

# **Job Characteristics and Gender Wage Differences Revisited: Evidence from Spain**

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Preliminary version  
March 10, 2008

## 1 Introduction

Gender wage gap in Spain remains substantial in line with the situation in other countries. Data from the Spanish Wage Structure Surveys in 2002 estimates the difference in average wages between men and women around 20%. The data reach a great relevance as far as women's participation in the labour market growths.

In analysing this differences economists have usually followed a human capital approach where wages are explained basically by variables capturing individual characteristics, including very few variables related to the characteristics of the job the individuals hold, as a consequence of the type of surveys they use. The most recent results obtained for the Spanish labour market are found in the works of Garcia et al. (1998), Garcia et alia (2001), Aláez and Ulibarri (2001), Gardeazabal and Ugidos (2002), Hernández and Méndez (2005), De la Rica et alia (2005), Simón, H (2006), and García and Morales (2006) . In recent years the interest is focused not only in the estimation of the gender wage gap but firstly to contrast the existence of the glass ceiling in Spain and secondly in the comparison of the gaps between regions in Spain and countries in European Union, due to the availability of data: the Survey of Wage Structure in Spain 2002, the European Community Household Panel, the European Survey of Wage Structure in 1995 and data from the Spanish Social Security.

Even if the data sources and methodologies applied are different, all these studies find that a substantial percentage of the wage gap is due to the returns to observable characteristics in favour of men. They have in common also the scarce information in jobs characteristics.

In this paper we use individual data from the Encuesta sobre discriminación salarial y características del puesto de trabajo, 2002 (Proyecto ISOS) in order to examine the influence of both job characteristics and individual characteristics on wages. There are more than one hundred questions in the survey which are related to the description of the job hold by the individual. This allows us to define 17 factors (and the corresponding subfactors) which describe (quantify) the working conditions (3 factors), the knowledge and skills required (6 factors), the effort (4 factors) and the responsibility (4 factors) associated to each job. Data have been collected from a human resource management's perspective in order to be able to perform

some job evaluation exercises and the information is much more detailed than that used in the existing literature on this topic.

The aim of the present work is, using this information, to explore the effect of job characteristics on wages and mainly to analyze to what extent the introduction of these job characteristics helps to explain the male-female wage differential which is not explained by the different characteristics males and females have. There are two steps involved, first, the previous estimation of hedonic wage equations by gender which shows the relationship among stock of human capital, working conditions and wages and secondly, the decomposition of the gender wage gap, in this case using the extended Oaxaca-Neumann decomposition and concretely their review in 1994.

Our results indicate that the characteristics of both, individual and jobs determine pay. Moreover, the introduction of job characteristics reduces substantially the part of the gender wage gap usually attributable to discrimination. We also find that, females hold jobs that globally are rated to be of equal value than males contrary to other studies (Schumann et alia, 2001, and Filer, 1990). This fact points to the effectiveness of the evaluation system in neutrally job evaluation to gender.

We describe the specification in section 2. In section 3 we briefly describe the survey and discuss the individual and the job characteristics data. Section 4 presents the empirical results on the effect of job characteristics on pay and the decomposition of the gender wage gap. We summarize our findings in section 5.

## **2 The model: econometric specification**

The usual approach in analyzing gender wage discrimination is based on the human capital theory and the idea that wages are related to productivity: without discrimination gender differences in productivity determine differences in salaries. The wage discrimination appears when workers with identical productivities receive different retribution.

In this sense quantifying discrimination imply the assessment of difference in mean wages, known as gender wage gap, and also the division of this gap in two parts. First part the explained part of the gap assembling the divergences in individual workers characteristics, those measuring productivity and usually called endowments. And second part, the “unexplained” fraction of gap or the difference in the rate of returns to these characteristics. This last part is usually attributable to discrimination.

Another line of research trying to explain wages divergence by gender is the compensating differential theory. According to this theory the diversity of preferences by gender in relation to work characteristics determines the wage differences. Moreover, women are paid less than men because jobs typically held by women are characterized by more favourable working condition than jobs dominated by men. If correct, once job characteristic are fully incorporate to the explanation of wages no evidences of discrimination remains

We find less empirical evidence sustaining or refuting this theory than the human capital one, especially in Europe, because no data on jobs characteristics are frequently available with the exception of working conditions. Testing this theory involve the analysis of both, the distribution of undesirable employment conditions by gender, and the existence of wage premiums or positive rates of return for this unpleasant characteristics. In our concern the point is whether the same job characteristics are rewarded differently.

In line with the arguments previously presented, job characteristics, and not only the stock of human capital, are partly approximating the unobserved productivity. Consequently explaining wages and the differences in compensation by gender, without the non-wage characteristics of job may overstate these differences and the estimation of fraction due to discrimination.

Focusing on the estimation of wage equation with the available data we will analyze first a hedonic wage equation including work characteristics and lately decompose the gap. The estimation of labour market discrimination by gender is based on the wage decomposition methodology by Blinder (1973) and Oaxaca (1973). In this methodology, one uses the separately estimated (log) wage equations (0) for two groups of workers to decompose the

difference in their mean wages into a discrimination (unexplained) portion and a human capital (explained) portion. The original decomposition procedure adopts one of the estimated wage structures, the male or the female, as the non-discriminatory norm. In this case the entire discriminatory wage differential is ascribed to underpayment of women or overpayment of males, respectively.

$$\begin{aligned}\ln(W_m) &= X'_m \beta_m + Z'_m \phi_m + u_m \\ \ln(W_f) &= X'_f \beta_f + Z'_f \phi_f + u_f\end{aligned}\quad (0)$$

Using male's structure as the non discriminatory, and as usual without job characteristics we will obtain the following expression (1). Differences in the mean characteristics of the two groups weighted by the estimated coefficients in the male structure and added, leads to the human capital portion of the differences, B. By aggregating the differences in the estimated coefficients between the two groups weighted by the mean characteristic of women the unexplained or discrimination portion, A, is obtained<sup>1</sup>.

$$\overline{\ln W_m} - \overline{\ln W_f} = \overline{X'_m} \beta_m - \overline{X'_f} \beta_f = \overline{X'_f} (\beta_m - \beta_f) + (\overline{X'_m} - \overline{X'_f})' \beta_m = A + B \quad (1)$$

In relation to the decomposition of gender wage gap we pretend to extend it to the inclusion of specific variables on job characteristics, in this sense wages are determined in our case by a wide and exhaustive set of job characteristics, individual variables related to human capital endowments and a set of control variable. Where, W refers to wages, X contain all variables related to human capital or control variables and Z contains all variables in relation to job characteristics; for male and female we use *m* and *f* sub indexes.

From the model estimation we perform the wage decomposition procedure but extending the original division: A, will be the explained part of the gap by differences in worker characteristics, B the part explained by differences in job characteristics, C the unexplained part due to individual characteristics and finally D the unexplained part due to job characteristics.

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<sup>1</sup> Where f subindex refers to females, m to males and p to the pooled sample.

$$\begin{aligned}
\overline{LnW_m} - \overline{LnW_f} &= (\overline{X_m}'\beta_m + \overline{Z_m}'\phi_m) - (\overline{X_f}'\beta_f + \overline{Z_f}'\phi_f) = \\
&\overline{X_f}'(\beta_m - \beta_f) + (\overline{X_m} - \overline{X_f})'\beta_m + \overline{Z_f}'(\phi_m - \phi_f) + (\overline{Z_m} - \overline{Z_f})'\phi_m = \\
&= \quad C \quad + \quad A \quad + \quad D \quad + \quad B
\end{aligned}$$

This information could allow us to explain which part of the gap is supported on “pure discriminations” and which on differences in the worker or job characteristics, and then, on differences in productivity.

This original decomposition could be improved using a more general approach as we can find in Neumark (1988), Oaxaca and Ransom (1988) and Oaxaca and Ransom (1994). In this last article there is a discussion about different methods to obtain the non-discriminatory wage structure; the more general approach sets this structure as estimation from a pooled sample of males and females. We'll take as non-discriminatory structure this last one, which allows disaggregating the discrimination component into overpayment and underpayment. The results are present in section 4.

### 3 The data: Wage Discrimination and Job Characteristics Survey

The data used in the analysis comes from The *Wage Discrimination and Job Characteristics Survey* (EDSCPT or ISOS Project in Spain). This survey was carried out in 2002 by the *Institute for Women, Ministry of Work and Social Affairs*. It was conducted on wage earners holding non managerial positions, and results in a matched establishment-worker data set with information about 600 establishment and 2382 employees. In addition to the individual usual information the survey collects data about job characteristics, discrimination's perception and firms involved in the process.

The survey develops a two-stage cluster sampling with stratification design considering three regions in Spain for the establishment and its workers: Andalusia, Catalonia and Madrid, and excluding the primary and the public sector, and also establishment with less than 5

workers<sup>2</sup>. Because of the non-response and the sampling procedure the sample didn't replicate the population frequency distribution. As a result it was necessary to develop a set of weights in order to extrapolate the sample's results to the population without bias and to capture the effects of occupations and activities on wages<sup>3</sup>. Finally the EDSCPT estimates the gender monthly wage gap for the whole sample in 18.07%, which represents an underestimation of the gap quantified in several official sources. Table 1 shows the gender wage gap estimates by different data sources in years close to 2002, for the full-time employees.

**Table 1: Gender wage gap in Spain. Full-time employment (Female/Male)<sup>4</sup>**

| Spain |                       | Source           | F/M ratio(%)     |
|-------|-----------------------|------------------|------------------|
|       |                       | ESIS 2000 (h)    |                  |
|       |                       | EES 2002 (a)     | 79.47%           |
|       |                       | EES 2002 (h)     | 82.21%           |
|       |                       | PHOGUE (mn) 2001 | 74.28%           |
|       |                       | PHOGUE (hn) 2001 | 84.24%           |
|       |                       | ISOS(m) 2002     | 84.28%           |
|       |                       | ISOS(h) 2002     | 87.64%           |
| (h)   | gross wages per hour  | (mn)             | net monthly wage |
| (m)   | gross wages per month | (hn)             | net annual wage  |
| (a)   | gross annual wages    |                  |                  |

There are several reasons to explain this divergence, such as smaller sample size, differences in the measurement of wages and mainly, different population under analysis: The survey didn't consider all economic sectors nor all establishments<sup>5</sup>. But mainly the arguments are, the employee is the person in charge of answering about incomes<sup>6</sup>, and the more important point to consider here for a properly evaluation on data: the survey's purpose is not closely getting the wage gender gap but their decomposition considering innovative information.

2 In a first stage 9 strata were defined using two different criteria, the establishment size (based on the number of workers) and the economic sector (main activity following the NACE-93 groups). In a second stage workers were randomly selected within firm.

3 See Rubio, C.(2005) for further information

4 ESIS is the survey of wages in industry and services, ESS refers to wage structure survey, and PHOGUE is the European Union household panel. In PHOGUE the gap is calculated in terms of net income and only for individuals that work more than 15 hours a week.

5 Excluding establishments less than 5 workers underestimates the real gender wage gap in the whole economy: these establishments hire major portion of women and also present greater differences in salaries due to discrimination. On the other side the omission of public sector partially compensate the problem

6 This implies a bigger gap and a bias in wages because of the measurement mistakes: the individuals tend to report smaller salaries; it's more difficult for them to distinguish net and gross wages and also to assign the bonuses. Sometimes they only provide the wage information in intervals.

Therefore, our objective is to re-examine the gender wage differences taking into account the characteristics of the job being carried out. The difference in mean salaries between man and women is considered appropriate given the design of the survey and the sample. With the exception of the work by Hernández (1995) using the Encuesta de Conciencia y Biografía de Clase (ECBC), is the first time this examination is done in Spain. In that case, the data refers to 1991 wages, the information about job characteristic was very limited and the survey estimates a gap of 26.23% for the whole sample of workers (not only full-time), 14.74% considering wages per hour. In both cases the gap considers net wages.

The variables included in the analysis refer first, to the usual Human Capital or individual variables and second, to the description of the job hold by the individual or job characteristics variables. The information related to individuals considered in the study is the usual one. In order to estimate the wage equation we take into account education, experience, seniority in the company, and some controls like, region, activity and if the contract is a contract of indefinite duration (permanent) or not. Table 2 summarizes the variables.

In relation to Education we define three dummy variables referring to the level of education reached by the individual, D\_EDUC1 refers to illiterate or primary level, D\_EDUC2 refers to secondary level (vocationary or bachelor) and finally D\_EDUC3, which refers to university degree, or higher degree.

There are two variables included reflecting, in a non linear manner, if the individual has previous working experience. They are called EXPERP and EXPERP2 and collect the previous experience in months. Besides, we include DFIJO a dummy variable that are related to the duration of the worker's contract, indefinite or not, and ANTIGEMP that collect the number of months spent by the worker in the current company.

We might consider PROP2 in the estimation, the proportion of females over the total number of worker, by occupation. However, there is no agreement in the empirical literature about its inclusion's convenience when using job characteristics due to the high grade of collinearity that may introduce.

Finally location is controlled by regional dummies, and also, the sector of activity by a set of activity dummies.

The information related to job characteristics in this sample is especially extensive in contrast to other studies which consider this kind of information, usually compensating differentials ones<sup>8</sup>. The treatment of the information in the survey, more than one hundred questions related to the job description, deserves mention apart.

In our data set the compilation of such a wide amount of data is based on the human resource management's perspective in the explanation of pay. This approach focuses on job's attributes as determinants of salary and measures these characteristics by a formal job analysis and job evaluation. These processes are usually related to comparable worth policies implementation. Applying the principle of "equal pay for works of comparable worth" involve the measurement of work's value considering an exhaustive set of characteristics.

There are several frameworks for evaluating jobs, but a general point factor job evaluation system is considered here. This system evaluates each job on a number of selected "compensable factors". Briefly, defining an evaluation system imply design a questionnaire or interview to collect the information related to the content of jobs, define the factors and the subfactors, and settled a way to convert the questionnaire answer into levels of each subfactors. Finally, the subfactors have to be totalled using weights. With this information is possible to put in order the work positions by the total points. The result of the job evaluation is a numerical score for each job in the organization

In our concern the evaluation is not based in interviews and assignation of points by an occupational job evaluation committee as usual. Instead, it is based on a questionnaire previously designed in ISOS project and included in the survey trying to cover as much information as possible. The result of the survey is a wide set of information including the behaviours, knowledge, skills and abilities required for successful job performance and also the working conditions. This information can be used directly or as usual in job evaluation systems, as a numerical score for the concrete job or several scores for each factor

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<sup>8</sup> The last usually consider only working conditions. We find the exception in the works by Filer (1985), Steinberg (1990) and Schuman et alia (2001) all of them in reference to labour markets in USA.

**Table 2: Weighted means and standard deviation broken down by gender for the individual variables.**

| Variable                                                | Males  |       | Females |       |
|---------------------------------------------------------|--------|-------|---------|-------|
|                                                         | Mean   | SD    | Mean    | SD    |
| Hourly wage <sup>9</sup>                                | 30.986 | 16.07 | 27.234  | 11.42 |
| Seniority                                               | 80.360 | 79.34 | 62.070  | 69.69 |
| Experp                                                  | 15.936 | 9.56  | 14.214  | 9.06  |
| Indefinite contract*                                    | 0.613  | 0.49  | 0.606   | 0.49  |
| Female's proportion by occupation                       | 0.211  | 0.23  | 0.664   | 0.17  |
| Age                                                     | 33.098 | 8.31  | 32.172  | 8.08  |
| <b>Education*</b>                                       |        |       |         |       |
| D_Educ1                                                 | 0.418  | 0.49  | 0.317   | 0.47  |
| D_Educ2                                                 | 0.403  | 0.49  | 0.400   | 0.49  |
| D_Educ3                                                 | 0.180  | 0.38  | 0.283   | 0.45  |
| <b>Economic Sector*</b>                                 |        |       |         |       |
| Manufacture 1 <sup>a</sup>                              | 0.057  | 0.23  | 0.061   | 0.24  |
| Manufacture 2 <sup>b</sup>                              | 0.084  | 0.28  | 0.074   | 0.26  |
| Manufacture 3 <sup>c</sup>                              | 0.058  | 0.23  | 0.009   | 0.09  |
| Construction/Building                                   | 0.486  | 0.50  | 0.036   | 0.19  |
| Wholesale and Retail Trade                              | 0.132  | 0.34  | 0.186   | 0.39  |
| Hotels and Restaurant                                   | 0.020  | 0.14  | 0.101   | 0.30  |
| Transport, storage and communication                    | 0.048  | 0.21  | 0.023   | 0.15  |
| Financial intermediation                                | 0.004  | 0.06  | 0.024   | 0.15  |
| Real estate, renting and business activities            | 0.078  | 0.27  | 0.172   | 0.38  |
| Education                                               | 0.011  | 0.10  | 0.104   | 0.31  |
| Health and social work                                  | 0.009  | 0.09  | 0.172   | 0.38  |
| Other community, social and personal service activities | 0.007  | 0.08  | 0.038   | 0.19  |
| <b>Region*</b>                                          |        |       |         |       |
| Andalusia                                               | 0.300  | 0.46  | 0.189   | 0.39  |
| Catalonia                                               | 0.481  | 0.50  | 0.475   | 0.50  |
| Madrid                                                  | 0.219  | 0.41  | 0.337   | 0.47  |
| <b>Family Status</b>                                    |        |       |         |       |
| Children under 6                                        | 0.232  | 0.53  | 0.193   | 0.47  |
| Children 6-18                                           | 0.267  | 0.61  | 0.188   | 0.46  |
| Family size                                             | 2.124  | 1.37  | 1.956   | 1.18  |
| <b>Marital Status</b>                                   |        |       |         |       |
| Single                                                  | 0.508  | 0.50  | 0.530   | 0.50  |
| Married                                                 | 0.450  | 0.50  | 0.418   | 0.49  |
| De facto partnership                                    | 0.005  | 0.07  | 0.014   | 0.12  |
| Widowed                                                 | 0.001  | 0.03  | 0.002   | 0.05  |
| Separated/Divorced                                      | 0.036  | 0.19  | 0.036   | 0.19  |

<sup>a</sup> Manufacture of food, textiles, leather paper and wood products

<sup>b</sup> Manufacture of coke, refined petroleum, quchemicals, plastics and other non-metallic minerals products. Electricity, gas and water supply

<sup>c</sup> Manufacture of machinery and equipment, electrical and optical equipment, transport equipment and others

9 Refers to gross hourly wage. In order to remove inconsistencies all the wages in the data set has been changed into gross wages following the Spanish income tax law in reference to deductions. This implies taking account of family composition, available in the survey

Concretely we have information on working condition (3 factors), skills and knowledge (6 factors, or 14 subfactors), effort (4 factors) and responsibility (4 factors). The factor's description and their values in the survey are summarized on table 3.

**Table 3: Weighted means and standard deviation broken down by gender for the compensable factors.**

| Compensable Factor  |                                                     | Total        |      | Female       |      | Male         |      |
|---------------------|-----------------------------------------------------|--------------|------|--------------|------|--------------|------|
|                     |                                                     | Mean         | S.D. | Mean         | S.D. | Mean         | S.D. |
| <b>GROUP A*</b>     | <b>WORKING CONDITIONS</b>                           | <b>4.315</b> | 4.4  | <b>2.268</b> | 2.5  | <b>5.078</b> | 4.7  |
| Factor 2*           | Dangerous conditions in work                        | 5.551        | 6.1  | 2.679        | 3.5  | 6.623        | 6.5  |
| Factor 3*           | Nights and weekends                                 | 1.133        | 0.5  | 1.196        | 0.7  | 1.110        | 0.5  |
| Factor 4            | Working hours and schedules                         | 1.323        | 0.7  | 1.289        | 0.6  | 1.336        | 0.7  |
| <b>GROUP B*</b>     | <b>KNOWLEDGE AND APTITUDES</b>                      | <b>5.183</b> | 1.8  | <b>5.498</b> | 1.8  | <b>5.066</b> | 1.7  |
| Factor 6*           | Knowledge and comprehension                         | 3.618        | 0.7  | 3.462        | 0.7  | 3.676        | 0.7  |
| Factor 7*           | Versatility                                         | 3.064        | 1.5  | 3.539        | 1.4  | 2.887        | 1.5  |
| Factor 8            | Physical aptitudes                                  | 5.883        | 2.7  | 5.610        | 2.6  | 5.984        | 2.7  |
| Factor 9            | Mental aptitudes                                    | 5.693        | 2.4  | 5.722        | 2.2  | 5.682        | 2.5  |
| Factor 10*          | Communication aptitudes                             | 4.493        | 2.5  | 5.230        | 2.5  | 4.218        | 2.5  |
| Factor 11*          | Human relationship aptitudes                        | 9.020        | 7.1  | 11.082       | 7.7  | 8.251        | 6.7  |
| <b>GROUP C</b>      | <b>EFFORT</b>                                       | <b>8.131</b> | 2.9  | <b>8.183</b> | 3.0  | <b>8.112</b> | 2.8  |
| Factor 12*          | Physical effort                                     | 6.228        | 2.5  | 5.308        | 1.6  | 6.571        | 2.7  |
| Factor 13           | Mental effort                                       | 11.365       | 5.4  | 11.907       | 5.6  | 11.163       | 5.2  |
| Factor 14           | Visual effort                                       | 4.756        | 4.2  | 5.287        | 4.4  | 4.558        | 4.1  |
| Factor 16*          | Emotional effort                                    | 5.361        | 2.6  | 5.771        | 3.0  | 5.208        | 2.4  |
| <b>GROUP D</b>      | <b>RESPONSIBILITY</b>                               | <b>3.586</b> | 3.8  | <b>3.817</b> | 3.8  | <b>3.500</b> | 3.8  |
| Factor 17           | Information and material resources responsibility   | 3.889        | 1.8  | 3.920        | 1.6  | 3.877        | 1.9  |
| Factor 18           | Supervisory Responsibility                          | 5.235        | 10.2 | 4.954        | 10.0 | 5.340        | 10.3 |
| Factor 19*          | Welfare responsibility                              | 2.331        | 4.6  | 3.005        | 6.1  | 2.080        | 3.9  |
| Factor 20           | Planning, management and development responsibility | 3.280        | 3.8  | 3.649        | 3.8  | 3.142        | 3.8  |
| <b>TOTAL POINTS</b> |                                                     | <b>5.246</b> | 2.1  | <b>5.226</b> | 2.2  | <b>5.254</b> | 2.1  |

\* Differences in the weighted mean points, 1% to 10% significative

One criticism to the point factor systems is that both, the assignation of points and weights, and the questionnaire design can derive in discrimination itself. We omit this problem taking advantage of the innovative properties of the job evaluation system specifically adopted, the ISOS evaluation system<sup>10</sup>. This system pretends the evaluation of the organization's positions in a neutral way with respect to gender.

As well as using this data in order to improve the specification in the wage's equation we can attempt to characterize the positions by gender to contrast if jobs typically held by women present different job characteristics that males ones. This argument usually supports the compensating differential hypothesis in relation to working conditions.

The weighted means for factors are showed in table 3 and allows for the analysis of the distribution of points by gender. The t test for the differences in the weighted mean points assigned to jobs held by males and by females show no significance difference for the mean in the global score assigned to jobs. Man and women are found to be in jobs that are evaluated, as a whole, to be of equal relative values. In our concern this equality reflects the successful attempt on neutrality global evaluation obtained by the inclusion of some aspects related to work that aren't always considered. This is the cases for well-being responsibility, emotional effort and a wide set of characteristics in works typically hold by women.

By groups, the differences appear in working condition, group A and knowledge and aptitudes, group B. In relation to the responsibility and effort there are no significative differences.

By factors the scenery is clearly different; there are important and significant differences that show both, segregation and differences in tastes and reflects the classical differences in jobs hold by males or females.

With greater differences we found factors 2, dangerous conditions, and factor12, physical effort, with greater mean in males, and factor 11, human relation skills and factor10,

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<sup>10</sup> ISOS project was a European project led by the *Institute for Women, Ministry of Work and Social Affairs*, in which the University Politècnica de Catalunya (UPC), the University Pompeu Fabra and the universities of Murcia, Leeds and Helsinki participated, as well as diverse people from a European scope expert in job evaluation techniques

communication aptitudes, with greater mean for females. Factors 2 and 12 have been usually involved in compensating differential explanation of pay.

There are a slightly greater mean for females in nights and weekends, versatility, emotional effort and welfare responsibility (factors 3, 7, 16 and 19). And a little difference in mean for males appears in factor 6, knowledge and comprehension. The rest of factors have no significative difference in mean.

It's surprising in this data set that females present equal responsibility than males, looking at group level. Considering factors, women hold more responsibility in well-being responsibility and planning and development nor in the case of supervisory responsibility and planning and management. It's worth to look directly at the variables in the questionnaire to deeper appreciation of differences<sup>11</sup>. Briefly, and only in relation to responsibility variables: While women declare twice the financial responsibility than males, they refer only to handling money. By the contrary, planning the budget or investments, decides on projects, or made responsibility for the administration, fall more usually on men. The magnitude of responsibility in euros is considerably large for males.

In case of responsibility for machines, resources or other materials, women assume more responsibility than men for confidential information and less for the rest of items, such as supervising and guarding, taking care of the stocks distributing materials,.... The magnitude of the consequences of committing errors or negligence is greater for males.

Again, women declare the assumption of supervision general tasks more frequently than men. Real greater responsibility appears only in relation to giving instruction or helping to new people. In this sense, allocating, scheduling, or evaluating work, recruiting personnel, developing groups, checking salaries or deciding promotions or disciplinary actions fall with priority on men. The number of subordinates and the different organizational levels under control is larger for men.

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<sup>11</sup> A table summarizing directly the variables and not the factors is available under request

In relation to well-being responsibility, women declare to assume it twice than men. And the level of responsibility is greater in this case for females in all the points, physical or mental treatment, nursery, look after their safety, rehabilitation judicial responsibility, etc...The consequences of possible errors or negligence are also greater for them.

The planning, organisation and development responsibility is more frequently declared by women but they only present larger responsibility in scheduling appointments or arranging the schedules of other people or the allocation of work. The development of products, policies, new operational models and strategies, are greater for males.

The differences found in greater exposure of males to hazards and the greater physical demands they support, pointed at first to the need of compensation. But the differences previously exposed in responsibilities, generating greater wages, improbably could be explained as merely differences in preferences by gender in the election of job characteristics. So the differences reflect both segregational discrimination and also compensating differentials. Other questions are if these characteristics are rewarded equal and whether a premium for the supposed unpleasant working conditions actually appears.

Later we'll see the effect of job characteristics on wages, if the gender wage gap reduces once we include them, and the effect of these variables on the fraction of the gap due to discrimination.

## **4 Estimation results and gender wage decomposition**

### **4.1 Wage equations and Job Characteristics**

The consideration of job characteristics in this analysis follow a double purpose: first examining the influence of job characteristics on wages, and, second to analyse to what extent the introduction of job characteristics help to explain the male-female wage differential which is not explained by the different characteristics males females have.

An initial approximation to the gender wage differences is the inclusion of variables referring jobs conditions in the explanation of pay which produce an increase in explanatory power and decrease the weight of the discrimination although it continues being important. A female wage-earning in private sector in Spain earns in mean, an 11.21% lower wage that a male with the same individual characteristics. The difference falls to 6.44% if we consider the individual and also the job characteristics. The estimation refers to a wage regression for the whole sample including a dummy for gender.

Setting the discrimination implies to analyze to what extend the same characteristics are regarded differently by gender, so we need to estimate separate regressions for males and females. Table 4 presents the estimation that involves gap decomposition, first the usual regression only with individual characteristics, secondly the regression adding the points attached to each job totally considered, and finally the regression considering all the factors in the job evaluation system.

Since the hedonic wage equation present a logarithmic specification, the coefficients for the dummy indicators can be interpreted as the percentage increase in wages that would arise when the worker has the corresponding characteristics.

In relation with individuals variables the results are similar to previous analysis. In relation to education, the university degree has the greater effect for both males and females. Medium or university levels increase the wage for women, but for males the only significant difference in wage is produced by the university degree. Therefore, the effect of education as in other studies is much more important for females than for men. It is interesting to contrast how educational variables act as proxies of job characteristics when they are not available. Once we included them the decrease on the coefficient reveals the major omission bias, and the university degree is only significant for women.

It has to be noted also the significance of experience, with non-linear effect, and seniority for both, males and females. An indefinite contract for males raise the wage between 12.74% and 10% but it has no significant effect for women.

The characteristics of the job seem to be, in general, at the same level of significance for both males and females, reaching an adjusted  $R^2$  of 0.47%, which is high enough in this kind of data. In fact, the whole punctuation for each job explains slightly better the wage for females, which could be reflecting the neutral nature of the methods trying to include female's characteristics in the job evaluation.

By the contrary, once all factors are included in the wage equation we observed that factors have a better adjustment for males. In fact, job characteristics have no relevance in order to explain the female's wages except for responsibility variables, concretely welfare responsibility and planning and management responsibility.

The grade of hazards and responsibility, the communication abilities/aptitudes and finally, the knowledge and visual effort are explaining the wage in male model.

We find that jobs that involve working in danger conditions, when significative, are associated with greater wages; so there is evidence of positive compensation associated with an undesirable job characteristic. By the contrary, working hours and schedules, and physical effort, usually attached to the compensation argument have no significance on wage's explanation. Moreover, visual effort and also mental and emotional effort (both almost significative) has negative effects on wages for males contrary to the positive effect expected. The explanation is more related to the segregation than to the compensation theory. These three characteristics are "female's characteristics", their means are greater for females than for males. Those males with high punctuation in this feminine factor obtain lower salaries in comparison to other males with the other characteristics reaching similar values.

**Table 4: Wage equations for males and females with and without job characteristics**

|              | Males               |                     |                     |                    | Females             |                     |
|--------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
|              | logsalhor05         | logsalhor05         | logsalhor05         | logsalhor05        | logsalhor05         | logsalhor05         |
| D_EDUC2      | 0.0679<br>[1.26]    | 0.0603<br>[1.15]    | 0.0357<br>[0.74]    | 0.1137<br>[1.75]+  | 0.099<br>[1.52]     | 0.0945<br>[1.45]    |
| D_EDUC3      | 0.2424<br>[3.64]**  | 0.1896<br>[2.82]**  | 0.0899<br>[1.28]    | 0.3067<br>[3.84]** | 0.2238<br>[2.74]**  | 0.2065<br>[2.59]**  |
| experp       | 0.0345<br>[5.07]**  | 0.032<br>[4.44]**   | 0.0207<br>[3.84]**  | 0.0236<br>[2.54]*  | 0.0201<br>[2.21]*   | 0.0174<br>[2.04]*   |
| experp2      | -0.0007<br>[3.78]** | -0.0006<br>[3.32]** | -0.0004<br>[2.72]** | -0.0003<br>[1.21]  | -0.0002<br>[0.67]   | -0.0001<br>[0.49]   |
| antigemp     | 0.0007<br>[2.27]*   | 0.0006<br>[2.05]*   | 0.0008<br>[3.16]**  | 0.0011<br>[2.66]** | 0.001<br>[2.43]*    | 0.001<br>[2.73]**   |
| Dfijo        | 0.1274<br>[2.91]**  | 0.1124<br>[2.39]*   | 0.1009<br>[2.50]*   | 0.0109<br>[0.23]   | 0.007<br>[0.15]     | 0.0201<br>[0.41]    |
| puntos       |                     | 0.0382<br>[2.60]**  |                     |                    | 0.0538<br>[4.12]**  |                     |
| factor2      |                     |                     | 0.0065<br>[1.68]+   |                    |                     | 0.0035<br>[0.65]    |
| factor3      |                     |                     | 0.0197<br>[0.47]    |                    |                     | -0.0276<br>[0.82]   |
| factor4      |                     |                     | 0.0125<br>[0.41]    |                    |                     | 0.025<br>[0.61]     |
| factor6      |                     |                     | 0.0719<br>[2.45]*   |                    |                     | 0.0645<br>[1.49]    |
| factor7      |                     |                     | -0.0106<br>[0.93]   |                    |                     | 0.0049<br>[0.28]    |
| factor8      |                     |                     | -0.0046<br>[0.44]   |                    |                     | 0.0033<br>[0.32]    |
| factor9      |                     |                     | -0.0057<br>[0.68]   |                    |                     | -0.0039<br>[0.34]   |
| factor10     |                     |                     | 0.0343<br>[2.27]*   |                    |                     | 0.0054<br>[0.29]    |
| factor11     |                     |                     | -0.0065<br>[1.49]   |                    |                     | -0.0055<br>[1.11]   |
| factor12     |                     |                     | -0.0069<br>[1.02]   |                    |                     | -0.0052<br>[0.38]   |
| factor13     |                     |                     | 0.0072<br>[1.61]    |                    |                     | 0.0023<br>[0.47]    |
| factor14     |                     |                     | -0.0187<br>[3.01]** |                    |                     | -0.008<br>[1.42]    |
| factor16     |                     |                     | -0.0146<br>[1.63]   |                    |                     | 0.0047<br>[0.42]    |
| factor17     |                     |                     | 0.0081<br>[0.58]    |                    |                     | -0.0071<br>[0.59]   |
| factor18     |                     |                     | -0.0016<br>[0.66]   |                    |                     | 0.0028<br>[1.23]    |
| factor19     |                     |                     | 0.0082<br>[2.13]*   |                    |                     | 0.0065<br>[2.19]*   |
| factor20     |                     |                     | 0.016<br>[2.00]*    |                    |                     | 0.0269<br>[3.18]**  |
| Constant     | 3.4043<br>[26.81]** | 3.1766<br>[20.17]** | 3.0531<br>[15.54]** | 2.974<br>[21.38]** | 2.6962<br>[19.10]** | 2.6853<br>[12.71]** |
| Observations | 755                 | 755                 | 755                 | 621                | 621                 | 621                 |
| AdjR2        | 0.35                | 0.38                | 0.45                | 0.35               | 0.39                | 0.42                |

With the robust t-statistics in brackets, and + significant at 10%; \* significant at 5%; and \*\* significant at 1%. The omitted individual works in Madrid, in financial intermediation sector and has primary education.

#### 4.2 Gender gap decomposition

Quantifying discrimination imply the assessment of difference in mean wages, known as gender wage gap, and also the division of this gap in two parts. The split of the gap is developed using the well-known Oaxaca decomposition. The results are presented in table 5 for the usual model without job characteristics and including them. In this case is expected to reduce the unexplained fraction of gender wage gap.

Concretely, in this survey women earn in mean 13.46% less than men<sup>13</sup>, with the usual approach in determining the unexplained portion of the gap, the “discrimination” reaches the 53.86% of this gap. Adding the job characteristics this percentage reduces to 27.99%, so women earn in mean only 3.77% less than men due to discrimination, and 9.69% due to differences in characteristics, including the differences in positions the individuals hold which reach 3.75%. The other 5.94% refers to difference in “human capital” variables.

**Table 5: GENDER WAGE GAP DECOMPOSITION**

|                                                      |           |         |
|------------------------------------------------------|-----------|---------|
| <i>GAP WITH WORK CHARACTERISTICS</i>                 | 0.1345795 | 100.00% |
| Differences in characteristics                       | 0.09692   | 72.01%  |
| Differences in rate of return to the characteristics | 0.03766   | 27.99%  |
| <i>GAP WITHOUT WORK CHARACTERISTICS</i>              | 0.1345795 | 100.00% |
| Differences in characteristics                       | 0.06209   | 46.14%  |
| Differences in rate of return to the characteristics | 0.07249   | 53.86%  |

<sup>13</sup> This gap is not completely consistent with the gap obtained with the whole sample, because of the missing values in the regression

The model is estimated without sample selection correction due to the absence of information of non participant in the sample. The omission of selection decision in the estimation of a wage equation results in omitted variable misspecification and consequently, sample selection bias. This problem is usually solved estimating the two-step procedure to correct the selectivity bias in the parameters estimation obtained from such a censored sample. The absence of information related to non workers in our data set force us to use a complementary data set, if we are interested in calculating the correction terms following the approach in Arellano and Meghir (1992)<sup>15</sup> Concretely the EPA (Economically Active Population Survey in Spain), in 2001 third quarter, after filtering the data set for homogenizing the population to those represented in the ISOS data set. When considering sample selection approach the Oaxaca decomposition of gender wage gap is also redefined. We can consider instead a double selection approach on the estimation of wage equation in order to distinguish between non-participants and unemployed. In the absence of the standard deviation correction for consistent estimation, the results points to similar conclusions in the decomposition of the gender wage gap.

## 5 Summary and conclusions

The previous analysis based on the *Wage Discrimination and Job Characteristics Survey*, allows a review of the determinants of wages and go into the analysis of the gender wage differences taking into account job's characteristics as determinant of productivity.

In one hand we don't find evidence of the compensating differential hypothesis explaining the gender wage gap. This approach suggests no underpayment of female dominated-occupation but wage premium paid to men because of unpleasant working conditions. The description of the characteristics in the data set reveal non expected distribution in the differences in characteristics by gender, and no difference as an aggregate level. Taking apart the difficulty of an objective characteristics classification as undesirable or not, we can consider that the access to some characteristics is itself the result of discrimination in the job

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<sup>15</sup> This implies also the correction of standard errors.

assignment. So, segregational occupation better than preferences, can sustain also the access to different kind of job.

On the other hand we find that these characteristics are able to explain a significant portion of the variation in wages. Moreover, once these characteristics are taken into account the portion in the wage gap that is attributed to discrimination is substantially reduced.

The distribution of characteristics by gender is not the expected and usual one, due to certain degree of subjectivity because the workers are providing data, and mainly to the “neutral” evaluation system applied. It would be interesting to analyse the results if the job evaluation is developed using alternative non-neutral methods.

Moreover, we saw that factors aggregation using the evaluation system settled down by ISOS allows for a regression including all the information and reducing substantially the collinearity. But when studying the characterization of position by gender we saw also that necessarily some information is loosened. In this sense it was suitable to look for an aggregation based directly on the variables without previous establishment of factors. We could see if using categorical principal components analysis we obtain equivalent factors and if the results are homogeneous with the obtained before.

For further research, it would be also interesting to study not only mean behaviour of wages and discrimination, but the effects of the enrich specification along the whole salary distribution using quantile regression.

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