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Sorting Through Affirmative Action: Three Field Experiments in Colombia*

Marcela Ibañez† Ashok Rai‡ Gerhard Riener§

April 2015

Abstract

Affirmative action to promote women's employment is a intensely debated policy. Do affirmative action policies attract women and does it come at a cost of deterring high qualified men? In three field experiments in Colombia we compare characteristics of job-seekers who are told of the affirmative action selection criterion before they apply with those who are only told after applying. We find that the gains in attracting female applicants far outweigh the losses in male applicants. Affirmative action is more effective in areas with larger female discrimination and deters male job-seekers from areas with low discrimination.

JEL code: J21, J24, J48, C93

Keywords: Field experiment; Affirmative Action; Labor market; Gender participation gap

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1 Introduction

Affirmative action policies are the subject of intense and polarized debate [Cohen and Sterba, 2003, Fullinwider, 2011]. Supporters point to the opportunities to address historical and statistical discrimination and to the advantages of diversity in both the workplace and in the classroom [Weber and Zulehner, 2014, Clayton and Crosby, 1992]. Critics contend that affirmative action is reverse discrimination [Newton, 1973], violates the principle of merit [Walzer, 1983, pp. 143–154] and can lead to economic inefficiencies [Coate and Loury, 1993]. In this paper we study the sorting of job applicants in response to affirmative action. We analyze some of the key questions in the debate in a naturally-occurring labor market: Do affirmative action policies for women actually encourage women to apply for jobs? Does this come at the cost of fewer applications from men? What kind of women are attracted to an affirmative-action job? What kind of men are deterred?

We conducted this study in Colombia, a country with substantial degree of female segregation in the labor market [see the review in Peña et al., 2013]. Although the proportion of women who complete a university degree in Colombia is larger than that of men (57.6 percent for undergraduates and 50.9 percent for graduates), women are only 70% as likely as men to enter the labor force. Besides employment rate and average earnings are higher for men than women.[1] In response to these inequalities, the government adopted affirmative action rules for higher political office. Yet, affirmative action is not commonly used in the private sector and hence Colombia provides a controlled environment to test for the effect of the voluntary introduction of this policy.

To investigate the effect of affirmative action on the labor market, we conducted three large-scale field experiments. In two of the experiments the announced positions concerned research assistants and the third experiment concerned the hiring of a consultant to work for a consultancy. In all of the experiments we apply a two stage design. In the first stage we recruited a large pool of job-seekers posting job advertisements. In the second stage we randomly varied the information that interested job-seekers received. Half of the job-seekers were told that affirmative action would play a role in selection before they completed the application form; the other half were informed of the affirmative action policy only after the application process was completed. This procedure has two main advantages: First it allows us to measure the impact of affirmative action on application rates, or the proportion of candidates of each gender to apply to a position. Second it allows us to observe personal characteristics of job-seekers before the policy is announced. Hence, we can attribute differences in the resulting distribution of characteristics of applicants to the affirmative action

[1] Cepeda and Barón (2012) estimate that female average salary is about 6.8% lower for women once that differences in field of study are accounted for.

policy.

We use two different affirmative action rules. The research-assistant experiments used a quota rule for selection: fifty percent of the positions were reserved were women. The consultant experiment used a preferential treatment rule: women with equal qualifications would be preferred.

Affirmative action policies might reduce perceived competitiveness and induce more women to apply but this policy might eventually worsen the problem. For instance, if women anticipate a patronization equilibrium, in the spirit of Coate and Loury [1993] in which they are receiving the job as "token" females, they might choose not to apply as their self-image would suffer [Heilman et al., 1992, Unzueta et al., 2010, Bracha et al., 2013]. Our results establish that affirmative action has no such perverse selection effects. Our main finding is that affirmative action encourages women to apply – and this does not come at the expense of reducing male applications. In the three experiments, women are 5 to 20 percent more likely to apply with affirmative action than without. In two of the experiments there is no significant deterrence of males; in one research-assistant experiment males are 9 percent less likely to apply with affirmative action than without. That loss is made up by an equal gain in female applicants, however.

Furthermore, we compared the applicant pool with and without affirmative action on a variety of dimensions. For all three experiments we collected basic information on qualifications (experience, performance in cognitive tests and performance in similar job) before manipulation. Our results indicate that there are non-linear effects of qualification on the likelihood to apply. Under affirmative action, the best qualified women and men are more likely to apply to the job offers than under the control treatment.

For the most recent experiment we also collected information on cognitive abilities, personality tests and attitudes towards risk and time before manipulation. We found evidence of differences in personality types with female applicants being more impulsive in the affirmative action treatment compared with the control. No differences are found with respect to risk and time preferences for the applicants under affirmative action.

In order to further investigate the selection effects of affirmative action, in the two assistant experiments we allow applications from job-seekers from any area of studies. This allows us to compare, how female discrimination affects applications by male and female candidates. Interestingly, our results suggest that in the absence of affirmative action, discrimination in the labor market, measured as gender differences in average income, discourages female applicats.Affirmative action is effective at closing this gap by attracting female candidates from areas with high discrimination without creating discouraging effects on male applicants.

This study contributes to the literature on female segregation in labor markets. It is, to the

best of our knowledge, the first paper that provides field evidence on the impact of affirmative action policies in favor of women on sorting in the labor market. Few papers use natural experiments to test if affirmative action policies encourage minority students to apply for college and the results are rather mixed [Long, 2004, Card and Krueger, 2005, Dickson, 2006, Hinrichs, 2012]. Bertrand et al. [2010] consider the impacts of affirmative action policies that favor university admission from low cast students in India. They find that the marginal low cast entrant comes from a less advantaged background than the marginal high-cast displaced indicating that the policy favors the target population. Our paper is complementary to these papers by considering the sorting effects of affirmative action policies that favor women in the work place.

Most of the papers on sorting effects of affirmative action in a labor market settings refer to laboratory experiments. Niederle et al. [2013], Balafoutas and Sutter [2012] and Calsamiglia et al. [2013] consider self-section into a tournament and find that affirmative action rules can incentivize women to enter into competitive environments. The field context in which we conduct the experiment allows to capture dimensions different from aversion to competition that constraint women from participating in the labor market. For instance, cultural norms towards women working, availability of childcare and support at home can play and important role explaining female participation in the labor market [Fogli and Veldkamp, 2011, Fernández, 2013, Bauernschuster and Schlotter, Forthcoming, Barone and Mocetti, 2011, Coen-Pirani et al., 2010] [Bauernschuster and Schlotter, Forthcoming] [Barone and Mocetti, 2011, Coen-Pirani et al., 2010] . Besides, unlike lab experiments, participants in the our field experiment are unaware that they are participating in an experiment, and hence, our results are not subject to experimental demand effects that could confound the findings from previous lab experiments.

Previous work using field evidence examined the sorting of workers into different jobs considering the effect of job characteristics and incentive schemes. For instance Bellemare and Shearer [2010] or Bonin et al. [2007] consider the effect of wage volatility, Guiteras and Jack [2014] and Dal Bó et al. [2013] consider the effect of value of the compensation, Ashraf et al. [2014] consider the salience of career incentives Eriksson et al. [2009], Dohmen and Falk [2011] and Flory et al. [2014] consider the effect of competitive versus individual remuneration schemes, Fernandez and Friedrich [2011] and Barbulescu and Bidwell [2013] consider the type of job (male vs female stereotypical jobs); Lefebvre and Merrigan [2008] and Havnes and Mogstad [2011] consider the the impact of provision of child care. Our paper is complementary to this research as it considers the impact of affirmative action rules on job-seekers sorting, a topic not explored in this literature yet.

Theoretical models on affirmative action mainly attempted to explain i) the long effects

of affirmative action on incentives to exert effort and ii) the impact on performance on admission tests. However, the predictions are quite mixed.[2] For instance Coate and Loury [1993] finds that affirmative action policies that fosters minorities by decreasing the standard of performance can decrease the incentives to invest in education, while Moro and Norman [2003] finds opposite results using a general equilibrium model with endogenous human capital formation. Regarding the effect on effort during admission test, various models have shown that affirmative action can induce higher effort if underlying initial heterogeneity among preferred and non preferred groups is not too large and if competition is increased [Fu, 2006, Fain, 2009, Franke, 2012]. Yet, models than consider different forms of heterogeneity among potential candidates can lead to opposite results [Hickman, 2010, Balart, 2011]. The sorting effects of voluntary affirmative action policies have not been discussed extensively in the literature. We therefore adapt Borjas model (1987) to conceptualize the sorting effects of affimative action and derive predictions concerning our setup.

Previous empirical research has focused on the impacts of affirmative action policy on political and labor market outcomes (see Holzer and Neumark, 2000 for a review on early non experimental evidence on the effects of affirmative action in the work place and Dahlerup, 2012). In this paper, we focus only on the selection effects of affirmative action and do not consider the impacts in performance in the work place. Recently, Howard and Prakash [2012] considered the effect of a female quota rules on public employment in India and find that this policy increases representation of women from scheduled castes in high-skilled occupations. While they consider the effect of the policy on final employment outcome (the combination of supply and demand effects), we consider the sorting effect of the policy and focus on the supply side effects. Moreover, our experimental approach allows investigating the effects of affirmative action on a large set of characteristics of the applicant pool (qualifications, risk and time preferences, personality, socioeconomics) a topic not addressed previously.

The remainder of the paper is organized as follows: Section 2 presents the conceptual framework. Section 3 describes the local context of the labor market in Colombia while Section 4 presents the experimental design and procedures. The results are presented in Section 5. We conclude with a discussion in Section 6.

2 Conceptual framework

The effect of affirmative action on self-selection in the labor market can be conceptualized using Roy's (1951) selection model. For that, it is useful to follow the conceptualization of Borjas [1987]. In the context of affirmative action policies, agents decide whether to apply

[2]For a recent review article on models of discrimination and affirmative action see Fang and Moro [2010].

to a firm that uses affirmative action which we will refer to as the AA firm. Log expected earnings in the AA firm are given by:

$$w_1 = \mu_1 - C + \varepsilon_1$$

where, $\varepsilon_1 \sim N(0, \sigma_1^2)$. The term μ_1 is the expected earnings in the AA firm that depend on the probability to be hired, π and the wage level for a given qualification level, ω. C is the application cost which we assume to be the same for applications to all firms. The term ε_1 captures unobserved factors that affect earnings. We assume that job-seekers otherwise confront a discriminatory labor market in which the log earnings are different across gender. We refer to the conditions in the discriminatory labor market as the D market. In the D market, log earnings for men, M, and women, F, are given by:

$$w_{M0} = \mu_{M0} + \varepsilon_{M0}$$

$$w_{F0} = \mu_{F0} + \varepsilon_{F0}$$

where $\mu_{F0} < \mu_{M0}$; $\varepsilon_{kD} \sim N(0, \sigma_{k0}^2)$ for $k \in \{M, F\}$. We assume that workers know the components of the earning functions in AA firm and in the D market. Further, we assume that there are no differences in application cost by men and women. The self-selection decision rule implies that job-seekers apply to the firm that uses affirmative action if:

$$I = \mu_1 - \mu_{k0} - C + \varepsilon_1 - \varepsilon_{k0} > 0$$

If women are discriminated in the labor market and receive lower mean expected earnings than men, wage discrimination implies that female applicants have a higher marginal incentive to apply to the firm using affirmative action than male applicants. The larger the gender wage gap, the larger the incentive for female job-seekers to apply and the lower the incentive for male job-seekers to apply. We summarize this in our first proposition:

Proposition 1. *A firm that uses an affirmative action policy attracts more female than male applicants in a discriminatory labor market characterized by a gender wage gap where women receive lower wages.*

Affirmative action policies, can however generate selection biases by endogenous selection of workers into the AA firm. The conditional earnings in the D market for job-seekers who apply to the AA firm are given by:

$$E(w_0 \Big| I > 0) = \mu_0 + E(\varepsilon_0 \Big| I > 0)$$

while, the expected earnings for applying to the AA firm are:

$$E(w_1 \Big| I > 0) = \mu_1 - C + E(\varepsilon_1 \Big| I > 0)$$

under normality assumptions, the conditional means of earnings for workers who sort in the AA firm are given by:

$$E(w_{k0} \Big| I > 0) = \mu_{k0} + \frac{\sigma_{k0}\sigma_1}{\sigma_v}(\rho - \frac{\sigma_{k0}}{\sigma_1})$$

$$E(w_1 \Big| I > 0) = \mu_1 - C + \frac{\sigma_{k0}\sigma_1}{\sigma_v}(\frac{\sigma_1}{\sigma_{k0}} - \rho)$$

where $k \in \{M, F\}$, σ_v is the correlation between of the error terms $(\varepsilon_1 - \varepsilon_{k0})$, and $\sigma_{k01} = cov(\varepsilon_{k0}, \varepsilon_1)$ and ρ is the correlation of ε_0 and ε_1. This expression shows that the average job-seeker who is willing to self-select in the AA firm is better than the average job-seeker in the D market if $\left(\rho - \frac{\sigma_{k0}}{\sigma_1}\right) > 0$. This worker would also out-perform other workers in the AA firm if $\left(\frac{\sigma_1}{\sigma_{k0}} - \rho\right) > 0$. Hence, positive sorting, in which relatively better performing candidates in the D firm sort into the AA firm and out-perform other job-seekers in this firm ($Q_0 = E\left(\varepsilon \Big| I > 0\right) > 0$ and $Q_1 = E\left(\varepsilon_1 \Big| I > 0\right) > 0$) occurs when $\frac{\sigma_1}{\sigma_{v0}} > 1$ and $\rho > \min\left(\frac{\sigma_1}{\sigma_0}, \frac{\sigma_0}{\sigma_1}\right)$. The first expression implies that the distribution of earnings in the AA firm is more spread than in the D firm. The second expression implies that there is significant correlation in earnings in the AA firm and D firm.

On the other hand, negative hierarchical sorting in which the worst job-seekers in the D firm self-select to apply to the AA firm and are also worst that the average applicants in the second firm ($Q_0 < 0$ and $Q_1 < 0$) occurs when $\frac{\sigma_0}{\sigma_1} > 1$ and $\rho > \min\left(\frac{\sigma_1}{\sigma_0}, \frac{\sigma_0}{\sigma_1}\right)$. This means that the distribution of earnings in the AA firm are more concentrated than in the D firm. Besides, as before, there is substantial correlation in earnings in both firms.

In a discriminatory labor market, it is reasonable to assume that earnings of the discriminated gender (female) would be more concentrated than earning of the privileged gender (male) so $\sigma^2_{F0} < \sigma^2_1 < \sigma^2_{M0}$. This leads to our second hypothesis:

Proposition 2. *If affirmative action policy eliminates differences in the spread of the earnings distributions such that $\sigma^2_{F0} < \sigma^2_1 < \sigma^2_{M0}$, there will be positive hierarchical sorting for women and negative hierarchical sorting for men provided that the correlation of skills values is sufficiently high.*

3 Context

To test the predictions of the above model and evaluate the sorting effects of affirmative action rules on job applications, we conducted three labor market field experiments in Colombia. The labor market in Colombia—as in other countries in Latin America—offers conditions that are less favorable for women than for men (UNDP, 2013). Female participation rate in the labor market is lower than that from men. Only six of every ten women participate in the labor market compared with 7.5 men of ten who do so. Once than women enter into the labor market, they confront higher unemployment rate, engage in less productive sectors and receive lower average salaries. Between, 1984 and 2010 the average female unemployment rate was five percentage points higher than that from men [Peña et al., 2013]. Besides, it is observed large segregation in the labor maket, where women tend to be under represented in the formal sector compared with men (Chioda, 2011). Only 32 percent of employed women work in the formal sector compared with 46 percent of men. Average wage for males are 13 to 25 percent higher than those for women [Badel and na, 2010, Hoyos et al., 2010].

Although less pronounced, gender disparities are also observed for population with university degree. Table 1 presents descriptive statistics of the national representative survey to graduated students conducted by the Colombian Ministery of Education (Ministery of Education, 2010) among 24 thousand graduated students from different levels of education. We focus on the sample of 22 thousand graduates with bachelor or master degree. Panel A presents the descriptive statistics for graduates with a bachelor title, while Panel B refers to graduates with a Master title.

The most common areas of study are engineering, economics and social sciences who represent 77 percent of all bachelor titles. While women represent a larger share of recent graduates (57 percent of bachelors and 50.6 percent of masters), they confront worse employment conditions than male graduates. In four of the eight areas of study the employment rate of women is significantly lower than that from men. In the area of economics, for example, the average employment rate of female graduates with bachelor title is two percentage points lower than that for male graduates, while this difference is about four percentage points for graduates with a master title. Inequalities in the labor market are also observed on the average income. Depending on the area of study, the average salary of females is between nine to twenty percent lower than that of male bachelor graduates. For bachelor graduates in economic, this difference is of twelve percentage points.

Discrimination in the labor market varies according to the area of study. Expected earnings, calculated as the average monthly income times the average employment rate by area of study, is significantly lower for women than men in four of the eight areas of study. For

Table 1: Labor Market Colombia

Panel A: Bachelor

	Graduates		Participation Rate			Employment Rate			Monthly Income			Std. Dev. Income		
		Female	Male	Female	PrTest	Male	Female	PrTest	Male	Female	t-test	Male	Female	test
Agricultural sciences	0.016	0.342	0.980	0.962		0.805	0.735		1502.618	1624.447		1183.221	1569.556	
Fine arts	0.042	0.569	0.980	0.938	**	0.816	0.786		2011.802	2046.965		2964.940	3286.117	
Education sciences	0.062	0.592	0.983	0.965	**	0.772	0.779		1396.038	1328.939		1235.201	1576.196	
Health sciences	0.078	0.783	0.903	0.961	***	0.836	0.768	**	2243.73	1791.756	***	1865.875	1816.761	
Social sciences	0.200	0.747	0.982	0.971	**	0.814	0.764	***	2289.501	2131.564		2527.741	2577.776	
Economics, business	0.243	0.605	0.986	0.971	***	0.860	0.841	*	2380.529	2080.73	***	3120.038	2736.778	**
Engineering	0.330	0.411	0.974	0.971		0.844	0.816	***	2201.829	1990.734	***	2419.758	1868.403	**
Natural and sciences	0.027	0.576	0.909	0.919		0.704	0.685		2117.082	1837.311		2370.282	1909.170	
All	1.000	0.576	0.974	0.967	***	0.834	0.796	***	2177.805	1981.455	***	2488.694	2307.781	**
Obs	18822	18822	7986	10836		7779	10475		6286	8102		6286	8102	

Panel B: Master

	Graduates		Participation Rate			Employment Rate			Monthly Income			Std. Dev. Income	
Area		Female	Male	Female	PrTest	Male	Female	PrTest	Male	Female	t-test	Male	Female
Agricultural sciences	0.002	0.500	1.000	1.000		0.750	0.750		1833.333	1363.636		577.3503	236.1887
Fine arts	0.007	0.520	0.917	0.923		1.000	1.000		2793.388	2511.995		1147.646	1641.646
Education sciences	0.062	0.500	1.000	0.972	*	0.981	0.895	***	2111.026	2142.841		1532.941	2188.622
Health sciences	0.035	0.637	0.956	1.000	*	1.000	0.886	*	4859.885	2894.904	**	6826.066	2820.685
Social sciences	0.160	0.593	0.978	0.964		0.888	0.882		2805.042	2622.217		2363.556	2895.943
Economics, business	0.550	0.522	0.987	0.972	**	0.925	0.884	***	3526.48	3019.666	***	3720.314	3764.161
Engineering	0.170	0.363	0.961	0.982		0.942	0.915		2956.989	3078.764		1899.327	2869.561
Natural and sciences	0.013	0.511	0.913	0.958		1.000	0.913		2421.515	3528.499		1554.137	4547.97
All	1.000	0.509	0.979	0.973		0.931	0.890	***	3227.139	2893.423	***	3027.854	3343.056
Obs	3505	3517	1722	1783		1685	1734		1516	1498		1516	1498

Note: This table reports labor market statistics constructed by the authors based on the Encuesta de Seguimiento a Graduados (Ministerio de Educacion, 2010). The statistics are calculated for the graduates between 2001 and 2007. Montly income is standardized considering the number of hours worked over the last week and projected for 40 hours of work a week. Proportion test refer to the test of the null hypothesis of equal proportion of male and female graduates participating in the labor market or the proportion of make and female participants in the labor market employed. Student t-test test the hypothesis of equal means in the standardize montly income by male and female graduates who were employed at the moment of the survey. Results of tests indicated at following significance levels * p<0.1, ** p<.05, *** p<.01.

bachelor graduates, the areas with largest gender discrimination in order are health sciences, economics, social sciences and engineering. Following our conceptual framework, we expect that the effect of affirmative action policies would be larger in those areas. The conceptual framework explains that sorting effects of quality of applicants would depend on the variance of income. The last column in Table 1, presents the standard deviation of earnings across areas of study. We observe that consistent with our assumption, the standard deviation of income for female bachelor is lower than that from men in two of the eight areas of study (economics and engineering). Hence, we would expect that there would be positive sorting of female candidates and negative sorting of male candidates in those areas.

4 Experimental Procedures and Design

Three experiments are the basis of our study. In the first two experiments, to which we will refer to as the *Assistant Experiment I and Assistant Experiment II,* we recruited applicants for research assistant positions for projects of two of the coauthors of this paper. Potential candidates were required to have completed or be close to completing a bachelor's degree in any area of study. No previous work experience was required. If selected, the research assistants in the first experiment would be responsible for conducting field work in rural areas in Colombia (i.e. collecting secondary data, conducting interviews with farmers).

In *Assistants Experiment II* applicants were required to conduct surveys or enter data from a previous survey. Assistants were expected to work in Bogota. As shown in Table 2, the *Assistant Experiment I* was conducted between 1st of October, 2010 and 1st of February 2011 while the *Assistant Experiment II* was conducted between 16th of July and 1st of September 2013.

The third experiment was conducted in collaboration with a consultancy company that offered one position for a consultant with at least two years of professional experience in implementation and evaluation of community development projects. Henceforth, we will refer to this experiment as the *Consultant Experiment.* Interested candidates were required to have at least a bachelor degree in a relevant field of study that included public administration, public management or economics. The hired consultant was responsible for the organization and supervision of community development workshops in rural communities. The firm interested in hiring a consultant was required to fill the position within one month. Hence, the recruitment process for the *Consultant Experiment* was much faster lasting only two weeks. The announcement was posted between the 15th and the 31st of January 2011.

The recruitment strategy in the three experiments followed a design similar to Flory et al. [2014] and involves fives stages that are presented in Table 2 and describe with more detail

below.

Table 2: Recruitment Process

	Assistant I			Assistant II			Consultant		
	Dates	No. Participants		Dates	No. Participants		Dates	No. Participants	
		Total No.	Female %		Total No.	Female %		Total No.	Female %
1. Announcement	Oct.10–Dec.10			Jul.13–Aug.13			Jan.11		
2. Statement of Interest	Oct.10–Dec.10	2207	55.14	Jul.13–Aug.13	2341	49.17	Jan.11	310	43.87
3. Randomization	Dec.10	733	55.53	Aug.13	761	50.46	Jan.11	293	46.42
4. Application	Dec.10–Jan.11	311	54.05	Aug.13	367	47.96	Jan.11	91	41.76
5. Hiring	Feb.11	3	100.00	Sep.13	22	50.00	Feb.11	1	100.00

Stage 1: Announcement. In the first stage we announced the positions through newspapers, university employment boards, social media and email lists. In this announcement we provided general information about the position. Appendix A presents the announcements used. In this stage we tried to get a large pool of subjects interested in the positions over which we could randomize the treatments.

For the *Assistant Experiment I* and *II*, the announcement explained that a university was looking for research assistants. The announcement also provided a link to a more detailed job description.[3] In this description we presented the research group, described the responsibilities of the position and described the qualifications required for the job. Finally, we provided a link to the statement of interest form. In order to be able to compare how conditions in the labor market as unemployment and gender discrimination affect applications, in the announcement, we stressed that applications from all areas of study were welcome.

For the *Consultant Experiment* the position was announced not only in newspapers and on employment boards in universities, but also via a "hot" mailing list containing around 3000 email addresses of currently active consultants. The announcement explained that a consultancy firm with extensive experience in the private and public sector was looking for a consultant to work on a community development project. Candidates were required to have at least two years of experience. Interested candidates could fill out a very short statement of interest form that asked for gender, civil state, degree and university of study and years of job experience.

Stage 2: Statement of Interest. In the second stage, interested participants were allowed to state their interest in the position by filling out a low hurdle *statement of interest* form.

[3]This information was the same for all treatments so it should not differential impact across treatments

Appendix B presents the complete list of socioeconomic information collected in this stage. The announcement elicited great interest and in the three experiments about 5 000 people expressed interest in the positions. We refer to this group as experimental participants.

In this stage we elicited basic information of the sample (individuals who filled the expression of interest) as gender of the applicant, age, level of studies (undergraduate, master), area of studies and year of graduation.[4] The *Assistant Experiment II* also included additional questions on qualifications of the pool of applicants and personality questions. Among the qualification measures we included grades during studies, the Frederick [2005] cognitive reflection test (henceforth CRT) and a exercise on a work example of digitizing data (see Appendix D). The test outcomes of Frederick's cognitive reflection test (CRT) are highly correlated with the outcomes of tests of general cognitive ability such as the Wonderlic Personnel Test which measures "the ability or disposition to resist reporting the response that first comes to mind" [Frederick, 2005, p. 35], a skill that is important for both the research assistants and the consulting work. Furthermore, the work example measures subjects ability to digitize data by measuring accuracy and time.

Personality question were assessed using the Spanish version of the Big 5 personality test [Benet-Martinez and John, 1998] measuring: (i) Openness to new experience, (ii) Conscientiousness, (iii) Extroversion, (iv) Agreeableness and (v) Neuroticism. This scale—although based on self reports—has shown to be reliable and stable over time [Barrick and Mount, 1991, Barrick et al., 2001, Salgado, 1997] and the measured traits have been shown to be predictors for various types of job performance [Barrick and Mount, 1991, Turban and Dougherty, 1994, Boudreau et al., 2001, Seibert and Kraimer, 2001, Ng et al., 2005, Nyhus and Pons, 2005, Mueller and Plug, 2006, Rode et al., 2008].[5] Finally, we included questions from the German Socioeconomic Panel (GSOEP) on risk aversion and time preferences. The question on risk aversion has been validated in a study by Dohmen et al. [2011] and showed high correlation with different measures of risk aversion for distinct domains of risk.

The measures that we obtained in this stage can be considered exogenous as we observe them before participants are exposed to the treatment. These measures constitute the baseline against which we measure the impacts of the intervention. Using self-reported measures, truthful reporting is of some concern as people have a tendency to misreport in order to in-

[4] Asking for gender is common in Colombia and there are no legal implications on doing so.

[5] Some studies relate personality traits as measured by the Big 5 with behavior in laboratory experiments: Volk et al. [2011] show, that Agreeableness correlates with pro-social behavior in public good games. Park and Antonioni [2007] show that Extroversion and Agreeableness were significantly related to conflict management strategies. Furthermore, Gerber et al. [2010] review and complement studies that connect personality traits to attitudes towards policies and ideologies on a liberal/conservative spectrum. Their findings suggest that conservative attitudes are correlated with conscientiousness, agreeableness and neuroticism, while openness is correlated positively with liberal attitudes. In our context, this may induce sorting effects on personality characteristics depending on whether the hiring policy is seen as liberal or conservative.

crease their chances to be hired. We therefore provided incentives for truthful reporting and announced to the candidates that upon invitation to a job interview they have to bring along all the necessary documentation of the information provided in the questionnaire. Failing to bring supporting documents will lead to an immediate rejection of the applicant. This policy was communicated whenever they had to enter verifiable information during the application process.

Stage 3: Randomization. In the third stage a random sample of participants, who we will refer to as job-seekers, received by email an invitation to apply to the job. Appendix C presents the invitation letters used in our experiments. The letter informed the particular conditions of employment regarding job responsibilities, salary and duration of the employment.

In the *Assistant Experiment* I we have 733 job-seekers who were invited to apply to the research assistant positions. The invitation letter stated that the job was a research assistant position in a project related to tobacco cultivation with a monthly salary of $1,500,000 COP (about US$700 at the date of the study) plus traveling commissions and that the duration of the project was two months. The invitation letter in the *Assistant Experiment II* explained that research assistants would be required to work in Bogota conducting interviews, collecting secondary information and entering data. We did not provide information on the exact payment. We send the invitations to 761 job-seekers. For the *Consultant Experiment* the invitation letter stated that the salary was 3 million COP and the duration of the job was 4 months. We sent the invitation to 310 job-seekers.

In this stage, job-seekers were randomly assigned to either an affirmative action treatment (AA) or a control group. In the *Assistant Experiment I* we used demographic information over gender and the main residence in Bogota to stratified job-seekers into affirmative action treatment and control group while in the *Assistant Experiment II*, we also stratified on level of studies (undergraduate or master). In the *Consultant Experiment*, job-seekers were not stratified according to observable characteristics. Instead, randomization was done using a random number generator within the survey software [LimeSurvey, 2012] in which job-seekers had a 50 percent probability of being selected into the *Affirmative Action Treatment* (AA) group. Moreover, assignment into the treatment was randomized and not stratified randomized, so in the end only 45 percent of the job-seekers were allocated into the AA treatment in this experiment. Randomization was done immediately after the statement of interest was completed.

In the *Affirmative action treatment* (AA) group, the last line of the invitation letter announced that the employer was an equal opportunity employer and that during the hiring

process women would be favored. In the affirmative action treatment, job-seekers where exposed to the affirmative action statement *before* completing the application questionnaire and applied expecting that this rules would be in place. *All job-seekers* who completed the application process were presented with the *affirmative action statement after* they had finished the questionnaire. Therefore we achieve ex-post equality of information for subjects who completed the questionnaire and effectively applied to the job.

We used two different rules that are commonly used to favor female applicants and used the statements typically used in recruitment processes. *Assistant Experiments I and II* used a quota rule in which a fixed share of the positions are reserved for women. The following statement (translated from Spanish) was displayed to participants in the affirmative action treatment:

> The University of ... is an equal opportunities employer. To increase female participation in areas where women are up to now underrepresented, a minimum of 50% of the hired assistants will be women.

The Consultant experiment, used a preferential treatment rule and presented the following statement:[6]

> We are an equal opportunity employer who seeks to increase the participation of women in areas where they have been under-represented. For equally qualified candidates, women will be preferred.

Since we use the affirmative action rules in separate experiments and since the type of jobs are not comparable, we cannot compare the relative effect of these two rules.

Finally, the invitation letter asked job-seekers to complete a lengthy application questionnaire in order to apply for the position. Filling out the questionnaire carefully would take between 40 and 60 minutes and required to search supporting information on several questions. By using a demanding and time consuming application questionnaire that would increase the cost of the application (time required), we wanted to improve the matching with potential applicants. . As recruitment processes are usually very comprehensive, we expected that job-seekers would not be surprised at the demanding application process.

Stage 4: Application. In this stage job-seekers had access to a personalized page and could complete the application form over different sessions saving the information and continuing the application over several days. Yet, a strict deadline date was set after which no application was accepted.

[6]The original statement in Spanish is presented in Appendix

The measures of qualifications obtained in this stage are endogenous as performance in the tests and responses to the questionnaire could have been affected by the treatment. In this paper we are interested in the sorting effects of Affirmative Action—hence in the analysis we do not consider the effects that the policy might have had on the responses given in the application form.

Job-seekers who were not interested in the job also had the chance to actively drop out of the application. While in the *Assistant Experiment I* they clicked a disagree button, the *Assistant Experiment II and in the Consultant Experiment* also allowed to complete a short exit questionnaire. In this questionnaire we asked the reasons why thy left the application process, especially whether they disliked the affirmative action policy applied to those who were randomized into the affirmative action treatment group. However, the turnout was low and only 3.2% of subjects who did not start the application process actively dropped out.

As in all field experiments —and lab experiments that go over multiple sessions, not conducted at the same time— there is a concern of treatment information spillovers. We tried to minimize this by opening the position at the same time and by recording the starting time of the applications, in order to control for potential timing effects.

Stage 5: Hiring. Job-seekers who completed the application processes, to which we will refer to as applicants, were ranked upon qualifications. The top 10 applicants were invited for an interview. The best applicants received a job offer. In the *Assistant Experiment* I three people were hired (all of them women).[7] Two of them were hired for two months and a third person was hired for four months. We hired 22 applicants in *Assistant Experiment II*, half of them female. In the *Consultant experiment* one female applicant was hired for six months. In this paper we focus on the analysis of the sorting effects in application process. We do not consider measures of on-the-job performance, as the limited number of positions offered does not allow us to conduct a statistical analysis of the impact of affirmative action on job performance.

5 Results

5.1 Descriptive statistics and randomization checks

In total 2207 people responded to the announcement for *Assistant Experiment I*, 2341 did so for *Assistant Experiment II* and 301 responded for the Consultant Experiment. In *Assistant*

[7] Affirmative action was intended to favor women, hence we did not intended to have equal gender representation. In other words, it should have not been expected that at least 50% of the positions would be reserved for men.

Experiments I and *II*, one third of the respondents, were randomly selected to participate in this experiment. Hence the total number of job-seekers in our experiment was 1787 people. Table 2 presents the number of participants in each of the stages of the experiment and the proportion of female participants in each stage.

Representativeness of the job-seekers In Table 3 we compare socioeconomic characteristics of the job-seekers in our experiment with those is the Survey of Recently Graduated University Students. For *Assistant Experiment I and II*, we take as reference the university graduates from any area of study over the last year, whereas for *Consultant Experiment*, we compare with graduates with 3 to 5 years of experience from areas of studies relevant for the job.

We find that the proportion of female job-seekers was very different in the three experiments. In *Assistant Experiment I* the majority of job-seekers was female (55%), in *Assistant Experiment II* there was almost gender balance (48% were female) and in the Consultant Experiment, the majority of job-seekers were male (43% were women). We find that the proportion of female job-seekers in *Assistant Experiment I* and *Consultant Experiment* is comparable with that in the "Recently Graduated Survey" from the Ministry of Education (2010), however, for the *Assistant Experiment II*, the proportion of female job-seekers is relatively lower than in the Recently Graduated Survey. This could be related with the characteristics of the job that could have been considered more male oriented as this job explicitly required computer skills, a task that is considered more male oriented.

When we compare the pool of applicants to the *Assistant Experiment I and II* with respect to degree of studies, we find that compared with the Recently Graduated Survey, the job-seekers in our experiment are less likely to have a Master title, this is not very surprising as the announcement emphasized that we were hiring recently graduated students and the description of the job required very basic skills. In the Consultant Experiment, the pool of applicants with a master title is relatively higher than the Recently Graduated Survey which can be explained by the requirement of a more qualified subject pool. Regarding area of studies, we find that participants in the *Assistant Experiment I and II* are significantly more likely to be have a background in agricultural sciences and social sciences and are less likely to be economists or engineers compared with the Recently Graduated Survey. This is also explained by the type of job that we announced that required work in rural areas in Colombia conducting interviews.

Table 3: Descriptives Statistics Job-Seekers

	Assistant I	*Assistant II*	*Consultant*	*Survey*
Panel A: Gender				
Male	0.4447	0.4954	0.5358	0.4353
Female	0.5553	0.5046	0.4642	0.5647
p-value of χ^2 test comparing with Survey	0.610	0.001	0.001	
Panel B: Academic Degree				
Bachelor	0.9018	0.9553	0.6645	0.8596
Master	0.0982	0.0447	0.0335	0.1404
p-value of χ^2 test comparing with *Survey*	0.000	0.000	0.000	
Panel C: Study area				
Agricultural Science	0.0962	0.0559	-	0.0137
Fine arts	0.0151	0.0218	-	0.0459
Education science	0.0165	0.0287	-	0.0556
Health sciences	0.0165	0.0505	-	0.0656
Social sciences	0.4217	0.3765	-	0.1750
Economics, and business	0.1511	0.1242	1.0000	0.3105
Engineering,	0.2184	0.1201	-	0.3113
Natural sciences	0.0646	0.1255	-	0.0226
Other	0.0000	0.0969	-	0.0000
p-value of χ^2 test comparing with *Survey*	0.000	0.000		

Note: This table reports the composition of the job-seekers in the first stage between the *Assistant Experiment I*, the *Assistant Experiment II* the *Consultant Experiment* and the Survey of Recent Graduated University Students in Colombia conducted by the Ministry of Education and available online. The relevant areas of study for the *Consultant Experiment* was narrowly defined, therefore all candidates are from economics, business and administration studies. The chi2 test compares the distribution in the experiment with that in the survey of recently graduated university students

Randomization tests Another important question is whether participants assigned to the different treatments are comparable in observable characteristics. Table 4 shows the descriptive statistics of the job-seekers in the different treatments and in the different experiments. Panel A presents the information for the *Assistant Experiment I*, Panel B refers to the *Assistant Experiment II* and Panel C presents the results for the *Consultant Experiment*. The pool of job-seekers in the *Assistant Experiments I and II*, is on average 28 and 24 years old, respectively. This group is relatively less educated and less experienced than the job-seekers in the Consultant experiment. While 9.8 percent and 4.5 percent of the job-seekers in the *Assistant Experiments I and II* had a master, around 35 percent of the applicants had a master's degree in the *Consultant experiment*. The average number of years of experience is

three in *Assistant Experiment I and I*I versus nine years of experience for job-seekers in the *Consultant Experiment.* Comparing the subjects characteristics after randomization with a joint orthogonality test, we find that most of the observable characteristics of job-seekers have good balance across treatments. Yet we find slight unbalance in age in the *Assistant Experiment I*, in CRT and the Work Example Score in *Assistant Experiment II* and in experience and Master degree in *Consultant* Experiment. In the analysis we control for these characteristics. As observed in Table 4 we find that male and female job-seekers are quite similar with respect to age, education level and experience. Yet, for the *Assistant Experiment II*, we find that women are significantly less risk loving and have a lower score in the CRT (t-test: p-value$<$0.10).

Table 4: Randomization checks

	Control			Affirmative Action			Overall	
	Male	Female	p-value	Male	Female	p-value	—	p-value
Panel A: Assistant I								
Experience	3.673	2.864	0.112	3.627	3.080	0.269	3.276	0.261
	(0.432)	(0.266)		(0.412)	(0.272)		(0.170)	
Master	0.110	0.098	0.701	0.092	0.094	0.959	0.098	0.946
	(0.025)	(0.021)		(0.023)	(0.020)		(0.011)	
Age	28.117	27.029	0.124	28.828	27.084	0.008	27.686	0.022
	(0.577)	(0.405)		(0.542)	(0.375)		(0.235)	
Bogota	0.337	0.382	0.374	0.337	0.384	0.355	0.363	0.647
	(0.037)	(0.034)		(0.037)	(0.034)		(0.018)	
N	163	204		163	203		733	
Proportion	0.222	0.278		0.222	0.277		1.000	
Panel B: Assistant II								
Experience	3.609	3.592	0.967	3.609	3.410	0.578	3.554	0.941
	(0.347)	(0.250)		(0.242)	(0.264)		(0.139)	
Master	0.037	0.042	0.817	0.047	0.052	0.851	0.045	0.916
	(0.014)	(0.015)		(0.015)	(0.016)		(0.007)	
Age	25.123	24.571	0.416	24.910	24.415	0.428	24.752	0.697
	(0.486)	(0.472)		(0.440)	(0.443)		(0.230)	
Risk taking	5.936	5.611	0.166	5.874	5.624	0.288	5.760	0.378
	(0.164)	(0.168)		(0.169)	(0.164)		(0.083)	
Time pref.	3.342	3.447	0.625	3.032	3.392	0.075	3.304	0.177
	(0.145)	(0.159)		(0.141)	(0.144)		(0.074)	
Impulsiveness	8.027	8.189	0.435	8.005	7.892	0.603	8.028	0.540
	(0.157)	(0.137)		(0.154)	(0.155)		(0.075)	
Relative Grade (Av/Max)	0.905	0.901	0.956	0.928	0.859	0.233	0.898	0.414
	(0.056)	(0.040)		(0.057)	(0.011)		(0.022)	
CRT	1.508	1.232	0.016	1.489	1.000	0.000	1.305	0.000
	(0.080)	(0.082)		(0.084)	(0.081)		(0.042)	
Score: Work Example	18.759	19.279	0.000	19.063	19.263	0.000	19.093	0.000
	(0.209)	(0.157)		(0.143)	(0.132)		(0.081)	
Has Children	0.118	0.142	0.481	0.126	0.144	0.607	0.133	0.845
	(0.024)	(0.025)		(0.024)	(0.025)		(0.012)	
Number of children	0.176	0.174	0.958	0.184	0.201	0.768	0.184	0.962
	(0.040)	(0.034)		(0.039)	(0.042)		(0.019)	
N	187	190		190	194		761	
Proportion	0.246	0.250		0.250	0.255		1.000	
Panel C: Consultant								
Experience	7.300	10.937	0.085	8.428	10.354	0.003	9.117	0.004
	(0.631)	(1.009)		(0.640)	(0.905)		(0.406)	
Master	0.422	0.282	0.000	0.388	0.308	0.000	0.355	0.000
	(0.052)	(0.054)		(0.060)	(0.058)		(0.028)	
N	90	71		67	65		293	
Proportion	0.307	0.242		0.229	0.222		1.000	

Note: This table reports the results of the randomization check. In the *Consultant experiment* 17 subjects did not report their gender and experience, and one person who did not report the university of study. Last column reports the p-value from joint orthogonality heteroskedasticity robust test of treatment allocation. A p-value less than 0.1 indicates that we can reject the null hypothesis of equal characteristics with a 10 percent significance level.

5.2 Impact of Affirmative Action in sorting by gender

One advantage of our experimental design is that we can compare the proportion of candidates that submit the application form, or application rate under both conditions. Application rates are 42.2, 48.3 and 29.7 percent in *Assistant Experiment I*, *II* and *Consultant experiment*, respectively. We find that overall application rates (not dis-aggregating by gender) are not significantly different under the control and treatment for any of the experiments (Fisher Exact tests*: Assistant 1, p=0.709; Assistant 2, p=0.718 and Consultant, p=0.533*). The more interesting question to pose is how the gender composition of applicants changes under affirmative action. Figure 1 shows the raw application rates for men and women under the different treatments and experiments. We find that in the control treatment women are significantly less likely to apply than men in the two of the experiments—*Assistant Experiment II and Consultant Experiment*—(*Fisher Exact Test, p<0.01*). Under the affirmative action treatment, the gender difference in application probabilities completely vanishes with women being equally likely to apply than men in all three experiments (*Fisher Exact Test, p>0.10*).

Result 1

Affirmative action policies close the gender gap in the application rates.

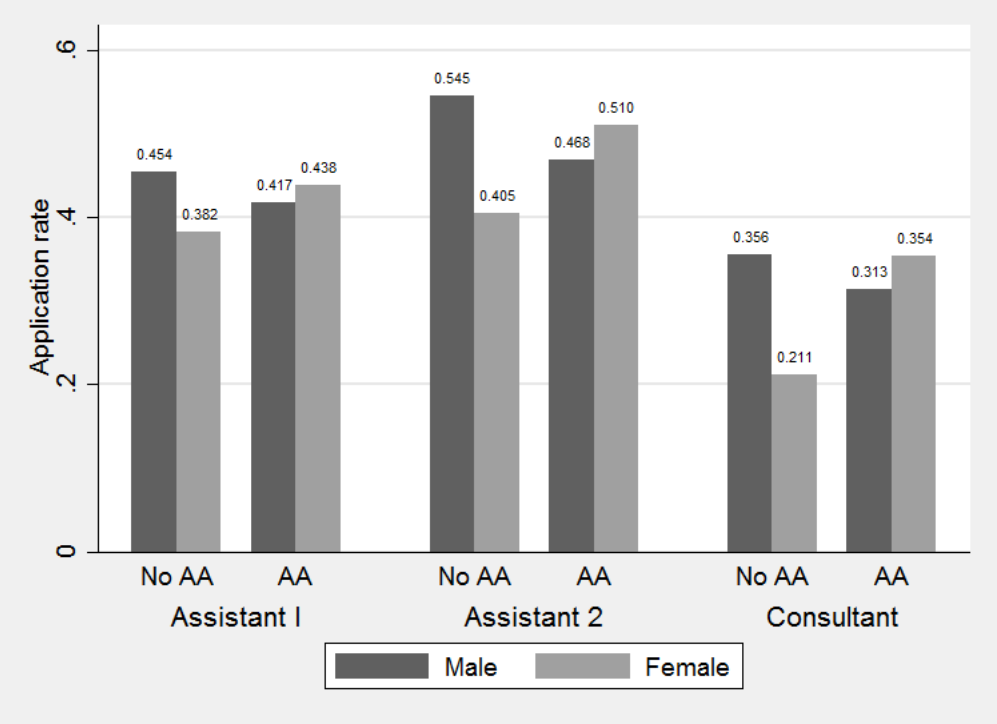
Figure 1 suggests that the closure in the gender gap on application rates is not only due to a higher application rate by women, but also by a lower application rate by men. We find that this is not the case and the change in the application rate for men under the control and affirmative action treatment is not significant in any of the experiments (*Fisher Exact Test, p>0.10*). Yet, compared to the control, the application rate is significantly higher for women in the affirmative action in *Assistant Experiment II* and *Consultant Experiment*.

To further examine this result, we estimate a linear probability model. Due to the random assignment of job-seekers into treatment and control groups, the identification of the causal effect of the treatment on the completion of the application process is straight forward. We estimate the following model with clustered standard errors at the city level:

$$Completed_i = \alpha + \beta_1 AA_i + \beta_2 female_i + \beta_3 AA_i \times female_i + \epsilon_i \quad (1)$$

The dependent variable *Completed* is binary and takes a value of one for job-seekers who agreed to the conditions of employment and submitted a completed application form and takes a value of zero otherwise. We focus on completed applications as this is the economic

Figure 1: Application rates by treatment and gender



relevant variable from the point of view of the employer.[8] AA refers to the treatment variable and takes a value equal to one for job-seekers randomized in the affirmative action treatment and zero otherwise. The variable $female$ is a dummy variable that indicates if the job-seeker is a woman. The intercept or $Constant$ term, indicates the proportion of male job-seekers who sorted in the job offer by completing the application. The coefficient for AA indicates the impact of affirmative action on the pool of male job-seekers. The coefficient for $female$ indicates the degree of female self-segregation in the labor market or the difference in application rate of female to male job-seekers. The coefficient for the interaction term $AAxfemale$ indicates the impact of affirmative action on the pool of female job-seekers compared to male job-seekers in the affirmative action treatment.

The estimation results of a linear probability model for both experiments is presented in Table 5.[9] We report results by experiment. The Panel A presents the results of the regression model, while Panel B presents different contrasts. For each model we present the results with and without controls on socioeconomic characteristics.

[8] Alternatively, one could also be interested in the first affective reaction to the affirmative action statement by considering whether people started or not the application process. We find that all results hold true when looking also at subjects who agreed to the conditions and started the application procedure, but not necessarily finished it.

[9] Our results are robust to non-linear estimations such as probit and logit models.

We find that between 43 and 56 percent of the male job-seekers completed the application process. As indicated by the contrasts, in the absence of affirmative action; women were significantly less less likely to apply to the positions than men with a difference between 7 and 24 percentage points depending on the experiment. The results also indicate that, under affirmative action, the difference in application rates between men and women is not significant in any of the three experiments.

From a policy perspective is important to understand whether the gap is closed by by having more women applying as is expected or whether this effect is due to less men applying. Contrasts results Table 5 indicates that in all three experiments women are significantly more likely to apply in the affirmative action treatment compared with the control treatment. The application rate is 5 to 22 percentage points higher for women under affirmative action compared with the control treatment. Application rates for men are not significantly different in affirmative action treatment and the control treatment in two of the three experiments. However in the *Assistant Experiment II*, men are six to eight percentage points less likely to apply than in the control treatment. That shortfall is compensated for by an increase in female applicants in that experiment.

Result 2

> Affirmative action policies induce more women to apply and do not systematically deter men.

Table 5: Linear probability model of completed applications under *Affirmative Action*

Panel A: Regression	Assistant I		Assistant II		Consultant	
	(1)	(2)	(3)	(4)	(5)	(6)
Affirmative action	-0.043	-0.041	-0.066*	-0.086***	-0.086	-0.094
	(0.028)	(0.026)	(0.034)	(0.031)	(0.100)	(0.104)
Female	-0.073*	-0.079**	-0.120***	-0.136***	-0.220**	-0.241**
	(0.041)	(0.037)	(0.025)	(0.026)	(0.087)	(0.092)
AA X Female	0.095**	0.093**	0.154***	0.174***	0.293**	0.314**
	(0.039)	(0.038)	(0.044)	(0.055)	(0.132)	(0.133)
Experience		-0.004		0.015**		0.007
		(0.009)		(0.007)		(0.005)
Master		0.021		-0.149**		0.073
		(0.083)		(0.063)		(0.062)
Age		0.000		-0.003		
		(0.005)		(0.004)		
Has Children				-0.130***		
				(0.047)		
CRT				-0.002		
				(0.015)		
Score: Work Example				0.010		
				(0.006)		
Baseline	0.457***	0.460***	0.519***	0.428***	0.561***	0.468***
	(0.042)	(0.125)	(0.044)	(0.149)	(0.058)	(0.063)
Observations	729	717	1585	689	180	180
Panel B: Contrasts						
AA vs. No AA						
Male	-0.043	-0.041	-0.066*	-0.086***	-0.086	-0.094
	(0.028)	(0.026)	(0.034)	(0.031)	(0.100)	(0.104)
Female	0.051*	0.052*	0.088*	0.088*	0.206	0.219*
	(0.027)	(0.028)	(0.029)	(0.034)	(0.127)	(0.122)
Female vs. Male						
No AA	-0.073*	-0.079**	-0.120***	-0.136***	-0.220**	-0.241**
	(0.041)	(0.037)	(0.025)	(0.026)	(0.087)	(0.092)
AA	0.022	0.014	0.034	0.038	0.073	0.073
	(0.035)	(0.037)	(0.032)	(0.044)	(0.113)	(0.113)

Note: Panel A reports the results of a linear probability model on completed application for for the Assistant I (Columns 1 and 2) the Assistant II (Columns 3 and 4) and the Consultant experiment (Columns 5 and 6). Panel B reports the differences in application rates by treatment and by gender resulting from Panel A. Standard errors are reported in parenthesis and p-values are in brackets. **AA** indicates the respective Affirmative Action treatment employed for the experiment: *Quota rule* for Assistant I and Assistant II and *Preferential Treatment rule* for the Consultant. Standard errors are clustered on the Metropolitan Area for the Assistant I experiment and the university of graduation for the Assistant II and the Consultant experiment and reported in parenthesis. Results of t-test indicated at following significance levels * p<0.1, ** p<.05, *** p<.01.

To check the robustness of the results, we checked for the timing of the applications, if women in the control treatment applied later, which would indicate that there are spillovers between the treatment and control groups. We do not find any significant differences in the timing of the application (neither statistically or in size) between the treatment and the control groups.

5.3 Affirmative Action and qualifications of the applicant pool

While affirmative action seems to induce more women to participate in the labor market, the question remaining is whether this policy comes at a cost of lower qualifications of male or female applicants. In this section we explore how costly—in terms of potential changes in the composition of characteristics of the applicant pool—affirmative action policies are. To assess the causal effect of the treatment on the composition of the applicant pool we estimate the following model pooled over gender and by male and female separately:

$$Completed_i = \alpha + \beta_1 AA_i + \beta_2 Z_i + \beta_3 AA_i \times Z_i + \beta_4 (Z_i I Z_i') + \beta_5 AA_i \times (Z_i I Z_i') + \beta_6 V + \beta_7 AA \times V + \epsilon_i \quad (2)$$

where Z is a column vector on qualifications of the job-seeker that include experience, graduate studies and performance in cognitive test (CRT). V is a column vector of other characteristics of the job-seekers like master, personality characteristics according to the Big 5 personality test, GSOEP self-reported attitudes towards risk aversion, impatience, impulsiveness, and family status (civil status and whether they have children). As previously explained, these measures were collected in the statement of interest form and hence are exogenous to the application process.

Furthermore we include a quadratic term of the variables in Z as assuming a linear relationship leads to under-reject the null hypothesis of no effect of the variables of interest as has been shown by Mogstad and Wiswall [2009]. While they use a non-parametric way by including dummy variables to capture the relationship between the independent and the dependent variables, we use a parametric approach adding a quadratic term to the linear formulation, as we have variables with far more categories and also continuous independent variables in our vector Z.

To differentiate the effects on the pool of male and female applicants we estimate separate regressions for each gender. We center the variables Z to have mean zero for two reasons: First it allows to interpret the intercept as expected value of the outcome variable evaluated at the mean of the characteristics and second it facilitates the interpretation of linear and the quadratic term of the characteristics. Appendix F presents the results for variables that relate to the qualifications of the applicant pool and discusses the findings.

To facilitate the interpretation of the effects of affirmative action on the qualification of the applicant pool, we plot the marginal effects by quality indicator, male and female job-seekers and experiment and display the results in Figure 2. A positive slope, indicates that candidates with higher qualification are more likely to apply. Panel A presents the marginal effects of experience in the three experiments. While Panel B presents the results

for additional qualification measures collected in the *Assistant Experiment II.*

The relation between experience and the likelihood to apply seems to have a different direction in the three experiments and to vary according to female and male job-seekers. Many of the results are driven by the upper tail. Given the small number of observation in the tails, this results should not be over interpreted. In the control treatment, as indicated in Appendix F there is a positive effect on experience on the likelihood to apply in *Assistant Experiment II.* This relation is mainly driven by male applicants. No significant effects of experience are found on the other two experiments on the control treatment. Under affirmative action, the effect of experience is not significantly different than in the control in *Assistant Experiment I and II*, indicating that the positive sorting of male job-seekers in *Assistant Experiment II* persists. Moreover, in the Consultant Experiment, more experienced women sort into the job compared with the control treatment.

Regarding other qualification measures included in in the *Assistant experiment II*, we find that in the control treatment, application rates do not change significantly with performance in the CRT, work example or relative grades for male or female job-seekers. Affirmative action, however, induces male job-seekers with higher relative grade and with higher performance in the work example to apply to the position (the effects are significant at the 10 percent level). Moreover, affirmative action, induces females with higher performance in the CRT and in the work example to apply to the job offer. Results in Appendix F indicate that this effect is significant.

These findings are consistent with Proposition 2 that predicts that affirmative action can generate positive hierarchical sorting by female job-seekers, but is inconsistent with the prediction that there could be negative sorting of male job-seekers. Hence we conclude:

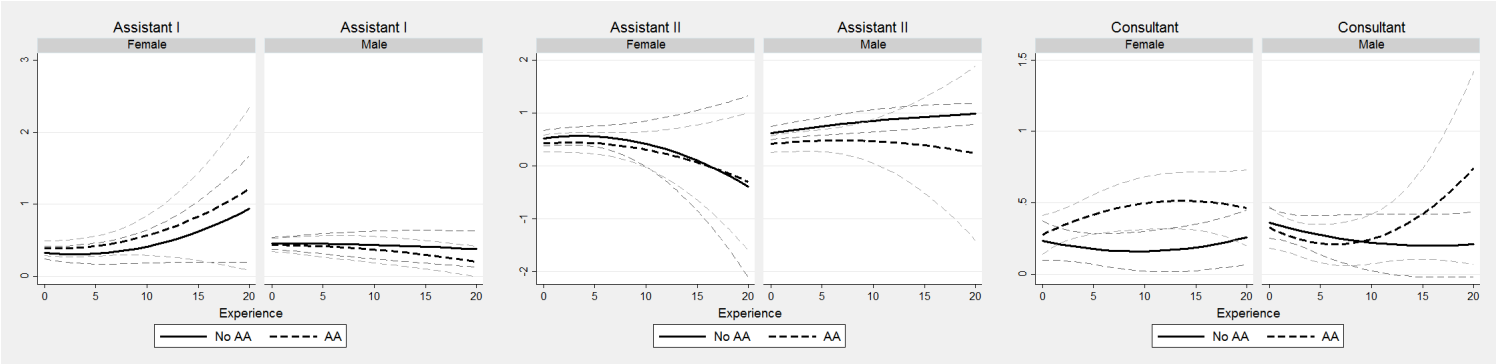
Result 3

> There is positive hierarchical sorting of male and female job-seekers under affirmative action policy.

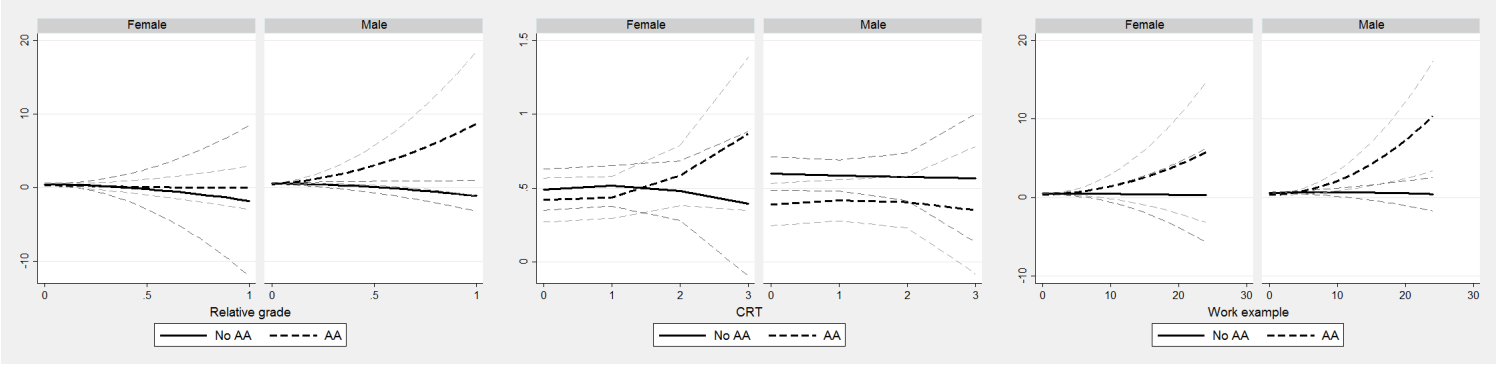
Personality traits and attitudes Table 6 presents the estimation results of Equation 2 for personality characteristics. We report here the linear model, as we do not find evidence for a non-linear relationship. We find that in the control treatment, personality characteristics do not affect significantly the likelihood to apply for male job-seekers. Women who apply under the control treatment appear less open a trait that is related to curiosity, a taste for intellectualizing, and acceptance of unconventional things. The likelihood to apply under affirmative action is not significantly different for various personality characteristics of the male job-seekers. However, compared with the control treatment, women who apply

Figure 2: Marginal effects of qualification indicators

Panel A: Experience for all Experiments



Panel B: Other characteristics Assistant II only



under the affirmative action are more impulsive. Unfortunately, we do not have data on the relationship between earnings and personality traits for Colombia, but in order the assess the importance of the findings we take the results by Mueller and Plug [2006] for the US. For women they find that a one standard deviation rise in openness is associated with 3% higher wages. No significant association is found for impulsiveness.

Table 6: Linear probability model of completed applications under *Affirmative Action:* Personality indicators

	Assistant II					
	(1) All		(2) Male		(3) Female	
AA interactions Personality						
AA × Extraversion	-0.009	(0.026)	0.017	(0.038)	-0.011	(0.037)
AA × Agreeableness	-0.019	(0.030)	-0.046	(0.041)	0.001	(0.045)
AA × Conscientousness	0.007	(0.038)	-0.094	(0.058)	0.042	(0.051)
AA × Neuroticism	0.018	(0.028)	0.011	(0.042)	0.042	(0.040)
AA × Openness	0.028	(0.026)	0.027	(0.040)	0.042	(0.037)
AA interactions GSOEP indicators						
AA × Risk taking	0.009	(0.017)	0.020	(0.024)	0.010	(0.024)
AA × Time pref.	0.011	(0.019)	0.007	(0.026)	0.010	(0.027)
AA × Impulsiveness	0.036*	(0.019)	0.004	(0.026)	0.066**	(0.029)
Main effects Personality						
Extraversion	-0.031*	(0.018)	-0.035	(0.027)	-0.042	(0.027)
Agreeableness	0.011	(0.021)	-0.005	(0.032)	0.035	(0.030)
Conscientousness	-0.022	(0.028)	0.032	(0.043)	-0.043	(0.038)
Neuroticism	-0.041**	(0.021)	-0.035	(0.031)	-0.042	(0.029)
Openness	-0.020	(0.019)	0.005	(0.031)	-0.044*	(0.025)
Main effects GSOEP indicators						
Risk taking	-0.013	(0.012)	-0.007	(0.019)	-0.019	(0.017)
Time pref.	0.004	(0.013)	0.019	(0.018)	-0.012	(0.018)
Impulsiveness	-0.019	(0.015)	-0.005	(0.019)	-0.037	(0.024)
Obs.	745		371		374	

Note: This table reports the likelihood to apply given personality characteristics collected in the first stage. We control for qualification measures including quadratic terms, risk attitudes and family characteristics and include interaction terms with *AA*. Results of t-test indicated at following significance levels * p<0.1, ** p<.05, *** p<.01.

The effect of family composition on the likelihood to apply is reported in Table 7. Family characteristics do not affect the likelihood to apply for male job-seekers in the control treatment. However, for female job-seekers, family status matter and women who are in a partnership are significantly less likely to apply under the control treatment compared with single women. Besides, job-seekers who are separated or widowed are significantly more likely to apply than single female job-seekers in the control treatment. We find no significant effect of children on the likelihood to apply once that we control for qualification and personality characteristics of the applicant pool. This effect does not change significantly under the affirmative action treatment.

Table 7: Linear probability model of completed applications under *Affirmative Action:* Family indicators

	Assistant II					
	(1) All		(2) Male		(3) Female	
AA × Married	0.062	(0.179)	-0.171	(0.247)	0.082	(0.249)
AA × Partnership	-0.099	(0.178)	-0.185	(0.250)	0.072	(0.221)
AA × Other	-0.252	(0.264)	-0.162	(0.290)	-0.455	(0.367)
AA × Has Children	-0.120	(0.137)	-0.146	(0.201)	-0.022	(0.181)
Married	-0.194	(0.130)	-0.182	(0.202)	-0.203	(0.181)
Partnership	-0.140	(0.137)	0.006	(0.196)	-0.347**	(0.137)
Other	0.256	(0.176)	0.076	(0.242)	0.372**	(0.177)
Has Children	0.003	(0.096)	-0.023	(0.159)	0.116	(0.118)
Obs.	745		371		374	

Note: This table reports the likelihood to apply given family status collected in the first stage controlling for qualification measures including quadratic terms, risk attitudes and characteristics interacted with *AA*. Results of t-test indicated at following significance levels * p<0.1, ** p<.05, *** p<.01.

5.4 Heterogeneous effects of application rates

As discussed with more detail in Section 3, there is variation in employment rates and average income by female and male bachelor graduates across areas of study. Ranking areas of study according to the degree of female discrimination, measured as gender difference in expected income (likelihood to be employed times average earnings), we find that the study areas with largest female discrimination are in order economics, social sciences, engineering, natural sciences, educational science, fine arts and agronomics. Considering this variation we further investigate heterogeneous effects of affirmative action treatment on application rates. Figure 3 presents the application rates by male and female job-seekers according to the average expected income differences across genders. The first row presents the results for the *Assistant Experiment I*, while the results for *Assistant Experiment II* are presented in the second row.

Comparing application rates of all job-seekers (male and female), as presented in the first column in Figure 3, we find that in both experiments, in the absence of affirmative action, application rates are significantly lower in areas where expected income differences are larger—Economics—compared with other areas (0.30 in Economics vs. 0.44 in other areas in *Assistant Experiment I* and 0.31 vs. 0.50 in *Assistant Experiment II.* Fisher Exact Test are 0.057 and 0.028, respectively).

Interestingly, as we disentangle the effects by gender, as presented in the second column in Figure 3 we find that in both experiment female job-seekers from areas with larger gender inequality (Economics) are less likely to complete the application in the control treatment compared with all other areas (0.22 vs. 0.41 in *Assistant Experiment I* and 0.44 vs 0.13 in *Assistant Experiment II*–p-values of *Fisher exact test are 0.067* and 0.005, respectively–

). Such difference is however, not observed for male job-seekers. Male job-seekers from economics are equally likely to apply as applicant from other areas (0.38 vs 0.47 in *Assistant Experiment I* and 0.56 vs. 0.54 in *Assistant Experiment II*—p-values of the Fisher exact test are 0.439 and 1.000, respectively).

The effect of affirmative action is to completely close the gap in application rates from areas with high female discrimination. Under affirmative action treatment, application rates from job-seekers from economics are not significantly different than application rates from other areas of study (p-values of Fisher exact test are 0.347 and 0.551, respectively). When we compare the effect by gender an interesting picture emerges. Affirmative action increases application rates of female job-seekers from economics from 0.22 to 0.28 in *Assistant Experiment I* (Fisher exact test, p-value=0.759) and from 0.13 to 0.44 in *Assistant Experiment II* (Fisher exact test, p-value=0.029) but it does not affect application rates for male job-seekers from this area of study (Fisher exact test>0.1). Surprisingly, affirmative action discourages application rates from male job-seekers in areas with low female discrimination. In *Assistant Experiment I* male job-seekers from agricultural sciences, fine arts, educational sciences are less likely to apply under affirmative action than in the control treatment (Fisher exact test is 0.075), while for *Assistant Experiment II* male job-seekers from Natural Sciences (the area with the second lowest degree of discrimination) are less likely to apply (Fisher exact test, p-value=0.042).

Result 4

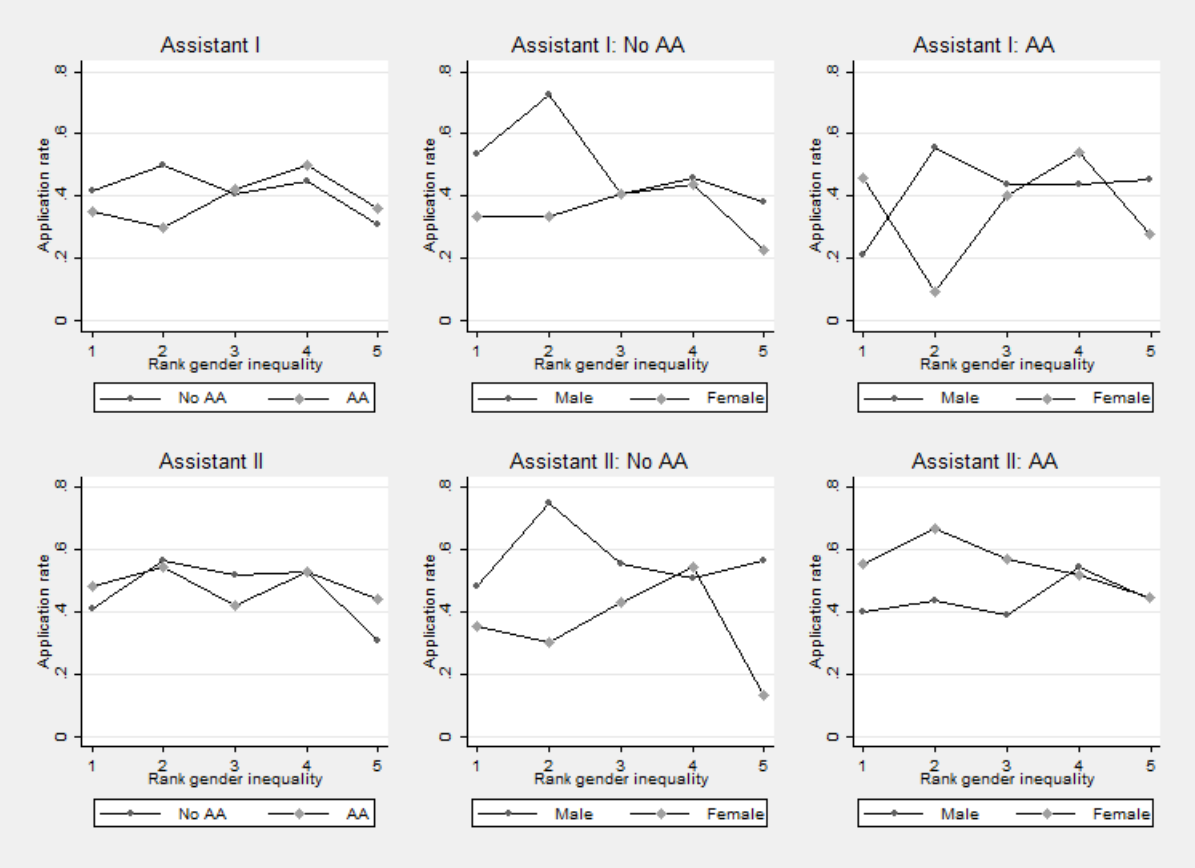
> Affirmative action closes the gender gap in application in areas with high a high subject area gender wage gap, by fostering female job-seekers to apply. Yet, this policy discourages male job-seekers from areas with low subject area gender wage gap.

5.5 Heterogeneous effects on qualifications of the applicant pool

Our conceptual framework predicts that the sorting effects of affirmative action would depend on the spread of income by male and female job-seekers. Hence, it is relevant to compare the sorting effect in areas with high and low deviation in income. We classifying areas of study with a standard deviation above the median as high variance areas (social sciences and economics) and the rest as low variance and repeated the analysis in Equation 2. The result of this analysis are presented in Appendix G.

We find that in the control treatment there are no significant effects of qualifications of job-seekers on the likelihood to apply. This effect holds for male and female job-seekers.

Figure 3: Completed applications by gender inequality in income rate of study area



Note: Rank gender inequality measures differences in expected income measured as employment rate times average income. The lowest rank corresponds to low gender inequality. Rank 1 includes the following study areas: Agricultural Sciences, Fine Arts, Educational Sciences. Rank 2 refers to Natural Sciences. Rank 3 to Engineering, Rank 4 to Social Sciences and Rank 5 to Economics.

Contrary to expected, we find that affirmative action has a positive sorting effect for female and male job-seekers from areas with high income variance. Female and male job-seekers from economics and social sciences have higher grades under affirmative action than in the control treatment. Moreover, we also find positive sorting effects for job-seekers from study areas with low variance of income. Under affirmative action, male applicants are less experienced, but have higher performance in the work example. We find no positive or negative hierarchical sorting for female job-seekers from areas with low variance of income.

Result 5

> We find no positive sorting effects of women from areas with low income variance due to affirmative action and on the contrary found positive sorting by women from areas with high income variance. We also find positive sorting by male job-seekers both from areas with high and low variance of income.

6 Discussion and Conclusion

Much has been written about how women are less likely to enter the labor force than men – and how policies such as affirmative action might reduce this segregation. We have designed and conducted three field experiments to answer a very specific question. Does including affirmative action statements in the job description induce women to apply for jobs? And hence reduce the gender-gap in applications? We find that it does, and the application pool under affirmative action is no less qualified than the application pool without affirmative action.

In the Colombian context of our field study, affirmative action is a voluntary choice for employers. In situations where affirmative action is compulsory, sorting of applicants may be very different. For example, Seierstad and Opsahl [2011] give evidence that the use of quota rules in the boards of publicly listed companies in Norway is associated with increased participation of women in multiple boards reflecting short term restrictions in the supply of female executives.

We have discussed our experiments in terms of sorting by applicants, both male and female. For instance, applicants with certain unobserved attributes may be more of less inclined to apply for a job with states a preference for hiring females. (We find some intriguing evidence that impulsive women are more likely to apply for such jobs). But there is another possibility that our study raises. It might be the employer itself reveals its previously unobserved type. For instance, employers might signal that they are family-friendly or that

women have better chance of promotion than at other firms. We do not find any strong evidence of such signaling.

Affirmative action statements in job advertisements may vary in their effectiveness at closing the gender gap in applications depending on the context. For instance, if there are cultural or childcare constraints that vary across economies, then affirmative action might be insufficient to induce women into the workplace. It is heartening therefore to find such evidence in our study in Colombia. Further replications are necessary to test if the effectiveness of affirmative action depends on the context.

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A Job Advertisements

- *Assistant Experiment I*
  - Newspaper
    - Spanish

      Universidad Alemana busca asistentes de investigación para trabajar en Áreas rurales. Más información en: https://lotus1.gwdg.de/asistentes
      - English

        German University is looking for research assistants to work in rural areas. More information is available at:
    - Employment Boards (Spanish)

      Oferta de empleo Asistentes de Investigación

      El Centro de Estudios sobre Pobreza, Equidad y Crecimiento de la Universidad Goettingen en Alemania está buscando asistentes de investigación para trabajar en zonas rurales en Colombia. Se espera que los asistentes de investigación vivan en comunidades rurales durante dos a tres meses. Su labor consiste en servir de puente entre las comunidades rurales y los investigadores principales. Las funciones del asistente de investigación incluyen:

      Establecer contactos con instituciones locales,

      Realizar entrevistas y encuestas,

      Recopilar datos secundarios,

      Reclutar, entrenar y supervisar encuestadores locales,

      Escribir reportes sobre actividades de campo.

      Estamos buscando profesionales de cualquier área de estudio que hayan terminado recientemente (o estén por terminar sus estudios). Los candidatos deben estar motivados para trabajar en las zonas rurales, deben tener la capacidad de realizar el trabajo de forma semi-independiente, deben ser proactivos, buenos miembros de equipo y deben tener buenas habilidades de comunicación. Aunque la experiencia en actividades similares es preferible no es un requisito obligatorio.Si está interesado y quiere saber más sobre el trabajo, por favor regístrese en nuestro portal: https://lotus1.gwdg.de/asistentes
    - Employment Boards (English)

      The Centre for the Study of Poverty, Equity and Growth from University of Goettingen is looking for research assistants to work in rural areas in Colombia. It is expected that the assistants will live in rural communities for two to

three months. Research assistants would help to connect rural communities and principal researchers. Some of the task required include:
Establish contact with local institutions,
Conduct interviews and surveys,
Collect secondary data,
Recruit, train and supervise local enumerators,
Write field work reports.
We are looking for professionals from any area of studies who have recently graduated (or are about to complete the degree). The candidates should be motivated to work in rural areas, should have capacity to work semi-independently, be proactive, good team members and have good communication skills. Although experience in similar tasks is preferable it is not compulsory. If you are interested and want to know more about the position, please register in: http://{...}

- *Assistant Experiment II*
  - Newspaper
    - Spanish
      Universidad Alemana busca asistentes de investigación para más información entre a nuestra página: https://{...}
    - English
      German University is looking for research assistants to work in rural areas for more information go to: http://{...}
  - Employment Boards (Spanish)
    El Centro de Estudios sobre Pobreza, Equidad y Crecimiento de la Universidad de Göttingen en Alemania está buscando asistentes de investigación universitarios de cualquier área de estudio. Los asistentes trabajarán en Bogotá apoyando nuestro grupo de investigación en diversas labores que incluyen:
    Establecer contactos con instituciones locales,
    Realizar entrevistas y encuestas
    Sistematizar información
    Recopilar información secundaria
    No se requiere experiencia previa. Si está interesado por favor regístrese en nuestro portal: http://www.{...}
  - Employment Boards (English)
    The Centre for the Study of Poverty, Equity and Growth from University of

Goettingen is looking for universitary research assistants from any area of studies. Research assistants would work in Bogota supporting our research group in different activities that include:
Establish contact with local institutions,
Conduct interviews and surveys,
Data entering,
Collect secondary data,
No previous experience is required. If you are interested, please register in: http://{...}

- Consultant Experiment
  - Newspaper
    Asesor solicita empresa consultora para trabajar en Implementación, Seguimiento y Evaluación participativa de planes municipales de desarrollo. Experiencia Mínima 2 años. http://www.personal.uni-jena.de/~we26mer/redes
    Consultant with at least 2 years of experience is required to work in the implementation, follow up and evaluation of municipal development plans using participatory methods.
  - Email
    Urgente! Empresa consultora con amplia trayectoria en el sector público y privado solicita asesor para trabajar en la Implementación, Seguimiento y Evaluación participativa de planes municipales de desarrollo. Mínimo 2 años de experiencia. Más información en:
    Urgent! Consultant firm with ample experience in public and private sector is looking for a Consultant to work in implementation, follow up and evaluation of municipal development plans using participatory methods. At least two years of experience is requiered. More information in:

B Variables Collected at the Statement of Interest

Variable	Ass I	Ass II	Consultant
Personal information			
National ID Number (Cedula)		x	x
Gender	x	x	x
Marital status	x	x	x
Do you have a master degree	x	x	x
How many years of experience do you have			x
Day of Birth	x	x	

Variable	**Ass I**	**Ass II**	**Consultant**
Place of Birth	x		
Actual address	x		
Permanent residence	x		
Please indicate time availability for next year	x		
Highest Education Level			
Institution	x	x	
University	x	x	
Area of studies	x	x	
Titles	x	x	
Years of graduation	x	x	
Average Grades		x	
Family Information			
Father's name (First name, last name)	x		
Address Street Barrio City Municipality Department	x		
Mothers's name (First name, last name)	x		
Address Street Barrio City Municipality Department	x		
Children		x	
Academic History			
University/College	x	x	
City	x		
From/To (Dates)	x		
Degree	x	x	
Year	x	x	
Health information			
Do you have medical insurance? Yes No	x		
Is your medical insurance valid for outside Bogota? Yes No	x		
Vaccinations: tuberculosis, tetanus, diphtheria, yellow fever, hepatitis B	x		
Where did you find the job offer? Email, poster, web-portal, newspaper, other	x		
Personality Test BIG 5		x	
Risk aversion: You like to take risks (10) or you avoid them (1)		x	
*Impulsiveness:*You think a lot before you take a decision (1) or you are impulsive (10)		x	
Time preferences: You are Impatient (1) or patient (10)		x	
Cognitive Reflection Test		x	
Work Related Ability		x	

C Invitation Letters

We present the invitation letters translated from Spanish

Assistant I

Thank you for your interest in working in our research group. Due to the high number of applications the screening process took a couple of days longer than we had anticipated. We apologize for this delay.

The position is available for a research assistant to work in rural areas in Santander with tobacco farmers. You will work in a team where their duties include:

Establish contacts with local institutions, conduct interviews and surveys, collect secondary data Recruit, train and supervise local enumerators, and write reports on field activities.

The contract is for two months with possibility of extension depending on the duration of the project and the candidate's performance. The base salary is 1,500,000 pesos plus travel commissions of 65,000 for each day in the field. It is expected that the research assistant will be in the field for two months. Additional cost such as transportation, will also be covered by the project.

If you are interested in applying for this position, please complete the form below. It takes approximately 60 minutes to answer it. At any time you can stop and resume the process. When you resume, you can continue without losing information as long as you have saved the changes. Please be completely honest in answering the following questions. This will allow us to determine your compatibility for work in our research group.

AFFIRMATIVE ACTION STATEMENT
The University of [HIDDEN] is committed to the policy of equal opportunities in the search and selection of staff. We seek to increase women's participation in areas where so far they have been underrepresented. At least 50% of the research assistants hired will be women.

To apply for the job, please click the following LINK.

The deadline to complete the application is December 31, 2010. We will contact you soon indicating whether you have been selected for interview. For additional questions please contact us by EMAIL.

Best regards, NOMBRE

Assistant II

Thank you for your interest in working in our research group. Due to the high number of applications we would need to do a second round of test. All the tests will be carried out in this internet platform. If you are interested in the position please complete the form. Completing the form take about 1 hour and includes different tests on work related abilities. Please complete the test individually and without asking for support to other people. No not use calculators or other electronic devices.

You can interrupt the application process in any moment. In order not to lose the information, please save the changes. Please be completely honest while answering the questions. This would allow us to determine your compatibility to the job offer. The deadline to complete the application form is August 13th. The best candidates will be invited for interview.

The research assistants would be hired to enter data from paper based surveys. The payment will be by survey entered. The data entered would be verified Hence your payment would depend on your job performance.

We have flexibility to adjust the working hours such that students do not have problems with the classes. Nonetheless, all the work needs to be do in our offices. As this is a contract by completed activities, there is no specified duration of the contract specified. We estimate that completing the data entering will take between 1 and 2 months. The work will start in the next two weeks.

****

AFFIRMATIVE ACTION STATEMENT

The university [HIDDEN] uses equal opportunity policy in the recruitment and employment of the personal. We aim at increasing female representation in areas where they have been underrepresented. At least 50% of the positions will be filled by women.

****

If you want to apply enter here ____.

If you do not want to continue, please press here.

If you have additional questions, please do not hesitate in contacting us.

Consultant

[THE COMPANY] Ltda. is a consulting firm with more than 15 years of experience working for the public and private sector. We seek professionals with at least 2 years of experience to work as consultants under service provision contracts on a consulting project.

The successful candidate will work on the implementation, participatory monitoring and evaluation of municipal development plans in two municipalities of Santander. The contract is for 4 months. The monthly salary is 3 million pesos, negotiable.

Besides the needed experience, it is indispensable that applicants are willing to travel outside of Bogota. We seek professionals preferably in public administration, international relations, and Economics.

AFFIRMATIVE ACTION (presented only to affirmative action group)

[THE COMPANY]is committed to the policy of equal opportunities in the search and selection of staff. Thus, [THE COMPANY] seeks to increase women's participation in areas where so far they have been underrepresented. In case of candidates with equal qualification level, women will be preferred .

If you are interested in applying for this position, please complete the form below. It takes approximately 40 minutes to answer the form. At any time you can interrupt the process. When you resume, you can continue without losing information, as long as you have saved the changes. The deadline to complete the application is January 21, 2011. We will contact individuals who have been selected for interview very soon. For any additional questions please contact us at EMAIL

D Tests included in application process

D.1 Frederick [2005]

Would you please answer the following questions.

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days

D.2 Work example

Subjects were asked to digitize the following example questionnaire.

E Metropolitan Areas

Bogota Area Cajicá, Chía, Cota, Facatativá, Soacha

Medellin Area Barbosa/Antioquia, Bello, Copacabana, Envigado, Girardota, Itagui, La Estrella, Sabaneta

Caribbean Area Barranquilla, Candelaria, Ponedera, Cartagena, Santa Marta, Montería, Cereté, Planeta Rica, San Carlos/Cordoba

Cali Area Calí, Palmira, Yumbo, Jamundí

Coffee Area Chinchiná, Villamaría, Manizales, Dosquebradas, Santa Rosa de Cabal, Calarca, Filandia, Pereira

F Sorting effects of Affirmative action on qualifications of job-seekers

Table 9 presents the results of the estimate coefficients of qualification measures according to Equation 2. Based on this estimations, we estimated the marginal effects presented in Figure 2.

Figure 4: Work example screen shots

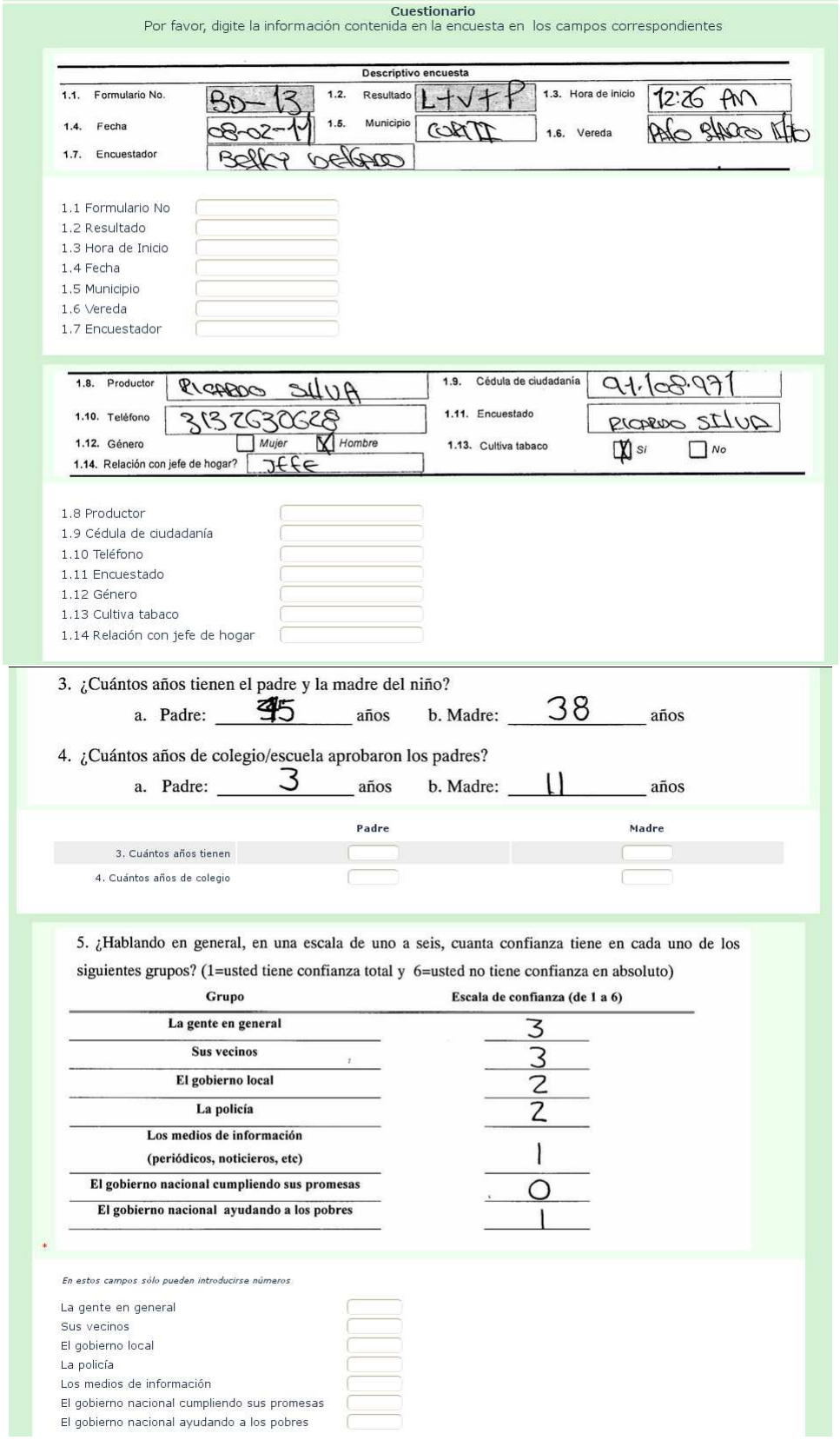


Table 9: Linear probability model of completed applications under *Affirmative Action:* Qualification indicators

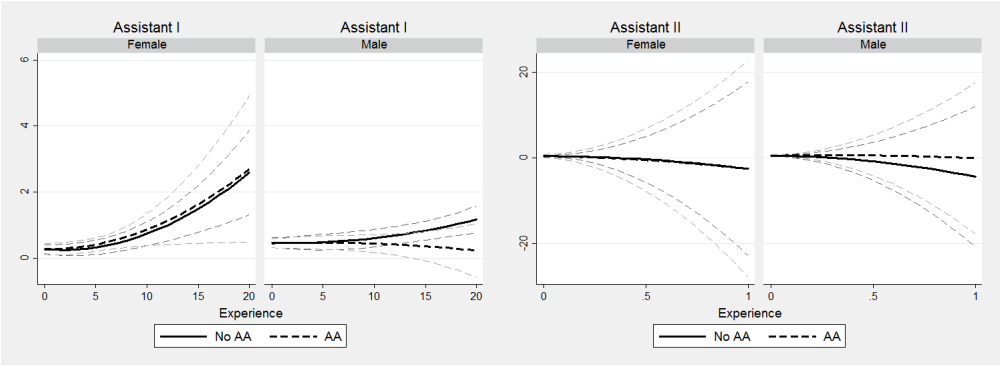
	Assistant I			Assistant II			Consultant		
	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female	(7) All	(8) Male	(9) Female
AA interactions Quality									
AA × Master	-0.178	-0.404**	-0.004	0.380**	0.424*	0.320	0.012	-0.100	0.154
	(0.124)	(0.174)	(0.171)	(0.166)	(0.229)	(0.252)	(0.116)	(0.153)	(0.179)
AA × Experience (centered)	0.002	-0.001	0.007	-0.005	-0.010	-0.010	0.030	-0.017	0.051**
	(0.011)	(0.015)	(0.015)	(0.013)	(0.018)	(0.019)	(0.019)	(0.031)	(0.024)
AA × Experience (squared)	-0.000	-0.000	0.000	-0.001	0.001	0.001	-0.001	0.002	-0.002*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)
AA × CRT (centered)				-0.062	0.067	-0.111*			
				(0.043)	(0.064)	(0.060)			
AA × CRT (squared)				0.046	-0.034	0.115**			
				(0.038)	(0.053)	(0.057)			
AA × Work Example (centered)				-0.011	-0.034	0.001			
				(0.018)	(0.025)	(0.028)			
AA × Work example (squared)				0.015***	0.016***	0.012			
				(0.005)	(0.006)	(0.010)			
AA × Grade (centered)				0.996*	2.189**	-0.262			
				(0.539)	(0.862)	(0.829)			
AA × Grade (squared)				4.155***	7.740*	2.518			
				(0.929)	(4.183)	(4.855)			
Main effects Quality									
Master	0.114	0.294**	-0.046	-0.236*	-0.328**	-0.137	0.344***	0.418***	0.236*
	(0.085)	(0.116)	(0.112)	(0.120)	(0.164)	(0.164)	(0.077)	(0.100)	(0.121)
Experience (centered)	-0.005	-0.001	-0.013	0.024***	0.029**	0.026**	-0.020*	-0.020	-0.016
	(0.007)	(0.010)	(0.011)	(0.009)	(0.012)	(0.013)	(0.011)	(0.018)	(0.015)
Experience (squared)	0.000	-0.000	0.002*	-0.000	-0.000	-0.003	0.001*	0.001	0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.001)	(0.001)
CRT (centered)				0.037	-0.008	0.063			
				(0.031)	(0.047)	(0.043)			
CRT (squared)				-0.020	0.006	-0.043			
				(0.027)	(0.039)	(0.038)			
Work Example (centered)				0.011	0.020	0.007			
				(0.012)	(0.016)	(0.018)			
rk example (squared)				-0.001	0.000	-0.003			
				(0.001)	(0.002)	(0.006)			
Grade (centered)				-0.445	-0.395	-0.444			
				(0.350)	(0.499)	(0.559)			
Grade (squared)				-1.146**	-1.403**	-1.565			
				(0.445)	(0.647)	(4.739)			
Obs.	721	323	398	745	371	374	293	157	136

Note: This table reports the likelihood to apply given qualification characteristics collected in the first stage. We control for personality, risk attitudes and family indicators characteristics and interaction terms with *AA*. Results of t-test indicated at following significance levels * p<0.1, ** p<.05, *** p<.01. Standard errors are clustered at the city level.

G Heterogeneous effects on sorting according to variance in income

Figure 5: Marginal effects of qualification indicators: Below median standard deviation of income

Panel A: Experience for Assistant I and Assistant II



Panel B: Other characteristics Assistant II only

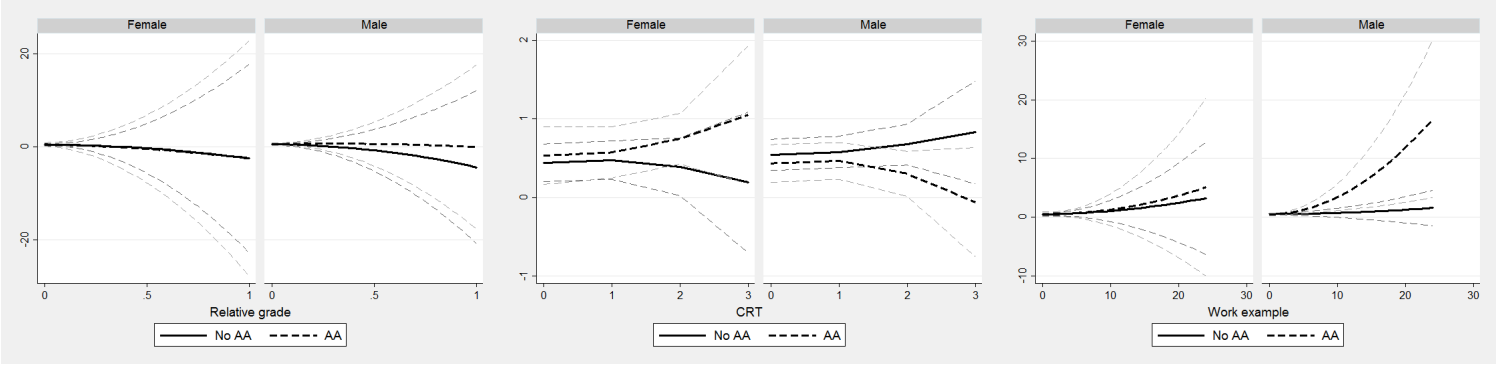
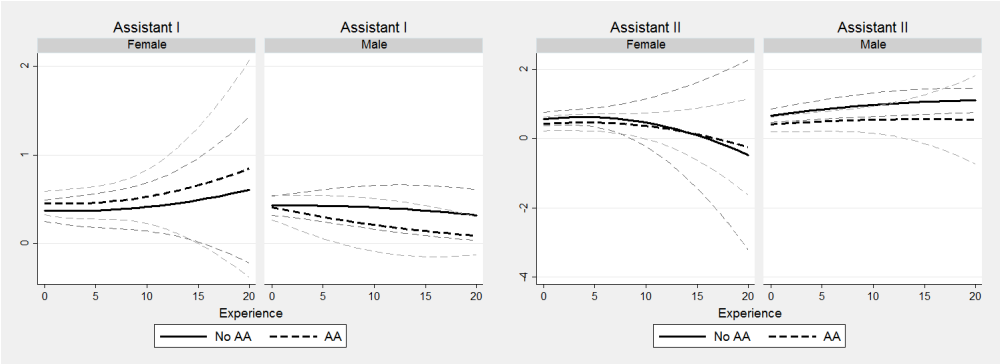
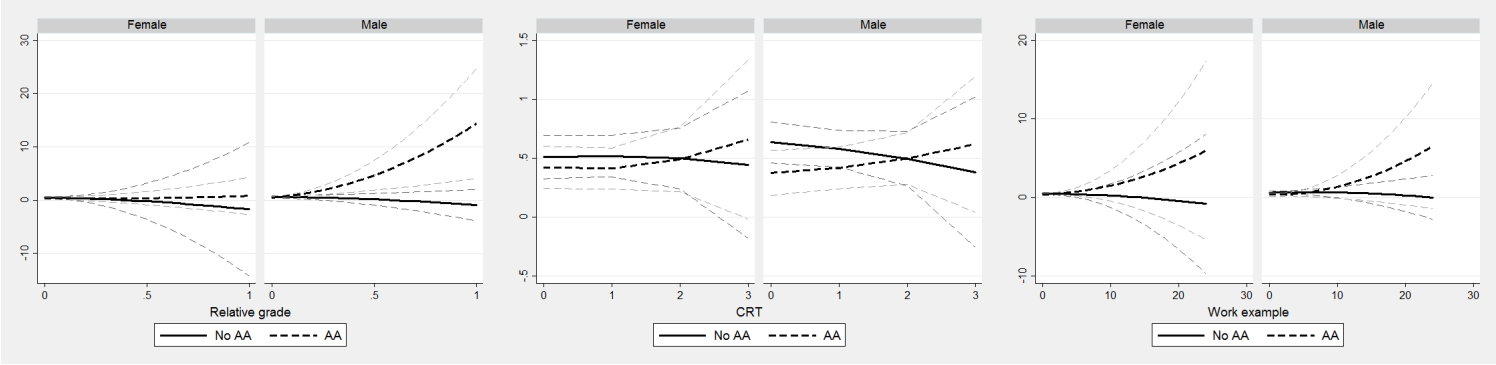


Figure 6: Marginal effects of qualification indicators: Above Median standard deviation of income

Panel A: Experience for Assistant I and Assistant II



Panel B: Other characteristics Assistant II only



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