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Working Papers

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ChilD n. 04/2007

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Abstract

The most recent literature on wage differentials highlights the need to evaluate the wage gap at different points of the wage distribution rather than at the average value alone. In this work we use quantile regressions and an adaptation of the procedure suggested by Machado and Mata (2005) to derive the predicted and counterfactual female wage distributions and to evaluate the extension of the unexplained part of the wage gap. We use data from the last available cross-section of the European Community Household Panel (2001). We show that in Italy the wage gap due to gender differences in the rewards to productive characteristics is higher in correspondence with the extremes of the female wage distribution, suggesting the presence of strong glass ceiling and sticky floor patterns. Controlling for different educational levels, we find that low-educated women suffer a higher unexplained wage gap along the whole distribution. However, we detect a strong sticky floor effect among low-educated women and some evidence of a glass ceiling pattern among highly-educated female workers.

JEL classification: J71

Keywords: Human capital, Gender wage gap, Discrimination.

[♣] This paper is produced as part of the project "Gender wage differentials" supported by the Italian Ministry of Welfare and Labour, coordinated and funded by ISFOL (Italy). We thank the participants in the research project for useful comments. A previous version of this paper was presented at the Conference of the Applied Econometrics Association on "Policies against unemployment", Naples, 1-2 June 2006 and at the XXI National Conference of AIEL, *Associazione Italiana Economisti del Lavoro*, Udine, 14-15 September 2006. We are grateful to the participants in these conferences for discussion of our results.

1. Introduction

Official data published by the European Commission (2002) show that the raw gender wage gap in the UE countries, in 1998, stood at an average 16.2 percentage points, meaning that male workers were earning on average 16.2% more than their female colleagues; the gap, however, was lower than 10% in Italy, Portugal and Belgium. But these data refer merely to the proportional difference between wages without taking account of differences in individual and working characteristics. Recent studies (Comitato nazionale parità e pari opportunità, 2001), evaluating the gap after controlling for the characteristics, estimate an average wage differential in Italy of around 19 percentage points; the estimated gap is persistent but lower than the gap in other European countries, such as the United Kingdom (with a gap of 34 percentage points) but higher than in the best performing European countries (for example, the estimated gap in Denmark amounts to 14 percentage points).

The above mentioned analyses, and much literature on the empirical study of the gender wage gap, have focused on average differentials; however, that approach has been widely criticised in most recent contributions and much literature has argued the need to extend the research to take into account the probably different incidence of the gap along the female distribution of wages. Different methodological proposals have been formulated; the best-known examples are Juhn, Murphy and Pierce (1991), Fortin and Lemieux (1998) and the most recent applications of the Machado and Mata (2005) methodology that suggest studying the extent of the wage gap at different points of the wage distributions, rather than at the average estimate alone. In particular, Machado and Mata (2005) propose estimation of different coefficients at different quantiles (or deciles) of the respective female and male wage distributions and construction of theoretical and counterfactual female wages by means of these coefficients; then, these distributions are compared at several points. A different

contribution made by Jenkins (1994) suggests evaluating the level of the gap at female individual level and analysing the cumulative density function constructed on the sample of females.

A number of recent contributions have studied the extent of the gender wage gap along the distribution of female wages applying the methodology of Machado and Mata (2005) or the simplified version proposed by Albrecht *et al.* (2003); some examples on European countries are proposed by Albrecht *et al.* (2003, 2004), Arulampalam *et al.* (2005), De la Rica *et al.* (2005), Garcìa *et al.* (2001).

Our analysis aims to contribute to the research on the topic by focusing on the Italian labour context. Some analysis on Italy is already included in Arulampalam *et al.* (2005); however, we present a different specification of the econometric model together with a disaggregated analysis by educational level (as explained in the following Sections).

The purpose of our paper is first to investigate the Italian gender wage gap along the whole female distribution of wages; we estimate wage quantile equations for the samples of female and male workers and then apply a simplified version of the Machado and Mata (2005) methodology, proposed by Albrecht *et al.* (2003), to derive theoretical and counterfactual distributions of female wages.

In the second part of the research we study the wage gap for subsamples of workers homogeneous with respect to education; we split the sample of workers conditional on an educational level lower than or equal at least to an upper-secondary diploma, and propose separate quantile estimates and distribution analyses[1]. We will show that it is particularly interesting to separate highly educated from lower-educated workers because the estimated coefficients and the estimated wage gap differ substantially between the two groups. These

[1] This analysis is partly inspired by the contribution of De la Rica *et al.* (2005), where they show some irregular patterns in the Italian raw wage gap by using ECHP 1999 data — as compared to the British — when they control for education.

results are not surprising in the light of some facts that have already become known in the literature, showing, for example, a different attachment to work and dissimilar human capital accumulation depending on individual education[2].

The paper is structured as follows: in Section 2 we present a review of the international literature evaluating the wage gap by means of a distributional analysis and the research on the evaluation of wage differentials in Italy. In Section 3 we explicate the methodological issues and discuss the technique we use to decompose the wage gap across the distribution. The model is then estimated by using a sample of employees drawn from the last available wave of the European Community Household Panel (2001), as described in Section 4. Results of the estimations and of the wage gap decomposition are then presented in Section 5 with respect to the whole sample and in Section 6 by educational level.

2. The wage gap along female wage distribution: some results on European countries

Most of the literature on gender wage differentials has focused on the analysis of the average wage gap, by applying the Oaxaca-Blinder methodology. That approach consists in estimating the average impact of individual, firm and market characteristics on the level of wages, and on the evaluation of theoretical and counterfactual female wages by means of the estimated average coefficients. Theoretical wages are derived by applying the coefficients estimated on the subsample of women, e.g. average estimated rewards that the market pays to female characteristics; conversely, counterfactual wages are evaluated on the hypothesis that female characteristics would receive male rewards. The methodology is extremely interesting because it allows one to decompose the average level of the so-called wage discrimination, defined as the difference between the theoretical and counterfactual average wages — in the

[2] See for example Addabbo (1999), Bettio and Villa (1999) for an analysis of female labour supply in Italy according to educational levels.

components due to the differences between female and male rewards to any characteristic. However, the evaluation of wage discrimination is effectively reduced to the average.

Recent contributions to the topic have suggested analysing the extent of discrimination at different points of the wage distribution. Some examples are Juhn, Murphy and Pierce (1991), Fortin and Lemieux (1998) and Machado and Mata (2005). Other contributions suggest evaluating the level of wage discrimination female-by-female to exactly determine the incidence of the unexplained wage gap at individual level and to study the relationship between each individual characteristic and the extent of wage discrimination (Jenkins, 1994).

Several works have applied the methodology proposed by Machado and Mata (2005). That procedure consists in estimating quantile regression models of wages for female and male workers, separately, and applying those quantile coefficients to derive marginal distributions of theoretical and counterfactual wages[3]. Separate marginal distributions are then compared at different points to assess the extent of the unexplained part of the wage gap at different levels of female estimated wages. That methodology has been widely used for studying wage differentials in some European countries since the procedure makes it possible to study the extent of discrimination along the wage distribution. Albrecht *et al.* (2003) have analysed the Swedish context; Albrecht *et al.* (2004) have applied the methodology to the Netherlands; different analyses have been proposed on Spanish data [Garcìa *et al.* (2001), Gardeazàbal and Ugidos (2005), Del Rìo *et al.* (2006), De la Rica *et al.* (2005)] and an interesting comparison among European countries has been proposed by Arulampalam *et al.* (2005).

Albrecht *et al.* (2003) study the wage gap over time in Sweden using the Swedish Level of Living Surveys, disaggregating by group of workers — immigrants versus no immigrants — and comparing Sweden to the USA. By applying a simpler version of the Machado and Mata method, they find evidence in favour of the existence of a glass ceiling pattern in the extent of

[3] The procedure will be better explained in the next Section.

the wage gap: the gender wage gap increases on moving from the bottom towards the top of the female wage distribution. They also demonstrate that the high wage differential at the top of the female wage distribution is mostly explained by differences in the returns to the characteristics. By applying the same methodology used in the Swedish case, Albrecht *et al.* (2004) study the wage gap on a sample of full-time workers selected from the 1992 Labour Supply Panel of the Dutch Institute for Labour Studies; in this case, they also correct for the non-random selection of women to full-time employment. Similarly to the Swedish case, their results are consistent with the existence of a glass ceiling pattern and with a high incidence of gender differences in the rewards to the characteristics. They also show that when adjusting for selection to full-employment the wage gap increases, although the effect of the differences in the characteristics also augments.

Some research using quantile regression analysis has also been carried out on Spanish data. Gardeazàbal and Ugidos (2005) use a sample selected from the 1995 Spanish Survey of Wage Structure[4] and show that gender differences in the returns to the characteristics are responsible for a higher gap at the bottom of the distribution. Garcìa *et al.* (2001), on the other hand, using a different dataset (the 1991 Encuesta de Conciencia, Biografia y Estructura de Clase) and correcting for non-random selection of women into employment and for endogeneity of education, find the opposite result, e.g. an increasing wage gap on moving from the bottom to the top of the female wage distribution.

An interesting study has been proposed by De la Rica *et al.* (2005) on the 1999 cross-sectional Spanish data of the European Household Community Panel (year 1999). The authors present a separate analysis of full-time workers conditioning on two educational levels, and show how the extent of the hourly wage gap follows two different patterns — along the respective wage distribution — in the two considered subsamples: highly-educated women

[4] The dataset covers employees in firms with ten or more workers and excludes the following production sectors: Agriculture, Public Administration, Health Services and Education.

suffer a higher gap at the top of the distribution, while low-educated females are most discriminated at the bottom. Moreover, in correspondence of the highest wage differentials, most of the gap is explained by differences in the rewards to the characteristics. According to the authors, these results are consistent with the existence of a glass ceiling effect for highly-educated working women and of a glass floor effect for low-educated.

The Spanish gender wage gap has been analysed also by Del Rìo *et al.* (2006), by using a methodology that relies on Jenkins (1994) and using poverty literature techniques. Even though the methodology used is rather different from the distributive contributions discussed above, the results obtained on the 1995 sample of the Survey of Wage Structure are consistent with De la Rica *et al.* (2005)

Arulampalam *et al.* (2005) present quantile regression analyses on a sample of eleven European countries and study the wage gap in the private and public sector, separately. They confirm, for most of the analysed countries, the unequal incidence of the gap along the distribution of female wages, with wider wage differentials at the tops of the wage distributions. However, they find different extents of the wage gap between the private and public sectors: higher wage gaps are estimated at both extremes of the private sector wage distribution; in contrast, female employees in the public sector suffer higher gaps only at the top of the distribution. This result is valid also in the Italian sample.

As regards the Italian research on wage differentials, very little work has been done by applying some distributional analysis. Favaro and Magrini (2005) evaluate the wage gap across the female wage distribution of a sample of young workers by using bivariate density functions and by conditioning on the distribution of the individual characteristics. Following the suggestions of Jenkins (1994), Favaro and Magrini evaluate the wage gap in correspondence of every female worker; they then evaluate the distributional extent of the unexplained wage gap by applying a non-parametric estimation of bivariate density functions,

conditional on some human capital characteristics. They evaluate the incidence of the wage gap along the wage distribution and the extent of human capital characteristics; moreover, they condition on different educational levels. Similarly to work applying the Machado and Mata methodology, Favaro and Magrini show that highly educated women suffer, in general, lower levels of wage discrimination than low-educated females but experience much higher increases in the gaps on moving towards the top of the distribution. In addition to that, they find that the accumulation of other human capital characteristics, such as experience and tenure in the firm, do not help women to close up the wage gap.

Istat (2005), by using the method proposed by Juhn, Murphy and Pierce, finds a wage gap that increases with women's wage level.

3. Methodological issues

In this section we present the econometric model that we will use to estimate the rewards of the characteristics and describe the procedure that allows us to derive the marginal distribution of theoretical and counterfactual female wages.

With regard to the econometric estimates, we estimate separate models for female and male earning functions. Following the most recent contribution to the analysis of the wage gap, we estimate wage equations at different points of the distributions; we adopt the quantile regression method (Koenker and Bassett, 1978; Buchinsky, 1998) according to which earning functions are centred on different quantiles of the wage distribution. Given the covariates vector *z*, we estimate $Q_\theta(\omega|z)$, corresponding to the θ-th quantile of the distribution of the log wage (ω), at any $\theta \in (0,1)$. The quantile regression model is assumed to be linear:

$$\omega = z'\beta_\theta + u_\theta$$

Where ω is the log of wages and β_θ is a vector of coefficients, the quantile regression coefficients. The distribution of the error term u_θ is unspecified and it is simply assumed that $Q_\theta(u_\theta|z) = 0$.

The estimated values of the θ-th quantile of the log wages, conditioned to covariates z, is equal to: $Q_\theta(\omega|z) = z'\hat{\beta}_\theta$.

For given $\theta \in (0,1)$, β_θ can be estimated by minimising in β_θ the following expression:

$$n^{-1}\sum_{i=1}^{n}\rho_\theta(\omega_i - z_i'\beta)$$

where:

$$\rho_\theta(u_i) = \begin{cases} \theta u_i & \text{for} \quad u_i \geq 0 \\ (\theta - 1)u_i & \text{for} \quad u_i < 0 \end{cases}$$

The vector of coefficients β_θ can be obtained by estimating each equation separately or simultaneously. We chose to estimate the equations simultaneously in order to obtain an estimate of the entire variance-covariance matrix of the estimated coefficients[5].

Following the above described procedure, we end up with the estimated values of the quantile coefficients for the female and the male samples. For any θ-th quantile, we obtain the male value $\hat{\beta}_\theta^m$ and the female value $\hat{\beta}_\theta^f$.

[5] The bootstrapping procedure allows us to test whether coefficients of different quantile regressions are significantly different.

Given the estimated coefficients, we derive the marginal distributions of the predicted (theoretical) and the counterfactual female wages by applying the Albrecht *et al.* (2003) methodology[6]. Female predicted wages are the theoretical wages that female workers can earn given their characteristics and the estimated rewards recognised to those characteristics, $\hat{\beta}_{\theta}^{f}$; female counterfactual wages are wages that women would be paid if female characteristics were rewarded at the male returns, $\hat{\beta}_{\theta}^{m}$.

In order to construct the marginal distributions, we proceed as follows:

- We take a draw from the female database and construct a predicted wage by multiplying the characteristics z_f of every chosen individual by $\hat{\beta}_{\theta}^{f}$, for a given quantile θ. We repeat that operation N=100 times for all quantiles, ending up with the estimated marginal distribution of female predicted wages.

- We repeat the operation described above but using male coefficients, $\hat{\beta}_{\theta}^{m}$. We derive the estimated marginal distribution of female counterfactual wages.

- We use the two generated wage distributions, $z_f'\hat{\beta}_{\theta}^{m}$ and $z_f'\hat{\beta}_{\theta}^{f}$ to evaluate the part of the "raw" wage gap due to different gender rewards of the characteristics.

[6] Albrecht *et al.* (2003) adopt a simplified version of the methodology proposed by J.A.F. Machado and J. Mata in a mimeo that was later published in the Journal of Applied Econometrics (Machado and Mata, 2005).

4. The dataset

The analysis is carried out on a sample of employed workers aged 15 to 65 selected from the 8th wave[7] of the European Community Household Panel (ECHP); we do not include the group of self-employed workers owing to the low reliability of some information on their working activity, especially on earnings and the number of hours worked, that makes the comparison with employed workers rather difficult.

The model we estimate assumes that the wage level is affected by individual characteristics and by other characteristics linked to the demand side of the labour market, such as the size of the firm, the sector of activity, the type of contract and the reference regional context. Regarding individual characteristics, the information provided by the ECHP concerns education, experience, supervisory responsibility and type of occupation in current job together with some information on the family, such as marital status and presence of children.

We control for education by distinguishing the effect of an upper-secondary education and a university degree from lower educational levels; we construct two dummies aiming to capture the impact of a "second stage of secondary level education (ISCED 3)", what we call "upper-secondary education", and a "recognised third level education (ISCED 5-7)", more simply referred to as "university education".

We measure working experience by estimating the total number of years of working activity accumulated as since the first entrance of the worker in the labour market; moreover, we evaluate "specific experience" accumulated in the present occupation (tenure) by taking into account the activity period spent in the current firm. In order to measure general experience, we compute a proxy of the total number of years of working activity as the difference between the individual's age and her age of entry into the labour market. We then

[7] The most recent available wave, for year 2001.

capture the generally recognized non-linear effect of experience on wages by constructing a quadratic function.

Some caution is generally advisable when using such a “theoretical” measure of experience in analyses on wages and on gender wage differentials: the theoretical value of experience, as measured by the number of years counted from the declared starting period of working activity till the time of observation, may not correspond to the effective years spent in the labour market. Indeed, that measure of experience does not take into account periods of absence from the labour market, owing to unemployment, inactivity, or simply illness or parenthood. If this were the case, theoretical experience would overestimate the real number of years of working activity. That measurement problem arises in the case of both male and female evaluation; however, as empirical evidence shows, the problem is more serious for females, due to the interruption connected with maternity. We try to partially solve that measurement problem by adding, among the explicatory variables, the interaction of experience with the number of children. If it is true that having children implies some interruption of the working activity and then some penalty in terms of experience, we should detect a negative impact of that variable on the level of wages.

With respect to “specific experience” accumulated in the current firm, ECHP provides the exact period of permanence only up to 15 years; longer times of permanence cannot be exactly measured. Therefore we control for specific experience by defining different dummies: one for less than five years of tenure (used as reference in the estimation), a second dummy for 6 to 10 years of tenure, and two more dummies for 11 to 15 years and for more than 15 years of specific experience.

Human capital characteristics are expected to positively affect the level of wages. However, the extent of the effect can reasonably be correlated with the type of occupation and the degree of responsibility concerning that occupation; if we did not control for occupational

characteristics we would overestimate (rather than underestimate — it depends on the occupation) the returns to human capital. Therefore, we include among our variables a number of dummies for each type of occupation listed in the ECHP[8]; moreover, since the survey questionnaire asks individuals in paid employment whether they have either a supervisory role or some intermediate supervisory role or no supervisory role, we construct two separate dummies capturing the effect of some degree of responsibility, with respect to no responsibility, on the level of wage. A positive sign is expected as a reward to greater supervisory responsibility.

In addition to the variables described above, we control for the economic sector by including a dummy variable for the public sector to measure the effect on wages of being a public employed worker, and two dummies for agriculture and services. We also isolate the effect of the type of contract and distinguish full-time from part-time work, permanent employment from fixed-term or short-term contracts and from other types of employment contracts[9]. Finally, we take account of the size of the firm and of regional effects.

Table A1 in Appendix summarizes some information on our sample. With respect to the educational level, most workers, independently of gender, have an educational level lower than upper-secondary with a rather small difference between the two genders (almost 53% in the female sample and 48% among men); 39% of women and 42% of men have an upper-secondary education and 8.4% of women and 10% of men have a university degree.

Looking at other human capital characteristics, rather small gender differences appear. In average terms, the amount of general experience is much alike between the two groups.

[8] The dummy variables introduced refer to the following professions: physical, mathematical, engineering, life science and health professionals, teaching professionals, other professionals; physical, mathematical, engineering, life science and health associate professionals, teaching and other technical professionals; office and customer services clerks; personal and protective services workers; models, salespersons and demonstrators; skilled agricultural and fishery workers; craft and related trades, and extraction and building trade workers; metal, machinery, precision, handicraft, craft printing and related trades workers. We have included these occupational dummies in the model and used as reference category 'Sales and services elementary occupations'.

[9] We summarise in the category "other type of contract" the categories defined by the ECHP as "casual work with no contract" and "other arrangement".

Summarising the information about the other characteristics of the workers, we see that women are less represented than men in jobs with supervisory roles: 16% of men are in jobs with an average supervisory level against 11% of women; moreover 11% of men against 6% of women have jobs with a high supervisory role[10]. With regard to the distribution of workers by sector, women are more concentrated than their male colleagues in the Public Sector (43% against 32%) and in the Service sector (79% of women against 56% of men) whereas men are more numerous in the industry sector (40% of men versus 19% of women). Working women are more likely than men to be employed in firms with less than 20 employees. Women are also more likely than men to be clustered in non-standard employment: 9% of working women are employed in part-time jobs against 1.6% of men; also temporary jobs are more frequent among women (1.7% of women and 0.5% of men).

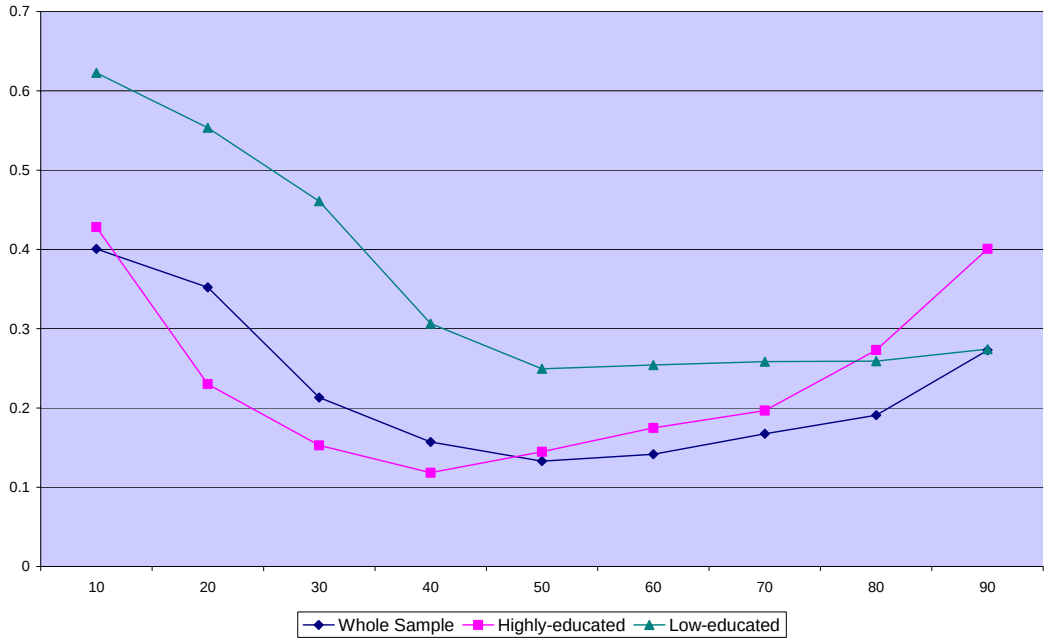
[10] This is consistent with the existence of vertical occupational segregation by gender in Italy (Rosti, 2006).

5. The wage gap along the distribution of wages

As illustrated in Section 2, recent analyses on gender wage differentials emphasize the different incidence of the wage gap at different levels of earnings. Following the hints of this research, we proceed to evaluate the wage gap between our sample female and male workers at different points of the distributions and then focus on its incidence conditioning on different educational levels.

Before dealing with the econometric analysis, we briefly discuss the gender difference in the earnings distributions. In Figure 1 we plot the “raw” wage gap measured at any decile of the distributions, both for the whole samples and for the two subsamples of low-educated (triangle) and highly-educated (square) female and male workers. The “raw” wage gap is defined as the difference between male and female yearly working incomes unadjusted for individual characteristics; for its level can depend both on a discriminatory behaviour observed against either the group of female workers or the group of male workers and on different characteristics observed between the two genders. Despite that, the “raw” wage gap gives a first interesting representation of how and to what extent gender income differences can vary across the distributions. The line “whole sample” represents the ”raw” wage gap measured as the difference between the i^{-th} decile value of the male wage distribution and the corresponding decile value of the female working income distribution. The same “raw” gap is evaluated on the subsample of workers with an educational level higher or equal to a second stage of secondary educational level (highly-educated workers) and on the subsample of individuals with an educational level lower than a second stage of secondary educational level (low-educated workers). A positive wage gap highlights an income differential in favour of male workers; conversely, a negative wage gap represents a wage advantage for women.

Figure 1. The log wage gap. Whole sample and subsamples conditioned on educational levels



As Figure 1 shows, the "raw" gap is always positive, at all points of the distributions and independently of the educational levels, meaning a wage differential constantly in favour of male workers. However, quite relevant differences emerge from a deeper analysis of the levels of the gap and of the trends characterising the different samples.

The wage gap measured between the whole female and male samples reaches higher values in correspondence with the first deciles of the distributions. The maximum wage gap amounts to 40 percentage points at the very first decile; it decreases across the lower tail of the distributions and reaches its minimum level at around the median point. Thereafter it steadily recovers up till 28 percentage points in the 90th percentile. The U-shape path of the gap across the wage distribution deciles is confirmed in the highly-educated worker subsample. However, the decreasing trend up till the median value and the subsequently recovering path are much steeper than in the whole sample.

The worst wage gap levels are registered for low-educated women; they can experience up to 60 percentage points of income disadvantage compared to their male colleagues in the first decile of the corresponding distribution. This is consistent with the hypothesis of sticky floor for the lower educated women. The gap falls by more than 30 percentage points before reaching the median wage value; from that point onwards it remains stable.

It is interesting to notice that highly educated women suffer the lowest wage gaps at all wage levels except at the highest deciles of the wage distributions, when their gap overtakes the low-educated wage gap.

As we have already noted, the "raw" wage gap depends closely on inter-gender variability of productive characteristics. The wage gap increases in favour of men when female workers have worse productive characteristics than males have. In order to separate the wage gap components due to differences in gender individual characteristics and to differences in their rewards, we proceed by estimating wage equations for men and women separately, following the quantile regression methodology explained in Section 3. Estimated coefficients are then used for measuring the part of the gap closely dependent on gender differences in the rewards to the characteristics. More precisely, following the procedure described in Section 3 we construct the marginal distributions of female predicted wages and of counterfactual wages female workers would be paid if their characteristics were rewarded at the male rates. Lastly we discuss the behaviour of the gap across the wage distributions. In the subsequent section we will focus on the wage gap conditioned on different educational levels. Quantile regressions for the separate samples of women and men are synthesised in Table 2. Figure 2 shows the plots of the marginal predicted and counterfactual distributions of female wages.

Regression results are reported in Tables 2a (females) and 2b (males). Our regressions estimate the impact of different characteristics on the logarithm of yearly incomes from work, including among the regressors the logarithmic transformation of the number of months worked and the number of weekly hours as declared by the individuals. A possible alternative would have been to estimate hourly earnings functions (as many analyses do when using the same data as ours): for, although the information on hourly wages is not available, we could have derived that value by using information on yearly earnings, number of worked months, number of hours worked per week and by supposing that the individual would work every week of the declared months of work. However, in doing so we would probably have committed some measurement errors owing to the possibility that workers do not work all weeks of a declared month worked. In order to avoid that risk, unlike other contributions, we opted to estimate the log of yearly earnings.

In Tables A2 and A3 we summarize the results of the tests on the differences between quantile coefficients. This exercise aims to verify whether the characteristics have significantly different effects on the wage level along the wage distribution. The tests are performed for each single characteristic and for a group of selected variables concerning individual human capital.

In addition to the human capital variables (education, experience and tenure) described in the previous Section, we control for the interaction of experience with the number of children, in order to correct the effect of potential experience: for, by adding that interaction among

those covariates we partly take account of the likely negative incidence of having children on the accumulation of experience and therefore on wage growth. We also control for working time (by adding the dummy "part-time"), the level of responsibility ("average supervisory level" and "supervisory level"), working sector (distinguishing between public and private sectors and also between agriculture, industry and services) and types of contracts (trying to distinguish between more stable and atypical contracts). Apart from including the size of the firm and the macro-region (capturing likely differences in unemployment rates and other macro variable differences), we control also for the type of occupation by adding a dummy for any occupation category[11]. The inclusion of these variables allows us to disentangle the effect of the impact of the type of activity from the effect of human capital variables; for, if we did not add these dummies, estimated human capital coefficients would partly incorporate the influence of the occupational characteristics[12]. This probably accounts for the results we obtain, as compared to those of previous studies: namely that our estimates of the human capital variables are slightly lower than others shown by previous research.

We start by discussing the results of the estimates of the female sample. We can note first that the characteristic "marital status" has no significant effect on the female wage level, at any point of the female distribution. Estimates confirm the positive and relevant impact of human capital characteristics on female wage levels, at any point of the distribution. An upper-secondary education level guarantees significant increases in wages; the percentage wage gain for female workers with an upper-secondary education certificate, relative to the wages of their colleagues with a lower education, is between 1.8 and 8.6 percentage points. However, the gain is not monotonic with respect to quantile values; having an upper-secondary education allows the worker to achieve higher wage gains on moving from the lowest decile of the wage distribution to the median value. Conversely, the wage gain decreases at wage levels higher than the median. Precisely, the impact on wage of an upper-secondary education degree amounts to 5.9 percentage points at the first decile and steadily increases along the left-hand part of the wage distribution reaching a percentage impact equal to 8.6 in correspondence with the median; thereafter, the percentage effect decreases at 6 percentage points in correspondence to the 75^{th} decile and reaches its minimum at the last decile of the distribution (1.8%). The impact of upper-secondary education along the

[11] We add 15 dummy variables for any occupational category reported in the dataset, imposing as base category "sales and services elementary occupations".

[12] Estimates without these dummies are rather different, especially for the female sample and for the lowest quantiles of the distributions.

distribution is statistically different when comparing the 90th decile with the 25th and the median.

The wage gain for females with a university degree — always compared to females with less than upper-secondary education diploma — increases from around 12 percentage points at the lowest decile of the distribution up till 25 percentage points at the opposite extreme of the distribution. That difference is statistically significant when comparing the extremes of the distribution (the 10th and the 25th decile against the 90th) and the median with respect to the 10th and the 90th values.

Experience accumulated in the labour market positively affects the wage level only for females earning wages not higher than the median; moreover, the contribution of experience to the level of wage monotonically decreases as earnings increase from the lowest decile up till the halfway point of the distribution and the effect is statistically different between couples of quantiles. The interaction between experience and the number of children assumes significant negative values in correspondence only with the lowest wage levels, precisely at the first decile of the distribution. This may be connected to the higher probability that low-paid women are more likely to interrupt their work profile for childbirth or childrearing.

Specific experience accumulated inside the firm (tenure) has a positive and increasing effect on the wage level as the period spent in the firm increases; this happens at any point of the distribution. However, the dummies capturing the effect of different periods of permanence in the firm are not always significant and we do not observe a clear monotonic trend as moving from the lowest to the highest deciles of the wage distribution. Attempting to account for this, we can say that the economic advantage recognised to female workers with a permanence in the firm of 6 to 10 years is significant at very low and very high levels of wages and insignificant between the 25th and the 75th decile values. Tenure of 11 to 15 years assures a statistically significant wage premium only for wage levels at the left-hand side of the distribution except for the 10th decile levels. The longest period of tenure (over 15 years) guarantees significant effects at any point of the distribution and the highest premium as the wage increases above the median value (10% gain at the 75th decile and 18% gain at the 90th decile).

Females working in the public sector are guaranteed higher wages than their colleagues working in the private sector if wages are not particularly high. The highest gain from working in the public sector is estimated for females in the lowest decile of the distribution; the gain decreases as wages increase up the median wage level and becomes strongly negative (still significant) at the highest decile of the distribution.

Examining the impact of the types of contracts, some interesting features emerge. First, we find some evidence of a wage penalty affecting female workers working part-time; however, that penalty decreases significantly as wages arise. We estimate a wage loss equal to 30 percentage points for female part-time workers whose wages belong to the lowest part of the distribution; that wage penalty, however, decreases by up to 10 percentage points as long as the wage increases. Inter-quantile differences in the coefficients of the part-time dummies are in general statistically significant. Similarly, fixed-term and short-term contracts are responsible for some wage loss inversely related to the level of wage; the coefficient for fixed-term contracts is generally significant except in correspondence with the 25th decile and accounts for a loss of 21% at the lowest estimated decile; that impact significantly decreases to around 8% in correspondence with the median and with the highest percentiles of the distribution. The dummies related to other types of contracts are actually significant only at very low levels of wages (10th and 25th percentiles) and capture a wage loss of around 30 percentage points.

In general, we detect a monotonic relationship between the size of the firm and the level of wage: wages increase as firms become bigger. Moreover, the impact of the size of the firm is not statistically different along the distribution.

Table 2a. Quantile regressions – Working women 16-65 years old[13]

Dep. variable: log income from work	Q10	Q25	Q50	Q75	Q90
Log months worked	1.004***	1.023***	.943***	.896***	.793***
	(7.76)	(10.89)	(12.80)	(11.05)	(5.06)
Log hours worked	.401***	.253***	.240***	.281***	.335***
	(5.15)	(3.24)	(4.68)	(4.33)	(4.98)
Married/cohabitating	.029	.-014	-.011	-.004	.000
	(0.99)	(-0.58)	(-0.66)	(-0.20)	(0.02)
Upper-secondary education	.059*	.084***	.086***	.060**	.018
	(1.69)	(2.94)	(3.58)	(1.90)	(0.57)
University education	.118**	.157***	.205***	.192***	.253***
	(2.42)	(3.79)	(6.25)	(4.37)	(4.76)
Experience	.031***	.011*	.007**	.004	.000
	(4.49)	(1.80)	(1.94)	(1.10)	(0.03)
Squared experience	-.001***	-.000	-.000	-.000	..000
	(-4.00)	(-1.33)	(-0.99)	(-0.58)	(0.04)
Experience*Children	-.005**	-.001	-.001	-.001	.001
	(-3.44)	(-1.19)	(-0.96)	(-0.82)	(.48)
Average supervisory level	.105***	.098***	.073***	.085***	.059
	(4.07)	(3.97)	(3.49)	(2.88)	(1.46)
High supervisory level	.120***	.085*	.154***	.197***	.257***
	(2.73)	(1.78)	(3.38)	(2.72)	(4.49)
Tenure 6-10 years	.069*	.046	.039	.040	.067*
	(1.71)	(1.44)	(1.47)	(1.30)	(1.73)
Tenure 11-15 years	.043	.076**	.077***	.039	.056
	(0.79)	(2.26)	(3.18)	(1.21)	(1.35)
Tenure more than 15 years	.076*	.098***	.068***	.102***	.180***
	(1.60)	(3.03)	(2.65)	(2.56)	(3.71)
Public sector	.159***	.084***	.057**	-.021	-.094**
	(3.83)	(3.31)	(2.38)	(-0.66)	(-2.43)
Agriculture	-.271	-.236	-.107	-.028	-.146
	(-0.49)	(-0.68)	(-0.33)	(-0.17)	(-1.28)
Services	-.075	-.045	.005	.022	.041
	(-1.39)	(-1.07)	(-0.20)	(0.65)	(0.86)
Part-time	-.282***	-.315***	-.298***	-.183***	-.110
	(-3.11)	(-5.25)	(-5.90)	(-2.85)	(-1.52)
Fixed-term or short-term contract	-.218**	-.089	-.075**	-.089**	-.089*
	(-2.38)	(-1.16)	(-2.38)	(-2.36)	(-1.60)
Other type of contract*	-.314**	-.270**	-.141	-.077	-.082
	(-2.07)	(-2.04)	(-1.43)	(-0.86)	(-1.21)
Firm size: 5-19 employees	.137***	.101***	.086***	.062*	.106***
	(2.57)	(3.03)	(3.61)	(1.88)	(2.99)
Firm size: 20-49 employees	.189***	.100***	.108***	.113***	.139***
	(4.01)	(3.24)	(4.69)	(3.19)	(3.32)
Firm size 50-99 employees	.158***	.129***	.134***	.107***	.116***
	(2.81)	(3.07)	(5.09)	(2.96)	(2.95)
Firm size 100-499 employees	.137**	.104***	.114***	.128***	.161***
	(2.38)	(2.70)	(4.32)	(3.76)	(4.35)
Firm size: more than 500 employees	.191***	.169***	.163**	.135***	.211***
	(2.69)	(3.63)	(4.84)	(2.82)	(3.94)
North-west	.050	.075**	.036	.063**	.082**
	(1.20)	(2.32)	(1.49)	(2.14)	(1.91)
North-east	.093**	.054**	.006	.012	.086*
	(2.78)	(2.27)	(0.33)	(0.42)	(1.88)
South and Islands	-.086**	-.058*	-.047**	.014	.036
	(-2.36)	(-1.54)	(-2.09)	(0.54)	(1.28)
Constant	5.142***	5.986***	6.389***	6.515***	6.709***
	(12.42)	(15.44)	(22.17))	(20.08)	(13.42)
R^2	.53	.46	.38	.32	.33

Observations: 1188. t-values in brackets. *** Significant 1%. ** Significant at 5%. * significant at 10%

[13] Quantile regressions include also 11 occupational dummies, as described in previous Sections.

Table 2b. Quantile regressions – Working men 16-65 years old

Dep. variable: log income from work	Q10	Q25	Q50	Q75	Q90
Log months worked	1.134***	1.107***	1.045***	1.042***	1.018***
	(11.02)	(17.28)	(21.84)	(17.84)	(6.31)
Log hours worked	.231**	.231***	.421***	.436***	.470***
	(2.45)	(3.04)	(4.81)	(5.76)	(5.48)
Married/cohabitating	.092**	.080***	.060***	.071***	.108***
	(2.27)	(3.05)	(3.01)	(3.48)	(3.27)
Upper-secondary education	.040	.034*	.025*	.066***	.077***
	(1.32)	(1.83)	(1.58)	(3.98)	(3.27)
University education	.236***	.222***	.255***	.366***	.348***
	(5.55)	(5.04)	(5.77)	(6.71)	(5.98)
Experience	.012**	.009**	.008***	.010***	.006
	(2.39)	(2.31)	(2.80)	(3.44)	(1.05)
Squared experience	-.000	-.000*	-.000**	-.000**	-.000
	(-1.38)	(-1.65)	(-2.21)	(-2.13)	(-0.32)
Experience*Children	.002*	.002***	.001*	.002*	.002
	(1.68)	(3.00)	(1.80)	(1.62)	(1.43)
Average supervisory level	.109***	.084***	.098***	.086***	.054
	(4.64)	(4.45)	(5.27)	(3.71)	(1.52)
High supervisory level	.107***	.142***	.188***	.244***	.221***
	(2.72)	(4.31)	(5.90)	(7.93)	(4.21)
Tenure 6-10 years	.107**	.064***	.065***	.035	.024
	(2.48)	(2.68)	(2.80)	(1.41)	(0.64)
Tenure 11-15 years	.065	.056**	.077***	.033	.021
	(1.30)	(1.87)	(2.71)	(1.16)	(0.44)
Tenure more than 15 years	.112***	.083***	.109***	.059**	.081*
	(2.71)	(3.41)	(4.77)	(2.26)	(1.80)
Public sector	-.013	.010	.001	.009	-.003
	(-0.37)	(0.34)	(0.04)	(0.44)	(-0.11)
Agriculture	-.519	-.092	-.047	-.087**	-.116
	(-0.44)	(-1.52)	(-1.16)	(-1.86)	(-1.10)
Services	-.015	-.044	.019	.021	.028
	(-0.47)	(-1.50)	(0.93)	(1.09)	(0.85)
Part-time	-.442***	-.290**	-.124	.159	.057
	(-2.52)	(-2.04)	(-0.66)	(0.75)	(0.20)
Fixed-term or short-term contract	-.245***	-.138**	-.051	.008	.205**
	(-2.81)	(-1.93)	(-1.33)	(0.18)	(2.00)
Other type of contract	-.327	-.169**	-.140***	-.109**	.053
	(-1.52)	(-2.17)	(-2.73)	(-2.12)	(0.39)
Firm size: 5-19 employees	.095**	.070***	.055***	.041*	.007
	(2.19)	(3.03)	(2.48)	(1.73)	(0.20)
Firm size: 20-49 employees	.115***	.086***	.054**	.055**	.009
	(2.68)	(3.23)	(2.28)	(2.01)	(0.22)
Firm size 50-99 employees	.194***	.141***	.088***	.057	.024
	(4.44)	(4.62)	(3.25)	(1.58)	(0.36)
Firm size 100-499 employees	.140***	.118***	.121***	.107***	.065
	(3.31)	(3.71)	(3.93)	(3.44)	(1.37)
Firm size: more than 500 employees	.138***	.147***	.140***	.085***	.032
	(2.80)	(4.81)	(5.14)	(3.17)	(0.79)
North-west	.057*	.011	-.005	.014	.004
	(1.70)	(0.43)	(-0.21)	(0.38)	(0.10)
North-east	.082***	.032	.046	.029	.026
	(2.59)	(1.37)	(1.74)*	(1.09)	(0.65)
South and Islands	-.031	-.060***	-.031	-.042**	-.038
	(-0.99)	(-2.78)	(-1.67)	(-2.15)	(-1.32)
Constant	5.746***	6.075***	5.650***	5.730***	5.865***
	(12.12)	(19.26)	(15.88)	(17.53)	(11.59)
R^2	.43	.37	.34	.36	.39

Observations: 1764. t-values in brackets. Significant 1%. ** Significant at 5%. * significant at 10%.

Having some level of responsibility positively and significantly affects the level of wage, at any point of the distribution; however, the effect is much higher for a relevant supervisory role. Moreover, on moving from lower to higher wages, the reward to "high supervisory" roles strongly increases and becomes much higher than the reward to "average supervisory" positions (by almost four times), which on the contrary tends to decrease.

It is interesting to observe that the tests on the hypothesis of equality of human capital coefficients between quantile regressions, as presented in Tables A.2 (last line), highlight the presence of differences in the impact of the characteristics of human capital along the female wage distribution, confirming the existence of inter-quantile statistically significant differences.

A comparison between female and male estimation results (male estimates are reported in Table 2b) is interesting.

In contrast with the results obtained for the female sample, being married or cohabiting with the partner significantly and positively affects the male wage level. The coefficient of the dummy decreases as wages increase from the lowest values up till the median; thereafter the coefficient tends to slowly increase. Being married increases male earning capacity by 9-10 percentage points at the edges of the wage distribution and by around 6 percentage points at the median value; the effect is in between (around 7-8%) at the 25^{th} and 75^{th} quantile of the distribution. However, the difference between coefficients is never statistically significant and we can not affirm that marital status has a different impact on wages depending on the wage level.

Relevant differences emerge when comparing the effect of human capital characteristics on wages. Alike female workers, in general, male workers with better human capital characteristics receive higher wages than their colleagues, at any point of the distribution. However, the pattern of wage gains is rather different along male and female wage distributions.

Relative to education, the range of the wage gain estimated for an upper-secondary education diploma (compared to a lower certificate) is fairly similar between the two genders. Females with an upper-secondary education can gain between 1.8 and 8.6 percentage points more than lower educated female colleagues; the gain is between 2.3% and 7.7% for male workers. However, the estimated coefficient follows a different pattern along the respective wage distributions: for females the return to upper-secondary education increases as the wage rises up till the median value and decreases thereafter, reaching its minimum in correspondence with the last decile of the female wage distribution (1.8%). In the case of

men, the highest wage gain from having an upper-secondary education is detected in correspondence with the highest wage levels: the return to upper-secondary education is lower than the female return along the left-hand side of the distribution and decreases from 3.9 percentage points in the first decile to 2.5 percentage points in correspondence with the median value; thereafter, it sharply increases to more than 7 percentage points, reaching the maximum at the last decile, in correspondence with the female minimum.

With regard to the highest educational level, the university degree, the wage gain for male workers is notably higher than the corresponding female return; male workers with a tertiary education receive a wage increase equal to 23% at the lowest decile and 35% in correspondence with the highest wage levels, compared to their male colleagues with less than an upper-secondary education. The gender gap in the returns to a tertiary educational level amounts to around 10 percentage points, independently of the wage level. Differences along the male distribution are statistically significant as confirmed by the tests reported in Table A3.

Unlike the estimates on the female subsample, experience accumulated in the labour market has a positive effect on wages across the whole male distribution with the sole exception of the last decile. The returns to general experience oscillate between 0.8 and 1 percentage points along the first 75^{th} deciles of the male distribution, a few decimals of percentage points less than the returns to experience recognised to female workers. Moreover, having a child increases the positive effect of experience on the level of wage.

Specific experience accumulated inside the firm (tenure) has, in general, a positive and significant impact on male wages if lower or equal to the median value, independently of the time of permanence in the firm; for higher wages we find some significant effect only in correspondence with the longest period of permanence (over 15 years). Moreover, similarly to females, we find a higher effect on the wage level as the period spent in the firm increases and we do not observe a clear monotonic trend on moving from the left-hand to the right-hand side of the wage distribution. Indeed, we observe no clear regular differences between females and males but we can observe higher rewards for males than for females in correspondence with left-hand sides of the distributions; conversely, on the right-hand sides we find some evidence of higher female returns to tenure.

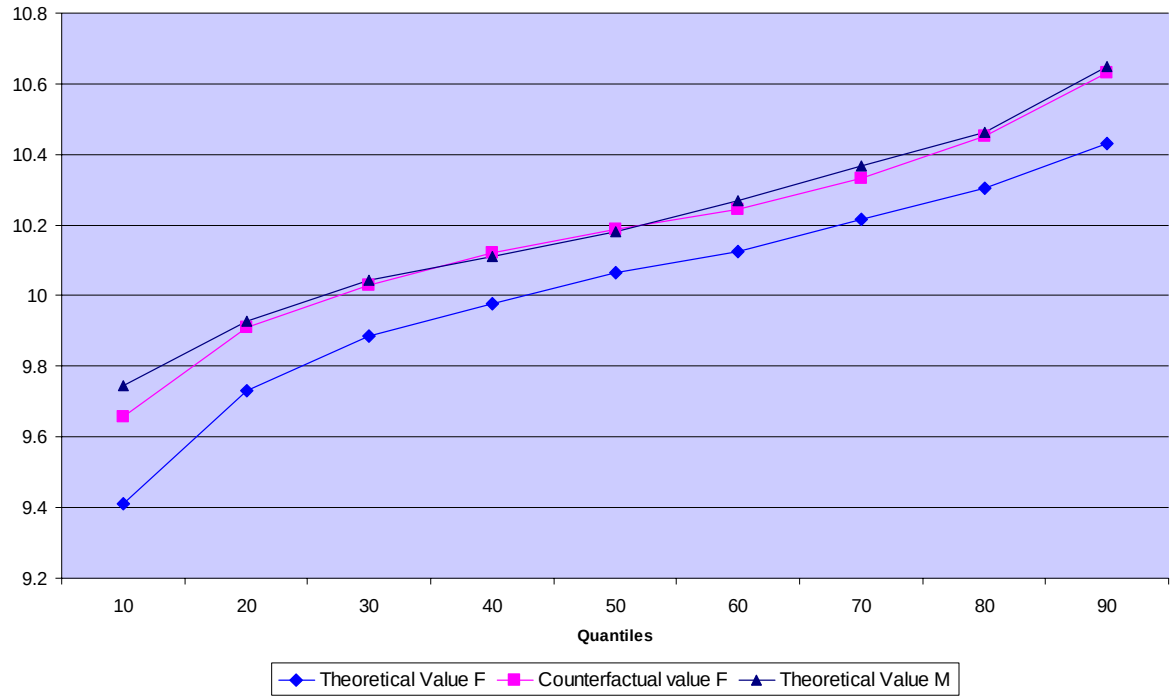
Examining the impact of the types of contracts, we find some significant impact of part-time contracts on the level of wages. Working part-time significantly and negatively affects male wages only on the left-hand side of the distribution, for wages lower or equal to the 25^{th} value; moreover, the extent of the effect is slightly higher than in the female case. This may

be connected to a higher incidence amongst low paid male workers than amongst female part-time workers of involuntary demand-driven part-time employment.

An interesting, and in our opinion important, difference between the two sexes emerges with respect to fixed- and short-term contracts. Males working temporary suffer a penalty approximately as high as females experience; however, at the highest decile of the male distribution the penalty turns out in a premium. In addition to that, unlike the results on the female sample, we detect no effect of working in the public sector.

Male workers with a supervisory role in the firm ("supervisory" level) are recognised a gain much higher than the premium recognised to females with similar responsibility functions; having a supervisory role in the firm guarantees male workers a 12% higher wage at the lowest decile of the distribution and a 47% higher earning at the 90th centile of the wage range. Having an intermediate supervisory role in the firm positively affects male worker wages as much as their female colleagues.

Figure 2. Log of wages. Theoretical versus counterfactual distribution. Women aged 16-65.



The results of the tests on inter-quantile equality of male coefficients suggest the existence of some considerable disparities between the 10th and the median values, the 10th and the 90th decile, and the 25th and 75th quantiles compared to the median. However, we can say that, in general, interquantile differences are less relevant than in the female sample.

Given the results of the estimates, we construct the marginal distributions of the predicted values and of the counterfactual values, following the procedure explained in the previous section. We then proceed to evaluate the wage gap due to differences in the rewards to the characteristics, as the difference between the counterfactual and the predicted marginal distributions. In Figure 2 we plot the two distributions, evaluated at different points.

In Figure 2 we plot the marginal distribution of the logarithm of predicted male wages. The marginal distribution of the logarithm of predicted female wages — female characteristics evaluated at female estimated rewards — and the marginal distribution of the logarithm of counterfactual female wages — female characteristics evaluated at male estimated rewards — observed at different deciles of the distributions. In correspondence with any decile, we measure the wage gap due to differences in the rewards to female characteristics as the distance between the logarithm of predicted and counterfactual female wages; on the other hand, the gap due to differences in the characteristics is represented by the distance between the logarithm of predicted male wages and the logarithm of counterfactual female wages.

The graph shows that the values of the deciles of the logarithm of the predicted female distribution are lower than the values of the logarithm of the counterfactual distribution at any observed decile. This highlights the persistence of wage differentials at any wage level. In addition to that, the wage differential is higher in correspondence with either very low or very high wage levels, e.g. in correspondence with the extremes of the distributions. At the first decile the unexplained wage gap amounts to 23 percentage points of the female wage level. It steadily decreases as the wage level increases up till the sixth decile of the distribution, but from that point onwards it starts increasing, to reach 18 percentage points at the upper decile of the distributions.

However, as we will show in the following Section, some interesting differences emerge when the analysis is carried out separately for workers with different educational levels.

6. The wage gap by educational level

In this section we discuss the results of the analysis carried out on two different subgroups of the whole sample, characterised by different educational levels; we split the sample between workers with an educational level equal to or higher than a “Second stage of secondary education (ISCED 3)” and workers with a lower educational level. The first subsample corresponds to individuals with at least an upper-secondary school diploma —

what in Italy is called '*Scuola secondaria superiore*', while the second subsample includes individuals with a lower-secondary school diploma ('*Scuola media inferiore*'), primary school ('*Scuola elementare*') or no education.

This analysis is motivated by the results of previous research carried out on other countries, showing that the level of the unexplained wage gap differs throughout the distribution between groups of workers with different educational levels. In addition to that, the different behaviour of the raw gap between groups of workers differently educated, as shown in Section 5, makes it all the more necessary to verify whether the decomposition of the gap would highlight different patterns for the two subgroups of workers. For these predictions are indeed confirmed by what we discuss below: in particular, we find that there is some differentiation conditional on the educational level. In general, we detect a higher and more significant effect on wages of human capital characteristics in the highly-educated female sample than in the other cases.

The applied methodology is the same as discussed above (Section 3), based on quantile regression analysis and on the subsequent adaptation of the Machado and Mata (2005) methodology, by which we derive the marginal distributions of female predicted and counterfactual wages. The results will be discussed either by comparing, by gender, the two differently educated subsamples, or by discussing the differences emerging between the two sexes, conditional on the same educational level. We also tested the hypotheses of inter-quantile coefficient equality for any econometric model results[14]. We observe that interquantile coefficient differences tested in the sample of highly-educated women are much like those detected in the whole female sample. On the contrary, in the case of males (both highly- and low-educated) and low-educated females, interquantile diversities are slightly less significant than in the corresponding whole male sample and in the whole female case.

Comparing the estimated results for the sample of highly-educated female workers (Table 3a) with the sample of low-educated female workers (Table 4a), we find interesting differences, concerning in particular the estimated rewards to different human capital components.

We find some differences in the effect of experience accumulated in the labour market. General experience does have a significant effect on wages of low-educated females but only at very high levels, in correspondence with the highest decile of the distribution; on the contrary, in the highly-educated female subsample, the reward to general experience is

[14] The values of the tests are not reported here (for reasons of space) but are available on request to the authors.

significant only in correspondence with the first half of the distribution and its value decreases as the wage increases. In addition, the estimated coefficient of the interaction between "experience" and "number of children", capturing the measure of penalty in terms of reward to experience that female workers suffer when having children, is not significant for less-educated women. It becomes significant and negative in the sample of highly-educated, in correspondence with the lower tail of the distribution and at the median wage.

The reward to tenure is generally insignificant in the sample of less-educated females with the exception of the lowest decile of the distribution; indeed the return is significant in the sample of highly-educated women but at the right-hand part of the distribution and its value is increasing as moving from the lowest decile to the median wage.

As we discussed in previous Section, estimates for the whole female sample show a significant and positive reward, across the whole wage distribution, recognised to workers having either an "average supervisory role" or a "high supervisory role" in the firm. In the first case the return is equal to a 10% wage increase; in the latter case the wage gain increases from 10% at the lower quantile up till 38% at the last decile of the distribution. Controlling for the educational level enables different patterns to be identified. In particular, having some supervisory role positively affects the level of wages in both cases, but not along the whole wage distribution; indeed, low-educated women have some advantage from carrying out some supervisory functions only if their wages are not too high, precisely lower than or equal to the median value. Highly-educated females, on the contrary, gain some advantage independently of the wage level. However, the reward is higher in the sample of low-educated women, amounting to twice the return estimated in the upper-educated female sample.

On the other hand, having a relevant supervisory role does not, in general, guarantee any economic advantage to low-educated females, with the exception of those earning very high wages (at the highest decile of the distribution); in a different way, highly-educated women with high supervisory roles can earn higher wages along the whole distribution and the gain increases as the wage rises.

Table 3a. Quantile regressions – Highly educated women 16-65 years old

Dep. variable: log income from work	Q10	Q25	Q50	Q75	Q90
Log months worked	1.191***	1.114***	1.128***	.992 ***	.766***
	(6.09)	(7.18)	(10.82)	(10.41)	(4.60)
Log hours worked	.339***	.144*	.167***	.216***	.311***
	(2.82)	(1.68)	(3.56)	(3.32)	(3.28)
Married/cohabitating	-.002	.-.011	-.004	.010	.007
	(-0.06)	(-0.43)	(-0.19)	(0.35)	(0.24)
University education	.033	.075**	.114***	.143***	.223***
	(0.77)	(2.39)	(4.49)	(4.33)	(4.36)
Experience	.026***	.013**	.007*	.000	.001
	(2.84)	(2.51)	(1.76)	(0.00)	(0.21)
Squared experience	-.000***	-.000	-.000.	.000	-.000
	(-2.31)	(-1.39)	(-0.37)	(0.65)	(-0.45)
Experience*Children	-.003*	-.002	-.002*	-.000	-.000
	(-1.69)	(-1.62)	(-1.72)	(-0.05)	(-0.03)
Average supervisory level	.094**	.077**	.092***	.063*	.046*
	(2.23)	(2.51)	(3.91)	(1.83)	(1.06)
High supervisory level	.110**	.038	.148***	.195***	.280***
	(2.17)	(0.73)	(2.78)	(2.54)	(3.96)
Tenure 6-10 years	.099	.073*	.075***	.048*	.032
	(1.50)	(1.89)	(3.08)	(1.67)	(0.75)
Tenure 11-15 years	.047	.088**	.102***	.067**	.084
	(0.56)	(2.02)	(3.32)	(2.16)	(1.42)
Tenure more than 15 years	.075	.088**	.059**	.112***	.208***
	(0.91)	(2.28)	(2.10)	(2.51)	(3.40)
Public sector	.163***	.097***	.056**	-.018	-.035
	(3..01)	(3.36)	(2.15)	(-0.51)	(-0.84)
Agriculture	-.611	-.1.101**	.067	.061.	-.087
	(-1.38)	(-2.00)	(0.12)	(0.12)	(-0.17)
Services	-.066	-.076**	-.025	.009	.004
	(-0.87)	(-2.04)	(-0.79)	(0.19)	(0.08)
Part-time	-.246**	-.347***	-.308***	-.199***	-.065
	(-2.10)	(-4.44)	(-6.86)	(-2.82)	(-0.61)
Fixed-term or short-term contract	-.241**	.001	-.058	-.097**	-.109*
	(-1.95)	(0.01)	(-1.62)	(-2.37)	(-1.84)
Other type of contract*	-.279	-.207	-.100	-.080	-.051
	(-1.14)	(-1.03)	(-0.93)	(-0.67)	(-0.44)
Firm size: 5-19 employees	.056	.029	.046*	.051	.123**
	(0.78)	(0.83)	(1.88)	(1.51)	(2.48)
Firm size: 20-49 employees	..101	.033	.064**	.094**	.138***
	(1.51)	(0.97)	(2.31)	(2.10)	(2.68)
Firm size 50-99 employees	.121	.051	.079***	.070*	.102**
	(1.53)	(1.26)	(2.77)	(1.69)	(1.98)
Firm size 100-499 employees	.053	.028	.064**	.083*	.130**
	(0.73)	(0.75)	(2.49)	(1.87)	(2.23)
Firm size: more than 500 employees	.132	.058	.122***	.115***	.215***
	(1.49)	(1.20)	(3.77)	(2.51)	(3.29)
North-west	.068	.047	.058**	.080*	.124***
	(1.17)	(1.16)	(1.92)	(1.93)	(2.65)
North-east	.131***	.082***	.030	.012	.038
	(3.22)	(3.23)	(1.42)	(0.38)	(0.77)
South and Islands	-.077*	-.041	-.035*	.005	.008
	(-1.84)	(-1.25)	(-1.69)	(0.18)	(0.23)
Constant	5.216***	6.250***	6.264***	6.544***	6.828***
	(8.02)	(11.75)	(19.41)	(18.58)	(14.18)
R^2	.50	.42	.34	.28	.30

Observations: 870. t-values in brackets. *** Significant 1%. ** Significant at 5%. * significant at 10%

Table 3b. Quantile regressions – Highly educated men 16-65 years old

Dep. variable: log income from work	Q10	Q25	Q50	Q75	Q90
Log months worked	1.363***	1.107***	1.099***	1.123***	1.061***
	(4.86)	(11.88)	(18.91)	(13.66)	(7.32)
Log hours worked	.190*	.208*	.520***	.663***	.464***
	(1.75)	(1.71)	(3.98)	(6.69)	(3.21)
Married/cohabitating	.126***	.074**	.061**	.099***	.111**
	(2.85)	(2.04)	(1.95)	(2.83)	(2.03)
University education	.184***	.189***	.216***	.269***	.241***
	(4.46)	(4.73)	(5.15)	(5.11)	(3.57)
Experience	.008	.008*	.009*	.011**	.002
	(1.19)	(1.30)	(1.72)	(1.90)	(0.22)
Squared experience	-.000	-.000	-.000	-.000	.000
	(-0.20)	(-0.61)	(-0.85)	(-0.82)	(0.49)
Experience*Children	.002	.003***	-.001	.001	.001
	(1.57)	(2.79)	(0.75)	(0.51)	(0.59)
Average supervisory level	.095***	.086***	.092***	.100***	.082*
	(3.56)	(3.74)	(3.37)	(2.94)	(1.88)
High supervisory level	.126***	.152***	.234***	.247***	.289***
	(2.78)	(4.05)	(5.83)	(6.26)	(4.31)
Tenure 6-10 years	.043	.024*	.047	.084**	.084
	(0.87)	(0.61)	(1.41)	(2.22)	(1.42)
Tenure 11-15 years	.000	.019	.039	.047	.059
	(0.00)	(0.40)	(1.00)	(1.05)	(0.84)
Tenure more than 15 years	.061	.071	.087**	.069	.159**
	(1.13)	(1.59)	(2.08)	(1.46)	(2.14)
Public sector	-.023	-.006	.009	.001	-.017
	(-0.52)	(-0.18)	(0.31)	(0.03)	(-0.39)
Agriculture	-.174	-.100	-.165**	-.087	-.022
	(-1.43)	(-0.93)	(-1.98)	(-0.92)	(-0.13)
Services	-.031	-.035	.032	.046	.010*
	(-0.62)	(-0.99)	(1.16)	(1.59)	(0.21)
Part-time	-.360	-.224	.274	.270	.301
	(-1.51)	(-0.92)	(0.96)	(0.99)	(1.08)
Fixed-term or short-term contract	-.290**	-.106	-.056	-.038	-.027
	(-2.13)	(-1.16)	(-1.20)	(-0.58)	(0.21)
Other type of contract*	-.668	-.118	-.028	.055	.151
	(-1.54)	(-0.61)	(-0.27)	(0.36)	(0.57)
Firm size: 5-19 employees	.132	.088**	.033	.006	.043
	(1.44)	(1.94)	(0.99)	(0.13)	(0.69)
Firm size: 20-49 employees	.188*	.111**	.047	.027	-.035
	(1.88)	(2.22)	(1.19)	(0.65)	(-0.64)
Firm size 50-99 employees	.215**	.187***	.071*	.037	-.017
	(2.16)	(3.57)	(1.85)	(0.73)	(0.25)
Firm size 100-499 employees	.205**	.133***	.097***	.064	.003
	(2.19)	(2.84)	(2.65)	(1.42)	(0.05)
Firm size: more than 500 employees	.184**	.164***	.136***	.059	-.025
	(1.93)	(3.09)	(3.50)	(1.22)	(0.43)
North-west	.014	-.004	007	-.046	-.001
	(0.27)	(-0.10)	(0.21)	(-1.07)	(-0.02)
North-east	.053**	.047	.037	.000	.013
	(1.30)	(1.54)	(1.18)	(-0.01)	(0.21)
South and Islands	-.043	-.068**	-.052**	-.074**	-.103**
	(-1.08)	(-2.38)	(-2.03)	(-2.49)	(-2.46)
Constant	5.428***	6.223***	5.171***	4.672 ***	5.815***
	(7.21)	(12.44)	(10.53)	(11.58)	(8.69)
R^2	.41	.34	.34	.39	.44

Observations: 1035. t-values in brackets. *** Significant 1%. ** Significant at 5%. * significant at 10%

Concerning the contract typology, highly educated females working part-time, with fixed- or short-term contracts or with other types of contract, are in general much more penalised, relative to their colleagues with stable jobs, than low-educated females.

Comparing the two gender estimates, conditioned on the same educational level, we find some interesting facts. Tables 3a and 3b summarise the estimates of the quantile regressions carried out only on workers with at least a second-stage secondary educational level. The estimates confirm the positive effect of education on wages, both in the female and in the male subsamples; this is true across the whole distributions. In addition, the wage increases due to a tertiary education degree increase significantly from the lowest to the highest decile, in both cases (sexes). However, the male reward to the highest educational level is much higher than the female reward across the whole distributions, except at the highest decile, where the rewards are much alike.

Unlike the results obtained in the male whole sample, general experience almost completely loses any significant effect in the sample of highly-educated men with the exception of the central wage values (at the median and in correspondence with the 75^{th} value). In the case of female workers, on the contrary, the results for the highly-educated subsample do not substantially differ from the results of the whole sample estimates; general experience has some significant impact only along the left-hand side of the distribution.

Regarding the wage effect of specific experience, the patterns differ by gender. The variable tenure generally has no effect on the wages of highly-educated men whereas it assumes significant and high values in the sample of female workers, across the whole distribution of highly educated. Both men and women (highly-educated), moreover, having a supervisory role in the firm are guaranteed a wage premium, which is similar between the two sexes.

Table 4a. Quantile regressions – Low educated women 16-65 years old

Dep. variable: log income from work	Q10	Q25	Q50	Q75	Q90
Log months worked	.823***	.905***	.948***	.872***	.780***
	(6.38)	(8.20)	(9.82)	(5.96)	(4.08)
Log hours worked	.502***	.585***	.550***	.606***	.384*
	(2.68)	(4.39)	(4.49)	(3.30)	(1.82)
Married/cohabitating	.128*	-.011	-.019	-.044	-.053
	(1.89)	(-0.22)	(-0.55)	(-0.97)	(-0.94)
Experience	.014	.013	.010	.012	.022**
	(1.04)	(1.32)	(1.50)	(1.27)	(2.07)
Squared experience	-.000	-.000	-.000	-.000	-.000*
	(-1.25)	(-1.13)	(-1.24)	(-1.02)	(-1.91)
Experience*Children	-.007	-.002	-.001	-.000	-.004
	(-1.41)	(-0.71)	(-0.64)	(-0.09)	(-1.27)
Average supervisory level	.200**	.130**	.102**	.053	.116
	(2.26)	(2.37)	(2.06)	(0.68)	(1.02)
High supervisory level	.227	.173	.164	.189	.397***
	(1.54)	(1.41)	(1.20)	(1.11)	(2.56)
Tenure 6-10 years	.000	-.070	-.063	.017	-.010
	(0.00)	(-1.11)	(-1.02)	(0.24)	(-0.12)
Tenure 11-15 years	.191*	.012	-.036	-.007	-.074
	(1.74)	(0.16)	(-0.62)	(-0.11)	(-0.88)
Tenure more than 15 years	.146	.010	-.007	.036	.060
	(1.32)	(0.15)	(-0.13)	(0.54)	(0.74)
Public sector	.031	.064	.049	.-.018	-.061
	(0.34)	(1.05)	(1.05)	(-0.29)	(-0.77)
Agriculture	-.285	-.142	-.174	-.014	-.262
	(-0.52)	(-0.36)	(-0.47)	(-0.06)	(-1.13)
Services	-.08	.062	.051*	.059	.088*
	(-0.77)	(0.82)	(0.87)	(0.84)	(1.10)
Part-time	-.297*	-.282**	-.126	.-.069	-.133
	(-1.63)	(-2.20)	(-1.24)	(-0.59)	(-0.85)
Fixed-term or short-term contract	-.048	-.064	-.072*	-.086	-.090
	(-0.31)	(-0.58)	(-0.93)	(-0.83)	(-0.76)
Other type of contract*	-.267	-.258*	-.328**	-.106	-.141
	(-1.49)	(-1.82)	(-2.18)	(-0.74)	(-1.11)
Firm size: 5-19 employees	.207*	.179**	.164***	.089	.099
	(1.66)	(1.99)	(2.65)	(1.31)	(1.13)
Firm size: 20-49 employees	.312**	.152*	.186***	.099	..036
	(2.45)	(1.70)	(2.80)	(1.37)	(0.38)
Firm size 50-99 employees	.262*	.295***	.296***	.161**	.145
	(1.66)	(2.70)	(4.01)	(2.05)	(1.57)
Firm size 100-499 employees	.261**	.191*	.263***	.183*	.250**
	(1.93)	(1.64)	(2.89)	(1.83)	(2.39)
Firm size: more than 500 employees	.381***	.293***	.284***	.198**	.182*
	(2.61)	(2.77)	(4.05)	(2.27)	(1.63)
North-west	.035	.010	.-.018	.007	-.024
	(0.48)	(0.20)	(-0.33)	(0.10)	(-0.30)
North-east	.040	-.020	-.029	.028	.125
	(0.73)	(-0.40)	(-0.63)	(0.40)	(1.55)
South and Islands	-.129	-.170*	-.049	.040	.052
	(-1.07)	(-1.67)	(-0.53)	(0.54)	(0.72)
Constant	5.360***	5.035***	5.246***	5.360***	6.448***
	(6.05)	(7.81)	(9.13)	(5.77)	(6.23)
R^2	.62	.55	.44	.37	.39

Observations: 318. t-values in brackets. *** Significant 1%. ** Significant at 5%. * significant at 10%

Table 4b. Quantile regressions – Low-educated men 16-65 years old

Dep. variable: log income from work	Q10	Q25	Q50	Q75	Q90
Log months worked	1.095***	1.164***	1.034***	1.055***	.830***
	(8.00)	(11.77)	(12.36)	(10.08)	(2.85)
Log hours worked	.232*	.211*	.191*	.318***	.483***
	(1.74)	(1.84)	(1.71)	(3.36)	(3.89)
Married/cohabitating	.074	.101**	.043	.052**	.027
	(0.92)	(2.46)	(1.43)	(2.07)	(0.51)
Experience	.018**	.011**	.008**	.006	.013*
	(2.01)	(2.10)	(2.03)	(1.52)	(1.67)
Squared experience	-.000	-.000*	-.000*	-.000	-.000
	(-1.51)	(-1.81)	(-1.61)	(-1.05)	(-1.32)
Experience*Children	-.000	.000	.001	.003**	.003
	(-0.00)	(0.35)	(1.00)	(2.07)	(1.59)
Average supervisory level	.200***	.104***	.118***	.070**	.008
	(3.28)	(2.82)	(3.34)	(2.37)	(0.15)
High supervisory level	.019	.062	.108*	.114**	.078
	(0.07)	(0.92)	(1.70)	(2.29)	(1.32)
Tenure 6-10 years	.190**	.097***	.069***	-.007	-.059
	(2.46)	(3.19)	(2.51)	(-0.23)	(-1.31)
Tenure 11-15 years	.063	.090*	.107***	.020	.004
	(0.65)	(1.85)	(3.18)	(0.60)	(0.07)
Tenure more than 15 years	.110	.105***	.111***	.081**	.044
	(1.32)	(2.95)	(3.13)	(2.42)	(0.83)
Public sector	.055	.024	-.016	-.024	-.053
	(0.98)	(0.61)	(-0.48)	(-0.61)	(-0.95)
Agriculture	.152	-.054	-.031	-.062*	.058
	(0.87)	(-0.77)	(-0.60)	(-0.77)	(0.33)
Services	-.001	-.036	.008	.024	.023
	(-0.02)	(-0.92)	(0.24)	(0.68)	(0.44)
Part-time	-.419	-.313	-.036*	-.232	.236
	(-1.50)	(-1.41)	(-1.88)	(-0.95)	(0.78)
Fixed-term or short-term contract	-.202*	-.145	-.037	-.024	.168
	(-1.71)	(-1.29)	(-0.58)	(-0.25)	(1.19)
Other type of contract*	-.483**	-.186***	-.164***	-.173***	-.180
	(-2.16)	(-2.02)	(-3.14)	(-2.82)	(-0.82)
Firm size: 5-19 employees	.058	.100***	.073**	.037	.019
	(1.19)	(2.85)	(2.34)	(1.42)	(0.41)
Firm size: 20-49 employees	.022	.065	.051*	..048	.058
	(0.32)	(1.52)	(1.79)	(1.26)	(1.22)
Firm size 50-99 employees	.101	.140***	.110***	.088*	.146
	(1.26)	(3.42)	(3.13)	(1.74)	(1.60)
Firm size 100-499 employees	.070	.089*	.158***	.123***	.143**
	(0.97)	(1.84)	(3.84)	(3.23)	(2.51)
Firm size: more than 500 employees	.109	.162***	.161***	.145***	.118*
	(1.51)	(3.23)	(3.90)	(3.36)	(1.75)
North-west	.109*	.042	-.010	.013	-.055
	(1.89)	(1.00)	(-0.23)	(0.27)	(0.49)
North-east	.115*	.068	.087**	.048	.044
	(1.82)	(1.58)	(2.20)	(1.28)	(0.67)
South and Islands	-.012	-.028	-.011	-.002	-.028*
	(-0.20)	(-0.90)	(-0.47)	(-0.09)	(-0.81)
Constant	5.762***	5.938***	6.523***	6.200***	6.274***
	(8.84)	(11.47)	(14.95)	(15.11)	(6.67)
R^2	.47	.39	.32	.27	.21

Observations: 729. t-values in brackets. *** Significant 1%. ** Significant at 5%. * significant at 10%

As regards the sample of low-educated workers (Tables 4a and 4b), one of the main results to mention is that human capital characteristics differently affect the wage levels of the two sexes. Variable experience is significant along the whole male subsample, whereas it is insignificant along the whole distribution except at the highest decile of the low-educated female sample.

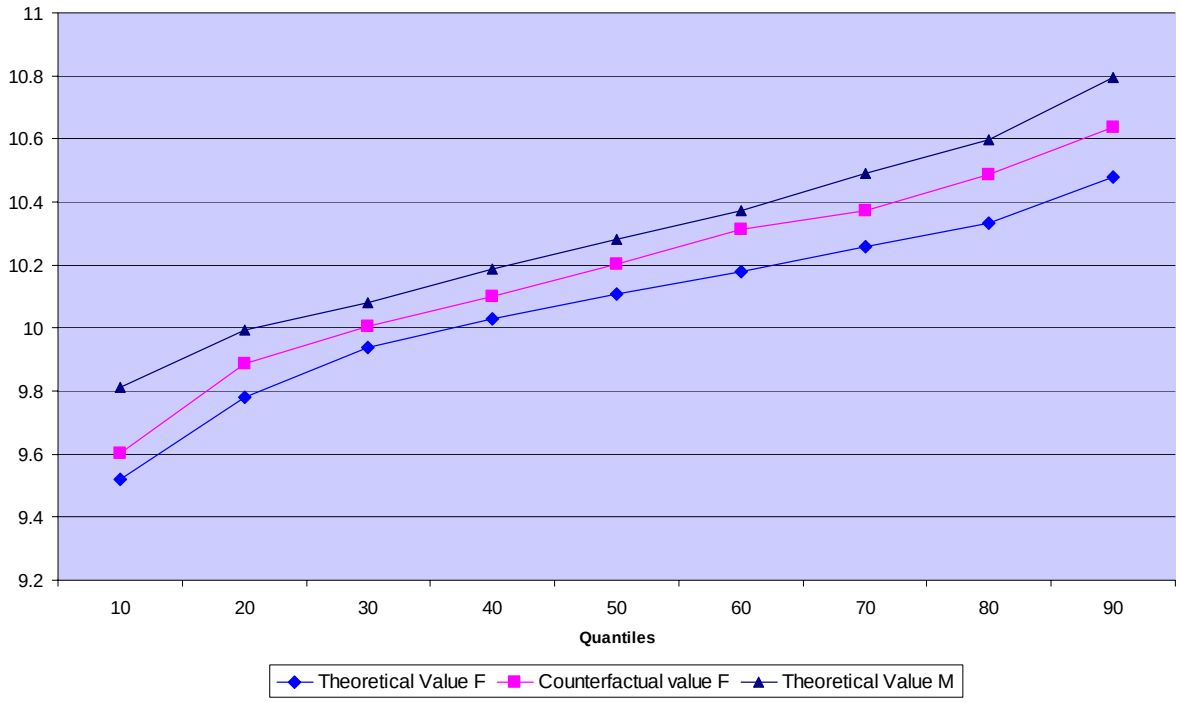
Some similar patterns are found with respect to specific experience accumulated inside the firm; also in this case we detect some significant and positive effects in the sample of men, where the characteristic tenure assumes an increasing effect on moving along the distribution and a rising impact as the period of permanence in the firm augments. In contrast, no significant effect is detected among females, in general along the whole distribution.

Low-educated females are economically advantaged by having some supervisory role in the firm; the advantage is significant at all levels of wages and is higher than in the subsample of low-educated men. However, having an important supervisory role does not significantly affect female wages, with the exception of those centred on the 25^{th} percentile of the distribution, and only slightly influences male wages around the median value and the third quarter of the distribution.

In the following Figures we compare the decile values of three marginal wage distributions obtained by applying the Machado and Mata procedure discussed in Section 3. The three marginal distributions are: 1) the male theoretical wage distribution (called 'theoretical value M'), e.g. the distribution of wages recognised to male workers on the basis of their characteristics and the male estimated coefficients; 2) the female predicted wage distribution, which corresponds to the female version of the male predicted wage distribution; 3) the female counterfactual wage distribution, equal to the distribution of wages that women would earn if their characteristics were rewarded at the male rates. In Figure 3 we plot the decile values of the three distributions of the sample of highly-educated workers; in Figure 4 we plot the corresponding values for the workers of the low-educated group.

The distance between the values of the male and the female predicted distributions corresponds to the total estimated wage gap, net of unobserved characteristics. On the other hand, the difference between the decile values of the female counterfactual and predicted distributions measures the gap component due to gender differences in the compensation of the characteristics; it represents the so-called 'unexplained wage gap', the part of wage gap which is not justified by differences in the characteristics. The wage gap attributed to gender differences in the characteristics is equal to the distance existing between the male predicted and the female counterfactual wage values.

Figure 3. Log of wages. Predicted versus counterfactual distributions. Highly-educated females



Some interesting observations emerge from Figures 3 and 4 and Table 5. First of all, the unexplained wage gap is in general much higher in the subsample of low-educated workers than among their highly-educated colleagues and the difference is quite substantial up till the third decile of the distributions, amounting to between 15 and 25 percentage points. However, starting from the fourth decile of both distributions, the gap steadily decreases in the low-educated subsample and slowly increases in the highly-educated sample; as from the seventh decile of the distributions, low-educated women are less penalised relative to their low-educated male colleagues than highly-educated females relative to highly-educated male workers; indeed, in correspondence with the last deciles of the distributions, the 'unexplained wage gap' amounts to 10 percentage points if women are low-educated and to 16 percentage points in the group of highly-educated females.

Figure 4. Log of wages. Predicted versus counterfactual distributions. Low-educated females

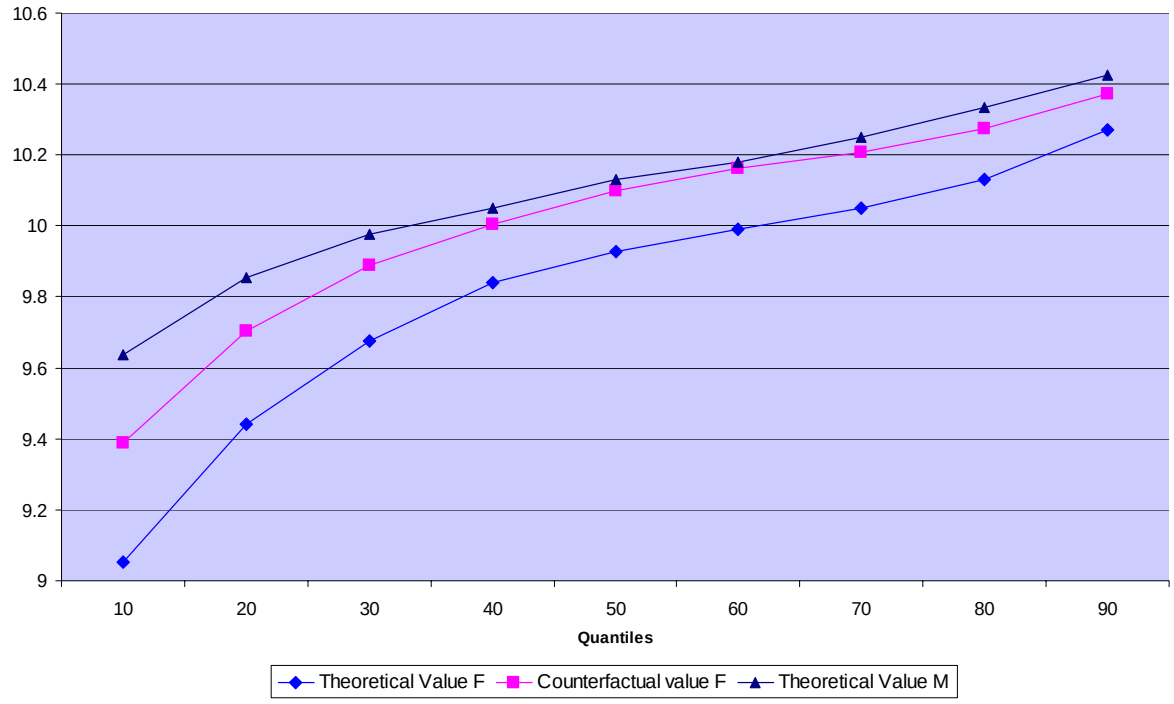


Table 5. Wage gap due to differences in the rewards of the characteristics. $z_f'\hat{\beta}_\theta^m - z_f'\hat{\beta}_\theta^f$

Deciles	Low-educated	Highly-educated
10	0.33	0.08
20	0.26	0.11
30	0.21	0.07
40	0.17	0.07
50	0.17	0.09
60	0.17	0.13
70	0.16	0.11
80	0.14	0.15
90	0.10	0.16

These results confirm that in Italy, as in other countries, female workers show a different pattern of wage discrimination according to their different educational endowments. In the Italian case, we find that females with an educational level lower than upper-secondary school diploma experience the highest levels of wage discrimination in the left-hand part of the wage distribution; however, as the wage increases, the amount of discrimination decreases. This trend of wage discrimination for low-educated females can be interpreted in terms of the existence of some sticky-floor pattern.

On the contrary, in the case of highly-educated women, we detect a rising 'unexplained wage gap' on moving from the left-hand side to the right-hand part of the wage distribution, proving the existence of some kind of glass-ceiling pattern for highly-educated female workers.

7. Conclusions

In this paper we analyse the Italian gender wage gap along the distribution of wages by applying quantile regression analysis and a simplified version of the Machado and Mata (2005) methodology to derive theoretical and counterfactual distributions of wages. We first study the gender wage gap along the whole distribution of wages and, subsequently, we condition the analysis on two different educational levels.

The analysis of the whole wage distribution shows that the unexplained wage gap is higher in correspondence with the extremes of the wage distribution, confirming the general result of the existence of some glass-ceiling and sticky-floor pattern in the wage distribution.

When analysing separate subsamples conditioned on different educational levels, some differences emerge. First of all we find that the unexplained wage gap is much higher in the subsample of low-educated workers than among their highly-educated colleagues, and the difference is fairly substantial up till the third decile of the distributions, ranging from 15 to 25 percentage points. However, on approaching the median value, the gap steadily decreases in the low-educated subsample and slowly increases in the highly-educated sample; as from the seventh decile of the distributions, low-educated women are less penalised relative to their low-educated male colleagues than highly-educated females relative to highly-educated male workers; indeed, in correspondence with the last deciles of the distributions, the 'unexplained wage gap' amounts to 10 percentage points if women are low-educated and to 16 percentage points in the group of highly-educated females.

These results confirm that in Italy, as elsewhere, there is a different pattern of wage discrimination affecting female workers in line with their educational endowment. In the Italian case, females with an educational level lower than an upper secondary-school diploma experience some sticky-floor pattern; on the contrary, highly-educated female wages are affected by some glass-ceiling pattern.

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Appendix

Table A1.Sample descriptive statistics. Employees 16-65 years old.

	Women		Men	
	Mean	St.Dev.	Mean	St.Dev.
Log yearlywage	9.9674	0.4606	10.1793	0.5047
Log months worked	2.4390	0.2052	2.4470	0.1942
Log hours worked	3.5239	0.2571	3.6717	0.1857
Upper-secondary education	0.3934	0.4886	0.4210	0,4938
University education	0.0842	0.2778	0.1004	0,3005
Experience	17.0862	11.4547	17.3864	11.5100
Experience squared	423.0921	467.0838	434.7138	465.5600
Experience*Children	5.2887	8.3112	7.0737	10.0640
Average supervisory level	0.1099	0.3128	0.1578	0.3646
High supervisory level	0.0559	0.2297	0.1115	0.3148
Tenure 6-10 years	0.1489	0.3561	0.1375	0.3445
Tenure 11-15 years	0.1127	0.3163	0.1033	0.3044
Tenure more than 15 years	0.3219	0.4674	0.3453	0.4756
Public Sector	0.4296	0.4952	0.3188	0.4661
Agriculture	0.0185	0.1349	0.0419	0.2000
Services	0.7932	0.4051	0.5584	0,4967
Part-time	0.0936	0.2914	0.0166	0,1277
Fixed-term or short-term contract	0.0176	0.1316	0.0050	0.0708
Other contract	0.0714	0.2575	0.0097	0.0980
Firm size: 5-19 employees	0.2845	0.4513	0.2664	0.4422
Firm size: 20-49 employees	0.0081	0.0897	0.0208	0.1426
Firm size 50-99 employees	0.0449	0.2072	0.1186	0.3234
Firm size 100-499 employees	0.0299	0.1705	0.1208	0.3259
Firm size: more than 500 employees	0.1635	0.3700	0.1628	0.3692
North-west	0.1113	0.3146	0.1007	0.3010
North-east	0.1340	0.3407	0.1402	0.3472
South and Islands	0.0792	0.2702	0.1221	0.3274

Source: *Descriptive statistics on ECHP 2001 sample*

Table A2. Tests on the hypothesis of coefficient equality between quantile coefficients (F-values). Female estimates§

	$b_{q10} = b_{q25}$	$b_{q10} = b_{q50}$	$b_{q10} = b_{q75}$	$b_{q10} = b_{q90}$	$b_{q25} = b_{q50}$	$b_{q25} = b_{q75}$	$b_{q25} = b_{q90}$	$b_{q50} = b_{q75}$	$b_{q50} = b_{q90}$	$b_{q75} = b_{q90}$
Log months worked	0.03	0.19	0.51	0.91	1.00	1.21	1.41	0.32	0.79	0.56
Log hours worked	3.98*	3.97*	2.23	0.58	0.03	0.11	0.76	0.57	1.88	0.62
Married/cohabitating	2.52*	1.90	0.90	0.49	0.02	0.14	0.15	0.11	0.14	0.04
Upper-secondary education	0.60	0.60	0.00	0.90	0.01	0.43	3.00*	1.13	4.65*	2.01
University education	0.85	3.70*	1.86	4.70*	1.70	0.47	2.98*	0.13	0.82	1.62
Experience	12.80*	12.69*	17.39*	14.53*	0.55	1.38	2.19	0.78	1.43	0.51
Squared experience	12.58*	13.98*	14.31*	12.38*	0.79	0.93	1.42	0.15	0.47	0.21
Experience*Children	6.00*	7.42*	4.90*	5.77*	0.21	0.11	1.27	0.00	0.91	1.28
Average supervisory level	0.06	0.99	0.24	0.87	1.12	0.15	0.79	0.25	0.16	0.61
High supervisory level	0.47	0.36	0.87	3.44*	1.75	2.07	6.21*	0.45	2.49*	0.72
Tenure 6-10 years	0.42	0.48	0.32	0.00	0.04	0.02	0.15	0.00	0.49	0.61
Tenure 11-15 years	0.47	0.37	0.00	0.03	0.00	0.76	0.13	1.95	0.24	0.20
Tenure more than 15 years	0.31	0.03	0.23	2.75*	0.97	0.01	1.96	1.00	5.00*	2.78*
Public sector	3.79*	6.00*	14.08*	22.83*	1.64	10.53*	20.29*	9.45*	19.44*	4.85*
Agriculture	0.01	0.07	0.18	0.05	0.19	0.36	0.06	0.08	0.02	0.57
Services	0.43	2.09	3.02*	2.87*	1.19	2.23	2.12	0.76	0.84	0.25
Part-time	0.18	0.03	1.19	2.56*	0.11	3.50*	6.18*	4.66*	6.95*	1.29
Fixed-term/short-term contract	2.25*	2.46*	2.06	1.51	0.04	0.00	0.00	0.17	0.06	0.00
Other type of contract	0.11	1.28	2.01	1.97	1.25	2.14	1.62	0.54	0.31	0.00
Firm size: 5-19 employees	0.57	1.05	1.72	0.28	0.31	1.03	0.70	0.56	0.26	1.81
Firm size: 20-49 employees	3.81*	2.75*	1.99	0.77	0.09	0.11	0.15	0.02	0.55	0.55
Firm size 50-99 employees	0.27	0.19	0.83	0.48	0.02	0.29	0.08	0.70	0.19	0.06
Firm size 100-499 employees	0.44	0.19	0.02	0.15	0.08	0.33	1.49	0.17	1.31	0.76
Firm size: more than 500 emp.	0.14	0.18	0.45	0.06	0.03	0.36	0.47	0.48	0.96	2.34
North-west	0.40	0.10	0.06	0.27	1.71	0.10	0.02	0.89	1.12	0.24
North-east	1.48	6.62*	3.82*	0.01	4.61*	1.68	0.46	0.05	3.35*	3.03*
South and Islands	0.50	1.04	5.31*	7.41*	0.13	3.61*	4.78*	6.59*	6.59*	0.72
Human capital variables°°	2.32*	3.17*	3.83*	6.37*	1.04	0.78	3.75*	1.09	2.79*	1.48

§ *We test the null hypothesis* $H_0 : b_{qi} = b_{qj}$ *against the alternative hypotheses* $H_1 : b_{qi} \neq b_{qj}$. *We report the value of the t-test and indicate with * when the null hypothesis is not verified at a significance level not lower than 10%.*

°° *Upper-secondary education, University education, experience, experience*child, tenure, supervisory level*

Table A3. Tests on the hypothesis of coefficient equality between quantile coefficients (F-values). Male estimates§

	$b_{q10} = b_{q25}$	$b_{q10} = b_{q50}$	$b_{q10} = b_{q75}$	$b_{q10} = b_{q90}$	$b_{q25} = b_{q50}$	$b_{q25} = b_{q75}$	$b_{q25} = b_{q90}$	$b_{q50} = b_{q75}$	$b_{q50} = b_{q90}$	$b_{q75} = b_{q90}$
Log months worked	0.09	0.80	0.69	0.38	1.06	0.77	0.30	0.00	0.03	0.03
Log hours worked	0.00	3.94*	3.86*	3.66*	6.70*	5.39*	4.57*	0.04	0.21	0.15
Married/cohabitating	0.14	0.67	0.24	0.11	0.69	0.07	0.54	0.26	1.77	1.60
Upper-secondary education	0.04	0.26	0.81	1.07	0.28	2.02	2.22	5.58*	4.31*	0.26
University education	0.10	0.11	4.49*	2.43*	0.64	6.50*	3.72*	5.93*	2.14	0.10
Experience	0.43	0.36	0.06	0.57	0.00	0.17	0.12	0.35	0.11	0.49
Squared experience	0.01	0.02	0.03	0.29	0.11	0.13	0.24	0.01	0.46	0.66
Experience*Children	0.25	0.07	0.02	0.00	1.25	0.41	0.17	0.02	0.04	0.01
Average supervisory level	1.34	0.15	0.49	1.92	0.53	0.01	0.71	0.36	1.85	1.19
High supervisory level	1.21	3.23*	7.78*	3.19*	2.05	6.26*	1.75	3.97*	0.34	0.16
Tenure 6-10 years	1.47	0.92	2.42*	2.21	0.00	0.95	0.86	1.90	1.17	0.09
Tenure 11-15 years	0.04	0.07	0.39	0.51	0.66	0.47	0.49	2.19	1.28	0.09
Tenure more than 15 years	0.58	0.01	1.30	0.34	1.17	0.61	0.00	4.07*	0.37	0.27
Public sector	0.55	0.16	0.29	0.04	0.11	0.00	0.11	0.12	0.02	0.23
Agriculture	0.16	0.00	0.08	0.18	0.60	0.00	0.04	0.71	0.45	0.12
Services	0.90	1.08	1.01	0.82	6.48*	4.63*	2.87*	0.01	0.06	0.05
Part-time	0.75	1.94	5.59*	2.22*	1.19	4.27*	1.28	2.24	0.42	0.21
Fixed-term/short-term contract	1.52	5.45*	7.57*	12.48*	2.00	4.20*	9.05*	1.70	7.26*	4.50*
Other type of contract	0.82	0.85	1.08	2.81*	0.19	0.48	2.37	0.35	2.33	2.25
Firm size: 5-19 employees	0.42	0.85	1.07	2.47*	0.41	0.81	2.65*	0.37	1.83	1.20
Firm size: 20-49 employees	0.52	1.54	1.40	3.16*	1.16	0.77	2.62*	0.00	0.98	1.74
Firm size 50-99 employees	2.01	4.65*	5.92*	4.33*	2.92*	4.28*	2.59*	0.85	0.92	0.38
Firm size 100-499 employees	0.30	0.17	0.40	1.27	0.00	0.09	0.98	0.20	1.19	1.03
Firm size: more than 500 emp.	0.04	0.00	0.84	2.74*	0.06	2.65*	5.43*	4.53*	8.08*	2.99*
North-west	2.73*	3.12*	0.98	1.37	0.45	0.01	0.03	0.38	0.06	0.11
North-east	3.71*	1.28	2.54*	1.85	0.35	0.01	0.02	0.60	0.28	0.01
South and Islands	1.19	0.00	0.09	0.03	2.26*	0.57	0.44	0.35	0.06	0.01
Human capital variables°°	1.13	1.41	3.35*	1.76*	0.74	1.77*	1.14	1.99*	1.19	0.46

§ *We test the null hypothesis* $H_0 : b_{qi} = b_{qj}$ *against the alternative hypotheses* $H_1 : b_{qi} \neq b_{qj}$. *We report the value of the t-test and indicate with * when the null hypothesis is not verified at a significance level not lower than 10%.*

°° *Upper-secondary education, University education, experience, experience*child, tenure, supervisory level*