

# **Occupational segregation as a cause of gender-based salary differences. A sectoral analysis**

Begoña Cueto

University of Oviedo

[bcueto@uniovi.es](mailto:bcueto@uniovi.es)

Nuria Sánchez-Sánchez

University of Cantabria

[sanchezn@unican.es](mailto:sanchezn@unican.es)

## **Abstract:**

This article aims to study the gender-based wage gap from a sectoral point of view. Sectors condition both the occupational structure itself and the distribution of occupations according to gender. From the data collected by the Salary Structure Survey (EES) in 2002 and 2006, and employing the method proposed by Brown *et al.* (1980), salary differentials between men and women are analysed for the various occupational levels. The procedure allows us to break down the salary differentials caused by segregation into two components: segregation owing to occupational differences, and purely discriminatory segregation. The procedure is repeated by sectors, which have been characterised as feminised, masculinised or gender-neutral (integrated), depending on the presence of women in the total employment base.

Preliminary results reveal wide differences across sectors, and allow us to characterise each sector according to its higher or lower degree of discriminatory segregation. This outcome may be used to focus labour insertion and discrimination policies for women on the appropriate sectors, as it is unnecessary to implement them in others.

JEL Codes: J31, J16, J71

## 1 Introduction

Women's participation in the labour market has increased in importance over the last few decades. This participation, however, has assumed very different distribution patterns from those of men, especially if we consider occupational classifications. A detailed analysis of women's occupational distribution shows that, generally speaking, there is an element of occupational segregation which entails important wage differentials. There are sectors where women's participation is traditionally very important (textile, footwear and food industries), whereas in others it is minimal (metallurgy, transport). Several studies carried out in Spain look into the importance of occupational segregation and wage differentials.

From the data collected by the Salary Structure Survey (Encuesta de Estructura Salarial, henceforth EES) for the years 2002 and 2006, and according to the method proposed by Brown *et al.* (1980), this article proposes to analyse salary differentials between men and women for each occupational level. The procedure allows us to break down salary differentials due to segregation into two components: segregation owing to occupational differences, and purely discriminatory segregation. In order to calculate the latter, we estimate a multinomial probit model for male distribution. The resulting coefficients are employed to estimate women's probability of participating in each occupation. The procedure is repeated by sectors, which have been characterised as feminised, masculinised or gender-neutral (integrated), according to women's participation in the total employment base.

The article is structured as follows: section two below synthesises a number of results from the existing literature about discrimination and gender-based occupational segregation; section three outlines the data and method employed in the analysis, and section four presents the results. The article closes with a brief concluding section.

## 2 Gender-based discrimination and segregation

Few aspects of the labour market in Spain have changed as significantly in the last few decades as the employment situation of women. Such a change has been particularly marked in the last phase of growth of the Spanish economy (ending in 2008), which has helped to place the female rate of activity at 51.4%, and the [female?] rate of employment at 43.6% in the fourth quarter of 2008, about fifteen points above the figures registered in 1996. Despite this increase, however, important inequities subsist. Female rates of participation and employment are substantially lower than those registered for males (69.2% and 60.2%, respectively). In addition, employed women must face occupational segregation and salary discrimination.

Both segregation by occupation and by activity sector have been well documented by various authors. Anker (1997) pointed out that gender-based occupational segregation is a common trait to countries throughout the world, and that it could be explained according to three theories: human capital (women are less qualified than men for certain occupations), labour market segmentation (which causes salaries to be reduced in feminised occupations), and a more complex theory based on women's greater childcare responsibilities.

In the case of Spain, Cebrián and Moreno (2008) recently demonstrated that over half of employed women in Spain are concentrated into five branches of the services sector; about half are likewise concentrated into six low-qualification occupations. The authors point out that the sharp increase in female employment has been accompanied by an increase in occupational segregation (measured according to Duncan's dissimilarity index), which points at the persistence of stereotypes and the labelling of occupations as "feminine" or "masculine".

Additionally, gender-based salary differentials have been the object of detailed research in the last two decades, research which has revealed a wage gap in men's favour. This gap is partially caused by differences in the characteristics of men and women, partially by the relative pay

associated to these characteristics, and partially, in no small degree, by occupational and/or sectoral segregation.

The existence of pay differentials between men and women is a common feature to the labour markets of all economies. According to the OECD women's hourly payment rate is 17% lower than men's, although there are important differences across countries (OECD, 2008). This salary gap has decreased over time, mainly owing to the reduction of the differences in observable characteristics (qualification levels and work experience) between men and women. On the other hand, the unexplained portion of this gap has increased (OECD, 2008; Weichselbaumer and Winter-Ebner, 2005).

The case of Spain presents several remarkable characteristics. Firstly, the differential is wider than in other European countries; and secondly, gender-based salary discrimination is associated with occupational and establishment segregation. As regards the latter, Simón (2006) finds that Spanish women are present to a larger extent in low-paid establishments than European women as a whole; as there is a considerable level of salary dispersion across establishments, the gender pay gap becomes even wider. Moreover, this type of segregation has increased rather than diminished over time, a circumstance which in turn contributes to widening the pay gap (Simón, 2008). Occupational segregation, on the other hand, helps very significantly to explain the existing pay differentials between men and women, especially when considering base salaries (de la Rica, 2007). Both occupational and sectoral segregation are more intense for females than for males, and especially marked among individuals with a higher educational level. This suggests that an increase in female educational levels does not necessarily result in a lower occupational segregation and a smaller salary gap (Alonso-Villar and del Río, 2008).

### **3 Data and method**

#### **3.1 Data**

This article makes use of the Salary Structure Survey (EES) developed by the Spanish National Institute of Statistics (INE), which compiles wage data for salaried workers, including a large number of variables related to the individual worker and the establishment or company where they are employed. The survey excludes workers who provide their services in establishments or companies with fewer than 10 employees, as well as those engaged in the primary sector. The issues examined are EES 2002 and EES 2006.

The 2002 sample includes a total of 153,774 workers, of whom 55,570 are women and 98,204 are men. The 2006 sample is wider; it includes 235,272 workers, of whom 61.1% are men and the remaining 38.9% are women.

The variables considered in the survey refer to individual characteristics (age, experience, occupation, educational levels, gender and type of contract) as well as company characteristics (size, activity sector or branch, market in which it operates, autonomous community where it is located and collective agreement by which it is governed). The dependent variable has been defined as the gross hourly rate.<sup>1</sup>

#### **3.2 Method**

In analysing the salary differentials caused by occupational segregation we follow the approach taken by Brown et al. (1980), and Miller (1987). This method consists in carrying out the Oaxaca-style salary decomposition, which allows us to consider occupation as an endogenous

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<sup>1</sup> The gross hourly rate has been calculated according to the following formula:  $((12 * (\text{base salary in October} + \text{salary complements} + \text{salary complements by shift}) + \text{extra payments}) / \text{agreed annual working hours})$ . The gross salary has been chosen over the net salary because the latter does not add relevant information to the topic under examination. On the other hand, we consider that the hourly salary affords a more homogenous criterion for all workers than the monthly or annual salary.

variable. The advantage of this approach is that it breaks down the estimation of the gender-based salary gap into within-occupation and across-occupation differentials.

First we define the average salary for males as:

$$\bar{w}_m = \sum_j p_m^j \bar{w}_m^j \quad [1]$$

Secondly we define the average salary for females as:

$$\bar{w}_f = \sum_j p_f^j \bar{w}_f^j \quad [2]$$

The salary differential is calculated as:

$$\bar{w}_m - \bar{w}_f = \sum_j p_m^j \bar{w}_m^j - \sum_j p_f^j \bar{w}_f^j \quad [3]$$

Adding and subtracting the expression:  $\sum_j p_f^j \bar{w}_m^j$  [4]

$$\bar{w}_m - \bar{w}_f = \sum_j (p_m^j - p_f^j) \bar{w}_m^j + \sum_j p_f^j (\bar{w}_m^j - \bar{w}_f^j) \quad [5]$$

Adding and subtracting the expression:  $\sum_j \hat{p}_f^j \bar{w}_m^j$  [6] we obtain the expression:

$$\bar{w}_m - \bar{w}_f = \sum_j p_f^j (\bar{w}_m^j - \bar{w}_f^j) + \sum_j (p_m^j - \hat{p}_f^j) \bar{w}_m^j + \sum_j (\hat{p}_f^j - p_f^j) \bar{w}_m^j \quad [7]$$

where  $\hat{p}_f^j$  is the percentage of women who would be present in each occupation if they followed the same pattern of occupational distribution as men. In order to calculate this percentage, the first step consists in estimating a multinomial logit by occupation for males alone. The second step consists in combining the parameters ( $\beta_j$ ) estimated in this multinomial logit with the characteristics of female workers, thus obtaining the occupational distribution that would occur if female behaviour followed the same pattern as male behaviour according to the characteristics of each worker.

The first element on the right-hand side of the equation [7] measures the average salary differential between men and women by occupation, estimated according to female participation in each occupation.

In order to calculate this addend we propose the following salary equations:

$$\ln w_m^j = X_m^j \beta_m^j + U_m^j \quad [8]$$

$$\ln w_f^j = X_f^j \beta_f^j + U_f^j \quad [9]$$

The estimation by OLS of these equations entails ignoring the possibility that the workers' placement in the different occupational categories may not be random. This would lead to bias in the least-square estimators.

In order to consider the possibility of non-exogeneity in the individual's decision to join one occupational category or another we employ a switching regression model. As a solution to endogeneity Heckman (1979) proposed estimation by a two-stage procedure. The first stage consists in using a probit model to estimate the probability of belonging to the occupation  $j$ , that is, the selection equation, which in this case we may express for each occupation as follows:

$$I_m^j = Z_m' \alpha^j + \varepsilon_m^j \quad [10]$$

$$I_f^j = Z_f' \alpha^j + \varepsilon_f^j \quad [11]$$

From this estimation we obtain the inverse Mill's Ratio (Mo). The second step consists in including this ratio in the salary estimation. Finally the salary equations to be estimated by ordinary least squares are:

$$\ln w_m^j = X_m^j \beta_m^j + M_m^j \gamma_m^j + U_m^j \quad [12]$$

$$\ln w_f^j = X_f^j \beta_f^j + M_f^j \gamma_f^j + U_f^j \quad [13]$$

In addition to the Heckman method, it is likewise possible to employ the maximum verisimilitude approach in the joint estimation of the salary and selection equations.

Deepening our analysis of gender-based salary differentials, we calculate the average salary differential according to the method proposed by Reimers (1983). This differential may thus be broken down as follows:

$$\begin{aligned} \overline{\ln w_m^j} - \overline{\ln w_f^j} = & (\bar{X}_m - \bar{X}_f) [\Omega \hat{\beta}_m + (1 - \Omega) \hat{\beta}_f] + [\bar{X}_m (1 - \Omega) + \bar{X}_f \Omega] (\hat{\beta}_m - \hat{\beta}_f) \\ & + (\hat{c}_m \bar{\lambda}_m - \hat{c}_f \bar{\lambda}_f) \end{aligned} \quad [14]$$

where  $\hat{c}_m$  and  $\hat{c}_f$  are the estimated coefficients of Heckman's lambda.

The left-hand side of the equation [14] represents the average salary differential observed between male and female workers. The first term on the right-hand side of the equation [14] measures the portion of the salary differential which may be attributed to the different characteristics of the workers governed by each collective agreement, whereas the second term is the portion of the salary differential arising from differences in economic returns, and is commonly interpreted as discrimination. The third term represents the portion of the observed salary differential which may be attributed to the sample selection. The “ $\Omega$ ” vector shows the relationship between the non-discriminatory salary structure and the observed salaries. This vector can take values comprised between 0 and 1. In this case we have opted for using the average value of 0.5, in agreement with Oaxaca and Ranson (1994), who consider that the non-discriminatory salary structure would lie in between the male and female structures. The underestimation of female characteristics would thus make up for the overestimation of male characteristics (that is to say, the non-discriminatory salary structure would correspond to the mean average between the structures observed for male and female workers) (Reimers, 1983).

If we introduce equation [14] into equation [7] we obtain the overall model:



$$\begin{aligned}
& \text{1<sup>st</sup> addend} & \text{2<sup>nd</sup> addend} \\
\bar{w}_m - \bar{w}_f = & \sum_j p_f^j \left[ (\bar{X}_m - \bar{X}_f) \left[ \Omega \hat{\beta}_m + (1 - \Omega) \hat{\beta}_f \right] + \left[ \bar{X}_m (1 - \Omega) + \bar{X}_f \Omega \right] (\hat{\beta}_m - \hat{\beta}_f) + (\hat{c}_m \bar{\lambda}_m - \hat{c}_f \bar{\lambda}_f) \right] \\
& + \sum_j (p_m^j - \bar{p}_f^j) \bar{w}_m^j + \sum_j (\bar{p}_f^j - p_f^j) \bar{w}_m^j & [15]
\end{aligned}$$

3<sup>rd</sup> addend      4<sup>th</sup> addend

Equation [15] is the final estimated model. The first sumatory on the right-hand side of the equation helps us to identify the average salary differentials between men and women based on the workers' characteristics, whereas the second one identifies the salary differentials associated to the returns yielded by these characteristics. These two addends contain the justified or unjustified salary differentials between men and women within the same occupation. The third and fourth sumatories measure the salary differential across occupations based on the different occupational distribution of men and women. More particularly the third sumatory indicates the percentage of the salary differential that may be attributed to women's occupational distribution based on differences in qualifications and characteristics with respect to men. The fourth sumatory measures the percentage of the salary differential that may be attributed to occupational segregation properly so called; in other words, the differential which arises not from objective characteristics, but from the existence of discrimination in the labour market, or social conditioning factors which affect the recruitment of women and their choice of occupation. Summing up, these last two addends represent the justified or unjustified salary differentials between men and women arising from the different occupations they exercise.

## 4 Results

### 4.1 Sectoral and occupational segregation.

A preliminary analysis of the subject requires looking into gender-based occupational distribution. Graph 1 nfirms that women's insertion into the labour market has taken very different

patterns of occupational distribution than men's. Regardless of gender distinctions, the occupations that employ the largest percentage of workers are technicians (4), construction forepeople (8), and charge hands (10). If we disaggregate them by gender, however, we notice a virtual absence of women in construction-related occupations, metallurgical forepeople, mechanics, drivers, charge hands, operators and fitters (occupations 8 and 10)<sup>2</sup>, and a greater presence among technicians, management, restaurant services and unskilled work (occupations (4, 5, 6 and 12). On the other hand, men are present to a lower degree than women in these occupations (except in the case of technicians), and to a larger degree among forepeople (8) and charge hands (10). In the highest-skilled occupation of direction and management women represent approximately half the number of men. Finally, in occupations 2, 3 and 4, which are attached to higher, intermediate or technical diploma, women are present to a larger degree than men, although the difference is not substantial.

As graph 1 shows, women's participation in certain sectors is minimal. This graph represents the relative percentage of women over the total number of workers in each sector. Women are represented to a particularly low degree (less than 10%) in metallurgy, machinery manufacturing and construction. By contrast, in sectors such as education, social work and real estate and renting, the percentage of women is higher than of men. Taking these percentages into account, we have carried out three sectoral groupings in order to test whether sectors present different behaviours of occupational distribution according to gender. These groupings have been termed as follows: masculinised sectors (those where the percentage of women is lower than 30%), feminised sectors (those where the percentage of women is higher than 60%), and integrated sectors (those where the percentage of women is higher than 30% but lower than 60%).<sup>3</sup> Graph 2 reflects the occupational

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<sup>2</sup> The aggregation of occupations is shown in Table 2 in the appendix. We will employ the greatest possible disaggregation with the available sample size, since Anker (1997) already pointed out that the segregation level increases as the occupational data reach a higher segregation level.

<sup>3</sup> The EES-2002 considers the following sectors as feminised: M (Education), N (health-care activities), and DB (textile and clothing manufacture). Integrated sectors comprise: DA (food industry), DC (leather and footwear), DG (chemical), GG (commerce), HH (hotel and restaurant services), JJ (financial intermediation), KK (real estate and renting), and 00

distribution of the three sectoral groups. As we may observe, this distribution varies according to sector. Masculinised sectors are dominated by occupations 8 and 10; feminised sectors are dominated by occupations 2, 3 and 6; while integrated sectors are dominated by occupations 4, 5 and 12.

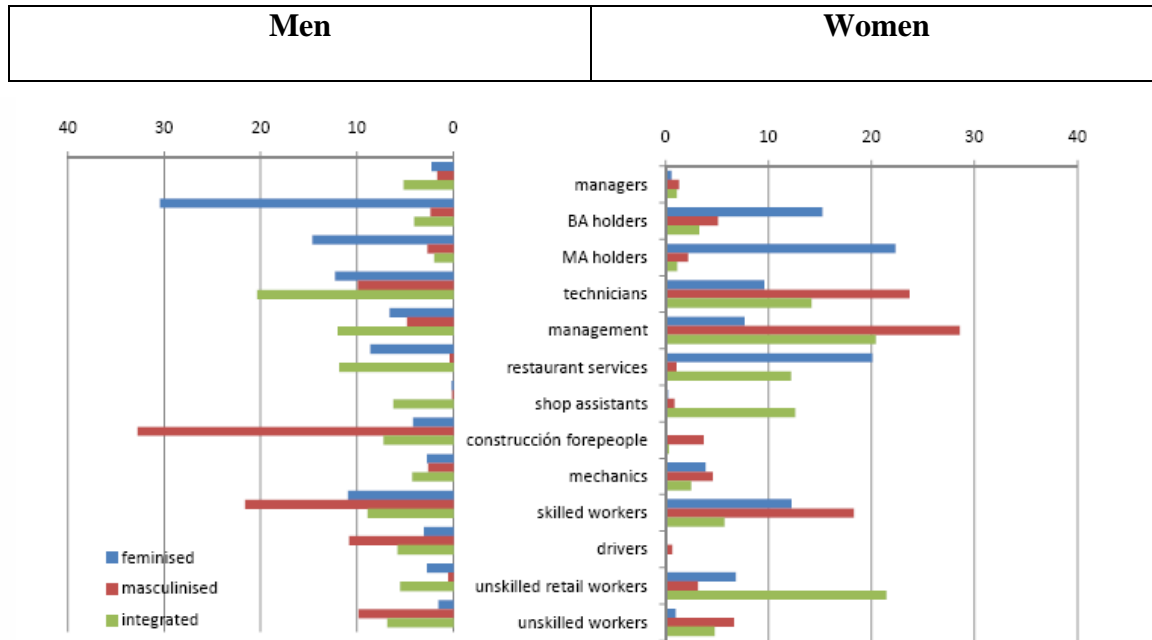
According to these data we may infer that the existence of occupational (or vertical) segregation is accompanied by sectoral (or horizontal) segregation. Feminised sectors are not dominated by women's most frequent occupations (4, 5 and 12), but mainly by occupations 2 and 3. In other words, feminised sectors are not feminised because women's occupations may have a greater weight. If this were so, the most important occupations in these sectors would be 4, 5 and 11, but this is not the case. Masculinised sectors, by contrast, do follow the pattern of integrated sectors—since the most important occupations are 8 and 10—especially in the case of men. Women, however, are mainly distributed across occupations 4 and 5. In the case of integrated sectors, the most important occupations are those typically filled by women (4, 5 and 12). Both men and women are found in these occupations to a larger degree than in the rest, except occupation 12, where the presence of men is not very significant.

Summing up, a descriptive analysis of the data shows that the occupational distribution of men and women does not follow the same pattern. Moreover, if we analyse the distribution across the different sectors we appreciate significant variations. In view of these results it may be wondered to what extent the gender-based salary differential observed is a consequence of this uneven occupational and sectoral distribution.

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(other social activities). The remaining sectors have been categorised as masculinised, except agriculture and fishing, which have not been included in the analysis due to the scarcity of data. EES-2006 has maintained the same selection criteria in grouping sectors; for this reason there have been certain changes in grouping which are associated to variations in the percentage of women in each of them. EES-2006 considers the following sectors as feminised: M (education), N (health-care activities), and G52 (commerce).

**Graph 1: Occupational distribution**

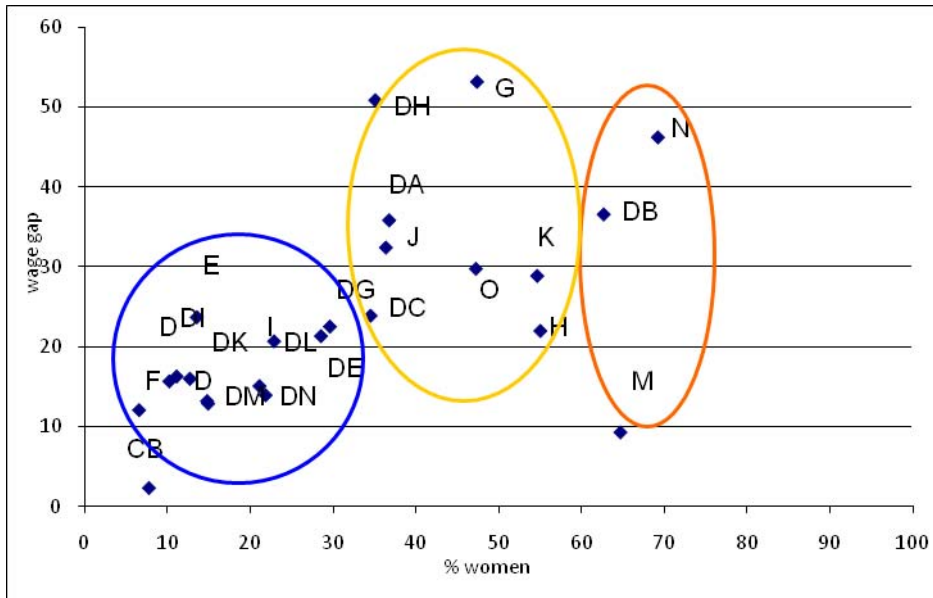


Note: percentages are calculated over the total number of workers in each type of sector.

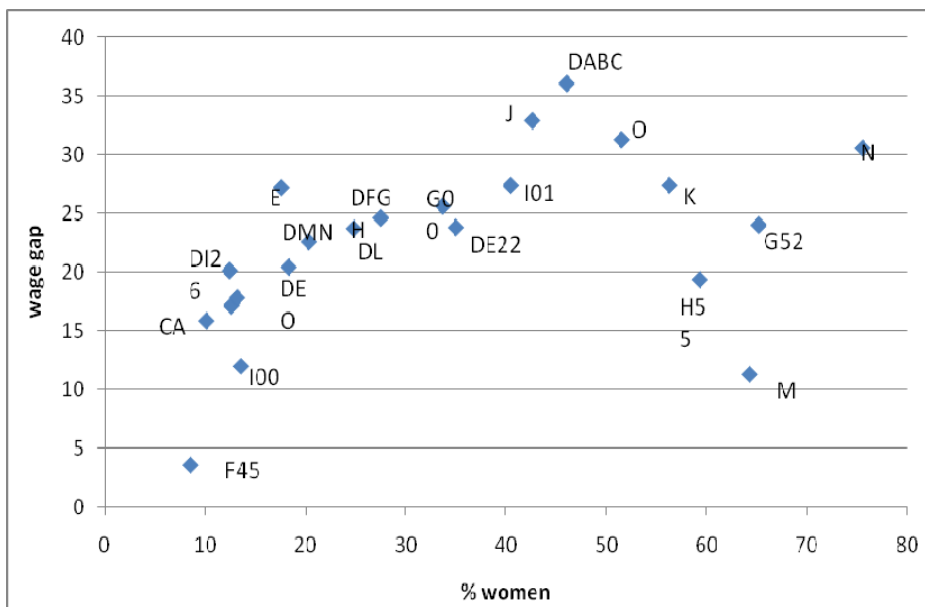
Gender-based salary differentials become equally evident when we disaggregate the data by sectors. In this case there does seem to be some correlation between a larger presence of women in the sector and a wider salary gap, as may be deduced from Graph 2.

**Graph 2: Relationship between the salary gap and the percentage of women by sector**

**EES-2002**



**EES-2006**



This correlation seems to call for a more detailed analysis of sectoral differences. With the help of this graph we break down the analysis into groups of sectors—masculinised, feminised and

integrated sectors—in order to test whether there are differences between the salary gap<sup>4</sup> and the different occupations across the three groups.

If we observe that in the case of feminised sectors there is no clear relationship between the percentage of women employed in a given occupation and the salary gap for this occupation. By contrast, in the case of masculinised sectors the occupations with a larger female participation present a wider salary differential. We perceive that the same occupation in feminised sectors (consider for instance occupation 8) presents a salary gap which fluctuates around 35%, whereas in masculinised sectors it does not exceed 10%, and in integrated sectors it reaches 45%. Taking another example, occupation 2 presents a salary gap of 17% in feminised sectors, but 35% in masculinised sectors, and almost 50% in integrated sectors.

On the other hand, there are occupations such as 1 (management) which present a more or less stable salary gap regardless of the sectoral group being examined (even if the percentage of female managers in feminised sectors almost doubles that in the remaining sectors). These results confirm the hypothesis that salary differentials are not generated by occupational causes alone, but also by sectoral differences. This article aims to measure what portion of the observable salary differentials is attributable to the existence of both vertical (occupational) and horizontal (sectoral) segregation. If the salary differential for each sectoral group varies according to occupation, it is very likely that the level of occupational segregation will vary as well.

## **4.2 Econometric analysis**

Before we proceed to analyse the results obtained regarding the salary differentials it may be useful to highlight the occupational differences between men and women that would disappear if women followed the same occupational pattern as men. As we have pointed out in the methodology

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<sup>4</sup> The salary gap is calculated as the difference between men's and women's salary, divided by men's salary, and the whole multiplied by one hundred.

section, these results are obtained from the estimation of a multinomial logit model for men, whose estimated coefficients are then applied to women. Table 2 shows the results of women's occupational distribution, the predicted occupational distribution, and the percentage of variation that would take place if both genders followed the same occupational patterns.

As expected, we see that women's occupational distribution is not as strongly conditioned by characteristics such as qualifications, experience, etc., as by other less objective factors such as social stereotypes, discrimination from certain occupations, or women's own work preferences. Occupations where these non-objective factors are most evident are also those which present the highest percentage of relative variation between real and predicted occupation. This percentage of variation is calculated as the rate of increase between the real and the predicted distribution. Thus, a negative sign in this percentage means that the real rate ought to increase in order to match the masculine pattern, whereas a positive sign indicates the opposite. For the year 2002, occupations 1 (management) and 8 and 9 (construction forepeople, mechanics, and food-industry and textile workers) particularly stand out with a negative variation rate over 200 percent. Occupation 10 and 11 (operatives, fitters and drivers) does not reach the same levels but it also shows a variation rate exceeding 100 percent. At the opposite end of the scale we find the occupations where women have a stronger presence than they would if they followed the masculine pattern. The highest variation rates among these are found in occupation 12 (unskilled commercial workers, domestic workers, janitors) at 85 percent, and occupations 7 (shop assistants) and 6 (restaurant services, personal services) at rates over 60 percent. Nevertheless, these positive percentages of variation are lower and more sparsely distributed across occupations than negative ones. This indicates the existence of occupations affected by discrimination (as in occupation 1, characterised by the so-called glass ceiling, Arulampalam et al., 2007), or social stereotypes and conditioning factors, which for instance would explain the small number of women working in occupation 8 (construction works).

**Table 1: Real and predicted occupational distribution for women.**

Occupation	EES 2002			EES 2006		
	Real distrib.	Predicted distrib.	%	Real distrib.	Predicted distrib.	%
1: managers	0.01	0.04	-244.2	0.01	0.03	-162.9
2: BA holders	0.07	0.08	16.0	0.07	0.06	8.85
3: MA holders	0.07	0.05	23.1	0.07	0.04	30.6
4: technical degrees	0.15	0.16	7.6	0.15	0.15	-2.2
5: management	0.18	0.08	55.2	0.20	0.08	56.7
6: restaurant services, personal services	0.12	0.05	60.5	0.11	0.03	71.4
7: shop assistants	0.07	0.02	66.3	0.07	0.02	71.1
8 and 9: construction forepeople, mechanics	0.04	0.21	-420.4	0.05	0.23	-360.7
10 and 11: skilled workers	0.10	0.21	-113.9	0.07	0.19	-168.0
12: unskilled retail workers	0.14	0.02	84.9	0.13	0.03	71.6
13: labourers	0.04	0.07	-73.6	0.03	0.07	-131.7

According to the theoretical model we have presented, the salary differentials between men and women may be caused either by the different characteristics of the two groups, or by a difference in the economic returns associated to these characteristics. Differences in characteristics may be related to the workers' experience, education, seniority, etc. (those obtained from the first addend in equation 15), or differences between occupations themselves based on the different qualifications held by men and women (addend 3). This addend is interpreted as an approximate value of occupational segregation based on variations in qualification; in other words, objective or justifiable causes. The same applies to economic returns; differences may arise from the different remuneration received by men and women on account of their characteristics (experience, education, etc.) (addend two in equation 15), or the existence of occupational segregation without justifiable cause (addend four). This occupational segregation occurs owing to discrimination or to the social conditioning factors that lead women into certain occupations. In other words, it can be interpreted as the salary differential between genders caused by the unequal occupational distribution of men and women. Summing up, addends one and two measure the salary differentials within occupations, whereas addends three and four measure the differentials across occupations which arise from gender-based variations in occupational distribution.



The results of tables 3 (EES 2002) and 4 (EES 2006) evidence that the salary differential between the genders is caused primarily by within-occupation differentials (addends 1 and 2 in equation 15), which represent 103.8 percent of the overall differential for the year 2002. These results match those obtained by Hernández (1996).

In view of these results it can be asserted that occupational segregation is not the main source of gender-based salary differentials, but neither is it a negligible one. The data for 2002 yield a positive coefficient for segregation without justifiable cause which represents 15.5 percent of the salary differential. This indicates that the unequal occupational distribution of men and women cannot be attributed to objective causes, and that women's wages are negatively affected by their occupational distribution<sup>5</sup>.

Segregation on objective grounds, by contrast, takes on a negative sign and represents 19.4 percent. Why this negative value? The reason is that the real occupational distribution of men is associated to lower salaries than the predicted distribution of women. This distribution shows higher percentages of women in higher-level occupations (1, 2, 3 and 4) as compared to men. Since these are also the occupations which receive the highest salaries, the result of this addend is a negative one (see table 5). In other words, it can be concluded that there is no occupational segregation based on justifiable causes or on workers' characteristics, because women's characteristics by themselves would place them in better-paid jobs than men. Summing up, the unequal occupational distribution of men and women is not based on their different characteristics; in fact, women are placed in the lowest-paid occupations even though they have the necessary qualification to position themselves in the more remunerative ones (the most significant differences

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<sup>5</sup> This conclusion matches the results put forward by Hernández (1996), who uses the Quality of Life at Work Survey (ECVT) of 1991 and the Survey on Structure, Conscience and Biography of Class (ECBC) of 1991, and obtains positive values for occupational segregation without justifiable cause.

arise in occupations 2 and 3). This is in contrast with the results obtained in other studies where the value of justified occupational segregation takes on a positive sign<sup>6</sup>.

Salary differentials remain practically identical for the year 2006, with no apparent improvement. It may be noted, on the other hand, that salary differentials within the same occupation increase while occupational segregation decreases. More particularly, discriminatory segregation represents 6.7 percent, and occupational segregation -16.3 percent of the salary differential.

If we disaggregate the sample by sectors, as we have done in the descriptive analysis, we obtain significant differences. Remarkably, sectors where male workers predominate present smaller salary differentials, whereas the sectors we have termed integrated present ostensibly larger ones. The same results arise from both surveys.

If we take a closer look at the breakdown of salary differentials for the year 2002, we see that the within-occupation differential is less significant in feminised sectors than in the rest, representing 63.8 percent of the overall salary differential, whereas the remaining 36.3 percent is attributed to the existence of occupational segregation. Occupational segregation on objective grounds presents a positive sign (by contrast with the results of the aggregated data), which confirms the existence of occupational segregation based on the different characteristics of men and women. The value of occupational segregation on non-objective grounds is much higher than the average for all sectors. Thus, although the percentage of women in these sectors is very high, the salary differential due to segregation has not been reduced, but rather the opposite. Moreover, the positive value of occupational segregation on objective grounds indicates that these sectors are populated by women with lower education or qualification levels than the average. In 2006, on the

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<sup>6</sup> Miller (1987), and Dolton and Kidd (1994) for the UK, Kidd and Shannon (1994) for Canada, Gabriel and Schmitz (2006) for the US, and Sung et al. (2001) for Hong Kong.

other hand, the salary difference by segregation diminishes in these sectors and becomes a negative one.

Masculinised sectors present a smaller salary differential by gender than the rest. This differential arises primarily from the unequal salary received by men and women within the same occupation, which represents 183.3 percent. This high percentage is compensated for by the negative salary differential obtained in the addends of occupational segregation on objective and non-objective grounds. This confirms that there is no salary differential based on occupational segregation to speak of in these sectors. The negative value of segregation without justifiable cause implies that women's occupational distribution at present is associated to higher salaries than their predicted distribution.

**Table 3: Summary of results salary gap 2002**

EES-2002									
		All industries		Feminised		Masculinised		Integrated	
		logs	%	logs	%	logs	%	logs	%
Wage differential		0,231	100,0%	0,26	100,0%	0,13	100,0%	0,35	100,0%
Within		0,24	103,9%	0,166	63,8%	0,239	183,8%	0,245	70,0%
	Justified	0,032	13,9%	0,024	9,2%	0,013	10,0%	-0,052	-14,9%
	Unjustified	0,314	135,9%	-0,23	-88,5%	0,358	275,4%	0,837	239,1%
	sample selection	-0,107	-46,3%	0,37	142,3%	-0,132	-101,5%	-0,539	-154,0%
Across		-0,009	-3,9%	0,094	36,2%	-0,101	-77,7%	0,109	31,1%
	Justified	-0,045	-19,5%	0,02	7,7%	-0,077	-59,2%	0,032	9,1%
	Unjustified	0,036	15,6%	0,074	28,5%	-0,024	-18,5%	0,077	22,0%

**Table 4: Detailed results of salary gap 2002 by occupation**

	All sectors	Feminised	Masculinised	Integrated
SALARY GAP	0.231	0.26	0.13	0.35
- gap within	0.240	0.166	0.239	0.245
1 and 2: Managers and BA holders	0.02	0.02	0.02	0.01
3: MA holders	0.00	0.01	0.00	0.00
4: technical degrees	0.04	0.01	0.07	0.03
5, 6 and 7: management, personal serv. and shop assistants	0.09	0.05	0.07	0.12
8 and 9: construction forepeople, mechanics	0.01	0.01	0.01	0.00
10 and 11: skilled workers	0.03	0.04	0.03	0.01
12 and 13: unskilled retail workers and labourers	0.02	0.00	0.01	0.03
- segregation by characteristics	-0.045	0.020	-0.077	0.032
1 and 2: Managers and BA holders	-0.087	0.09	-0.10	0.06
3: MA holders	-0.049	0.01	-0.09	0.00
4: technical degrees	-0.042	0.00	-0.11	0.05

5, 6 and 7: management, personal serv. and shop assistants	-0.012	-0.10	-0.03	-0.02
8 and 9: construction forepeople, mechanics	0.058	-0.00	0.12	-0.01
10 and 11: skilled workers	0.065	0.03	0.10	-0.01
12 and 13: unskilled retail workers and labourers	0.021	-0.01	0.04	-0.02
- segregation on non-objective grounds	0.036	0.074	-0.024	0.077
1 and 2: Managers and BA holders	0.094	0.41	0.03	0.09
3: MA holders	-0.054	-0.22	0.10	0.01
4: technical degrees	0.026	0.06	-0.26	0.11
5, 6 and 7: management, personal serv. and shop assistants	-0.499	-0.18	-0.54	-0.31
8 and 9: construction forepeople, mechanics	0.387	0.07	0.47	0.19
10 and 11: skilled workers	0.255	-0.00	0.20	0.21
12 and 13: unskilled retail workers and labourers	-0.172	-0.05	-0.03	-0.24

Note: Occupations 1 and 2 have been grouped together in the sectoral segregation due to lack of observations, as has been the case with occupations 5, 6 and 7, and occupations 12 and 13.

Lastly we analyse the integrated sectors for 2002. Results are very similar to those obtained for feminised sectors. Salary differentials are particularly marked within occupations, with a rate of 70 percent. The remaining 30 percent is attributed to occupational segregation. Nevertheless, we do perceive an important discrepancy between the two sectoral groups in the area of salary differentials within the same occupation owing to discrimination; this represents 239 percent in integrated sectors, as opposed to -88 percent in feminised sectors.

As regards the data for 2006 in integrated sectors, the salary differential owing to occupational segregation is 20 percent, and that within occupations is 80 percent.

Summing up, feminised sectors behave very differently from masculinised ones; in the former, the salary gap between men and women within the same occupation is smaller, and the differential arising from unjustified occupational segregation is a favourable one, in contrast with masculinised sectors where it is unfavourable. This means that the occupational distribution in feminised sectors does not benefit women's salaries. Moreover, in the case of feminised sectors it is possible to point at occupational segregation on objective grounds; in other words, different characteristics in men and women which justify their unequal occupational distribution. This is not the case in masculinised sectors, where occupational segregation on objective grounds assumes a negative value.

As has been noted, salary differentials within the same occupation are quantitatively more important than segregation itself. It is essential, therefore, to look more closely into the reasons for these differentials. In order to facilitate the analysis we have followed the salary decomposition devised by Reimer and Neumack, which allows us to determine which portion of these differentials are connected to different characteristics (justified), and which are connected to the economic returns associated to these characteristics (unjustified) within the same occupation.

If we examine the salary decomposition within occupations we see important differences among the various sectoral groups. In the global analysis of all sectors, 13 percent of the salary differential between men and women may be attributed to the workers' characteristics (justified), which means that men present higher qualifications, seniority, experience, etc. than women. The different economic returns that individuals obtain from these characteristics (unjustified) contribute significantly to increase the salary differential observed; that is, the same characteristic receives a higher remuneration in the case of men than in women. Moreover, the weight of this unexplained component in the wage differential is much stronger than that of the 'characteristics' component in absolute terms, which indicates a high level of salary discrimination in favour of the male worker. On the other hand, the positive effect of the 'returns' component is partially offset by the sample selection bias, which assumes a negative value.

If we analyse in detail each value obtained under characteristics, returns and bias for each occupation we may conclude that management, commerce and restaurant services are the sectors with the highest degree of salary discrimination. In the latter case (restaurant services), the value of the coefficient associated to returns represents 34 percent of the salary differential, whereas in management it reaches the much lower level of 5.2 percent<sup>7</sup>.

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<sup>7</sup> These data have been omitted from the present article in order to avoid an overwhelming number of tables, but the authors will be happy to make them available on request.

In the case of feminised sectors the values obtained for explained and unexplained effects are identical with the overall results for all sectors, except for the field of returns. More particularly, if we consider the workers' characteristics we obtain a salary increase of 9.2 percent. If we consider the returns associated to these characteristics, however, the coefficient becomes quite substantially negative at 88.5 percent of the salary differential. This negative value may be explained because feminised sectors are those where women have an advantage over men on the grounds of the activity they develop. The negative value of returns becomes positive in 2006.

In masculinised sectors, however, the same characteristic receives a higher remuneration in men than in women; the returns component shows a positive rate of 275.4 percent of the wage gap. In this case the characteristics component is also positive but less significant, since it only amounts to 10 percent of the salary differential. The results are very similar in 2006.

Integrated sectors, like masculinised ones, present a highly positive component of returns, amounting to 239.1 percent of the salary differential. The characteristics component, on the other hand, is a negative one and amounts to 14.9 percent of the differential. Again, as in the case of feminised sectors, in 2006 there is a noticeable decrease in the salary differential associated to unjustifiable causes.

Therefore, according to the results obtained from the decomposition of the salary differential, it may be concluded that in masculinised and integrated sectors the unjustified portion of the differential (that is, the returns) contributes very significantly to increase the overall differential between men and women, and in this case it is possible to point at salary discrimination. This is not the case in feminised sectors, however, where differences in workers' characteristics play a more significant role in explaining the salary differential.

## **5 Conclusions**

This article has attempted to look into the factors which explain the gender-based salary differential. According to the theoretical model adopted, this differential may be broken down into

salary differentials between men and women within the same occupation, and differentials between those engaged in different occupations, which we have termed occupational segregation.

In addition to this, the analysis has been replicated by taking three sectoral groups as a reference according to women's participation. This has allowed us to measure the salary differential for feminised, masculinised and integrated sectors.

The conclusions arising from the empirical analysis show a marked heterogeneity in salary differentials across sectors. Nevertheless, the salary differential between genders in all sectoral groups is mostly related to differentials within the same occupation, while those based on occupational segregation remain secondary.

On the other hand, although occupational segregation is not the main source of the salary differential between the sexes, it cannot be considered as negligible. Occupational segregation for unjustifiable causes represents 15.5 percent of the differential, whereas segregation for justifiable causes represents -19.4 percent. In other words, it may be said that there is no occupational segregation based on workers' characteristics, because women's characteristics by themselves would place them in more remunerative positions than men.

If we break down the data by sectors, we see that feminised sectors behave very differently than masculinised ones. The overall salary differential is wider in the former than in the latter. However, if we analyse the differential within the same occupation, the opposite result is obtained: it is smaller for feminised sectors. According to these results, therefore, the salary differential caused by occupational segregation is a positive one, but there is no occupational segregation in masculinised sectors (in the year 2006 occupational segregation for unjustifiable causes becomes negative in feminised sectors).

According to the results obtained from the decomposition of salary differentials within the same occupation, it may be concluded that in masculinised and integrated sectors the remuneration associated to workers' characteristics (that is, the returns) contributes very significantly to increase

the salary differential between men and women; thus in this case we can point at salary discrimination. The same conclusion, however, does not apply to feminised sectors (in the year 2006 these sectoral differences decrease).

As regards the practical application of these results, it may be concluded that designing programmes to prevent gender-based occupational segregation is certainly a way to reduce the salary differential, but it is an even more effective approach to implement programmes focused on reducing the differences in remuneration accorded to the same characteristics among workers. In view of the diversities across sectors, however, it is not feasible to propose homogenous measures for all sectors. In feminised sectors the remuneration imbalance already favours women rather than men. Therefore, the stress should be placed on masculinised and integrated sectors.

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