Decomposition of Gender Wage Differentials among Portuguese Top Management Jobs

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Abstract

This paper studies gender wage differentials among top managers in the Portuguese economy. The objective is to investigate whether men and women within the same occupational group, with relatively high levels of human capital, and who are evaluated basically on their performance, are treated unequally in relation to pay. The Oaxaca wage differential decomposition method is used, relying on micro data from the Personnel Records (*Quadros de Pessoal)* for the year 2000. The main findings indicate that a substantial portion of the wage gap between male and female top managers in Portugal is explained by labor market discrimination.

JEL classification: J71, C50
Keywords: gender wage differentials, discrimination, wage decomposition

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1. Introduction

Over the last decades the Portuguese labor market has been marked by some dramatic changes. Perhaps the most striking aspect of these transformations has been the sharp increase of women's participation in the labor force. This increase has been such that Portugal's female employment rate ranks among the highest within the European Union. Despite the significant progress of women in relation to their integration into the labor market, gender wage differentials persist in the Portuguese economy. In fact, when compared to other European countries, Portugal presents what is considered a substantially high gender wage gap (Santos and González, 2003).

The factors that determine gender wage differentials have been the object of much discussion among economists. The traditional approach in analyzing the determinants of the gender wage gap is to consider the role of differences in workers' human capital characteristics and labor market discrimination. Alongside the theoretical discussion of the determinants of gender wage differentials is the formulation of wage decomposition methods aimed at identifying the sources of these differentials and their contributions. One of the most commonly used methods is derived by Oaxaca (1973). This method decomposes wage differentials into two components: a component explained by observable differences in male and female characteristics and a residual component potentially due to labor market discrimination. Although numerous empirical studies have based their investigation of the wage gap on the application of the Oaxaca (1973) method (e.g. Ashraf, 1993; Barbezat, 1987; Bertrand and Hallock, 2001; Blinder, 1973; Gunderson, 1979; Monk-Turner and Turner, 2001; Neuman and Weisberg, 1998; Ward, 1999), few studies have used this standard approach to analyze gender wage differentials in the Portuguese economy (e.g. Kiker and Santos, 1991; Santos and González, 2003; Vieira and Pereira, 1993; Vieira *et al.*, 2005). Furthermore, no analysis is known to have applied this procedure to the decomposition of gender wage disparities among top management jobs in Portugal.

The purpose of this paper is to study gender wage differentials among top managers in the Portuguese economy. Specifically, the objective is to investigate whether, in Portugal, men and women within the same occupational group, with relatively high levels of human capital, and who are evaluated basically on their performance, are treated unequally in relation to pay. Relying on micro data from the Personnel Records (*Quadros de Pessoal*) for

the year 2000, this paper uses the Oaxaca (1973) wage decomposition procedure to conduct the empirical analysis.

This paper is organized as follows. Section 2 briefly reviews the main theories that provide important explanations for gender wage differentials. Sections 3 and section 4 describe the empirical model and the data set used, while section 5 presents and discusses the results. Concluding remarks are presented in section 6.

2. Determinants of gender wage differentials

Why do women earn lower wages than men? The factors that determine gender wage differentials have been the object of discussion among economists. The result of this ongoing debate is the development of theories that provide some important explanations for these differentials. The traditional approach in analyzing the determinants of the wage gap is to consider the role of gender differences in human capital characteristics and labor market discrimination.[1] The human capital theory (Mincer and Polachek, 1974) posits that the earnings of individual workers are a function of their past investment in human capital. The theory suggests that the gap can be explained by the fact that, when compared to men, women have fewer qualifications, such as formal education, labor market experience, and on-the-job training. The results of these differences in human capital are lower levels of productivity for women and, therefore, lower wages. This theory's explanation for gender differences in acquisitions of human capital is based upon the traditional role of women within the family. Because they tend to have shorter and more interrupted working lives than men, women invest less in labor market qualifications (Blau and Kahn, 1999).

In addition to differences in human capital characteristics, labor market discrimination is often pointed out as a main source of gender wage differentials. Blau and Ferber (1986: 229) consider that labor market discrimination exists when "two equally qualified individuals are treated differently solely on the basis of their sex". Thus, in accordance with the labor market discrimination theory, gender disparities in earnings arise from the

[1] Blau and Kahn (1996) additionally consider the role of wage structure in determining the magnitude of the gender wage gap. Defined as "the array of prices set for various labour market skills (measured and unmeasured) and rents received for employment in particular sectors of the economy" (Blau and Kahn, 1996: S29), wage structure determines the wage penalty or reward related to an individual's position in the wage distribution. For example, if female employees have less formal education than their male colleagues, the greater the return to formal education (regardless of gender), the larger the size of the wage gap.

unequal treatment of equally productive males and females.[2] The two main theories of labor market discrimination are those referred to as theories of taste discrimination and theories of statistical discrimination (Stenzel, 2001). In Becker's (1957) model of taste discrimination, the unequal treatment of two groups arises from discriminatory tastes or personal prejudices against members of one of the groups. In models of statistical discrimination (e.g. Aigner and Cain, 1977), employers discriminate based on the average differences between two groups in the expected value of productivity or in the reliability with which this value can be predicted (Blau and Kahn, 1999).

Although the economic literature tends to evoke gender differences in human capital characteristics and labor market discrimination as major sources of gender wage differentials, most economists do not necessarily consider these factors as mutually exclusive sources of the gender wage gap. Many authors refer to the possibility of both factors' contribution to the gap. In her analysis of the Portuguese female labor force participation, Cardoso (1996) concludes that gender wage differentials do not result exclusively from lower levels of female human capital. This author considers that disparities between male and female wages can also be due to the fact that women with equal characteristics as that of men are paid less.

Related to the theoretical discussion of the determinants of the gender wage gap is the formulation of mathematical and statistical methods aimed at decomposing wage differentials. These methods have become a popular and useful way to identify the sources of the wage gap and their contributions. One of the most widely used decomposition methods is the traditional approach derived by Oaxaca (1973).[3] The next section summarizes this decomposition procedure that is used to conduct the analysis of wage disparities among top managers in the Portuguese economy.

3. The model

The Oaxaca decomposition method decomposes the overall wage gap between gender groups into two components: one explained by observable differences in male and female

[2] Dex and Sloane (1988) consider two distinct forms of labor market discrimination: wage discrimination and employment discrimination. Wage discrimination occurs when individuals with the same levels of productivity are paid different amounts, whereas employment discrimination occurs when individuals with the same levels of productivity are employed differently across occupations. Dex and Sloane (1988) note that employment discrimination may or may not accompany wage discrimination.

[3] Also derived by Blinder (1973).

characteristics[4] and the other, residual, due to gender differences in the rates of return to those characteristics. This residual portion of the wage gap is generally interpreted as wage discrimination.[5] The basic idea of this decomposition procedure is that differences in wages between two groups can be partially explained by the fact that these groups have different attributes, whereas the remaining portion of the gap is potentially explained by wage discrimination.

Following the Oaxaca (1973) method, the first step to decomposing the differential in male and female wages is to run separate wage regressions by gender:

$$lnW^m = \beta^m X^m + \mu^m \tag{1}$$

$$lnW^f = \beta^f X^f + \mu^f \tag{2}$$

where superscripts m and f indicate the gender (respectively male and female), lnW^m and lnW^f represent the natural logarithms of hourly wages, β^m and β^f are vectors of the coefficients to be estimated, X^m and X^f are matrices of the employees' characteristics, and μ^m and μ^f correspond to the error terms. From the OLS estimation of equations (1) and (2), it results that:

$$\overline{lnW^m} = \hat{\beta}^m \overline{X}^m \tag{3}$$

$$\overline{lnW^f} = \hat{\beta}^f \overline{X}^f \tag{4}$$

where $\overline{lnW^m}$ and $\overline{lnW^f}$ are the average natural logarithms of hourly wages, $\hat{\beta}^m$ and $\hat{\beta}^f$ are vectors of the estimated regression coefficients, and $\overline{X}^m$ and $\overline{X}^f$ are the matrices of the average values of male and female characteristics, respectively. Given these results, the wage differential between the two groups may be written as:

$$(\overline{lnW^m} - \overline{lnW^f}) = \hat{\beta}^m \overline{X}^m - \hat{\beta}^f \overline{X}^f . \tag{5}$$

[4] These characteristics are usually referred to as human capital characteristics (e.g. education, experience), although investigators often also include job related characteristics (e.g. occupation, economic sector, size or location of firm).

[5] Cotton (1988) notes that the residual component may also be attributed to differences in unobserved male and female characteristics. To be an exact measure of discrimination, all factors that determine wages must be accounted for. If for some reason (e.g. dataset limitations) they are not, then the residual component will also reflect these omitted determinants. Caution should therefore be taken when interpreting the residual component as discrimination.

By adding and subtracting $\hat{\beta}^m \overline{X}^f$ from the right-hand side of equation (5), it follows that:

$$(\overline{lnW^m} - \overline{lnW^f}) = \hat{\beta}^m (\overline{X}^m - \overline{X}^f) + \overline{X}^f (\hat{\beta}^m - \hat{\beta}^f). \quad (6)$$

This equation corresponds to the standard Oaxaca (1973) wage decomposition based on the male wage structure. The first term on the right hand side corresponds to the explained component which represents the portion of the wage differential due to observable differences in male and female characteristics. Kunze (2000) also interprets this component as the wage gain female employees would obtain if they had the same average characteristics as their male colleagues. The second term on the right hand side of the equation is the unexplained (or residual) component which corresponds to the portion of the wage differential that is not explained by observable gender differences in characteristics. This component stems from differences in the two groups' coefficients, that is, from differences in the rates of return to male and female characteristics. The unexplained portion of the wage differential, potentially due to wage discrimination, measures the wage gain that, given their average characteristics, female employees would obtain if they were to be paid the same as male employees (Kunze, 2000).

The wage differential decomposition specified in equation (6) assumes that in the absence of wage discrimination females will have the same rates of return to characteristics as males. However, if it is assumed that the non-discriminatory wage structure is the female wage structure[6] then the decomposition equation is equal to:

$$(\overline{lnW^m} - \overline{lnW^f}) = \hat{\beta}^f (\overline{X}^m - \overline{X}^f) + \overline{X}^m (\hat{\beta}^m - \hat{\beta}^f). \quad (7)$$

Since its formulation, the Oaxaca (1973) method has played an important role in decomposing wage differentials by source. Numerous studies have applied this conventional approach (e.g. Ashraf, 1993; Barbezat, 1987; Bertrand and Hallock, 2001;

[6] In his study of gender wage differentials in urban labor markets, Oaxaca (1973) proposed the decomposition based on either the male wage structure or the female wage structure. He estimated both cases, suggesting that the results would define the range within which the values of the components would fall. Decompositions based on alternative non-discriminatory structures are found in Cotton (1988), Neumark (1988), and Oaxaca and Ransom (1988). Cotton (1988) defines the non-discriminatory wage structure as the weighted average of the male and female wage structures, using the proportion of males and females in the sample as weights. Neumark (1988) and Oaxaca and Ransom (1988) propose that the wage structure in the absence of discrimination can be estimated by using the coefficients from a pooled wage regression of males and females.

Blinder, 1973; Gunderson, 1979; Monk-Turner and Turner, 2001; Neuman and Weisberg, 1998; Ward, 1999). In Portugal, there are a very limited number of studies aimed at analyzing the size and composition of the gap. Only a few of these studies, including Kiker and Santos (1991) and Vieira and Pereira (1993), have based their empirical analysis on the Oaxaca (1973) technique. Kiker and Santos (1991), relying on micro data from the *Quadros de Pessoal (QP)* for the year 1985, conclude[7] that 33% of Portuguese wage disparities is explained by gender differences in male and female characteristics, while the remaining 67% is attributed to differences in the rates of return to those characteristics (discriminatory component). Vieira and Pereira (1993), who investigate wage differentials in the Azores islands based on data from the *Quadros de Pessoal (QP)* for the year 1989, conclude that the wage gap stems primarily from differences in the rates of return to male and female characteristics. It is important to note that there is no known study that attempts to analyze gender wage differentials among Portuguese top management jobs.

4. The data

The empirical analysis is performed for the year 2000[8], based on micro data from the *Quadros de Pessoal (QP)*. The *QP* is an annual employment inquiry gathered by the Portuguese Ministry of Social Security and Employment (MSST) that every establishment with wage earners is legally obliged to fill out. Reported data cover information on each establishment and on each firm, such as size, location, economic activity, and employment, as well as information on each employee, for instance, gender, age, education, skills, occupation, tenure with the current firm, monthly wages, and hours worked.

The analysis includes 44,925 non-self employed full-time top managers[9] that represent about 3% of the total working force. For the year in analysis, only 26% of top management jobs were held by female employees, indicating a disproportionate representation of women in Portuguese top corporate jobs. Table 1 provides descriptive statistics of male and female top managers. Table A1 of the Appendix presents the description of variables used in the analysis.

[7] Based on the male wage structure.
[8] Given that 2000 is the last year for which information is available.
[9] Due to their low representation, observations relative to the economic sectors of agriculture, fishery, mining, public administration and international organizations are not included in the sample. Employees with ages under 16 and over 64 are also not included. The analysis focuses on the Portuguese mainland, therefore excluding observations regarding the islands of Azores and Madeira. Observations with missing values are also excluded from the analysis.

Table 1: Descriptive statistics of male and female top managers in Portugal, 2000

Characteristics (N =44,925)	Males			Females		
	%	Mean	Std. dev.	%	Mean	Std. dev.
Share of top managers by gender	74.3			25.7		
Hourly wage (PTE)		3015	2459		2156	1676
Ln hourly wage		7.724	0.793		7.404	0.762
Education (years)		12.736	3.919		12.933	3.931
≤4	7.5			7.7		
6	5.5			5.5		
9	12.9			10.0		
12	21.0			20.5		
≥15	53.1			56.3		
Age (years)		42.389	10.076		38.440	9.760
Experience (years)		23.654	11.602		19.608	11.777
Tenure (years)		8.316	9.035		6.846	7.724
Region						
North	25.1			23.5		
Center	9.0			8.3		
Lisbon	62.1			64.0		
Alentejo	1.5			1.7		
Algarve	2.3			2.5		
Economic sector						
Food, beverages, and tobacco	3.0			1.8		
Textiles, clothing, and footwear	3.5			4.1		
Wood and cork	1.1			0.4		
Paper, printing, and publishing	2.8			2.8		
Chemical industries	2.5			1.6		
Non-metal mineral products	2.0			1.4		
Metal industries	2.3			1.2		
Machinery and equipment	3.7			1.7		
Other manufacturing industries	0.9			0.6		
Electricity, gas, and water	0.9			0.3		
Construction	6.1			3.0		
Wholesale and retail	22.5			22.2		
Restaurants and hotels	5.3			6.5		
Transportation and communication	11.7			13.2		
Banking and insurance	10.2			6.6		
Services to firms	15.9			20.2		
Social and personal services	5.6			12.4		

Notes: The equivalent of 200.482 PTE is 1 Euro.
Source: Computations based on Portugal, MSST (2000).

The comparison of both groups' average gross hourly regular wages reveals that female top managers earn about only 72% of the total amount earned by their male colleagues. Differences in the educational attainments of male and female top managers are small. In

fact, these two groups have very similar distributions among the different levels of their formal education. While the majority of male and female top managers (53% and 56%, respectively) have 15 or more years of schooling, 34% and 31%, respectively, have 9 to 12 years, 6% have 6 years, and 8% have 4 or less years.

On average, male top managers are older and have more work experience than their female counterparts by about 4 years. Tenure with the current firm is also greater for men than for women. On average, male top managers have worked with the same firm for 8 years, while female top managers have dedicated 7 years to the same employer.

Both groups of employees are similarly characterized in relation to the firm's location. Differences in the two groups' distribution across economic sectors are also small. The three leading economic sectors for both male and female top managers are "wholesale and retail", "services to firms", and "transportation and communication".

5. Results of the Oaxaca (1973) wage decomposition method

Following the Oaxaca (1973) method, the first step to decomposing the overall wage differential between male and female top managers is to estimate separate wage equations by gender. The OLS estimates of these equations are displayed in Table A2 of the Appendix. The dependent variable is the natural logarithm of hourly wages, whereas the independent variables are: years of work experience (and its square), years of job tenure (and its square), and a sequence of dummy variables that reflect years of educational attainment, firm location and economic sector. The majority of the regression coefficients are statistically significant at the 0.01 level. It appears, therefore, that the majority of the independent variables included in the regressions are very highly significant in explaining hourly wages for both male and female top managers.

The two sets of estimates reveal that higher educational attainments raise earnings. For both groups of employees, the relationship between hourly wages and experience, as well as the relationship between hourly wages and tenure, take on a concave shape, i.e., work experience and tenure have diminishing marginal effects on hourly wages.

The wage regression results also show that the firm's location in Lisbon leads to higher hourly wages when compared to the firm's location in other Portuguese regions. As for economic sector, the estimated results indicate that "banking and insurance", "electricity,

gas, and water", "paper, printing, and publishing", "chemical industries", and "machinery and equipment" are among the most highly remunerated economic sectors.

The Oaxaca (1973) decomposition equation is calculated based on the wage equation estimates. The decomposition is first performed assuming that the male wage structure is the prevailing wage structure (equation 6) and then assuming the female wage structure as the benchmark (equation 7). The results are summarized in Table 2.

Based on the male wage structure, the estimated results of the standard Oaxaca (1973) decomposition method reveal that 26% of the total wage gap is explained by observable differences in male and female characteristics, while 74% is residual and potentially due to wage discrimination. Similar to these results are those based on the female wage structure. In this case, 27% of the gap results from observable gender differences in characteristics and the remaining 73% is attributable to wage discrimination. For the year in analysis, both decompositions indicate that a significant portion of the wage differential between male and female top managers in the Portuguese economy stems from wage discrimination, whereas a small part is attributable to the fact that these two groups have different characteristics.

Table 2: Oaxaca (1973) wage gap decomposition results, 2000

Decomposition	Total wage gap $(\overline{lnW^m} - \overline{lnW^f})$	Explained component	Residual component
Based on male wage structure	0.320	0.084	0.236
Based on female wage structure	0.320	0.086	0.234

Source: Computations based on Portugal, MSST (2000).

6. Conclusion

The purpose of this paper was to investigate gender wage differentials among top managers in the Portuguese economy. The main objective was to determine the sources of the observed gap and to measure their relative importance. The Oaxaca wage decomposition method was applied to micro data from the Personnel Records *(Quadros de Pessoal)* for the year 2000.

The main findings of this investigation indicate that wage discrimination underlies a substantial portion of the wage gap between male and female top managers in Portugal, whereas differences in the groups' characteristics account for a small part of those differentials. That is, the results indicate that the majority of the observed gap arises from potential labor market discrimination rather from gender wage differences in the mean values of productive and job related characteristics. From a policy point of view, the main findings of this chapter suggest a more effective role of anti-discrimination labor market policies aimed at reducing gender wage differentials in the Portuguese economy.

Future studies might involve an application of alternative decomposition procedures to the analysis of wage disparities among top managers in the Portuguese economy. On the other hand, and given the disproportionate representation of women in Portuguese top corporate jobs, one might also investigate the possibility of male and female employees having different mechanisms of access to higher level jobs.

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Appendix

Table A.1: Description of variables

Variable	Description
hourly wage	Average hourly regular wage: [(*bw*+*ts*+*rs*)/*nh*: *bw* is the base wage, *ts* is the payment indexed to tenure, *rs* are regular subsidies and *nh* is the number of normal hours worked]
ln hourly wage	Natural logarithm of hourly wage
ed4	Dummy variable, 1 if years of education is ≤4
ed6	Dummy variable, 1 if years of education is =6
ed9	Dummy variable, 1 if years of education is =9
ed12	Dummy variable, 1 if years of education is =12
ed15	Dummy variable, 1 if years of education is ≥15
experien	Number of years of work experience (*age-education-6*)
experien^2	Experience squared
tenure	Number of years of tenure in the current job
tenure^2	Tenure squared
north	Dummy variable, 1 if firm location is in the Northern region
center	Dummy variable, 1 if firm location is in the Central region
lisbon	Dummy variable, 1 if firm location is in the Lisbon and Tagus Valley region
alentejo	Dummy variable, 1 if firm location is in the Alentejo region
algarve	Dummy variable, 1 if firm location is in the Algarve region
foodbevto	Dummy variable, 1 if economic sector is Food, beverages, and tobacco
txclothfo	Dummy variable, 1 if economic sector is Textiles, clothing, and footwear
woodcork	Dummy variable, 1 if economic sector is Wood and cork
paper	Dummy variable, 1 if economic sector is Paper, printing, and publishing
chemical	Dummy variable, 1 if economic sector is Chemical industries
nonmetal	Dummy variable, 1 if economic sector is Non-metal mineral products
metal	Dummy variable, 1 if economic sector is Metal industries
machequip	Dummy variable, 1 if economic sector is Machinery and equipment
others	Dummy variable, 1 if economic sector is Other manufacturing industries
elecgaswa	Dummy variable, 1 if economic sector is Electricity, gas, and water
construc	Dummy variable, 1 if economic sector is Construction
wholeret	Dummy variable, 1 if economic sector is Wholesale and retail
resthot	Dummy variable, 1 if economic sector is Restaurants and hotels
transcomm	Dummy variable, 1 if economic sector is Transportation and communication
bankinsur	Dummy variable, 1 if economic sector is Banking and insurance
services	Dummy variable, 1 if economic sector is Services to firms
social	Dummy variable, 1 if economic sector is Social and personal services

Table A2: OLS wage equation estimates for male and female top managers, 2000

Independent variable	Males	Females
constant	6.0067**	5.7226**
	(169.84)	(113.01)
ed6	0.1892**	0.1407**
	(9.52)	(4.59)
ed9	0.5386**	0.4872**
	(31.93)	(17.18)
ed12	0.8001**	0.7281**
	(46.70)	(26.82)
ed15	1.2421**	1.2666**
	(73.72)	(46.07)
experien	0.0326**	0.0297**
	(26.96)	(16.51)
experien^2	-0.0004**	-0.0004**
	(-14.86)	(-9.33)
tenure	0.0148**	0.0264**
	(13.07)	(12.95)
tenure^2	-0.0001*	-0.0003**
	(-2.48)	(-4.17)
north	0.0022	0.0334
	(0.08)	(0.86)
center	-0.1519**	-0.1271**
	(-5.51)	(-3.12)
lisbon	0.2006**	0.1630**
	(7.84)	(4.30)
alentejo	-0.1432**	-0.1641**
	(-3.64)	(-3.17)
foodbevto	0.1161**	0.2138**
	(4.89)	(5.64)
txclothfo	0.1086**	0.1805**
	(4.91)	(6.12)
woodcork	0.0180	0.1647*
	(0.50)	(1.98)
paper	0.1419**	0.2851**
	(5.93)	(8.16)
chemical	0.2038**	0.2690**
	(8.47)	(7.04)
nonmetal	0.0960**	0.1662**
	(3.64)	(3.61)
metal	-0.0375	0.0831
	(-1.54)	(1.68)
machequip	0.2155**	0.2402**
	(10.18)	(5.46)
others	-0.0280	0.0398
	(-0.81)	(0.62)
elecgaswa	0.2102**	0.5250**
	(8.48)	(6.81)
construc	-0.1126**	-0.0389
	(-5.74)	(-1.15)
wholeret	-0.0213	-0.0028
	(-1.31)	(-0.14)
resthot	-0.3041**	-0.1417**
	(-14.14)	(-5.30)
transcomm	0.0708**	0.2050**
	(4.31)	(10.72)
bankinsur	0.4631**	0.5909**
	(28.53)	(25.89)
services	0.0904**	0.1609**
	(5.27)	(8.15)
N	33,375	11,550
R^2	0.4152	0.4799
S_e	0.6067	0.5499

Notes: The values in parentheses are t-statistics derived from robust standard errors; *statistically significant at the 0.05 level; ** statistically significant at the 0.01 level. The base group for "education" is "ed4"; the base group for "firm location" is "algarve"; the base group for "economic sector" is "social".
Source: Computations based on Portugal, MSST (2000).