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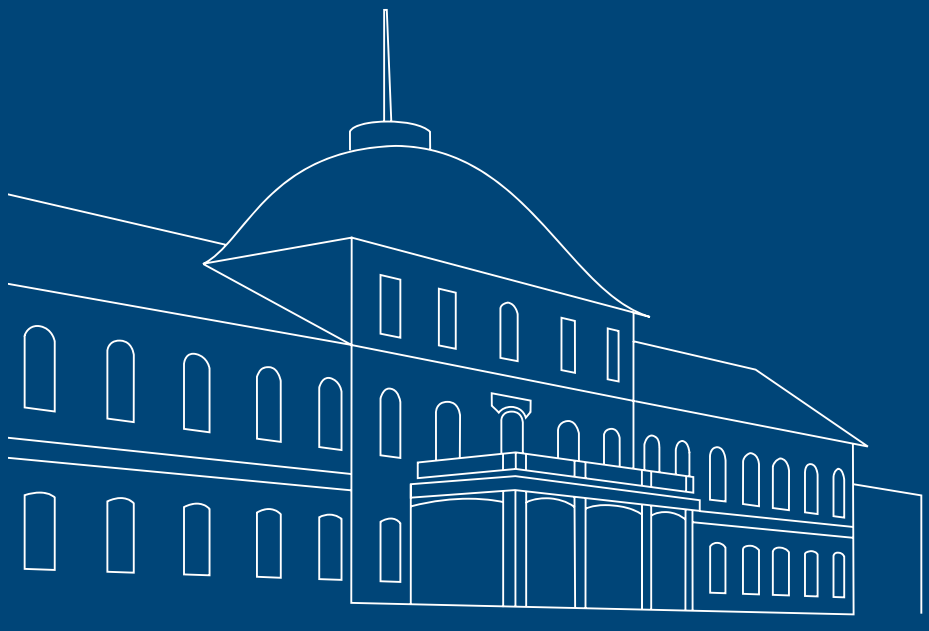

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The Reversal of the Gender Pay Gap among Public-Contest Selected Young Employees*

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Abstract

This paper analyzes the effect of public-contest recruitment on earnings by applying an extended version of the Oaxaca-Blinder model with double selection to microdata on Italy. We find that the gender pay gap vanishes among public-contest selected employees, and even reverses in favor of women (-17.4%) in the young sample. The reversal is because public contests are merit-based and gender-fair screening devices. They are merit-based because selected employees possess higher productive characteristics than unselected ones, both women and men. They are gender-fair because the coefficients component in the Oaxaca-Blinder decomposition is never significant among public-contest recruited employees, either with or without selection. On the contrary, among employees not hired by public contest the gender pay gap is positive and significant (7.6%), and it is entirely due to coefficients, that is to discrimination in the career path.

Keywords: Gender pay gap; Public-contest recruitment; Double sample selection.

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1 Introduction

There is a big literature on the gender pay gap (GPG) and on its narrowing in recent years (Blau and Kahn (2003), (2006), (2007), Goldin (2014)). However, there still be large international differences in the GPG as shown recently by Kahn (2015) who compares the GPG of several countries in the period 2010 - 2012. While in some developed countries women were close to earnings parity with men, in others large gaps remained. Many factors may influence the GPG. Among them are skill supply and demand, unions, and minimum wages, which explain the wage returns to education, experience, and occupational wage differentials.

Understanding the causes of the gender pay gap can help in evaluating the efficiency of the labor market. For example, if women earn less than comparably productive men because of discrimination, the gender pay gap reflect a labor market inefficiency in that women's abilities are not being fully applied and remunerated in the labor market. More, if the persistence of the gender pay disparity is because of the occupational segregation, changes in the wage structure are likely to have an effect on the gender pay gap (see Kahn 2015). However, the direction of the effect is not clear-cut. From one side, reducing occupational wage differentials may induce men to enter female-dominated job; from the other side, the effect may be of reducing women's incentive to enter male-dominated jobs. Occupational segregation and the stereotypes it creates have strong influences on career choice also in terms of entry opportunity. Castagnetti and Rosti (2013) identify specific environments in which the use of stereotypes is expected to be more likely to exert an influence on performance appraisal and show that the unexplained, i.e. discrimination, component of the gender pay gap increases or decreases in line with the expected influence of the stereotypes. In particular, Castagnetti and Rosti (2013) show 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.[1]

In this paper we focus on the impact of public contests as institutional selection mechanism that may counteract the discrimination mechanism in the hiring process. We argue that public contest, whose methods of implementation are strictly regulated by law, ensures higher probabilities that applicants are chosen and rewarded because of differences in their personal characteristics and not discriminated against. As public contests are by law more regulated and more controlled,

[1]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.

less discretionary and less ambiguous than other private methods of performance appraisal, they can reduce the conditions for gender discrimination to flourish. In public contest, 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.

We study the effect of public-contest selection on earnings, and we expect the unexplained component of the gender gap in pay vanishes among employees hired by public contest. As the effect of hiring methods are stronger on early-career wages, we focus on young employees and we expect the gender gap in pay vanishes or even reverses in favor of women, due to their higher observed characteristics such as education and degree grades (see Castagnetti and Rosti 2009).

Using Italian micro data we empirically confirm our anticipations; recruitment carried out by public contest makes the gender pay gap vanish among public-contest selected employees, and even reverses in favor of women (-17.4%) in the young sample. To the best of our knowledge, this is the first work that shows the reversal of the GPG. Moreover, we show that the public contest selection mechanism is a gender-fair and merit based selection mechanism; the reversal is entirely explained by the observable characteristics that are rewarded as men's one.

We confirm these findings by considering a double sample selection model where both the decision to be employed and the sectoral choice (recruitment by public contest or not) are taken into account.

The paper is organized as follows. Section 2 introduces the Public Contest mechanism in Italy. Section 3 describes the data. Section 4 shows the effects of selection hiring process on earnings. Section 5 provides evidence on public contests as gender-fair and merit-based selection methods. Section 6 extends the analysis to a double sample selection model. Section 7 concludes.

2 Public Contest

In the Italian legal framework, the public contest is the institutional process to which the Constitution explicitly delegates the hiring of public servants, that is the meritocratic selection of aspirants to public employment positions in both central and local administration (art. 97 of the Constitution). The methods for the assessment of candidates may be based on presentation of diplomas and other qualification titles (skills, work experience, publications, etc.) and/or consist of theoretical and practical tests. All tests must be performed in the presence of the selection board and must be written and blind. The examination may include an interview consisting of answers to questions

from members of the Commission. Both questions and answers are recorded in the report prepared by the secretary of the commission and signed by all members of the board. Public contests are the recruitment system prevailing in the Public Administration, but private firms can also use them.[2] In particular, our sample shows that about 10% of the recruitment in the private sector takes place by contest (see Table 1).

3 Data

We use microdata on Italy from the 2010 file of the Italian Institute for the Development of Vocational Training for Workers (Isfol). The data was collected in the context of a joint project with the Italian Ministry of Labor and Social Policy that was started in 2005, the survey Isfol Plus. The project aims particularly at creating a data set for the study of wage inequality by gender. Hence, it delivers broad information on the personal working profiles and individual motivation to work as well as on the cultural and territorial background of the participants (Centra and Cutillo 2009). Isfol Plus covers the whole population with focus on the working population. The data was collected by means of Computer Assisted Telephone Interviewing (CATI). One of the main characteristics of the national survey is that only answers with direct responses were considered, that is no proxies were used. Isfol Plus 2010 is conducted with 55,000 interviews. In our analysis, we focus on full-time employees aged between 18 and 64 years. Part-time workers are excluded from the sample as they have a larger dispersion in pay than their full-time colleagues, what raises the probability of earning less than the average hourly wage. Moreover, women have a significantly higher fraction of part-time work than men. Similarly, autonomous workers are not considered in the study, as the focus in this paper is employees' selection mechanisms, but self-employed are unselected or, if selection takes place in the form of an entrance examination as to notaries, the aim pursued is not to fill job vacancies but to ensure the citizens on the quality of the services provided. The analysis is also constrained to earnings from the main job only, i.e. from the job that yields the highest income. As only 2.4% of the sample have more than one job, this restriction is unlikely to be important. Last, we exclude all individuals with disabilities (2.8%). The selection criteria yielded a sample size of 17,275 of which 9.033 were female (52.3%) and 8,242 were male employees (47.1%). Out of this sample there were 9,787 employed individuals, 5,397 men (55.1%) and 4,390 women (44.9%). In the data, 1,485 male (27.5%) and 1,718 female (39.1%) employees entered via

[2] In this case, the company agrees to comply with the rules that represent the essential elements of the procedure; otherwise it must compensate the damage (art. 1218 Civil Code).

public contest in their current job. Table 1 reports mean and standard deviation for some of the controls that are included in our analysis.

Table 1: Descriptive Statistics

	Selection by Public Contest		Selection not by Public Contest	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Net Hourly Wage	12.790	34.828	8.624	14.168
Women	0.536	0.499	0.406	0.491
Age	48.458	10.671	36.598	12.649
Children	0.716	0.451	0.405	0.491
Experience	20.375	11.516	11.043	13.014
Tenure	15.729	11.66	5.682	10.996
Northern Region	0.393	0.488	0.536	0.499
Metropolitan Area	0.340	0.470	0.258	0.438
Education	15.039	3.265	13.000	3.499
University Degree	0.466	0.499	0.225	0.418
High School	0.459	0.498	0.553	0.497
Primary Education	0.002	0.047	0.016	0.126
Secondary Education	0.073	0.260	0.206	0.404
Occupation				
Managers	0.393	0.488	0.161	0.368
Intermediate professions	0.338	0.473	0.231	0.422
White-collar workers	0.201	0.401	0.308	0.462
Service Sector	0.968	0.177	0.712	0.453
Big Firm	0.088	0.283	0.42	0.494
Public Firm	0.905	0.293	0.159	0.365
Private Firm	0.095	0.293	0.841	0.365
Observations	3,203		6,584	

On average, workers hired by public contest have higher salaries, more experience and have more frequently achieved a university degree while the other employees have more often reached a high school education only. Our data show that the selection by public contest is not a prerogative of the public sector; about 10% of the recruitment in the private sector takes place by contest.

4 The Effect of Public-Contest Selection on Earnings

The unadjusted GPG[3] is a key indicator used within the European employment strategy to monitor imbalances in wages between men and women. The Eurostat data show that in 2010 the GPG is estimated to be 16.2% in the EU as a whole, and 5.3% in Italy.[4] In our dataset the gender gap in

[3] *The* unadjusted *gender pay gap provides an overall picture of gender inequality in hourly pay. This gap represents the difference between the average gross hourly earnings of men and women expressed as a percentage of average gross hourly earnings of men. It is called* unadjusted *as it does not take into account all of the factors that influence the gender pay gap, such as differences in education, labour market experience or type of job* (Eurostat 2015).

[4] The GPG indicator is calculated within the framework of the data collected according to the methodology of the Structure of Earnings Survey - NACE Rev. 2. The population consists of all paid employees in enterprises with 10 employees or more (Eurostat 2014).

hourly wages among full time employees is 5.9% (Table 2).

Table 2: Raw GPG: Net Hourly Wages in Euro in Italy (2010)

Whole Sample	Male Wages	Female Wages	Raw
(9,787 Observations)	(5,397 Observations)	(4,390 Observations)	GPG
9.980	10.260	9.652	5.926%

A small GPG in gross hourly wage does not imply a thin overall income inequality between women and men within the economy. When considering the gross annual income instead of the hourly wage, the differential increases significantly due to the lower number of hours worked by female employees. Moreover, besides the GPG and the gender gap in paid hours, it is important to consider gender gaps in employment, as these also contribute substantially to increase the difference in average earnings of women versus men. That is because in countries where the female employment rate is particularly low, women who chose to work may decide so due to their higher job profile and earnings expectations. To give a complete picture of the GPG, Eurostat has developed a new synthetic indicator called *Gender overall earnings gap*. This measures the impact of three combined factors (hourly earnings, hours paid and employment rate) on the average earnings of all men of working age compared to women. Eurostat (2015) estimates the 2010 Gender overall earnings gap at 44.3% in Italy, and at 41,1% in Europe. At EU level, the Gender overall earnings gap was driven mostly by the GPG (contribution of 37.0%) and the gender employment gap (contribution of 35.0%), with minor contribution of gender gap in paid hours (28.0%). In Italy the gender gap in employment rates was the main contributor to the total earnings gap (contribution of 65.0%), followed by the gender gap in paid hours (26.0%) and by the GPG (contribution of 9.0%) (Eurostat 2015). Although the GPG in hourly wages is only a small part of the overall income inequality by gender in Italy, it is precisely the analysis of that small difference which brings out discrimination from the data. As Becker (1985) emphasized, large market discrimination is not required to understand why the gender gap in earnings traditionally has been enormous. Even small amounts of discrimination against women can cause huge differences in wages.

We exactly intend to prove that recruitment carried out by public contest can reverse the gender wage gap (GPG) among young employees because public contests are merit-based and gender-fair selection methods, that is without (or with a lower) wage discrimination. To achieve our purpose we focus on the estimates of disparity in hourly wages that persists when employed women and men are similar as regards personal and job characteristics. This gap is of special interest for discrimination search, since this wage disparity cannot be justified on grounds of productivity.

The base for the following analysis is the estimation of a Mincer wage equation. There has been much debate about what variables one should enter into the earnings functions used in studies of the gender wage differential (Antonj and Blank, 1999). 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: years of education, dummy variables for the kind of high school attended, dummy variable for the mark gained in the high school graduation exam. The employment variables include actual work experience, as well as experience squared as an indicator of the diminishing marginal utility of the work experience, tenure (years with present employer), dummy variables for the employment sector and job characteristics and, when appropriate, a dummy variable for the size of the firm where the respondent works. 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. A complete list of the variables included in the analysis along with their coding is provided in Appendix A.

Table 3 reports the estimation results of the log of the hourly wage for different samples. Among the explanatory variables there is the dummy *Public Contest*, which takes the value 1 if the individual has been hired by public contest and zero otherwise. We expect to find that the estimated coefficient for *Public Contest* is significantly positive indicating that hiring carried out by public contest has a positive effect on earnings.

Results in Table 3 (column 1) show that recruitment carried out by public contest has a positive effect on wages. The recruitment through public contest has a sizeable positive effect on earnings and the dummy *Public Contest* emerges as the most important among the considered variables to predict earnings. In the full sample of individuals aged 18-64 the wage premium for the public-contest selection is 13.0% . The coefficient of the variable *Female*, negative and significant, confirms the usual results of the literature: being a woman reduces earnings of 7.9%. But the coefficient for the interaction term *Contsex*[5], positive and significant, shows that female employees receive from the public-contest selection a wage prize even higher than the gender penalty (8.7%). The results presented in Table 3 also show that, as usual, age, experience, education and tenure positively impact on wages. Among the regressors we consider also a dummy variable for being or not overeducated in the actual job. The coefficient of the variable $Not - overeducated$, positive and

[5]The variable *Contsex* is given by the interaction between the variables *Female* and *Public Contest*.

Table 3: Wage Regression: OLS Model with Dummy *Public Contest* and Interactive Effect *Contsex*

Variables	(1) Full Sample of of Individuals Aged 18-64	(2) Individuals Aged 18-34	(3) Individuals Hired by Public Contest and Aged 18-64	(4) Individuals Hired by Public Contest and Aged 18-34	(5) Individuals not hired by Public Contest and Aged 18-64	(6) Individuals not Hired by Public Contest and Aged 18-34
Public Contest	0.122***	0.147***				
	(0.0151)	(0.0380)				
Contsex	0.0836***	0.118**				
	(0.0196)	(0.0489)				
Female	-0.0792***	-0.0255	-0.0142	0.0611	-0.0702***	-0.0230
	(0.0116)	(0.0172)	(0.0146)	(0.0435)	(0.0124)	(0.0176)
Exper	0.0209***	0.0135**	0.0204***	-0.00564	0.0193***	0.0153**
	(0.00175)	(0.00684)	(0.00303)	(0.0174)	(0.00217)	(0.00743)
Exper2	-0.000308***	-0.000508	-0.000285***	1.67e-05	-0.000286***	-0.000532
	(3.76e-05)	(0.000409)	(6.07e-05)	(0.00104)	(4.80e-05)	(0.000445)
Tenure	0.00426***	0.0137***	0.00313***	0.0137*	0.00510***	0.0139***
	(0.000653)	(0.00312)	(0.00103)	(0.00819)	(0.000837)	(0.00337)
Educ	0.0266***	0.0124***	0.0368***	0.00882	0.0232***	0.0135***
	(0.00199)	(0.00351)	(0.00325)	(0.00941)	(0.00250)	(0.00380)
Age_y_child	-0.00152**	-0.00144	-0.00166*	-0.000217	-0.00129	-0.00144
	(0.000621)	(0.00156)	(0.000883)	(0.00316)	(0.000834)	(0.00177)
Childrdummy	0.0782***	0.0882	0.0809***	0.209**	0.0775***	0.0607
	(0.0199)	(0.0553)	(0.0278)	(0.106)	(0.0272)	(0.0634)
Degree	0.0858***	0.0442*	0.0867***	0.146***	0.0587***	0.0163
	(0.0154)	(0.0262)	(0.0209)	(0.0523)	(0.0217)	(0.0298)
Maximum_d_mark	0.0733***	0.0758**	0.0804***	0.0936	0.0415	0.0725*
	(0.0204)	(0.0359)	(0.0241)	(0.0639)	(0.0321)	(0.0418)
Married	0.0462***	0.0541**	0.00788	0.0733	0.0646***	0.0527*
	(0.0141)	(0.0271)	(0.0198)	(0.0615)	(0.0190)	(0.0298)
City	-0.0184*	-0.0346*	-0.0261*	0.00575	-0.0125	-0.0377*
	(0.0105)	(0.0184)	(0.0151)	(0.0437)	(0.0139)	(0.0201)
Homeowner	0.0412***	0.0359	0.0683***	0.0969	0.0330*	0.0274
	(0.0144)	(0.0229)	(0.0242)	(0.0610)	(0.0178)	(0.0246)
Child_care_aid	-0.0269	-0.0313	-0.0281	-0.212**	-0.0304	0.000438
	(0.0186)	(0.0560)	(0.0273)	(0.104)	(0.0249)	(0.0646)
Not-overeducated	0.0709***	0.0178	0.154***	0.0800	0.0508***	0.0110
	(0.0105)	(0.0169)	(0.0194)	(0.0515)	(0.0127)	(0.0179)
Constant	1.274***	1.440***	1.235***	1.616***	1.320***	1.431***
	(0.0422)	(0.0699)	(0.0715)	(0.190)	(0.0540)	(0.0762)
Observations	9,787	4,125	3,203	491	6,584	3,634
R-squared	0.277	0.075	0.244	0.166	0.150	0.042

Robust standard errors in parentheses

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

The regression includes all variables used in the model and described in Appendix A, but the table shows only the most significant.

significant confirms the that individuals matched to a job in which the educational qualification is a requirement have higher wages than individuals matched to a job in which the qualification is not a necessary requirement. Both theoretical literature and empirical evidence on the GPG indicate that small differences in the early career greatly expand with age and give rise to large lifelong observed gender disparity in earnings. As the positive effect of public-contest selection impacts to a greater extent on early wages, we expect to find a stronger effect of public-contest recruitment among young people, by taking the early age as a proxy for the early career.

The results in column 2 of Table 3 also show that the positive effect on wages of recruitments carried out by public contest is stronger in the early career (that is among young employees). The positive effect of recruitment through public contest is higher among young employees: their earnings increase by 15.8% if individuals are selected by public contest (compared to the non-selected) . The coefficient of the variable *Female*, negative and significant, reduces the earnings of young employees of 2.5%. But the coefficient of the variable *Contsex*, positive and significant, shows that the premium received by female employees for the public-contest selection is much higher: 12.5%. As public contests are less discretionary than other private methods of recruitment, they are preferred by women (all else equal) because they can reduce gender discrimination. Consequently, we expect that the positive effect on wages of recruitment carried out by public contest is stronger for women than for men, as shown in Table 4.

The dummy *Public Contest* is more important for women than for men in both the young sample and in the full sample (respectively 0.202 vs. 0.122 and 0.246 vs. 0.160). The regression results for the wage equations by recruitment method and gender are presented in Appendix B (Table B1 and Table B2).

5 Public contests are gender-fair and merit-based selection methods

In the previous section we have found evidence that hiring carried out by public contest have a positive effect on earnings, more prominent for female and young employees. In this section we use the Oaxaca-Blinder (1973) standard methodology to decompose the GPG. Our aim is to estimate the GPG all else equal, and to find evidence of gender discrimination in our data (if any). We expect that both the GPG and discrimination are lower among public-contest selected employees. That is because we assume that public contests are merit-based and gender-fair, whereas other private

Table 4: Wage Regression by Age and Gender.

	(1)	(2)	(3)	(4)
Variables	Individuals Aged 18-64. Male Sample	Individuals Aged 18-64. Female Sample	Individuals Aged 18-34. Male Sample	Individuals Aged 18-34. Female Sample
Public Contest	0.122***	0.202***	0.160***	0.246***
	(0.0158)	(0.0172)	(0.0365)	(0.0345)
Exper	0.0251***	0.0173***	0.0186**	0.00736
	(0.00236)	(0.00266)	(0.00914)	(0.0103)
Exper2	-0.000370***	-0.000266***	-0.000845	-6.13e-05
	(4.97e-05)	(5.85e-05)	(0.000548)	(0.000616)
Tenure	0.00415***	0.00433***	0.0138***	0.0135***
	(0.000834)	(0.00104)	(0.00409)	(0.00484)
Educ	0.0214***	0.0331***	0.00414	0.0238***
	(0.00262)	(0.00308)	(0.00451)	(0.00558)
Ageychild	-0.00122	-0.00140	-0.00237	-0.000920
	(0.000824)	(0.000958)	(0.00251)	(0.00206)
Childrdummy	0.0612**	0.100***	0.0993	0.101
	(0.0279)	(0.0294)	(0.0930)	(0.0714)
Degree	0.126***	0.0433**	0.0570	0.0182
	(0.0224)	(0.0213)	(0.0381)	(0.0370)
Max-D-mark	0.116***	0.0403	0.152**	0.0292
	(0.0335)	(0.0259)	(0.0613)	(0.0459)
Married	0.0324	0.0499***	0.0598	0.0545
	(0.0217)	(0.0187)	(0.0445)	(0.0352)
Homeowner	0.0477**	0.0319	0.0544*	0.0157
	(0.0197)	(0.0211)	(0.0300)	(0.0350)
Child-care-aid	0.00961	-0.0585**	-0.0276	-0.0447
	(0.0273)	(0.0264)	(0.0969)	(0.0715)
Not-overeducated	0.0483***	0.106***	0.00251	0.0479*
	(0.0137)	(0.0165)	(0.0215)	(0.0268)
Constant	1.304***	1.132***	1.546***	1.231***
	(0.0576)	(0.0632)	(0.0909)	(0.112)
Observations	5,397	4,39	2,22	1,905
R-squared	0.272	0.294	0.061	0.109

The regression includes all variables used in the model and described in Appendix A, but the table shows only the most significant. Robust standard errors in parentheses - $***p < 0.01$, $**p < 0.05$, $*p < 0.1$

methods of recruitment are more discretionary and unregulated, in so creating the conditions for gender discrimination to flourish. By using the implicit assumptions in Oaxaca and Blinder (1973) we decompose the wage differential in three distinct parts; endowments, coefficients and interaction effect:

$$
\begin{aligned}
ln(\bar{W}_M) - ln(\bar{W}_F) &= \bar{X}_M^{'}\hat{\beta}_M - \bar{X}_F^{'}\hat{\beta}_F && (1)\\
&= (\bar{X}_M^{'} - \bar{X}_F^{'})\hat{\beta}_F + \bar{X}_F^{'}(\hat{\beta}_M - \hat{\beta}_F) + (\bar{X}_M^{'} - \bar{X}_F^{'})(\hat{\beta}_M - \hat{\beta}_F) && (2)
\end{aligned}
$$

where $(\bar{W}_M, \bar{W}_F)$ is the average wage for the male and female samples, respectively, with $\bar{X}_G$ and $\hat{\beta}_G$ being $(K \times 1)$ vectors of average characteristics and estimated coefficients for $G = (F, M)$, where $G = F$ is for female and $G = M$ is for male. The first term is the endowments effect that evaluates the GPG in terms of characteristics at the rate of return of the characteristics of women. As different endowments should have different effects on earnings, the difference in endowments represents the *explained* component in the Oaxaca three-fold decomposition. The second term is the coefficients effect evaluating the GPG in terms of different returns for women characteristics. As the same endowments should have the same effect on earnings for both men and women, coefficients should not differ by gender, which is why this term represents the *unexplained* part of the GPG. If the GPG depends mainly on the difference on characteristics returns, this may indicate the presence of gender discrimination. Last, the third term is the interaction effect that takes into account the simultaneous existence of differences in endowments and coefficients by gender.

Table 5 shows an important result, that is, recruitment carried out by public contest significantly reverses the GPG among young employees. In the young sample of individuals recruited by public contest our data show a strong GPG in favor of women (-17.4%). Moreover, this wage gap is all explained by endowments, i.e. by the fact that women have better observable characteristics than men. The component for discrimination (coefficients) is not significant; given the same observable characteristics for men and women, the difference in coefficients by gender is negligible (not statistically significant). Conversely, in the sample of young individuals not hired by public contest, the GPG is not significantly different from zero. In this case too, the component coefficients is not significant; meaning that there is no discrimination in pay at the early career. Instead, the coefficient for endowment is significant and negative, meaning that women have better observable characteristics than men. As we know from the literature, even small differences at the start may

expand greatly in the career path and give rise to large lifelong GPGs.

Our data show (Table 5) that the reversal of the GPG observed among public-contest selected young employees vanishes in the full sample of individuals aged 18-64 even if they are recruited by public contest. This is because the career path erodes the head start that young women receive by public-contest recruitment.

Table 5: Log Hourly Wages by Age, Gender and Method of Recruitment and Oaxaca Decomposition of the GPG.

Log- Hourly Wages	Coefficient	$P > \|z\|$
Public-Contest Selected Employees - Full Sample 18-64 (3,203 Observations)		
Differential		
Male Wages (Log- Hourly Wages)	**2,379393**	0
Female Wages (Log- Hourly Wages)	**2,381921**	0
Difference	-0,002528	0,876
Decomposition		
Endowments	-0,003303	0,735
Coefficients	0,0068167	0,672
Interaction	-0,006042	0,54
Employees Not Selected by Public Contest Full Sample 18 - 64 (6,584 Observations)		
Differential		
Male Wages (Log- Hourly Wages)	**2,004464**	0
Female Wages (Log- Hourly Wages)	**1,92555**	0
Difference	**0,0789141**	0
Decomposition		
Endowments	-0,022433	0,051
Coefficients	**0,0637489**	0
Interaction	**0,0375982**	0,002
Public-Contest Selected Employees Young Sample 18-34 (491 Observations)		
Differential		
Male Wages (Log- Hourly Wages)	**2,031359**	0
Female Wages (Log- Hourly Wages)	**2,191992**	0
Difference	**-0,160632**	0,001
Decomposition		
Endowments	**-0,131036**	0
Coefficients	-0,100022	0,15
Interaction	0,0704257	0,256
Employees Not Selected by Public Contest Young Sample 18-34 (3,634 Observations)		
Differential		
Male Wages (Log- Hourly Wages)	**1,843471**	0
Female Wages (Log- Hourly Wages)	**1,850177**	0
Difference	-0,006706	0,703
Decomposition		
Endowments	**-0,07368**	0
Coefficients	0,022447	0,257
Interaction	**0,0445273**	0,015
Statistically significant values in bold		
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$		

Although the best female productive characteristics are confirmed by a positive and significant coefficient for endowments in the full sample too, whenever the initial advantage of young women

is reabsorbed from the career path, the reversal vanishes and the GPG becomes not significantly different from zero.

Among employees not hired by public contest, the GPG becomes positive and signifcant (7.6%), and is almost entirely due to coefficients, that is to discrimination in the career path. Hence, in the case of non public-contest recruitment, the discriminatory part containing discrimination of the GPG is highly significant and makes up more than 80% of the gap of the full sample, while it is not significant among people in early careers.

6 Double sample selection. Model and Results

In the previous sections we find a reversal of the GPG in favor of women among public-contest selected young employees. We argue that the reversal is due to the fairness of the public-contest selection mechanism, that is, among public-contest selected employees women's characteristics are rewarded as men's ones. In order to prove this statement, we must control for any possible selection bias that may occur when the selection process into the considered subsample is not random and may be different for male and female workers (Heckman 1979). Earnings are observed only for the sector in which the individual is employed in (sector where the entry depends or not on a public contest) and thus the sectoral earnings equations cannot be consistently estimated using ordinary least squares regression due to the endogeneity of sectoral choice (often referred to as selection bias). The selection rule depends on two individual decisions; the decision to be employed and the sectoral choice (recruitment by public contest or not). Our setup refers to the case of a censored probit, i.e. *partial partial observability* by the definition of Meng and Schmidt (1985); the output of the first decision is always observed, but the output of the second decision is observed if and only if the individual participates in employment. In this paper, we do not take into account the selectivity bias that can stem from the participation in the labor market. We consider only individuals that have already chosen to participate in the labor market. We are aware of the fact that the selectivity bias that can stem from the participation to the labor force may be particularly relevant in Italy given the low female participation into the labor market (see De la Rica et al. 2008; Olivetti and Petrongolo 2008; Centra and Cutillo 2009). However, as this participation bias is well known for the Italian case, in this paper we prefer to focus on the double selection of employment and recruitment decisions only; i.e. the decision to accept a wage offer[6] (yes or no) and the decision to compete

[6]The observation of the wage may depend either from the decision of the employee to accept or not a job offer, or from the firm decision to hire or not the candidate. We assume that the selection into employment depends only on

in public contests (yes or no). The double selection approach allows simultaneous estimations of the worker's participation to employment and the employee's recruitment decision either for public-contest selected individuals or for employees not selected by public contest. The selection into wage work may depend on some positive factors such as individual ability, or motivation, or education quality, and so on that raise both the probability of being employed and wages, but are omitted in the estimates of earnings equation because they are unobservable in the data. Moreover, we need to correct for any possible endogeneity bias that may result when the condition of individuals recruited by public contest also depend on individuals decisions such as to accept to participate in a contest. The selection rules are described by the following relations:

$$\text{Employment Selection:} \qquad Y_{iE}^{*} = Z_i^{'}\gamma + u_{iE} \tag{3}$$

$$\text{Public-Contest Selection:} \qquad Y_{iPC}^{*} = Q_i^{'}\alpha + u_{iPC} \tag{4}$$

where Y_{iE}^{*} represents the unobserved indexes of that individual i uses to make the decision to work or not and Y_{iPC}^{*} represents the unobserved indexes of utility that individual i uses to make the decision to use the channel of public contests; with Z_i and Q_i being $(K_z \times 1)$ and $(K_Q \times 1)$ vectors of explanatory variables, respectively; and the u_i are assumed to be $N(0,1)$ with $cov(u_E, u_{PC}) = \rho$.

The model is completed with wage equations for paid-employees in both sectors. Moreover, we estimate the model separately for the female and the male sample. The model can be consistently estimated by Maximum Likelihood Estimation (MLE). Yet, the number of parameters to be estimated is rather large and the estimates we obtained by FMLE are unreliable. Therefore, we follow Tunali (1986) and Sorensen (1989) that extend the Heckman (1976, 1979), and Lee (1979, 1983) procedure by including selectivity coefficients as explanatory variables in the wage regression. The method proposed by Tunali (1986) is a two-step procedure that at the first step makes use of MLE for equations (2) and (3) to obtain consistent estimates of the correction (selectivity) terms; $\bar{\lambda}_E$ and $\bar{\lambda}_{PC}$. This procedure allows wages to be generated through multiple selection rules explicitly recognizing the roles of both the work decision and the recruitment decision for the determination of the individual's employment status. In Appendix B, Table B3 and Table B4, the estimation results of the bivariate probit regression for men and women are outlined. Adding the selection terms $\bar{\lambda}_E$ and $\bar{\lambda}_{PC}$ to the earnings equations allows us to consistently estimate the earnings for

the individual decision and not on the firm decision.

public-contest and non-public-contest selected, respectively (Lee 1983; Tunali 1986):

$$ln(\bar{W}_G^m) = \bar{X}_G^{m'}\hat{\beta}_G^m + \hat{\delta}_{E,G}^m\bar{\lambda}_{E,G}^m + \hat{\delta}_{PC,G}^m\bar{\lambda}_{PC,G}^m \tag{5}$$

where $m = (PC, NPC)$; $m = PC$ is for individuals selected by contest and $m = NPC$ is for individuals not selected by public not selected by public contest. Following Beblo et al. (2003), when considering selection in the sample, the decomposition expression (1) becomes:

$$\begin{aligned} ln(\bar{W}_M^m) - ln(\bar{W}_F^m) &= \bar{X}_M^{m'}\hat{\beta}_M^m - \bar{X}_F^{m'}\hat{\beta}_F^m & (6)\\ &= (\bar{X}_M^{m'} - \bar{X}_F^{m'})\hat{\beta}_F^m + \bar{X}_F^{m'}(\hat{\beta}_M^m - \hat{\beta}_F^m) + (\bar{X}_M^{m'} - \bar{X}_F^{m'})(\hat{\beta}_M^m - \hat{\beta}_F^m) & (7)\\ &+ (\hat{\delta}_{M,E}^m\bar{\lambda}_{M,E}^m - \hat{\delta}_{F,E}^m\bar{\lambda}_{F,E}^m) + (\hat{\delta}_{M,PC}^m\bar{\lambda}_{M,PC}^m - \hat{\delta}_{F,PC}^m\bar{\lambda}_{F,PC}^m) & (8) \end{aligned}$$

Public-contest selected employees (both men and women) may benefit from a double selection mechanism. If the selection effect of both the work decision and the recruitment decision is significant and positive, women and men selected by public contest would have higher unobserved characteristics and wages than women and men with the same observed characteristics not selected by public contest. We present in Table 6 definitions and values of the four selection variables we consider in this study, for both men and women in the full sample. Due to data restrictions, we are not able to estimate the selection effects for the young sample, 18-34 years. We study first the sign of λ's in the sample of individuals selected by public contest (λ_E^{PC} and λ_{PC}^{PC}). The positive sign of the coefficient λ_E^{PC} indicates the presence of sample selection bias, that is, individuals in employment are paid more than otherwise observationally identical unemployed individuals. This means that those unobserved characteristics raising the probability of being employed also increase wages. We find evidence that women recruited by public contest have higher positive unobserved characteristics and earnings than other women with similar observed characteristics and actually unemployed would have obtained if they were recruited by public contest.

The positive sign of the coefficient λ_{PC}^{PC} indicates that those unobserved positive characteristics raising the probability of winning a contest also increase wages. That is, individuals who are actually recruited by public contest have higher positive unobserved characteristics and wages than individuals not recruited by public contest would have obtained if they were recruited by public contest.

This bias is stronger for men, due to their higher employment rate that includes among employ-

Table 6: Selection Variables, Definition and Values

	Women	Men
λ_E^{PC} measures the selection bias from the *work decision* for those selected by public contest	**0.1865278*** **	0.3331715
λ_{PC}^{PC} measures the selection bias from the *recruitment decision* for those selected by public contest	**0.2927062*** **	**0.3940814***
Observations	1,718	1,485
λ_E^{NPC} measures the selection bias from the *work decision* for those NOT selected by public contest	0.1478356	-0.1475796
λ_{PC}^{NPC} measures the selection bias from the *recruitment decision* for those NOT selected by public contest	**-0.331799*** **	**-0.3383643*** **
Observations	2,672	3,912

Statistically significant values in bold
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

ees not selected by public contest also individuals with a very low occupational profile (finding a job is men's primary responsibility). As only the very best men are selected by public contest, the difference in positive unobserved characteristics and wages is higher for men than for women. As caretaking is women's primary responsibility, women with low occupational profiles are more likely to be out of employment (instead of employees not selected by public contest) due to female higher opportunity cost of time. We turn now to study the sign of λ's in the sample of individuals not selected by public public contest (λ_E^{NPC} and λ_{PC}^{NPC}). The selectivity variable λ_E^{NPC} λ_E^{NPC} is not statistically significant, that is employees not selected by public contest have near the same unobserved characteristics and wage offers than unemployed individuals. On the contrary, as expected, the selectivity variable λ_{PC}^{NPC} is negative and statistically significant, that is employees recruited without public contest have lower levels of positive unobserved characteristics and wage offers than individuals actually selected by public contest.

Our results in Table 6 strengthen the results found in Section 5; Public contests are merit-based selection methods. The value of λ_E^{PC} (female coefficient) in Table 6, positive and significant, confirms that women selected by contest have better unobserved characteristics than unemployed women. Moreover, the value of λ_{PC}^{PC}, positive and significant, confirms that women selected by

public contest have better unobserved characteristics than women not selected by public contest. As expected, the female coefficient of λ_{PC}^{NPC}, negative and significant, provides a further confirmation of the fact that public contest is a merit-based selection method; indeed women not selected by public contest have worse unobserved characteristics. The values of the male coefficients λ_{PC}^{PC} and λ_{PC}^{NPC}, positive and significant the first, negative and significant the second, confirm the fact that public contest is a merit-based selection methods also for men.

Last, the value of λ_{E}^{PC} positive and significant for women and not significant for men, confirms once again that women have better unobserved characteristics than men among public-contest selected employees.

In the Oaxaca-Blinder decomposition of the GPG among public-contest selected employees the component for discrimination (coefficients) is never significant, either with or without selection. In Table 5 (Oaxaca without selection) discrimination is not statistically significant either for the full sample of individuals aged 18-64 or for the young sample. Also in Table 7 (Oaxaca with selection) the coefficient for discrimination is not significant among public-contest selected employees (full sample). Therefore, controlling for selection confirms the results of Section 5. As in both cases, with and without selection, the discrimination coefficient turns out to be not statistically significant, public contests are gender-fair selection methods.

When we look at the employees not selected by public contest (Table 5, Oaxaca without selection), the coefficient for discrimination is significant and causes a significant GPG (7.6%) for the full sample of individuals aged 18-64. Also in Table 7 (Oaxaca with selection) the coefficient for discrimination is positive and significant among employees not selected by public contest. Therefore, also in this case, we confirm the findings of Section 5; in the case of non public-contest recruitment, the labor market is not a gender-fair selection mechanism.

Table 7: Oaxaca Decomposition of the GPG by Method of Recruitment (with Selection)

	Employees Not Selected by Public Contest Full Sample 18-64 (6,584 Observations)		Public-Contest Selected Employees Full Sample 18-64 (3,203 Observations)	
Log. Hourly Wages	Coefficient	$P > \|z\|$	Coefficient	$P > \|z\|$
Endowments	**-0.0345393**	0.00202612	0.01229034	0.42537277
Coefficients	**0.31504413**	0.08295	-0.17083547	0.51629527
Interaction	**0.0442252**	0.00058638	-0.00467105	0.7482381
λ_E	-0.22854093	0.24811172	**-0.05201955**	0.01649974
λ_{PC}	-0.01727497	0.7254131	0.2127077	0.39046751

Statistically significant values in bold
$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

7 Conclusion

We study the effect of hiring methods on earnings and we show that public-contest selection reduces the conditions for gender discrimination to flourish. We argue that public contests are merit-based and gender-fair mechanisms for performance appraisal. They are merit-based because employees hired by public contest hold better observable and unobservable characteristics than unselected employees. They are gender-fair because among public-contest selected employees women's characteristics are rewarded as men's ones, in so indicating the absence of gender discrimination. The GPG, if any, only depends on the difference in women's and men's characteristics. We prove that recruitment carried out by public contests erases the GPG in the full sample of individuals aged 18-64, and even reverse the gap in favor of women among young employees. To the best of our knowledge, no other research establishes such a relationship between recruitment procedures and the reversal of the GPG. This merit-based procedure picks out the most deserving participants because it is less discretionary and more regulated by law than other screening devices.

Our data show that the positive effect of public-contest selection impacts to a greater extent in the early career. Among young employees earnings increase of 15.8% if individuals are selected by public contest (compared to the non-selected). Moreover, the Oaxaca-Blinder decomposition of the GPG shows that discrimination is lower (or even not statistically significant) among public-contest selected employees. Hence, public contests are merit-based and gender-fair selection methods.

The implication is that we observe in the young sample of individuals recruited by public contest a strong wage gap in favor of women (-17.4%). Moreover, this gap is all explained by endowments, i.e. by the fact that women have better observable characteristics than men. The component for discrimination (coefficients) is not significant; if men had the same productive characteristics than women, they would have their own wages. Our data also show that the reversal of the GPG observed among public-contest selected young employees vanishes among individuals aged 18-64, even if they are recruited by public contest. This is because the career path erodes the head start that young women receive by public-contest recruitment. The best female characteristics are confirmed by a positive and significant coefficient for endowments in the full sample too, but whenever the initial advantage of young women is reabsorbed from the career path, the GPG becomes not significantly different from zero. On the contrary, among employees not hired by public contest the GPG is positive and significant (7.6%), and it is entirely due to coefficients, that is to discrimination in the career path. By comparing the values of coefficients in the Oaxaca-Blinder decomposition we

definitely draw the conclusion that public-contest recruitment is a gender-fair screening device.

Compliance with Ethical Standards: The authors declare that they have no conflict of interest.

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Appendix A: Definition of Variables

Table A1: Definition of Variables

Variable Name	Definition
	Dependent Variables
Work Decision	One if the respective individual decided to work for pay, zero if unemployed
Public Contest	One if the respective individual was selected by public contest, zero otherwise
Net Hourly Wages	Hourly wages in Euros and net of taxes and social security contributions
	Independent Variables
Female	One if the respective individual is a woman, zero otherwise
Contsex	Interactive effect of Public Contest and Female, i.e. one if employee entered via public contests in current job and is female, zero otherwise
Exper	Number of years of prior work experience
Exper2	Exper squared
Tenure	Number of years worked for current employer
Educ	Number of years of schooling completed
Degree	One if completed a degree, zero otherwise
High School	One if highest education was high school, zero otherwise
Primary Education	One if highest education obtained was primary education, zero otherwise
Secondary Education	One if highest degree obtained was secondary education, zero otherwise
Managers	Intellectual professions; scientific, and highly specialized occupations
Intermediate Professions	Intermediary positions in commercial, technical or administrative sectors, health services, technicians.
White-collar Workers	Commercial, technical and administrative employees and clerks.
Age	Age of individual (in years)
Age5064	One if age is between 50 and sixty years, zero otherwise
Big Firm	One if firm has at least 10,000 workers, zero otherwise
Public	One if firm is a publicly owned firm, zero otherwise
Private	One if firm is a privately owned firm, zero otherwise
City	One if individual is located in a metropolitan area, zero otherwise
Full-time	One if worked at least 1,840 hours last year, zero otherwise
Married	One if married, zero otherwise
Childrdummy	One if individual has at least one child, zero otherwise
Ageychild	Age of youngest child
Not-Overeducated	One if education is required to perform the job, zero 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 equations
North	One if individual lives and works in the North of Italy, zero otherwise
Centre	One if individual lives and works in the Centre of Italy, zero otherwise
Father College Degree	One if employee's father possesses a university degree, zero otherwise
Mother College Degree	One if employee's mother possesses a university degree, zero otherwise
Father Secondary Degree	One if employee's father possesses an high school degree, zero otherwise
Mother Secondary Degree	One if employee's mother possesses an high school degree, zero otherwise
Father in Work	One if employee's father was working when employee was 14, zero otherwise
Father Self-employed	One if employee's father was working as self-employed when employee was 14, zero otherwise
Father Manager	One if employee's father was a manager when employee was 14, zero otherwise
Father Executive Cadre	One if employee's father was an executive cadre when employee was 14, zero otherwise
Father White Collar	One if employee's father was a white collar when employee was 14, zero otherwise
Mother in Work	One if employee's mother was working when employee was 14, zero otherwise
Mother Self-employed	One if employee's mother was working as self-employed when employee was 14, zero otherwise
Mother Manager	One if employee's mother was a manager when employee was 14, zero otherwise
Mother Executive Cadre	One if employee's mother was an executive cadre when employee was 14; zero otherwise
Mother White Collar	One if employee's mother was a white collar when employee was 14, zero otherwise
Sectoral Dummies	21 sectoral dummies for the type of economic activity performed according to the ATECO 2007 Classification of Economic Activity used as controls in the earnings equation
Max-D-mark	One if employee achieved the maximum degree mark, zero otherwise
Homeowner	One if employee owns a house, zero otherwise
Child-care-aid	One if aid for child care is available to employee, zero otherwise
Partner-works	One if partner is employed, zero otherwise
Eng-skill	One if individual is able to communicate in English, zero otherwise
Italian	One if individual is Italian, zero otherwise
	Selection Variables
λ_E^{PC}	Measures the selection bias from the work decision for those selected by public contest
λ_{PC}^{PC}	Measures the selection bias from the recruitment decision for those selected by public contest.
λ_E^{NPC}	Measures the selection bias from the work decision for those not selected by

	public contest
λ_{PC}^{NPC}	Measures the selection bias from the recruitment decision for those not selected by public contest

Appendix B: Estimation results

Table B1: Wage Regression. Sample of Public-Contest Selected Individuals by Gender

	(1)	(2)
VARIABLES	Women	Men
Exper	0.0282***	0.0403***
	(0.00637)	(0.0101)
Exper2	-4.87E-05	-0.000385***
	(8.31E-05)	(0.000106)
Tenure	0.00286**	0.00218
	(0.00137)	(0.00162)
Educ	0.0962***	0.0857***
	(0.0156)	(0.025)
Age-y-child	-0.00308**	-0.00142
	(0.0013)	(0.00136)
Childrdummy	0.0831**	0.102**
	(0.0388)	(0.0443)
Degree	0.0289	0.104***
	(0.026)	(0.0359)
Maximum-d-mark	0.0741***	0.110**
	(0.0284)	(0.0442)
Married	0.0573**	-0.0308
	(0.0259)	(0.044)
Homeowner	0.0608**	0.0918**
	(0.0308)	(0.04)
Child-care-aid	-0.0537	0.076
	(0.0357)	(0.0554)
λ_E^{PC}	0.1865***	0.3332
	(0.0707)	(0.422)
λ_{PC}^{PC}	0.2927***	0.3941*
	(0.107)	(0.216)
Constant	-0.306	-0.442
	(0.481)	(0.892)
Observations	1,718	1,485
R-squared	0.248	0.251

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table B2: Wage Regression. Sample of Not-Public-Contest Selected Individuals by Gender

		(1)	(2)
VARIABLES		Women	Men
Exper	0.00978**	0.0154***	
	(0.00419)	(0.00301)	
Exper2	-0.000252***	-0.000297***	
	(9.40E-05)	(6.19E-05)	
Tenure	0.00364**	0.00409***	
	(0.00157)	(0.000995)	
Educ	0.00984	-0.00388	
	(0.0109)	(0.00723)	
Age-y-child	-0.00250*	-0.00171	
	(0.00148)	(0.00116)	
Childrdummy	0.046	0.0293	
	(0.0578)	(0.0383)	
Degree	-0.0287	0.0576*	
	(0.0331)	(0.03)	
Maximum-d-mark	0.00873	0.0843*	
	(0.0436)	(0.0495)	
Married	0.0724**	0.047	
	(0.0304)	(0.0463)	
Homeowner	0.0216	0.0447**	
	(0.0278)	(0.0225)	
Child-care-aid	-0.0392	0.0179	
	(0.04)	(0.0361)	
λ_E^{NPC}	0.1478	-0.1476	
	(0.191)	(0.153)	
λ_{PC}^{NPC}	-0.3318***	-0.3384***	
	(0.0636)	(0.0943)	
Constant	1.148***	1.715***	
	(0.405)	(0.24)	
Observations	2,672	3,912	
R-squared	0.146	0.196	

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table B3: Bivariate Probit Estimation by Gender

	(1)	(2)	(3)	(4)	(5)	(6)
	Women			Men		
VARIABLES	Public Contest	Employment		Public Contest	Employment	
Childrdummy		-0.309***			0.131*	
		(0.0507)			(0.07)	
Age	0.0737***	0.0224***		0.0480***	0.00435*	
	(0.00432)	(0.00255)		(0.00369)	(0.00247)	
Educ	0.161***	0.0931***		0.114***	0.0544***	
	(0.0072)	(0.00415)		(0.00649)	(0.00443)	
Married		0.0657			0.309***	
		(0.0552)			(0.061)	
Age-y-child	-0.00088	0.00255		0.00247	0.00591**	
	(0.0024)	(0.00201)		(0.00197)	(0.00262)	
North		0.808***			0.655***	
		(0.0321)			(0.0332)	
Centre		0.461***			0.409***	
		(0.0394)			(0.0409)	
Age5064		0.739***			0.419***	
		(0.0685)			(0.065)	
Partner-works		0.0406			0.186***	
		(0.0475)			(0.0526)	
Exper	-0.00409			-0.000162		
	(0.00397)			(0.00353)		
Eng-skill	-0.117**			-0.129***		
	(0.0481)			(0.0437)		
Italian	-1.378***			-0.880**		
	(0.369)			(0.414)		
City	-0.0783*			0.122***		
	(0.0457)			(0.0391)		
Constant	-5.727***	-2.552***		-4.476***	-1.117***	
	(0.164)	(0.0949)		(0.117)	(0.0905)	
Athrho			0.518***			1.557
			(0.116)			(1.052)
ρ			0.476		0.915	
			(0.089)		(0.171)	
Observations	9,033	9,033		8,242	8,242	8,242

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The two binary outcomes, *Public Contest* and *Employment*, are strongly positively correlated; with $\rho = 0.42$. Hence, the two decisions need to be modeled jointly. In Table B3, we estimate via a bivariate probit regression, the decision to enter employment via public contest and the decision to become employed. The parameter ρ measuring the correlation of the residuals from the two models shows that the unobservable parts of the two equations are strongly correlated for both, men and women. For the female sample, ρ equals to 0.48 and is highly statistically significant (log likelihood ratio, LLR, statistic = 22.19). Similarly, also the ρ for the male sample, amounting to 0.92, is highly statistically significant with LLR statistic equal to 0.33. The coefficient of ρ is positive in either case pointing to the fact that the unobservable components of the two decisions are positively correlated. The LLR test (see Table B4) shows that the two equations are not independent and thus underlines the importance of taking both decisions into account. In both cases, the null hypothesis, $H_0 : \rho = 0$, is rejected at a 1% level of significance, with the corresponding χ^2-statistics going from 1,341.57 for the male estimation to 1,526.47 for the female estimation. Hence, the results suggests that there are positive and significant selection or truncation effects and those who select into public-contest employment get higher wages than a randomly chosen individual not selected into public-contest recruitment with a similar set of characteristics would get.

Table B4: Log Likelihood Test of Independent Equations, $H_0 : \rho = 0$:

	χ^2-statistics	-2LL	LLR statistics[7]	$Prob > \chi^2$
Women	1,526.47	14,441.02 (unrestricted model) 14,463.21 (restricted model)	22.19	0.0000
Men	1,341.57	14,075.45 (unrestricted model) 14,105.78 (restricted model)	30.327	0.0000

Appendix C: Methodological issues

The probabilities of observing a positive labor income given recruitment through public contests or recruitment through other channels are given below:

$$Pr(Y_E^* > 0, Y_{PC}^* > 0) = Pr(u_E > -Z^{'}\gamma, u_{PC} > -Q^{'}\alpha) = G(Z^{'}\gamma, Q^{'}\alpha, \rho) \tag{9}$$

$$Pr(Y_E^* > 0, Y_{PC}^* \leq 0) = Pr(u_E > -Z^{'}\gamma, u_{PC} \leq -Q^{'}\alpha) = G(Z^{'}\gamma, -Q^{'}\alpha, -\rho) \tag{10}$$

where $G(.)$ is the standard bivariate normal distribution and ρ is the correlation coefficient between the two selection rules. Under the assumption that the two selection rules are not independent, that is $\rho \neq 0$, maximum likelihood of the bivariate probit leads to the following selection terms for public-contest selected employees, $m = PC$:

$$\lambda_E^{PC} = \frac{f(Z^{'}\gamma)F[\frac{Q^{'}\alpha - \rho Z^{'}\gamma}{\sqrt{1-\rho^2}}]}{G(Z^{'}\gamma, Q^{'}\alpha, \rho)} \tag{11}$$

$$\lambda_{PC}^{PC} = \frac{f(Q^{'}\alpha)F[\frac{Z^{'}\gamma - \rho Q^{'}\alpha}{\sqrt{1-\rho^2}}]}{G(Z^{'}\gamma, Q^{'}\alpha, \rho)} \tag{12}$$

Similarly, for the subsample of non-public-contest selected individuals, $m = NPC$, the corresponding selection terms are given by:

$$\lambda_E^{NPC} = \frac{f(Z^{'}\gamma)F[-\frac{Q^{'}\alpha - \rho Z^{'}\gamma}{\sqrt{1-\rho^2}}]}{G(Z^{'}\gamma, -Q^{'}\alpha, -\rho)} \tag{13}$$

$$\lambda_{PC}^{NPC} = \frac{f(Q^{'}\alpha)F[\frac{Z^{'}\gamma - \rho Q^{'}\alpha}{\sqrt{1-\rho^2}}]}{G(Z^{'}\gamma, -Q^{'}\alpha, -\rho)} \tag{14}$$

$f(.)$ is the standard normal density, while $F(.)$ is the standard normal distribution and ρ is the correlation coefficient between the two selection rules.

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