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# Estimating the Gender Pay Gap in the Managerial and non Managerial Italian Labor Market

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## Abstract

In this article we apply a two stage approach in order to investigate the existence of a stronger gender discrimination when the job position is higher, splitting the Italian labor market into managers and non managers. Once the threefold selection biases for the two genders are accounted for through a multinomial logit model, amongst non managers both the wage gap and the discriminatory component rise, while amongst managers those two components decrease considerably and become not significant. The stronger negative process of selection amongst Italian female managers can thus lead to regard that segment of the labor market as unfair. To fight this bias policies aimed at reconciling family and work and at curbing stereotypes are recommended

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## 1. Introduction

The gender pay gap (GPG, henceforth) has become a widespread research topic in the empirical economic literature. Indeed, occupational segregation by gender and the exclusion of women from the most highly paid jobs have long been considered among the most relevant of its determinants (England 1992; Petersen and Morgan 1995; Tomaskovic-Devey 1993) [1] . Nevertheless, only a few studies directly consider managerial positions or duties which involve formal responsibility for supervising a group: Bertrand and Hallock (2001) and Muñoz-Bullón (2010) are two relevant examples of this kind. In such a string of research, a key point which has largely been left unexplored is to control for a selectivity bias affecting sample selection. This issue has arguably particular relevance for two main reasons: firstly, when women's wages are examined, the possibility that unobservable factors influence selection into the sample often hinders the achievement of rigorous, scientific results[2]. Secondly, when the GPG for women in supervisory positions is examined and compared with that of male supervisors[3], the selection term becomes much more relevant in order to compute unbiased estimates. In this respect, if we are interested in examining women's behavior in a particular working condition *x*, the most appropriate potential outcome is even threefold - working in *x*, working in a position other than *x*, not working at all - so that two selection terms need to be calculated. Furthermore, when the working condition *x* is a supervisory task – a role where women are traditionally underrepresented – that selection term - the so called inverse of the Mills Ratio (IMR hereafter, see Heckman 1976, 1979) - is expected to be particularly significant. In our procedure we follow Watson (2010) who investigates the GPG of managers in Australia by controlling for a threefold selection bias. His results show that female managers earn about 26% less than their male counterparts and somewhere between 65 and 90% of this wage gap cannot be explained. To the best of our knowledge, however, there is no empirical study comparing GPG (i.e. analyzing discrimination against women in the labor market) simultaneously for supervisory and non supervisory positions, after controlling for a threefold selectivity bias: we fill this gap of literature by analyzing this issue for the Italian labor market.

Closely following Acemoglu and Newman (2002) and Beaudry and Francois (2010), we define the managerial/supervisory roles as a whole kind of jobs related to

[1] The most relevant issue seems to be the so called "allocative discrimination". This type of discrimination is defined as the condition in which a difference is found in the allocation of women and men to occupations and establishments that differ in the wages they pay. This entails sorting men and women into different jobs at the point of hire and differences in the subsequent rates of promotion and dismissals. Nonetheless, Petersen and Morgan (1995) and Petersen and Saporta (2004) also consider the "valuative discrimination"- defined as a situation where women hold occupations with lower wages than those held by men, although skill requirements and other wage-relevant sectors are the same – and the "within-job wage discrimination"- i.e. a situation where women receive a lower salary than men even though the occupation and the establishment they work in is the same. Valuative discrimination as well as allocative discrimination involve segregation.

[2] Dolton and Makepeace (1986), among others, have shown that the selection bias is particularly pertinent to general studies of women's wages, given the labor force participation decisions entailed.

[3] In what follows the tems "supervisor" and "manager" are used interchangeably as the latter refers to whatever individual has undertaken middle or high hierarchical tasks.

the responsibility of organizing and monitoring other employees. A crucial point in our analysis is to control for the selectivity bias which may probably affect women, most notably in acceding to higher job positions, as already pointed out in both academic and policy documents ever since the beginning of the 2000s (see, among others, European Commission 2003, OECD 2001). In doing so, we choose to adopt a two-step procedure. In the first step, we correct for a threefold selectivity bias through a multinomial logit model. This selectivity may affect the participation to the labor market and the working level (i.e. non supervisor or supervisor) for both males and females. In the second step we estimate the wage equation by taking into account the potentially significant selectivity terms. This method allows us to verify the unadjusted and the (multiple-selection) adjusted GPG among the two job positions. Furthermore, strictly following Petersen and Morgan (1995), we are able to verify whether or not the (within-position) discrimination against women is higher among supervisors w.r.t. non managers through the Blinder-Oaxaca decomposition (BO, henceforth)[4].

Results confirm the presence of a strong GPG and a within-position discrimination in compensations, and also find evidence of a negative selection bias for women at managerial positions that leads us to regard that particular labor market segment as "unfair". In other words, the managerial portion of the Italian labor market seems to be not much sensitive to the shifts in labor demand and supply and not hinging upon the so called "meritocracy" criterion. Finally we also find a reduction of this managerial GPG which becomes not statistically significant once the selection bias is accounted for. In other words, if handled with more proper econometric techniques, the evidence of a within-position discrimination disappears.

This paper is organized as follows. Section 2 describes the econometric methodologies adopted. Section 3 deals with the data used. Section 4 presents the results, while the last section concludes.

## 2. Econometric specification

Selection models are usually implemented within a dichotomous framework. Differently from the classical econometric techniques, in this article we choose to build a threefold potential outcome: not working, working in a non managerial position or working as a manager. For this reason we divide our dependent variable into three categories: this allows to obtain the following probabilities, as in (1) and (2):

$$\Pr\left(Y_{ij}=0\right)=\frac{1}{1+\exp\left(\beta_1 Z_{ij}\right)+\exp\left(\beta_2 Z_{ij}\right)}+\varepsilon_{ij} \tag{1}$$

$$\Pr\left(Y_{ij}=k\right)=\frac{\exp\left(\beta_k Z_{ij}\right)}{1+\exp\left(\beta_1 Z_{ij}\right)+\exp\left(\beta_2 Z_{ij}\right)}+\varepsilon_{ij} \tag{2}$$

[4] See Blinder (1973), Oaxaca (1973).

where ε~N(0,1), k=1,2 and j=males, females. In equation (1) $P(Y_{ij}=0)$ stands for the probability of being in the base category (not working), while in equation (2) $P(Y_{ij}=1)$ is the probability of working in a normal position and $P(Y_{ij}=2)$ is that of working as a supervisor. Z is a matrix containing personal (essentially) categorical regressors on which the choice is based: age, level of education attained, consensual union, health, household type (linked to the number of persons and dependent children living in a family) and citizenship[5].

Our multinomial logit[6] is a necessary first stage to compute the IMR for undertaking a non supervisory and a supervisory position for both the genders: these IMRs allow us to account for a possible selection bias and need to be plugged in a second stage regression to get unbiased OLS estimates as in Heckman (1976, 1979) or Bourguignon et al. (2007) and see whether the differential between men and women's gross hourly wage is significantly affected by the presence of the IMR terms[7].

More specifically, in the second stage four separate OLS regressions taking the following form are computed:

$$\ln W_{ijk} = \alpha_{jk} X_{ijk} + (\sigma_{jk}\rho_{jk}) \frac{\phi[H_{jk}(\beta_{jk} Z_{ijk})]}{\Phi[H_{jk}(\beta_{jk} Z_{ijk})]} = \alpha_{jk} X_{ijk} + c_{jk}\lambda_{ijk} + \zeta_{ijk} \quad (3)$$

where

$$\zeta_{ijk} \sim N(0,\sigma_{jk}),$$
$$corr(\varepsilon_{ijk}, \zeta_{ijk}) = \rho_{jk}$$

and where j=males, females and k=1,2 like above.

The dependent variable of equation (3) represents the logarithm of the gross hourly wage. X is a matrix containing all of the regressors, $\sigma_j$ is the standard deviation of the error term in the equation for the wage of gender j; $\rho_j$ is the correlation between the error term in the selection equation and the one in the equation for the wage of gender j; ϕ[.] is the standard normal density and Φ[.] is the normal cumulative distribution function. λ is the IMR computed in the first stage. The suffix k has been added with respect to equation (2) in order to take into account the diversity of coefficients by category other than gender. If a correlation between the two error terms ε and ζ is found, it would be an evidence of the presence of a selection effect. *If it is positive (negative), more (less) able people are likely to enter the labor market and get higher wages. More precisely, those who select or are selected for the labor market - be they supervisors or non supervisors - obtain a larger remuneration than*

[5] The estimates of the multinomial logit model as well as the summary statistics are available from the authors upon request.

[6] In this analysis, the consistency of the choice of the multinomial logit has been corroborated by the satisfaction of the Hausmann-McFadden test for the IIA hypothesis.

[7] As a robustness check we have also performed a first stage binary logit on non managers and managers only. The results do not change much and are available upon request. We thank a referee for the suggestion.

*what a random drawing from the population of men and women with a comparable set of characteristics would get*.

Finally, the mean GPGs with and without significant selection terms are obtained both for non managers and managers and split into endowment, coefficients and interaction effects singled out using a threefold BO decomposition:

$$G = [E(X_M - X_F)]' \alpha_F + E(X_F)'(\alpha_M - \alpha_F) + [E(X_M) - E(X_F)]'(\alpha_M - \alpha_F) \quad (4)$$

where G on the left-hand side is the GPG, the suffixes M and F indicate males and females respectively and the letter E represents the usual symbol for the expectation (i.e. the mean values of the considered characteristics for the two genders)[8]. The first RHS term represents the effect of endowments, the second the effect of coefficients and the third term quantifies the simultaneous effect of differences in endowments and coefficients existing at the same time, both for males and females. To give a better explanation, the first term measures the group differences in the predictors weighted by the coefficients of women i.e. the expected change of women's mean wage had they the same predictor levels as men; it constitutes the "explained" part of the GPG. The second term measures the difference in coefficients weighted by women's predictor levels, i.e. the expected change of women's mean outcome, had they the same coefficients as men. In the literature on the GPG, this component is generally referred to as the "discrimination component".

## 3. Data

We used the latest 2007 version of the EU-SILC database, the new European homogenized panel survey, available since March 2009. We restricted our analysis to people in the 25-65 age bracket in order to analyze age groups with a majority of employed people. For the same reason we also dropped individuals who were not part of the labor force[9]. After doing so, 15,138 people have been left, 8,323 of whom men, the remaining 6,815 women. To ensure unbiasedness, analytical weights supplied by EU-SILC have been used[10].

The first stage dependent variable has three categories – not working, working and working in a managerial position: EU-SILC identifies the latter working condition with a supervisory role, where supervisory responsibility includes formal duty in coordinating a group of employees (other than apprentices), whom supervisors manage directly, sometimes doing some of the work they monitor. It implies that the supervisor takes charge of the work, directs it and sees whether it is properly done. As already remembered, such a definition closely follows that adopted in the theoretical models by Acemoglu and Newman (2002) and Beaudry and Francois (2010).

[8] See Jann (2008) for further details.

[9] More specifically, the following categories have been discarded: students aged more than 25 and people getting other types of training, early retired, unfit to work, other people serving compulsorily in the military, housewives, other inactive persons.

[10] Analytical weights are inversely proportional to the variance of an observation. Typically, the observations represent averages and the weights are the number of elements that gave rise to those averages.

For the selection in the labor market individual characteristics (age, education, marital status, health, citizenship) and nine different types of household have been used.

For what concerns the wage equation in the second stage, we have chosen to take the following variables on which the logarithm of the gross hourly wage has been regressed[11]: (i) The Level of education attained (ISCED), with 3 categories. The first (the base) denote pre-primary, primary and lower secondary school; the second (ISCED 3 & 4) stands for upper secondary and post-secondary non tertiary education; the last (ISCED 5) includes only people with at least tertiary education. (ii) A continuous variable indicating the years of work experience (exp) and its squared value (exp_2). (iii) A part-time dummy (part), taking on the value 0 for individuals working full time and 1 if they work on a part-time contract. (iv) Consensual union (union) with 3 categories: single individuals or engaged but not living together (the base category), union without legal basis, union with legal basis. (v) Citizenship (Italian, European, non-European). (vi) A categorical variable regarding a possible limitation of activity because of health problems whose categories are: strongly limited (base category), limited, not limited. (vii) The size of the unit where a worker is employed split into 3 categories (11-19, 20-49, and 50+ employees) other than the base (up to 10 employees). Finally, 27 dummies for occupations and 13 dummies for sectors have been also included.

Consistently with the econometric literature, household characteristics have only been included in the first stage to ensure the validity of the selection model as they are crucial in the participation equation. Indeed, those attributes are expected to influence the occupation choice, rather than the hourly wage. Oppositely, labor market variables which cannot be included in the selection model, are relevant in the second stage, mincerian-like equation (Bardasi and Gornick 2003, 2008, Puhany 2000, Watson 2010).

Due to several missing values encountered in some of the regressors, the second stage has been performed considering 1,027 female supervisors, 2,125 male supervisors, 4,626 non supervisory women and 4,914 non supervisory men. Thus, while the number of non supervisors is barely different among genders, that of supervisor males is double compared to women's, even though it is still somewhat relevant This is clearly a starting evidence of allocative discrimination in the managerial positions going to the detriment of women, i.e. a sign of classical segregation.

## 4. Empirical results

The coefficients in the wage equations for both genders are listed in table 1, for managers/supervisors and as well as non managers. Some relevant gender differences between the unadjusted and adjusted models, for both the two job positions considered emerge here. In particular we find that, in the non managerial sample, the lambda coefficient is positive and significant for both genders, even though its effect is clearly stronger for women than for men (0.683 vs. 0.349). For what concerns the managerial

[11] Other than the significant IMRs obtained in the first stage.

positions, the lambda is found to be negative and significant only in the case of females (-0.384 and p-value of 0.04). In our view, this is an evidence of an unfair job market for higher positions, where not always the most capable women get the jobs (and the relative salaries) they deserve.

In figures 1a and 1b we provide the results of the BO decomposition for GPGs at the mean. Our starting point is the mean raw GPG equal to 23.5 and 17.7% for managerial and non managerial positions respectively (not shown in those figures). When we control for the variables included in the wage equation, for non managers (figure 1a), it reaches 19.8%, while remains at 23.5% for managerial positions. But for the latter positions the coefficient term accounts for more than 75% of the GPG, while that for non supervisors is slightly more than 57%. In other words, if we do not account for the selectivity bias (the IMRs), there is a higher within-position gender discrimination at higher hierarchical levels. When we include the IMRs (the so called adjusted specification), the GPG remains statistically significant only at lower hierarchical level (28.2%, 69% of which explained by the coefficient term, again a sign of strong within-position discrimination). For supervisory positions the IMRs adjusted GPG (15.7%) is found to be not statistically significant, and so is found the term related to coefficients (which helps explains 59% of that GPG).

This result derives directly from the fact that the only significant IMR at higher hierarchical level is negative and concerns women. In sum, for what concerns managerial positions, the higher GPG lowers and become statistically non significant when an IMR adjustment is performed.

## 5. Conclusions and policy implications

In this article we analyze the Italian labor market by splitting it into managerial and non managerial positions., The main results found are the following:

- The raw gender wage gap is higher among managers than among non managers;
- When controlling for many personal and labor market variables this difference shrinks: in particular, the unadjusted GPG among non managerial jobs increases, while the gap among managers remains the same;
- In the unadjusted specification, the higher GPG among managers also implies a higher within-position discrimination against females, accompanied by the usual allocative discrimination confirmed by the lower number of managerial women compared to men. Yet, the number of female managers is not negligible;
- When considering a possible influence of a selectivity bias on the labor market participation by means of a multinomial logit model, it comes to light that: a) among non managerial positions, both males and females evidence positive and highly significant selection bias: further to this, the coefficient for females is much greater and almost twice that for males; b) among managerial positions, only for females a significant and negative selectivity bias is found;
- As a consequence of this, if the selection bias would be accounted for a) among non managers the GPG would widen to 28.2% and the discrimination would increase to 69%; b) among managers, both the GPG and the within-position discrimination would considerably decrease and become not significant.

The negative selection bias for managerial positions taken on by women is of particular interest for policy responses. We put forward two possible and arguably not alternative explanations for the puzzling "unfairness" in the Italian managerial labor market of women as it results from this paper. First, the dearth in childcare supply which affects negatively job decisions of Italian women more than those of other European women, both from Nordic and other Mediterranean countries (Del Boca and Locatelli 2008, Nicodemo 2009). Even though it is reasonable to argue that this scarcity may force Italian women to choose household management rather than a job, be it a supervisory position or not, its influence is likely to be stronger when tasks which implicate some kind of responsibility are undertaken. Second, idiosyncratic, sociological and cultural reasons may have an equally relevant role, because supervisory positions are traditionally considered better fit for and carried out by men, which are almost naturally associated to being good managers unlike women (OECD 2002, Gregory 1990, Schein 2001, Fiske et al. 1999).

In this framework, entrenched habits deep-rooted in the Italian society are likely to constitute the most significant barriers to women's career advancement and appointment to managerial positions, thus generating a gender-segregated labor market. Only when these economic and cultural barriers will be completely eliminated, allocative discrimination will be removed. To reach this result policies aimed at reconciling work and family and at curbing old stereotypes are strongly recommended.

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**Tab. 1**

Unadjusted and adjusted results: managers and non managers

| | Non managers | | | | Managers | | | |
|---|---|---|---|---|---|---|---|---|
| | Unadjusted | | Adjusted | | Unadjusted | | Adjusted | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| ISCED 3 & 4 | 0.083 (0.000) | 0.117 (0.000) | 0.058 (0.000) | 0.102 (0.000) | 0.121 (0.000) | 0.151 (0.000) | 0.090 (0.002) | 0.130 (0.000) |
| ISCED 5 | 0.199 (0.000) | 0.183 (0.000) | 0.149 (0.000) | 0.137 (0.000) | 0.344 (0.000) | 0.222 (0.000) | 0.285 (0.000) | 0.179 (0.000) |
| Exp | 0.019 (0.000) | 0.017 (0.000) | 0.019 (0.000) | 0.017 (0.000) | 0.024 (0.000) | 0.025 (0.000) | 0.023 (0.000) | 0.024 (0.000) |
| Exp_2 | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.001) |
| Part | -0.456 (0.000) | -0.402 (0.000) | -0.457 (0.000) | -0.401 (0.000) | -0.258 (0.000) | -0.462 (0.000) | -0.257 (0.000) | -0.459 (0.000) |
| Union without legal basis | -0.006 (0.740) | 0.027 (0.193) | -0.008 (0.673) | 0.000 (0.998) | -0.055 (0.094) | 0.018 (0.639) | -0.060 (0.071) | -0.003 (0.947) |
| Union with legal basis | -0.067 (0.000) | -0.007 (0.482) | -0.057 (0.000) | -0.014 (0.147) | -0.100 (0.000) | 0.018 (0.392) | -0.082 (0.000) | 0.017 (0.439) |
| EU citizenship | 0.019 (0.775) | -0.094 (0.039) | 0.001 (0.986) | -0.121 (0.008) | -0.252 (0.020) | -0.130 (0.415) | -0.254 (0.019) | -0.163 (0.311) |
| Extra EU citizenship | -0.047 (0.482) | -0.132 (0.006) | -0.033 (0.617) | -0.124 (0.009) | -0.118 (0.378) | -0.003 (0.989) | -0.075 (0.583) | 0.007 (0.968) |
| Limited | 0.081 (0.005) | 0.060 (0.092) | 0.078 (0.007) | 0.068 (0.058) | 0.091 (0.119) | 0.181 (0.038) | 0.096 (0.103) | 0.178 (0.041) |
| Not limited | 0.107 (0.000) | 0.090 (0.007) | 0.103 (0.000) | 0.099 (0.003) | 0.104 (0.050) | 0.176 (0.037) | 0.106 (0.046) | 0.178 (0.035) |
| Size 11-19 | 0.065 (0.000) | 0.080 (0.000) | 0.065 (0.000) | 0.081 (0.000) | 0.032 (0.205) | 0.087 (0.010) | 0.031 (0.219) | 0.088 (0.009) |
| Size 20-49 | 0.071 (0.000) | 0.091 (0.000) | 0.072 (0.000) | 0.090 (0.000) | 0.074 (0.003) | 0.109 (0.001) | 0.074 (0.003) | 0.109 (0.001) |
| Size > 50 | 0.116 (0.000) | 0.156 (0.000) | 0.116 (0.000) | 0.156 (0.000) | 0.126 (0.000) | 0.185 (0.000) | 0.126 (0.000) | 0.187 (0.000) |
| Cons | 2.108 (0.000) | 1.587 (0.000) | 2.008 (0.000) | 1.368 (0.000) | 2.108 (0.000) | 2.002 (0.000) | 2.306 (0.000) | 2.318 (0.000) |
| Lambda | | | 0.349 (0.002) | 0.683 (0.000) | | | -0.269 (0.122) | -0.384 (0.040) |
| N. Obs | 4914 | 4626 | 4914 | 4626 | 2125 | 1027 | 2125 | 1027 |
| Prob > F | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| R-squared | 0.400 | 0.538 | 0.401 | 0.540 | 0.445 | 0.582 | 0.445 | 0.584 |
| Adj R-squared | 0.393 | 0.533 | 0.395 | 0.535 | 0.431 | 0.560 | 0.431 | 0.561 |
| Root MSE | 0.270 | 0.299 | 0.270 | 0.299 | 0.331 | 0.305 | 0.331 | 0.305 |

Note. 12 dummies for occupations and 27 dummies for sectors included, but not reported. Omitted categories are: ISCED 0-2; full-time; Single; Italian; Strongly limited in activities because of health problems; local unit size 1-10. Source: elaboration from EU-SILC 2007, available since March 2009. Observations are weighted by EU-SILC personal cross-sectional weights. p-values in parentheses.

**Figure 1a.**
*Gender pay gap for non managers: unadjusted and adjusted*

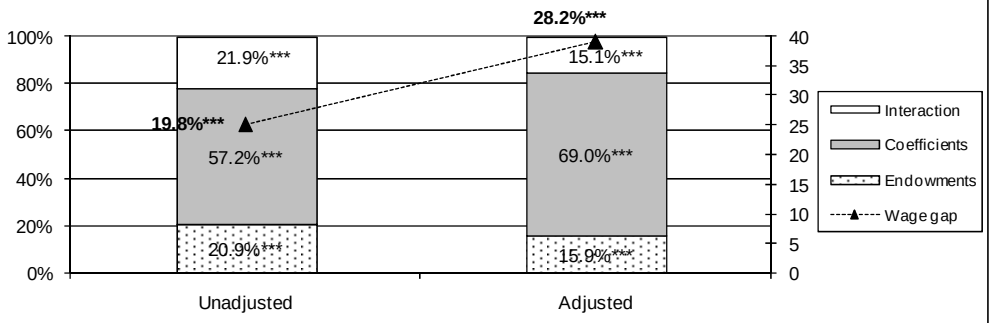
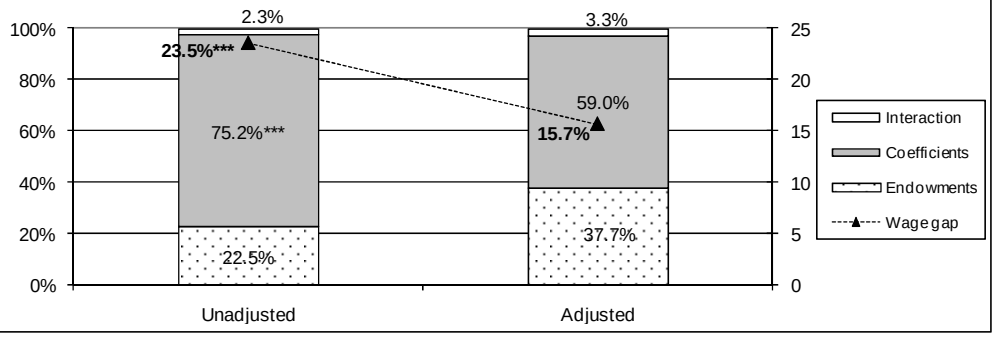



**Figure 1b**.
*Gender pay gap for managers: unadjusted and adjusted*




Note. Gender pay gap in bold. Significance: * p<0.10. ** p<0.05. *** p<0.01.