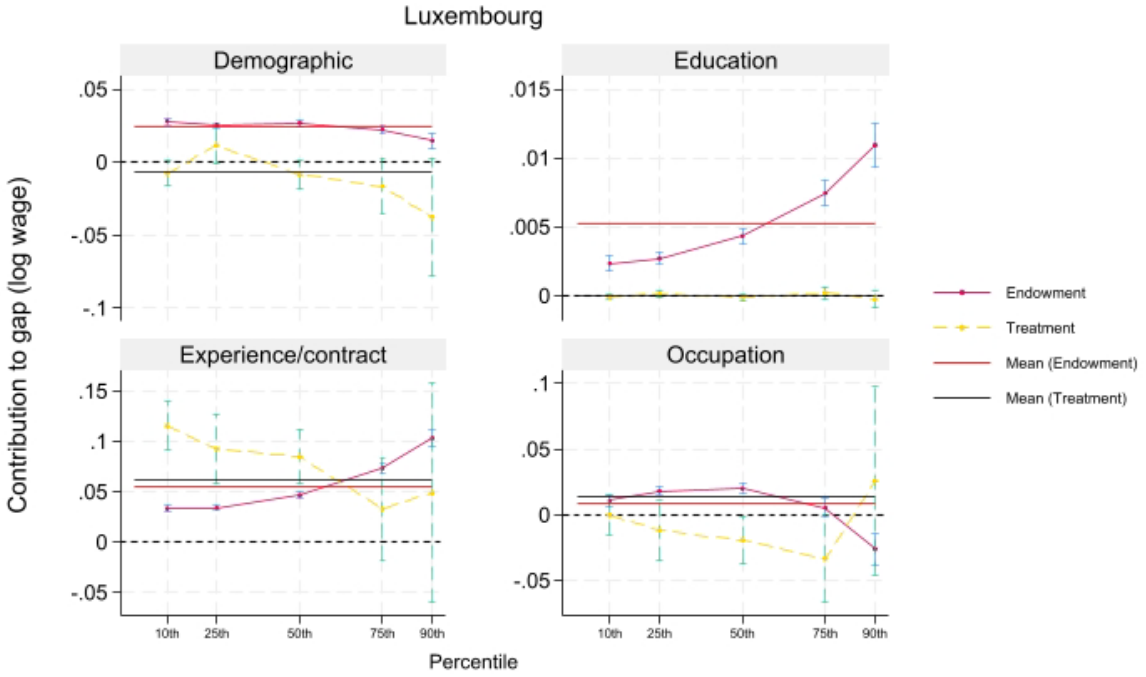
a negative treatment effect indicates that these characteristics are rewarded relatively more in hospitality, thus reducing the gap.

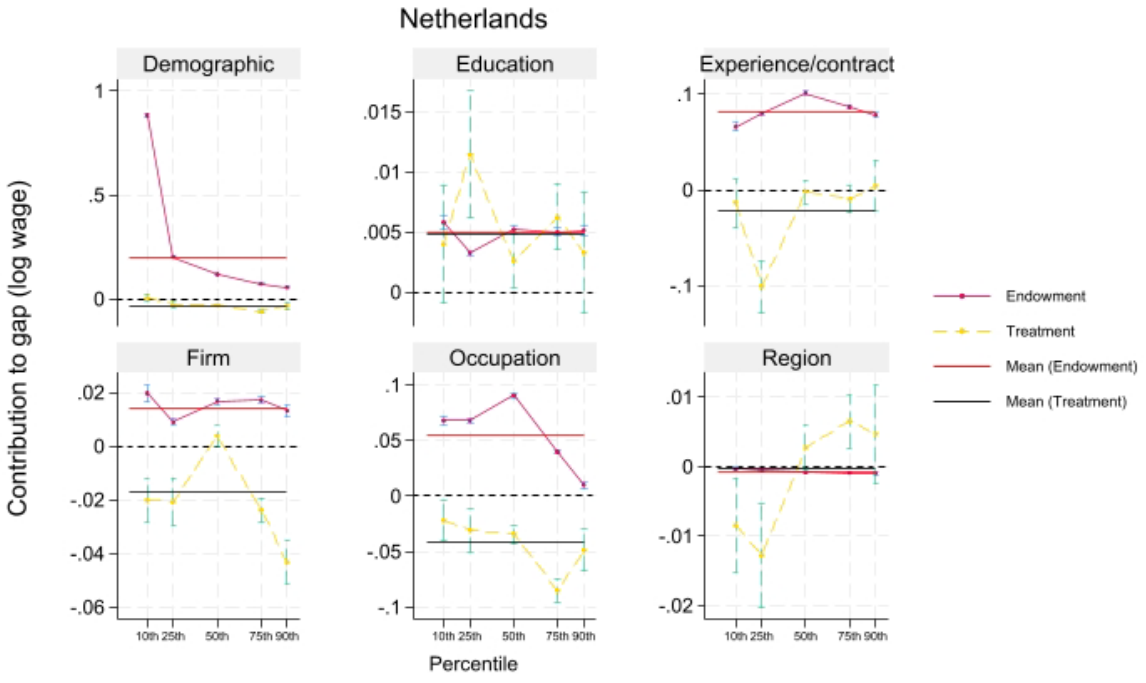
Figure 3: Drivers of the wage differentials.

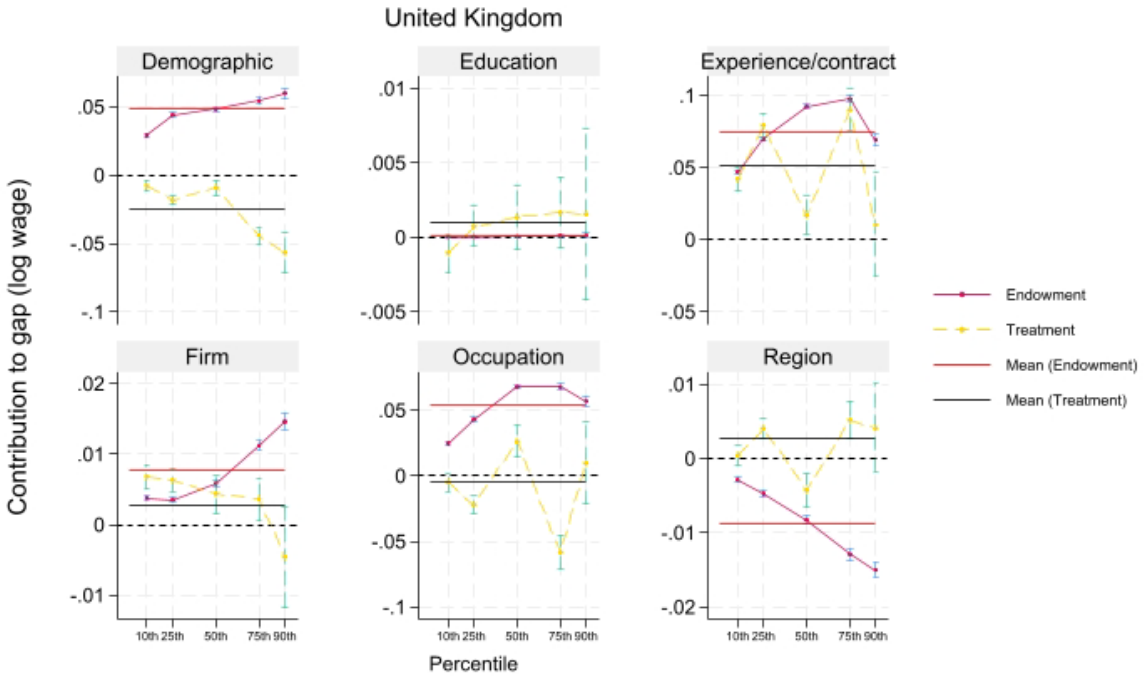



Germany
Demographic
Education
Experience/contract
Firm
Occupation
Region
Contribution to gap (log wage)
Percentile
10th 25th 50th 75th 90th
Endowment
Treatment
Mean (Endowment)
Mean (Treatment)


France
Demographic
Education
Experience/contract
Firm
Occupation
Region
Contribution to gap (log wage)
Percentile
15th 35th 50th 75th 90th
Endowment
Treatment
Mean (Endowment)
Mean (Treatment)


Luxembourg
Demographic
Education
Experience/contract
Occupation
Contribution to gap (log wage)
Percentile
10th
25th
50th
75th
90th
Endowment
Treatment
Mean (Endowment)
Mean (Treatment)


Netherlands
Demographic
Education
Experience/contract
Firm
Occupation
Region
Contribution to gap (log wage)
Percentile
10th 25th 50th 75th 90th
Endowment
Treatment
Mean (Endowment)
Mean (Treatment)



Across all countries, the endowment effect is mostly positive, indicating that a substantial share of the wage gap between hospitality and the rest of the economy workers is attributable to differences in observable characteristics. Demographic composition and occupational characteristics are the most important contributors to this endowment-driven gap, followed by contract type and tenure. By contrast, the treatment effects are considerably more volatile and often work in the opposite direction, particularly for demographic and occupational variables, suggesting that differences in returns tend to compress, rather than systematically widen, the observed gap. The main exception is the experience/contract treatment effect block, which is sizeable and positive in countries such as Belgium, Luxembourg, and the United Kingdom, implying that these characteristics are rewarded more favourably outside hospitality and therefore widen the wage penalty in that sector. In France, this effect is markedly non-linear: it widens the gap in the middle of the wage distribution but reduces it at the top, indicating that experience and contract-related characteristics are relatively better rewarded within hospitality only among higher-paid workers.

5.3.Robustness check

The baseline analysis excludes workers with higher education degrees. To address this, we extend the analysis by examining the pay gap among workers with tertiary and postgraduate education only. Figure A1 in the Appendix indicates that the overall patterns of the pay gap

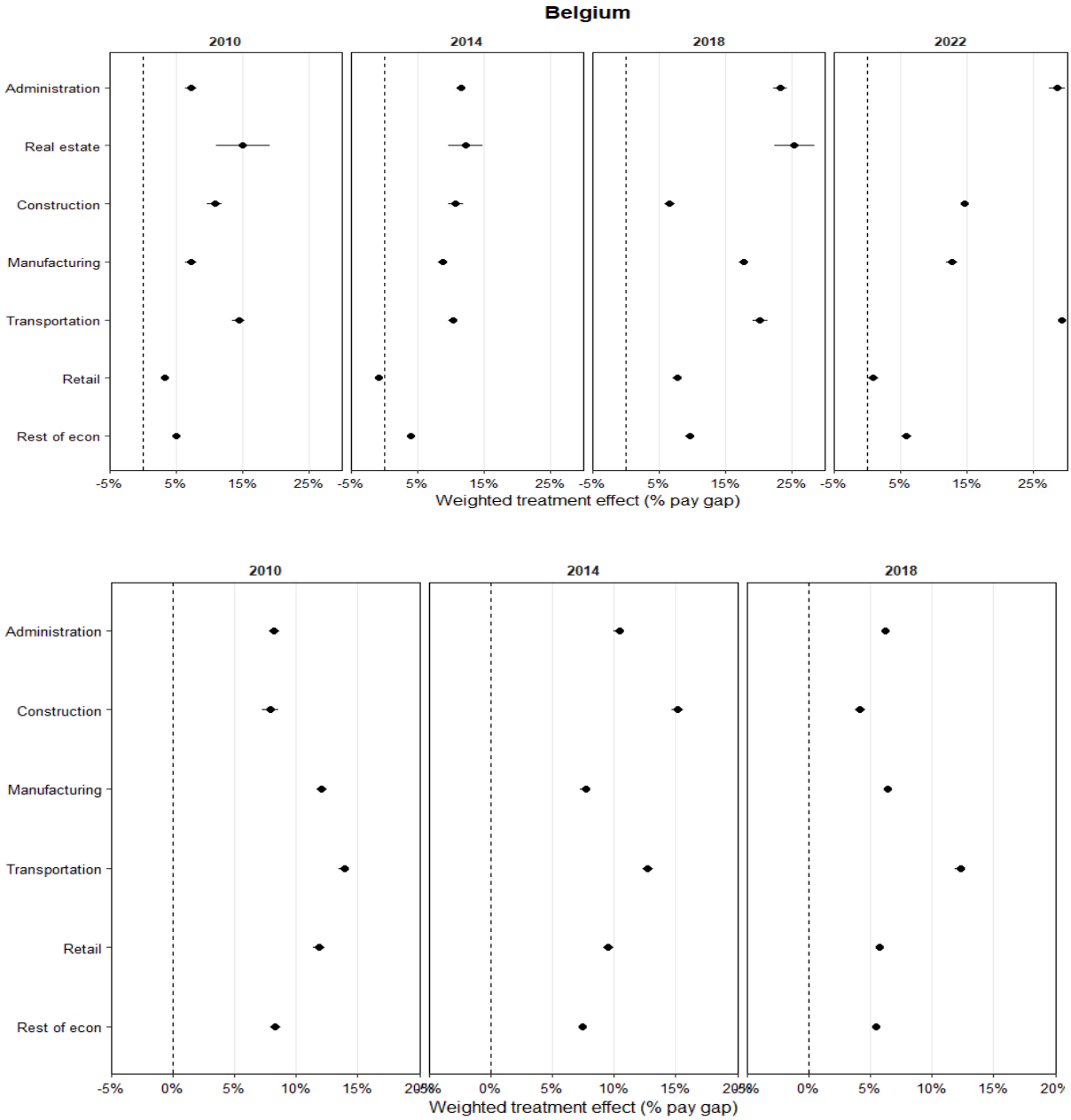
remain similar. Because the number of highly educated hospitality workers is relatively small, the estimation combines all three SES waves. Across most countries, the trends in the unexplained gap closely mirror those observed for the full sample of hospitality workers (Figure 2). These findings suggest that, in addition to the well-documented evidence on the lower returns to education in tourism and hospitality (e.g., Marchante et al., 2007; Fernández et al., 2009), highly educated workers in the sector also face a substantial wage penalty. This penalty may be linked to the high levels of overqualification and job mismatch documented in the sector (Lillo-Bañuls and Casado-Díaz, 2012, 2015). Nevertheless, two noteworthy differences emerge. First, in Denmark, highly educated hospitality workers—unlike those with secondary or lower education—face an average wage penalty that increases steadily across the distribution. Second, France stands out as the only country where highly educated hospitality workers do not experience a wage penalty across most of the distribution.

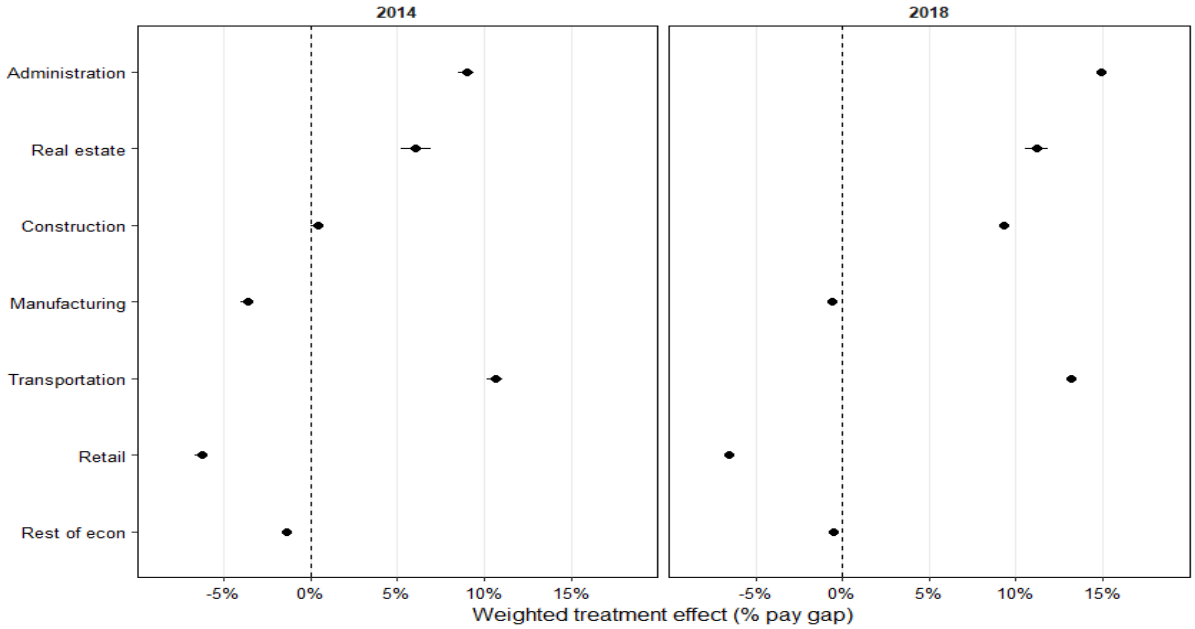
Second, given the substantial share of part-time workers in the hospitality sector, we re-estimate the model using a sample restricted to part-time workers only. Figure A2 presents the resulting unexplained gap, indicating that in Luxembourg, the Netherlands, and Germany, the pay gap follows the same general pattern observed for the overall sector, though with a smaller magnitude. A similar pattern emerges in Belgium and the UK, where the unexplained gap for part-time workers is also relatively smaller. In Denmark, part-time hospitality workers experience a wage premium up to approximately the 70th percentile of the distribution. In France, consistent with earlier findings, part-time hospitality workers do not exhibit a significant wage gap across most quantiles. Overall, part-time workers appear to possess greater bargaining power, resulting in lower—or even positive—wage differentials. One plausible explanation is that many part-time workers view employment in hospitality as a stepping-stone toward better job opportunities, a dynamic documented in the literature (Richardson & Thomas, 2012).

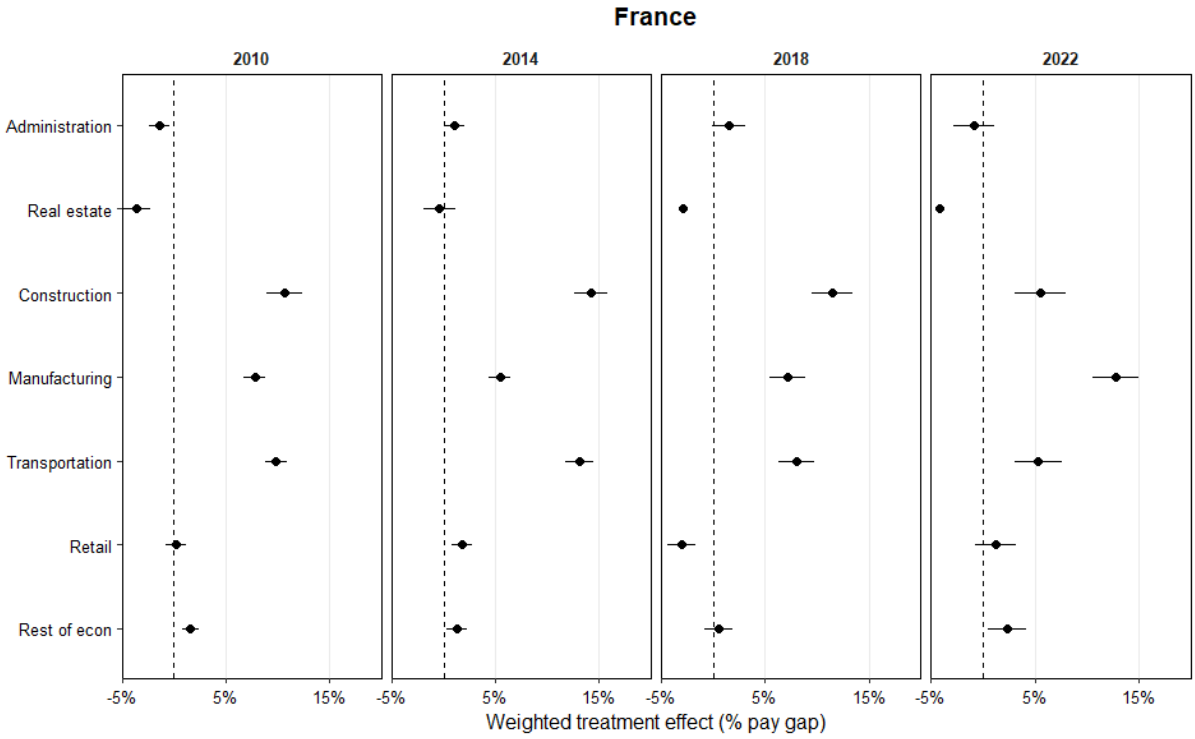
Although we ensure that hospitality workers are compared with the rest of the comparable sectors in the economy, it is useful to examine whether comparing sectors individually reveals different results. Therefore, we next compare hospitality workers with secondary or less education to workers with similar characteristics in other sectors separately. Across the seven Western European countries, accommodation workers consistently experience a wage penalty relative to most other sectors, although the magnitude and pattern vary across national labour markets. In Belgium, Germany, Luxembourg, the Netherlands, and the UK, accommodation workers face the largest penalties when compared with workers in transportation, construction,

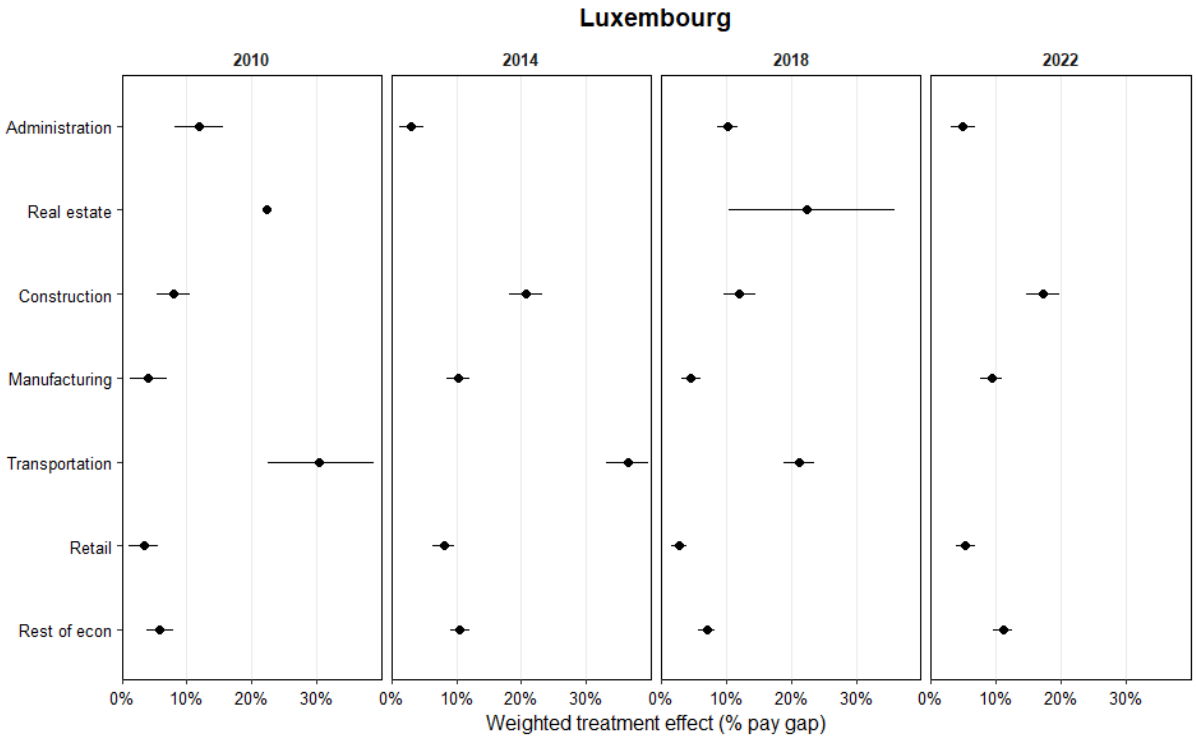
manufacturing, and real estate, exceeding the overall average penalty. Contrary, when comparing with retail sector workers, the penalty is lower than the overall average penalty in most cases. The UK exhibits pronounced sectoral disparities, with the smallest gap observed against retail and the largest against transportation and construction. These results collectively indicate that in most countries, accommodation workers are systematically positioned at the lower end of the wage distribution compared with workers in other sectors with similar characteristics

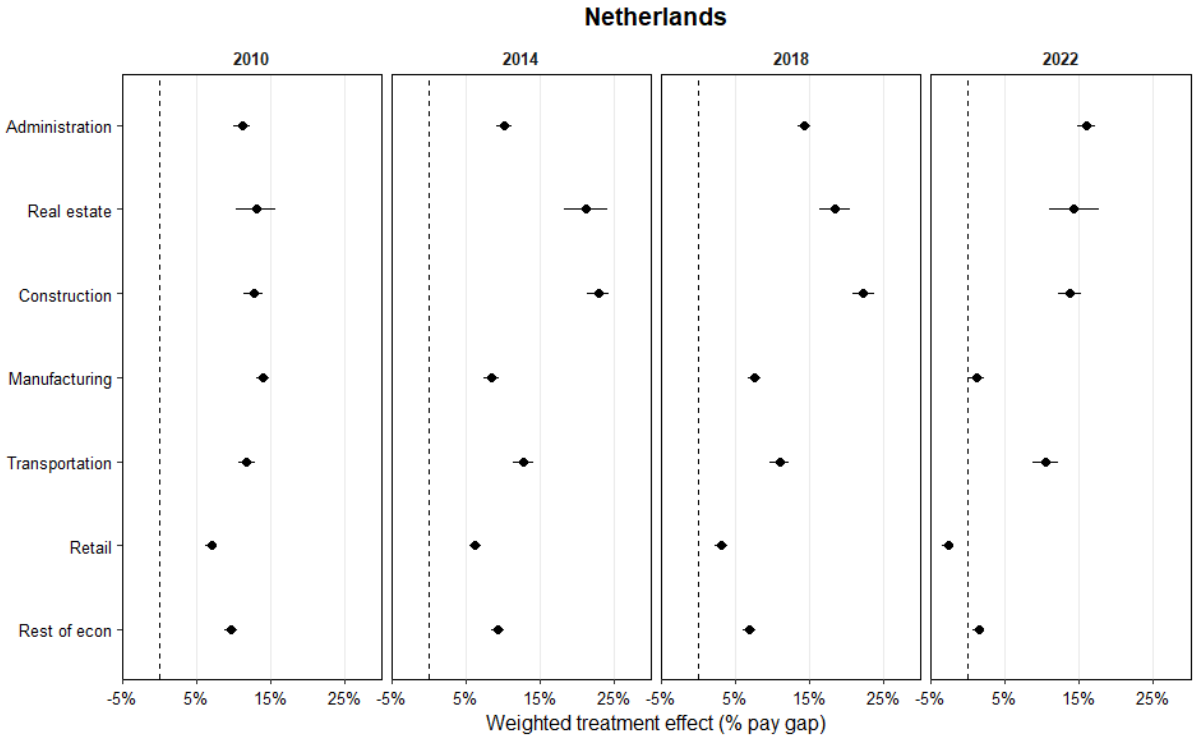
Figure 4: Average pure unexplained coefficients

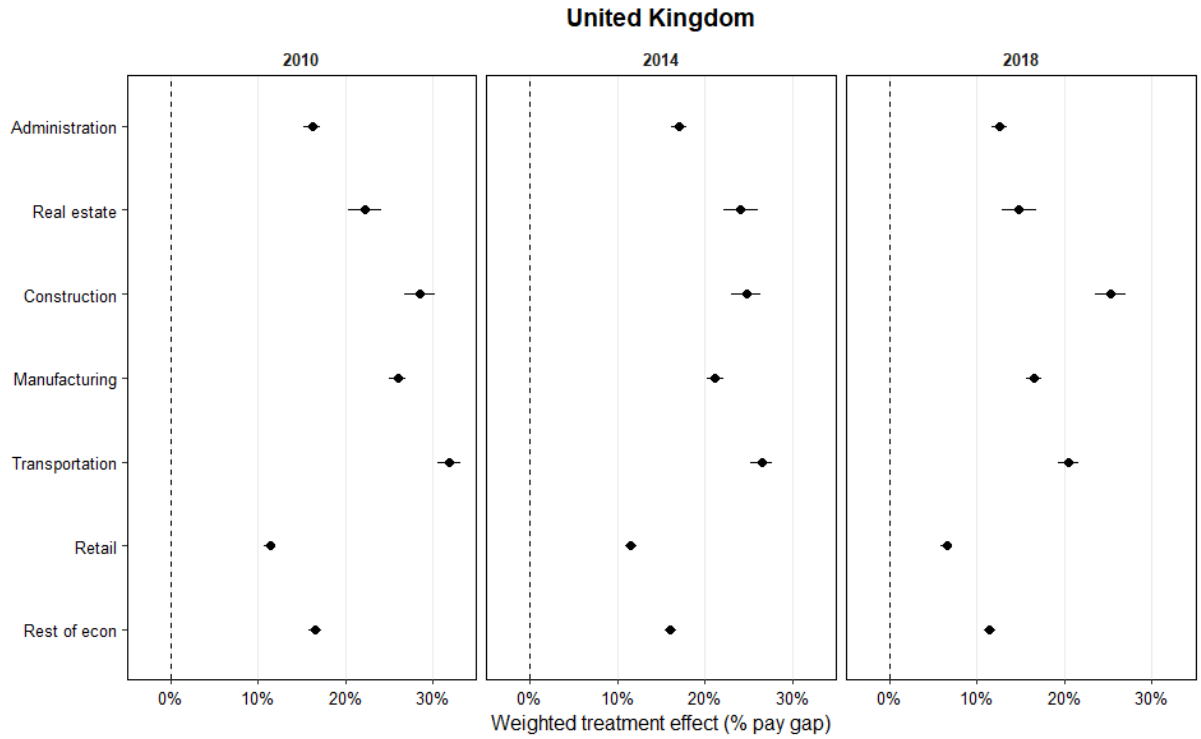



2014
2018
Administration
Real estate
Construction
Manufacturing
Transportation
Retail
Rest of econ
-5%
0%
5%
10%
15%
Weighted treatment effect (% pay gap)


France
2010
2014
2018
2022
Administration
Real estate
Construction
Manufacturing
Transportation
Retail
Rest of econ
-5%
5%
15%
Weighted treatment effect (% pay gap)


Luxembourg
2010
2014
2018
2022
Administration
Real estate
Construction
Manufacturing
Transportation
Retail
Rest of econ
0%
10%
20%
30%
Weighted treatment effect (% pay gap)


Netherlands
2010
2014
2018
2022
Administration
Real estate
Construction
Manufacturing
Transportation
Retail
Rest of econ
-5%
5%
15%
25%
Weighted treatment effect (% pay gap)



Denmark and France stand out as exceptions again. In Denmark, accommodation workers earn a small wage premium relative to workers in retail and manufacturing, while penalties relative to construction, real estate, and transportation remain but are generally smaller than those observed in other countries. Similarly, in France, pay differentials between accommodation workers and the rest of the economy are largely insignificant, and in 2018 accommodation workers even experience a notable premium over retail and real estate workers. These findings suggest that sectoral wage structures and institutional settings in Denmark and France mitigate the disadvantages typically associated with employment in accommodation. Overall, while pay penalties in the accommodation sector are pervasive across Western Europe, their magnitude is shaped by country-specific labour market conditions.

Next, we re-estimate the wage gap using the EU-SILC, which captures tip income received by hospitality workers. Figure A3 shows that the raw wage gap, measured in log hourly earnings, is broadly similar across countries in both the SES and the EU-SILC. Contrary to our expectation, however, Figure A4 indicates that the unexplained wage differential becomes larger and statistically significant in all seven countries, ranging from roughly 12 to more than 25 percent per hour. As in the baseline estimates, the treatment effect follows an increasing pattern across the earnings distribution. A plausible explanation lies in the broader earnings concept used in the EU-SILC. Unlike the SES hourly wage measure, which is based on gross earnings in the reference month and is restricted to earnings paid in each pay period, EU-SILC

employee cash or near-cash income is defined more broadly and explicitly includes commissions, tips and gratuities, supplementary payments, bonuses, productivity-related pay, and several job-related allowances. This suggests that, although hospitality workers may benefit from tips, workers in other sectors may receive additional bonuses and cash-equivalent benefits that more than offset tip income, thereby widening the unexplained pay gap in the EU-SILC.

Finally, we report specification and reweighting errors in Table A2, which show potential misspecification of the linear regression and issues of covariate overlap, respectively. For most percentiles, the error terms are not statistically different from zero, as theoretically required. In the few cases where the specification or weighting errors are statistically significant, their magnitudes are small relative to the estimated 'pure' treatment effects and therefore do not undermine the overall pattern of findings reported across the unconditional distribution.

6. Conclusion

A large body of literature documents that workers in the tourism sector are systematically and persistently paid less than those in most other industries (Muñoz-Bullón, 2009; Santos & Varejão, 2007; Lee & Kang, 1998; Dogru et al., 2019). Low compensation is not the only disadvantage faced by hospitality workers: these jobs are also characterised by irregular hours, limited opportunities for training and career advancement, and precarious employment conditions (Ladkin, 2011; Eurofound & ILO, 2019). While a well-established literature exists on sectoral wage differentials (e.g., Krueger & Summers, 1988; Abowd, 2012; Davis, 2022; Card et al., 2023), previous studies specifically comparing hospitality wages with those in other sectors are scarce. Consequently, evidence on whether the pay gap between hospitality workers and other sectors is fully explained by job and worker characteristics, or whether a distinct sector-specific wage penalty exists, has been limited.

This paper investigates the presence and magnitude of a wage penalty for hospitality workers in seven Western European countries. We first use matched employer–employee data from the Structure of Earnings Survey, which provide information on hourly gross wages. The SES allows us to estimate wage differentials for the hospitality sector using precise hourly earnings based on employers' payroll records; however, these data do not account for tips. Given the importance of tips in hospitality, we therefore complement the analysis with self-reported earnings from the EU-SILC, which include tips, and construct hourly wages using usual

working hours and the number of months in the job. To estimate the hospitality wage penalty across the wage distribution, we employ the reweighting-based decomposition method developed by Firpo, Fortin and Lemieux (2018), which accounts for differences in the distribution of observable characteristics across groups. In this framework, the treatment and endowment components capture, respectively, differences in wages due to "pure treatment" and "pure composition" effects, by reweighting hospitality workers to have the same distribution of observables as comparable non-hospitality workers.

This paper makes three main contributions. First, it provides novel evidence that hospitality workers experience a wage penalty in five of the seven Western European countries studied. Second, it documents substantial within-country heterogeneity in earnings: workers at the top of the hospitality wage distribution face a particularly large and statistically significant wage penalty in all countries in the sample. Third, the wage penalty remains significant among highly educated workers, indicating lower returns to education in the hospitality sector. These results are robust to restricting the sample to part-time workers, to alternative classifications by educational attainment, to comparisons between hospitality and individual non-hospitality sectors, and to the inclusion of tips in the wage measure.

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Appendix

Table A1: Summary statistics

	Belgium			Denmark			Germany		
	Hosp.	Retail	Rest of Econ	Hosp.	Retail	Rest of Econ	Hosp.	Retail	Rest of Econ
lnwage	2.625	2.846	2.932	5.036	5.061	5.282	2.269	2.603	2.739
wage hour	14.184	18.345	20.117	159.9	172.568	209.274	10.434	15.175	17.699
women	0.513	0.445	0.467	0.561	0.467	0.535	0.595	0.503	0.458
age14 19	0.025	0.008	0.007	0.256	0.284	0.079	0.051	0.028	0.018
age20 29	0.229	0.175	0.164	0.387	0.259	0.194	0.288	0.201	0.172
age30 39	0.275	0.272	0.272	0.147	0.146	0.206	0.209	0.209	0.197
age40 49	0.256	0.291	0.29	0.102	0.148	0.223	0.207	0.254	0.264
age50 59	0.184	0.228	0.239	0.078	0.115	0.206	0.172	0.226	0.258
age60 plus	0.032	0.026	0.029	0.031	0.049	0.092	0.073	0.083	0.091
educ prim	0.4	0.201	0.2	0.305	0.347	0.173	0.304	0.139	0.139
educ sec	0.53	0.504	0.392	0.524	0.489	0.429	0.644	0.773	0.627
educ tert	0.057	0.155	0.224	0.136	0.12	0.269	0.035	0.054	0.122
educ post	0.013	0.141	0.183	0.035	0.044	0.128	0.025	0.05	0.219
tenure	6.287	10.143	10.085	2.077	3.785	5.725	4.347	8.727	12.201
occ mgr	0.036	0.046	0.025	0.016	0.054	0.032	0.014	0.02	0.026
occ prof	0.01	0.131	0.241	0.013	0.055	0.305	0.013	0.043	0.143
occ tech	0.022	0.128	0.15	0.037	0.101	0.106	0.042	0.129	0.21
occ cler	0.136	0.222	0.165	0.067	0.09	0.096	0.039	0.187	0.177
occ serv	0.506	0.321	0.116	0.534	0.509	0.245	0.549	0.368	0.078
occ craft	0.02	0.072	0.084	0.003	0.07	0.07	0.011	0.104	0.105
occ oper	0.01	0.038	0.086	0.011	0.022	0.047	0.02	0.04	0.083
occ elem	0.261	0.042	0.133	0.319	0.099	0.097	0.31	0.108	0.175
perman cont	0.897	0.971	0.941	0.92	0.905	0.936	0.78	0.85	0.849
collective ag	0.881	0.749	0.761	0.628	0.727	0.837	0.908	0.93	0.837
full t	0.722	0.75	0.763	0.31	0.528	0.667	0.422	0.604	0.661
small	0.433	0.301	0.182				0.454	0.317	0.21

medium	0.329	0.246	0.268	0.266	0.213	0.182	0.362	0.284	0.248
large	0.239	0.454	0.549	0.27	0.512	0.63	0.184	0.399	0.542
y 1	0.306	0.289	0.296				0.315	0.328	0.492
y 2	0.36	0.272	0.302	0.34	0.305	0.309	0.376	0.352	0.256
y 3	0.334	0.44	0.402	0.66	0.695	0.691	0.309	0.319	0.252
Observations	7191	55947	446660	96239	507063	3191165	134148	277175	3681016

Table A1 (cont.)

	France			Luxembourg			Netherlands			UK		
	Hosp.	Retail	Rest of Econ	Hosp.	Retail	Rest of Econ	Hosp.	Retail	Rest of Econ	Hosp.	Retail	Rest of Econ
lnwage	2.641	2.875	2.906	2.615	2.793	3.196	2.241	2.54	2.847	2.102	2.281	2.531
wage hour	15.437	20.042	20.512	14.206	17.63	28.126	10.43	14.515	19.061	8.712	10.853	14.225
women	0.47	0.429	0.463	0.501	0.423	0.422	0.537	0.462	0.491	0.538	0.501	0.526
age14 19	0.016	0.006	0.002	0.023	0.016	0.007	0.283	0.167	0.047	0.155	0.088	0.034
age20 29	0.265	0.148	0.117	0.241	0.21	0.171	0.314	0.208	0.163	0.327	0.237	0.189
age30 39	0.257	0.272	0.256	0.297	0.296	0.31	0.124	0.17	0.193	0.205	0.203	0.227
age40 49	0.244	0.305	0.293	0.277	0.293	0.299	0.131	0.216	0.25	0.15	0.21	0.251
age50 59	0.182	0.228	0.266	0.144	0.166	0.193	0.11	0.18	0.26	0.112	0.18	0.219
age60 plus	0.037	0.041	0.065	0.017	0.019	0.019	0.039	0.058	0.087	0.051	0.08	0.079
educ prim	0.182	0.138	0.106	0.403	0.254	0.205	0.205	0.181	0.114	0.22	0.194	0.151
educ sec	0.592	0.462	0.41	0.392	0.411	0.322	0.633	0.625	0.501	0.585	0.531	0.456
educ tert	0.177	0.269	0.285	0.186	0.257	0.289	0.143	0.162	0.287	0.175	0.24	0.321
educ post	0.049	0.13	0.199	0.019	0.078	0.184	0.019	0.033	0.098	0.021	0.035	0.072
tenure	7.202	10.572	11.836	4.424	6.375	7.253	5.75	8.649	10.807	3.149	6.462	7.369
occ mgr	0.175	0.379	0.194	0.047	0.061	0.058	0.056	0.067	0.063	0.1	0.103	0.083
occ prof	0.022	0.075	0.257	0.011	0.074	0.285	0.032	0.08	0.262	0.017	0.07	0.225
occ tech	0.081	0.1	0.175	0.061	0.123	0.126	0.067	0.11	0.181	0.119	0.084	0.128
occ cler	0.12	0.162	0.122	0.042	0.126	0.128	0.051	0.1	0.114	0.075	0.113	0.146
occ serv	0.329	0.192	0.082	0.546	0.298	0.1	0.547	0.361	0.173	0.329	0.416	0.208
occ craft	0.015	0.042	0.062	0.017	0.125	0.115	0.02	0.097	0.079	0.005	0.053	0.051
occ oper	0.009	0.026	0.055	0.007	0.073	0.069	0.012	0.032	0.043	0.016	0.051	0.051
occ elem	0.248	0.025	0.051	0.27	0.119	0.118	0.209	0.147	0.077	0.335	0.11	0.106
perman cont	0.893	0.966	0.912	0.947	0.936	0.926	0.589	0.752	0.81	0.907	0.966	0.916
collective ag	0.957	0.921	0.751	0.135	0.319	0.694	0.857	0.696	0.712	0.026	0.019	0.233
full t	0.781	0.899	0.851	0.762	0.834	0.835	0.235	0.45	0.476	0.484	0.592	0.704
small	0.229	0.16	0.124				0.692	0.45	0.271	0.326	0.224	0.192
medium	0.335	0.242	0.23				0.123	0.191	0.189	0.131	0.109	0.133
large	0.436	0.597	0.646				0.186	0.359	0.541	0.543	0.668	0.674
y 1	0.356	0.205	0.295	0.223	0.239	0.169	0.336	0.348	0.346	0.294	0.334	0.336
y 2	0.387	0.368	0.359	0.346	0.348	0.235	0.298	0.315	0.312	0.326	0.343	0.337
y 3	0.257	0.427	0.346	0.431	0.413	0.596	0.366	0.338	0.342	0.379	0.324	0.327
Observations	10342	53382	707558	3190	8204	90892	17246	76256	471587	27709	83372	483584

Figure A1: The unexplained pay gap among workers with tertiary or postgraduate education

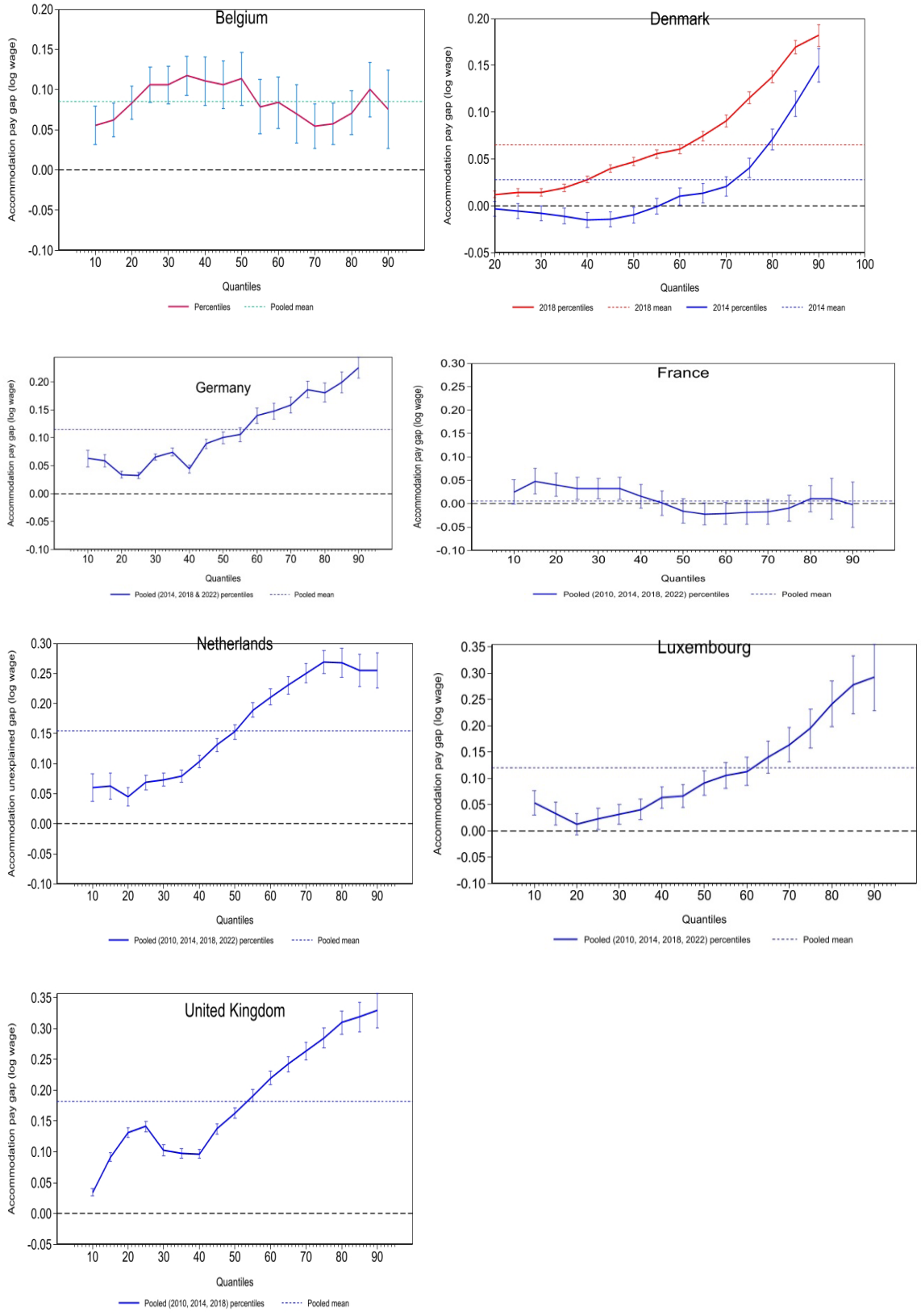


Figure A2: The unexplained pay gap among part-time workers

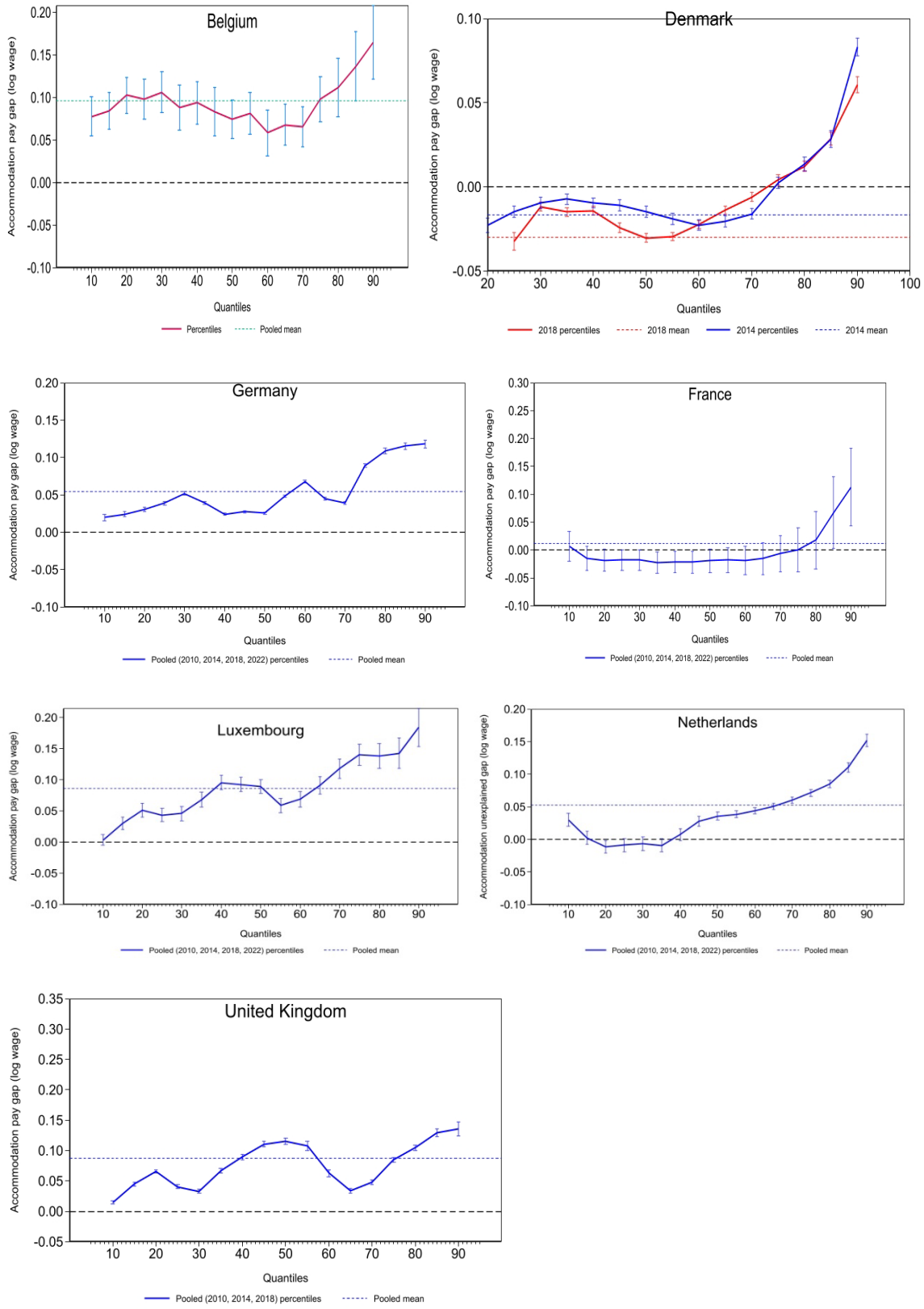


Figure A3: The raw pay gap based on SES and EU-Silc

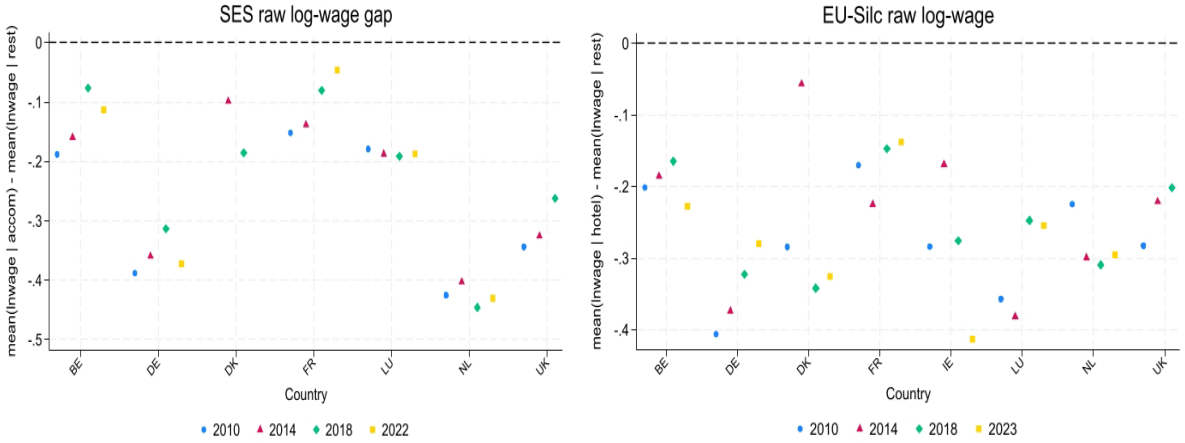
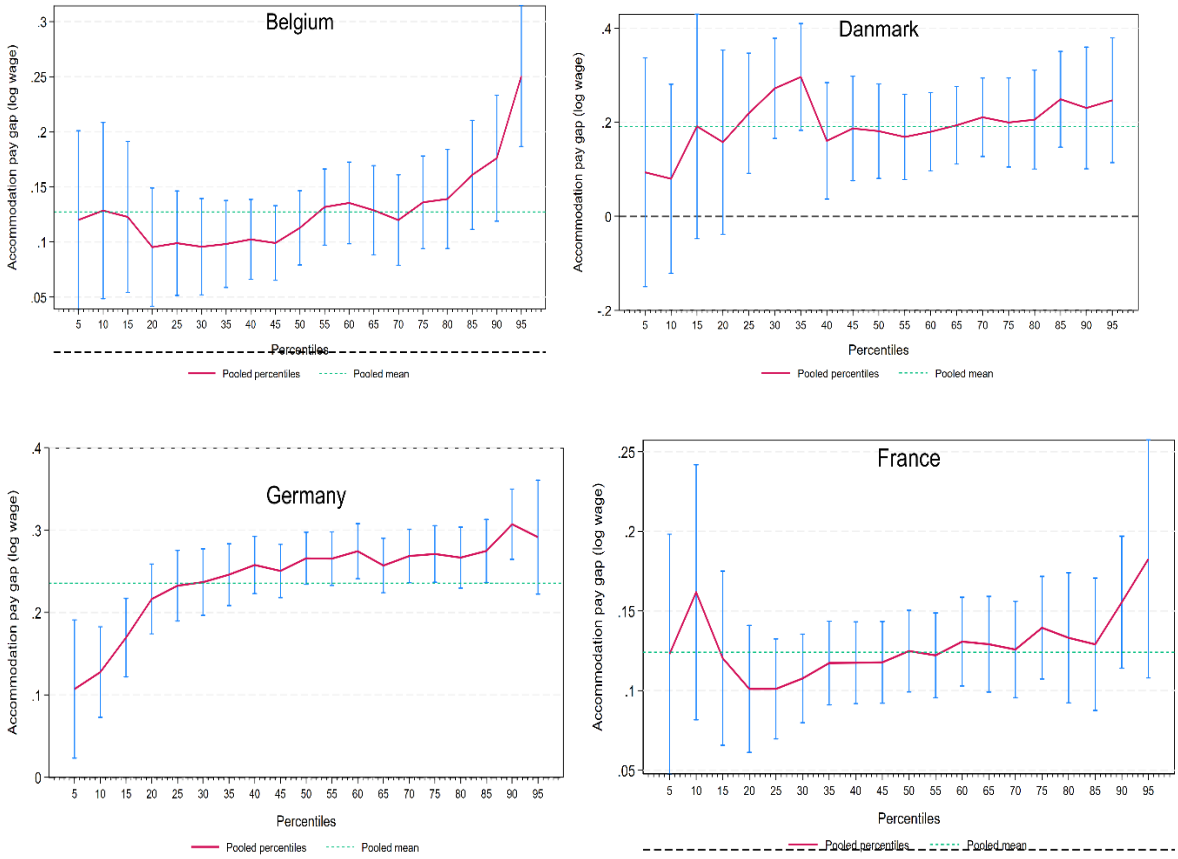
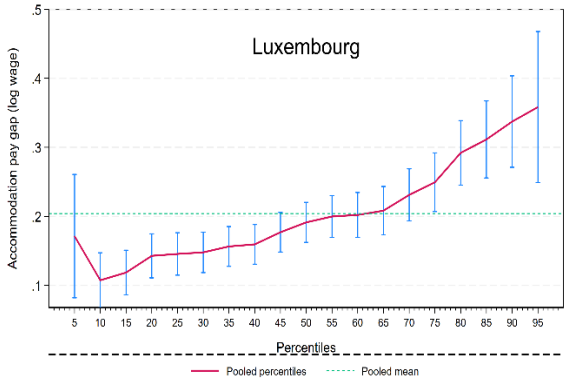
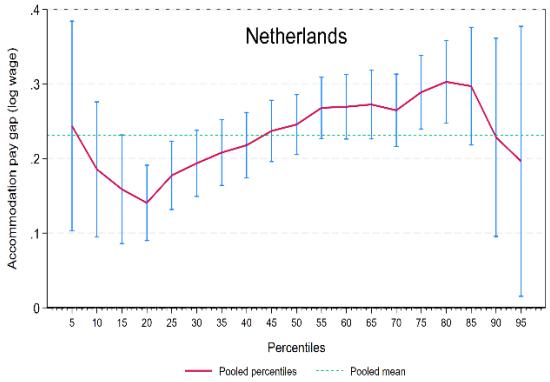
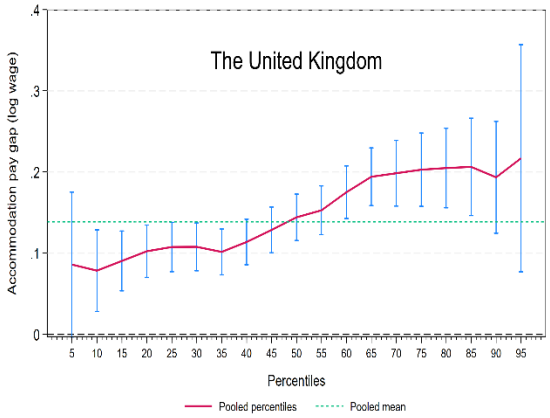


Figure A4: The unexplained pay gap based on EU-Silc data for the baseline specification









Note: The estimation is done on a pooled dataset for 2010, 2014, 2018 and 2022 based on EU-Silc cross section data.