Exploring wage gaps between earned wages and bargained pay rates: the Dutch Case

BARWAGE Report No. 14

Janna Besamusca & Andrea Medina Ojeda[1]

31 August 2024

Funding

BARWAGE is a project within the Social Dialogue Program of the European Commission. (SOCPL-2021-IND-REL - Project ID 101052319). @ 2024 Utrecht University, Central European Labour Studies Institute (CELSI), Fondazione Giuseppe di Vittorio, WageIndicator Foundation. All rights reserved.

[1] Contact: Janna Besamusca (J.W.Besamusca@uu.nl) and Andrea Medina Ojeda (j.a.medinaojeda@uu.nl), Utrecht University, Department of Interdisciplinary Social Science.

Please cite as: Besamusca, J. & Medina Ojeda, A. (2024) Exploring wage gaps between earned wages and bargained pay rates: the Dutch Case. *BARWAGE Project report 14.* Amsterdam: WageIndicator Foundation. DOI: 10.5281/zenodo.13378420

Abstract

This exploratory study investigates the relationship between earned wages and bargained wages across various Dutch sectors, focusing on the gaps between earned wages and minimum and maximum bargained wages per occupation. The research examines sociodemographic factors associated with these gaps in selected sectors, revealing significant patterns and influential variables.

The study finds a consistent gender gap across sectors, with male workers generally benefiting from larger gaps, particularly at higher education levels. Education levels generally correlate positively with the wage gap, although variations exist among sectors. Age plays a significant role, with the gap generally increasing with age and peaking in the 50s. Firm size impacts the wage gap differently across sectors, with smaller firms typically associated with smaller gaps. Firm location influences the gap, with West and South regions of the Netherlands associated with higher earned-minimum bargained wage gaps, particularly in manufacturing.

The study employed two novel experimental steps: calculating minimum and maximum bargained wage references per occupation per sector and determining gaps between earned wages and these references. Data limitations included restricted pay scale information in some collective bargaining agreements and the use of 2-digit ISCO08 occupation codes in the microdata, leading to more aggregated wage reference ranges.

This research advances the empirical exploration of earned-bargained wage gaps and provides a foundation for future studies as more detailed data becomes available. The findings offer valuable insights into the complex interplay of factors influencing wage disparities across different sectors and demographic groups.

Keywords: wage gaps, collective bargaining, pay scales, gender, occupation, Netherlands

Acknowledgments

This paper reflects the views of the authors only; the European Commission or any other funding agency or consortium partner cannot be held responsible for any use that may be made of the information contained therein.

BARWAGE

BARWAGE investigates the potential of collective bargaining as a tool for ensuring adequate minimum wages in the European Union. It explores the size of four wage-setting arenas across EU countries and industries: the national or peak level, sector-level collective bargaining, firm-level collective bargaining, and individual (non-collective) negotiations. BARWAGE uses microdata to identify what share of the workers are earning under 110% of the statutory minimum wage are covered by sectoral or enterprise collective bargaining. Using coded data of 900 CBAs from 9 EU countries, the presence and nature of pay scales in the sectoral and firm-level collective bargaining agreements (CBAs) are analysed. To deepen the insight into the impact of collective wage bargaining, national level data will be used to detail the wage arenas in 2 EU countries (Netherlands and Italy). The project lasts 2 years (2022-2024) and includes 6 work packages.

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Introduction

Collective bargaining on wages is often considered one of the key pillars of wage fixing in the European Union and an integral part of its social model (Eurofound, 2015; Keune, 2016; OECD, 2018). As an institution, collective wage bargaining is situated in between the legislative level (e.g., statutory minimum wages) and individual wage negotiations (Müller et al., 2019; Streeck, 2011). In the past few years, it has become a policy instrument European politicians and policy makers rely on to realise adequate wages for workers (European Parliament & Council of the European Union, 2022; Schulten & Müller, 2021; von der Leyen, 2019).

In its research into wage floors in collective agreements, Eurofound (2024) concluded the vast majority of collective agreements in the EU fix at least one pay rate; however, they also identified substantial shares of so-called 'numberless' collective agreements, i.e., collective agreements that did not include provisions on pay. Analysing over 1200 collective agreements in 10 EU member states Medina Ojeda and Besamusca (Medina Ojeda & Besamusca, 2024) found that 98% of the collective agreements contained some kind of provisions on pay, and three quarters of the agreements included pay scale tables.

Despite its potential for regulating wages and wage floors, collective wage bargaining has also been recognised to leave substantial discretionary space for employers to determine actual pay (Baccaro & Howell, 2017). The extent to which employers make use of this discretionary space, remains largely unknown. Interviews with bargaining partners in nine EU member states, conducted in the context of the BARWAGE project (Kahancová & Besamusca, 2024), confirm that bargaining partners know earned wages to vary from the bargained pay rates, in most cases varying only upwardly from bargained rates. However, it is unclear to what extent collectively bargained pay rates effectively correspond to real, earned wages in the firms applying these collective agreements.

This research aims to measure the gap between individual employees' earned wages and the minimum and maximum pay rates they are entitled to according to collective agreements in their sector of employment The study is conducted for the BARWAGE project (2022-2024; SOCPL-2021-IND-REL - Project ID 101052319), which investigates importance of collective bargaining for wage setting in the European Union. Given the lack of an established methodology for comparing bargained pay rates to earned wages, the study's primary focus is exploratory. It relies on quantitative methods to pilot a methodology for estimating an earned-bargained wage gap and investigating the extent to which this gap differs across sectors, firm characteristics, and employee socio-demographics.

The study is part of three parallel pilot studies into the comparison of bargained to earned wages. In a comparison of seven EU member states, Besamusca and Medina Ojeda (2024) employ two different strategies to match aggregate data on earned wages to the scope of collectively bargained pay rates. Exploiting the high quality of the Italian statistical data, Irene Brunetti (2024) maps earned wages in Italy against collectively agreed pay scale tables. And in this study, we use the case of the Netherlands to attempt to match specific collectively bargained pay rates to individual employees using the 2018 European Structure of Earnings Survey (Eurostat, 2021) and the WageIndicator CBA Database (WageIndicator Foundation, 2024). We use the Netherlands as a case for this study because, for several reasons, it is a county with optimal conditions for matching the two data sources. First, the Netherlands is a country with a relatively high collective bargaining coverage rate that predominantly

bargains at the sector level, with additional enterprise bargaining being relatively rate (OECD & AIAS, 2021). Secondly, Dutch collective agreements tend to include detailed pay systems including job classifications and stepped pay grades, which are required for assigning bargained pay rates to microdata observations on earned wages (Besamusca, 2021; Medina Ojeda & Besamusca, 2024). Finally, it is a country where employers have traditionally been expected to closely follow bargained pay rates, but where a shift towards larger (upward) deviations from collective provisions has been observed over the last decades (Besamusca, 2024; Boumans, 2022; Ibsen & Keune, 2018).

In the following sections of this report, which constitutes deliverable 5.2 of the BARWAGE project, we firstly explain our methodology for matching collectively bargained pay rates to earned wages on the individual level. We then present the results of descriptive and multivariate analyses into the size of the earned-bargained wage gap across four sectors and a range of firm level characteristics and employee socio-demographics. In the concluding section of the report, we discuss the key findings of the study and reflect on the quality and feasibility of the methodology piloted in this study.

Method: matching micro wage data and bargained pay rates

Selection of micro data and CBA data

This research aims to measure the gap between individual employees' wages and the minimum and maximum pay rates they are entitled to according to collective agreements in their sector of employment. To do so, we compare microdata on employees' earned wages, derived from the 2018 European Structure of Earnings Survey (ESES2018), published by Eurostat (2021), with bargained pay rates in the corresponding jobs and sectors, obtained from the WageIndicator CBA database (WageIndicator Foundation, 2024). Due to reasons outlined in the previous section, we test the feasibility of this comparison using the case of the Netherlands. Therefore, both the ESES2018 and the WageIndicator CBA Database data were reduced to include the Dutch[2] samples only.

We further reduced the WageIndicator CBA Database to sector level collective agreements because individual firms cannot be identified in the ESES 2018 due anonymization procedures, which prevent the matching of firm level collective agreements to microdata. Furthermore, for the purpose of comparing to wages in the 2018 ESES data, only those sector level collective agreements that were valid in 2018 and contained provisions on pay, were included in the sample. Subsequently, the ESES2018 data were reduced to include only observations from the sectors for which collective agreements were available. This methodology is described in more detail in report 15 of the BARWAGE project (Besamusca & Medina Ojeda, 2024).

The CBA data was monthly adjusted when required, for example if the original data on payment is provided per hour, week, 4 weeks, or per year. The CBA data is also adjusted by purchasing power

[2] Specifically, the final size of the ESES2018 Dutch sample is 16.048 observations (covering the 4 sectors, and containing only those occupations found in the CBAs). The final size of the Dutch CBA sub sample is 14 observations that provided material to code 16, 17, 20 and 18 new sets of calculations for the respective selected sectors.

parity (PPP). The ESES2018 data for the case of the Netherlands is already adjusted by this concept. The ESES2018 data selected for this research was filtered to observations showing full-time working to match monthly wages. Finally it is important to note that we could not control by tenure or years of experience on the job, because the ESES2018 does not offer this information.

These data restrictions resulted in a sample of 26 sector level collective agreements and an ESES sample of 24.478 workers, employed in 11.610 firms. This initial sample was taken as the starting point for the construction of a set a 'bargained reference wages', which measure the minimum and maximum payable amount to workers in a given occupation in a given sector. The methodology for the construction of these bargained reference wages and their matching to ESES data, which led to the further reduction of the sample to 14 collective agreements that could be matched, is described in the next section.

Matching bargained and earn wages based on sectors and occupations (NACE & ISCO)

In order to construct bargained reference wage reference, we coded the job titles found in collective agreements, linked them to pay grades from the respective collective agreement, and extracted minimum and maximum payable rates per job title. The minimum and maximum bargained reference wages were then attributed to observations from the ESES with matching sector-occupation dyads. Each of these steps is described in more detail in the remainder of this section.

The construction of bargained reference wages

In order to construct bargained reference wages, we evaluated the 26 collective agreements from the initial sample for the inclusion of job classifications with sufficient information for occupation coding, as well as sufficient data to determine the pay grade(s) into which each job is classified. Fourteen of the 26 Dutch collective agreements initially considered, met these criteria. The data availability allowed to explore four Dutch sectors: Manufacturing, Wholesale and Retail Trade, Accommodation and Food Services, and Human Health and Social Work Activities.

The first step of the construction of bargained reference wages, being the coding of jobs into occupations, starts with the extraction of the job function matrices/grid from each collective agreement. Job functions extracted from a collective agreements[3] were coded based on four digit ISCO08 classifications (Tijdens & Kaandorp, 2019) following the ILO methodology[4] for coding, which takes into account skill levels, job tasks, responsibility, and supervision of other workers ILO 2012). This search is driven by matching occupation title and or at least one task description. Occupation coding of job functions, however, does involve a certain level of interpretation, as job titles and job descriptions in collective agreements rarely perfectly match ISCO groupings (Tijdens & Kaandorp, 2019). Common problems encountered at this stage included the absence of such job descriptions or

[3] Detailed lists of matched occupations per sector and the full reference ISCO-08 list are provided in the appendix.

[4] ISCO-08 is the current version of the International Standard Classification of Occupations.

job titles from the collective agreement text[5], or the classification of employees into pay grade being based other criteria than jobs (e.g., when collective agreement describes a job as 'a worker with some considerable skill level and multiple years of experience'). These type of problems account for 12 out of the 26 CBAs originally selected.

Secondly, for those collective agreements where jobs could be coded into ISCO occupations, , the job function were matched to their corresponding pay grades in the pay scale tables to obtain the pay range for each occupation identified in the collective agreement. The beginning and ending of the applicable pay range were coded, yielding a minimum and maximum pay rate for each occupation in the collective agreement. It is possible, and even fairly common, that the pay range associated with an occupation spanned multiple pay grades (e.g., a waiter might be classified into pay grade 2 or 3 of the hospitality collective agreement and a barkeeper into pay grades 3 through 5) (CNV Vakmensen et al., n.d.). As this reflects the collective wage bargaining practice and is purposefully included in collective agreements, we do not see this as problematic but rather as a reflection of employer discretion in collective wage bargaining (Besamusca, 2024). In order to avoid unnecessary complications in this pilot study, and considering that the ESES data only includes respondents' ages in ten-year brackets, only adult pay rates were considered and youth pay grades were ignored.

Thirdly, a bargained reference wage, including minimum and maximum amounts, was then constructed per sector-occupation dyad. In cases where an occupation was only included in one collective agreement in a given sector, these minimum and maximum bargained reference wages were coded straightforwardly, as the start and end of the pay range identified in the collective agreement. However, in some cases, an occupation was identified multiple times within the same sector. This was usually due to the inclusion of multiple collective agreements in the same NACE 2 digit sector (Manufacturing, Wholesale and Retail Trade, Accommodation and Food Services, and Human Health and Social Work Activities) – a common occurrence due to collective bargaining often covering more detailed sub-sectors (Besamusca et al., 2022; Tijdens et al., 2022).

In cases where an occupation in a sector was matched to multiple pay ranges, the pay ranges for the occupation were compared to build one[6] pay range for the occupation-sector dyad that could be matched to the ESES microdata. After completing this step, we construct 71 minimum and maximum bargained wage references, covering 71 occupation-sector dyads across the 14 collective agreements in the four sectors.

Matching bargained reference wages to microdata on earned wages

Following the construction of the minimum and maximum bargained reference wages per occupation-sector dyad, we proceeded to match these to observations in the ESES microdata. Using the Dutch subsample of the ESES2018 for the selected sectors, as described in the section on data selection, we

[5] Job descriptions were considered missing if they could not be identified in the main text of the collective agreements, in any of the included appendices, nor in any other public document or online tool referenced in the collective agreement.

[6] Specifically, if an occupation was matched to more than one pay range within a sector, we built the unique occupation-sector pay range by selecting the lowest and highest amount found in the pay ranges matched.

for each sector, we compared the list of occupations from the collective agreements to the occupations observed in the ESES 2018.

Occupations that were included in both lists, were matched and a minimum and maximum bargained reference wages were assigned to all ESES observations employed in the relevant sector and occupation. Since occupations in the ESES are coded at the two-digit ISCO level (as opposed to the four-digit coding of the occupations in the collective agreements), this was the most disaggregated occupational grouping at which the matching could be performed. In some cases, this resulted in substantial loss of nuance compared to the original bargained references wages, as multiple four-digit occupational groups were clustered under the same two-digit occupational group. In these cases, the pay range of the bargained reference wages had to be broadened. The lowest minimum and highest maximum bargained reference wages observed across the cluster of four-digit ISCO groupings were assigned to all ESES observations in the merged two-digit occupational group. On average each CBA loses half of the occupations identification when clustering under two-digit ISCO instead of using four-digits.

Finally, robustness checks of the matching were performed using the non-matched occupation-sector dyads. All occupation-sector dyads that were observed in the ESES microdata but not in the collective agreements were collected and manually checked. In most cases, non-matched occupation-sector dyads observed only in the ESES data were justly excluded, as they concerned occupational groups from different sub-sectors than the coded collective agreements (for example, ISCO08 72 covers " Metal, Machinery and Related Trades Workers" was NOT found in any of the CBAs included in this study). In some cases, this led to the re-classification of the occupational groups in the collective agreements[7]. The observations concerned were recoded and corrected bargained reference wages were constructed. There were no occupation-sector dyads that were identified in the collective agreements but not in the ESES data.

Table 1 Matched sample of occupation-sector dyads in collective agreements and microdata on earned wages

Sector	CBAs	Occ. Found	n ESES18*	% of ESES118**
Manufacturing	2	16	7066	62
Wholesale & Retail Trade	7	17	7249	66
Accommodation & food Ss.	2	20	1270	93
Human Health & Social Work Acts.	3	18	463	65
Total	14			

Source: Own elaboration

* Data after occupation selection

** % of the sector before occupation selection

[7] An example of how an occupation can be easily misunderstood is the Assistant Manager position. This occupation is not found within the ISCO08 list by occupation title. But the one that can be found by occupation title matching is Manager Assistant. These type of considerations easily lead to confusion and possible mistakes.

Table 1 summarizes the matched CBA Database and ESES 2018 samples obtained for each sector. As notes above, 14 collective agreements were coded from four sectors: the manufacturing sector (2) , wholesale and retail trade, (7). accommodation and food services (2) and human health and social work activities (3). In each sector, between 16 and 20 different two-digit occupational groupings were identified. The table shows that after matching occupational groupings found in the collective agreements to those contained in the microdata (SES2018), the matched samples contained at least 62% of the total ESES sample (in manufacturing); up to 93% in the case of the accommodation and food services sector.

Analytical strategy

In order measure the gap between the bargained reference wages and earned wages, we subtracted the bargained reference wages from the earned wages observed in the ESES. This resulted in the construction of two dependent variables: the 'earned-minimum bargained wage gap' (minimum EBWG), which measures the distance between the bargained wage floor for the occupation-sector dyad and the actual, earned wage observed in the ESES. Secondly the 'earned-maximum bargained wage gap' (maximum EBWG), which measures the distance between the highest bargained pay rate for the occupation-sector dyad and the actual, earned wage observed in the ESES. In both cases, a positive gap implies that the earned wage is higher than the bargained reference wage, indicating an employee earns a premium. A negative gap means the opposite: that the earned wage is lower than the level of the bargained refences wage.

We analyse the size of the minimum and maximum EBWGs per sector. In order to understand which groups are earning below, close to or above the bargained references wages, compare the EBWG according to relevant firm and employee characteristics. On the firm level, we distinguish between different firm sizes (under 10, 10-49 and 50 or more employees). Secondly, we distinguish according to firm location (north, east, west and south regions of the Netherlands). The majority of, independently of their size, are located in the South and West regions. Finally, we measure whether firms report applying of any collective agreement (none, firm level, sector level, other). Although only full-time earners are included in the ESES sample, we do control for standard weekly work hours in the firm, because firms applying different standard work weeks than those assumed in collective agreements might explain part of the gap between earned and bargained wages.

Furthermore, we compare EBWG across different socio-demographic groups of employees. These socio-demographic characteristics include variables commonly include in wage equations. These are age in ten-year brackets (from 20-29 years until over 60), binary assigned sex, and highest completed education (less than primary, up to secondary, tertiary, post-graduate). It is important to note that the gender distribution is heavily biased towards males, due to the selection on full-time employees. Table 2 summarizes the variables used to explore the relation between the earned-bargained wage gaps,

firm characteristics, socio-demographics and control variables[8]. To introduce the lector into the microdata used, the following tables/or reference the appendix summarize the sociodemographic distribution and the characteristics of the firms (location and size) per sector obtained from the SES2018, before occupations were matched.

Table 2 Variables summary

Variables		
Dependent	Earned-Minimum Bargained Wage Gap	
	Earned-Maximum Bargained Wage Gap	
Independent	Age Group	categorical
	Sex	
	Education Level	
	Firm Size	
	Location of the Firm	
Control	Collective Pay Agreement	
	Monthly Effective Working Hours	continuous

Source: Own elaboration

In the next section, we describe the size of the minimum and maximum EBWGs by the abovementioned firm and employee characteristics. To further explore these associations, we complement the analysis with econometric work. In order to account for uneven distributions of men and women across education and age groups, the models include interaction terms for sea and education levels.

The ESES is an enterprise survey, in which firms or local units of firms report wage data for all their employees. This implies that that ESES data includes observations of earned wages from employees in the same firm, who are thus subject to the same pay system. We account for this nesting of employees in firms by employing two-level hierarchical linear regressions models with random intercepts (De Leeuw & Meijer, 2008; Hox & van de Schoot, 2018; Stegmueller, 2013). Using these models, this study investigates the associations between the predictors (independent and control variables) and the estimated earned-bargained wage gaps to research whether some groups of workers have significantly smaller or larger EBWGs. Due to differences in the coverage of the four sectors, we run the regression models separately for each sector.

The earned-bargained wage gap

In this section, descriptive statistics associated with both gaps (**Earned-Min/Max. Bargained Wage Gaps**) are presented, showing a characterization involving sociodemographics and firm characteristics, such as size and location. The bar graphs in the appendix (figures 5, 6, 8, 9, 11, 12, 14, and 15) show

[8] Note that monthly effective working hours is a mean centred variable using variable b32 from the survey and its general mean (per sector).

the size of the gaps between the bargained and earned wages for these groups of workers. Positive (upward pointing) bars indicate that this group, on average, earns wages above the bargained reference wage. Negative (downward pointing) bars indicate that this group, on average, earns wages below the bargained reference wage. The longer the bars, the larger the gap.

As shown in Figures 1 left pane (as well as in figures 5, 8, 11 and 14 of the appendix), most groups of workers, on average, earn wages above the minimum bargained reference wages, as indicated by the upward pointing blue bars. This is to be expected, as these analyses compare earned wages to the lowest bargained wage floor. Downward deviations can exist because not all firms apply collective agreements, some employees may be allocated to youth- or other sub-minimum pay grades, and it is possible that some firms apply a collective agreement with lower pay grades than any of the coded agreements. On average, however, at Dutch levels of collective bargaining coverage, earned wages should be expected to be equal to or higher than the minimum bargained reference wage. This is both because these minimum bargained references wages are negotiated in order to regulate minimum payable rates in the sector, and because a substantial share of employees would have been granted periodic wage increases along the pay steps of their grade for each year that they held their current job.

Figure 1 EBWG Summary, selected sectors

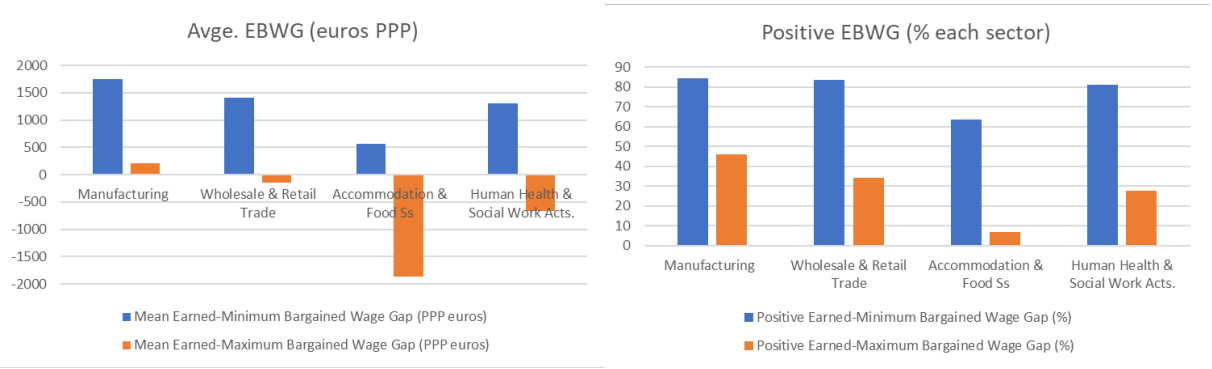

Figure 1 (left pane) confirms that the average EBWG in all four sectors is positive, indicating the average employee in all sectors in the study earns wages above the minimum bargained reference wage for their occupational group. Figure 1 (right pane) shows the positive percentages per sector (considering sectors size after occupations matching) for each gap. Manufacturing and wholesale and retail trade industries present 84% of positive earned-minimum bargained wage gaps. Followed by human health and social work activities with 81%. The lowest positive percentage is within the accommodation and food services industry (63%). Crucial to the interpretation of these figures is to understand that the display the *gap* and not the *wage level* in the different sector. Therefore, the larger gap in the manufacturing sector compared to accommodation and food services sector does *not* mean that wages are higher in the former. Rather, it means that, on average, employees in the manufacturing sector are paid wages that exceed their collectively bargained pay rates by a larger degree (i.e., by €1.754) than employees in the accommodation and food services sector (who earn €567 above their bargained minimum pay rate, on average).

Figures 1 (left pane) displaying the maximum EBWG, shows both positive gaps (premiums) and negative gaps (penalties). In principle, the maximum bargained reference wages constitute the pay rate for employees in the occupation-sector dyad who have been classified in the highest applicable pay grade and reached the highest period step within that pay grade, according to the highest paying collective agreement in which that particular occupation-sector dyad occurs. As such, it would seem reasonable to assume that substantial shares of employees, if not all employees, earn wages at or below this threshold. However, as report 9 of the BARWAGE project demonstrates, Dutch collective agreements often include provisions that make it possible for employees to earn wages above the maximum negotiated rates (Besamusca, 2024).

Indeed, the right pane of figure 1 shows that the average maximum EBWG is only positive in one of the four sectors, in manufacturing (€209). In the wholesale and retail trade industry it is slightly negative, -€150. In human health and social work activities is -€670. While in accommodation and food services reaches the largest penalty (-€1863). This sector relies intensively on younger (20-29 years old). Many times is the case that the Dutch pay scale tables acknowledge adult payment from 20, 21 and up to from 22 years old. Therefore, the younger workers of this sector are more likely contribute to such a penalty.

The average EBWG across firms and employee socio-demographics

Across all sectors, a consistent age-related pattern emerged in the relationship between earned wages and bargained benchmarks. Workers under 30, particularly those in the 20-29 age group, consistently experience the smallest earned-minimum bargained wage gap (minimum EBWG) and earned-maximum bargained wage gap (minimum EMWG). Conversely, older workers generally exhibit the highest gaps, with the 50-59 age group showing the most significant differences in Manufacturing, Wholesale and Retail Trade, and Accommodation and Food Services sectors (See Appendix tables 5, 6, 8, 9, 11 and 12 top right panes). This trend is especially pronounced in the Manufacturing sector where the minimum EBWG varies from around €200 for the youngest workers to above €2.200 for workers between 50 and 59 years old. An interesting exception is observed in the Human Health and Social Work Activities sector (see appendix tables 14 and 15, right pane), where the largest gaps are associated with the middle-aged group (40-49 years old), and the minimum EBWG is on average marginally negative for workers in their 20s. These findings suggest a general trend where younger workers' earned wages align more closely with minimum bargained wages, while older workers tend to earn substantially above these negotiated rates. The unique pattern in the Health and Social Work sector, with middle-aged workers showing the highest gaps, presents an intriguing anomaly that warrants further investigation covering work experience and productivity. This consistent age-related pattern across sectors provides insights into the dynamics of wage structures and the varying impacts of collective bargaining agreements on different age groups in the workforce.

Another consistent pattern emerges across all examined sectors regarding gender and wage gaps. Women generally experience (on average) smaller earned-minimum bargained wage gaps (minimum EBWG) and earned-maximum bargained wage gaps (maximum EBWG) compared to their male counterparts (Se appendix figures 5, 6, 8, 9, 11, 12, 14, and 15, top right panes). In the manufacturing, wholesale, and retail trade, as well as human health and social work activities industries, women show the smallest premiums. Conversely, males, exhibit the highest ones. In the Accommodation and Food

Services industry, the pattern persists. However, this sector is notable for having the smallest gender gap in the maximum EBWG (see Figure 2 right pane and Appendix Figure 15, top right pane, though negative, more equitable), suggesting a more equitable wage structure at these pay levels. Figure 2 (left pane) shows the gender composition for the selected sectors and displays smaller composition gaps for the accommodation and food services and human health and social work activities sectors. The right pane of Figure 2, presents the average[9] minimum EBWG per gender for the selected sectors. The consistent findings across sectors suggest that gender plays a significant role in the relationship between earned wages and bargained benchmarks. Women tend to have earned wages more closely aligned with bargained rates, while men tend to earn significantly above bargained rates. This pattern raises important questions about gender equality in wage structures and the effectiveness of collective bargaining in addressing gender-based wage disparities.

Figure 2 Gender Gap, selected sectors

A regular array appears also across the selected sectors regarding the relationship between education levels and EBWG. Generally, employees with no or low education levels present smaller premiums compared to their more educated colleagues. Regarding the minimum EBWG, on average workers with no or low education levels earn smaller premiums than their more educated colleagues. This suggests an on-average gradual increase in the minimum EBWG associated with completing higher education levels (see scale patterns in the appendix figures 5, 8, and 14, middle left pane). An exception to this pattern can be observed in accommodation and food services. The Appendix Figure 11 (middle left pane) shows how in this sector a sharper percentual increase (170%) occurs between the averages of the two highest education levels. Concerning the maximum EBWG, the manufacturing, and wholesale and retail trade sectors present a mixed configuration (positive and negative average values), where the negative values (earning wages are lower than the maximum negotiated) are associated on average with the two lowest education levels. Positive averages are associated with the two highest levels of education (see appendix figures 6 and 9 middle left panes). In accommodation and food services, and human health and social work activities the maximum EBWG are on average negative (see appendix figures 12 and 15 middle left panes). The exception to the scale pattern occurs

[9] Though the averages for the minimum EBWG are consistently higher for males (blue bars) than females (orange bars) (Figure 2, right pane), the latter show higher variation around those averages.

in the accommodation and food services sector, where the largest penalty (on average) corresponds to the secondary education level instead to the lowest as in the rest of the sectors (see appendix figure 12, middle left pane). This might suggest a potential "insensitive spot" at the lower education levels in this sector. These consistent findings across sectors suggest that education level significantly influences the relationship between earned wages and bargained benchmarks. Less educated workers tend to have earned wages more closely aligned with bargained rates, while those with higher education, especially in combination with other factors like gender (male) and larger firm size, tend to earn significantly above bargained rates. This pattern raises important questions about the role of education in wage structures and how collective bargaining agreements interact with educational attainment in determining actual wages.

The main highlights are the gender gap, education and firm size. Excepting Accommodation and Food Services, the other three selected sectors display a consistent gender gap regarding the differences between earned wages and the ceiling and floor negotiated. Excepting wholesale and retail trade industry, the rest of the selected sectors indicate small firms are associated with smaller EBWG. In the wholesale and retail trade industry, larger firms are associated with smaller EBWG.

Manufacturing and wholesale and retail trade display positive, negative, and turning points when looking at the maximum EBWG. The turning point, at which such a gap becomes positive, is at 40 years old, male, higher levels of education, medium size firms located in the west and south regions. Accommodation and food services, and human health care and social work activities present mainly penalties associated with the maximum EBWG. This means that in these industries earned wages on average are lower than the maximum negotiated ones.

The statistics presented indicate earned-bargained wage gaps mimic broader economic inequalities (socio-demographics). More details about the stylized statistics just presented can be found in the respective appendix figures 4 to 15.

The impact of firm characteristics and socio-demographics on the EBWG

The present section shows the results obtained from the econometric analyses. This study applies hierarchical linear models with firm-level random intercepts to explore the association between the abovementioned firm characteristics and employee socio-demographics, and the earned-bargained wage gaps in the four Dutch sectors. The following tables (tables 3 and 4) summarize the results for each of the earned-bargained wage gaps in the selected sectors. In these tables, the value of the predictors is accompanied by their corresponding significance level.

Table 3 shows the associations between the firm characteristics and employee socio-demographics and the minimum EBWG. Since the groups that, on average, earned the smallest premiums or largest penalty (i.e., their earned wages were closest to the bargained wages, or furthest below it) were taken as the reference category, the intercept is strongly negative. This implies that female employees under the age of 29, with no more than primary education, working in small firms in the Northern region of the Netherlands that applies only the sector-level collective agreement, on average earned between €970 (accommodation and food) and €2.340 (manufacturing) less than expected based on the lowest bargained pay rate in their occupation and sector. Conversely, these models estimate that a tertiary

educated male employee of over 60 years of age in a firm with more than 50 employees in the West region covered under a sector-level collective agreement, earns wages that are between €1.632 (accommodation and food services) and €3.026 (manufacturing) higher than the minimum bargained reference wage. The age group 60+ is not significant in the accommodation and food services industry. In human health and social work activities only groups above 40 and postgraduate level of education are significant.

Confirming the descriptive results, the regression models (table 3) show that older workers are more likely to earn wages above the minimum bargained reference wage. Compared to employees aged 20-29 with the same characteristics, all other age groups have smaller negative wage gaps, or larger positive wage gaps. The increasing size of the coefficients by age group, indicate that the difference is larger for older age groups, which is to be expected given their larger average work experience.

Similarly, employees with higher levels of education tend to experience more positive EBWGs, i.e., their earned wages exceed the minimum bargained reference wage by larger amounts in all sectors, except human health and social work. The strongest association is found in the manufacturing sector, where the coefficient of 3106 (sig. p<.000) indicates that the wages of workers with post-graduate degrees exceed the minimum bargained reference wage by €3106, compared to workers with at most primary education. Given the effect size of the other coefficients in the model, this means that all workers with post-graduate degrees in the manufacturing sector are estimated to earn wages above the bargained wages, regardless of other characteristics.

The gender gap is also confirmed, implying male employees on average earn wages farther above the minimum bargained reference wage than female employees with similar characteristics do. In both manufacturing and wholesale and retail, male workers receive a premium of over €500. This association is not significant in accommodation and food services, and human health and social work activities. Moreover, when looking at the disaggregation of gender by education, an even larger gender gap can be at the highest levels of education (tertiary and higher) favouring male workers.

Significant differences in the size of the minimum EBWG are found in regard to firm characteristics too. As in the descriptive statistics section, West and South firm locations are associated with more positive earned-minimum bargained wage gaps in manufacturing and wholesale and retail. Once again, the western firm location shows the most positive earned-minimum bargained wage gap in the manufacturing sector. West and South locations are significant for the manufacturing sector, East and West for Wholesale and Retail Trade, and only the East region for Accommodation and Food Services.

Finally, concerning firm size, the regression results for this variable confirmed what was displayed in the descriptive statistics section. Larger firms have the biggest and most significant impact on this gap in the manufacturing sector, paying wages that are on average €260 farther above the minimum bargained reference wage than small firms pay to employees with the same characteristics. In wholesale and retail trade sector paid wages father above the bargained reference. The effect of the largest companies is significant in manufacturing, and the accommodation and food services. Medium-sized firms are significant for the wholesale and retail trade sector.

Table 3 Random Effects Results summary Earned-Minimum Bargained Wage Gap

Earned-Minimum Bargained Wage Gap	Manufacturing		Wholesale & Retail Trade		Accommodation & Food Ss		Human Health & Social Work Acts.	
	Estimator	Sig.	Estimator	Sig.	Estimator	Sig.	Estimator	Sig.
Age: base 0 (20-29)	0.000		0.000		0.000	***	0.000	
1: 30-39	832.790	***	679.525	***	536.749	***	399.365	
2: 40-49	1.900.579	***	1.523.717	***	938.000	***	1.298.257	***
3: 50-59	2.203.973	***	1.730.969	***	1.065.020	***	1.546.810	***
4: 60+	2.097.056	***	1.630.773	***	848.229		1.991.776	***
Sex : base 0 (female)	0.000		0.000		0.000	**	0.000	
1 (male)	519.002	***	505.878	***	349.821		633.680	
Edu: base 0 (up to primary)	0.000		0.000		0.000	***	0.000	
1: up to secondary	789.666	***	665.056	***	445.163	***	734.184	
2: up to tertiary	1.982.748	***	1.320.702	***	732.224	***	1.145.251	
3: post-graduate	3.106.458	***	2.943.533	***	1.372.934		2.037.003	**
Male Primary Ed.	0.000		0.000		0.000		0.000	
Male Secondary Ed.	-23.918		-112.931		-151.641		-138.641	
Male Tertiary Ed.	25.885		373.785	**	8.460	***	178.067	
Male Post-graduate Ed.	540.058	**	220.636		1.162.878		-388.905	
Location : base 0 (North)	0.000		0.000		0.000		0.000	
1: East	129.575		167.498	*	194.701	*	250.336	
2: West	480.590	***	392.001	***	241.130		239.190	
3: South	307.925	***	148.762		220.759		-284.666	
Firm size : base 0 (<10 workers)	0.000		0.000		0.000		0.000	
1: 10-49 workers	9.124		153.354	***	-20.685	***	121.093	
2: 50+ workers	260.553	***	58.785		422.549		-153.137	
CPA : base 0 (industry)	0.000		0.000		0.000		0.000	
1: enterprise	641.479	***	430.572	***	-274.521	***	890.110	
2: any other	-385.577		-1.375.398					
3: no cpa	255.799	***	389.101	***	533.882	***	411.093	
Monthly Work Hrs.	16.481	***	5.670	***	7.427	***	11.667	*
Constant	-2.340.330	***	-1.467.000	***	-969.772		-1.568.057	

Finally, the regression results for the maximum earned-bargained wage gap are presented in Table 4. The negative intercepts indicate that the lowest paid groups - female employees under the age of 29, with no more than primary education, working in small firms in the Northern region of the Netherlands that applies only the sector-level collective agreement – are estimated to earn wages to fall below the maximum bargained reference wage by amounts varying between €3339 (human health and social work) and €2907 (wholesale and retail). Tertiary educated male employees of over 60 years of age in firms with over 50 employees in the West region, covered under a sector-level collective agreement, are estimated to earns wages that vary from falling €968 *below* the maximum bargained reference wage (accommodation and food services) to earning €1496 *above* the maximum bargained reference wage (manufacturing).

In general, the maximum EBWG analysis (Table 4) shows more variation across sectors and reveals some differences in significant factors compared to the minimum EBWG analysis (Table 3). The maximum EBWG results also tend to show larger gaps and more negative intercepts, indicating that even the highest-earning groups often fall below the maximum bargained wage reference.

Overall, while both models show similar trends in age and education effects, they reveal nuanced differences in gender dynamics, firm size impacts, and the magnitude of wage gaps relative to minimum and maximum bargained wages across sectors. Some variables show different significance levels between the two models, particularly in the human health and social work sector.

Table 4 Random Effects Results summary maximum Earned-Bargained Wage Gap

Earned-Maximum Bargained Wage Gap	Manufacturing		Wholesale & Retail Trade		Accommodation & Food Ss		Human Health & Social Work Acts.	
	Estimator	Sig.	Estimator	Sig.	Estimator	Sig.	Estimator	Sig.
Age: base 0 (20-29)	0.000		0.000		0.000		0.000	
1: 30-39	777.469	***	559.935	***	597.131	***	577.851	*
2: 40-49	1.746.357	***	1.359.862	***	859.884	***	1.455.900	***
3: 50-59	2.074.323	***	1.575.091	***	1.156.337	***	1.569.112	***
4: 60+	2.005.801	***	1.575.998	***	860.889	***	1.889.027	***
Sex : base 0 (female)	0.000		0.000		0.000		0.000	
1 (male)	115.901		702.044	***	217.037		231.135	
Edu: base 0 (up to primary)	0.000		0.000		0.000		0.000	
1: up to secondary	610.516	***	592.989	***	95.967		-112.480	
2: up to tertiary	1.428.247	***	1.155.429	***	382.164	*	238.326	
3: post-graduate	2.522.383	***	3.142.777	***	1.011.762	***	1.014.039	
Male Primary Ed.	0.000		0.000		0.000		0.000	
Male Secondary Ed.	62.339		-283.619	*	-88.982		659.599	
Male Tertiary Ed.	454.456	**	207.277		-98.874		707.784	
Male Post-graduate Ed.	882.360	***	-193.568		1.358.641	***	99.619	
Location : base 0 (North)	0.000		0.000		0.000		0.000	
1: East	107.830		189.415	*	222.254		604.148	
2: West	437.302	***	355.904	***	224.928		608.002	
3: South	335.632	***	141.773		238.066		-42.376	
Firm size : base 0 (<10 workers)	0.000		0.000		0.000		0.000	
1: 10-49 workers	102.807	*	304.402	***	73.981		58.770	
2: 50+ workers	422.311	***	88.290		554.420	***	-193.233	
CPA : base 0 (industry)	0.000		0.000		0.000		0.000	
1: enterprise	594.852	***	378.889	**	-243.980		897.633	
2: any other	-247.429		-1.508.025					
3: no cpa	227.467	***	352.962	***	599.578	***	582.385	*
Monthly Work Hrs.	14.556	***	10.960	***	6.665	***	10.345	
Constant	-3.366.985	***	-2.907.273	***	-3.107.557	***	-3.339.949	***

Table 4 corroborates the age group dynamics observed in the descriptive statistics across all selected sectors. Regarding the gender gap, the regression results reveal a significant and substantial premium favouring male workers exclusively in the wholesale and retail trade sector, exceeding €700. The educational level trends identified in the descriptive statistics are largely confirmed by the regression analysis, with the notable exception of human health and social work activities, where educational effects are not statistically significant. Examining the interaction between gender and education, we find that only the highest education level shows significant effects favouring male workers, particularly in manufacturing (€882) and accommodation and food services (€1.358) sectors. The impact of firm location aligns with the descriptive statistics, with the West region consistently demonstrating the

highest effect on the wage gap. However, this effect is not significant in the accommodation and food services or human health and social work activities sectors. Lastly, the influence of firm size varies across sectors, which is consistent with the patterns observed in the descriptive statistics section, underscoring the complexity of this factor's impact on the earned-bargained wage gap. Full detailed results tables per sector can be found in the appendix (tables 7 to 14).

Conclusion and discussions

This explorative research aimed to compare earned to bargained wages. For this purpose, this research calculated the gaps between earned wages and minimum and maximum bargained wages per occupation per sector. And then, it explored the sociodemographics associated with them in each of the selected sectors.

The analysis reveals significant patterns across the selected sectors, with gender gap, education, and firm size emerging as primary factors influencing the earned-bargained wage gap. A consistent gender gap is observed in most sectors, with male workers generally benefiting from larger gaps, particularly at higher education levels. The manufacturing sector shows the highest gender premium. Education levels generally correlate positively with the wage gap, although this varies by sector. In Accommodation and Food Services, on average, young females with secondary education show smaller gaps, contrary to other sectors where lower education levels are associated with smaller gaps. Firm size impacts the wage gap differently across sectors. Smaller firms are associated with smaller gaps in most sectors, except in Wholesale and Retail Trade where larger firms show smaller gaps. Age plays a significant role, with the gap typically increasing with age, peaking in the 50s, likely due to accumulated work experience. However, in Human Health and Social Work, middle-aged males show the highest gaps. Firm location also influences the gap, with West and South locations associated with higher earned-minimum bargained wage gaps, particularly in the manufacturing sector. The findings from the random effects regression confirm the trends observed in the descriptive statistics, providing a depict of the factors influencing the earned-bargained wage gap across different sectors.

As mentioned through the research, this is an exploratory study. It advanced the empirical exploration of earned-bargained wage gaps. It went through two, so far unexplored experimental steps. The first is the calculation of the minimum and maximum bargained wage references per occupation per sector, and the second is the calculation of the gaps between earned wages and the aforementioned references. As with every exploratory research, this study faced some data restrictions. This is the case for the two data sources used. On the CBA database, some pay scale tables only provide one value. This issue is probably explained by institutionalized employer discretion. Therefore, in these cases the range is restricted to the same minimum and maximum bargained value. On the microdata side, the ESES 2018 only publishes at 2-digit ISCO08. As mentioned throughout this study, 2-digit occupation codes only allow for wide or general job identification. It means that occupations that could differ under a 4-digit classification are now under the same category. This data restriction implies wider or more aggregated wage reference ranges than reality.

The data availability allowed for 62% coverage of the microdata on the manufacturing sector, 66% of the wholesale and retail trade industry, 93% of the accommodation and food services, and 65% of the human health and social work activities once occupations were matched. As the codification of CBAs

advances, bigger samples of bargained wage ranges are possible. Hence, more solid observation sets are feasible. For example, more occupations could be compared across CBAs within each sector, and the analysis could be expanded to other industries. If the same analysis uses more disaggregated microdata occupation-wise, higher sector coverages and more detailed specifications on the corresponding wage ranges are possible.

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Appendix

Table 5 Lists of Matched Occupations per sector

Occupations matched per sector			
XC	XG	XI	XR
12	12	12	12
13	13	13	13
21	14	14	14
24	22	24	22
25	31	25	23
26	33	26	24
31	41	33	25
33	42	34	26
35	43	35	32
41	44	41	33
42	52	42	35
43	61	43	41
44	75	44	42
52	83	51	51
71	91	52	53
93	93	54	83
	96	83	91
		91	
		94	
		96	

XC, Manufacturing
XG, Wholesale & Retail Trade
XI, Accommodation & Food Services
XR, Human Health & Social Work Acts.

Table 6 ISCO08 sub-major group (2-digit)

	code ISCO-08 sub-major group
Commissioned armed forces officers	1
Non-commissioned armed forces officers	2
Armed forces occupations, other ranks	3
Chief executives, senior officials and legislators	11
Administrative and commercial managers	12
Production and specialised services managers	13
Hospitality, retail and other services managers	14
Science and engineering professionals	21
Health professionals	22
Teaching professionals	23
Business and administration professionals	24
Information and communications technology professionals	25
Legal, social and cultural professionals	26
Science and engineering associate professionals	31
Health associate professionals	32
Business and administration associate professionals	33
Legal, social, cultural and related associate professionals	34
Information and communications technicians	35
General and keyboard clerks	41
Customer services clerks	42
Numerical and material recording clerks	43
Other clerical support workers	44
Personal service workers	51
Sales workers	52
Personal care workers	53
Protective services workers	54
Market-oriented skilled agricultural workers	61
Market-oriented skilled forestry, fishery and hunting workers	62
Subsistence farmers, fishers, hunters and gatherers	63
Building and related trades workers, excluding electricians	71
Metal, machinery and related trades workers	72
Handicraft and printing workers	73
Electrical and electronic trades workers	74
Food processing, wood working, garment and other craft and related trades workers	75
Stationary plant and machine operators	81
Assemblers	82
Drivers and mobile plant operators	83
Cleaners and helpers	91
Agricultural, forestry and fishery labourers	92
Labourers in mining, construction, manufacturing and transport	93
Food preparation assistants	94
Street and related sales and service workers	95
Refuse workers and other elementary workers	96

Figure 3 Worker sociodemographics & Firm size and location, selected sectors (before occupation matching)

NL_Manufacturing Sector: Worker Sociodemographics by sex

Age group category	Highest successfully completed level of education and training (ISCED-97)							
	Female (% of each Ed. Level)				Male (% of each Ed. Level)			
	G1	G2	G3	G4	G1	G2	G3	G4
20-29	11	20	24	24	5	14	12	9
30-39	12	14	26	34	10	15	21	26
40-49	24	27	25	26	22	24	25	27
50-59	34	31	22	16	41	34	32	30
60+	19	8	4	1	23	13	10	8

NL_Manufacturing Sector: Firm Size & location

Geographical location of the statistical unit (local unit) - NUTS-1	Size of the enterprise to which the local unit belongs		
	<10 (% small)	10-49 (% med.)	>50 (% large)
North	11	10	5
East	26	30	21
West	33	30	36
South	31	30	38

NL_Human Health & Social Work Acts. Sector: Worker Sociodemographics by sex

Age group category	Highest successfully completed level of education and training (ISCED-97)							
	Female (% of each Ed. Level)				Male (% of each Ed. Level)			
	G1	G2	G3	G4	G1	G2	G3	G4
	25	26	16	22	2	22	18	10
	16	18	31	19	16	21	23	30
	25	31	24	28	19	22	19	23
	25	16	22	21	44	29	28	20
	10	9	7	10	19	6	12	16

NL_Human Health & Social Work Acts. Sector: Firm Size & location

Geographical location of the statistical unit (local unit) - NUTS-1	Size of the enterprise to which the local unit belongs		
	<10 (% small)	10-49 (% med.)	>50 (% large)
	8	4	2
	20	17	0
	51	64	69
	21	14	28

NL_Accommodation & Food Services Sector: Worker Sociodemographics by sex

Age group category	Highest successfully completed level of education and training (ISCED-97)							
	Female (% of each Ed. Level)				Male (% of each Ed. Level)			
	G1	G2	G3	G4	G1	G2	G3	G4
	54	50	31	47	14	36	28	17
	18	27	31	21	19	26	40	33
	12	14	15	14	29	18	14	33
	13	10	23	15	27	15	16	17
	3	0	0	3	11	5	3	0

NL_Accommodation & Food Services Sector: Firm Size & location

Geographical location of the statistical unit (local unit) - NUTS-1	Size of the enterprise to which the local unit belongs		
	<10 (% small)	10-49 (% med.)	>50 (% large)
	7	5	1
	15	14	5
	52	63	80
	26	18	14

NL_Human Health & Social Work Acts. Sector: Worker Sociodemographics by sex

Age group category	Highest successfully completed level of education and training (ISCED-97)							
	Female (% of each Ed. Level)				Male (% of each Ed. Level)			
	G1	G2	G3	G4	G1	G2	G3	G4
	25	26	16	22	2	22	18	10
	16	18	31	19	16	21	23	30
	25	31	24	28	19	22	19	23
	25	16	22	21	44	29	28	20
	10	9	7	10	19	6	12	16

NL_Human Health & Social Work Acts. Sector: Firm Size & location

Geographical location of the statistical unit (local unit) - NUTS-1	Size of the enterprise to which the local unit belongs		
	<10 (% small)	10-49 (% med.)	>50 (% large)
	8	4	2
	20	17	0
	51	64	69
	21	14	28

Figure 4 Manufacturing, EBWG Gaps distributions

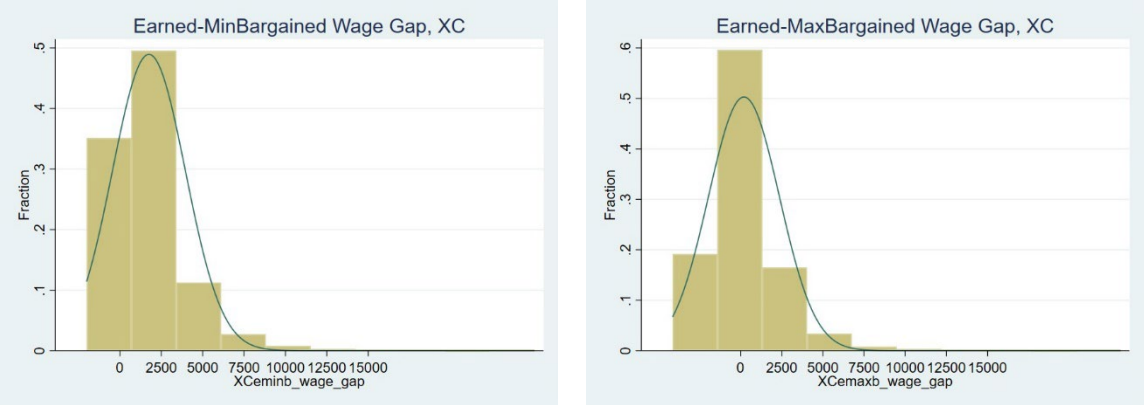

Figure 5 Manufacturing, Descriptive Statistics Minimum EBWG

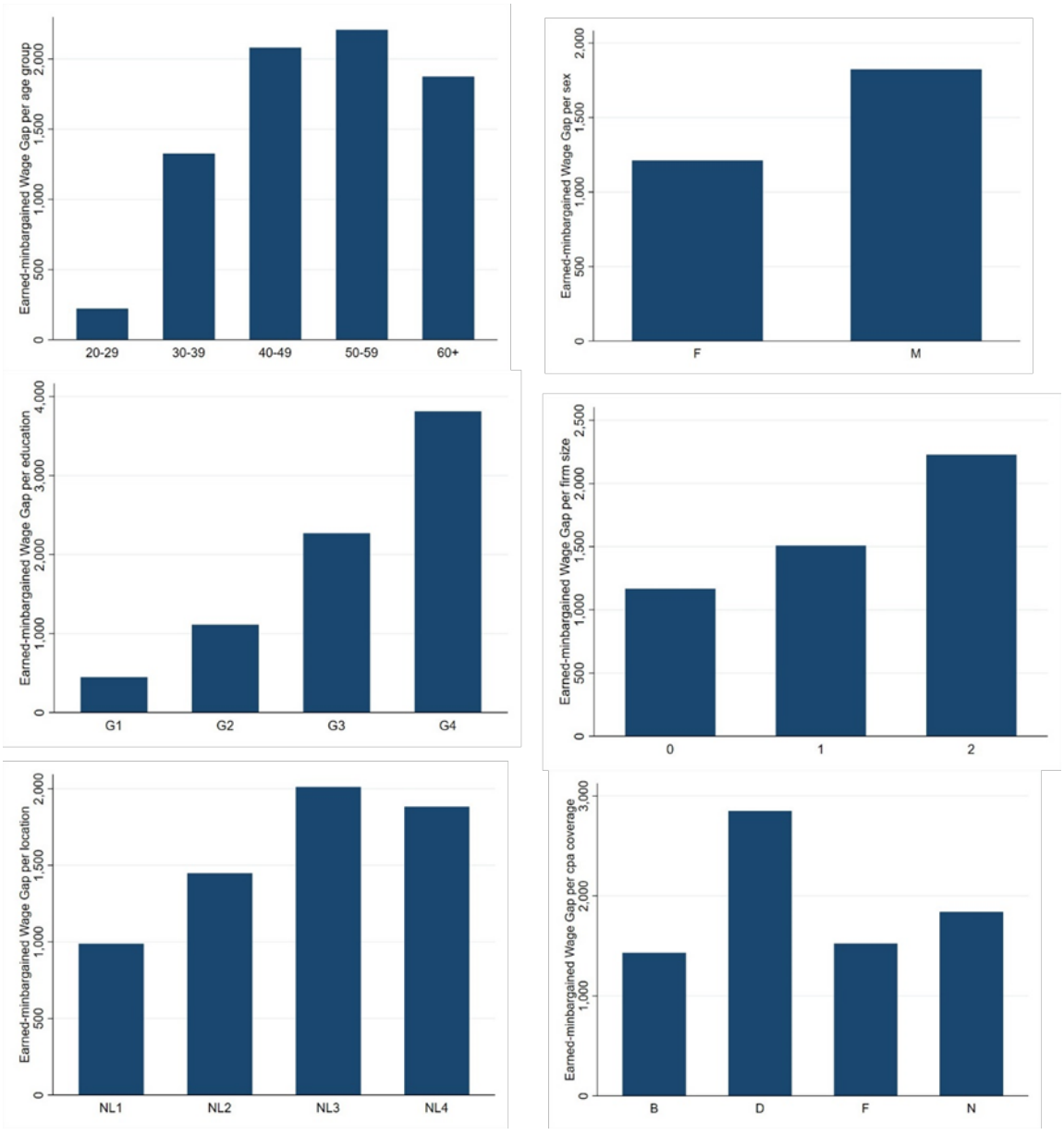

Figure 6 Manufacturing, Descriptive Statistics Maximum EBWG

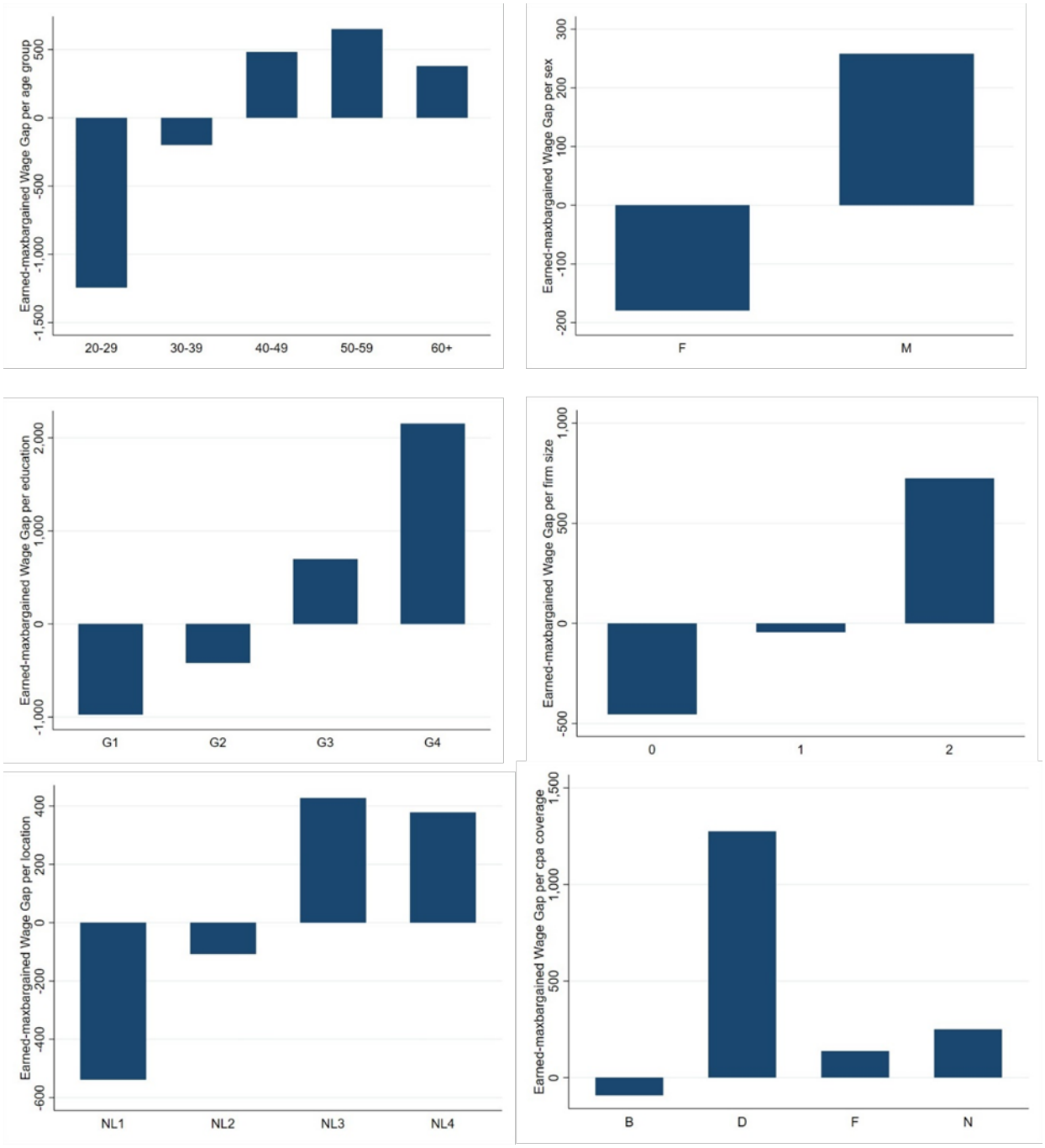

Figure 7 Wholesale & Retail Trade, EBWG distributions

Figure 8 Wholesale & Retail Trade, Descriptive Statistics Minimum EBWG

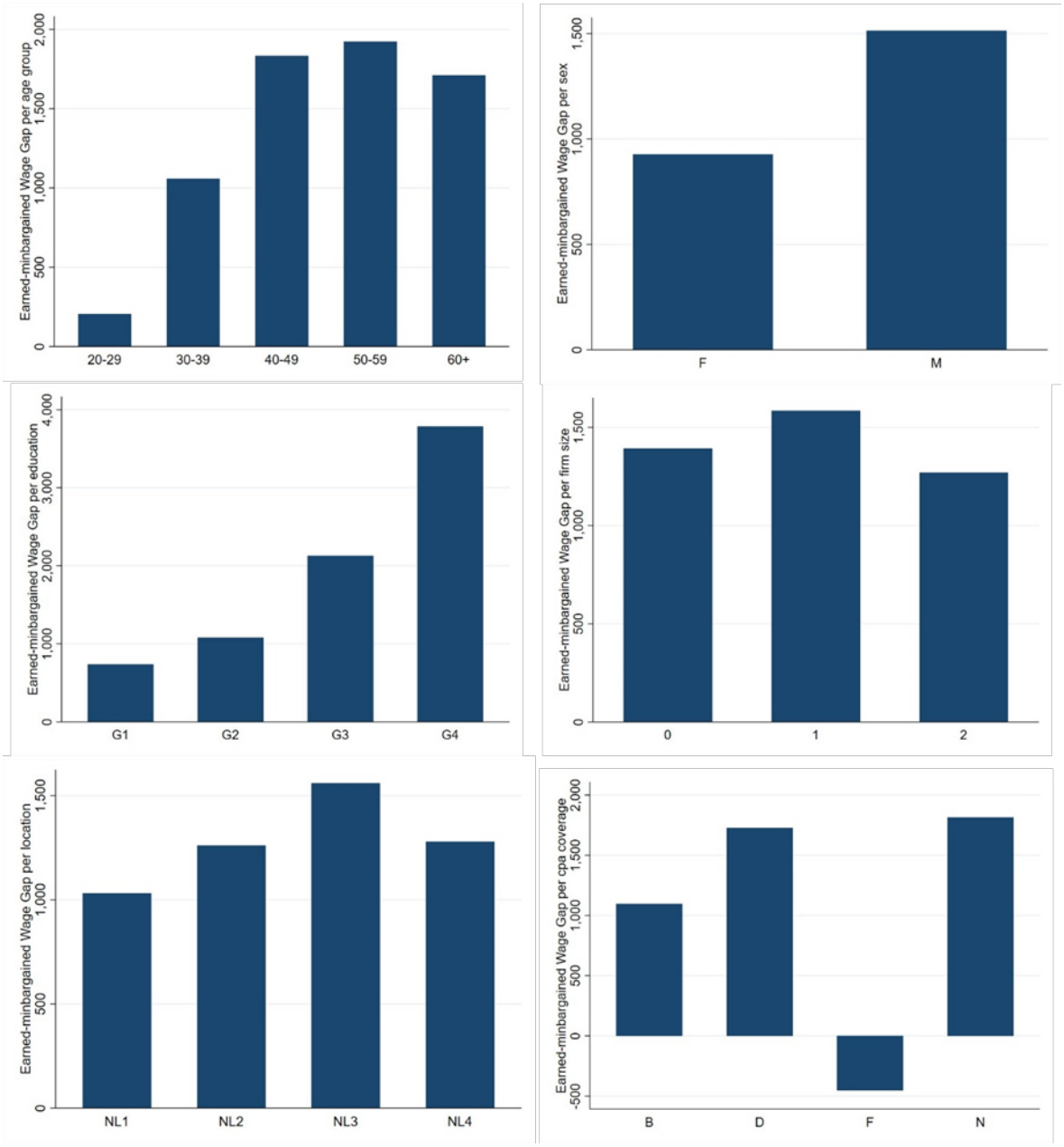

Figure 9 Wholesale & Retail Trade, Descriptive Statistics Maximum EBWG

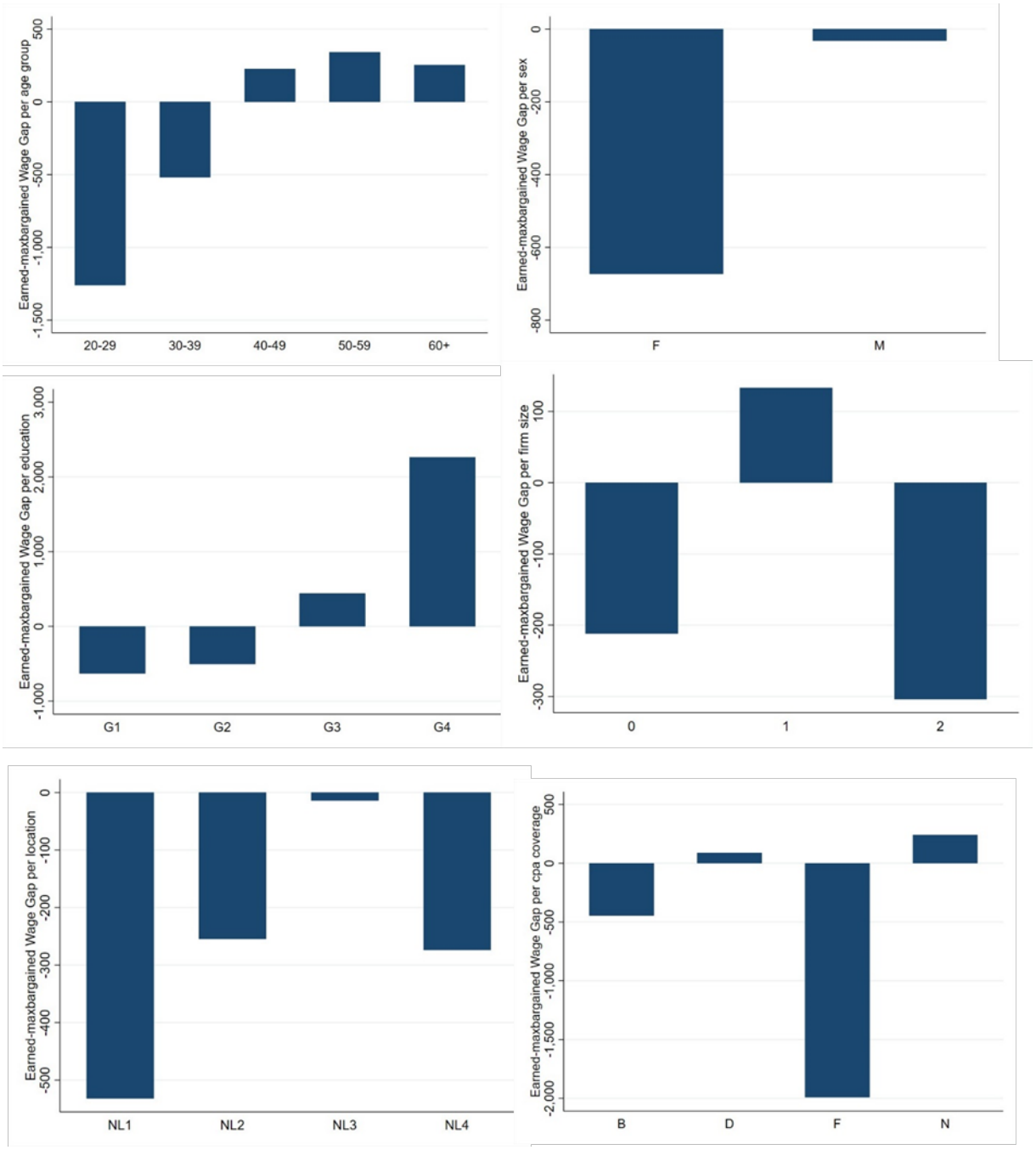

Figure 10 Accommodation & Food Services, EBWG distributions

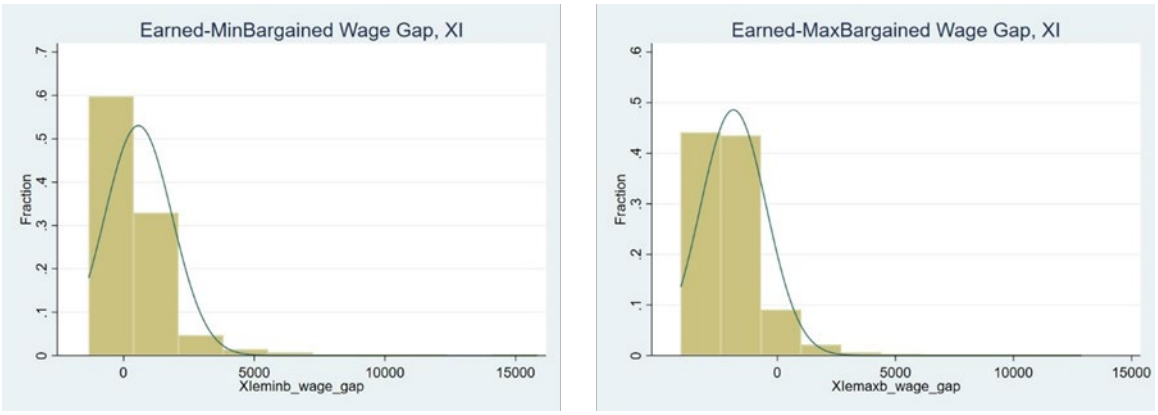

Figure 11 Accommodation & Food Services, Descriptive Statistics Minimum EBWG

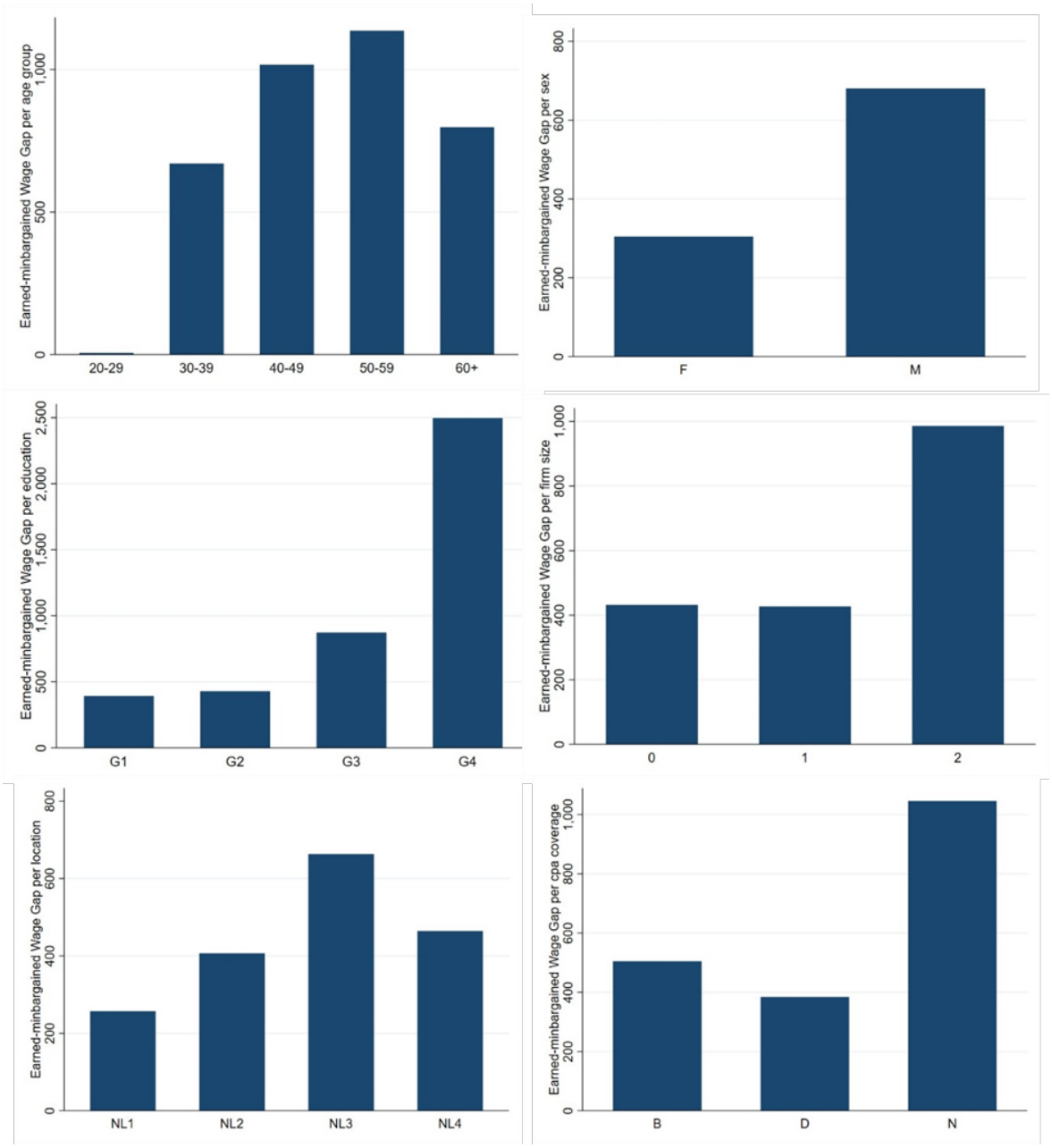

Figure 12 Accommodation & Food Services, Descriptive Statistics Maximum EBWG

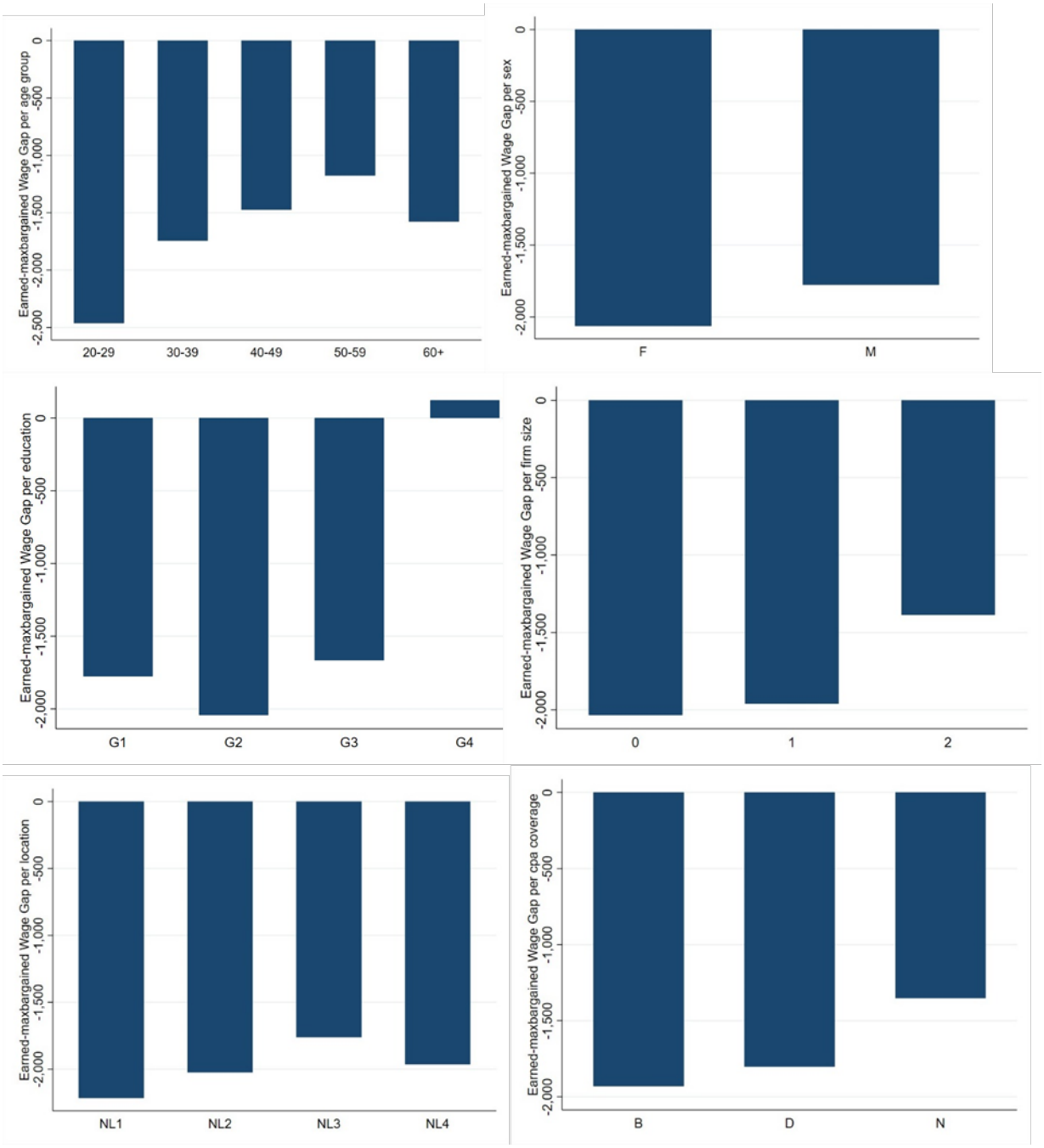

Figure 13 Human Health & Social Work Activities, EBWG distributions

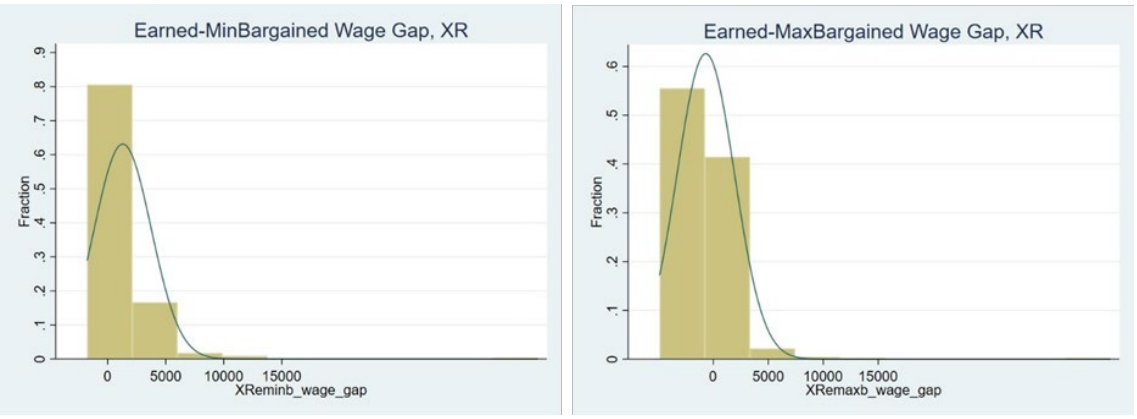

Figure 14 Human Health & Social Work Activities, Descriptive Statistics Minimum EBWG

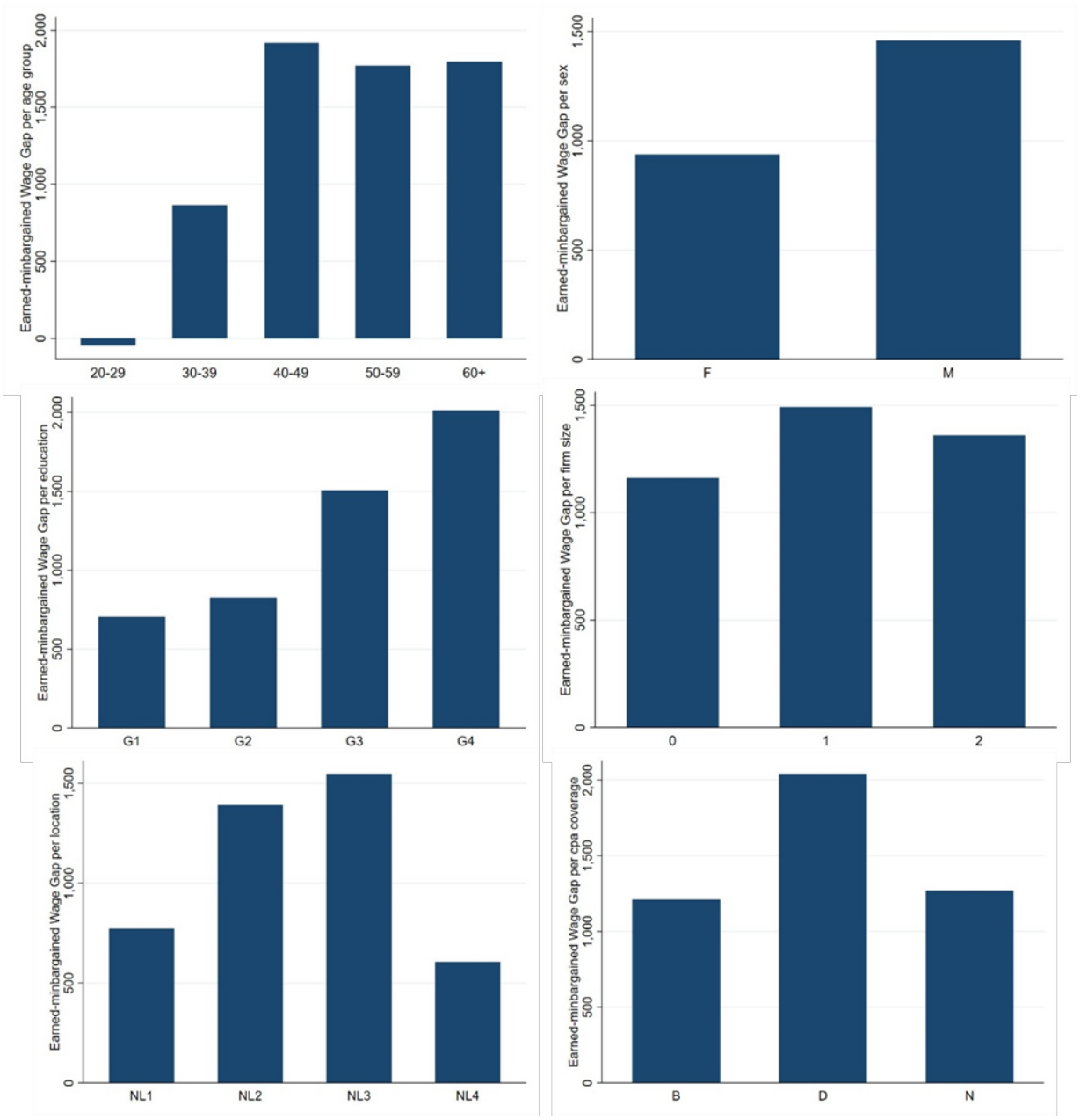

Figure 15 Human Health & Social Work Activities, Descriptive Statistics Maximum EBWG

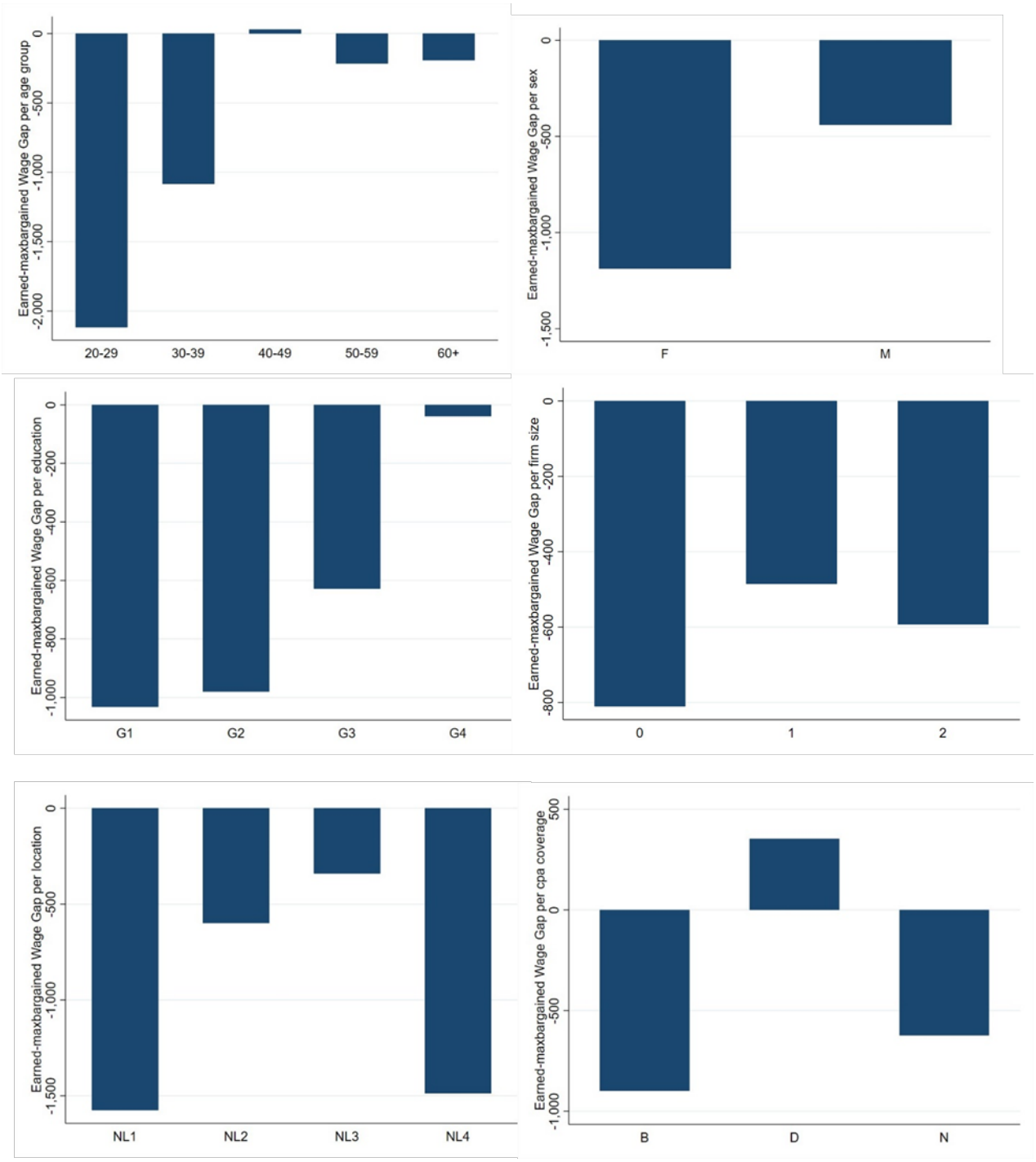

Table 7 Manufacturing, Minimum EBWG Regression Results

NL_XC Earned-minbargained Wage Gap Random Effects

XCeminb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age: base 0 (20-29)	0.000	.	.	.	.	.	
1: 30-39	832.790	78.155	10.66	0.000	679.609	985.970	***
2: 40-49	1.900.579	73.995	25.69	0.000	1.755.552	2.045.606	***
3: 50-59	2.203.973	72.016	30.60	0.000	2.062.823	2.345.122	***
4: 60+	2.097.056	86.469	24.25	0.000	1.927.580	2.266.532	***
Sex : base 0 (female)	0.000	.	.	.	.	.	
1 (male)	519.002	169.599	3.06	0.002	186.594	851.410	***
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
1: up to secondary	789.666	191.451	4.12	0.000	414.429	1.164.903	***
2: up to tertiary	1.982.748	196.271	10.10	0.000	1.598.063	2.367.432	***
3: post-graduate	3.106.458	206.324	15.06	0.000	2.702.072	3.510.845	***
sex#0b : base 0	0.000	.	.	.	.	.	
sex#1o : base 0	0.000	.	.	.	.	.	
sex#2o : base 0	0.000	.	.	.	.	.	
sex#3o : base 0	0.000	.	.	.	.	.	
Male Primary Ed.	0.000	.	.	.	.	.	
Male Secondary Ed.	-23.918	202.302	-0.12	0.906	-420.422	372.586	
Male Tertiary Ed.	25.885	207.155	0.12	0.901	-380.131	431.902	
Male Post-graduate Ed.	540.058	220.952	2.44	0.015	107.000	973.115	**
Location : base 0 (North)	0.000	.	.	.	.	.	
1: East	129.575	85.853	1.51	0.131	-38.693	297.843	
2: West	480.590	83.559	5.75	0.000	316.817	644.364	***
3: South	307.925	83.643	3.68	0.000	143.988	471.862	***
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
1: 10-49 workers	9.124	56.757	0.16	0.872	-102.118	120.367	
2: 50+ workers	260.553	57.740	4.51	0.000	147.385	373.722	***
CPA : base 0 (industry)	0.000	.	.	.	.	.	
1: enterprise	641.479	60.349	10.63	0.000	523.197	759.761	***
2: any other	-385.577	649.637	-0.59	0.553	-1.658.843	887.689	
3: no cpa	255.799	52.133	4.91	0.000	153.619	357.978	***
Monthly Work Hrs.	16.481	1.369	12.04	0.000	13.799	19.164	***
Constant	-2.340.330	186.769	-12.53	0.000	-2.706.390	-1.974.270	***

Mean dependent var	1.754.144	SD dependent var	2.204.239
Overall r-squared	0.396	Number of obs	7066
Chi-square	4.628.489	Prob > chi2	0.000
R-squared within	0.291	R-squared between	0.371

****p<.01, **p<.05, *p<.1*

Table 8 Manufacturing, Maximum EBWG Regression Results

NL_XC Earned-maxbargained Wage Gap Random Effects

XCemaxb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age: base 0 (20-29)	0.000	.	.	.	.	.	
1: 30-39	777.469	78.106	9.95	0.000	624.384	930.553	***
2: 40-49	1.746.357	73.948	23.62	0.000	1.601.422	1.891.293	***
3: 50-59	2.074.323	71.971	28.82	0.000	1.933.262	2.215.384	***
4: 60+	2.005.801	86.415	23.21	0.000	1.836.431	2.175.170	***
Sex : base 0 (female)	0.000	.	.	.	.	.	
1 (male)	115.901	169.493	0.68	0.494	-216.299	448.100	
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
1: up to secondary	610.516	191.331	3.19	0.001	235.515	985.517	***
2: up to tertiary	1.428.247	196.148	7.28	0.000	1.043.804	1.812.689	***
3: post-graduate	2.522.383	206.194	12.23	0.000	2.118.250	2.926.515	***
sex#0b : base 0	0.000	.	.	.	.	.	
sex#1o : base 0	0.000	.	.	.	.	.	
sex#2o : base 0	0.000	.	.	.	.	.	
sex#3o : base 0	0.000	.	.	.	.	.	
Male Primary Ed.	0.000	.	.	.	.	.	
Male Secondary Ed.	62.339	202.174	0.31	0.758	-333.916	458.594	
Male Tertiary Ed.	454.456	207.025	2.20	0.028	48.695	860.217	**
Male Post-graduate Ed.	882.360	220.813	4.00	0.000	449.575	1.315.145	***
Location : base 0 (North)	0.000	.	.	.	.	.	
1: East	107.830	85.799	1.26	0.209	-60.332	275.993	
2: West	437.302	83.507	5.24	0.000	273.632	600.973	***
3: South	335.632	83.590	4.02	0.000	171.799	499.466	***
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
1: 10-49 workers	102.807	56.722	1.81	0.070	-8.366	213.980	*
2: 50+ workers	422.311	57.704	7.32	0.000	309.214	535.408	***
CPA : base 0 (industry)	0.000	.	.	.	.	.	
1: enterprise	594.852	60.311	9.86	0.000	476.643	713.060	***
2: any other	-247.429	649.229	-0.38	0.703	-1.519.895	1.025.036	
3: no cpa	227.467	52.101	4.37	0.000	125.352	329.582	***
Monthly Work Hrs.	14.556	1.368	10.64	0.000	11.875	17.237	***
Constant	-3.366.985	186.651	-18.04	0.000	-3.732.815	-3.001.155	***

Mean dependent var	208.980	SD dependent var	2.156.744
Overall r-squared	0.370	Number of obs	7066
Chi-square	4.144.906	Prob > chi2	0.000
R-squared within	0.269	R-squared between	0.321

****p<.01, **p<.05, *p<.1*

Table 9 Wholesale & Retail Trade Minimum EBWG Regression Results

NL_XG Earned-minbargained Wage Gap Random Effects

XGeminb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age: base 0 (20-29)	0.000	.	.	.	.	.	
1: 30-39	679.525	60.464	11.24	0.000	561.019	798.032	***
2: 40-49	1.523.717	57.965	26.29	0.000	1.410.108	1.637.327	***
3: 50-59	1.730.969	57.359	30.18	0.000	1.618.547	1.843.390	***
4: 60+	1.630.773	79.212	20.59	0.000	1.475.520	1.786.026	***
Sex : base 0 (female)	0.000	.	.	.	.	.	
1 (male)	505.878	111.934	4.52	0.000	286.491	725.266	***
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
1: up to secondary	665.056	120.225	5.53	0.000	429.420	900.692	***
2: up to tertiary	1.320.702	135.128	9.77	0.000	1.055.855	1.585.548	***
3: post-graduate	2.943.533	168.951	17.42	0.000	2.612.394	3.274.671	***
sex#0b : base 0	0.000	.	.	.	.	.	
sex#1o : base 0	0.000	.	.	.	.	.	
sex#2o : base 0	0.000	.	.	.	.	.	
sex#3o : base 0	0.000	.	.	.	.	.	
Male Primary Ed.	0.000	.	.	.	.	.	
Male Secondary Ed.	-112.931	130.611	-0.86	0.387	-368.925	143.063	
Male Tertiary Ed.	373.785	148.278	2.52	0.012	83.165	664.405	**
Male Post-graduate Ed.	220.636	193.977	1.14	0.255	-159.552	600.825	
Location : base 0 (North)	0.000	.	.	.	.	.	
1: East	167.498	95.989	1.74	0.081	-20.638	355.633	*
2: West	392.001	90.480	4.33	0.000	214.662	569.339	***
3: South	148.762	95.068	1.56	0.118	-37.568	335.093	
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
1: 10-49 workers	153.354	48.879	3.14	0.002	57.554	249.155	***
2: 50+ workers	58.785	59.019	1.00	0.319	-56.891	174.461	
CPA : base 0 (industry)	0.000	.	.	.	.	.	
1: enterprise	430.572	166.399	2.59	0.010	104.435	756.708	***
2: any other	-1.375.398	1.585.953	-0.87	0.386	-4.483.809	1.733.013	
3: no cpa	389.101	43.966	8.85	0.000	302.929	475.272	***
Monthly Work Hrs.	5.670	1.280	4.43	0.000	3.161	8.178	***
Constant	-1.467.000	142.524	-10.29	0.000	-1.746.342	-1.187.658	***

Mean dependent var	1.404.055	SD dependent var	1.928.954
Overall r-squared	0.328	Number of obs	7249
Chi-square	3.355.950	Prob > chi2	0.000
R-squared within	0.241	R-squared between	0.346

****p<.01, **p<.05, *p<.1*

Table 10 Wholesale & Retail Trade Maximum EBWG Regression Results

NL_XG Earned-maxbargained Wage Gap Random Effects

XGemaxb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age: base 0 (20-29)	0.000	.	.	.	.	.	
1: 30-39	559.935	69.066	8.11	0.000	424.568	695.302	***
2: 40-49	1.359.862	66.096	20.57	0.000	1.230.317	1.489.407	***
3: 50-59	1.575.091	65.386	24.09	0.000	1.446.937	1.703.245	***
4: 60+	1.575.998	90.333	17.45	0.000	1.398.948	1.753.048	***
Sex : base 0 (female)	0.000	.	.	.	.	.	
1 (male)	702.044	127.832	5.49	0.000	451.498	952.590	***
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
1: up to secondary	592.989	137.347	4.32	0.000	323.794	862.185	***
2: up to tertiary	1.155.429	154.281	7.49	0.000	853.043	1.457.815	***
3: post-graduate	3.142.777	193.022	16.28	0.000	2.764.460	3.521.094	***
sex#0b : base 0	0.000	.	.	.	.	.	
sex#1o : base 0	0.000	.	.	.	.	.	
sex#2o : base 0	0.000	.	.	.	.	.	
sex#3o : base 0	0.000	.	.	.	.	.	
Male Primary Ed.	0.000	.	.	.	.	.	
Male Secondary Ed.	-283.619	149.213	-1.90	0.057	-576.071	8.832	*
Male Tertiary Ed.	207.277	169.333	1.22	0.221	-124.609	539.163	
Male Post-graduate Ed.	-193.568	221.658	-0.87	0.383	-628.011	240.874	
Location : base 0 (North)	0.000	.	.	.	.	.	
1: East	189.415	107.702	1.76	0.079	-21.677	400.506	*
2: West	355.904	101.528	3.51	0.000	156.914	554.895	***
3: South	141.773	106.638	1.33	0.184	-67.233	350.779	
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
1: 10-49 workers	304.402	54.874	5.55	0.000	196.851	411.954	***
2: 50+ workers	88.290	64.084	1.38	0.168	-37.312	213.892	
CPA : base 0 (industry)	0.000	.	.	.	.	.	
1: enterprise	378.889	180.145	2.10	0.035	25.811	731.966	**
2: any other	-1.508.025	1.801.854	-0.84	0.403	-5.039.593	2.023.543	
3: no cpa	352.962	49.247	7.17	0.000	256.441	449.484	***
Monthly Work Hrs.	10.960	1.458	7.52	0.000	8.103	13.817	***
Constant	-2.907.273	161.739	-17.98	0.000	-3.224.276	-2.590.269	***

Mean dependent var	-152.311	SD dependent var	2.088.520
Overall r-squared	0.259	Number of obs	7249
Chi-square	2.394.008	Prob > chi2	0.000
R-squared within	0.162	R-squared between	0.281

****p<.01, **p<.05, *p<.1*

Table 11 Accommodation & Food Services Minimum EBWG Regression Results

NL_XI Earned-minbargained Wage Gap Random Effects

XIeminb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
\ge: base 0 (20-29)	0.000	.	.	.	.	.	
: 30-39	536.749	81.592	6.58	0.000	376.832	696.667	***
': 40-49	938.000	92.844	10.10	0.000	756.029	1.119.970	***
': 50-59	1.065.020	97.190	10.96	0.000	874.531	1.255.508	***
': 60+	848.229	159.045	5.33	0.000	536.506	1.159.953	***
ex : base 0 (female)	0.000	.	.	.	.	.	
(male)	349.821	174.051	2.01	0.044	8.686	690.955	**
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
: up to secondary	445.163	170.351	2.61	0.009	111.280	779.045	***
': up to tertiary	732.224	190.884	3.84	0.000	358.099	1.106.349	***
': post-graduate	1.372.934	353.704	3.88	0.000	679.687	2.066.181	***
ex#0b : base 0	0.000	.	.	.	.	.	
ex#1o : base 0	0.000	.	.	.	.	.	
ex#2o : base 0	0.000	.	.	.	.	.	
ex#3o : base 0	0.000	.	.	.	.	.	
\ale Primary Ed.	0.000	.	.	.	.	.	
\ale Secondary Ed.	-151.641	194.965	-0.78	0.437	-533.765	230.483	
\ale Tertiary Ed.	8.460	228.882	0.04	0.971	-440.140	457.061	
Male Post-graduate Ed.	1.162.878	423.931	2.74	0.006	331.988	1.993.767	***
Location : base 0 (North)	0.000	.	.	.	.	.	
: East	194.701	161.830	1.20	0.229	-122.480	511.882	
': West	241.130	144.388	1.67	0.095	-41.866	524.126	*
': South	220.759	152.647	1.45	0.148	-78.423	519.941	
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
: 10-49 workers	-20.685	84.399	-0.25	0.806	-186.105	144.734	
': 50+ workers	422.549	81.292	5.20	0.000	263.220	581.878	***
CPA : base 0 (industry)	0.000	.	.	.	.	.	
: enterprise	-274.521	397.814	-0.69	0.490	-1.054.223	505.181	
2: any other							
': no cpa	533.882	100.610	5.31	0.000	336.689	731.074	***
\onthly Work Hrs.	7.427	1.796	4.13	0.000	3.907	10.948	***
Constant	-969.772	213.597	-4.54	0.000	-1.388.415	-551.129	***

Mean dependent var	565.985	SD dependent var	1.290.391
Overall r-squared	0.278	Number of obs	1270
Chi-square	481.683	Prob > chi2	0.000
R-squared within	0.284	R-squared between	0.210

****p<.01, **p<.05, *p<.1*

Table 12 Accommodation & Food Services Maximum EBWG Regression Results

NL_XI Earned-maxbargained Wage Gap Random Effects

Iemaxb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
.ge: base 0 (20-29)	0.000	.	.	.	.	.	
: 30-39	597.131	90.114	6.63	0.000	420.511	773.751	***
: 40-49	859.884	102.541	8.39	0.000	658.907	1.060.860	***
: 50-59	1.156.337	107.341	10.77	0.000	945.953	1.366.720	***
: 60+	860.889	175.657	4.90	0.000	516.608	1.205.171	***
ex : base 0 (female)	0.000	.	.	.	.	.	
(male)	217.037	192.230	1.13	0.259	-159.727	593.801	
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
: up to secondary	95.967	188.144	0.51	0.610	-272.787	464.722	
: up to tertiary	382.164	210.821	1.81	0.070	-31.037	795.365	*
: post-graduate	1.011.762	390.647	2.59	0.010	246.109	1.777.415	***
ex#0b : base 0	0.000	.	.	.	.	.	
ex#1o : base 0	0.000	.	.	.	.	.	
ex#2o : base 0	0.000	.	.	.	.	.	
ex#3o : base 0	0.000	.	.	.	.	.	
Iale Primary Ed.	0.000	.	.	.	.	.	
Iale Secondary Ed.	-88.982	215.328	-0.41	0.679	-511.017	333.053	
Iale Tertiary Ed.	-98.874	252.788	-0.39	0.696	-594.328	396.581	
Male Post-graduate Ed.	1.358.641	468.208	2.90	0.004	440.970	2.276.312	***
Location : base 0 (North)	0.000	.	.	.	.	.	
: East	222.254	178.732	1.24	0.214	-128.055	572.563	
: West	224.928	159.469	1.41	0.158	-87.626	537.481	
: South	238.066	168.590	1.41	0.158	-92.364	568.496	
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
: 10-49 workers	73.981	93.214	0.79	0.427	-108.715	256.678	
: 50+ workers	554.420	89.782	6.18	0.000	378.450	730.390	***
CPA : base 0 (industry)	0.000	.	.	.	.	.	
: enterprise	-243.980	439.364	-0.56	0.579	-1.105.117	617.158	
: any other							
: no cpa	599.578	111.118	5.40	0.000	381.790	817.366	***
Ionthly Work Hrs.	6.665	1.984	3.36	0.001	2.777	10.554	***
:onstant	-3.107.557	235.906	-13.17	0.000	-3.569.925	-2.645.189	***

Mean dependent var	-1.862.703	SD dependent var	1.394.200
Overall r-squared	0.246	Number of obs	1270
Chi-square	407.249	Prob > chi2	0.000
R-squared within	0.247	R-squared between	0.176

****p<.01, **p<.05, *p<.1*

Table 13 Human Health & Social Work Activities Minimum EBWG Regression Results

NL_XR Earned-minbargained Wage Gap Random Effects

XReminb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ge: base 0 (20-29)	0.000	.	.	.	.	.	
30-39	399.365	296.070	1.35	0.177	-180.921	979.651	
40-49	1.298.257	287.669	4.51	0.000	734.436	1.862.078	***
50-59	1.546.810	287.106	5.39	0.000	984.092	2.109.527	***
60+	1.991.776	351.664	5.66	0.000	1.302.526	2.681.025	***
:x : base 0 (female)	0.000	.	.	.	.	.	
(male)	633.680	943.732	0.67	0.502	-1.216.000	2.483.361	
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
up to secondary	734.184	921.958	0.80	0.426	-1.072.821	2.541.189	
up to tertiary	1.145.251	916.622	1.25	0.212	-651.295	2.941.796	
post-graduate	2.037.003	932.365	2.18	0.029	209.601	3.864.406	**
x#0b : base 0	0.000	.	.	.	.	.	
x#1o : base 0	0.000	.	.	.	.	.	
x#2o : base 0	0.000	.	.	.	.	.	
x#3o : base 0	0.000	.	.	.	.	.	
ale Primary Ed.	0.000	.	.	.	.	.	
ale Secondary Ed.	-138.641	990.555	-0.14	0.889	-2.080.092	1.802.810	
ale Tertiary Ed.	178.067	991.533	0.18	0.857	-1.765.301	2.121.436	
Male Post-graduate Ed.	-388.905	1.015.950	-0.38	0.702	-2.380.130	1.602.321	
Location : base 0 (North)	0.000	.	.	.	.	.	
East	250.336	670.762	0.37	0.709	-1.064.334	1.565.005	
West	239.190	618.109	0.39	0.699	-972.282	1.450.662	
South	-284.666	668.953	-0.43	0.670	-1.595.790	1.026.458	
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
10-49 workers	121.093	342.491	0.35	0.724	-550.177	792.363	
50+ workers	-153.137	572.808	-0.27	0.789	-1.275.820	969.547	
CPA : base 0 (industry)	0.000	.	.	.	.	.	
enterprise	890.110	1.048.521	0.85	0.396	-1.164.953	2.945.173	
any other							
no cpa	411.093	308.250	1.33	0.182	-193.066	1.015.252	
onthly Work Hrs.	11.667	6.632	1.76	0.079	-1.332	24.665	*
onstant	-1.568.057	1.054.835	-1.49	0.137	-3.635.496	499.383	

Mean dependent var	1.299.194	SD dependent var	2.451.723
Overall r-squared	0.147	Number of obs	463
Chi-square	93.497	Prob > chi2	0.000
R-squared within	0.264	R-squared between	0.130

****p<.01, **p<.05, *p<.1*

Table 14 Human Health & Social Work Activities Maximum EBWG Regression Results

NL_XR Earned-maxbargained Wage Gap Random Effects

XRemaxb_wage_gap	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
e 0 (20-29)	0.000	.	.	.	.	.	
	577.851	325.097	1.78	0.075	-59.327	1.215.029	*
	1.455.900	316.406	4.60	0.000	835.757	2.076.044	***
	1.569.112	315.763	4.97	0.000	950.228	2.187.996	***
	1.889.027	387.263	4.88	0.000	1.130.005	2.648.048	***
e 0 (female)	0.000	.	.	.	.	.	
	231.135	1.004.082	0.23	0.818	-1.736.828	2.199.099	
Edu: base 0 (up to primary)	0.000	.	.	.	.	.	
econdary	-112.480	979.917	-0.11	0.909	-2.033.081	1.808.121	
ertiary	238.326	972.687	0.25	0.806	-1.668.107	2.144.758	
raduate	1.014.039	991.260	1.02	0.306	-928.796	2.956.873	
base 0	0.000	.	.	.	.	.	
base 0	0.000	.	.	.	.	.	
base 0	0.000	.	.	.	.	.	
base 0	0.000	.	.	.	.	.	
nary Ed.	0.000	.	.	.	.	.	
ondary Ed.	659.599	1.058.479	0.62	0.533	-1.414.982	2.734.180	
tiary Ed.	707.784	1.058.260	0.67	0.504	-1.366.367	2.781.934	
Male Post-graduate Ed.	99.619	1.086.976	0.09	0.927	-2.030.815	2.230.052	
Location : base 0 (North)	0.000	.	.	.	.	.	
	604.148	709.450	0.85	0.394	-786.349	1.994.645	
	608.002	653.488	0.93	0.352	-672.811	1.888.814	
	-42.376	707.228	-0.06	0.952	-1.428.518	1.343.765	
Firm size : base 0 (<10 workers)	0.000	.	.	.	.	.	
workers	58.770	361.885	0.16	0.871	-650.513	768.052	
orkers	-193.233	600.418	-0.32	0.748	-1.370.030	983.564	
CPA : base 0 (industry)	0.000	.	.	.	.	.	
rise	897.633	1.098.088	0.82	0.414	-1.254.580	3.049.847	
ner							
	582.385	325.989	1.79	0.074	-56.541	1.221.312	*
Work Hrs.	10.345	7.258	1.43	0.154	-3.879	24.570	
	-3.339.949	1.118.274	-2.99	0.003	-5.531.726	-1.148.172	***

Mean dependent var	-671.426	SD dependent var	2.609.329
Overall r-squared	0.151	Number of obs	463
Chi-square	73.978	Prob > chi2	0.000
R-squared within	0.181	R-squared between	0.132

**** p<.01, ** p<.05, * p<.1*