Gender of supervisors. Does it matter?

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Abstract

This study analysed the effect on the wage gap of women´s access to supervisory jobs within each establishment in the Spanish labour market. Previous empirical studies have found that the promotion of women has a positive effect on the wage difference between genders. However, these studies did not take into account the endogeneity problem associated with job choice. We proposed a specific econometric specification to control for this problem under certain assumptions. Using matched employer-employee data from a sample of 213,709 workers, we found that an increase in the proportion of women among supervisors within each establishment significantly widens the wage difference between genders, but increases the presence of women in supervisory positions. This study shows that the impact of an increase in women´s power within establishments may well be more limited than other empirical studies suggest.

Keywords: Endogeneity problem, probit, supervisory jobs, switching model.

JEL Codes: J16, J32, J71,

1. Introduction

The proportion of women in management has increased significantly during the last twenty years (Cohen and Huffman, 2007). As pointed out by Marini (1989) and Baron (1991), managers and supervisors have a direct influence over organizational procedures and policies as well as over every day decision-making, which in turn has effects on inequality in rewards between men and women. For this reason, a number of theoretical studies have analysed the effects of women's career advancement on other women´s career paths.

A variety of institutional and theoretical arguments have suggested that an increase in women's power has a positive influence on other women´s labour market outcomes. Based on Becker's (1957) theory of a taste for discrimination, female managers may pay other women more because they will be less likely to discriminate against female workers than male managers. This would not occur if workers and jobs were homogeneous, but in

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practice they are heterogeneous. Female managers may place other women in more favourable positions with somewhat higher pay. In fact, it has been found that female managers have a greater tendency than their male counterparts to actively promote measures aimed at establishing employment equity at the workplace (Baron, 1991). Statistical discrimination models suggest that differences in the treatment of men and women based on imperfect information about women´s abilities will decrease as women advance within organizations ladders (Phelps, 1972).

Sociologists have also extensively investigated the influence of the gender of managers on their subordinates´ outcomes. For example, Cotter et al. (1997) and Nelson and Bridges (1999) suggested that gender differences in earnings within organizations should decrease whenever there are more women in positions of authority who make crucial decisions about salaries, promotion, hiring, and firing. Likewise, Hultin and Szulkin (2003) suggested that sex-differentiated networks of friendships, communication, and trust may be a mechanism by which gender inequality in reward outcomes are generated within organizations. They argue that individual female employees in general have better chances to benefit from network ties in organizations in which men do not dominate the decision-making strata. Furthermore, Kanter (1977), Ibarra (1992), and McPherson, Smith-Lovin and Cook (2001) use the term "homophily" for the tendency of women to hire other women. Similarly, Halpert, Wilson, and Hickman (1993) consider that women who evaluate potential female job candidates are less subject to pregnancy-related bias.

Other sociological researches have studied the role of women´s power to encourage other women to occupy supervisory jobs requiring specific educational investments. In particular, Polavieja (2012) suggested that job investment decisions involve intentional microlevel actions that are themselves influenced by the social environment in which individuals are embedded, i.e., by the actions and outcomes experienced by other actors. When actors face greater uncertainty and informational constraints when pondering different investment options, and when the risks involved in the investment decision itself are greater, the actors will be more likely to rely on their social contexts in the search for clues. Women face greater constraints and uncertainties than men and confront harsher work-family trade-offs. This makes their investment choices particularly sensitive to the social environment. For this reason, women´s expectations about future returns of their educational investments can be influenced by the proportion of women in jobs with supervisory tasks.

In a similar vein, some studies have analysed the role of discrimination and social closure in hindering women´s access to firm-provided training (Tomaskovic-Devey and Skaggs, 2002; Petersen and Saporta, 2004; Mun, 2010). According to these studies, gender differences in specialized skills are the result of the active role played by individual actors with more power (i.e. male employers, male co-workers, and male supervisors) in excluding status inferiors (i.e. women) from the best and most desired jobs, which tend to be those requiring specific training (Tomaskovic-Devey and Skaggs, 2002, p. 109). The resulting underrepresentation of women in supervisory jobs signals other female workers that there are gender-specific barriers and constraints associated with job specialization in the firm they belong to.

Finally, classic socialization approaches have focussed on the cultural transmission of sex-specific values, norms, and orientations, and have investigated the effect of holding traditional gender views on the labour market (Reskin, 1993; Reskin and Bielby, 2005). More recent sociological contributions have investigated the social interaction processes that help recreate gender-specific status beliefs (Ridgeway and Erickson, 2000; Ridgeway and Correll, 2004) as well as gender-biased expectations regarding self-competence (Correll 2001, 2004). These belief-formation approaches explain gender differences in job allocation even under conditions of attitudinal convergence between men and women. Workers with supervisory tasks within each firm play an important role in transmitting norms, values, and orientations within each firm. Thus, the gender of workers in these supervisory jobs can affect significantly job allocation within each firm.

Despite the previous arguments in favour of an increase in women´s access to managerial positions, two assumptions must hold in order for female managers to reduce workplace inequality. Firstly, female managers must be motivated to act in the interests of subordinate women. Second, they must have sufficient power to decrease gender inequality by improving their subordinates´ outcomes. The motivations of female managers may be affected by two potential sources of loyalty or identity: their female peers in subordinate class positions and their managerial peers and superiors (Cohen and Huffman, 2007). Class is a source of distinction that could prevent the expression of collective identity among women (Young, 1994). In fact, a selection process may operate such that female workers are promoted into management partly because of their affinity with the existing hierarchy. Furthermore, some women share men´s biased views of women´s work (Deaux, 1985). Thus, the potential for female managers to act against inequality may be limited.

The managerial power assumption may also be unsound. It is not obvious that managers, especially those working in bureaucratic organizations, are able to act autonomously on the basis of their own or women´s interests. In fact, they may be compelled to act under the mandates of routinization, efficiency, or profitability or according to the prejudices of those heading the hierarchy (Merton, 1940). Kanter (1977) suggested that female managers occupy weak structural positions and Ridgeway (1997) suggested that they are handicapped by their lower power and by interactional gender mechanisms. In fact, the increase in women holding managerial positions may reflect the fact that some non-managerial workers have been reclassified as managers with little increase in pay or authority (Jacobs, 1992).

In summary, female managers may enhance the labour market prospects of women in non-managerial positions. Their homophilous preferences or affiliations and their role as a benchmark for other women may promote equality. Furthermore, women may be more aware than men of discriminatory practices and may be less susceptible to cognitive processes leading to gender bias. In contrast, bureaucracy, market pressures, divided loyalties, past discrimination, or the mandates of those with more power within the firm may dilute women´s managerial power to confront inequality.

Despite these arguments, few empirical studies have analysed the effect of the sex composition of managers or supervisors on the gender wage gap among their subordinates. For example, Hulting and Szulkin (2003) found that in Sweden the gender pay gap among workers without any managerial or supervisory responsibilities was lower in firms with a higher share of women among supervisors, whereas the proportion of women among managers had no effect on the gap. Additionally, Cohen and Huffman (2007) found that in the USA the gender pay gap among non-managerial workers is lower in industries with a large share of women in management occupations, although their data did not allow them to investigate this finding at the firm level. Using linked employer-employee data for Portugal and controlling for employment segregation by including firm fixed effects, Rute-Cardoso and Winter-Ebmer (2010) found a lower gender pay gap in female-led firms than in male-led firms. However, gender segregation was not fully controlled for in this paper. Similarly, Hirsch (2013) found that an increase in the female share in first-level management by 10 percentage points decreased the unexplained within-job gender pay gap in Germany by 0.5 log points. The effect was more pronounced for the female share in second-level management than in first-level management. However, Hirsch (2013) did not

have information on working hours and therefore had to study the effect of the female share in management jobs on daily wages.

Other papers have analysed the effects of women´s representation in the top levels of firm hierarchies on managers´ outcomes. For example, Bell (2005) showed that the gender pay gap among top executives was significantly lower in women-led firms than in other firms. However, this was not the case when controlling for specific occupational titles. Furthermore, Bell (2005) found that the difference between the pay of men and women in companies with a high share of women board members is even larger than in firms with no female members. Finally, Elkinawy and Stater (2011) found that the gender difference in salary is larger in firms with more male-dominated boards.

In addition, some authors have investigated the effect of an increase in the proportion of female supervisors on gender segregation. For example, Baron (1991), Baron, Mittman and Newman (1991), Carrington and Troske (1995), and Cohen, Broschak and Haveman (1998) have suggested that women´s access to managerial positions decreases gender segregation and lowers the barriers to other women accessing to top positions within their firms. Likewise, Bell (2005) showed that women leaders help women gain access to the highest ranks in the firm. Lastly, Elkinawy and Stater (2011) observed that firms with more male-dominated boards have fewer female executives in top managerial positions.

Nevertheless, all of these results may be biased due to the endogeneity of job choices. In fact, unmeasured variables could drive both the gender wage gap and the representation of women in management. Few studies have taken into account this endogeneity problem. In a randomized experiment, Bagues and Esteve-Volart (2007) investigated recruitment committees for Spanish public service positions and found that female recruiters treated female candidates more unfavourably. Using a similar experiment, Broder (1993) found that female reviewers of economics proposals for National Science Foundation grants awarded lower grades to women than to men. Thus, results can be strongly affected by taking into account endogenous decisions on job allocation.

The main aim of this paper was to measure the effect of the gender composition of supervisory jobs on the gender wage gap and on the probability of holding a supervisory job. On the one hand, we used a probit model to obtain the determinants of each worker´s choice of job status. On the other hand, we used a switching model to estimate the effect of an increase in the proportion of female supervisors on the gender wage gap among

supervisors and non-supervisors. Unlike previous studies, these estimations allowed us to control for the endogeneity problem previously mentioned.

Hence, this study contributes to previous empirical literature in three different ways. First, using the probit model, we investigated whether a greater proportion of women among supervisors reduces other women´s barriers to these better posts by controlling for a relevant set of explanatory variables which affects the type of job chosen. Second, using the switching model, we compared the effects on the wage gap of women´s access to supervisory jobs for supervisors and for non-supervisors. Finally, we broke down the effects of the gender composition of supervisory jobs on the wage gap into several components. The direct effect was the impact of women´s representation among supervisors on the wage difference between men and women within the same job. The indirect effects included the impact of more women reaching supervisory posts on the wage gap induced by its impact on each type of gender segregation. For example, the presence of more women in supervisory jobs in male-dominated establishments and industries, where wages are higher, might encourage other women to seek jobs there. This would reduce these types of gender segregation and therefore the wage gap that they would prompt. Similarly, a greater percentage of women in supervisory jobs might reduce the barriers women face in jobs that are mainly dominated by men (which are better paid), thus reducing occupational segregation within each establishment and the resulting gender wage gap.

The rest of the paper is organized as follows: The next section outlines the econometric methodology; Section 3 describes the data sources; Section 4 shows the main empirical results; Section 5 analyses the robustness of these results; some concluding comments are provided in the final section.

2. Methodological framework

2.1. Econometric Specification

This section describes the methodology applied to estimate the impact of an increase in the proportion of women with supervisory jobs within an establishment on the wage gap and on the effect of different types of gender segregation on the wage difference. We assume that each individual makes his or her decisions in two stages. First, if a worker is offered a supervisory job, he or she will have to choose whether to accept or reject it. Second, each worker will receive a wage depending on his or her choice.

Each individual will accept an offer of a supervisory job if and only if his or her reservation wage is lower than the wage offered, that is,

$$w_i^r < w_{hjki} \tag{1}$$

where w_i^r is worker i's reservation wage for accepting a supervisory job, whereas w_{hjki} is the wage offered to individual i in job k within the establishment j in the industry h for accepting a supervisory post. We assume that the reservation wage depends on each worker's personal characteristics, whereas the wage offered by the firm depends on the industry, establishment, and job characteristics as well as on each worker's personal characteristics. Equation (1) can be expressed as:

$$\alpha_1 + m_i \tau_1 + c_i' \gamma_1 + \varepsilon_i < \alpha_2 + m_i \tau_2 + c_{hjki}' \gamma_2 + \xi_{hjki} \tag{2}$$

Where m_i is a dummy variable equal to one when the worker is a man and equal to zero otherwise, c_i denotes a vector of individual characteristics, c_{hjki} denotes industry, establishment, job, and individual characteristics, ε_i, ξ_{hjki} includes unobservable characteristics which affect the reservation wage and the wage offered, respectively, α_1, α_2, τ_1, τ_2, γ_1 and γ_2 are the vectors of parameters. Equation (2) can be expressed as:

$$s_{hjki} = 1(\alpha + m_i \tau + z_{hjki}' \gamma + v_{hjki} > 0) \tag{3}$$

where s_{hjki} represents the supervisory status of each worker, and $1(.)$ is the indicator function which is unity whenever the statement in brackets is true, $z_{hjki}' = \left(c_{hjki}', c_i' \right)$, which is a row vector, $\alpha = \alpha_2 - \alpha_1$, $\tau = \tau_2 - \tau_1$, $\gamma = \begin{pmatrix} \gamma_2 \\ -\gamma_1 \end{pmatrix}$, which is a column vector, and $v_{hjki} = \xi_{hjki} - \varepsilon_i$, which is assumed to be independent of z_{hjki} and m_i with a standard normal distribution. Each worker's wage will depend on his or her chosen supervisory status:

$$w_{hjki}^o = \delta_1 + \eta_1 m_{hjki} + x_{hjki}' \beta_1 + u_{1hjki} \quad \text{if } s_{hjki} = 1 \tag{4}$$

$$w_{hjki}^o = \delta_2 + \eta_2 m_{hjki} + x_{hjki}' \beta_2 + u_{2hjki} \quad \text{if } s_{hjki} = 0 \tag{5}$$

where w_{hjki}^o is the logarithm of the observed wage of each worker, m_{hjki} is a dummy variable equal to 1 if a worker is a male and zero otherwise, x_{hjki} is a vector of each

worker´s individual characteristics as well as industry, establishment, and job characteristics, whereas δ_1, δ_2, η_1, η_2, β_1, and β_2 are the vectors of parameters. Finally, u_{1hjki} and u_{2hjki} include unobservable characteristics associated with each type of worker[1]. We assume that u_{1hjki}, u_{2hjki} and v_{hjki} follow a trivariate normal distribution with a vector of means equal to zero and with the following covariance matrix:

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{1v} \\ \sigma_{12} & \sigma_2^2 & \sigma_{2v} \\ \sigma_{1v} & \sigma_{2v} & 1 \end{pmatrix}$$

We can now derive the expectation of each worker´s log wage conditional on observable characteristics and on her supervisory status:

$$E\left(w_{hjki}^o | m_{hjki}, x_{hjki}', s_{hjki} = 1\right) = \delta_1 + \eta_1 m_{hjki} + x_{hjki}'\beta_1 + \sigma_{1v}\lambda \qquad (6)$$

$$E\left(w_{hjki}^o | m_{hjki}, x_{hjki}', s_{hjki} = 0\right) = \delta_2 + \eta_2 m_{hjki} + x_{hjki}'\beta_2 - \sigma_{2v}\bar{\lambda} \qquad (7)$$

where $\lambda = \dfrac{\phi\left(\alpha + m_i\tau + z_{hjki}'\gamma\right)}{\Phi\left(\alpha + m_i\tau + z_{hjki}'\gamma\right)}$, $\bar{\lambda} = \dfrac{\phi\left(\alpha + m_i\tau + z_{hjki}'\gamma\right)}{1 - \Phi\left(\alpha + m_i\tau + z_{hjki}'\gamma\right)}$, $\phi(.)$ is the density function of a standard normal and $\Phi(.)$ is its distribution function. Thus, we can estimate all the parameters using a two-step methodology. First, we estimate a probit model for the supervisory job decision with the whole sample. Second, we substitute the predicted probabilities, $\phi\left(\hat{\alpha} + m_i\hat{\tau} + z_{hjki}'\hat{\gamma}\right)$ and $\Phi\left(\hat{\alpha} + m_i\hat{\tau} + z_{hjki}'\hat{\gamma}\right)$ into equations (6) and (7) in order to estimate separate wage regressions for each group of workers. In this way, we control for the sample selection problem of workers with and without supervisory jobs.

This econometric specification estimates the contribution to the wage gap of the difference between men and women in each observable characteristic. Furthermore, we can separate these contributions for supervisors and non-supervisors. For example, from equation (6), the gender wage difference for supervisors is defined as:

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[1] The meanings of the subscripts in the different stages of each worker´s decision process are slightly different. In particular, the subscript of each variable in the job status choice (equations 1-3) denotes whether the corresponding variable include only individual characteristics (subscript i) or industrial, establishment, job and individual characteristics (subscript hjki). However, the subscript of each variable in the wage equations, that is, in equations (4) and (5), identifies the worker considered. For this reason, all the variables in those equations have the same subscript which represents the worker i holding job k within the establishment j in the industry h.

$$E\left(w^o_{hjki}\big|x'_{hjki}, s_{hjki}=1, m_{hjki}=1\right) - E\left(w^o_{hjki}\big|x'_{hjki}, s_{hjki}=1, m_{hjki}=0\right) = \eta_1 +$$
$$\beta'_1\left[E\left(x_{hjki}\big|s_{hjki}=1, m_{hjki}=1\right) - E\left(x_{hjki}\big|s_{hjki}=1, m_{hjki}=0\right)\right] +$$
$$\sigma_{1v}\left[E\left(\frac{\phi\left(\alpha+\tau+z'_{hjki}\gamma\right)}{\Phi\left(\alpha+\tau+z'_{hjki}\gamma\right)}\bigg|s_{hjki}=1, m_{hjki}=1\right) - E\left(\frac{\phi\left(\alpha+z'_{hjki}\gamma\right)}{\Phi\left(\alpha+z'_{hjki}\gamma\right)}\bigg|s_{hjki}=1, m_{hjki}=0\right)\right]$$

<div align="right">(8)</div>

The wage difference for non-supervisors is defined in a similar way from equation (7):

$$E\left(w^o_{hjki}\big|x'_{hjki}, s_{hjki}=0, m_{hjki}=1\right) - E\left(w^o_{hjki}\big|x'_{hjki}, s_{hjki}=0, m_{hjki}=0\right) = \eta_2 +$$
$$\beta'_2\left[E\left(x_{hjki}\big|s_{hjki}=0, m_{hjki}=1\right) - E\left(x_{hjki}\big|s_{hjki}=0, m_{hjki}=0\right)\right] -$$
$$-\sigma_{2v}\left[E\left(\frac{\phi\left(\alpha+\tau+z'_{hjki}\gamma\right)}{1-\Phi\left(\alpha+\tau+z'_{hjki}\gamma\right)}\bigg|s_{hjki}=0, m_{hjki}=1\right) -$$
$$-E\left(\frac{\phi\left(\alpha+z'_{hjki}\gamma\right)}{1-\Phi\left(\alpha+z'_{hjki}\gamma\right)}\bigg|s_{hjki}=0, m_{hjki}=0\right)\right]$$

<div align="center">(9)</div>

As x includes the proportion of women with supervisory jobs within each establishment as well as its interaction with gender and segregation variables, from equations (8) and (9), we can separate the effect of an increase in the proportion of women with supervisory jobs within each establishment on the wage gap within each job from the effect of this better representation of women among supervisors on the wage gap caused by each type of gender segregation. Standard errors for these contributions are clustered at the establishment level.

2.2. Description of the variables

This section describes the variables used in the wage regressions. The dependent variable for the probit model takes value 1 if the worker holds a supervisory job and 0 otherwise, whereas the log gross hourly wage is the dependent variable of the wage regressions. The control variables include individual characteristics as well as characteristics of the industry, the establishment, and each worker's job. Individual characteristics include gender and nationality, different measures of a worker's human capital, such as the number of years of schooling, theoretical work experience,[2] and tenure in the firm. We add the square of theoretical work experience to take into account the possible concave relationship between wages and this variable. Additionally, three dummy variables are used to represent the type of contract: the first dummy takes value 1 when the work is temporary and 0 otherwise; the

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[2] Theoretical work experience is equal to the age of each worker minus his/her years of completed schooling minus 6.

second dummy variable takes value 1 when the worker's contract is part-time and 0 otherwise; and the third dummy variable takes value 1 when the contract is seasonal and 0 otherwise

We included the proportion of women in each industry to identify the industrial segregation effect on the wage gap. This variable was calculated using the Spanish National Classification of Economic Activities 2009 (NCEA-09) conducted out by the Spanish National Institute of Statistics.

The establishment characteristics were controlled by variables which indicate its size, ownership, target market, type of collective bargaining agreement applied, as well as establishment segregation. In particular, we used dummy variables to classify establishments as large (100 or more workers), medium (between 50 and 99 workers), and small (fewer than 50 workers). Regarding the type of ownership, a dummy variable was used to distinguish state-owned establishments from private establishments. Likewise, establishments whose target market was regional, national or international were differentiated. Furthermore, other dummy variables were added to consider the type of collective bargaining agreement. Specifically, we distinguished sectorial or regional agreements – which are automatically extended to cover an industry or a region –from firm-specific agreements, which are applied to all establishments in the same firm. Finally, we added the proportion of women in each establishment and the proportion of women among supervisors within each establishment, which is the key variable in this study.

Regarding job characteristics, we included the proportion of women working in each job within each establishment.

In order to estimate what we called the direct and indirect effects of women´s access to supervisory jobs on gender outcomes in the labour market, the proportion of women among supervisors interacts with four gender variables: the dummy variable indicating whether a worker is female and the proportions of women within each industry, establishment, and job. The estimated coefficient of the first interaction variable measures the direct effect of an increase in women´s responsibilities on the wage gap, whereas the estimated coefficients of the other interaction variables depict the indirect effects on the wage difference between both genders. For example, if a rise in the proportion of female supervisors decreased the gender wage gap and decreased the effect of each type of gender

segregation on the wage difference, the estimated coefficients of these four variables would be positive.

To identify the parameters of our model, an explanatory variable had to be included that only affects the probit decision but not each worker´s wage. In our analysis, we assumed that short-term disabilities, recently born children, having to care for other family members or dependants, or being on strike would affect the type of job chosen by workers, but would not have an influence on workers´ wages. For this reason, we added four explanatory dummy variables in the probit model that are not included in the wage regressions. In particular, the first dummy variable represents whether each worker was on sick leave due to a temporary disability during the year; the second dummy variable takes value 1 if each worker was on maternity or paternity leave during the year and 0 otherwise; the third dummy variable indicates whether each worker had fewer working days in order to looking after other family members; and the fourth dummy variable takes value 1 if the worker was on strike or suspended from her job for any reason during the year and 0 otherwise. Thus, the basic assumption was that people make decisions and face restrictions during their life cycle that have an effect on their health status, the size of their family, and their family commitment, and that these decisions and restrictions would also affect their probabilities of being offered and accepting a supervisory job. However, each worker´s wage only depends on the type of job chosen, her level of integration in the Spanish labour market (measured by each employee´s nationality), her human capital, her type of contract, and the type of industry and firm in which she works. In other words, we assumed that, conditional on the four dummy variables added to the probit model, the random shocks of the wage regressions are independent of the explanatory variables.

3. Data and descriptive statistics

3.1 The dataset

The data used in this study were obtained from the 2010 Wage Structure Survey (WSS-2010) conducted by the Spanish National Institute of Statistics. This survey contains matched employer-employee data drawn from a representative sample of 213,709 salaried workers belonging to 24,848 establishments located in Spain in 2010 and provides information on wages, employees´ socioeconomic variables, and establishment and job characteristics.

The WSS-2010 contains information on establishments with 1 or more workers. One of the main advantages of this database is that it covers a wide spectrum of industries and occupations; specifically, it includes establishments from 18 different industries which appear in the 2009 Spanish National Classification of Economic Activities (NCEA-09). Moreover, it provides a high degree of occupational disaggregation due to containing information on 60 different occupations.

We consider that individuals holding the same occupation within the same establishment and with the same supervisory status occupy the same job. Given this narrow definition, we expects that most jobs include only a few employees. Table 1 shows the distribution of jobs by the number of women and men in each job.

Table 1. *Distribution of jobs across different size categories*

Number of women in each job	Number of men in each job						Total
	0	**1**	**2**	**3-4**	**5-9**	**10-50**	
0	0	31,489	7300	4715	1850	350	45,704
1	21,685	4276	1546	1021	551	190	29,269
2	3718	1518	724	512	289	121	6882
3-4	1871	988	560	490	360	139	4408
5-9	705	632	428	507	427	133	2832
10-50	190	195	176	249	289	37	1136
Total	28,169	39,098	10,734	7494	3766	970	90,231

Table 1 shows that there were 53,174 jobs with only one worker (58.9% of the total). There were 16,358 integrated jobs, i.e., jobs including men and women. The remaining jobs were held by either men or women. More specifically, there were 45,704 jobs occupied by men alone and 28,169 by women alone. On average, there were 3.16 men per job in the former category and 3 women in the latter.

3.2. Sample statistics

Table 2 compares establishments in which there are women supervisors to those in which there are no female supervisors. The average hourly wage is significantly higher in the former establishments than in the latter. Likewise, women achieve supervisory positions in establishments with more female workers and with more educated workers. Furthermore, workers have greater tenure in the firm, but lower labour experience in establishments with

female supervisors than in the other type. There are also fewer temporary and more discontinuous indefinite contracts in this type of workplace. On average, establishments with some female supervisors are larger, a greater percentage are state-owned, their target market is wider, and they have more firm-specific agreements than the other type of establishments. Finally, there are more workers in commerce and vehicle repair, hospitality, information and communication, finance and insurance, professional, scientific and technical activities, public administration, defence and health services in establishments with some female supervisors than in establishments without female supervisors. However, the opposite is the case in extractive industries, manufacturing, energy, gas, steam, and air conditioning providers, provision of water and waste management, construction, transport, real estate agents, administrative and auxiliary activities, education, and artistic and entertainment activities.

Table 2. *Sample statistics by type of establishment*

Variable	Establishments with female supervisors	Establishments without female supervisors	Total
Individual characteristics			
Hourly wage, Euros***	17.5163 (14.9726)	15.0046 (13.3093)	16.1288 (14.1333)
Proportion of women***	0.5260 (0.4993)	0.3514 (0.4774)	0.4295 (0.4950)
Schooling years***	11.9860 (3.9850)	10.7320 (4.0231)	11.2932 (4.0543)
Firm tenure (years)***	9.8898 (9.8439)	8.7106 (9.3785)	9.2384(9.6074)
Work experience (years)***	22.3995 (11.6215)	23.6753 (11.8054)	23.1043 (11.7406)
Partial contracts	0.1672 (0.3731)	0.1673 (0.3733)	0.1673 (0.3732)
Temporary contracts***	0.1854 (0.3886)	0.2620 (0.4397)	0.2277 (0.4194)
Discontinuous indefinite contracts***	0.0211 (0.1437)	0.0160 (0.1253)	0.0183 (0.1339)
Establishment characteristics			
Medium establishment***	0.0933 (0.2909)	0.1214 (0.3266)	0.1088 (0.3114)
Large establishment***	0.7308 (0.4435)	0.4680 (0.4990)	0.5857 (0.4926)
Public ownership***	0.1906 (0.3928)	0.1392 (0.3462)	0.1622 (0.3687)
National market***	0.4171 (0.4971)	0.4171 (0.4931)	0.4302 (0.4951)
Foreign market***	0.1780 (0.3825)	0.1380 (0.3449)	0.1559 (0.3628)
Firm agreement***	0.3732 (0.4836)	0.3221 (0.4673)	0.3449 (0.4754)
Industry			
Extractive industry***	0.0034 (0.0580)	0.0113 (0.1055)	0.0077 (0.0876)
Manufacturing industry***	0.1883 (0.3909)	0.2773 (0.4476)	0.2374 (0.4255)
Energy, gas, steam and air conditioning providers***	0.0061 (0.0779)	0.0110 (0.1045)	0.0088 (0.0936)
Provision of water and waste management***	0.0215 (0.1452)	0.0324 (0.1771)	0.0275 (0.1637)
Construction***	0.0390 (0.1935)	0.0871 (0.2819)	0.0655 (0.2475)
Commerce and vehicle repair***	0.1020 (0.3026)	0.0678 (0.2514)	0.0831 (0.2760)
Transport***	0.0435 (0.2039)	0.0609 (0.2392)	0.0531 (0.2243)
Hospitality***	0.0459 (0.2093)	0.0228 (0.1492)	0.0331 (0.1790)
Information and communication industry***	0.0604 (0.2382)	0.0496 (0.2172)	0.0544 (0.2269)
Finance and insurance***	0.0703 (0.2557)	0.0243 (0.1539)	0.0449 (0.2070)
Real estate agents***	0.0048 (0.0693)	0.0072 (0.0845)	0.0061 (0.0781)
Professional, scientific and technical activities***	0.0858 (0.2801)	0.0618 (0.2408)	0.0726 (0.2594)
Administrative and auxiliary activities***	0.0755 (0.2642)	0.1056 (0.3073)	0.0921 (0.2892)
Public Administrations and defence***	0.0673 (0.2505)	0.0298 (0.1701)	0.0466 (0.2107)
Education***	0.0274 (0.1633)	0.0324 (0.1769)	0.0301 (0.1710)
Health services***	0.1062 (0.3081)	0.0664 (0.2489)	0.0842 (0.2777)
Artistic and entertainment activities*	0.0254 (0.1575)	0.0268 (0.1614)	0.0262 (0.1597)
Sample size	95 651	118 058	213 709

Notes: Standard deviations are in parentheses. A mean comparison test assuming independent samples and unequal variances was conducted. *indicates a 10% significance level; **indicates a 5% significance level; and *** indicates a 1% significance level.

Table 3 depicts significant gender differences related to market outcomes. We observe that men earn on average 29.1% more than women per hour worked. Men have more tenure in the firm and more theoretical work experience, whereas women have a higher educational level. Women hold more temporary, partial, and discontinuous indefinite contracts than men. Thus, women are contracted with a lower level of commitment to firms than men. More men work in smaller establishments than women, but are employed in firms with a wider target market. In addition, more women work in publicly owned establishments.

Table 3. *Sample statistics by gender*

Variable	Men	Women	Total
Individual characteristics			
Hourly wage, Euros***	17.8600 (15.2524)	13.8298 (12.1166)	16.1288 (14.1333)
Schooling years***	10.9653 (4.0779)	11.7288 (3.9812)	11.2932 (4.0543)
Firm tenure (years)***	10.0909 (10.1592)	8.1062 (8.6933)	9.2384 (9.6074)
Work experience (years)***	24.2011 (11.7410)	21.6476 (11.5807)	23.1043 (11.7406)
Partial contracts***	0.0918 (0.2888)	0.2674 (0.4426)	0.1673 (0.3732)
Temporary contracts***	0.2182 (0.4130)	0.2404 (0.4273)	0.2277 (0.4194)
Discontinuous indefinite contracts***	0.0091 (0.0949)	0.0305 (0.1719)	0.0183 (0.1339)
Establishment characteristics			
Medium establishment***	0.1189 (0.3237)	0.0954 (0.2938)	0.1088 (0.3114)
Large establishment***	0.5544 (0.4970)	0.6272 (0.4836)	0.5857 (0.4926)
Public ownership***	0.1312 (0.3376)	0.2034 (0.4025)	0.1622 (0.3687)
National market***	0.4351 (0.4958)	0.4236 (0.4941)	0.4302 (0.4951)
Foreign market***	0.1815 (0.3854)	0.1219 (0.3272)	0.1559 (0.3628)
Firm agreement	0.3458 (0.4756)	0.3438 (0.4750)	0.3449 (0.4754)
Gender segregation			
Proportion of women in each industry***	0.3729 (0.1709)	0.5048 (0.1628)	0.4295 (0.1797)
Proportion of women in each establishment***	0.2772 (0.2322)	0.6319 (0.2428)	0.4295 (0.2948)
Proportion of women in each job***	0.1969 (0.3215)	0.5447 (0.3175)	0.3463 (0.3632)
Proportion of women with supervisory jobs***	0.1769 (0.2818)	0.3556 (0.3858)	0.2537 (0.3421)
Sample size	121 911	91 798	213 709

Notes: Standard deviations are in parentheses. A mean comparison test assuming independent samples and unequal variances was conducted.* indicates a 10% significance level; ** indicates a 5% significance level; and *** indicates a 1% significance level.

A comparison of the proportion of women in industries, establishments or jobs in which both men and women work clearly shows that there is gender segregation in the Spanish labour market. For example, we see that only 37.29% of women work in those industries where men are employed, whereas 50.48% of women work in those industries where women work. Thus, industrial segregation by gender is an important phenomenon. Table 3 also highlights the importance of establishment segregation and occupational segregation within each establishment. Finally, the proportion of women with supervisory tasks in those establishments in which men work is significantly lower than in those in which women work. Hence, famale supervisors typically oversee other women.

4. Results

This section includes several sets of estimations. First, Table 4 presents the marginal effects of each variable on the probability of having a supervisory job. Second, the OLS results obtained from standard regressions without controlling for the endogeneity of the job choice are included in the first two columns of Table 5, whereas the last four columns show the results of the switching model for workers with and without supervisory jobs, separately. Finally, based on the estimations of the switching model, Table 6 shows the effects on the wage gap of gender differences by observable characteristics[3].

4.1. Probit estimates

As expected, Table 4 shows that the probability of holding a supervisory job is significantly lower for women than for men and is higher for Spanish employees than for foreigners. We also observe that individuals from countries that do not belong to the European Union have a significantly lower probability of reaching a supervisory post than workers from Latin America and from the European Union. Hence, it seems that job status is associated with the level of assimilation of foreign workers into the Spanish labour market. Furthermore, the higher the worker´s educational level, labour experience, and firm tenure, the greater the probability of holding a supervisory job. As usual, the effect of labour experience is not linear. Finally, workers with short-term disabilities, those on strike, or those caring for other family members are less likely to hold a supervisory job. However, Spanish laws against gender discrimination and the authorities´ surveillance of this type of practice may prevent being on maternity leave from having a significant effect on the probability of reaching a supervisory status.

The type of contract also affects the probability of holding a supervisory job. In particular, workers with part-time or temporary contracts are less likely to oversee other workers than those with indefinite contracts, even when the indefinite contracts are seasonal. Thus, the greater workers´ commitment to a firm, the greater the probability of holding a supervisory post. Regarding the effect of occupational segregation within each establishment, we found that the higher the proportion of female employees within a job, the lower the probability

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[3] If the mean difference between men and women for a variable or its estimated coefficient is not significantly different from zero (at least at a 10% level), we assign zero to its relative impact.

of reaching a supervisory status within that job. This may be because women are more concentrated in jobs in which they have less chance of reaching a supervisory position.

Regarding the effects of the characteristics of establishments, we found that workers are less likely to hold a supervisory job in larger establishments than in smaller ones, in public establishments than in private ones, and in establishments whose target market is national rather than regional. Workers are less likely to oversee other workers in establishments with firm-specific agreements than in those governed by sectorial or national agreements. These results suggest that the likelihood that workers oversee other employees depend on the ratio of supervisory jobs to potential candidates within each establishment, which will depend on its size, ownership, target market and type of collective agreement. Regarding the effect of establishment segregation by gender, we found that the higher the proportion of women within an establishment, the higher the chances of having a supervisory job. Thus, it appears that there is a higher concentration of women in establishments with more supervisory jobs. This may also explain that an increase in the proportion of women with supervisory positions within an establishment significantly increases the probability of achieving this type of job.

In contrast, women are concentrated in industries with fewer possibilities of achieving a supervisory position. The estimated coefficients of the interactions between the proportion of women among supervisors within each establishment and other gender variables illustrate the effects of increasing women´s power within the workplace. In fact, we obtained that a greater proportion of female supervisors decreases the gender difference in the probability of reaching a supervisory job. Moreover, an increase in the proportion of women in supervisory posts increases the probability of a worker reaching these positions and this effect is greater in those jobs where more women work, but is lower in those establishments where there are a greater concentration of women[4]. In summary, an increase in the proportion of female supervisors within an establishment will narrow the gender gap in the access to these posts by means of two mechanisms. First, a better access for women to supervisory positions will increase the probability of reaching these posts to a greater extent for women than for men. Second, when more women oversee other workers within

[4]As Table 4 shows, an increase in the proportion of women within each establishment as well as an increase in the proportion of women among supervisors within an establishment increases the probability of workers holding a supervisory job. These estimations could reflect the existence of female-friendly establishments. However, in female-dominated establishments with more women among supervisors, there will be fewer supervisory posts left for other workers, which could explain the negative impact of the interaction between female supervisors and the proportion of women within each establishment.

an establishment, they will help other women to reach supervisory positions mainly in female-dominated jobs.

Table 4. *Probit model for the supervisory job choice*

	Marginal effect	Stand. E.[1]
Individual regressors		
Female	-0.1007***	0.0036
EU (Spain not included)	-0.0097**	0.0049
Rest of Europe	-0.0654***	0.0107
Latin America	-0.0311***	0.0056
Rest of the world	-0.0331***	0.0078
Schooling years	0.0239***	0.0004
$\sqrt{\text{Firm tenure}}$	0.0144***	0.0008
Experience	0.0059***	0.0003
Experience²	-0.0001***	0.0001
Short-term disability	-0.0366***	0.0018
Maternity leave	-0.0052	0.0039
Family care	-0.0278***	0.0054
Being on strike	-0.0575***	0.0030
Temporary contracts	-0.0455***	0.0030
Part-time contracts	-0.0423***	0.0033
Discontinuous indefinite contracts	0.0631***	0.0166
Job regressors		
Proportion of women	-0.2992***	0.0085
Establishment regressors		
Proportion of women	0.0501***	0.0080
Proportion of women with supervisory jobs	0.0733***	0.0117
Medium establishment	-0.0128***	0.0033
Large establishment	-0.0323***	0.0029
Public ownership	-0.0259***	0.0044
National market	-0.0067**	0.0029
Foreign market	-0.0038	0.0039
Firm agreement	-0.0153***	0.0031
Industrial regressors		
Proportion of women	-0.0661***	0.0108
Interactions of the proportion of women with supervisory jobs within each establishment with the following explanatory variables		
Female dummy	0.2807***	0.0071
Proportion of women in each industry	-0.0287	0.0262
Proportion of women in each establishment	-0.1992***	0.0156
Proportion of women in each job	0.2175***	0.0180
Number of observations	213,709	
X²(30 degrees of freedom)	11,829.82	
Predicted probability	0.1078	
Pseudo R-squared	0.2311	

Notes: [1] Standard errors are clustered at the establishment level. There are 24,848 clusters. ***Level of significance 1%. **Level of significance 5%. *Level of significance 10%.

4.2. Wage regressions

The first two columns of Table 5 include the results of the wage regressions without controlling for the endogeneity of supervisory jobs, whereas the remaining columns contain the estimations of the switching model for supervisors and for non-supervisors. Similarly, Table 6 shows the effect on the wage gap of the difference between men and women in each observable characteristic. Taking into account the main goal of this paper, Table 5 highlights the estimated coefficients of the proportion of women with supervisory

jobs interacted with the gender dummy variable and with the proportion of women within each industry, establishment and job[5].The standard errors are clustered at the establishment level.

The results of this switching model allow us to estimate the effects on the wage gap of gender difference by observable characteristics for supervisors and for non-supervisors. Specifically, the wage difference between non-supervisor men and non-supervisor women with the same observable characteristics and the same job is 9.7%. This unexplained difference between genders accounts for 55.4% of the wage inequality. However, the unexplained wage gap is not significantly different from zero for supervisors.

As in other previous studies, the uncorrected regressions show that an increase in the proportion of women among supervisors significantly decreases the unexplained wage difference between men and women. Similarly, a higher proportion of female supervisors within an establishment significantly increases wages in female-dominated industries, but decreases wages in establishments and jobs in which there is a greater concentration of women. Nevertheless, the results of the switching model suggest that a greater proportion of female supervisors within each organization significantly increases the wage gap for both supervisors and non-supervisors. Table 6 shows that an increase in the proportion of female supervisors within an establishment explains 82.8% of the wage gap among supervisors and 12.6% of the wage gap among non-supervisors. Thus, these estimations are strongly biased when the endogeneity of job choice is not taken into account.

We found some differences between supervisors and non-supervisors in relation to the impact of women´s access to supervisory posts on the contribution of gender segregation to the wage gap. First, the higher the proportion of women within an industry, the lower the wage, but this effect is lower when there are more women among supervisors, which contributes to decreasing the gender wage difference by 18.6% among supervisors and 9% among non-supervisors. Second, a greater proportion of women within an establishment significantly increases supervisors´ wages, but this effect is lower in those establishments with more female supervisors, explaining 29.9% of the supervisors´ wage gap. However, a greater concentration of women within an establishment significantly decreases non-supervisors´ wages and this effect is greater when there are more women among

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[5]We refer to the estimated coefficients of these variables alone, but the remaining estimated coefficients are consistent with those of previous studies. For example, Amuedo Dorantes and De la Rica (2006) obtained similar effects for the remaining explanatory variables on wages in the Spanish labour market, although they did not study the impact of women´s access to supervisory jobs.

supervisors, which widens the non-supervisors´ wage gap by 7.5%. Third, a rise in the proportion of women within a job significantly increases supervisors´ wages, but this effect is lower in those establishments where more women hold a supervisory position, which accounts for 32.5% of supervisors´ wage gap. Nevertheless, an increase in women´s power within each establishment does not affect the impact of occupational segregation within each establishment on the wage gap for non supervisors. Overall, a higher proportion of women among supervisors increases their gender wage gap by 126.6% and explains 11% of the non-supervisors´ wage difference.

According to previous results, it seems that when more women reach supervisory jobs within female-dominated industries, the main players in the wage bargaining process within those industries are more aware of gender issues, the result of which is a decrease in the average wage difference. Regarding the effects of establishment segregation and occupational segregation within each establishment, we observe that women are more concentrated in those establishments and jobs where supervisors´ wages are greater, but these wage premiums are lower when there are more women among supervisors. Thus, the results might suggest that supervisory positions occupied by women usually imply a nominal change in the job title instead of being better paid jobs with additional responsibilities. Then, a lack of power could explain that a greater proportion of women with supervisory jobs does not help to reduce the wage gap among workers beneath them in those establishments and jobs where more women work.

The switching model also estimates the covariance between unobservable variables that affect the choice of supervisory jobs and unobservable variables that influence the wage setting. The estimations of σ_{1v} and σ_{2v} from equations (6) and (7) suggest that unobservable characteristics which positively affect the probability of reaching a supervisory job are negatively correlated with unobservable variables which positively influence wages for all workers. These results are consistent with Jacobs´ (1992) notion of "title inflation", that is, the reclassification of previously non-supervisory jobs as supervisory jobs with little change in authority or wages. In fact, our results show that those workers with the worst paid unobservable characteristics are more likely to hold a supervisory job[6].

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[6] It is possible that women can only help to narrow the gender wage gap when they have enough power within organizations. For this reason, wage regressions were repeated using a dummy variable indicating whether there are at least 25% (and 50%) of women among supervisors within each establishment instead of using the proportion of female supervisors. The results obtained are qualitatively similar and are available

Table 5. *Wage regression results*

| | Standard regressions | | Switching model | | | |
| | All the workers | | Supervisors | | Non supervisors | |
	Coefficient	Stand. E.[1]	Coefficient	Stand. E.[1]	Coefficient	Stand. E.[1]
Intercept	1.4326***	0.0115	1.9767***	0.0770	1.6087***	0.0040
Individual regressors						
Female	-0.1590***	0.0033	-0.0272	0.0210	-0.0977***	0.0040
EU (Spain not included)	0.0662***	0.0082	0.1278***	0.0228	0.0551***	0.0081
Rest of Europe	-0.0250	0.0178	0.0384	0.0964	0.0006	0.0170
Latin America	-0.0338***	0.0072	0.0203	0.0311	-0.0275***	0.0070
Rest of the world	0.0225*	0.0128	0.1584***	0.0448	0.0176	0.0127
Schooling years	0.0640***	0.0006	0.0510***	0.0029	0.0455***	0.0009
√Firm tenure	0.0849***	0.0015	0.0395***	0.0031	0.0841***	0.0016
Experience	0.0168***	0.0004	0.0213***	0.0012	0.0095***	0.0005
Experience^2	-0.0002***	7.82E-06	-0.0002***	0.0001	-0.0001***	8.38E-06
Temporary contracts	-0.0246***	0.0043	-0.0238**	0.0121	0.0058	0.0044
Part-time contracts	-0.0224***	0.0049	-0.0064	0.0147	-0.0064	0.0051
Discontinuous indefinite contracts	0.1966***	0.0199	-0.0004	0.0437	0.2020***	0.0207
Job regressors						
Proportion of women	-0.1015***	0.0070	0.3405***	0.0477	0.0032	0.0085
Establishment regressors						
Proportion of women	-0.1024***	0.0111	0.0526**	0.0261	-0.1811***	0.0114
Proportion of women with supervisory jobs	0.0445**	0.0192	0.0098	0.0352	-0.0271	0.0202
Medium establishment	0.0775***	0.0062	0.1320***	0.0118	0.0750***	0.0063
Large establishment	0.1514***	0.0049	0.2376***	0.0099	0.1609***	0.0051
Public ownership	0.1185***	0.0080	0.0397***	0.0136	0.1729***	0.0086
National market	0.0543***	0.0049	0.1212***	0.0084	0.0380***	0.0051
Foreign market	0.0991***	0.0072	0.1493***	0.0115	0.0871***	0.0075
Firm agreement	0.0629***	0.0057	0.0780***	0.0099	0.0716***	0.0059
Industrial regressors						
Proportion of women	-0.1368***	0.0183	-0.0955***	0.0359	-0.0956***	0.0190
Interactions of the proportion of women with supervisory jobs within each establishment with the following explanatory variables						
Female dummy	0.0682***	0.0068	-0.3174***	0.0468	-0.0732***	0.0103
Proportion of women in each industry	0.1443***	0.0435	0.1863**	0.0735	0.1815***	0.0467
Proportion of women in each establishment	-0.2296***	0.0280	-0.2139***	0.0474	-0.0937***	0.0323
Proportion of women in each job	-0.0331**	0.0172	-0.3788***	0.0595	-0.0274	0.0212
Other parameters						
σ_{1v}			-0.2945***	0.0289		
σ_{2v}					-0.1539***	0.0154
Number of observations	213 709		40 276		173 433	
F(26, 24 847)	1534.80					
F(27, 15 138)			537.37			
F(27, 23 695)					986.22	
R-squared	0.4599		0.4312		0.4311	

Notes: [1] The standard errors are adjusted for 24,848 clusters for the OLS estimations, those of supervisors´ regressions are adjusted for 15,139 clusters and those of non-supervisors are adjusted for 23,696 clusters. ***Level of significance 1%. **Level of significance 5%. *Level of significance 10%.

It may be the case that women with power within firms can only help other women to increase their wages when wages are set within these organizations, but cannot do this if wages are bargained in a wider context, such as industry in general, the region or the entire country. For this reason, uncorrected and corrected regressions were also estimated for the different types of collective bargaining agreement applied. The results are not described, but we find that the results for workers covered by firm-specific agreements and for those

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from the authors upon request. The only difference we highlight is that the probability of holding a supervisory job is lower in establishments where there are at least 50% of female supervisors than in the other establishments. This change is predictable because when the proportion of female supervisors is higher than 50% in an establishment, it is less likely that other workers can achieve these positions.

covered by national, regional, or industry agreements are similar to those presented in Tables 5 and 6. Furthermore, no significant differences were found between the results obtained for workers covered by each type of collective agreement.

Table 6. *Gender wage gap decompositions*

	Mean difference by gender		Contribution to the wage gap	
	Supervisors	Non supervisors	Supervisors	Non supervisors
Individual regressors				
Female	-1.0000***	-1.0000***	0.0000	0.0977
EU (Spain not included)	0.0000	0.0039***	0.0000	0.0002
Rest of Europe	0.0000	-0.0004*	0.0000	0.0000
Latin America	-0.0025**	-0.0040***	0.0000	0.0001
Rest of the world	0.0021***	0.0127***	0.0003	0.0000
Schooling years	-0.8955***	-0.9593***	-0.0457	-0.0436
√Firm tenure	0.3815***	0.2283***	0.0151	0.0192
Experience	4.7883***	2.0983***	0.1023	0.0199
Experience^2	229.9770***	100.4354***	-0.0449	-0.0103
Temporary contracts	-0.0170***	-0.0110***	0.0004	0.0000
Part-time contracts	-0.0740***	-0.1895***	0.0000	0.0000
Discontinuous indefinite contracts	-0.0101***	-0.0232***	0.0000	-0.0047
			0.0276	0.0785
Job regressors				
Proportion of women	-0.2908***	-0.3446***	-0.0990	0.0000
			-0.0990	0.0000
Establishment regressors				
Proportion of women	-0.2985***	-0.3665***	-0.0156	0.0664
Proportion of women with supervisory jobs	-0.4774***	-0.1264***	0.0000	0.0000
Medium establishment	0.0219***	0.0235***	0.0029	0.0018
Large establishment	-0.0280***	-0.0794***	-0.0067	-0.0128
Public ownership	-0.0713***	-0.0720***	-0.0028	-0.0124
National market	0.0287***	0.0068***	0.0035	0.0003
Foreign market	0.0632***	0.0568***	0.0094	0.0049
Firm agreement	0.0093*	0.0000	0.0007	0.0000
			-0.0087	0.0481
Industrial regressors				
Proportion of women	-0.1114***	-0.1354***	0.0106	0.0129
			0.0106	0.0129
Interactions of the proportion of women with supervisory jobs within each establishment with other explanatory variables				
Female dummy	-0.6552***	-0.3031***	0.2080	0.0222
Proportion of women in each industry	-0.2511***	-0.0881***	-0.0468	-0.0160
Proportion of women in each establishment	-0.3514***	-0.1421***	0.0752	0.0133
Proportion of women in each job	-0.2153***	-0.1095***	0.0816	0.0000
			0.3179	0.0195
Other variables				
λ	-0.0089***		0.0026	
λ		0.1119***		0.0172
Overall sum			0.2511	0.1763

Notes: The raw wage gap, as measured by the sex difference in mean log wages, is 0.2511 for supervisors and 0.1763 for non-supervisors. The first two columns show the mean differences by gender of all regressors for supervisors and non-supervisors, respectively. In both columns, mean comparison tests are applied assuming independent samples and unequal variances. ***Level of significance 1%; **Level of significance 5%; *Level of significance 10%. The last two columns show the absolute contribution to the wage gap of the gender difference in each regressor. The contributions were obtained by multiplying the coefficients in Table 5 by the sex differences in the sample means in this table. The cumulative effects of individual, industrial, establishment, and job regressors, as well as those of the interactions of the proportion of women among supervisors with other female variables, are shown below the horizontal lines.

Some previous studies have only investigated employees in the private sector. Given that the results shown in Table 5 may be driven by the presence of workers employed in state-owned establishments, wage regressions were repeated only for workers within private establishments. Once again, the qualitative results (not reported) are the same as those for the whole sample.

Finally, in order to address the possibility that female supervisors may only influence some components of wages, all the wage models were also estimated separately for the base salary and for the variable complements. These estimations were not included in the paper because no qualitative differences were found between these estimations and those presented in Tables 5 and 6[7].

5. Robustness of the results

This section includes additional estimations to test the robustness of our results because the empirical evidence presented could be sensitive to data restrictions[8]. Table 7 shows the effects of women having better access to supervisory jobs on the wage gap obtained under different selection criteria. Specifically, estimations were conducted for jobs with more than two workers, for integrated jobs with more than two workers, and for integrated jobs with more than two workers and at least 1 worker with supervisory tasks within each establishment.

5.1 The effects of size thresholds for jobs

As shown in Section 3, the database used contains many jobs with only one or two workers. Since this feature could have driven the results, we replicated the estimations of the switching model and excluded all workers in jobs with fewer than three employees in order to investigate this possibility. These results are included in the first column of Table 7 for supervisors and in the second column for non-supervisors. Specifically, the first row of Table 7 shows the direct effect of a greater proportion of female supervisors on the wage difference, whereas the second, third, and fourth rows show the indirect impacts of women´s power within an establishment on gender wage inequality via its effect on the different types of gender segregation. Finally, the last row of Table 7 shows the total effect of an increase in women´s access to supervisory positions on the wage gap.

Table 7. *Contribution of women´s access to supervisory jobs to the wage gap (robustness of the results)*

Component	Supervisors (1)	Non supervisors (2)	Supervisors (3)	Non supervisors (4)	Supervisors (5)	Non Supervisors (6)
Direct effect	0,2863	0,0244	0,1922	0,0480	0,1922	0,0797
Industrial segregation	-0,1889	-0,0246	-0,1955	-0,0134	-0,1955	-0,0282

[7]This paper assumes that establishments without supervisory jobs have a horizontal hierarchy, in which case the proportion of female supervisors would be trivially equal to zero. However, when the sample is restricted to establishments with at least 1 supervisory job, the qualitative results are exactly the same.
[8] These results are available from the authors on request.

Establishment segregation	0,1867	0,0212	0,0000	0,0000	0,0000	0,0000
Job segregation	0,0784	0,0000	0,0000	-0,0055	0,0000	0,0000
Total effect	0,3625	0,0209	-0,0032	0,0291	-0,0032	0,0515

Columns (1), (3) and (5) shows, for supervisors, the results for jobs with more than two workers, for integrated jobs with more than two workers, and for integrated jobs with more than two workers and at least 1 worker with supervisory tasks, respectively. Columns (2), (4) and (6) show the same for non-supervisors. If the mean difference between men and women for a variable or its estimated coefficient is not significantly different from zero (at least at a 10% level), we assign zero to its relative impact.

Table 7 shows that an increase in women´s power within each establishment increases relative female wages in industries dominated by female workers and decreases the gender wage difference by 73.2% among supervisors and by 13.1% among non-supervisors. In contrast, an increase in access to supervisory jobs among women decreases the relative female wages in those establishments where more women work and increases their gender wage gap by 72.4% among supervisors and by 11.3% among non-supervisors. In addition, a greater proportion of female supervisors significantly widens the wage gap due to occupational segregation within each establishment, but only among supervisors, which explains 30.4% of supervisors´ wage difference by gender. Unlike the negative repercussions reported in other empirical studies, we found that an increase in the number of women achieving supervisory positions within an establishment increases women´s earnings less than men´s earnings and increases the gender wage difference by 111% among supervisors and by 13% among non-supervisors.

In summary, an increase in female supervisors in each establishment increases the wage difference between men and women by 140.6% for supervisors and by 11.1% for non-supervisors. Hence, these results are consistent with those presented in Section 4.

5.2 The effect of representation of both genders in each job

Another limitation of the database used is that many of the jobs were held either by men or by women, and thus these jobs help to estimate the role of sex segregation but not the gender wage differential within jobs. For this reason, we replicated the analysis only using integrated jobs with at least three workers[9]. The third and fourth columns of Table 7 include the direct, indirect, and total effects on the wage gap of more women taking on responsibility within each establishment for this restricted dataset.

The results obtained present some qualitative differences when compared to the estimations for integrated and non-integrated jobs. Specifically, we found that a greater

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[9] These results are available from the authors on request.

proportion of female supervisors did neither significantly influence the effects of establishment segregation on the wage gap nor significantly change the impact of occupational segregation within each establishment on the wage difference by gender for supervisors. However, when there are more female supervisors, the wage difference due to occupational segregation significantly decreases among non-supervisors by 3.5%. As expected, women´s access to supervisory jobs can only improve women´s relative wages within jobs in which there are male and female workers, which may explain this result.

Despite these qualitative differences, once again, a greater proportion of female supervisors in each establishment directly increases the wage difference between men and women by 97.2% for supervisors and by 30.2% for non-supervisors. When there are more female supervisors, the gender wage differential as a whole decreases by only 1.6% for supervisors, but increases by 18.3% for non-supervisors.

5.3 The effect of the existence of supervisors within an establishment

In the sample of workers obtained from the database used in this paper, 23.9% of workers were employed in establishments without supervisory jobs. Perhaps, we cannot observe supervisors within these establishments because they have a horizontal hierarchy, but it is also possible that no supervisors in these establishment were surveyed. If so, it would not be possible to determine the proportion of female supervisors in such establishments. Thus, we restricted the sample to integrated jobs with at least three workers and at least 1 supervisor[10]. Using this sub-sample, the fifth and the sixth columns of Table 7 include the estimated direct, indirect, and total effects on the wage gap of a greater proportion of female supervisors within each establishment.

As expected, the results for supervisors in this section are the same as those obtained in the previous section. This is because the additional criterion used in this analysis did not change the sample of supervisors used in the previous section. Regarding non-supervisors, a significant difference was found in these estimations. In particular, a greater proportion of female supervisors does not significantly affect the impact of occupational segregation within each establishment on their wage gap. The remaining results are qualitatively and quantitatively similar to those included in the fourth column of Table 7. Once again, a greater proportion of female supervisors significantly increases the wage gap among non-supervisors by 38% (direct effect). In total, a higher proportion of female supervisors increases the wage gap by 24.5% among non-supervisors.

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[10]These results are available from the authors on request.

6. Conclusions

Previous empirical studies have shown that the women's access to managerial positions has decreased the gender wage gap among workers below them. Sociologists and economists have provided different explanations for this result, including women´s lower taste for discrimination, female networks of friendship, or homophilous preferences among others. However, most studies have not taken into account that the workers´ choice of managerial jobs can be endogenous. In fact, we observe that those workers with the worst unobservable characteristics are chosen to be supervisors in the Spanish labour market. Then, a greater proportion of women among supervisors would leave the best women among non supervisors. It would explain that standard regressions obtain a lower gender wage difference for workers without supervisory jobs in those establishment with a greater proportion of female supervisors. For this reason, previous results could be biased. Thus, we estimated a switching model for supervisors and for non-supervisors for the Spanish labour market. This model separated the effect of a greater proportion of female supervisors on the difference between men and women regarding the likelihood of choosing a supervisory job from the effect of women accessing this type of job on the gender wage gap.

Our findings show that a higher proportion of female supervisors in each establishment increases the probability of women obtaining a supervisory position more than the probability of men obtaining that position. This effect is stronger in those jobs with a higher proportion of women. Substantial theoretical and institutional literature supports these results and shows that women are more likely to be promoted to a particular job level when there is already a higher proportion of women at this level. This is especially the case for decision-making positions (Bell, 2005). Nevertheless, women´s access to jobs with greater authority does not help to narrow the gender wage gap at their level or among their subordinate workers. This result is consistent with Jacobs´ (1992) notion of "title inflation", that is, the reclassification of non-managerial workers as managers with little change in authority or wages. In this case, a nominal increase in the proportion of female supervisors has a limited effect on the gender wage gap.

Our estimations also suggest an alternative explanation for the observed limited impact of women´s power. In particular, we found that better access among women to supervisory jobs and a greater proportion of women within each establishment significantly increases the probability of holding a supervisory job. A possible explanation for this is the existence

of women-friendly firms. These types of firms may have a higher proportion of women and thus may have a greater proportion of female supervisors. Although this interpretation may seem hopeful in relation to women´s careers, female supervisors will not be able to reduce the gender wage difference within the same establishment if there are no male workers in their firm. This may explain why there is no association between women´s representation in supervisory jobs in each establishment and the wage difference when we take into account the endogeneity of job allocations.

Although equal opportunity and equal treatment laws dominated political agendas in the past, the imposition of gender quotas or gender parity in top positions has replaced them. For example, Norway passed a law in 2006 requiring every public corporation to have a board of directors that is at least 40 % female (The Guardian, 2006).Similarly, a EU Directive published in November 2002 require EU corporate boards to set a "minimum objective" for the "underrepresented" sex to hold at least 40 per cent of the non-executive director positions on a corporate board Coleman et al. (2013). Promoting or hiring more women to top and influential positions is intended to have a direct impact on female employment and wages and an indirect impact, since female decision-makers might may hire more women for subordinate positions and pay them better wages. Our results suggest that the potential impact of these policies on the gender wage gap may be limited, at least in the short term.

The unavailability of data on top managers or other managerial positions in each organization may have driven our results. In fact, we only have data on supervisors whose power is lower than that of managers. Some people identified as non-supervisors in our sample (e.g., doctors) may wield more authority in some cases than those counted as supervisors within the same establishment (e.g., administrative service managers in doctors´ offices). Nevertheless, recent studies have found that women´s access to managerial positions narrows the wage gap, but this effect decreases with managers´ positions within the hierarchical ladder (Hirsch, 2013). In any case, our results suggest that the estimations conducted in these kinds of study may well be biased if they do not take into account that the workers´ choice of managerial positions is endogenous. Specifically, this paper proposes an alternative methodology for those cases where a randomized experiment cannot be used to estimate the effects of more female supervisors on the gender wage gap in order to address this endogeneity problem.

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