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Labor Force Heterogeneity and Wage Polarization: Italy and Spain

Abstract

Purpose: This paper assesses the change in the Italian and Spanish wage polarization degree in a time of economic crisis, taking into account the factors affecting labor-force heterogeneity. Gender differences in the evolution of social fractures are considered by carrying out the analysis separately for males and females.

Design/methodology/approach: The approach by Palacios-González and García-Fernández (2012) on polarization is applied to the micro data provided by the EU Living Conditions Surveys (2007, 2010 and 2012). According to Palacios-González and García-Fernández's approach, polarization is generated by two tendencies that contribute to the generation of social tension: the homogeneity or cohesion within group and the heterogeneity between groups. The following labor force characteristics are considered: gender, level of education, type of contract, occupational status and job status.

Findings: Our results for Italy reveal a higher increase of polarization for women than for men from the perspective of the type of contract. In Spain, the wage polarization of women also increases more intensively compared to men from the perspectives of level of education, job status and occupational status, while in Italy the reduction of the wage polarization index by level of education can be related, above all, to an increase in overqualification of women.

Originality/Value: While the empirical literature on polarization has made considerable investigation into employment and job polarization, this paper explores the rather less explored matter of wage polarization. Furthermore, particular attention is paid to the impact on polarization of the great recession.

Keywords: Polarization, coefficient of determination, ANOVA models, social fractures, inequality

Paper type: Research paper

JEL Codes: C01, C13, D63, J01, J30

1. Introduction

The Italian and Spanish labor markets belong to the Southern European model owing to their characteristics and the institutional arrangements affecting labor supply and demand (Verashchagina and Capparucci, 2014). Moreover, their wage distribution is very heterogeneous in terms of educational level, occupational status, type of contract and collective agreements regulating the different activity branches. This heterogeneity has been lately amplified by the rise in female participation and the increase in the average educational

level of workers (Permanyer and Treviño, 2013; Istat, 2013; Bettio *et al.,* 2012; Motellón *et al*., 2010; Palacio and Simón, 2004).

In addition, the Italian and Spanish labor markets are characterized by deep gender gaps affecting wage distribution [1]. Fixed-term contracts, part-time work and unemployment have a greater detrimental effect on the female workforce (see among others, OECD, 2012a). Nevertheless, OECD (2012b) stressed the advance of Italian and Spanish young women in the narrowing of the educational gap, which could have a bearing on the homogeneity of women as a group and, therefore, on their wage distributions. This group has been characterized by low skill levels in Spain (Centro de Estudios del Cambio Social, 2011 p. 322) and, although in Italy the educational gender gap of adults (45-54 years old) is not as dramatic as in Spain, Italian women are also more likely than men to enter low qualified jobs and to be overqualified (Istat, 2013 and 2014).

Turning to gender wage gap, it should be highlighted that in Spain the wage gap for the top 10 percent wages is smaller. In Italy the unadjusted gender pay gap is far below the EU-28 average. This can be considered as a result of self-selection of women into the labor market: mainly better-educated and most qualified women enter the labor market having wages more similar to men (De la Rica *et al*., 2008 and Olivetti and Petrongolo, 2008). In both countries, the so-called "sticky floor" effect can be observed (OECD, 2012b), with the gender wage gap being wider for low earners (i.e. in the 1st decile of the earnings distribution). Moreover, Italian and Spanish women are more severely penalised by overeducation than men (Budría and Moro-Egido, 2009; Addabbo and Favaro, 2011).

With this background of social fractures resulting from labor-market characteristics, the great recession had a strong negative impact on the Italian and Spanish economies. It caused a high increase in the unemployment rates especially affecting males at the beginning of the crisis. Furthermore, in both countries, part-time and temporary jobs grew in the 2007-2012 period

with a higher intensity for men. In addition, the increase in the educational level of the potential labor force and employed people was more significant among females (see Labor Force Survey data for Spain and Italy). Therefore, social fractures could have followed different patterns for males and females in these selected countries.

In this context, it is important to test the evolution of the wage distribution paying special attention to the existing gaps and taking into account the main characteristics of the labor force (type of contract, level of education, etc.). It is also important to consider the possible different behavior by gender in order to guide the economic policy interventions to support the most disadvantaged population. To address these issues we focus on wage polarization.

The concept of polarization was introduced by Wolfson (1994) and Esteban and Ray (1994) independently. Following Esteban and Ray (1994), polarization is focused on the extent to which population is grouped around a small number of poles: if there is a high degree of homogeneity within each group and a high degree of heterogeneity across groups, society is polarized. This idea shows the difference between polarization and inequality. An increase in the degree of homogeneity within each group should be considered as a reduction in inequality, while polarization should increase. Namely, inequality quantifies the concentration around the global mean, whereas polarization focuses on the concentration around different poles.

A broad body of literature related to employment polarization analyses how the routinization process has polarized the labor market (see among others Autor *et al*., 2006; Cozzi and Impullitti, 2016; Goos *et al*., 2009 and Anghel *et al*., 2013) [2]. According to Autor and Dorn (2013), this job polarization process accelerated during the great recession [3]. In another line of research developed especially in the USA (Croci Angelini *et al*., 2009; Goldin and Katz, 2007; Ezcurra *et al*., 2005 and Harrison and Bluestone, 1990), wage polarization has instead been studied in relation to its effect on social unrest and the consequent fiscal strain on

traditional welfare programs (Kuhn, 1995). Poggi and Silber (2010) focus on Italy and carry out an analysis linking together wage polarization and wage mobility. Nevertheless, as Naticchioni *et al*. (2014) stated, the number of empirical studies on wage polarization in Europe is still limited and, according to Pertold-Gebicka (2014), the existing international analysis on labor market polarization focuses only on employment or job polarization but not on wage polarization. In fact, comparative research on the Italian and Spanish wage polarization is even scarcer. Furthermore, as far as we are aware, the existing literature on Italy and Spain does not pay attention to the impact of the economic crisis and it does not take into account the labor-force heterogeneity and a gender perspective on wage polarization. Nonetheless, this issue is of great interest, especially if one considers the impact on real wages and on unemployment caused by the crisis and the Italian and Spanish labor markets characteristics.

In this paper we focus on wage polarization by characteristics of the individuals in the labor market rather than on job polarization – i.e. the tendency of an increase in low-skilled and highly-skilled positions with a simultaneous decrease in middle-skilled jobs-. On the contrary, we are interested in identifying and quantifying possible differences in the wage distribution according to the socioeconomic characteristics of the individuals. More precisely, our main aim is to analyse the role of different individuals' characteristics in the formation of groups in the Italian and Spanish wage distribution (e.g. by educational level, job status or type of contract). We assume that groups are determined by a certain characteristic that their members share. As we will see, different characteristics will lead to different levels of the selected wage polarization index. This fact is important for policy making purposes.

We follow the approach to polarization by Palacios-González and García-Fernández (2012) which provides an alternative way to analyze wage polarization by labor force characteristics. In this paper we focus on real gross hourly wage and on the following characteristics of the

labor force: gender, level of education, type of contract, occupational status and job status. Our analysis is carried out in three steps: firstly, we compute the polarization index by gender using the overall population; secondly, we carry out the analysis of the index by characteristics separately for males and females; thirdly, we compare inequality and polarization indexes. This methodology is applied to Italian and Spanish wage data for the years 2007, 2010 and 2012 provided by the Living Conditions Surveys (SILC).

The remainder of the paper is organized as follows: section 2 contains the statistical approach, section 3 presents the data, section 4 analyses the results and section 5 concludes.

2. Statistical Approach

The approach to polarization developed by Palacios-González and García-Fernández (2012, PG henceforth) considers that polarization is generated by two tendencies that contribute to the generation of social tension: the homogeneity or cohesion within group and the heterogeneity between groups. In the specialized literature on polarization, cohesion and heterogeneity are usually named identification and alienation respectively. Specifically, it is assumed that two individuals identify with each other when their incomes are closer and they feel alienated when their incomes are distant. So, given a number of groups exogenously determined, it is assumed that the income difference within the group decreases when the incomes of the individuals are closer to the average income (in our case, the average real gross hourly wage) of the group to which they belong. The smaller the distance, the higher the homogeneity within the group and the greater the contribution of this tendency to polarization. In addition, it is presumed that heterogeneity is linked to the distance between the mean incomes of the groups (in our case, average real gross hourly wages). The larger the distance, the higher the heterogeneity between groups and the greater the contribution of this tendency to polarization. That is, the key aspect of the polarization in a population is a high

degree of alienation or heterogeneity between income groups and a high degree of identification or homogeneity within group. Both concepts depend on the distance between the incomes or wages of the individuals and they will be computed using the variance decomposition.

According to the previous arguments, a global measure of income homogeneity within a group should be inversely proportional to the intra-group variance (V_W). On the other hand, a global measure of income heterogeneity between individuals belonging to different groups should be proportional to the variance between groups (V_B). Formally, polarization can be computed by the expression [4]

$$P^* = \frac{V_B}{V_W} \in [0, +\infty]$$

Note that P^* is not normalized which makes its understanding more difficult. Nonetheless, by taking into account the decomposition of the variance of the overall population (V) into the intra group variance plus the inter groups variance, P^* can be normalized giving us the following expression:

$$P = \frac{V_B}{V} = 1 - \frac{V_W}{V} \in [0, 1]$$

P is the measure of polarization used in this paper which, multiplied by 100, can be interpreted as a percentage of polarization.

One of the main advantages of P is that it allows us to connect the relatively new topic of polarization with the highly developed topic of regression via the coefficient of determination. It is demonstrated (see PG 2012) that P is equal to the coefficient of determination of an ANOVA model (see, for example, Gujarati, 1997, p. 490) in which the wage is explained by the dummy variables that assign each individual to a group.

Let us consider a sample of n individuals randomly selected over which is observed a variable Y (in our case, real gross hourly wage). Additionaly, let us focus on any individual feature, for example gender, education or job status, that provides an exhaustive partition of the population into k sub-populations or groups G_i , $i = 1, \dots, k$. Each sample supplies the following table:

Y_j	$D_1(j)$	$D_2(j)$	….	$D_k(j)$
Y_1	$D_1(1)$	$D_2(1)$	….	$D_k(1)$
Y_2	$D_1(2)$	$D_2(2)$	….	$D_k(2)$
⋮	⋮	⋮	⋱	⋮
Y_n	$D_1(n)$	$D_2(n)$	….	$D_k(n)$

where $D_i, \forall i = 1,2, \dots, k$ is a dummy variable that takes the value one if the individual j belongs to the group G_i and zero otherwise.

Let us consider the ANOVA Model (1) that explains the variable Y according to the group to which each individual belongs [5]:

$$Y_j = \sum_{i=1}^{k} \beta_i \, D_i(j) + u_j \qquad (1)$$

where β_i are the regression parameters, $D_i \ \forall \, i = 1,2, \dots k$, is a dummy variable that is equal to one if, and only if, the individual of the sample belongs to the groups, and zero otherwise and u_j is the error term which verifies that $E(u_j) = 0, V(u_j) = \sigma^2$ and $Corr(u_i u_j) = 0$ for all $i \neq j$.

As it has been pointed out, it is demonstrated (see PG 2012) that the polarization measure, P , is equal to the coefficient of the determination, R^2, of the ANOVA model (1). That is,

$$P = \frac{Model\ SS}{Total\ SS} = 1 - \frac{Error\ SS}{Total\ SS} = R^2$$

where $Model\ SS$ denotes the explained sum of squares of model (1), $Total\ SS$ is the total sum of squares and $Error\ SS$ represents the residual or error sum of squares.

3. Data

To carry out an applied analysis on wages polarization degree it is necessary to have data on employment and job status together with individual characteristics of the workers and their wages. For this purpose we have used the European Survey on Income and Living Conditions (EU SILC) that collects detailed information on the variables object of analysis for the two countries of interest in this study.

In the following analysis, our dependent variable, real gross hourly wage (table 1), is obtained by dividing nominal gross monthly wage of SILC (variable coded *py200g* in the SILC dataset) for Spain and Italy (2007, 2010 and 2012) by four times weekly-hours worked and deflating the result by using as base the 2007 Consumer Price Index. Firstly, we compute the polarization index in terms of gender (*pb150* code in the SILC dataset). Secondly, we carry out the analysis on the polarization degree separately for men and women for the following characteristics of the worker: level of education (*pe040:* up to elementary, secondary, high school, tertiary education), job status (*pl030*: full-time vs part-time employee), occupational status (*pl050*: white collar vs blue-collar; white-collars include ISCO major groups 1 to 4; blue-collars include groups 5 to 9) and type of contract (*pl140*: temporary vs permanent).

We have estimated an ANOVA model with intercept equivalent to model (1) for each considered characteristic (Tables 2 and 3). The Tables include the measure of polarization (R^2) for each considered characteristic. Moreover, from the model equation, it follows that

the coefficient can be interpreted as the wage gap between the average hourly wage of the group included in the model and the average hourly wage of the reference category, which was removed to avoid multicollinearity. For instance, focusing on education we have one characteristic, the education of the earner, with four possible levels, which determine our groups: up to elementary, secondary school, high school, and tertiary education [6]. We consider up to elementary group as the reference category. The coefficients of the other variables are the wage gaps of the other groups with respect the "up to elementary" group and R^2 shows the polarization degree from the perspective of the education characteristic of the individuals.

4. Results

Table 1 reports average hourly wages in Italy and Spain in 2007, 2010 and 2012. It can be noticed that, despite the recession, from 2007 to 2010 the Italian average hourly wage stayed almost constant and the Spanish one even rose by 5.7%. This reveals the rigidity of the observed labor markets in wage determination and could be the result of the multi-annual character of large part of the collective agreements in place at that time. Further, focusing on males and females separately, it should be noted that female average hourly wages slightly increased in Italy (by 1%) from 2007 to 2010 while the male ones remained stable. In Spain the growth of female wages was higher than that of males over the same period (6.0% vs. 5.6%).

However, things started changing afterwards. In fact, in 2012 compared to 2007 the average gross wage rate decreased by 3.9% for men and by 6% for women in Italy and by 2.0% for men and by 3.3% for women in Spain.

[Table 1 about here]

The increasing gender gap to the disadvantage of women is corroborated by the results of the ANOVA model run on gender (Model 1 in table 2): in both countries the coefficient related to being female increased in absolute value from 2007 to 2012. The wage polarization degree measured by the R^2 from the perspective of gender slightly increased in both countries from 2010 to 2012 [7]. This can be connected in both countries to the fiscal austerity measures cutting public sector employees' wages [8]. These cuts affected mostly women given their higher presence in the public sector (Bettio *et al.,* 2013, Antón and Muñoz de Bustillo, 2015), leading to an increase in within group homogeneity in wages [9]. Furthermore, particularly in Spain, many low educated women entered into the labor market to support their household income. Moreover both countries show a higher gender wage gap for low earners, where female jobs are concentrated, leading to a high heterogeneity between men and women.

[Table 2 about here]

Models 2 in tables 3 & 4 report the results on the ANOVA model estimated with respect to educational level in Spain and Italy respectively. Four levels of education are considered as previously mentioned: up to elementary school (reference category), secondary education, high school and tertiary education.

The coefficients of the model estimated on Italy suggest, for both men and women from 2007 to 2012, a decrease in the wage gap to the advantage of the better educated, the decrease being particularly high for women with tertiary education. This signals the increasing overqualification shown in Italy by higher educated employees, especially women. This has led to a decrease in between group variance and in polarization: our measure of polarization

by level of education decreased in Italy from 2007 to 2012 by 6.5 p.p. for men and by 7.8 p.p. for women.

As far as the Spanish labor market is concerned, the estimated ANOVA models bring out some peculiarities since we have to differentiate two opposite findings for men and women, the first at the outset of the crisis and the second in the depth and adjustment period following it. Firstly, from 2007 to 2010, we note a high labor market punishment towards low qualified workers (women above all) as the wage gaps at their disadvantage increased, differently from Italy. Secondly, the fall in the wage gap for workers with tertiary education after 2010, resulting from the above mentioned adjustment of wages in the public sector carried out since 2010 affecting more intensively qualified women with a significant presence in the public administration. This explains why the degree of polarization decreased for men and increased for women over time.

Next, we take into account the job status, i.e. whether the worker has a full-time (reference category) or a part-time job (models 3 in tables 3 & 4). For Spain, we observe, as expected, an increase in the wage gap to the disadvantage of part-time workers in 2010 (both for males and females), followed by a subsequent decrease for women in 2012. It should be pointed out that part-time jobs grew in Spain by 7.3% from 2007 to 2012, and these jobs are involuntary for a high proportion of the population. This tendency led to an increase from 2007 to 2012 in the polarization degree from the perspective of job status in Spain (by 0.2 p.p. for men and by 1.8 p.p. for women). This did not occur in Italy where, on the contrary, the wage gap to the disadvantage of part-timers decreased both for men and for women. This resulted in a reduction of the polarization degree in Italy from this perspective by 0.4 p.p. for men and by 1.1 p.p. for women.

[Table 3 & 4 about here]

Another characteristic that we have analysed is the occupational status: whether the worker is in a blue collar or in a white collar position (see models 4 in tables 3 & 4). Starting from Italy, the estimates suggest a reduction of the polarization degree for women from 2007 to 2012, resulting from a decrease of heterogeneity between the two groups and a decrease of the homogeneity within the group of white collar workers more likely to be overqualified in 2012 with respect to the past. On the other hand, as far as men are concerned, one can detect an increase in the polarization index from 2010 to 2012.

Turning to Spain, we can observe that the wage gap for blue collar workers decreased for men in the analysed years and increased for women in 2010 but dropped in 2012. Furthermore, the polarization degree increased for women over time in Spain, while the male polarization index decreased from 2010 to 2012. This can be related to a consistent entry of women into low paid unskilled blue collar employment in the service sector, which had an impact on the homogeneity of this group. As previously mentioned, most Spanish working women have jobs requiring low qualification and the outset of the crisis had a greater negative impact on this group and opened this wage gap (Centro de Estudios del Cambio Social, 2011, p. 322).

Models 5 in tables 3 & 4 compare workers by type of contract: temporary and permanent (reference category) contracts. For Italy, as expected, the regression coefficient related to temporary workers is always negative and statistically significant, and it increased from 2007 to 2012 for both men and women (despite a different tendency for 2010). Our polarization measure increased for Italy for both men and women from 2007 to 2012, respectively by 1.4 p.p. and 1.5 p.p. The observed outcomes can be related to an increase in dispersion between temporary and permanent employees – as suggested also by the regression results – which occurred during the crisis and deepened with its persistence. Despite the efforts to favour stable jobs (see among others, Battiloro and Mo Costabella, 2011 and Anastasia *et al*., 2013),

an increasing number of workers entered the labor force in precarious employment both at the beginning of their career (where temporary work is massively used) or, as far as women are concerned, while returning to the labor force after a long interruption. These are mainly low-educated older women that appear as entering the labor force in low-skilled and precarious employment in the presence of a sharp decrease in their household's income (Istat, 2013 and 2014).

As far as Spain is concerned, two different paths according to two sub-period of the crisis can be observed. The index of polarization fell, more for females than for males (-4.1 p.p. versus -1.9 p.p.) at the outset of the crisis. This was due to the higher rate of growth registered by the average hourly wage of female temporary workers. Women are the group more affected by temporary contracting [10]. Our results for 2012 reveal a substantial increase in the polarization degree much more marked for women than for men (3.4 p.p. vs 0.6 p.p. with respect to 2010). Not surprisingly, the coefficients of the model for women show a widening of the wage gap between temporary and permanent contracts in the second period. In fact, the average hourly wage of temporary workers decreased in 2012 with respect to 2010 at a much higher extent than for workers in permanent positions (11.6% vs. 7.29%). The flexibility promoted by the above mentioned labor market 2010 reform allowed this adjustment, which implied a change in the previous path. Moreover, this can be considered an effect of fiscal austerity in the public sector taking place since May 2010 in Spain. This increase in the polarization degree for women holding temporary jobs in Spain is particularly relevant given their higher presence in fixed-terms jobs.

Table 5 presents the Gini index computed on the whole population and separately for men and women over the analysed period in Italy and Spain. As it can be observed, the previously described evolution of the polarization was accompanied by a reduction in wage inequality. The Gini index in fact fell for the overall population both for Italy and Spain.

[Table 5 about here]

Broadly speaking, the increase of the homogeneity within group caused a decrease in inequality but, in addition, a relative increase in the wage polarization index in Spain for females compared to males under most of the criteria considered in our analysis. The increase in the polarization degree in Italy occurred mainly for women as far as temporary versus permanent employment is concerned, while there was a reduction in the wage polarization index by level of education.

5. Conclusions

The Spanish and Italian labor markets are characterized by a high degree of heterogeneity and marked gender gaps in terms of labor force participation, type of contract, job status and unemployment levels. In this context, an increasing gender gap in average hourly wages to the disadvantage of women is found over the time period of our analysis for both Italy and Spain.

Moreover, our polarization analysis for Spain shows an increase in the polarization degree of the female labor force according to type of contract, job status and educational level. As a result of the economic crisis, the Spanish labor market has become much more polarized for women than for men. In terms of education level, in particular, the polarization index increased for females whilst it decreased for males. Hence, despite the significant advance in the narrowing of the gender education gap for the young population, the persistent inferior skills of the Spanish female labor force, compared with that of men, strongly influence these results by affecting the sectors and occupations where women's jobs are concentrated.

As far as Italy is concerned, our results show an overall reduction, both for men and women, of the index of wage polarization by level of education. This can be related to an increase in overqualification (Istat, 2014), with women and the youth being likely to be in this position

(Istat, 2014). So, the polarization decrease was more intense for women.

In Italy we observed an increase in the degree of wage polarization for women employed with temporary contracts with respect to women employed with permanent contracts. This can be related to the increasing use of temporary contracts at the different port of entry to employment (including the re-entry after child-rearing that is increasingly taking place with the crisis to sustain household's income). This should require specific policy attention particularly as long as women are more likely to be trapped in temporary jobs than men, suffering therefore to a higher extent than men of wage inequalities and costs connected to precarious employment. With the persistence of the crisis and the increase in precarious jobs held by youth (men and women), the wage polarization index with regard to the type of contract increased also for men.

The trend in increasing polarization detected - especially for Spain - could be a factor of social instability that can affect mostly women but, at the same time, it can be an incentive to quicken the adjustment of the Spanish and Italian economies to a new model based on knowledge. In this respect, the strengthening of skilled female labor and gender equality initiatives should be stepped up together with an attention to the quality of jobs and to the match between the acquired knowledge and the job content. A mismatch (suggested by the decreasing wage polarization by level of education in Italy) can have a negative effect on job satisfaction and productivity and lead to deterioration of individual skills in the long run. We should remember, at this point, that most working women in Spain are still low qualified, therefore, they have a weaker position in the labor market and are more detrimentally affected by the economic disruptions. This applies also to an increasing number of women having a low level of education and being over 40 who try to re-enter employment to sustain their deteriorated household's income in both countries. To avoid the short-term hardship of this

transition for these less-skilled workers, the social safety net and education programs should be reorganized.

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[1] The Spanish and the Italian gender gap in the median earning of full-time employees was respectively 6.1 and 10.6 percent in 2010 (Data available at Gender Data Browser in http://www.oecd.org/gender/equality). In the same line, the Global Gender Gap index for 2011, published by the World Economic Forum (2011), ranks Italy and Spain 74th and 12th, respectively, among 135 countries; but according to its economic participation and opportunity sub index, which includes earned income, Italy ranks 90th and Spain 74th.

[2] Labor market polarization is described as the result of a growth in low and highly-skilled occupations and the substitution of routine middle-skilled job tasks by modern technologies thanks to a decrease in the price of capital goods.

[3] The average wage is used in the studies on European evidence as a rough measure of the skill requirements of occupations. Pertold-Gebicka (2010) criticized this approach since it implicitly assumes that within occupations differently skilled workers are perfect substitutes and it is likely not to be the case.

[4] P* resembles the measure of polarization of Zhang and Kanbur (2001, ZK henceforth) which is given by $ZK = T_B/T_W$ where T_B and T_W are the inter and intra group decomposition of the index of Theil. PG utilized the variance mainly because the notion of polarization is linked with dispersion and the variance is more appropriate than the concentration indices to compute dispersion (see, for instance, Fisher 1958).

[5] In the empirical applications, it is more interesting to eliminate a dummy variable, to avoid collinearity, instead of the constant because the coefficients of the model show the difference between the expected wage of the groups included in the model and the omitted group. So, in section 3 we estimated an ANOVA linear intercept model equivalent to (1).

[6] Note that due to the fact that there is only one feature in each model, interactions do not occur between levels associated with different characteristics. We have proceeded in this way because our purpose is to study polarization according to different criteria of classification of the population. However, the extension of this approach to the multidimensional case is an interesting issue to be considered in a further paper.

[7] However, this measure - though statistically significant - is low due to heterogeneity within the male and female groups of workers.

[8] The average wage in Spanish private activities also suffered an adjustment, although at a lesser extent, facilitated by the legislative reform of labor market carried out in September 2010, which allows companies not to respect collective agreements in wage issues. As for Italy, Casadio (2010) stated that collective bargaining at the company level is not particularly widespread, especially in small firms and in the South.

[9] Giordano (2010) found a positive wage premium for the Italian public sector averaging at about 12 percent in the period 1993-2006. The pay gap for women and workers in southern regions turns out to be higher than the average in the whole sample.

[10] This is coherent with the homogeneous wage increase for temporary workers and the wage decrease for permanent workers with intermediate wages derived from labor market reforms in Spain since 1994 (see Motellón *et al.* 2010). The average hourly wage of the temporary workers increased almost 6.73 times more than that of permanent workers in that period in Spain.

Table 1. Mean real gross hourly wages by country, gender and year

Italy	**2007**	**2010**	**2012**
Total	11.60	11.61	11.03
Male	11.86	11.86	11.40
Female	11.24	11.27	10.58
Spain	**2007**	**2010**	**2012**
Total	10.54	11.15	10.26
Male	11.07	11.68	10.84
Female	9.92	10.52	9.59

Source: Our own elaboration on Spanish and Italian SILC microdata

Table 2. Estimated ANOVA models for Spain and Italy for Gender

	Model 1: Gender (Overall population)					
	SPAIN			ITALY		
	2007	**2010**	**2012**	**2007**	**2010**	**2012**
Female	-1.148***	-1.167***	-1.255***	-0.627***	-0.592***	-0.828***
	(0.13)	(0.146)	(0.136)	(0.127)	(0.115)	(0.105)
Constant	11.07***	11.68***	10.84***	11.86***	11.86***	11.40***
	(0.0948)	(0.104)	(0.0991)	(0.0862)	(0.0774)	(0.0745)
F-test	78.56***	63.89***	85.66***	24.50***	26.65***	62.35***
R-squared	0.009	0.009	0.015	0.003	0.003	0.007
Reference Variable: Male						
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Source: Our own elaboration on Spanish & Italian SILC microdata

Notes: Although they are small, the ANOVA F-Test are significantly distinct from zero with p-values of order less than 0.01 in all cases except for male job status. This is due to the sample size being extraordinarily big and the potency of the contrast is very high.

Table 3. Estimated ANOVA models-Spain

Model 2: Education level						
		Males			Females	
	2007	**2010**	**2012**	**2007**	**2010**	**2012**
Secondary	-0.27	0.417**	0.650***	-0.153	0.517***	0.264
	(0.172)	(0.191)	(0.186)	(0.201)	(0.158)	(0.197)
High School	1.692***	2.155***	2.014***	1.322***	2.144***	1.102***
	(0.216)	(0.248)	(0.243)	(0.204)	(0.194)	(0.201)
Tertiary	6.074***	6.178***	5.344***	5.781***	6.716***	5.184***
	(0.256)	(0.252)	(0.231)	(0.229)	(0.216)	(0.227)

Constant	8.790***	8.769***	8.162***	7.085***	6.767***	6.779***
	(0.142)	(0.152)	(0.142)	(0.168)	(0.13)	(0.17)
F-test	265.92***	244.39***	204.80***	358.33***	396.13***	281.36***
R-squared	0.181	0.173	0.158	0.208	0.236	0.240
Reference Variable: Up to elementary school						
Model 3: Job Status						
Part time	-1.026*	-1.369*	-1.425**	-1.814***	-2.127***	-2.061***
	(0.539)	(0.755)	(0.574)	(0.189)	(0.241)	(0.188)
Constant	11.10***	11.74***	10.92***	10.30***	10.99***	10.06***
	(0.0962)	(0.104)	(0.1)	(0.102)	(0.116)	(0.11)
F-test	3.62*	3.29*	6.18**	91.87***	77.55***	120.24***
R-squared	0.001	0.002	0.003	0.016	0.023	0.034
Reference Variable Full-time job						
Model 4: Occupational Status						
Blue Collars	-6.064***	-5.946***	-5.201***	-5.258***	-5.687***	-4.997***
	(0.218)	(0.212)	(0.156	(0.149)	(0.167)	(0.12)
Constant	15.05***	15.25***	13.99***	12.31***	13.02***	12.03***
	(0.206)	(0.197)	(0.139)	(0.128)	(0.154)	(0.107)
F-test	771.05***	786.62***	1112.44***	1247.80***	1158.6***	1723.20***
R-squared	0.205	0.220	0.207	0.203	0.230	0.253
Reference variable: White Collars						
Model 5: Type of Contract						
Temporary C.	-3.994***	-3.715***	-3.382***	-3.056***	-1.764***	-2.513***
	(0.159)	(0.221)	(0.221)	(0.167)	(0.253)	(0.188)
Constant	12.09***	12.40***	11.52***	10.81***	10.92***	10.15***
	(0.116)	(0.118)	(0.112)	(0.11)	(0.114)	(0,107)
F-test	627.26***	282.05***	233.36***	333.34***	48.8***	178.15***
R-squared	0.075	0.056	0.062	0.057	0.016	0.050
Reference Variable: Permanent Contract						
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Source: Our own elaboration on Spanish SILC microdata

Table 4. Estimated ANOVA models – Italy

Model 2: Level of Education						
		Males			Females	
	2007	**2010**	**2012**	**2007**	**2010**	**2012**
Secondary	0.600***	0.105	0.199	-0.0342	0.212	-0.649
	(0.196)	(0.272)	(0.327)	(0.380)	(0.377)	(0.456)
High School	2.381***	1.620***	1.561***	2.200***	2.204***	0.910**
	(0.202)	(0.275)	(0.328)	(0.377)	(0.364)	(0.447)
Tertiary	8.539***	6.855***	6.153***	7.001***	5.730***	3.746***
	(0.423)	(0.417)	(0.422)	(0.457)	(0.415)	(0.473)

Constant	9.429***	10.14***	9.710***	8.690***	8.781***	9.335***
	(0.175)	(0.259)	(0.314)	(0.365)	(0.351)	(0.438)
F-test	193.50***	162.88***	150.13	226.60***	164.01***	136.95***
R-squared	0.195	0.152	0.13	0.198	0.143	0.12
Reference Variable: Up to elementary school						
Model 3: Job Status						
Part time	-2.395***	-2.091***	-1.416***	-1.734***	-1.480***	-0.780***
	(0.425)	(0.289)	(0.336)	(0.189)	(0.174)	(0.155)
Constant	11.97***	11.94***	11.47***	11.62***	11.58***	10.78***
	(0.0876)	(0.0794)	(0.0765)	(0.110)	(0.0993)	(0.0890)
F-test	31.81***	52.53***	17.80***	84.53***	72.19***	25.16***
R-squared	0.007	0.005	0.003	0.017	0.013	0.006
Reference Variable: Full-time job						
Model 4: Occupational Status						
Blue Collars	-4.544***	-4.023***	-4.159***	-4.658***	-4.420***	-4.065***
	(0.182)	(0.164)	(0.147)	(0.152)	(0.145)	(0.125)
Constant	14.57***	14.25***	13.74***	13.05***	13.03***	12.29***
	(0.170)	(0.151)	(0.132)	(0.127)	(0.112)	(0.0989)
F-test	622.02***	604.27***	796.78***	937.50***	934.96***	1064***
R-squared	0.139	0.125	0.1455	0.164	0.168	0.14
Reference variable: White Collars						
Model 5: Type of Contract						
Temporary C.	-3.354***	-3.116***	-3.601***	-2.330***	-2.858***	-2.487***
	(0.216)	(0.208)	(0.168)	(0.218)	(0.203)	(0.173)
Constant	12.36***	12.23***	11.85***	11.70***	11.68***	10.95***
	(0.0934)	(0.0828)	(0.0800)	(0.105)	(0.0927)	(0.0814)
F-test	241.23***	223.37***	459.79***	113.86***	197.51***	206.15***
R-squared	0.036	0.032	0.05	0.025	0.036	0.04
Reference Variable: Permanent Contract						
Robust standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1						

Source: Our own elaboration on Italian SILC microdata

Table 5. Gini Index computed on real gross hourly wage by country, gender and year

Italy	**2007**	**2010**	**2012**
Total	0.24	0.23	0.22
Male	0.24	0.23	0.22
Female	0.25	0.23	0.22
Spain	**2007**	**2010**	**2012**
Total	0.28	0.27	0.25
Male	0.28	0.27	0.25
Female	0.29	0.28	0.25

Source: Our own elaboration on Spanish & Italian SILC microdata