

Quotas in Public Universities and Labor Outcomes: Evidence for Rio de Janeiro¹

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Abstract

In the last years, many Brazilian public universities introduced quotas for black and/or public school candidates in their admission processes. The proportion of students that had been admitted through quotas increased substantially (from 11% in 2009 to 25% in 2014) and in 2013 a specific law regarding quotas in Brazilian federal public universities was created (*Lei de Cotas*). In this paper, we investigate how the introduction of quotas in public universities may affect employers' perception of students and graduates from these universities. We explore the different timing of the introduction of quota systems in two public universities in the State of Rio de Janeiro to conduct an exercise where we use a difference in differences approach to compare potentially eligible (black and/or public school) students and graduates from a university that has introduced quota systems (UERJ) to a similar group from another university with no quota system at the time (UFRJ). We found no effects in the probability of being employed in the formal sector but negative effects for hourly wages (conditional on being employed in the formal sector) for men who are potentially eligible for quotas and study or have studied in an environment with quotas. We argue that the introduction of quotas may have affected employer's perception of students and graduates from these universities.

Keywords: affirmative action, quotas, statistical discrimination, labor market.

Resumo

Nos últimos anos, muitas universidades públicas brasileiras introduziram cotas para candidatos negros e/ou provenientes de escolas públicas em seus processos seletivos. A proporção de estudantes admitidos através de cotas aumentou substancialmente (de 11% em 2009 para 25% em 2014) e em 2013 foi criada uma lei específica sobre cotas em universidades públicas federais brasileiras (Lei de Cotas). Neste trabalho, investigamos como a introdução de cotas em universidades públicas pode afetar a percepção dos empregadores sobre estudantes e graduados dessas universidades. Nós exploramos diferentes momentos de introdução de sistemas de cotas em duas universidades públicas do Estado do Rio de Janeiro para realizar um exercício em que usamos uma abordagem de Diferença em Diferenças para comparar estudantes e graduados potencialmente elegíveis (negros e/ou provenientes de escolas públicas) de uma universidade que introduziu sistemas de cotas (UERJ) com um grupo similar de outra universidade sem sistema de cotas até então (UFRJ). Não foram encontrados efeitos sobre a probabilidade de ser empregado no setor formal, mas foram encontrados efeitos negativos sobre os salários por hora (condicional a estar empregado no setor formal) para os homens potencialmente elegíveis a cotas que estudam ou estudaram em um ambiente com cotas. Argumentamos que a introdução de cotas pode ter afetado a percepção dos empregadores sobre estudantes e graduados dessas universidades.

Palavras-chave: ação afirmativa, cotas, discriminação estatística, mercado de trabalho.

JEL Codes: I25, J15, J18

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1. Introduction

In the last years, many Brazilian public universities introduced quotas for black and public school candidates in their admission processes. The proportion of students that had been admitted through quotas increased from 11% in 2009 to 25% in 2014. In particular, in 2013 a specific law regarding quotas in Brazilian federal public universities was created and it states that by 2017 50% of all available admission slots in all federal universities and institutes will be reserved to public school candidates (*Lei de Cotas*).

The use of quotas and its effect is a controversial subject. On one hand, it is possible that students admitted through quotas are not as prepared for attending university, what might be correlated to worse grades and an increased probability of dropping out. In this sense, it is likely that their performance on the labor market may be unsatisfactory. On the other hand, it is possible that the gains of graduating university for individuals admitted through quotas might be higher than the gains for students that would have been admitted anyway, what would make the introduction of quotas to cause an efficient reallocation of resources (Bertrand et al (2010)).

The existence of quotas in universities may cause changes in the incentives for human capital acquisition, the composition of the student body and in students' performance (Francis & Tannuri-Pianto (2012), Silva & Machado (2014) and Assunção & Ferman (2015)). It can also affect employers' perception of students and graduates from these universities. There are many affirmative action models in the relevant literature that show that affirmative actions may have an opposite effect to what it was supposed to do: it may increase the between groups inequality (Coate & Loury (1993), Moro & Norman (2003) and Fang & Norman (2006)).

In this paper, we investigate how the introduction of quotas in Brazilian public universities affects employers' perception of students and graduates from these universities. We are particularly interested in the effects on potentially eligible students and graduates, regardless of their quota status. We explore the introduction of quotas for black and public school candidates in one public prestigious university in the State of Rio de Janeiro to investigate if potentially eligible students and graduates in an environment with quotas have different probability of being employed in the formal sector of the economy and different hourly wages (conditional on being employed in the formal sector) from students and graduates that have the same characteristics but are studying in another public prestigious university in the State with no quota system at the time.

The paper is organized in seven sections, including this introduction. The second section present a literature review. The third section presents the context of universities and student profile in the State of Rio de Janeiro focusing on UERJ. The fourth section describes the data and the fifth section presents our empirical strategy and descriptive statistics. The sixth section presents the main empirical results. Finally, in the seventh section we present concluding remarks.

2. Literature Review

Employers cannot perfectly observe all candidates' abilities and the information they have access to is restricted to their observable characteristics. The statistical discrimination literature addresses this issue, specifically the use of observable characteristics as a proxy for non-observable characteristics that are relevant to performance. In particular, between groups inequality may arise as a consequence of exogenous differences between groups and imperfect information (Phelps (1972)) or may be derived endogenously because of coordination failures of the disadvantaged group associated to self-fulfilling stereotypes (Arrow (1973)).

Affirmative action works as a compensation mechanism for the disadvantaged group for having been harmed in the past. The idea is that it might eliminate inequality arising from self-fulfilling stereotypes as a way of eliminating asymmetrical discrimination equilibria and promoting equality. However, there are many models that show that results in which group inequality persists remain possible. Coate & Loury (1993) show that, depending on the circumstances, affirmative action in the labor market may eliminate negative stereotypes towards the disadvantaged group or may worsen employers' perceptions regarding this group (this is the case of the "patronizing equilibrium" in which employers reduce their hiring standards for the disadvantaged group which causes members of this group to have reduced incentives to invest in human capital acquisition). However, affirmative action for workers may eliminate negative stereotypes

without this kind of side effects. Moro & Norman (2003) extend this model by allowing wages to be endogenous. Their results confirm the perverse effects mentioned before and reveal that there may be circumstances in which equilibrium wages might be negatively affected in a way that affirmative action can actually harm its intended beneficiaries.

Considering the introduction of quotas in universities, it is known that they may cause changes in the incentives for human capital acquisition, the composition of the student body and in students' performance. In Brazil, there is mixed evidence about the effects of the introduction of quotas in public universities on human capital acquisition before college. There is evidence that the introduction of quotas for black candidates in two public universities in the State of Rio de Janeiro has reduced the proficiency during high school of black public school students (Assunção & Ferman (2015)). In Brasilia, on the other hand, there is evidence that the introduction of quotas in a federal university (*Universidade de Brasília - UnB*) has increased the number of times mixed race candidates take the admission exam and their probability of enrolling in a preparatory course but no changes were found for black candidates (Francis & Tannuri-Pianto (2012)).

A similar pattern is observed for performance during college. Francis & Tannuri-Pianto (2012) show that there is no significant difference between quota and non-quota students' performance in UnB while Silva & Machado (2014) show that there is a significant negative impact of the introduction of affirmative action in universities on its students' performance in a higher education national exam (*Exame Nacional de Desempenho de Estudantes - Enade*).

The introduction of quotas in universities can also affect employers' perception of its students and graduates. Bertrand et al (2010) study the effects of the introduction of quotas in universities in a specific state in India and considering engineering major only. The authors show that this affirmative action policy has contributed to the redistribution of educational resources benefiting students with lower family income and has positively affected quota students' future wages. Students admitted through quotas are not the only ones who might be affected, though. Employers' perception may change for all students with observable eligible characteristics, and this is what we investigate in this paper.

3. Context

3.1 Universities and Student Profile in the State of Rio de Janeiro

The State of Rio de Janeiro has 8 large public universities. At present, all of them have adopted affirmative actions to favor minority groups. Table 1 presents information regarding affirmative action policies and when they were introduced in each of these universities.

Table 1: Public Universities in the State of Rio de Janeiro and Affirmative Action

UENF (Universidade Estadual do Norte Fluminense Darcy Ribeiro): Quotas for black and/or public school candidates in 2003.
UERJ (Universidade do Estado do Rio de Janeiro): Quotas for black and/or public school candidates in 2003.
UFF (Universidade Federal Fluminense): Bonus for public school candidates in 2008.
UEZO (Fundação Centro Universitário Estadual da Zona Oeste): Quotas for black and/or public school candidates in 2009.
UFRRJ (Universidade Federal Rural do Rio de Janeiro): Bonus for public school candidates in 2010.
UFRJ (Universidade Federal do Rio de Janeiro): Quotas for public school candidates in 2011.
UNIRIO (Universidade Federal do Estado do Rio de Janeiro): Quotas for black and/or public school candidates in 2013.

Source: Elaborated by the authors.

In this paper, we will focus on two of these public universities in the State of Rio de Janeiro: UERJ and UFRJ. This choice was made because UENF and UEZO are much smaller in terms of number of students admitted per year, UFF and UFRRJ have adopted bonus policies and no information is available about which were the benefited students and UNIRIO has adopted quotas only in 2013 because of the specific federal law regarding this matter (at this moment all other public universities in the State of Rio de Janeiro already had affirmative action).

Table 2 presents the number of students who were admitted to university in the State of Rio de Janeiro in every year between 2006 and 2014 (freshmen only) considering only public universities. It also shows the percentage of these students who were black, who previously attended public schools, who were admitted through quotas, who were enrolled at UERJ and at UFRJ.

Table 2: Public Universities in the State of Rio de Janeiro: Student Profile (Freshmen Only)

Admission Year	Number of Students	% Black	% Public Schools	% Quota	% UERJ	% UFRJ
2006	14857	6%	11%	7%	16%	31%
2007	16332	6%	12%	6%	14%	32%
2008	18017	5%	16%	5%	15%	33%
2009	22782	5%	19%	5%	15%	32%
2010	27377	6%	32%	14%	14%	30%
2011	29513	4%	37%	15%	15%	29%
2012	28483	4%	56%	17%	15%	26%
2013	30640	5%	48%	17%	14%	29%
2014	30906	7%	54%	27%	14%	31%

Source: Elaborated by the authors. Data: *Censo da Educação Superior* (INEP/MEC).

3.2 Work While at University in the State of Rio de Janeiro

In Brazil, there is a large proportion of higher education students that work while at university, especially considering students in private ones. Table 3 presents information about labor market participation during university in the State of Rio de Janeiro using the *Pesquisa Nacional por Amostra de Domicílios* (national household survey) provided by IBGE. For each university year, the average percentage from 2006 to 2014 was calculated. We notice that considering all university years in both public and private universities, 60% of students work while studying. When we consider public and private universities separately, we observe that the percentage of working students is higher at private universities (65% versus 47% in public universities). Finally, for students who are working, the majority is employed in the formal sector (62% of working public universities students and 70% of working private universities students).

Table 3: Labor Market Participation While at University

Group	% Work	Public: % Work	Private: % Work	Public, Work: % Formal	Private, Work: % Formal
First Year	56%	34%	62%	67%	75%
Second Year	59%	43%	64%	57%	70%
Third Year	60%	49%	64%	67%	66%
Fourth Year	66%	55%	70%	61%	69%
All	60%	47%	65%	62%	70%

Source: Elaborated by the authors. Data: *Pesquisa Nacional por Amostra de Domicílios* (IBGE).

3.3 UERJ

The admission process to UERJ is based on the performance of candidates on an entrance exam called *Vestibular Estadual*. This exam is composed by two parts. The first part is a qualifying exam covering high school content that is offered twice and candidates may choose to take one or both. Candidates must score at least 40% in order to pass to the second part, which is a written exam. At this stage, candidates must choose their major and if they want to apply for regular admission or the quota system. Candidates are considered eligible for the quota system if they prove to be economically vulnerable (at the 2016 admission process, eligible candidates maximum gross monthly per capita family income was R\$ 1,182.00). The quota system was adopted in 2003, but benefited groups varied over time. Table 4 presents the rules of the quota system in UERJ over the years.

Table 4: Quotas in UERJ over the Years

Year	Rules
2003	50% to public schools candidates and 40% to self-declared black candidates (overlapping).
2004 to 2006	20% to public schools candidates, 20% to self-declared black candidates and 5% to disabled and ethnic minorities candidates.
2007 to 2008	20% to public schools candidates, 20% to self-declared black candidates and 5% to disabled, ethnic minorities or candidates whose parents were police officers, military, firefighters, safety inspectors or prison administration officers who were killed or disabled on duty.
2009 to 2014	20% to public schools candidates, 20% to self-declared black or indigenous candidates and 5% to disabled or candidates whose parents were police officers, military, firefighters, safety inspectors or prison administration officers who were killed or disabled on duty.

Source: Elaborated by the authors.

Table 5 presents UERJ freshmen students' profile over the years considering their *ENEM* information from the year before admission to university². Information is provided for both quota and non-quota students. We notice that: (i) quota students are slightly older than non-quota student; (ii) the percentage of black students among quota students is much higher than among non-quota students (27% versus 8% in 2014); (iii) a similar pattern is observed when we consider both black and mixed race (66% versus 30%); (iv) the vast majority of quota students previously attend public schools (78% in 2014) while a much smaller percentage of non-quota students attended this type of school (only 25% in the same year); (v) quota students' parents are in general less educated than non-quota students' parents: in 2014, more than 80% of non-quota students' parents graduated high school and more than 40% graduated college while only about 50% of quota students' parents graduated high school and less than 10% graduated college; (vi) the proportion who worked before being admitted to university is much larger among quota students than non-quota students (44% versus 23% in 2014); and (vii) quota students' standardized ENEM score is much smaller than non-quota students' (1.16 versus 1.61 in 2014).

Another interesting comparison between quota and non-quota students refers to what happens to them after they are admitted to university. Do they have similar probabilities of staying in the university in following years? Do they have similar probabilities of graduating? Do they make similar choices regarding working while studying at university? Table 6 presents evidence for these questions considering cohorts of admission years in UERJ³. We notice that quota students present higher probabilities of staying in the university in the years following admission than non-quota students. However, their probability of graduating seems to be smaller (except for the 2008 and 2009 cohorts). Finally, considering work while at university (formal sector only), we notice that quota students seems to have a higher probability of working for most cohorts and years after admission.

² Details about sample and data are available in the Data section of the paper.

³ In Table 6, unavailable information for the 2006 to 2008 cohorts is due to data limitations of the *Censo da Educação Superior* (INEP/MEC) since individual student data is only available from 2009 onwards. Unavailable information for the 2011 to 2014 cohorts is either because the information does not apply or because of data availability to researchers (more details in the Data section).

Table 5: UERJ Freshmen Students' Profile per over the Years: Quota versus Non-quota

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Quota																		
Age (Mean)	21	22	19	20	22	22	21	21	19	20	19	20	19	20	19	20	19	20
% Women	64%	69%	64%	68%	62%	69%	64%	64%	54%	59%	56%	60%	54%	61%	56%	63%	55%	57%
% Black	8%	30%	6%	26%	13%	31%	11%	30%	9%	29%	8%	27%	9%	26%	9%	29%	8%	27%
% Black or Mixed Race	43%	68%	37%	62%	50%	68%	40%	64%	35%	63%	32%	63%	33%	64%	31%	63%	30%	66%
% Attended Public High School	46%	85%	36%	88%	56%	86%	41%	85%	28%	80%	30%	81%	32%	82%	31%	79%	25%	78%
% Father Education - High School	67%	34%	76%	43%	58%	38%	69%	42%	80%	49%	81%	50%	78%	41%	78%	47%	81%	47%
% Father Education - College	36%	7%	42%	9%	27%	9%	32%	8%	42%	10%	43%	12%	43%	7%	42%	9%	42%	8%
% Mother Education - High School	66%	29%	78%	39%	61%	31%	72%	43%	80%	52%	83%	55%	81%	47%	81%	50%	84%	54%
% Mother Education - College	29%	4%	41%	8%	20%	5%	35%	9%	43%	11%	45%	12%	43%	9%	45%	9%	48%	10%
% Family Income <= Min. Wage	3%	7%	2%	10%	4%	11%	4%	10%	2%	7%	5%	13%	4%	10%	5%	14%	4%	14%
% Worked	39%	56%	20%	38%	41%	50%	35%	47%	25%	43%	24%	38%	24%	38%	25%	40%	23%	44%
ENEM Score (Standardized)	1.70	1.03	1.76	1.12	1.32	1.19	1.38	1.16	1.58	1.15	1.38	1.04	1.54	1.06	1.47	1.05	1.61	1.16

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC).

Table 6: UERJ Students' Follow Up: Quota versus Non-quota

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Quota																		
% Stay One Year After Admission	-	-	-	-	-	-	62%	71%	76%	85%	86%	93%	85%	93%	86%	94%	-	-
% Stay Two Years After Admission	-	-	-	-	69%	75%	56%	62%	62%	77%	80%	90%	77%	89%	-	-	-	-
% Stay Three Years After Admission	-	-	72%	70%	65%	68%	45%	59%	63%	78%	76%	85%	-	-	-	-	-	-
% Stay Four Years After Admission	70%	71%	58%	61%	53%	59%	43%	54%	55%	71%	-	-	-	-	-	-	-	-
% Graduate	56%	51%	52%	50%	41%	42%	26%	31%	19%	17%	5%	4%	-	-	-	-	-	-
% Work During Admission Year	16%	24%	13%	18%	25%	19%	17%	19%	15%	16%	16%	19%	14%	19%	13%	14%	13%	14%
% Work One Year After Admission	19%	19%	16%	21%	24%	20%	19%	19%	17%	21%	17%	19%	15%	15%	15%	13%	-	-
% Work Two Years After Admission	20%	25%	18%	19%	20%	21%	21%	21%	18%	20%	18%	20%	16%	17%	-	-	-	-
% Work Three Years After Admission	21%	26%	23%	23%	22%	24%	23%	26%	22%	24%	21%	23%	-	-	-	-	-	-
% Work Four Years After Admission	30%	32%	34%	32%	33%	29%	33%	32%	28%	30%	-	-	-	-	-	-	-	-
% Work Five Years After Admission	44%	51%	46%	41%	45%	39%	43%	41%	-	-	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* (INEP/MEC) and *RAIS* (MTE).

4. Data

We use three sources of information: (i) the *Censo da Educação Superior* (higher education census), (ii) the *Exame Nacional do Ensino Médio - ENEM* (high school national exam), and (iii) the *Relação Anual de Informações Sociais - RAIS* (annual reports of social information). Information from these three sources can be combined by individuals' *Cadastro de Pessoa Física - CPF* which is a unique individual identification number in Brazil.

The *Censo da Educação Superior* (higher education census) is provided by Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira (INEP/MEC), an autarchy related to the Brazilian Ministry of Education and includes information about all higher education students in Brazil. It contains information about students' characteristics (sex, age, race, type of school attended previously) and about students while at university including the chosen major and admission type (regular or quota). Data is available yearly for all higher education students attending college since 2009.

The *Exame Nacional do Ensino Médio - ENEM* (high school national exam) is also provided by INEP/MEC and can be used as a measure of student performance. This exam is usually taken by students who are willing to apply for university on the year they finish high school, although it is not mandatory. In recent years, some universities in Brazil started using this exam as part of their admission process.

Finally, the *Relação Anual de Informações Sociais - RAIS* (annual reports of social information) which is provided by the Brazilian Ministry of Labor and Employment, includes yearly information about individuals' performance on the formal sector of the economy. All firms in the formal sector must report information about their employees' wages, occupations and number of hours worked, in addition to individual characteristics such as education, gender and age on an annual basis. It is important to state that all results presented in this paper refer exclusively to the formal sector of the economy. This limitation is due to the fact that identified individual information about performance in the labor market is needed for the analysis and this is only available for the formal sector in Brazil.

For each year from 2006 to 2014, an unbalanced panel was created combining these three sources of data for all students that were admitted into university in the State of Rio de Janeiro in that specific year. Only students that were admitted in only one university and that took only one major were considered (82% of all students).

Table 7 presents the number of students (freshmen only) per admission year in all universities in the State of Rio de Janeiro and specifically in UERJ and in UFRJ. It also presents the percentage of students for which *ENEM* scores and sociodemographic information from the previous year are available. In the final sample, only students for which *ENEM* information was available are considered. Considering all admission years, in average it is possible to match *ENEM* scores for 55% of UERJ students and 50% of UFRJ students.

Table 7: Number of Students

Admission Year	Higher Education Census			<i>ENEM</i> Available		
	Total	UERJ	UFRJ	% Total	% UERJ	% UFRJ
2006	75300	2466	4597	10%	21%	14%
2007	83201	2327	5261	24%	47%	40%
2008	98387	2072	5985	10%	31%	14%
2009	122383	3392	7295	9%	18%	14%
2010	136887	4197	8189	28%	60%	70%
2011	131014	4557	8474	38%	76%	71%
2012	146673	4253	7483	37%	77%	78%
2013	150192	4557	8666	41%	82%	74%
2014	159103	4414	8344	41%	81%	69%

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC).

Table 8 presents the percentage of students and/or graduates per admission year for which there is information in *RAIS* and for which *ENEM* information is also available. Once again, information is provided considering all universities in the State of Rio de Janeiro, UERJ and UFRJ only. The last two correspond to the sample that will be used in some of the analysis in the next sections (the ones regarding hourly wages).

Table 8: Percentage of Students in RAIS with ENEM Information Also Available

Admission Year	RAIS 2014			RAIS 2013			RAIS 2012		
	% Total	% UERJ	% UFRJ	% Total	% UERJ	% UFRJ	% Total	% UERJ	% UFRJ
2006	7%	14%	9%	7%	14%	8%	6%	12%	8%
2007	15%	30%	21%	15%	28%	19%	13%	23%	13%
2008	6%	16%	6%	6%	14%	5%	5%	10%	3%
2009	5%	8%	5%	5%	6%	3%	4%	5%	2%
2010	11%	21%	16%	10%	18%	12%	9%	16%	12%
2011	14%	21%	13%	14%	19%	12%	14%	19%	11%
2012	14%	18%	14%	13%	17%	13%	13%	20%	16%
2013	15%	17%	15%	15%	21%	17%	-	-	-
2014	15%	20%	17%	-	-	-	-	-	-

Admission Year	RAIS 2011			RAIS 2010			RAIS 2009		
	% Total	% UERJ	% UFRJ	% Total	% UERJ	% UFRJ	% Total	% UERJ	% UFRJ
2006	6%	11%	5%	5%	8%	4%	4%	6%	2%
2007	11%	17%	8%	9%	13%	5%	8%	12%	5%
2008	5%	9%	2%	4%	9%	2%	4%	8%	2%
2009	4%	5%	2%	4%	4%	2%	4%	4%	2%
2010	9%	16%	11%	9%	15%	12%	-	-	-
2011	13%	21%	12%	-	-	-	-	-	-

Admission Year	RAIS 2008			RAIS 2007			RAIS 2006		
	% Total	% UERJ	% UFRJ	% Total	% UERJ	% UFRJ	% Total	% UERJ	% UFRJ
2006	4%	5%	2%	4%	5%	2%	4%	6%	2%
2007	7%	10%	5%	7%	10%	4%	-	-	-
2008	4%	9%	3%	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

5. Empirical Strategy and Descriptive Statistics

As UERJ introduced quotas in 2003 and UFRJ did not until 2011, it is possible to investigate how the introduction of quotas in UERJ affected employers' perception of its students and graduates by using a difference in differences approach where we will compare potentially eligible individuals (black and/or public school) to non-eligible individuals (white and/or private school) in two different environments: with quotas (UERJ) and without quotas (UFRJ)⁴ We are interested on results regarding the probability of being employed in the formal sector and hourly wages (conditional on being employed in the formal sector).

We will estimate two alternative models. In the first model, we will consider all university years and years after graduating at once (pooled version), as described in equation (1):

$$Y_{ijt} = \alpha + \beta \text{eligible}_i + \gamma \text{treatment}_j + \delta \text{eligible}_i \text{treatment}_j + X_i' \pi + W_t' \phi + e_{ijt} \quad (1)$$

where i refers to the individual, j to the university, t to the moment of time, Y_{ijt} is the dependent variable (e.g. employed in the formal sector dummy, log of hourly wage), eligible_i is an eligibility dummy (black, public school or black and public school), treatment_j is a treatment dummy (UERJ student or graduate), X_i is a vector of individual observable characteristics (e.g. age, sex, *ENEM* score, parental education, major and admission year), W_t are calendar year dummies and e_{ijt} is the error term. We are interested in the parameter δ .

In the second model, we will consider each college year separately (e.g. first year at college, second year at college), as described in equation (2):

$$Y_{ij} = \alpha + \beta \text{eligible}_i + \gamma \text{treatment}_j + \delta \text{eligible}_i \text{treatment}_j + X_i' \pi + e_{ij} \quad (2)$$

where i refers to the individual, j to the university, Y_{ij} is the dependent variable (e.g. employed in the formal sector dummy, log of hourly wage), eligible_i is an eligibility dummy (black, public school or black and public school), treatment_j is a treatment dummy (UERJ student or graduate), X_i is a vector of individual observable characteristics (e.g. age, sex, *ENEM* score, parental education, major and admission year) and e_{ij} is the error term. As in the last version, we are interested in the parameter δ .

Tables 9 to 14 present descriptive statistics. In Tables 9 and 10 it is possible to compare UERJ and UFRJ students (respectively) in terms of sociodemographic characteristics considering subgroups: black and public school versus non-black and/or private school students. Information is provided by admission year from 2006 to 2014 and refers to freshmen students only. Tables 11 and 12 are organized likewise and present information considering subgroups of black and non-black students. Finally, Tables 13 and 14 are also organized in the same way and present information considering subgroups of public and private school students.

We notice that UERJ students tend to perform worse in *ENEM* than UFRJ students, independently of the year of admission and subgroup considered. In both universities, students with characteristics that would make them eligible for quotas perform worse in *ENEM* than their comparison groups of non-eligible students. Differences in parental education are also found: UERJ students' parents are less educated.

Considering the probability of working in the formal sector both during admission year and five years later, we notice that in both universities students with characteristics that would make them eligible for quotas tend to have a higher probability of working than their comparison groups (non-eligible students) in most of the cases considered. In general, UERJ students tend to present higher probabilities of working than UFRJ in both the admission year and five years later.

⁴ Although it is possible to identify students admitted in previous years using the *Censo da Educação Superior*, it would not be possible to identify students that were admitted before 2003 as it is expected that by 2009 (the first year for which there are identified student data available at the *Censo da Educação Superior*) most students would have graduated and only those who did not would be observed in this data.

Table 9: Descriptive Statistics: UERJ, Black and Public School versus Non-Black and/or Private School Students

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Black and Public School																		
Age (Mean)	21	23	19	21	22	23	21	23	19	21	20	21	20	22	19	21	19	20
% Women	66%	71%	65%	75%	64%	71%	65%	61%	56%	68%	57%	57%	56%	61%	58%	63%	55%	63%
% Father Education - High School	52%	28%	66%	33%	51%	27%	61%	34%	71%	46%	72%	47%	68%	34%	69%	41%	71%	38%
% Father Education - College	23%	4%	31%	4%	19%	7%	24%	5%	33%	5%	34%	7%	33%	2%	32%	5%	32%	5%
% Mother Education - High School	49%	25%	65%	30%	49%	19%	64%	25%	72%	44%	75%	43%	72%	35%	72%	40%	75%	47%
% Mother Education - College	17%	3%	30%	1%	13%	2%	26%	2%	33%	8%	36%	6%	33%	9%	34%	4%	36%	6%
% Family Income <= Min. Wage	5%	5%	4%	9%	8%	8%	6%	12%	3%	7%	7%	18%	5%	15%	7%	21%	7%	19%
ENEM Score (Standardized)	1.41	0.69	1.56	0.88	1.29	0.91	1.33	0.88	1.47	0.83	1.28	0.81	1.41	0.82	1.34	0.79	1.48	0.81
% Work During Admission Year	19%	34%	14%	25%	22%	21%	16%	30%	15%	16%	16%	29%	15%	28%	13%	24%	13%	23%
% Work Five Years After Admission	30%	47%	34%	30%	30%	39%	31%	50%	28%	34%	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 10: Descriptive Statistics: UFRJ, Black and Public School versus Non-Black and/or Private School Students

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Black and Public School																		
Age (Mean)	19	22	18	20	20	22	20	23	19	23	19	22	20	22	21	23	21	24
% Women	64%	54%	59%	48%	67%	59%	65%	71%	57%	65%	53%	55%	56%	59%	53%	56%	54%	56%
% Father Education - High School	75%	27%	85%	60%	65%	32%	78%	39%	81%	46%	85%	51%	75%	44%	77%	42%	75%	43%
% Father Education - College	42%	9%	57%	18%	29%	0%	42%	19%	46%	8%	52%	11%	39%	8%	42%	10%	39%	8%
% Mother Education - High School	76%	33%	86%	51%	65%	14%	80%	34%	83%	38%	87%	55%	78%	43%	79%	40%	77%	45%
% Mother Education - College	38%	17%	57%	9%	30%	10%	44%	5%	50%	6%	54%	21%	42%	9%	45%	7%	41%	9%
% Family Income <= Min. Wage	2%	15%	1%	9%	6%	18%	3%	17%	2%	8%	3%	12%	3%	13%	4%	18%	6%	17%
ENEM Score (Standardized)	1.90	1.54	2.09	1.26	1.63	0.96	1.72	1.01	1.72	0.75	1.89	1.14	1.68	0.97	1.72	0.84	1.82	1.09
% Work During Admission Year	10%	23%	6%	13%	11%	32%	9%	27%	9%	29%	10%	25%	10%	25%	12%	22%	13%	25%
% Work Five Years After Admission	21%	15%	17%	24%	20%	23%	19%	24%	18%	39%	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 11: Descriptive Statistics: UERJ, Black versus Non-Black Students

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
Black	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Age (Mean)	21	23	19	20	22	22	21	22	19	20	20	21	20	21	19	20	19	20
% Women	65%	71%	64%	71%	64%	70%	65%	63%	56%	58%	57%	57%	55%	62%	57%	62%	55%	60%
% Father Education - High School	53%	37%	65%	55%	51%	38%	62%	45%	72%	59%	72%	61%	68%	56%	69%	56%	72%	55%
% Father Education - College	25%	6%	31%	20%	19%	13%	26%	11%	34%	15%	36%	17%	34%	15%	33%	13%	33%	14%
% Mother Education - High School	50%	33%	66%	46%	50%	29%	65%	43%	73%	58%	75%	62%	73%	57%	72%	56%	75%	64%
% Mother Education - College	19%	4%	30%	18%	14%	6%	28%	8%	35%	14%	36%	20%	35%	17%	35%	14%	38%	16%
% Family Income <= Min. Wage	4%	7%	5%	6%	8%	9%	5%	10%	3%	5%	7%	12%	5%	9%	7%	13%	6%	15%
ENEM Score (Standardized)	1.47	0.86	1.60	1.03	1.30	1.09	1.35	1.04	1.50	1.10	1.30	0.99	1.45	0.99	1.38	0.96	1.51	1.08
% Work During Admission Year	20%	21%	14%	18%	22%	21%	16%	22%	15%	17%	16%	23%	14%	23%	13%	20%	13%	17%
% Work Five Years After Admission	30%	37%	34%	32%	28%	41%	30%	42%	28%	32%	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 12: Descriptive Statistics: UFRJ, Black versus Non-Black Students

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
Black	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Age (Mean)	19	21	18	19	20	21	20	21	19	21	19	20	20	22	20	22	21	22
% Women	63%	64%	58%	62%	66%	68%	64%	67%	56%	64%	53%	55%	57%	53%	53%	55%	54%	55%
% Father Education - High School	75%	68%	85%	73%	66%	48%	79%	54%	82%	60%	86%	73%	75%	60%	78%	59%	75%	62%
% Father Education - College	44%	22%	57%	35%	31%	10%	43%	22%	48%	19%	53%	31%	40%	19%	43%	23%	40%	20%
% Mother Education - High School	77%	56%	86%	66%	66%	41%	81%	57%	83%	59%	87%	76%	78%	62%	80%	60%	77%	62%
% Mother Education - College	39%	24%	58%	26%	32%	13%	45%	24%	51%	21%	55%	35%	43%	24%	46%	24%	42%	22%
% Family Income <= Min. Wage	2%	6%	1%	3%	6%	12%	3%	11%	2%	6%	3%	7%	3%	7%	4%	10%	6%	13%
ENEM Score (Standardized)	1.93	1.53	2.11	1.50	1.63	1.39	1.74	1.20	1.75	1.02	1.91	1.47	1.70	1.24	1.74	1.23	1.84	1.37
% Work During Admission Year	10%	12%	7%	8%	11%	20%	9%	15%	9%	18%	10%	16%	10%	18%	12%	18%	12%	20%
% Work Five Years After Admission	21%	19%	17%	26%	19%	30%	19%	29%	17%	29%	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 13: Descriptive Statistics: UERJ, Public versus Private School Students

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
Public School	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Age (Mean)	21	22	19	20	21	23	20	22	19	21	19	21	19	21	19	21	19	21
% Women	65%	69%	65%	66%	61%	69%	63%	66%	55%	61%	55%	62%	54%	61%	56%	65%	55%	58%
% Father Education - High School	67%	30%	77%	38%	64%	32%	71%	37%	79%	46%	82%	43%	78%	36%	78%	41%	79%	41%
% Father Education - College	32%	7%	41%	8%	26%	8%	32%	8%	40%	10%	43%	9%	41%	7%	39%	9%	37%	9%
% Mother Education - High School	65%	25%	78%	36%	60%	30%	75%	37%	80%	47%	84%	48%	81%	43%	81%	44%	82%	46%
% Mother Education - College	26%	4%	40%	7%	19%	5%	34%	8%	40%	11%	45%	9%	41%	10%	42%	9%	43%	9%
% Family Income <= Min. Wage	3%	6%	2%	10%	6%	10%	4%	9%	2%	7%	5%	16%	4%	11%	5%	16%	5%	15%
ENEM Score (Standardized)	1.60	1.05	1.73	1.14	1.46	1.05	1.45	1.03	1.57	1.11	1.40	0.93	1.55	0.97	1.48	0.92	1.59	1.06
% Work During Admission Year	15%	27%	11%	21%	17%	27%	13%	24%	14%	18%	14%	24%	12%	24%	11%	20%	11%	19%
% Work Five Years After Admission	27%	36%	33%	35%	27%	34%	29%	39%	27%	32%	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 14: Descriptive Statistics: UFRJ, Public versus Private School Students

Admission Year	2006		2007		2008		2009		2010		2011		2012		2013		2014	
Public School	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Age (Mean)	19	21	18	20	19	21	19	21	19	22	19	22	20	22	20	23	20	23
% Women	63%	67%	58%	60%	66%	67%	64%	70%	56%	64%	53%	53%	56%	58%	53%	55%	54%	54%
% Father Education - High School	80%	51%	87%	57%	73%	37%	82%	50%	85%	49%	89%	57%	82%	43%	83%	48%	82%	47%
% Father Education - College	46%	20%	60%	26%	34%	10%	45%	22%	50%	16%	56%	21%	46%	10%	48%	14%	46%	12%
% Mother Education - High School	79%	53%	89%	52%	72%	36%	84%	52%	87%	50%	91%	60%	85%	47%	86%	49%	84%	50%
% Mother Education - College	42%	19%	60%	22%	36%	12%	48%	18%	54%	18%	59%	24%	49%	13%	51%	15%	49%	14%
% Family Income <= Min. Wage	1%	7%	1%	5%	4%	13%	2%	10%	1%	8%	2%	13%	2%	10%	3%	13%	4%	14%
ENEM Score (Standardized)	1.98	1.48	2.15	1.44	1.74	1.20	1.78	1.25	1.80	1.01	1.96	1.48	1.81	1.17	1.85	1.11	1.97	1.26
% Work During Admission Year	9%	19%	6%	14%	9%	20%	8%	16%	8%	22%	9%	21%	9%	17%	10%	20%	12%	19%
% Work Five Years After Admission	21%	24%	17%	25%	20%	21%	19%	23%	16%	29%	-	-	-	-	-	-	-	-

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

6. Results

In the first model, we consider all university years and years after graduating at once (equation (1)). Three different samples were considered for each potentially eligible group: men, women and all (both men and women). All specifications include: (i) higher education census controls such as age and sex according to *Censo da Educação Superior* information; (ii) *ENEM* controls comprised of dummies for *ENEM* score deciles, father and mother education (both high school and college graduation dummies), elementary and high school completion in the expected time dummies and a dummy for maximum family income of one minimum wage value⁵; (iii) chosen major area dummies; (iv) admission year dummies; and (v) year of life dummies, which correspond to the year the information refers to considering admission year as reference (first year).

Table 15 presents results for the probability of being employed in the formal sector⁶ when we consider: (i) students and/or graduates with two potentially eligible characteristics, i.e. black and public school (columns I to III); (ii) black students and/or graduates (columns IV to VI); and (iii) public school students and/or graduates (columns VII to IX). Although coefficients for the interaction of treatment (UERJ) and eligible dummies are negative in all cases and samples, we find no statistically significant difference in the probability of being employed in the formal sector for those who are potentially eligible for quotas (black and/or public school) and study or have studied in an environment with quotas (UERJ) when we compare them to similar individuals that study or have studied in an environment with no quota system (UFRJ) at the time.

Table 16 is organized likewise and presents results for the log of hourly wages (conditional on being employed in the formal sector). We notice that for men, those who are potentially eligible for quotas (black and/or public school) and study or have studied in an environment with quotas (UERJ) earn smaller hourly wages than individuals with the same characteristics that study or have studied in an environment with no quota system (UFRJ). Results seem to be especially strong in terms of size and significance for those who previously attended public schools (their hourly wages are 22.7% smaller). We find no statistically significant difference between groups for women, although coefficients are also negative when we consider eligibility because of previously attending public schools.

In the second model, we consider each year of life separately using admission year as reference (equation (2)). Tables 17 and 18 present results for the probability of being employed in the formal sector at the admission year and five years after admission, respectively. We notice that, in the admission year, we find some negative statistically significant effects for eligible individuals (black and public school) in an environment with quotas (UERJ) when we consider only women and both men and women. In the fifth year after admission, however, these effects are not present anymore but we do find negative statistically significant effects for eligible individuals (public school only) in an environment with quotas (UERJ) when we consider only men.

Finally, Tables 19 and 20 present results for the log of hourly wages (conditional on being employed in the formal sector). In the admission year, we find no statistically significant difference in hourly wages for those who are potentially eligible for quotas and study in an environment with quotas when we compare them to similar individuals that study in an environment with no quota system. Results are quite different when we consider the fifth year after admission. Considering only men, we find negative statistically significant effects for those who are/were UERJ students and are eligible because they are black and attended public schools (35.8%) or only because they attended public schools (27.2%). This effect is also found when we consider both men and women who are black and attended public schools (hourly wages are 20.1% smaller).

⁵ Results do not change significantly when the dummy for maximum family income of one minimum wage value is not included in the model.

⁶ A *probit* was used in all cases for the probability of being employed in the formal sector.

Table 15: Pooled Version Results: Probability of Being Employed in the Formal Sector

	I	II	III	IV	V	VI	VII	VIII	IX
Eligibility Reason	Black and Public School	Black and Public School	Black and Public School	Black	Black	Black	Public School	Public School	Public School
Sample	Men	Women	All	Men	Women	All	Men	Women	All
Treatment (UERJ) * Eligible Dummy	-0.200 (0.172)	-0.161 (0.112)	-0.163 (0.0996)	-0.0935 (0.133)	-0.0491 (0.115)	-0.0615 (0.0851)	-0.0581 (0.0826)	-0.0306 (0.0703)	-0.0509 (0.0608)
Treatment (UERJ)	0.312*** (0.0527)	0.208*** (0.0652)	0.252*** (0.0470)	0.310*** (0.0492)	0.200*** (0.0691)	0.247*** (0.0444)	0.306*** (0.0506)	0.199*** (0.0580)	0.249*** (0.0458)
Eligible Dummy	0.326** (0.157)	0.199*** (0.0756)	0.239*** (0.0833)	0.145 (0.111)	0.108 (0.0777)	0.117* (0.0663)	0.224*** (0.0460)	0.156*** (0.0468)	0.186*** (0.0413)
Constant	-1.978*** (0.238)	-1.614*** (0.241)	-1.683*** (0.180)	-1.986*** (0.241)	-1.615*** (0.241)	-1.687*** (0.178)	-2.032*** (0.235)	-1.696*** (0.244)	-1.753*** (0.186)
Higher Education Census Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ENEM Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admission year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Life Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chosen Major Area Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,672	31,020	52,692	21,858	31,237	53,095	21,779	31,157	52,936

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

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 16: Pooled Version Results: Log of Hourly Wages (Conditional on Being Employed in the Formal Sector)

	I	II	III	IV	V	VI	VII	VIII	IX
Eligibility Reason	Black and Public School	Black and Public School	Black and Public School	Black	Black	Black	Public School	Public School	Public School
Sample	Men	Women	All	Men	Women	All	Men	Women	All
Treatment (UERJ) * Eligible Dummy	-0.192** (0.0755)	-0.0380 (0.102)	-0.0858 (0.0721)	-0.144* (0.0788)	0.00107 (0.0795)	-0.0648 (0.0583)	-0.227*** (0.0750)	-0.0297 (0.0807)	-0.118* (0.0663)
Treatment (UERJ)	-0.00565 (0.0306)	-0.0974** (0.0369)	-0.0562* (0.0294)	-0.00464 (0.0257)	-0.0956** (0.0377)	-0.0529* (0.0275)	0.0868* (0.0464)	-0.0906 (0.0541)	-0.00930 (0.0401)
Eligible Dummy	0.164*** (0.0580)	-0.100 (0.0674)	-0.000135 (0.0435)	0.0824 (0.0702)	-0.109** (0.0482)	-0.0313 (0.0350)	0.173*** (0.0400)	0.0227 (0.0710)	0.102* (0.0570)
Constant	2.186*** (0.252)	2.813*** (0.207)	2.646*** (0.213)	2.194*** (0.253)	2.647*** (0.149)	2.511*** (0.167)	2.008*** (0.223)	2.609*** (0.159)	2.437*** (0.168)
Higher Education Census Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ENEM Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admission year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Life Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chosen Major Area Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,444	4,426	7,870	3,462	4,469	7,931	3,468	4,438	7,906
R-squared	0.261	0.234	0.249	0.262	0.232	0.249	0.265	0.232	0.251

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

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 17: Admission Year Results: Probability of Being Employed in the Formal Sector

	I	II	III	IV	V	VI	VII	VIII	IX
Eligibility Reason	Black and Public School	Black and Public School	Black and Public School	Black	Black	Black	Public School	Public School	Public School
Sample	Men	Women	All	Men	Women	All	Men	Women	All
Treatment (UERJ) * Eligible Dummy	-0.163 (0.266)	-0.428** (0.193)	-0.344** (0.172)	0.0254 (0.227)	-0.191 (0.163)	-0.143 (0.143)	0.182* (0.109)	-0.0612 (0.0928)	0.0251 (0.0774)
Treatment (UERJ)	0.202** (0.0978)	0.208*** (0.0433)	0.210*** (0.0609)	0.203** (0.0955)	0.190*** (0.0450)	0.202*** (0.0585)	0.0978 (0.0922)	0.187*** (0.0532)	0.159*** (0.0502)
Eligible Dummy	0.307 (0.226)	0.533*** (0.166)	0.456*** (0.142)	-0.0548 (0.194)	0.333*** (0.114)	0.201* (0.102)	0.107 (0.0836)	0.211*** (0.0775)	0.175*** (0.0584)
Constant	-1.940*** (0.371)	-2.110*** (0.252)	-1.993*** (0.239)	-1.923*** (0.367)	-2.112*** (0.237)	-1.997*** (0.237)	-1.955*** (0.364)	-2.204*** (0.228)	-2.048*** (0.227)
Higher Education Census Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ENEM Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admission year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chosen Major Area Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,254	4,523	7,790	3,295	4,570	7,878	3,270	4,548	7,831

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

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 18: Fifth Year After Admission Results: Probability of Being Employed in the Formal Sector

	I	II	III	IV	V	VI	VII	VIII	IX
Eligibility Reason	Black and Public School	Black and Public School	Black and Public School	Black	Black	Black	Public School	Public School	Public School
Sample	Men	Women	All	Men	Women	All	Men	Women	All
Treatment (UERJ) * Eligible Dummy	-0.0609 (0.156)	-0.0725 (0.143)	-0.0549 (0.0991)	0.00299 (0.152)	0.0255 (0.117)	0.0302 (0.0900)	-0.196** (0.0963)	-0.109 (0.100)	-0.148* (0.0816)
Treatment (UERJ)	0.368*** (0.0700)	0.210** (0.103)	0.274*** (0.0800)	0.363*** (0.0627)	0.200* (0.109)	0.266*** (0.0787)	0.422*** (0.0664)	0.250*** (0.0911)	0.324*** (0.0787)
Eligible Dummy	0.216* (0.125)	0.175 (0.106)	0.178** (0.0749)	0.0997 (0.108)	0.0465 (0.0787)	0.0535 (0.0586)	0.306*** (0.0720)	0.178* (0.0907)	0.229*** (0.0702)
Constant	-1.391*** (0.310)	-0.983*** (0.320)	-1.053*** (0.252)	-1.428*** (0.315)	-0.963*** (0.324)	-1.051*** (0.258)	-1.515*** (0.321)	-1.064*** (0.328)	-1.149*** (0.261)
Higher Education Census Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ENEM Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admission year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chosen Major Area Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,971	5,936	9,907	4,000	5,971	9,971	3,990	5,962	9,952

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

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 19: Admission Year Results: Log of Hourly Wages (Conditional on Being Employed in the Formal Sector)

	I	II	III	IV	V	VI	VII	VIII	IX
Eligibility Reason	Black and Public School	Black and Public School	Black and Public School	Black	Black	Black	Public School	Public School	Public School
Sample	Men	Women	All	Men	Women	All	Men	Women	All
Treatment (UERJ) * Eligible Dummy	0.116 (0.173)	0.0319 (0.175)	0.0576 (0.147)	0.0280 (0.148)	0.151 (0.152)	0.0818 (0.124)	-0.190 (0.155)	0.0185 (0.113)	-0.0846 (0.104)
Treatment (UERJ)	0.106 (0.0917)	-0.116** (0.0547)	-0.00735 (0.0575)	0.113 (0.0882)	-0.124** (0.0536)	-0.00322 (0.0567)	0.175 (0.112)	-0.134* (0.0749)	0.0226 (0.0697)
Eligible Dummy	-0.00813 (0.129)	0.00255 (0.0899)	0.00219 (0.0830)	0.0276 (0.117)	-0.155 (0.0953)	-0.0834 (0.0774)	0.318*** (0.0992)	0.0674 (0.0839)	0.207** (0.0766)
Constant	1.644*** (0.375)	2.190*** (0.169)	2.127*** (0.206)	1.656*** (0.375)	2.221*** (0.177)	2.143*** (0.206)	1.480*** (0.400)	2.122*** (0.177)	1.972*** (0.207)
Higher Education Census Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ENEM Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admission year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chosen Major Area Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	357	477	834	359	487	846	359	479	838
R-squared	0.377	0.314	0.312	0.375	0.320	0.314	0.395	0.324	0.326

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

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

Table 20: Fifth Year After Admission Results: Log of Hourly Wages (Conditional on Being Employed in the Formal Sector)

	I	II	III	IV	V	VI	VII	VIII	IX
Eligibility Reason	Black and Public School	Black and Public School	Black and Public School	Black	Black	Black	Public School	Public School	Public School
Sample	Men	Women	All	Men	Women	All	Men	Women	All
Treatment (UERJ) * Eligible Dummy	-0.358** (0.161)	-0.120 (0.132)	-0.201** (0.0869)	-0.221* (0.129)	-0.00809 (0.116)	-0.0970 (0.0901)	-0.272** (0.0995)	0.0885 (0.112)	-0.0640 (0.0820)
Treatment (UERJ)	-0.0568 (0.0478)	-0.107* (0.0604)	-0.0967* (0.0502)	-0.0570 (0.0373)	-0.111* (0.0610)	-0.0985** (0.0468)	0.0484 (0.0671)	-0.171* (0.0895)	-0.0875 (0.0723)
Eligible Dummy	0.149 (0.122)	-0.0747 (0.104)	0.0133 (0.0568)	-0.000479 (0.0976)	-0.121 (0.0816)	-0.0676 (0.0649)	0.140* (0.0819)	0.00926 (0.0583)	0.0732 (0.0595)
Constant	3.123*** (0.383)	3.299*** (0.240)	3.399*** (0.233)	3.174*** (0.404)	3.301*** (0.247)	3.324*** (0.192)	3.046*** (0.405)	3.409*** (0.281)	3.250*** (0.206)
Higher Education Census Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ENEM Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Admission year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chosen Major Area Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	746	1,077	1,823	750	1,083	1,833	752	1,078	1,830
R-squared	0.159	0.151	0.150	0.165	0.149	0.151	0.161	0.151	0.148

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

Source: Elaborated by the authors. Data: *Censo da Educação Superior* and *ENEM* (INEP/MEC) and *RAIS* (MTE).

7. Conclusion

In this paper, we investigate if the introduction of quotas in public universities affect employers' perception of potentially eligible students and graduates from these universities considering both their probability of being employed in the formal sector and hourly wages (conditional on being employed in the formal sector).

We explore the different timing of introduction of quota systems in two public universities in the State of Rio de Janeiro to conduct an exercise where we use a difference in differences approach to compare potentially eligible (black and/or public school) students and graduates from a university that has introduced quotas (UERJ) to a similar group in a university with no quota system (UFRJ) at the time.

When we consider a model where we analyze all university years and years after graduating at once, we find no effects in the probability of being employed in the formal sector but we do find negative effects for hourly wages for those who are employed in the formal sector (only for men, hourly wages are 19.2% smaller for those who are eligible for being black and having attend a public school and 22.7% smaller for those who are eligible for attending a public school only).

In an alternative model where we consider each year of life separately taking the admission year to be the first year, results differ slightly. Results were presented for both admission year and the fifth year after that. Considering the admission year, we found some negative statistically significant effects in the probability of being employed in the formal sector for eligible individuals (black and public school) in an environment with quotas when we consider only women and both men and women all together. However, these effects vanish when we analyze the fifth year after admission. Results for the log of hourly wages (conditional on being employed in the formal sector) are rather interesting. For the admission year, we find no statistically significant effects, but results are quite different when we consider the fifth year after admission, in which we find negative statistically significant effects for men who are/were UERJ students and are eligible because they are black and attended public schools or only because they attended public schools.

These results may serve as evidence that the introduction of quota system in public universities may affect employer's perception of its' students and graduates regardless of their actual quota status. Further investigation on this matter is needed to make sure these effects are causal and not driven by other factors. As next steps, we will investigate if composition effects are present and also analyze the introduction of quotas in UFRJ.

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