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Unfair tournaments: gender stereotyping and wage discrimination among Italian graduates

Carolina Castagnetti
(Università di Pavia)

Luisa Rosti
(Università di Pavia)

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Via San Felice, 5
I-27100 Pavia
http://epmq.unipv.eu/site/home.html

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Unfair tournaments: gender stereotyping and wage discrimination among Italian graduates*

Carolina Castagnetti
University of Pavia

Luisa Rosti
University of Pavia

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Abstract

This paper addresses the gender pay gap among Italian university graduates on entry to the labor market, and stresses the importance of gender stereotypes on subjective assessment of individual productivity. We build upon previous research about gender and wage inequality introducing tournament theory as a convenient framework for the gender pay gap analysis. We hypothesize that the effects of gender stereotypes make occupational tournaments unfair. As a consequence, male workers have higher probabilities of winning the wage competition. Our data show that in contexts where the stereotype is most likely to occur, making tournaments less fair, the unexplained component of the gender pay gap is higher.

JEL codes: J24, J7, J3.

Keywords: Labor market, Italy, Gender pay gap, Stereotypes, Tournaments.

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In Italy, equal pay and sex discrimination legislation have been in place since 1991. New entrants to the labor market in the mid-2000s grew up in a society which encouraged them to take equal opportunities for granted, and nowadays no employer would deny, in principle, the employees right to be evaluated according to their actual productivity. As a consequence, it is tempting to believe that discrimination is a thing of the past, currently carried out only by a small set of uninformed people (Magnusson 2010). On the contrary, a large body of research has reported evidence that women were systematically rated as performing worse than men in the workplace, even after controlling for ability and experience. Perhaps, is it because the assessment of productivity is strongly influenced by stereotypes, beliefs or expectations that stem from the distribution of men and women into social roles and affect our judgments of others (Eagly and Steffen 1984)? Stereotypes and prejudice could preclude the fair assessment of individual performance and create workplace discrimination. Hence, even today, gender stereotypes seem to shape individuals' preferences and choices and lead to systematic underestimation of women's productivity and rewards.

This paper explores gender pay disparities among Italian university graduates and focuses on wage discrimination due to sex-role stereotypes.[1] We add to the psychological and sociological literature regarding women's discrimination in the labor market by introducing tournament theory as a convenient framework for the gender pay gap analysis. Our main statement is that gender stereotypes make occupational tournaments unfair and cause gender discrimination, which realizes in the unexplained component of the gender wage gap. Tournaments are competitive mechanisms that rank players, that is, assess their relative performance. If tournaments are unfair, due to the influence of gender stereotypes, the probabilities of winning differ by gender, all else equal. The higher the influence of stereotypes, the lower the female probability of winning, and the wider the unexplained gender pay gap. Accordingly, tournament theory provides an additional rationale to the glass ceiling literature for the evidence that in any given occupation, the higher the rank, prestige or power, the smaller the proportion of women. Following Hersch (2006) and the empirical literature on the gender pay gap (Oaxaca 1973) we

[1]For a general overview of cognitive analysis of stereotypes and stereotyping, see Hamilton and Trolier (1986).

interpret unexplained sex disparities in pay that persist empirically even after extensive controls for individuals and jobs characteristics as due to gender discrimination, which arises when the assessment of productivity is affected by stereotypes, that is non-conscious hypotheses, beliefs or expectations that influence others judgment (Valian 1998). In the next section we summarize the main explanations for sex disparities in pay, separating those focusing on the choices made by the women (supply side explanations) from the ones focusing on the choices made by employers (demand side explanations). All of them play a role in tournament theory, influencing both women decisions to participate and women's probability of winning the tournament.

However, in this paper we do not consider the influence of gender stereotypes on women decisions to participate in the labor market. Our focus is on the demand-side only and on the effects of stereotypes on the women's performance appraisal. In particular, we identify specific environments in which the use of stereotypes is expected to be more or less likely to exert an influence on performance appraisal, and we hypothesize that the unexplained component of the gender pay gap increases or decreases in line with the expected influence of the stereotype. Using a unique data set provided by the Italian Institute of Statistics (ISTAT), examining college-to-work transitions three years after graduation, we provide empirical support for our hypotheses.

TRADITIONAL EXPLANATIONS FOR SEX DISPARITIES IN PAY AND THE ROLE OF STEREOTYPES

Social science scholars have analyzed the sources of the gender pay gap from different perspectives. In particular, labor economists have emphasized two broad sets of explanations: explanations focused on the supply-side of the labor market, such as the effect of individual preferences and characteristics on pay, and explanations focused on the demand-side, such as the effect of occupation and job characteristics on pay. Traditionally, the first set of explanations focuses on the choices made by women, while the second set of explanations focuses on job-related constraints faced by women. However, these two sets of explanations are not mutually exclusive. They both play a role in explaining the gender pay gap. In the next two sub-sections we examine the influence of gender stereotypes on both women's (supply-side) and employers' (demand-side) decisions.

Supply-side Explanations

A preference-based explanation of women labor choices posits that gender differences in career path and earnings derive largely from genuine sex role preferences (Hakim 2000). However, it is worth considering whether gender differences in preferences could be constrained by social norms too. Indeed, gender stereotypes may shape employment preferences and make men and women choose different types of jobs and different career paths. It is obvious that revealed preferences (including career aspirations) are shaped by individuals' assessments of their likely success in a given activity, and that individuals adjust their activities in light of the gendered expectations others have of them (Correll 2001, 2004; Ridgeway and Shelley 2004; Ridgeway 2009; Winslow 2010).

The human capital theory (Mincer and Polachel 1974) explains women's lower wages with gender differences in personal characteristics that affect individuals' productivity. Economists have argued that anticipated family responsibilities influence women's decisions about both the number of years of schooling and the field of study, as well as the length of time devoted to market activities. Hence, the lower incentives of women to invest in human capital reduce their productivity and their earnings compared with men. However, over the past three decades women have made substantial progress in educational outcomes, and this trend is expected to widen further (Bobbitt-Zeher 2007; Blau and Kahn 2000, 2007). While in the past men typically had better access to university-level institutions, nowadays female graduates exceed the number of male graduates, and on average female students outperform male students in academic achievements in most OECD countries (OECD 2009). Unfortunately, despite the women's progress in higher education, the belief that women and men are suited for different fields of study and professions is still persistent and pervasive even among individuals participating in higher education. Women continue to prefer traditionally female majors, and men are not likely to choose faculties with high proportions of women in significant numbers (Reskin and Bielby 2005; England and Li 2006).

Demand-side Explanations

Gender inequality in wages might also be due to differences in working conditions (England and Folbre 2005). If female-dominated occupations enjoy non-pecuniary benefits (as working part-time) which make it easier to combine work and family life, these benefits may result in lower wages. Solberg and Laughlin (1995) point out that any measure of earnings that excludes these benefits may produce misleading results as to the existence of gender discrimination.

An alternative explanation for the gender income differences, is discrimination against women, that is, employers' gender-biased decisions on the allocation of individuals across and within occupations. Mainstream economic theory describes two related aspects of the social division of labor that are important for gender discrimination. The first aspect is related to the horizontal division of labor (diversity of professions at the same hierarchical level). The second aspect is related to the vertical division of labor (assignment of heterogeneous agents to different hierarchical levels). In feminist economic literature, these two aspects are strictly related to the theory of the sexual segregation (Hakim 2000; Bileby and Baron 1986). A substantial body of research shows that both the possibility of entering an occupation and access to promotion within occupations differ between men and women (Anker 1998). Especially notable is the case for statistical discrimination (Arrow 1972; Stiglitz 1973), that occurs when employers make hiring and promoting decisions based not on an individual's personal characteristics but on the average productivity of the individual's gender. For example, according to this view, although not all women have children or quit, employers make their hiring decisions on the basis of higher statistical probability for women to quit (England 1992). Even more troubling is the fact that female-dominated occupations have lower wages than male dominated occupations despite the required qualifications are comparable (England 2005; England and Folbre 2005). Proponents of the "comparable worth view" have directed attention to gender bias in job evaluations. In particular, they show how skills, effort, responsibilities and working conditions in female jobs have been overlooked in evaluation processes (England 1992; Steinberg 1990).

TOURNAMENT THEORY

We introduce tournament theory (Lazear and Rosen 1981) in the feminist social science

literature as a convenient framework for the analysis of sex disparities in pay. Labor tournaments are competitive mechanisms that define the ranking of employees/players. They assign employees to a particular level in the hierarchy and award to them the remuneration that corresponds to it. Players are ranked according to their assessed relative performance. This performance, in turn, depends on both talent and effort. Effort being equal, the most talented individual will win, thereby ensuring that greater talent commands greater resources (Rosen 1982; Lazear 1998). Thus, tournament theory emphasizes the role of talent as the main determinant of the final rank, and regards competition among agents as an efficient tool to match individuals with jobs in hierarchical organizations (Lazear and Rosen 1981). It is worth noting, however, that the efficiency of this outcome depends on the symmetry of the tournament (O'Keeffe, Viscusi and Zeckhauser 1984). Symmetric tournaments occur when agents are homogeneous and are treated equally by the rules of the competition (Schotter and Weigelt 1992). Asymmetric tournaments may be uneven or unfair: they are uneven when agents have different cost-of-effort functions; they are unfair when agents are identical, but yet the rules of the competition favor one of them and discriminate the other. In particular, in unfair tournaments the probabilities of winning the contest can differ by gender, all else equal. We assume that, due to the influence of gender stereotypes, the "rules" of the competition favor male contestants and discriminate female participants. The higher the influence of stereotypes, the lower female probability of winning the contest prize, and the wider the gender pay gap. In particular, women with the same productive characteristics than men (same education, work experience, and so on) do not have the same chance of winning the job competition, so they are not matched to the position they deserve and their talent is underutilized.

Effect of Stereotypes on Labor Tournaments

In this section we identify different types of employment/jobs to test the previsions of the theory. In particular, we expect a lower unexplained component of the gender pay gap in occupational context where the unfairness of the tournament is arguably less prominent.

The first environment we consider is one where there are simply no tournaments (self-employed workers) compared to a context in which tournaments are held (wage and salary workers). As the self employed are employers of themselves, and they know their own produc-

tivity without any kind of assessment, in self employment there is neither performance evaluation nor any ranking of contestants, and then stereotypes are less likely to exert an influence. As a consequence, we expect a lower unexplained gender pay gap among the self employed workers than among employees (Moore 1983).

Then, we identify executive jobs as a setting in which tournaments are more likely to be unfair because the assessment of individual productivity is usually inaccurate, thereby allowing stereotypes to exert an influence on performance appraisal. In particular, in lower-level occupations, characterized by purely executive tasks, the perceiver is not motivated to make accurate judgments, and the criteria used to assess individual productivity remain often unspecified. In the absence of concrete criteria, expectations based on stereotypes tend to dominate the judgment process (Heilman 2001; Nieva and Gutek 1980). Temporary work represents another situation in which stereotypes are more likely to occur because the employer is less motivate to make accurate judgments. Firms may use fixed term contracts as a probationary stage during which they can observe individual performance (Loh 1994; Wang and Weiss 1998; Booth, Francesconi and Frank 2002). In this case, productivity evaluation is less important because expiry of the contract will soon eliminate the error of assessment by not renewing the contract. Therefore, the estimate of productivity is less accurate and more superficial, and leaves room for the stereotype to exert an influence. In both these conditions, evaluators may "safely" rely on their stereotypes when deciding whom to hire or promote, or what an appropriate salary increase will be. As a consequence, we expect that the unexplained component of the gender pay gap is higher in executive, low-level occupations than it is in intellectual professions and highly specialized occupations. We also expect that the unexplained component of the gender pay gap is greater among employees hired under fixed term contracts than it is among employees hired under permanent wage contracts.

Finally, we analyze the gender pay gap when the recruitment takes place through open competition. In this case, tournaments are more likely to be fair because the assessors are required to provide justifications for their choices, and must use objective criteria and structured evaluation procedures, thereby increasing the incentive for a more accurate assessment of individual performance. The stereotyping literature actually indicates that ambiguity in evaluative criteria and

a lack of structure in the evaluation process can create the conditions for gender stereotypes to flourish (Heilman 2001; Welle and Heilman 2007; Heilman and Okimoto 2008). Indeed, Tetlock and Kim (1987) find that people show greater accuracy in productivity assessments when they anticipate having to justify their ratings. Dobbs and Crano (2001) show that individuals who have to justify their decisions have a stronger incentive to bypass their stereotyped impressions than those who do not have to provide justifications. As a consequence, decision makers are required to justify their choices and describe the criteria they use to evaluate candidates, as in open competition, they are less likely to discriminate against women. In open competitions, the recruitment procedure is a combination of examinations, scrutiny of the curriculum and qualifications, in which the information cannot easily be distorted to fit the stereotypes. Also signaling and labeling incontrovertibly their own excellence at school (Spence 1973) may reduce ambiguity in personnel evaluation and curtail the unfairness of the tournament. Thus, we expect that the unexplained component of the gender pay gap is lower among employees hired through open competition than it is among those hired without open competition. We also expect that the unexplained component of the gender pay gap drops among graduates achieving the maximum degree mark.

Hypotheses

To summarize, the above considerations lead to the following predictions:

Hypothesis 1 The unexplained component of the gender pay gap is lower in situations when the assessment of productivity is unnecessary, that is, there are no tournaments.

Hypothesis 2 The more the tournaments are unfair given the influence of stereotypes, the higher the unexplained component of the gender pay gap. The more the tournaments are fair, given the weaker impact of stereotypes, the lower the unexplained component of the gender pay gap.

DATA AND METHOD

Data

The data source of this paper is the Survey on the Early Career of College Graduates (SECCG, "Indagine sull'inserimento professionale dei laureati") conducted by ISTAT every three

years. In particular, we analyse the individuals who graduated in 2004 and interviewed in 2007 which represents the last survey available when the paper was written. The graduate population of 2004 consisted of 167,886 individuals (68,939 males and 98,947 females). In the first semester of the survey year ISTAT extracts a random sample from the universe of the individuals graduating in that year, stratified on the basis of gender, faculty and university. In the second semester ISTAT interviews the sampled individuals by the CATI (Computer Assisted Telephone Interview) interviewing technique, double-checking all answers with universities' administrative records. The response rate was about 69.5 percent, yielding a data-set containing information on 26,570 graduates.[2]

The surveys collect information on: (i) University Career and High School Background: including, kind of high school attended, high school mark, other education, university, subject, duration, degree score, accommodation, work during university, post graduate studies; (ii) Work Experience: including, previous experience, experience in actual work, type of work, net monthly wage; (iii) Search for Work: including, kind of work desired, willingness to work abroad, preference over working hours, minimum net monthly wage required; (iv) Family Information: including, parents' work, parents' education level, brothers and/or sisters; (v) Personal Characteristics: including, date of birth, sex, marital status, children, country of domicile, country of birth, residence.

Among the Italian surveys currently available, the SECCG offers the most precise and detailed information on demographic characteristics, college attended, ability, family background, current employment and income of recently graduated individuals. Our sample, consisting of 25,408 individuals (11,909 males and 13,499 females), has been obtained after excluding individuals with missing values for sex, University Career and labor market outcome. Table 1 presents descriptive statistics for the sample while Table 9 contains details of each variable used in the empirical analysis.

[Insert Table 1 somewhere here]

[2]For a complete description of the sampling procedure see Istat 2007 "Inserimento professionale dei laureati Indagine 2007. Manuale utente e tracciato record" available at www.istat.it.

Measures

The dependent variable, earnings, is measured as monthly earnings in 2007 in euros and net of taxes and social security contributions. Table 2 reports average monthly earnings and employment probability 3 years after graduation by gender and field of study. The average earnings are 1,299.00 and 1,081.00 per month for the male and the female sub sample, respectively. The average earning difference between male and female students is statistically significant for all of the subjects studied, as indicated by the test in Table 2. The average empirical employment probability 3 years after graduation is 0.74 and 0.64 for male and female candidates, respectively. Therefore, on average, male graduates earn about 20 percent more than females and are more likely to have a job 3 years after graduation.

[Insert Table 2 somewhere here]

The first step of our empirical analysis consists of estimating the earnings equation for male and female samples. The presence of interval income data prevents us from working with the hourly wage rate and therefore we restrict the sample to full-time workers only. We define full-time workers as those who worked more than 30 hours per week. This restriction leads to a sample of 5,392 and 4,503 man and woman full time workers, respectively and to 3,709 and 3,274 man and woman full time employees, respectively. In the following we examine the earnings differential between different groups of employed individuals: self-employed versus employees; permanent contracts versus fixed term contracts; overeducated versus not overeducated; etc.. Table 3 shows that within each group the number of observations by gender is very close, reflecting the stratified sampling method followed by ISTAT. Moreover, the sample size of every group considered is such that accurate estimates of the earning equations can be performed.

[Insert Table 3 somewhere here]

There has been much debate about what variables one should enter into the earnings functions used in studies of the gender wage differential (Altonji and Blank 1991). The standard Mincer equation including experience and schooling is typically augmented by factors as human capital, employment, personal and family background characteristics (Prokos and Padavic

2005). We consider as human capital variables: faculty dummies, the mark gained in the high school graduation exam, dummy variables for the kind of high school attended, etc.. To ease the effect of potential endogeneity in the earning equation, we measure the unobservable ability by means of the degree performance. In particular, our measure of degree performance combines information on the degree mark and the speed at which students complete their academic career. This variables is called $Edperf$ calculated as the product of the final degree mark and the inverse of the degree-completion time. Formally, $Edperf = (dscore)/(1 + 0.1years)$ where $dscore$ is the degree mark and $years$ is the number of years used to get the degree. The degree scores have been normalized to take into account that different faculties might employ different marking scale and different duration. The upper bound limit of $Edperf$ is set to 113, which corresponds to honors degree with no delay in completion.[3] The employment variables include work experience, Experience, as well as the Experience squared as an indicator of the diminishing marginal utility of the work experience, dummy variables for employment sector and job characteristics (public versus private sector, firm size, dummy for the employment sector of the graduate) when appropriate, a dummy variable for the size of the firm where the respondent works and the natural log of hours worked per week. Family background characteristics include mother's and father's education and employment status when the individual was 14 years of age. Personal characteristics include family status and sex when appropriate. In order to capture the impact of differences in regional wages we include dummies for the region where the current job is located in the earning equation and dummies for the region of residence in the selection equation. By considering close to 65 controls we expect to explain earnings as well as selection into employment and therefore we expect to capture the explained and the unexplained components of the difference in mean outcomes; i.e. the gender wage gap.

[3]The educational performance has been computed in order to overweight the degree mark with respect to the number of years used to get degree. In this way we (see also Castagnetti and Rosti (2009) somehow smooth the measure of the unobserved ability given the fact that in the Italian education system, each faculty only sets a minimum number of years in which to obtain a degree. As a consequence there is a high dispersion in the age at which students graduate. Hence a measure of educational performance computed as degree mark over years would be very erratic.

Method

In order to measure gender wage differentials, we estimate separately the wage equation for men and women and then we use these equations to decompose the gross differential in explained and unexplained components by means of the standard Oaxaca-Blinder (O-B) decomposition. To analyze the wage equation we need a model for selection bias. We estimate the sample selection model by means of the Heckman (1979) two-step procedure.

We first consistently estimate the selection equations, binary choice type equations, where the binary variable simply indicates working or not working. The estimation is conducted by means of probit maximum likelihood. We then use the estimation results of the first stage to consistently estimate by OLS the linear earning equations:

$$w = X\beta + \lambda\alpha + \epsilon \tag{1}$$

where w is the natural log of the net monthly wage, and λ is the estimate of the inverse Mills ratio constructed from the first-stage probit model. With the inverse Mills ratio included, the coefficients on the X, β, represent consistent estimates of the parameters of the wage equation. Such estimation takes into account the possibility that individuals may select a particular employment status for themselves because they have a comparative advantage. Following much of the existing literature on the gender wage gap, we use a dummy variable recording whether the individual has at least one child, Children, as the identifying variable for the Heckman (1979) procedure. Finally, from the separate regression analyses by gender, we compute the gender difference in earnings and their O-B decomposition.

The procedure illustrated above (estimation and O-B decomposition) was then used for all the other groups considered.[4] In particular, we estimate the sample selection model depending on the categories underlined. For instance, when we consider the wage gap between Public and Private sector (second line of Table 8), the selection equation indicates the choice of working people with respect to the activity sector, i.e. working in the Public sector or working in the Private sector. Moreover, we adopt the same identifying variable, Children, for the Heckman two step procedure and we include the Heckman correction term only if there is a significant

[4]See Table 3 for the distribution of the groups considered with respect to the full sample.

selection bias, i.e. "lambda" is statistically significant.

RESULTS

We present detailed estimation results only for the decomposition of the gender wage gap among the employees. Table 4 reports results from estimating gender-specific earnings equations controlled for self-selection, while the results of the first-stage probit model are presented in Table 5. Table 4 shows that the block of educational variables displays expected results. The educational performance has a positive impact on earnings and subject of degree are statistically significant in explaining the earnings. We observe that the experience and its squared have no impact on wage. This may be due to the fact that we are considering a proxy of a first entry in the labor market and, therefore, the effect of work experience on earnings may be negligible. The significance of lambda in Table 4, confirms the selectivity bias for both men and women.

[Insert Tables 4 and 5 somewhere here]

Then, from the separate regression analyses by gender, we compute the gender difference in earnings and their O-B decomposition.[5] The first line of Table 6 reports the decomposition for the gender difference among employees. First of all, we observe that the raw gender pay gap among graduate employees at the beginning of their career is significant and amounts to about 11percent. Moreover, only about 12percent of the gender pay gap can be explained by differences in average observed characteristics. The remaining 88percent is not explained by the large amount of observed individual characteristics we control for, and it is attributable to gender differences in economic returns to individual characteristics.[6]

[Insert Table 6 somewhere here]

Many empirical studies (see Brown and Corcoran 1997 and Lin 2010, among the others) consider the choice of college majors as a relevant factor in explaining large gender disparities

[5]OLS estimation results of the earnings equations underlying Tables 6-8 are conducted similarly to the earnings equation presented in Table 4. In particular, we make use of the same set of variables listed in Tables 4 and 5 to explain the wage gap between the other population groups considered whenever possible and adequate. Calculations are not presented here for brevity, but will be provided by the authors to anyone who requests.

[6]Castagnetti and Rosti (2009) find very similar results using a different data set and Castagnetti and Rosti (2010) find very similar results by a slightly different methodology. Rustichelli (2010) finds a gender pay gap in employees hourly earnings of 7 percent using data from ISFOL-GPG 2007 survey (13,9 percent for the sub-sample of graduates).

in pay at the beginning of the career. Results in Table 7, however, document large gender disparities in pay that persist even between individuals who studied the same field. Moreover, we observe that the unexplained component of the gender pay gap remains nevertheless high within each field of study.

Sex stereotypes in performance evaluation do not operate when the assessment of individual productivity is unnecessary, as in self employment. Self employment as a method of avoiding discrimination by employers should then result in a lower unexplained gender pay gap among self employed workers than among employees (Hypothesis 1). Our data confirm this hypothesis: Table 6 (first two rows) shows that the explained component of the gender pay gap among the self-employed is more than twice that of the employees (27.8 compared to 12.2). It is worth noting that in Italy self-employment is a clear alternative to paid employment; the share of self-employment in total employment is above 22.6 percent, and is 27.2 percent among graduate workers (Eurostat 2012).[7]

[Insert Tables 7 and 8 somewhere here]

Results in Table 6 also confirm Hypotheses 2, that is, the unexplained component of the gender pay gap increases when tournaments are more likely to be unfair and decreases when tournaments are more likely to be fair. In particular, our data show that the unexplained component of the gender pay gap in executive, low-level occupations, is higher than in intellectual professions and highly specialized occupations (78.1 compared to 55.6). Similarly, the unexplained component of the gender pay gap is greater among employees hired under fixed term contracts than it is among employees hired under permanent wage contracts (80.8 compared to 66.9). On the contrary, when employees are recruited through open competition, performance appraisal should be more objective, more structured and less ambiguous, thereby reducing the conditions for gender stereotypes to flourish. We actually observe that when employees are recruited through open competition, the unexplained component of the gender pay gap is slightly lower (60.3 compared to 66.0).

Finally, we want to test whether a signalling activity through the educational performance,

[7] In European countries (EU27), the share of self-employment is only 14.5 percent in total employment and 14.4 percent among graduate workers. In Italy, women represent 29.8 percent among graduate self employed.

can reduce the unexplained component of the gender pay gap. Our assumption is that excelling in university career reduces ambiguity in personnel evaluation and help counteracting the effect of stereotyping. Our data confirm this assumption by showing that achieving the maximum degree mark significantly reduces the unexplained component of the gender pay gap (from 73.0 to 51.9). This finding provides additional support for Hypothesis 2. However, it is worth noting that even if an excellent educational performance may counteract the gender bias in on-the-job evaluation, this does not ensure that a woman will be rewarded as an equivalently performing man.

LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Under our hypothesis, the unfairness of the tournament will only explain the difference in treatment received by two individuals who are identical for all productive characteristics except for sex. It is worth noting that our data only allow to infer discrimination from the wage gap that remains unexplained after including a wide range of proxies for productivity. Such inference is the most widely-used approach to test for labor market discrimination, but it is open to the criticism that the proxies do not adequately capture all differences in productivity. For example, one of the referees observes that our result could also contain the effect of some variable (she cites the aggressiveness) which would make the participants different from each other, and therefore contributes to the explanation of the pay gap. Interestingly, this could be interpreted as an example of an uneven tournament where the focus is on the supply-side instead of on the demand-side. This suggests also that our data might be too poor to explain wage differences arising among heterogeneous individuals. For this reason, we try to check the adequacy of our data to explain the differences in wages other than the gender pay gap. Our results show that the same type of wage decomposition can capture most of the differences in productivity that explain the pay gap between groups other than sex. For example, available information on individuals and jobs can explain more than 80 percent of the difference in pay between Public and Private sector. The comparison between several types of wage differentials shows that only the gender pay gap is by far the most unexplained among the considered groups

(Table 8).

[Insert Table 8 here]

Future research might add new evidence of gender discrimination in pay using panel data from personnel archives of large companies. The use of personnel data might substantially reduce the possible bias from unobserved heterogeneity by partially controlling for heterogeneity on the demand side.

CONCLUSIONS

Even in societies where gender discrimination is normatively proscribed, cultural beliefs and gender stereotypes may influence life opportunities of individuals and performance evaluations of job applicants and workers.

In this paper we build upon previous research about gender wage inequality introducing tournament theory as a convenient framework for the analysis of sex disparities in pay. We hypothesize that gender stereotypes make occupational tournaments unfair, favoring men and lowering the probability of equivalently performing women of winning the contest prize. Our perspective suggests that the most unfair the tournament is, the higher the unexplained component of the gender pay gap should be. By estimating the earnings equation for male and female graduates we find a gender wage gap of 11 percent, and even controlling for a lot of individual and job characteristics the unexplained component remains nevertheless high (near to 88 percent in our data). We than identify contexts in which stereotypes are relatively more likely to occur and verify that for them the unexplained component of the gender pay gap is relatively higher.

Finally, as a robustness check of the adequacy of our data, we compared several types of wage differentials and found that the gender gap is by far the most unexplained among the above considered groups.

The need for public policies is because asymmetric tournaments preclude efficiency attainment. Fully utilizing women's resources requires a commitment to overcome the persistent asymmetry in occupational tournaments. It is important to be aware that the gender pay gap is influenced by gender stereotypes that affect the assessment of women's productivity when they enter the labor market or are in the early years of their working life. Very small differences in

treatment can, as they accumulate, have major consequences in salary, promotion, and prestige, including advancement to leadership positions.

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Table 1: Descriptive Statistics for Selected Variables Used in the Analysis

	Women		*Men*	
Variable	*Mean*	*Standard Deviation*	*Mean*	*Standard Deviation*
Number of observations	13,499		11,909	
Wage	7.11	0.23	7.227	0.258
Hours worked	3.687	0.082	3.71	0.084
High School Mark	50.585	6.997	48.751	7.253
Edperf	90.903	17.438	88.583	16.528
Experience	1.964	2.368	2.358	2.402
Experience2	9.465	14.615	11.326	15.196
Degree subject				
Sciences	0.023	0.149	0.043	0.2
Pharmacy	0.053	0.221	0.046	0.207
Natural sciences	0.048	0.21	0.039	0.191
Engineering	0.047	0.209	0.188	0.386
Architecture	0.05	0.214	0.057	0.228
Agricultural studies	0.025	0.155	0.029	0.165
Economics, business and statistics	0.142	0.344	0.152	0.354
Political sciences and sociology	0.091	0.283	0.064	0.241
Law	0.123	0.324	0.102	0.298
Humanities	0.06	0.233	0.036	0.183
Foreign languages	0.052	0.219	0.014	0.115
Teachers college	0.046	0.206	0.015	0.118
Psychology	0.023	0.147	0.02	0.137
Medicine	0.217	0.407	0.194	0.39
University of North	0.454	0.498	0.471	0.499
University of Center	0.259	0.438	0.275	0.446
Private University	0.062	0.241	0.05	0.219
Liceo	0.696	0.46	0.655	0.475
Previously entered another degree course	0.121	0.327	0.151	0.358
Studied in the hometown	0.365	0.481	0.383	0.486
Moved to attend university	0.225	0.417	0.225	0.418
Attended private lessons	0.025	0.156	0.03	0.171
Erasmus	0.086	0.28	0.094	0.292
Working student	0.607	0.488	0.638	0.481
Married	0.318	0.466	0.21	0.407
Children	0.11	0.313	0.074	0.262
Father college degree	0.243	0.429	0.284	0.451
Father secondary degree	0.375	0.484	0.367	0.482
Mother college degree	0.199	0.399	0.216	0.412
Mother secondary degree	0.382	0.486	0.381	0.486
Father's occupation				
Father employed	0.956	0.206	0.96	0.196
Father self-employed	0.28	0.449	0.258	0.438
Father Manager	0.087	0.282	0.106	0.307
Father Executive cadre	0.115	0.319	0.14	0.347
Father White collar	0.197	0.398	0.193	0.394
Mother's occupation				
Mother employed	0.551	0.497	0.546	0.498
Mother self-employed	0.086	0.28	0.076	0.266
Mother Manager	0.012	0.11	0.013	0.115
Mother Executive cadre	0.11	0.312	0.124	0.33
Mother White collar	0.21	0.407	0.212	0.409
Work	0.636	0.481	0.735	0.441
Firm size	0.069	0.254	0.039	0.194
Industrial sector	0.218	0.413	0.351	0.477
Paid Training	0.027	0.163	0.026	0.159

Table 2: Average Earnings and Employment Probability by Gender and Field of Study

Field of study	Average monthly earnings			Average employment probability	
	Male students	Female students	T-statistic	Male students	Female students
Sciences	1,252.36	1,065.03	-4.03	0.69	0.66
Pharmacy	1,280.79	1,137.91	-4.35	0.74	0.76
Natural sciences	1,232.25	1,062.48	-4.04	0.65	0.59
Medicine	1,468.22	1,234.35	-4.24	0.45	0.27
Engineering	1,391.70	1,287.06	-3.85	0.92	0.83
Architecture	1,221.35	1,054.29	-4.15	0.87	0.82
Agricultural studies	1,141.59	905.72	-4.06	0.77	0.7
Economics, Business and Statistics	1,349.92	1,169.86	-9.09	0.83	0.77
Political Science and Sociology	1,300.48	1,096.71	-7.68	0.78	0.82
Law	1,172.35	1,018.93	-4.63	0.6	0.51
Humanities	1,107	948.09	-4.19	0.69	0.75
Foreign languages	1,204.67	1,048.28	-3.3	0.85	0.8
Teachers college	1,062.94	961.70	-2.65	0.81	0.79
Psychology	1,078.69	832.67	-4.88	0.72	0.7
Health	1,098.13	882.75	-4.75	0.78	0.74
Total	1,299.28	1,080.96	-23.34	0.74	0.64

The fourth column reports the values of the T-statistic for the null hypothesis that the difference between the monthly earning is zero.

Table 3: Number of Observations by Groups of Employed Individuals

	Women	*Men*
Employees	3,274	3,709
Self-employed	699	1,233
Public sector	1,087	961
Private sector	2,156	2,470
Permanent contracts	2,176	2,789
Fixed-term contracts	1,629	1,373
Graduate degree required	1,344	1,434
Graduate degree not required	3,160	3,963
Recruitment through open competition	334	297
Recruitment without open competition	4,169	5,095

Table 4: Estimation Results of the Earnings Equation for Employees

	Women		*Men*	
Variable	*Coefficient*	*t-value*	*Coefficient*	*t-value*
Constant	5.64	30.484	5.81	31.007
Edperf	0.001	4.122	0.001	5.115
Lambda	0.384	4.929	0.185	2.937
Experience	-0.01	-1.011	0.012	1.076
Experience2	0.001	1.235	-0.001	-0.759
Degree subject				
Sciences	0.108	2.508	0.135	3.421
Pharmacy	0.227	5.629	0.197	5.184
Natural sciences	0.065	1.532	0.128	2.998
Engineering	0.288	6.752	0.243	6.278
Architecture	0.108	2.456	0.133	3.122
Agricultural studies	0.079	1.751	0.09	2.037
Economics, business and statistics	0.169	4.409	0.186	5.102
Political sciences and sociology	0.119	2.967	0.1	2.595
Law	0.008	0.186	0.117	2.86
Humanities	0.047	1.128	-0.018	-0.404
Foreign languages	0.083	2.035	0.035	0.739
Teachers college	0.031	0.716	0.065	1.265
Psychology	0.012	0.242	0.09	1.78
Medicine	-0.061	-0.935	0.168	3.514
University of North	-0.092	-6.457	-0.028	-1.88
University of Center	-0.027	-1.825	0.033	2.212
Private University	0.022	1.56	0.041	2.307
Liceo	-0.009	-0.94	0.008	0.846
Previously entered another degree course	-0.009	-0.672	0.014	1.025
Studied in the hometown	-0.001	-0.123	0.003	0.354
Moved to attend university	0.014	1.497	0.021	1.963
Attended private lessons	0.015	0.685	0.001	0.05
Erasmus	0.032	2.748	0.05	3.842
Working student	0.092	6.478	0.047	4.048
Paid Training	-0.086	-5.445	-0.061	-3.985
Married	0.003	0.416	0.075	6.354
Father college degree	0.03	2.21	0.015	1.042
Father secondary degree	0.022	2.239	0.004	0.411
Mother college degree	-0.001	-0.101	0.006	0.376
Mother secondary degree	-0.008	-0.772	0.009	0.875
Father's occupation				
Father in work	-0.002	-0.108	-0.005	-0.234
Father self-employed	0.022	2.165	0.021	1.953
Father Manager	0.01	0.629	0.028	1.772
Father Executive cadre	-0.006	-0.434	0.03	2.023
Father White collar	-0.009	-0.784	-0.002	-0.162
Mother's occupation				
Mother Executive cadre	0.014	0.968	-0.019	-1.252
Mother White collar	0.025	2.42	0.008	0.714
Firm size	0.101	5.873	0.084	4.053
Industrial sector	0.028	3.089	0.041	4.544
Hours worked	0.345	7.275	0.317	6.505
Regional dummies	X		X	
Number of observations	3,274		3,709	
Rbar-squared	0.185		0.164	
F	12.807 (0.00)		12.566(0.00)	
Average wage women (ln)	7.104			
Average wage men (ln)	7.227			

Table 5: Probit Estimation Results of the Employment Probabilities for Employees

	Women		*Men*	
Variable	*Coefficient*	*t-value*	*Coefficient*	*t-value*
Constant	0.643	3.86	0.425	2.71
Edperf	-0.001	-0.43	0.001	1.6
Degree subject				
Sciences	-0.191	-1.93	0.003	0.03
Pharmacy	0.004	0.04	0.316	3.56
Natural sciences	-0.309	-3.13	-0.214	-2.47
Engineering	0.736	8.38	0.551	5.83
Architecture	0.384	3.79	0.477	5.13
Agricultural studies	0.13	1.17	0.139	1.35
Economics, business and statistics	0.25	2.94	0.23	2.98
Political sciences and sociology	0.128	1.36	0.398	4.84
Law	-0.289	-3.32	-0.386	-4.95
Humanities	-0.165	-1.61	0.227	2.64
Foreign languages	0.185	1.24	0.286	3.15
Teachers college	0.415	2.64	0.426	4.57
Psychology	0.016	0.13	0.101	0.96
Medicine	-0.593	-7.25	-0.921	-12.26
University of North	0.048	0.89	-0.042	-0.84
University of Center	0.048	0.97	-0.042	-0.91
Liceo	-0.061	-1.83	-0.117	-3.85
Attended private lessons	0.089	1.06	0.252	3.04
Erasmus	-0.034	-0.7	0.013	0.27
Working graduate	0.36	12.07	0.337	12.68
Married	0.304	7.25	0.026	0.86
Children	0.207	3.02	-0.236	-5.37
Father college degree	-0.048	-0.95	0.034	0.76
Father secondary degree	0.034	0.86	0.058	1.7
Mother college degree	0.02	0.37	-0.012	-0.24
Mother secondary degree	0.031	0.8	-0.002	-0.05
Father's occupation				
Father in work	0.067	0.95	0.009	0.14
Father self-employed	-0.003	-0.09	0.091	2.77
Father Manager	-0.007	-0.12	-0.013	-0.24
Father Executive cadre	-0.057	-1.1	0.023	0.47
Father White collar	-0.017	-0.38	0.036	0.95
Mother's occupation				
Mother Executive cadre	-0.018	-0.35	-0.029	-0.6
Mother White collar	-0.019	-0.49	-0.022	-0.64
Regional dummies	X		X	
Number of observations	13,499		11,909	
Percent correctly predicted	78.35		74.67	
Madalla's pseudo R-square	0.207		0.234	

Table 6: Gender Pay Gap in Different Contexts

	Percentage of raw pay gap	*Percentage of gap explained*	*Percentage of gap unexplained*
Employees	11.05	12.23	87.77
Self employed	12.13	27.83	72.16
Intellectual professions, scientific and highly specialized occupations	11.44	44.39	55.6
Professions relating to the administration and executive management	9.08	21.8	78.19
Permanent contracts	12.7	33.06	66.94
Fixed term contracts	7.18	19.24	80.76
Recruitment through open competition	12.12	39.64	60.36
Recruitment without open competition	12.09	33.99	66.01
Graduates with excellent educational performance (edperf=113)	14.32	48.07	51.92
Total graduates	11.55	27.03	72.98

Table 7: Gender Pay Gap by College Majors

College majors	*Percentage of gap explained*	*Percentage of gap unexplained*	*Percentage of raw pay gap*
Humanities	10.55	89.45	8.86
Economics, business and statistics	12.74	87.26	9.25
Political science and sociology	56.77	43.23	8.95
Sciences	1.83	98.17	10.27
Law	53.68	46.32	3.11
Engineering	16.4	83.6	6.64
Architecture	13.98	86.02	10.02
Medicine	46.72	53.28	16.13

Table 8: Gender Pay Gap Versus Other Differences in Pay Between Groups

	Percentage of gap explained	*Percentage of gap unexplained*	*Percentage of raw pay gap*
Gender pay gap (Male employees versus Female employees)	11.05	16.11	83.89
Public sector versus Private sector	0.74	80.32	19.48
Self-employed versus Employees	6.34	65.02	34.98
Permanent contracts versus Fixed-term contracts	13.18	40.44	59.56
Graduate degree required versus not required (overeducation)	9.44	48.4	51.6
Recruitment through open competition versus without open competition	1.37	66.31	33.69

Table 9: A1. Variable Description

Variable	*Description*
Wage	Natural log of the net monthly wage. Monthly wages are in Euros and net of taxes and social security contributions.
Edperf	Educational Performance. See on page 12
Lambda	Heckman inverse mills ratio obtained at the first stage
Experience	Years of work experience
Experience2	Experience squared
Sciences	1 if the graduate studied physical or mathematical science; 0 otherwise
Pharmacy	1 if the graduate studied pharmacy; 0 otherwise
Natural sciences	1 if the graduate studied a natural science; 0 otherwise
Engineering	1 if the graduate studied an engineering course; 0 otherwise
Architecture	1 if the graduate studied architecture or related subject; 0 otherwise
Agricultural studies	1 if the graduate studied agriculture or related subject; 0 otherwise
Economics, business and statistics	1 if the graduate studied business or economics or statistics; 0 otherwise
Political sciences and sociology	1 if the graduate studied political science or sociology; 0 otherwise
Law	1 if the graduate studied law; 0 otherwise
Humanities	1 if the graduate studied a humanities subject including Italian literature; 0 otherwise
Foreign languages	1 if the graduate studied foreign languages; 0 otherwise
Teachers college	1 if the graduate studied an education course, e.g. teacher training; 0 otherwise
Psychology	1 if the graduate studied psychology; 0 otherwise
Medicine	1 if the graduate studied medicine; 0 otherwise
Hours worked	Natural log of the number of hours worked in a week
University of North	1 if graduate studied in a University in the North; 0 otherwise
University of Center	1 if graduate studied in a University in the Center; 0 otherwise
University of South	1 if graduate studied in a University in the South; 0 otherwise
Private University	1 if graduate studied in a Private University; 0 otherwise
Liceo	1 if graduate studied in a general high school ("Liceo"); 0 otherwise. In the Italian system general high schools are academic oriented as opposed to technical and teaching schools.
Previously entered another degree course	1 if graduate previously attended a different degree course; 0 otherwise
Studied in the hometown	1 if graduate studied in the hometown; 0 otherwise
Moved to attend university	1 if graduate moved to a different town to attend university; 0 otherwise
Attended private lessons	1 if graduate attended private lessons; 0 otherwise
Erasmus	1 if graduate attended the Erasmus program; 0 otherwise
Working student	1 if part time student; 0 otherwise
Paid Training	1 if graduate received employer-paid training; 0 otherwise
Married	1 if graduate was married when interviewed; 0 otherwise
Children	1 if graduate has children when interviewed; 0 otherwise
Father college degree	1 if graduate's father possesses a university degree; 0 otherwise
Father secondary degree	1 if graduate's father possesses an high school degree; 0 otherwise
Mother college degree	1 if graduate's mother possesses a university degree; 0 otherwise
Mother secondary degree	1 if graduate's mother possesses an high school degree; 0 otherwise
Father in work	1 if graduate's father was working when graduate was 14; 0 otherwise
Father self-employed	1 if graduate's father was working as self-employed when student was 14; 0 otherwise
Father Manager	1 if graduate's father was a manager when the student was 14; 0 otherwise
Father Executive cadre	1 if graduate's father was an executive cadre when the student was 14; 0 otherwise
Father White collar	1 if graduate's father was a white collar when the student was 14; 0 otherwise
Mother employed	1 if graduate's mother was working when the student was 14; 0 otherwise
Mother self-employed	1 if graduate's mother was working as self-employed when the student was 14; 0 otherwise
Mother Manager	1 if graduate's mother was a manager when the student was 14; 0 otherwise
Mother Executive cadre	1 if graduate's mother was an executive cadre when the student was 14; 0 otherwise
Mother White collar	1 if graduate's mother was a white collar when the student was 14; 0 otherwise
Work	1 if graduate works; 0 otherwise
Firm size	1 if graduate works in a firm with more than 50 employees; 0 otherwise
Industrial sector	1 if graduated works in the industrial sector; 0 otherwise
Regional dummies	19 regional dummies for the region where the current job is located, used as controls in the earning equation and 19 regional dummies for the region of residence, used as controls in the selection equation