LOOKING AT THE ADJUSTED GENDER PAY GAP. SEARCHING FOR DIRECT DISCRIMINATION IN SPAIN

LA OBSERVACIÓN DE LA BRECHA SALARIAL DE GÉNERO AJUSTADA. EN BUSCA DE LA DISCRIMINACIÓN DIRECTA EN ESPAÑA

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ABSTRACT

We investigate the hidden gender gap, the unexplained wage inequality that could be related to direct discrimination. A General Linear Model combining the variables of the 2018 Spanish Structure of Earnings Survey is estimated to construct typologies with maximum pay gap. We build a matrix with all combinations of explanatory variables including sex (>3 million rows). We predict salary with the model and calculate the wage gap between rows whose only difference is sex. We order rows selecting those with the maximum pay gap (≥ 99th percentile) to identify typologies. Therefore, we are able to adjust the calculation of the hidden gap (13.1%) and identify the type of occupation where it mostly occurs (permanent jobs, in companies of 1 to 49 workers in the industrial sector of the Northwest of Spain). Additionally, we highlight the characteristics of women who suffer most from it (women ≥ 50 years with medium and high education).

KEYWORDS

General Linear Model; Gender Inequality; Hidden Gap; Pay Discrimination.

RESUMEN

Investigamos la brecha de género oculta, la desigualdad salarial inexplicable que podría relacionarse con la discriminación directa. Se estima un Modelo Lineal General combinando las variables de la Encuesta Española de Estructura Salarial de 2018 para construir tipologías con máxi-ma brecha salarial. Construimos una matriz con todas las combinaciones de variables explicativas incluido el sexo (>3 millones de filas). Predecimos el salario con el modelo y calculamos la brecha salarial entre filas cuya única dife-rencia es el sexo. Ordenamos filas seleccionando aquellas con la máxima brecha salarial (≥ percentil 99) para identifi-car tipologías. Ajustamos así el cálculo de la brecha oculta (13,1%) e identificamos los tipos de ocupación donde se da mayoritariamente (puestos de trabajo fijos en empresas de 1 a 49 trabajadores del sector industrial del Noroeste de España). Adicionalmente, observamos las características de las mujeres que más la padecen (mujeres ≥ 50 años con educación media y alta).

PALABRAS CLAVE

Modelo General Lineal; Desigualdad de Género; Brecha Oculta; Discriminación Salarial.

INTRODUCTION

The gender pay gap has been widely addressed in academic literature. Many studies analyse the differences in pay between women and men and try to identify their causes. These studies often differentiate, on the one hand, which part of the gender pay gap can be explained by the different personal characteristics– generally associated to the concept of human capital and the characteristics of their jobs – and on the other, the part that cannot be explained by monitoring these factors. The latter generally appears in the literature under different terms such as 'the effect of discrimination', 'the unexplained part of the gender pay gap', or simply 'discrimination'.

Concerning the causes, most works resort to the classical decomposition methodology proposed by (Blinder 1973) and (Oxaca 1973) or their subsequent modifications (for further information, see Beblo et al. 2003). This methodology, commonly used in economic analyses, is based on a multiple regression where the dependent variable is a wage estimator (most frequently, the natural logarithm of the pay) and the independent or explanatory variables include human capital calculations (like seniority and level of education), as well as other independent variables affecting the wages, such as the characteristics of the job (full time/part time, overtime, type of contract of employment, etc.). The goal is to analyse how a change in an explanatory variable leads to a change in wages, while keeping the other explanatory variables constant. Thus, the aim is to have the general regression equation explain the change in wages.

In this type of equation, regressions are generally performed separately for men and women. Therefore, by analysing the results of both regressions, the wage differential can be decomposed respectively into the estimate of the gap that can be explained and the one that cannot - the 'unexplained part of the gender pay gap' (see Stanley and Jarrell 1998)-.

In such studies, it is also common to use a second type of regression analysis with a single regression equation including the male/female sex variable. In this case, the coefficients in the other independent variables are homogeneous for men and women, so that the sex variable coefficient can measure the 'unexplained salary gap' (see Olson 2013).

Regardless of the technique used, in these estimates of the gender pay gap, it is essential to contemplate as many variables as possible to account for the gender differences in pay, trying to identify whether the differential is the result of Direct Pay Discrimination – referring to cases in which, for the same or equivalent value, individuals are paid differently depending on their sex (Corominas et al. 2001; Findlay, Findlay, and Stewart 2009) – or Indirect Pay Discrimination – rules, procedures, and practices that may seem neutral at first, but whose implementation disproportionately affects the members of certain collectives, women in this case – (Blume Moore 2015; Tomei 2003; Torns and Recio 2012).

Likewise, we also need studies analysing and evidencing the role of horizontal and vertical occupational segregation in explaining such differences. In this sense, several international (Emerek 2008; Jarman, Blackburn, and Racko 2012) and Spanish (Díaz and Simó 2016; Hernández 1996; Palacio and Simón 2002; Simón, Ramos-Lobo, and Sanromá 2008) studies have focused on the relationship between wage determination and highly gendered occupational fields, as well as on the labour hierarchies in such fields, which have a direct effect on the pay differential.

However, when the most important surveys examine the pay gap, even with extensive information, some potentially relevant aspects are often omitted: motivation, risk aversion/tolerance, etc. Moreover, basing the analysis of the gap on human capital theory, which equates an individual's wage with their potential productivity, can deliver biased results. This assumption is based on the idea that the labour field is gender-neutral and all the variables that determine a person's pay affect men and women equally. Hence, authors such as Lips (2013) insist that it would be advisable to incorporate new perspectives and methodological approaches to expand this interpretative framework.

Our study agrees with many of these arguments and tries to adopt a novel approach to shed some light on the 'unexplained part of the gender pay gap' for jobs with the same or equivalent value in the Spanish labour market. The objective of the study is to investigate which specific sociodemographic and occupational characteristics show the widest adjusted gender wage gap in Spain, according to the data of the Structure of Earnings Survey (SES).

To this end, we start by creating a matrix in which we establish all possible combinations of a series of independent variables that explain wages, collected from the SES, to identify the typologies of employment and employees with which we can subsequently estimate the gender wage gap.

This approach allows us to identify the types of employment that accumulate the greatest gender gap in Spain and the profile of the women who suffer from it. On the other hand, as the variables that define the jobs and the profiles of the employees are constant, our model allows us to calculate the gender salary gap in an alternative way to that generally used in other studies.

Therefore, we believe that this study can provide additional knowledge in this field. Firstly, the use of an alternative statistical approach can contribute to methodological triangulation in obtaining results by showing possible new evidence. Secondly, our model allows us to expand the sample by combining all the variables used, predicting the wage gap for each of these combinations.

It is worthwhile pointing out that the SES sample size is approximately 217,000 workers, whereas our base estimation matrix is substantially larger (more than 3 million rows). Consequently, although some of the profiles obtained in the matrix were not represented in the sample, it does not mean that they do not exist in the larger and more complex Spanish labour market (19,564,600 workers at the end of the fourth quarter of 2018).

Therefore, we believe that this study contributes to a better understanding of the hidden gap. In fact, highlighting realities that may remain hidden is one of the foundations of sociology.

DATA AND METHODS

We have used the micro-data from the 2018 Structure of Earnings Survey (SES), the most recent survey published conducted by the Spanish National Statistics Institute (INE). This survey collects information on the national structure and distribution of wages every four years and is carried out in all Member States of the European Union. The Spanish version of the survey covers the entire country.

The questionnaires are answered by employed persons who were registered with the Social Security on 31st of October of the reference year. The companies they work for, regardless of size, are part of three major sectors: industry, construction, and services. Other sectors are excluded from the survey: agricultural, livestock, and fishing activities, household staff, extraterritorial organisations, and, partially, public administrations and defence (although public servants belonging to the General Scheme of the Social Security are included). In addition, the survey includes employees of the public sector that are not public servants.

One of the advantages of this survey is that it includes information on both the employees and the business organisations for which they work. This allows our observations to cover wage information and determinants, contemplating both individual and company characteristics.

On the other hand, the sample has some limitations. For example, it does not include other types of variables that could also partly explain some differences in the wages, such as, the degree of risk aversion, the family characteristics of the employees, etc.

With this circumstance in mind, and in the first stage, we use a general linear model to analyse the pay gap between employees, a group of statistical techniques that aim to analyse the effect of continuous or categorical variables in a continuous variable. We use it with interactions of the following explanatory variables, with the sex variable to separate the effect of men and women[1]. The dependent variable is the natural logarithm of the employee's hourly wage (W) and the independent variables are 1) the characteristics of the company: region where it is located (REGION), size of the company in number of employees (SIZE), ownership of the company, public or private (OWNERSHIP), collective bargaining agreement (AGREEMENT); 2) the characteristics of the job: occupation, according to the first level of the current national classification (OCCUPATION), the existence of supervision over the job position (SUPERVISION), working hours, part-time or full-time (WORKDAY), the type of contract, temporary or indefinite (CONTRACT); and, finally, 3) the individual characteristics of the employee: seniority (SENIORITY), sex (SEX), age group (AGE), and educational level (EDUCATION). Details of the variables used can be found in Annex 1.

To reduce the number of possible combinations and preserve information on the characteristics of the job, the OCCUPATION variable is recoded into eleven categories from the National Occupations Classification CNO1. Although this represents a limitation, the national classification of economic activities (CNAE 2009) is disregarded, as it includes 27 categories. Incorporating it into the model would have significantly increased the number of possible combinations in the typology matrix, consequently increasing the cost to process it and complicating its analysis, with no increased precision.

The proposed model is:

$$\log(W_{ijklmnopqrstu})$$

$$= E_i + R_j + Z_k + W_l + A_m + S_n + G_o + O_p + U_q$$
$$+ E_r + H_s + C_t + SE_{ni}$$

$$+ SR_{nj} + SZ_{nk} + SW_{nl} + SA_{nm} + SG_{no} + SO_{np} +$$
$$SU_{nq} + SE_{nr} + SH_{ns}$$

$$+ SC_{nt} + \varepsilon_{ijllmnopqrstu}$$

E_i is the effect of the ith level of the SENIORITY factor. R_j is the effect of the jth level of the REGION factor. Z_k is the effect of the kth level of the SIZE factor, recoded in three categories, W_l is the effect of the lth level of the OWNERSHIP factor. A_m is the effect of the mth level of the AGREEMENT factor. S_n

is the effect of the nth level of the SEX factor. G_o is the effect of the oth level of the AGE factor. O_p is the effect of the pth level of the OCCUPATION factor, recoded in ten categories. U_q is the effect of the qth level of the SUPERVISION factor. E_r is the effect of the rth level of the EDUCATION factor. H_s is the effect of the sth level of the WORKDAY factor. C_t is the effect of the tth level of the CONTRACT factor. $\varepsilon_{ijklmnopqrstu}$ is the experimental error, distributed as $N(0, \sigma^2_\varepsilon)$.

We estimate two models, one with the base salary (BS) – the part of the pay that does not include overtime and other bonuses – and another with the total salary including these bonuses (BSPB). In the first case, the hourly wage is equivalent to the base salary divided by the number of hours in a workday, excluding overtime (BS). In the second, the hourly wage is calculated with the sum of the base salary, overtime, and bonuses divided by the sum of regular hours and overtime (BSPB). Details of the wage model estimates can be found in Annex 2.

Various international and Spanish studies (Blinder, 1973; Oxaca, 1973; Brindusa et al., 2019; Conde-Ruiz & Marra de Artíñano, 2016; Fernández Kranz, 2018) analyse the gender pay gap by using general linear models such as this one. However, our approach consists of using this model to construct typologies of the maximum pay gap. To do so, we first construct a design matrix with all combinations of the explanatory variables including sex, resulting in more than 3 million rows. We then apply our estimated model to this new dataset in order to predict salary. Afterwards, we calculate the gender gap between rows whose only difference is sex. Finally, we order rows accordingly and select those with the maximum pay gap (those in the 99th percentile and over). We then descriptively identify typologies that show where the maximum gender gap is.

All statistical analyses were carried out using R (R Core Team, 2019) version 3.6.2.

RESULTS

The analysis carried out is basically descriptive, without any evidence of causality between the variables and the estimated gap. The results obtained show a total of 31,046 socio-labour typologies with the maximum unexplained pay gap (in the 99th and 100th percentile of the pay gap distribution). The gender pay gap in the BS ranges between 9.23% and 12.91%. For BSPB, the range is 10.57%–13.1%.

According with the SES variables, these results can be interpreted as direct pay discrimination based on the employee's gender. We must keep in mind that these results estimate the differences in salary between men and women when they share the same demographic, educational, and occupational characteristics. However, apart from the hidden discrimination against women related to the information available in the survey, there might be forces that are not considered in the variables included in the data used. Some examples of these might be motivation, risk aversion/tolerance or men's greater disposition to negotiate a pay rise. Therefore, in the analysis we will refer to this pay differential as the hidden gap.

In order to describe the types of jobs and the profiles of women that accumulate the largest hidden gap, the different variables that comprise them are analysed below.

PROFILE OF WOMEN WITH THE HIGHEST HIDDEN GAP

Human capital postulates establish a direct relationship between salary and investment in terms of training, education, experience, daily hours, etc. Thus, the greater the investment, the higher the salary will be (Heckman 2015; Mincer and Polachek 1974; Sweetland 1996). In this sense, each worker's rational choice plays a central role in deciding where and how much to invest in order to grow in the labour field.

Yet, evidently, these aspects are affected by different social factors such as the initial social class, ethnicity, and gender. Similarly, the characteristics of the labour market also impact the wage relationship.

Several studies (Brindusa, Conde-Ruiz, and de Artíñano 2019; Conde-Ruiz and Marra de Artíñano 2016; Fernández Kranz 2018; Murillo and Simón 2014) have analysed the gender pay gap in the Spanish labour market estimating it and examining whether it can be explained by the difference in human capital "investments" between women and men, or rather it evidences discrimination. However, these studies have not revealed the specific characteristics of jobs in which the hidden pay gap is most significant, nor have they addressed the specific sociodemographic characteristics of the women affected by it. Hence, we will now analyse these characteristics.

EDUCATIONAL LEVEL

Does a greater educational investment lead to a lower chance of experiencing the hidden gap? In general terms, the level of studies is one of the most important variables to consider when analysing the adjusted pay gap. In this sense, several studies point out that the growing levels of education in women will eventually lead to closing the pay gap (Fortin 2005; Gradín and Del Río 2009). Others suggest that, at present, higher levels of education are not enough (Campos-Soria and Ropero-García 2016; De la Rica Goiricelaya et al. 2005).

Regarding the educational level, we found two relevant aspects in our analysis (Figure 1). The first is that the maximum hidden gap in BS tends to concentrate on women with advanced vocational training (35.8%) or university education (31% of the cases). As for BSPB, women with university education do not frequently experience the maximum hidden gap, which concentrates mostly on women with advanced vocational training (42.9%).

In this sense, we must consider that, generally speaking, jobs that do not require university education are more likely to be remunerated with overtime, especially in the industry and construction sectors (Zarapuz 2016).

The results indicate that, for individuals with the maximum hidden gap, higher educational levels do not necessarily prevent this situation. In fact, the gap concentrates on medium and high educational levels.

WORK EXPERIENCE

Does more work experience help to avoid the hidden gap?

Economic studies often consider experience as a key aspect in determining a salary. It is worth noting at this point that feminist economists (Figart and Mutari 2005; Whitehouse 2003) have long pointed out that conventional economic approaches tend to underestimate the extent to which men's and women's work experience is strongly conditioned by gender constructs and that these studies may

therefore incorporate biases that underestimate both the gap itself and the mechanisms of discrimination behind it.

The SES questionnaire does not include a variable for years of work experience, but it does include the seniority variable. At this point, it is important to distinguish an individual's professional career (understood as a continuum of years of employment) from professional experience. In this sense, women's greater job discontinuity (especially when the interruptions are long) is highlighted by numerous studies as a disadvantage in terms of career development, access to full-time jobs, and, consequently, pay (Abele and Spurk 2011; Manning and Swaffield 2008; Miyoshi 2008; Reitman and Schneer 2005). However, contrary to what might be assumed initially, other studies indicate that work experience alone is often not particularly important as a determinant of pay (Blau and Beller 1987; Frieze et al. 2006; Oxaca 1973). This suggest that the relationship between work experience and pay is complex, and that the explanation of the pay gap should not be reduced to women having generally less work experience.

The results of our study seem to point in this direction; they do not indicate that experience, understood as seniority in the company, explains the hidden gender pay. As can be seen in Table I, the prevalence of occupations with the maximum hidden gap is relatively evenly distributed across all seniority categories in the sample.

Figure 1.
Distribution of socio-labour typologies with the maximum gap according to educational level
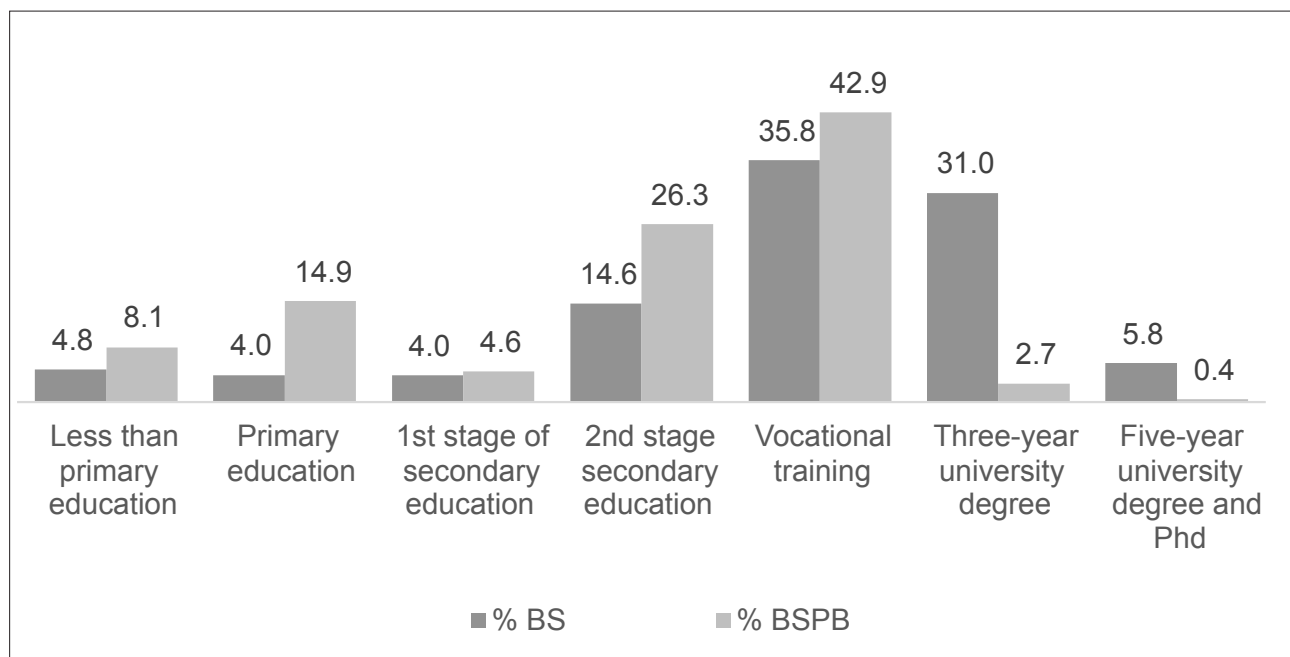
Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

Table I.
Distribution of socio-labour typologies with the maximum gap according to seniority in the company

	% BS	% BSPB
Under a year	29.0	21.3
Junior	26.2	23.6
Semi-senior	23.6	26.1
Senior	21.2	29.0

Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

Indeed, seniority in a specific job position does not necessarily reflect accumulated work experience. In the past, previous jobs might have provided added value in terms of experience for the current job.

On the other hand, the variable related to the age of employees could be also interpreted as a proxy of work experience and, consequently, as a "justification" for certain wage differentials. However, we must be aware that the gender pay gap in Spain, as in other EU countries, increases with age. Different studies (eg: Conde-Ruiz and Marra de Artíñano 2016) estimate the Spanish adjusted pay gap in 2014 to be around 5% for women under 30 years of age, while for the age groups 50–59 and over 59 this gap is between 15% and 17% respectively.

As we can see in Figure 2, the results of our study coincide with these estimates, and the highest prevalence of jobs with the maximum hidden gap is concentrated in the oldest age ranges.

As observed in the data, there are very few women under the age of 30 performing jobs with the maximum pay gap. Note that Spanish young people have the highest unemployment rate in the EU (40.7% in 2020 for people under 25, over 20 points more than the European average). In addition, the jobs they can generally access are mostly temporary and worse paid (Ortega and Martín 2012; Torrejón-Velardiez and Ermólieva 2016). And even though Spanish young people are not free of gender inequality in the labour market (Pasos Cervera and Asián-Chaves 2018), they suffer from it less frequently than other age groups.

The precarious situation of youth employment in Spain can explain the limited presence of young women in occupational typologies with the maximum hidden given that precariousness alone can make it impossible for large pay differences to exist in equivalent jobs. In other words, job insecurity itself may be leading to a downward homogenising effect in the wages of young men and women.

However, among people aged 30 to 49, the prevalence of the maximum hidden gap increases significantly. This is even more relevant for their BSPB, which goes from 1% in the previous age group (20–29) to 6.3% in the 30–39 age group. Meanwhile, in the case of BS, the percentage is 3% for the 40–49 age group.

Figure 2.
Distribution of socio-labour typologies with the maximum gap according to age
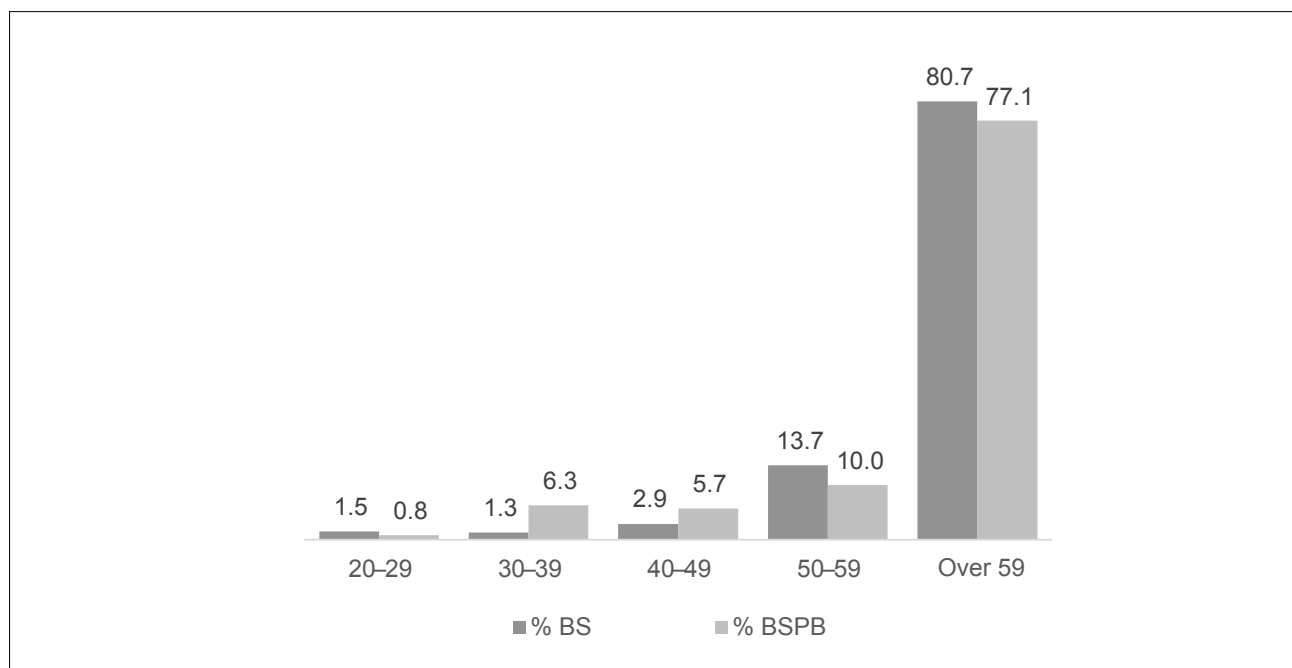
Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

A reasonable explanation is that the presence of the hidden gap is amplified with age, due to periods of motherhood and care. Unfortunately, the SES provides no information on the number of children, so it is not possible to estimate the effect of motherhood on the gap. However, we must note that the average age for first-time mothers in Spain is 31 (INE, 2018) and, as many studies point out (e.g., Amorós et al., 2019; Kranz, 2018; Moreno Minguez, 2015), our country has not yet achieved care co-responsibility between men and women. All this generates several major obstacles in women's professional careers, in an employment context in which caring for dependent persons is incompatible with an increasingly demanding investment in and dedication to employment.

Finally, as mentioned above, the prevalence of jobs with the highest unobservable pay gap is concentrated in the older age brackets. On the one hand, the 50–59 age range shows that the prevalence of cases increases in both BS and BSPB, reaching 13% and 10% respectively; on the other hand, the group of people aged over 59 concentrates the bulk of the prevalence of observed cases, reaching 80% in BS and 77% in BSPB.

In this sense, we must consider the generational effect of women born before 1962 on the sample. Many of them joined the labour market during the 1980s. Since then, they have had to fight against a labour context with deep-rooted androcentric beliefs and representations, in which maternity leaves were practically non-existent. In view of the results, this has contributed to the creation of "hidden" wage discrimination. We should also note that this situation is particularly burdensome for women of these generations, because they are close to retirement age and their benefits will most likely be substantially lower than those of men of the same age who have held equivalent jobs.

INVESTMENT IN PRODUCTIVE TIME

One of the most frequent explanations for the existence of the 'gross earnings' gap is the different investment of time made by women and men in their jobs. This argument is based on a universally shared principle of equity, according to which a greater investment of time during the working day must necessarily result in a higher pay. However, to explain the impact of productive time investment on the gender pay gap, it is necessary to consider a sociological perspective that brings us closer to understanding the underlying motivations behind the different time investment.

In this sense, many Spanish and international works (Booth et al. 2013; Mauriani, Rogerat, and Torns 2000; Webber and Williams 2008) highlight

the higher prevalence of part-time jobs and reduced hours among women (when compared to men). These studies point out that the main reason behind this is that women try to find jobs they can balance with care responsibilities.

As in other countries, part-time jobs in Spain are also highly feminised. There is an underlying (yet erroneous) belief that these jobs are ideal to balance productive and reproductive work (according to the INE, in 2018, 96% of part-time employees were women). However, over the past two decades, the Spanish labour market has become increasingly precarious, accumulating worse remuneration and higher temporality (Alcañiz Moscardó 2015; Echaves and Echaves 2017; Ortíz García 2014).

In this sense, we must note that the adjusted pay gap in Spain is higher among full-time employees (Figure 3): 14% in 2014, compared to 7% for part-time employees (Brindusa et al. 2019). We must not forget that the pay gap increases for high-paying jobs (Spanish Confederation of Employer's Organisations - CEOE, 2019), so evidently, part-time jobs, with a much smaller salary range than full-time jobs, also have narrower adjusted pay gaps.

However, when analysing the highest hidden pay gap between men and women in our study, the employees' working hours are not an explanatory factor. As seen in Graph 3 the prevalence of jobs with the maximum hidden pay gap (both for the BS and the BSPB) is quite homogeneously distributed between part-time and full-time contracts.

Figure 3.
Distribution of socio-labour typologies with the maximum gap according to working hours
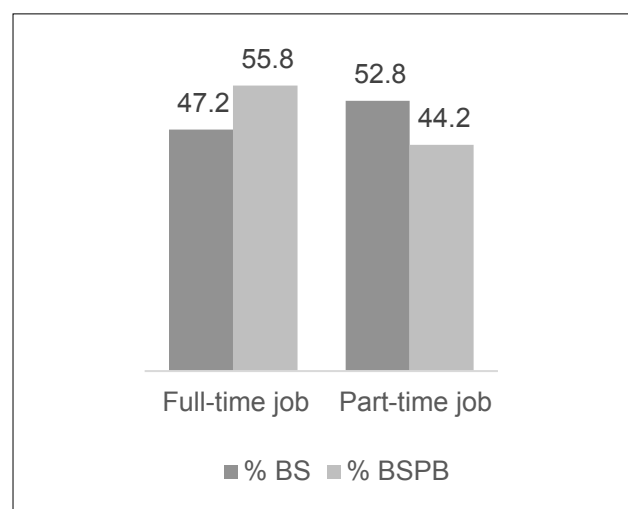
Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

Overall, we can conclude that the jobs that accumulate the highest proportion of the hidden pay gap in the Spanish labour market are those mainly held by women with university education (in the case of BS) and advanced vocational training (in the case of BSPB), mainly aged over 59 years old. A progressive increase can be identified from the age of 30.

This pay gap, on the other hand, cannot be explained by seniority nor the amount of working hours. Therefore, up to this point, the existence of the maximum hidden pay gap cannot be explained by the different categories of human capital investment. That is, if the hidden gap reflects a situation of discrimination, it is independent from the human capital investment of female employees.

Can job and company characteristics explain the existence of a hidden pay gap?

Next, we will analyse the characteristics of the jobs where the maximum hidden gap can be observed, as well as their corresponding productive sectors. Let us remember though, that the SES does not collect information on public servants, army personnel, and agricultural and livestock production.

OCCUPATION TYPES

Before analysing our results and to contextualise the salary differential in Spain, we should first note that recent studies (e.g. Brindusa, Conde-Ruiz, and de Artíñano 2019) have observed the highest adjusted pay gaps in male-dominated jobs; generally speaking, the pay gap tends to be higher the lower the percentage of women working in that job type.

When analysing which job types accumulate more cases with the maximum hidden gap, our study model offers results that correlate with the aforementioned works (Table II). In fact, the occupation groups with the highest prevalence of the maximum pay gap are *Skilled Workers in Construction* (65,5% BS, without supervision task, and 61,0% BS, with supervision task) and *Skilled Workers in Manufacturing Construction* (64,1% BSPB, without supervision task, and 60,4% BSPB, with supervision task).

These are highly male-dominated jobs. According to the Spanish Confederation of Employers' Organizations (CEOE, 2019), women represented only 1% of *Skilled Workers in Construction* and 12% of *Skilled Workers in Manufacturing* in 2017. On the other hand, female-dominated occupational fields such as *Accountancy, Administrative and other office employees*, *Workers in catering, and Trade salespersons*, and *Workers in health and care* do not show cases of the maximum hidden gap.

It is important to understand that, when male-dominated jobs include supervision tasks, in general terms, they tend to accumulate a large number of maximum hidden gap cases (Brindusa et al. 2019). Nevertheless, in our study the supervisory function is not the main explanatory factor.

We must keep in mind that in some job types, especially those that are skilled, salary determination is generally affected by bargaining between the employer and the employee, above the wage standards set out in the corresponding labour regulations. This negotiation can affect both the base salary and the complements or bonuses.

In this sense, several studies report that men generally demand a substantially higher salary than women, and women adopt less demanding negotiating positions when pursuing something for themselves. Consequently, they are less likely to start negotiations (Amanatullah and Morris 2010; Barron 2003; Bowles and Babcock 2013; Bowles, Babcock, and Lai 2007). These attitudes are often considered a consequence of gender socialisation processes, according to which men are encouraged to be ambitious and have a greater tolerance of risk

Table II.

Distribution of socio-labour typologies with the maximum gap according to job type and the existence of supervision tasks

	Without supervision tasks		With supervision tasks	
	% BS	% BSPB	% BS	% BSPB
Installation and machinery operators and assemblers	0.3	1.1	1.0	1.6
Skilled workers in manufacturing	32.5	64.1	34.0	60.4
Skilled workers in construction	65.5	28.8	61.0	29.9
Skilled agricultural, livestock, forestry, and fishing sector workers	0.9	0.0	1.9	0.0
Workers in protection services	0.0	0.2	0.0	0.5
Workers in catering, and trade salespersons	0.0	0.0	0.3	0.0
Unskilled service workers	0.8	5.8	1.8	7.5

Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

more than women (Bonin et al. 2007; Croson and Gneezy 2009).

We therefore consider it necessary to deepen our knowledge on these issues to confirm whether or not the hidden gap in the observed job types reflects a situation of pay discrimination or is the consequence of women taking less demanding negotiation attitudes.

TYPE OF CONTRACT

Looking at the results according to the type of contract (fixed term or permanent jobs), we observed that permanent contracts accumulate the highest prevalence of jobs with the maximum hidden gap (75.2% for BS and 76.8% for BSPB) (Figure 4). In this sense, and similarly to what we have discussed above, fixed-term jobs in Spain are often quite precarious, so consequently, the maximum hidden gap is concentrated in contracts with a wider salary range.

Figure 4.

Distribution of t socio-labour typologies with the maximum gap according to type of contract
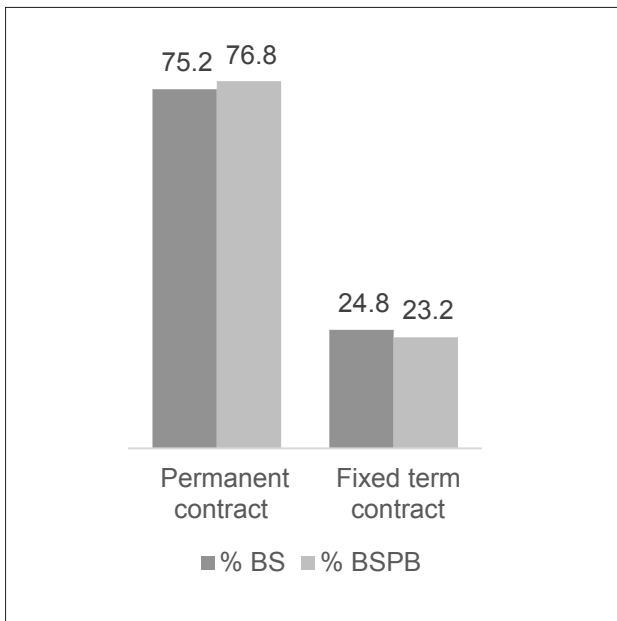
Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

COMPANY TYPE

Studies of the adjusted pay gap in Spain indicate that it grows proportionally with the size of the company (Brindusa et al. 2019; Conde-Ruiz and Marra de Artíñano 2016; Spanish Confederation

of Employers' Organisations 2019). For example, in 2014, the pay gap for companies with over 50 employees was approximately 13–14%, and in companies with less than 10 employees, it was 9%.

However, the results of our study indicate that company size is not too important to explain the prevalence of jobs with the maximum hidden gap (Table III): for BS, the cases observed are distributed in a relatively equivalent way across all company types; for BSPB, small companies have more prevalence, but other company sizes also accumulate a relatively important number of cases.

Note that these companies include only the private sector and public companies whose employees are not public servants. Were public service contracts to be included, the hidden gap in that sector would be significantly lower, because the public sector is more strongly regulated and there is no possibility to negotiate the salary outside the established pay tables.

Table III.

Distribution of socio-labour typologies with the maximum gap according to company ownership

	Private		Public	
	% BS	% BSPB	% BS	% BSPB
1–49 employees	38.1	47.9	37.3	49.1
50–199 employees	33.3	31.9	33.3	31.8
200 or more employees	28.7	20.2	29.3	19

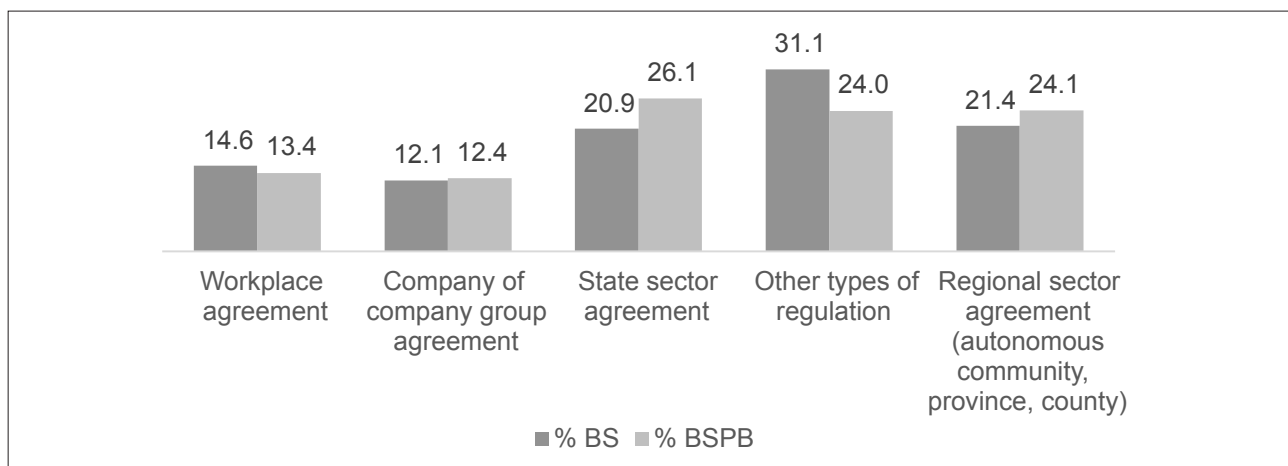Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

COLLECTIVE BARGAINING AGREEMENT

Looking at the collective bargaining agreements regulating the companies, these do not seem to explain the higher or lower recurrence of cases with the maximum hidden gap (Figure 5). The prevalence is relatively significant in all models. We can only point out that, for BS, there is a larger number of cases (31.1%) when the company does not subscribe any agreement. For BSPB, this mainly occurs when they subscribe the State Sector Agreement (26.1%). This suggests that, in general, agreements are not enough to defend workers against the maximum hidden gap in companies.

## GEOGRAPHICAL DISTRIBUTION OF SOCIO-LABOUR TYPOLOGIES WITH THE MAXIMUM HIDDEN PAY GAP

Lastly, we studied which regions in Spain accumulated the largest number of job types with the maximum hidden gap (Figure 6). The Northwest

Figure 5.
Distribution of socio-labour typologies with the maximum gap according to collective agreement

Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

Figure 6.
Distribution of socio-labour typologies with the maximum gap according to region
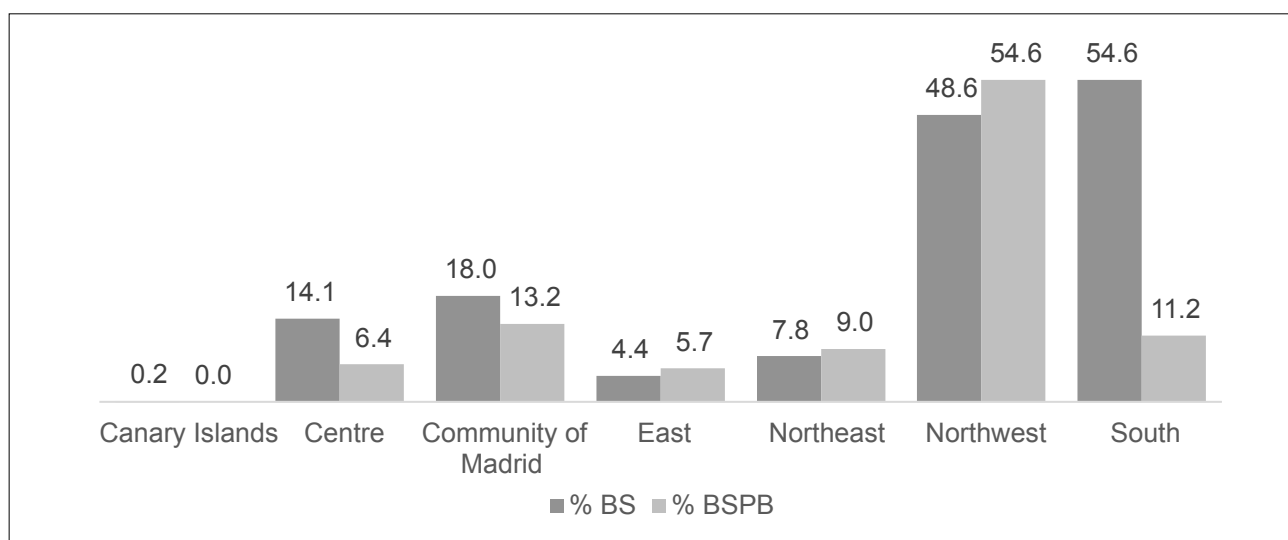
Source: Created by the authors using data from the Four-yearly Structure of Earnings Survey 2018.

(including Galicia, Asturias, and Cantabria) tops the list as the region with the most cases, both for BS (48.6%) and for BSPB (54.6%). On the other hand, the Canary Islands do not show any job types with the maximum hidden gap.

Even though the goal of this study is not to analyse the different productive models of each area, we think these models are indeed strongly connected with the results. Therefore, as a general reference, we would like to point out, on the one hand, that the Canary Islands have a productive sector that is very much geared towards tourism. In this sector, most jobs do not require high qualifications, so the salary range is not as wide as in other sectors. In addition, the tourism sector has an important presence of women. Probably these circumstances must have contributed to configure an autonomous community with virtually no jobs with the maximum hidden gap.

On the other hand, the North-western region has a different productive structure that in comparison with Canary Island is much less oriented to tourism. To reach more precise conclusions as to what factors might be operating in each Spanish region in order to explain the maximum hidden gap, it would be necessary to carry out an in-depth analysis of the characteristics of the labour market in each region, considering all the factors that can have an impact on it (specific regulations, union structure, etc.).

DISCUSSION

Adjusted pay gap studies try to measure the percentage difference between men's and women's pay, considering the differences between both groups, to quantifying the 'differences in pay for the same job'. This task is particularly complex because it must include as much information as possible to identify the causes of the gap and whether it is the result of wage discrimination or of differences in the human capital investment of men and women.

This issue generates academic debate not only on how to estimate the size of the gap, but also on whether the gap is fair or unfair: whether it is explained by the differences in human capital noted above or reflects a situation of discrimination. These debates are based on retributive justice principles and try to measure equal units of employment value.

Using the General Linear Model, our study is innovative in that it estimates the maximum adjusted wage gap in occupations where the explanatory variables determining wages are homogeneous between men and women. Our approach makes it possible to reveal both the specific characteristics of the occupations in which it exists and the specific socio-demographic characteristics of the women who are affected by it. Such a visualisation can be very useful for different administrative institutions (such as, for example, for the Labour Inspectorate) in their fight against wage discrimination. It also provides society in general with expanded knowledge of wage differentials in the Spanish labour market.

It should be noted that in Spain, gender-based wage differentials for the same job (intra-activity) are illegal and that there are various mechanisms to prevent them from occurring (collective agreements, labour inspections, etc.). However, these behaviours are often difficult to identify because these discriminatory practices do not usually leave a trace in surveys or other administrative documents.

The results obtained in this study show the existence of a maximum adjusted gender wage gap in the Spanish labour market, both in the base salary (between 9.23% and 12.91%) and in the base salary plus bonuses and overtime (between 10.57% and 13.1%), which cannot be explained by the observed variables. This is why we have called it the 'hidden pay gap'; even though the characteristics of the jobs in which this gap exists are homologous for men and women, we cannot categorically confirm or deny that part of this hidden gender gap may be the result of a situation of wage direct discrimination against women.

However, results suggest that some of our observations potentially point to it, especially if we consider wages as just one dimension of discrimination. We know that Spanish women not only have higher unemployment rates, but also higher rates of undesired temporary and part-time employment (Bote Álvarez-Carrasco and Cabezas Ares 2012; Moral Carcedo, García Belenguer-Campos, and Bote Álvaréz-Carrasco 2012; Ortíz García 2014).

As for the characteristics of the jobs that accumulate the maximum hidden gap, there is a great similarity between base pay and base pay plus bonuses. Thus, the occupational profile with the highest hidden gap in terms of BS wage would correspond to women over 50 years of age (especially those over 59), with a university degree or similar training who carry out functions as skilled workers in manufacturing or construction (highly male-dominated sectors), with an indefinite contract and working either full or part-time.

These women work in companies located mainly in the Northwest of Spain. Company ownership (public/private), size (number of employees), and the collective bargaining agreement they subscribe are not particularly relevant variables when it comes to explaining why there might be greater hidden discrimination. However, there is a tendency for more job types with the maximum hidden gap in companies that do not adhere to any collective bargaining agreement.

In the case of BSPB, the job types with the largest hidden gap are also mainly women over 50 years of age (especially those over 59) with advanced vocational training mainly working full-time in skilled occupations in manufacturing, working under an indefinite contract. These women also work mostly in small companies (1–49 workers) in the Northwest.

It is well known that contexts of homosociability at work lead men and women to take stances and assume certain beliefs that result in different values and attitudes towards risk (Adams and Funk 2012) and these beliefs have an impact when negotiating and determining a salary, both on the part of the employer, who engages in discriminatory "homosocial reproduction" (Ibarra 1993), and on the part of female employees, who take less demanding negotiating positions. In fact, homophily is one of the direct causes of female under-representation in the workplace. It facilitates situations of gender discrimination (McPherson, Smith-Lovin, and Cook 2001), but it may also be indirectly responsible for the absence of networks for women's professional advancement (Linehan and Scullion 2008). Hence, there is a need to emphasise research, but also regulatory and inspection efforts to combat pay inequality in highly male-dominated work contexts. In this case, this applies especially to those located in the Northwest of Spain.

Finally, although the model used in this study does not attempt to estimate the number of women who

suffer the maximum hidden gap, the results obtained show that considering the main characteristics that define the socio-occupational typologies with the greatest hidden gap, a case frequency of 1.9% in SES sample is identified in the Northwest region of Spain. Therefore, we cannot rule out that the number of cases could be considerably higher. Further studies will be necessary to test this hypothesis.

On the other hand, it is observed that by setting other percentile limits (90 and 95), the conclusions of the study do not change substantially. As the percentile decreases, the number of socio-occupational typologies increases and the lower range of the pay gap decreases, but the socio-occupational characteristics remain practically stable.

CONCLUSION

The estimation of the hidden gender pay gap and its association with human capital characteristics and with the characteristics of the job shed new light on the aspects of the unobserved information that might be relevant to explain the gender discrimination. This is the case of the job evaluation and its corresponding assignment to a professional category. This source of discrimination cannot be observed because SES does not collect the necessary information. In this sense, the new Spanish *Royal Decree 902/2020, of 13 October, on equal pay for women and men*, addresses this challenge by requiring employers to be transparent in their remuneration structure and to justify any possible differences between women and men.

This new regulation reflects the actions of the current Spanish government to overcome the still persistent mechanisms of gender-based wage discrimination. Therefore, we believe that the next versions of the Annual Structure of Earnings Survey should include information on this issue, which would allow for a more profound analysis of the matter.

This study has shown that the group of women aged 50 and over are the ones who accumulate the highest percentage of estimates of the hidden pay gap compared to other age groups, both in terms of base salary and full salary, including bonuses. Therefore, we consider it necessary to address the greater vulnerability of women over 50 who, being close to retirement, experience a pay gap that puts them at a clear disadvantage when it comes to receiving their retirement pension, compared to men of their generation who have held comparable jobs. In this sense, in view of the results, it is reasonable to expect that, as new generations reach retirement age, the hidden gap in the later stages of working life will start to narrow.

In view of the above, and because hidden pay discrimination can emerge in different ways and at different stages of a person's working life, it is necessary to understand in detail the barriers present in the Spanish labour market and how they affect different groups of employees. Even more so when these barriers emerge due to hidden factors that are difficult to explain. Therefore, we believe it is necessary and urgent for official surveys to incorporate an adequate gender perspective, so that, apart from the traditional explanatory variables from human capital theory (which we consider essential), they can also incorporate new variables as level of motivation, inclination to risk, willingness to ask for pay rises, perception of equal treatment in the working environment, etc., as well as information about the care for dependent persons. This way, we will build up official databases compiling information on the characteristics of the Spanish labour market, considering the differential factors arising as a result of gender relations.

The sociological analysis must be carried out on public policy design, specific gender equality regulations, and public socialisation spaces. With that, we will gain a greater and deeper knowledge of the hidden factors that give rise to wage discrimination and contribute to the creation of better guidelines so that the regulatory, economic, and cultural frameworks can fight this unjust social reality.

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ANNEX 1.

Details of codified variables and their categories

The following variables have been used as they are codified in the survey: REGION, OWNERSHIP, SUPERVISION, AGREEMENT, WORKDAY, CONTRACT, SEX, AGE, EDUCATION

SENIORITY (ANOANTI): 1) less than one year: from 0 to 1 year; 2) Junior: from 1 to 2 years; 3) Semi-senior: from 2 to 6 years; 4) Senior: more than 6 years.

SIZE (STRATO2): 1) 1 to 49 workers; 2) 50 to 199 workers; 3) 200 and more workers.

OCCUPATION (CNO1): 1) Business and Public Administration Management = DIRECTORS AND MANAGERS; 2) Scientific and Intellectual Technicians and Professionals = SCIENTIFIC AND INTELLECTUAL HEALTH AND EDUCATION TECHNICIANS AND PROFESSIONALS + OTHER SCIENTIFIC AND INTELLECTUAL TECHNICIANS AND PROFESSIONALS + TECHNICIANS; SUPPORT PROFESSIONALS; 3) Administrative type employees = OFFICE EMPLOYEES NOT SERVING THE PUBLIC + OFFICE EMPLOYEES SERVING THE PUBLIC; 4) Catering and commerce workers = RESTORATION AND COMMERCE WORKERS; 5) Health and care workers = HEALTH AND CARE WORKERS; 6) Health and care workers = HEALTH AND CARE WORKERS; 6) Protection and security services workers = PROTECTION AND SECURITY SERVICES WORKERS + MILITARY OCCUPATIONS; 7) Skilled workers in agriculture and fishing = SKILLED WORKERS IN AGRICULTURE, FARMING, FORESTRY SECTOR: 8) Skilled workers in the construction sector = SKILLED WORKERS IN CONSTRUCTION, EXCEPT MACHINE OPERATORS; 9) Skilled workers in manufacturing industries, except operators = SKILLED WORKERS IN MANUFACTURING INDUSTRIES, EXCEPT INSTALLATION AND MACHINE OPERATORS; 10) Operators, drivers and assemblers = FIXED INSTALLATION AND MACHINERY OPERATORS, AND ASSEMBLERS + MOVABLE MACHINERY DRIVERS AND OPERATORS; 11) Unskilled workers = UNQUALIFIED WORKERS IN SERVICES + WORKERS IN AGRICULTURE, FISHING, CONSTRUCTION, MANUFACTURING AND TRANSPORT INDUSTRIES.

ANNEX 2.

Salary estimation

Analysis of variance Table BS

Response: as.numeric (LN_SALAR10)

	Df	Sum sq	Mean sq	F Value	Pr(>F)	
SENIORITY	1	974	973.5	6165. 7741	< 2.2e-16	***
REGION	6	903	150.5	953. 3903	< 2.2e-16	***
SIZE	1	21	21.0	132. 7121	< 2.2e-16	***
OWNERSHIP	1	208	208.2	1318. 3732	< 2.2e-16	***
AGREEMENT	4	739	184.7	1169. 5399	< 2.2e-16	***
SEX	1	404	404.5	2561. 8019	< 2.2e-16	***
AGE	5	75	15.0	95. 2782	< 2.2e-16	***
OCCUPATION	1	3695	3695.3	23404. 6301	< 2.2e-16	***
SUPERVISION	1	962	961.8	6091. 7363	< 2.2e-16	***
EDUCATION	6	3598	599.7	3797. 9611	< 2.2e-16	***
WORKDAY	1	6	5.9	37. 3318	9. 982e- 10	***
CONTRACT	1	5	4.5	28. 6789	8. 552e-08	***
REGION: SIZE	6	23	3.9	24. 7272	< 2.2e-16	***
REGION: SEX	6	25	4.2	26. 5360	< 2.2e-16	***
SEX: AGE	5	18	3.7	23. 4172	< 2.2e-16	***
SEX: OCCUPATION	1	1	1.1	6. 8095	0.009068	**
SEX: SUPERVISION	1	5	5.2	32. 8739	9. 846e-09	***
SEX: EDUCATION	6	18	3.0	18. 9466	< 2.2e-16	***
SEX: WORKDAY	1	1	0.8	4. 7509	0. 029284	*
SEX: CONTRACT	1	6	6.0	37. 9350	7. 327e-10	***
SENIORITY: SEX	1	0	0.0	0. 0025	0. 960511	
Residuals	216650	34207	0.2			

Signif. codes : 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1' ' 1

Analysis of variance Table BS (comparison)

Model 1: as. numeric (LN_SALARIO) ~ 1 + SENIORITY + REGION + SIZE + OWNERSHIP + AGREEMENT + SEX + AGE + OCCUPATION + SUPERVISION + EDUCATION + WORKDAY + CONTRACT + REGION: SIZE + REGION: SEX + SEX: AGE + SEX: OCCUPATION + SEX: SUPERVISION + SEX: EDUCATION + SEX: WORKDAY + SEX: CONTRACT + SEX: SENIORITY

Model 2: as.numeric (LN_SALARIO) ~ 1

Res . Df	RSS	Df	Sum of Sq	F	Pr(>F)
1 216650	34207				
2 216707	45894	-57	-11688	1298.7	< 2.2e-16

Signif. codes : 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1' ' 1

Analysis of variance Table BSPB

Response: as.numeric (LN_SALAR10)

	Df	Sum sq	Mean sq	F value	Pr(>F)	
SENIORITY	1	5628.4	5628.4	40027. 017	< 2.2e-16	***
REGION	6	1047.7	174.6	1241. 790	< 2.2e-16	***
SIZE	1	655.0	655.0	4658. 370	< 2.2e-16	***
OWNERSHIP	1	1103. 2	1103.2	7845. 366	< 2.2e-16	***
AGREEMENT	4	623. 3	155. 8	1108. 214	< 2.2e-16	***
SEX	1	1917.0	1917.0	13633. 076	< 2.2e-16	***
AGE	5	340. 8	68. 2	484. 683	< 2.2e-16	***
OCCUPATION	1	6083. 8	6083. 8	43265. 434	< 2.2e-16	***
SUPERVISION	1	2461. 3	2461. 3	17504. 080	< 2.2e-16	***
EDUCATION	6	4577. 3	762.9	5425. 312	< 2.2e-16	***
WORKDAY	1	198. 0	198. 0	1407. 823	< 2.2e-16	***
CONTRACT	1	4. 6	4.6	32. 662	1. 098e-08	***
REGION: SIZE	6	34.1	5. 7	40. 401	< 2.2e-16	***
REGION: SEX	6	27. 7	4.6	32. 845	< 2.2e-16	***
SEX: AGE	5	38. 3	7.7	54. 448	< 2.2e-16	***
SEX: OCCUPATION	1	45. 9	45. 9	326. 308	< 2.2e-16	***
SEX: SUPERVISION	1	13.1	13.1	92. 871	< 2.2e-16	***
SEX: EDUCATION	6	23. 2	3. 9	27. 485	< 2.2e-16	***
SEX: WORKDAY	1	4.0	4. 0	28. 777	8. 128e-08	***
SEX: CONTRACT	1	12. 9	12. 9	91. 567	< 2.2e-16	***
SENIORITY: SEX	1	2.2	2.2	15. 385	8. 773e-05	***
Residuals	216668	30466.9	0.1		0.1	

Signif. codes :   0 '***'   0.001 '**'   0.01 '*'   0.05 '.'   0.1' '   1

Analysis of variance Table BS (comparison)

Model 1: as. numeric (LN_SALARIO) ~ 1 + SENIORITY + REGION + SIZE + OWNERSHIP +
AGREEMENT + SEX + AGE + OCCUPATION + SUPERVISION + EDUCATION + WORKDAY +
CONTRACT + REGION: SIZE + REGION: SEX + SEX: AGE + SEX: OCCUPATION +
SEX: SUPERVISION + SEX: EDUCATION + SEX: WORKDAY + SEX: CONTRACT + SEX: SENIORITY

Model 2: as.numeric (LN_SALARIO) ~ 1

Res . Df	RSS	Df	Sum of Sq	F	Pr(>F)
1 216668	30467				
2 216725	55309	-57	-24842	3099.4	< 2.2e-16

Signif. codes :   0 '***'   0.001 '**'   0.01 '*'   0.05 '.'   0.1' '   1