Are there performance differentials between quota and non-quota Brazilian students?

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Abstract

This work investigates the performance differentials between students benefited and not benefited by the affirmative action policy of racial, social and public education quotas in Brazil. The results were estimated using Oaxaca-Ransom decomposition and the Recentered Influence Function Regression model. The data are from the 2016 Student Performance National Exam (Enade). The analysis shows that the performance difference between quota and non-quota students, in the mean, is small and not statistically significant in the upper quantiles, but this difference is high in the lower quantiles. For social and racial quotas specifically, there is a drop in the total performance differential along the distribution, making it insignificant in the upper tail. The quota policy provided access to higher education; however, it may still prove to be insufficient and specific actions directed at lower quintile students are needed in order to reduce performance differentials.

Key words: Enade; Affirmative Action; Oaxaca-Ransom.

Resumo

O trabalho visa investigar os diferenciais de desempenho dentre os grupos de alunos beneficiados e não beneficiados pela política de ações afirmativas (cotas raciais, sociais, escola pública e dois critérios). A metodologia empregada foi a decomposição de Oaxaca-Ransom e o modelo Recentered Influence Function-Regression para o ENADE de 2016. O resultados demonstraram que a diferença de desempenho entre cotistas e não-cotistas é pequena e não significativa nos quantis superiores de desempenho. Porém, a diferença de desempenho é elevada nos menores quantis. As evidências mostram que, apesar das políticas de ações afirmativas terem aumentado a oportunidade de acesso ao ensino superior, são necessárias ações específicas voltadas para os estudantes pertencentes aos quintis inferiores a fim de reduzir esses diferenciais.

Palavras chave: Enade; Ação Afirmativa; Oaxaca-Ransom.

JEL Classification: D63, I21, I28.

Área 13. Desigualdade, pobreza e políticas sociais

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1. Introduction

The Brazilian educational system is unequal, an inherent characteristic of the country's reality, where low average education levels and permanent inequalities have generated discussions and social initiatives in order to promote access to quality education (Bucci and Gomes, 2017; Castro, 2009). In this context, higher education is no exception, being marked by the inequalities of access and permanence in this type of education, especially for students from lower socioeconomic groups (Neves et al., 2007).

The educational stratification at the higher level has presented a pattern of increasing inequalities, in which the association between social origin and educational progression related to entry into higher education has been strengthened (Oliveira et al., 2018; Brito, 2017). Black, multiracial, and indigenous Brazilians are 2.5 times more likely to be illiterate, are less likely to enter higher education and earn, on average, half the income of their peers who declare themselves white, which shows how social segregation influences the educational inequality in the country (Long and Kavazanjian 2012).

Lopes (2017) points out the lack of equal opportunities among students when they try to enter higher education in Brazil. The first group is made up of more affluent students who can attend private schools during elementary and high school. Those schools usually have a higher education quality that allows its students to compete for places in universities (mostly public ones) and in more prestigious programs. The second group consists of low-income families and attends public schools during elementary and high school. In general, the quality of those schools is lower than that of private schools. Consequently, this group of students competes for places in universities (mostly private ones) and in less prestigious programs.

An alternative to mitigate inequality of education in Brazil is to develop specific public policies that can bring about changes in the social structure (Almeida and Rodrigues, 2020; Santos, 2019). To this end, an institutional landmark in Brazil was the enactment, in August 2012, of Federal Law No. 12,711, called the Quota Law, regarding a growing quotas program in all universities and federal institutions until it reached 50% of the places of all university programs in 2016.

According to the Quota Law, at least 25% of the universities' places are aimed at students of public schools and with gross income of up to 1.5 minimum wages[2] and up to 25% of the places are occupied by public school students with incomes over 1.5 minimum wages (Law 12.711/2012). The law also determines the definition of racial quotas, reserved for the proportion of ethnic minorities – such as black, multiracial, and indigenous persons – of the federative unit where the educational institution is located. Social quotas differ from racial quotas in that they consider low family income (up to 1.5 minimum wages), public schools and people with disabilities.

By highlighting the need for equal opportunities in higher education, this paper aims to answer to the following question: are there performance differentials among the groups of beneficiary and non-beneficiary students of the quotas policy in relation to race, low income and public school, as to the scores obtained by students in Enade? In order to answer this question, this essay uses the students' results from the 2016 National Student Performance Examination (Enade) and employs the Oaxaca-Ransom decomposition method, which is based on two estimates: (i) regression in the mean (Ordinary Least Squares) and (ii) unconditional quantile regression (RIF-Regression).

Enade is an instrument that evaluates the performance of undergraduate students in relation to the contents provided for in the curricular guidelines of programs, as well as the development of necessary competences and skills related to general and professional training.

[2] Corresponds to $379,31 in 2016.

Therefore, Enade is a large-scale exam, which evaluates items that appear in the national curriculum guidelines from which pedagogical projects are developed (Brito, 2008).

This work goes further in relation to Vidigal (2018) and Pereira (2013) regarding the inclusion of the affirmative actions of public school and mixed quotas. In addition to this, we highlight the methodological contribution, through the application of the Oaxaca-Ransom model associated with RIF Regression, which enables the analysis of the performance differentials from observed and unobserved characteristics among students and throughout the distribution. The decomposition of Oaxaca has a superior performance than other methodologies in finite samples (Słoczyński, 2015), producing more robust results.

In general, the results showed that, in the mean, the performance difference between quota and non-quota students is small and not significant in the upper quantiles and high in the lower quantiles. Thus, in order to contribute to the analysis of the Quota Law in Brazil, this paper is divided into four sections, in addition to this introduction. The second section discusses the literature review on affirmative action under two points of view: unequal opportunities and student performance. The third section presents the methodology, which is subdivided into database and empirical strategy. The fourth section presents and discusses the results and, lastly, the final considerations.

2 Literature review

2.1 Unequal opportunities and affirmative policies

Reducing the inequality of opportunities is one of the main challenges imposed on development, as it seeks to give all children the same chances of becoming successful in life. According to Barros et al. (2009, p. 26), equal opportunities must allow a person's success to depend essentially on his/her choices, effort and personal talents, and not on his/her circumstances at birth (such as gender, ethnicity, place of birth or family history), which cannot be controlled by that individual.

Although inequality of opportunities is a theme that sparks off intense debate, the importance of allocating resources to meet the basic needs of children and young people is indisputable, since access to these services fosters their development (Barros et al., 2009). The argument that children and young people who grow up in poorer environments perform worse in school is also verified by Carvalho and Waltenberg (2015).

In contrast, Schotter and Weigelt (1992) point out that the discrepancy in school performance, caused by the inefficient allocation of resources throughout student life, can be mitigated by the meritocracy of education, which aims to start the process over, on an equal footing. Therefore, it is necessary to consider that all students start with the same conditions to learn, and to respect the classic pillars: (i) individual freedoms, (ii) respect for private property, and (iii) minimal state intervention.

This egalitarian trend was the basis for the Brazilian entrance exam system, prior to the quotas, since the best students (best grades) would gain access to the best universities. However, differences in school performance related to social inequalities, according to Barros and Mendonça (1995), would justify the adoption of affirmative action policies, since it is necessary to rectify past inequalities, which is supported by Su (2005). The author reiterates the existence of inequality, which translates into a smaller range of opportunities for those individuals who are in the disadvantaged group, therefore, it is unfair that the selection is based only on performance tests.

According to Su (2005), the entrance exam system, in addition to being socially inefficient, is discriminatory in that it does not consider the historical difference between the groups. Su (2005) asserts that affirmative policies are aimed at an already disadvantaged group and not at an individual, which reinforces its importance in mitigating inequalities in opportunities among students.

Affirmative policies promote competition between people who are part of the same group (at a disadvantage when compared to other candidates), who compete to obtain the benefit. Individuals in the group that is at an advantage would compete to avoid the potential cost associated with affirmative action. Thus, it is possible to believe that individuals in both groups put in more effort because affirmative action stimulates greater competition within each group (Su, 2005).

Therefore, quotas not only reinforce efficiency within the group, but also between groups (benefited and not benefited). And without this type of intervention there is limited access to higher education, since admission to universities is based purely on performance tests, which can ultimately enhance social differences (Santos et al., 2020).

Although they are aimed at providing better opportunities for historically disadvantaged social classes, affirmative action policies have caused an intense debate about the rupture of the principle of isonomy and its effects on academic performance in higher education and in the labor market. Ferman and Assunção (2005) and Jaccoud and Beghin (2002) believe that quotas violate the premise of merit for access to higher education, in addition to shifting the focus from the actual problem of poverty.

Francis and Tannuri-Pianto (2012) observe a negative relationship between affirmative actions and incentives for effort and skill acquisition. In addition, they also verify that quota students perform worse than others in Enem[3] (National High School Exam) and enter less prestigious universities. Frisancho and Krishna (2016) show that students from disadvantaged classes are less likely to get the best jobs in the job market.

Alternatively, Velloso (2009) finds that more than a third of the students benefited by affirmative actions have achieved satisfactory performance rates, alongside the best students approved by the universal admission system. In line with this view, the study by Vilela et al. (2017) points out that, although there are federative units with more than one public university, students in general (quota and non-quota students) compete for places in the best universities. In view of this, the students who enter universities are those who have the best performance in the admission process.

2.2 Student performance and affirmative actions

In the literature, the evaluation of students' performance in relation to benefits obtained with affirmative actions has been explored especially through performance indicators. Quote students may have a better (Mendes Júnior e Waltenberg, 2015) or not significantly different performance than non-quota students (Queiroz et al., 2015) in the admission process.

As for Enade, it is possible to see a decrease of four points in the grades obtained by quota students from public universities when compared to other students. In private institutions, the performance gaps occurred in programs with high social prestige (Waltenberg and Carvalho, 2012).

With an analysis of the social and racial quotas in specific programs, the quotas had a negative impact on Pedagogy, History and Physics programs and a positive impact on the Agronomy program. Low-income students coming from the public school system performed better in some programs when compared to their peers in private institutions, but poorly in other programs (Pereira, 2013).

[3] Enem was created in 1998 to assess the performance of students who completed basic education. It was redesigned in 2009 in order to unify the university admission process.

In private universities, when comparing the performance of ProUni[4] and FIES[5] beneficiaries and non-beneficiaries, with few exceptions, students with scholarships performed better, and in three programs students with FIES loans performed better than students without aid in the form of scholarships or funding (Barbosa and Santos, 2011). However, according to Wainer and Melguizo (2018), students benefited and not benefited by FIES achieved an equivalent performance, while ProUni students performed better.

Vidigal (2018) approached the impact of racial and low income quotas for students from public and private universities, verifying a significant difference in performance among students admitted through racial quotas, with pro-quota results in the northern region and positive results for non-quota students living in the center-west region of Brazil. Students who entered the university through the income quotas criterion presented proficiency approximately 14% lower in comparison to the other students.

Racial quotas have been analyzed more frequently. Griner et al. (2015) pointed out the absence of significant differences in performance between ethnic quota students and others in the admission process. When analyzing the performance of quota students at Enade, the results differ. Gutterres and França (2016) verified that according to racial, income and public education criteria, the differences were favorable to the quota students who entered the university through the criterion of having attended a public high school.

On the other hand, Almeida and Rodrigues (2020), who sought to assess the academic performance of quota and non-quota students, for Universidade de Viçosa, did not find significant differences between the two groups. Wainer and Melguizo (2018) also found no significant differences between racial and social quota students and their non-beneficiary classmates.

The next section presents the methodology used to assess the performance differentials between the quota and non-quota groups according to the type of affirmative action. The application of the Oaxaca-Ransom model associated with RIF Regression is a step forward in the literature about affirmative actions.

3. Methodology

3.1 Database

As previously pointed out, this paper uses Microdata from the 2016 Enade, an exam that integrates Sinaes (National System of Higher Education Evaluation) and aims to evaluate the performance of students in undergraduate programs in terms of program content and skills acquired during the academic education. Taking the exam is mandatory and Enade's first application took place in 2004, and it has a triennial periodicity for each area of knowledge (Inep, 2015).

Students who are qualified to take the exam are from programs linked to the areas of Enade[6], defined according to the three-year cycle of the exam. The students are those expected to graduate by July 2017 or who have completed 80% or more of the minimum course load in the year of the exam (Brasil, 2017).

The exam consists of discursive and multiple choice questions, divided into two parts: a component that evaluates general knowledge, common to courses in all areas, and a specific

[4] The University for All Program (ProUni), implemented in 2005, aims to provide full and partial scholarships to private higher education institutions.

[5] The Student Financing Fund (FIES), implemented in 2001, is a type of financing for undergraduate students enrolled in private educational institutions. The loan is paid off after the studies are completed and can even be deducted from the student's payroll.

[6] In 2016, students from agronomy, biomedicine, physical education, nursing, pharmacy, physiotherapy, speech therapy, medicine, veterinary medicine, nutrition, dentistry, social work and zootechnics participated. The graduates of technology programs in the areas of agribusiness, aesthetics and cosmetics, environmental management, hospital management and radiology were also evaluated.

component of each area. The student's overall grade consists of a weighted average of 25% of the general knowledge test and 75% of the specific knowledge test. Another point is the basic instruments that make up the questionnaires: socioeconomic characteristics, the student's perception about the exam, the exam’s results, and an instrument that is aimed at the program coordinator.

The total sample comprised the grades of the 2016 Performance Examination of 22,290 students from universities and federal institutes, excluding the information pertinent to the students' decision not to respond to the exam and who, therefore, scored zero in the exam[7]. The variables used are set out in Table A1 (Appendice), divided in relation to the grades obtained in the exam (general and specific), personal characteristics (self-declared ethnicity, age, marital status, whether they moved out from a different state to enter the university), family members (parent’s education, income), school-related (time between the end of high school and the beginning of higher education, hours spent studying, studying a foreign language during graduation, having been in an exchange program, receiving scholarship or financial aid during graduation) and quotas (race, social and public education).

3.2 Empirical Strategy

In this work, we use the Oaxaca-Ransom model with two estimates: (i) regression in the mean (OLS); (ii) unconditional quantile regression (Recentered Influence Function-Regression). We seek thus to decompose the differences in the performance of quota and non-quota students into explained and unexplained components, and ultimately to understand the differences in attributes, which can be reduced through public basic education policies. The distribution of performance by quantiles makes it possible to identify the heterogeneous effect of the characteristics of undergraduates and educational institutions in the gap of grades between quota and non-quota students (Arraes and Mariano, 2019).

According to Fortin, et al. (2011, p. 3) “(...) the key connection with the treatment effects literature is that the ‘unexplained’ component of an Oaxaca decomposition can be interpreted as a treatment effect.” Therefore, this model may be more appropriate than the Propensity Score Matching model (PSM), since it already incorporates the difference between control and treatment and constitutes a new element for the analysis of quota policies. In addition, the use of Oaxaca-Ransom, in unconditional quantile regressions, allows an accurate analysis of the differential along the results’ distribution. In addition, the use of Oaxaca decomposition produces more robust results in the unexplained component, when compared with models such as IPW and Kernel Matching (Słoczyński, 2015).

The explained difference is the variable’s aggregate differential, that is, differences in the general test results (proxy for educational background), difference in parents’ education, study hours, and others. The unexplained component is attributed in the labor economics literature to wage discrimination, which is also called differential in intrinsic skills and dedication differential (effort).

There are basically two comparison groups: quota and non-quota students. Quota students are still separated in the different quota types, but the group of non-quota students is always the same. The dependent variable is the natural logarithm of the specific component results of the 2016 Enade. According to Lépine (2016), the choice for this component rather than the general one is due to the existence of a smaller difference in the performance of this component among students who are at the beginning and at the end of graduation. However, a high performance difference is observed for the specific component. Thus, in addition to the specific component to measure the knowledge acquired throughout higher education, the

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[4]The results were estimated using the Software for Statistics and Data Science: Stata 12.1 version, serial number 40120570107.

general component will be a proxy for the prior knowledge of this student when entering higher education.

i) Oaxaca-Ransom Model

The identification of differences in the Enade results for quota and non-quota students is given by a linear relationship by means of an Ordinary Least Squares (OLS) regression:

$$Y_l = X_l'\beta_l + \varepsilon_l,\ \ E(\varepsilon_l) = 0,\ \ l \in \{\text{A and B}\} \qquad (1)$$

where Y is the dependent variable (natural logarithm of Enade's results), X is a vector of explanatory variables, β contains the coefficients associated with the variables in X and ε is the error component. Groups A and B represent the quota and non-quota groups, thus the counterfactual decomposition developed by Oaxaca (1973) and Blinder (1973), the magnitude of difference between the groups is given by:

$$D = E(Y_A) - E(Y_B) = E(X_A)'\beta_A - E(X_B)'\beta_B \qquad (2)^{8}$$

by rearranging the terms of Equation (2) and adding and subtracting by $E(X_A)'\beta^*$ and $E(X_B)'\beta^*$, we have:

$$D = [E(X_A) - E(X_B)]'\beta^* + [E(X_A)'(\beta_A - \beta^*) + E(X_B)'(\beta^* - \beta_B)] \qquad (3)$$

Equation (3) is the so-called two-part decomposition. The part explained by control variables is the first part of the Equation, while the second part contains the unobserved component. An improvement in the model is proposed by Oaxaca-Ransom (1994) by changing Equation (3) so that we associate a matrix of weights (W) given by the coefficients of group A and the identity matrix (I):

$$D = [E(X_A) - E(X_B)]'[W\beta_A + (I - W)\beta_B] + [(I - W)'E(X_A) + W'E(X_B)](\beta_A - \beta_B) \quad (4)$$

The authors also show that $\widehat{W} = \Omega = ({X_A}'X_A + {X_B}'X_B)^{-1}{X_A}'X_A$, with X being an observable data matrix, is similar to the use of coefficients of the stacked model on the groups as reference coefficients.

ii) RIF-Regression Model

The model known as RIF-Regression (Recentered Influence Function), developed by Firpo *et al*. (2009), uses the dependent variable as an influence function (IF). The initial assumption is that by means of a linear function of the control variables it is possible to model the conditional expectation of the RIF (Y; v):

$$E[RIF(Y; v)|X] = X\gamma + \varepsilon \qquad (5)$$

The γ parameters can be estimated by means of an OLS model. As for the quantiles, the RIF (Y; Q_τ) can be written by means of being equal to $Q_\tau + IF(Y, Q_\tau)$, therefore:

$$RIF(y; Q_\tau) = Q_\tau + \frac{\tau - 1\{y \le Q_\tau\}}{f_Y(Q_\tau)} \qquad (6)$$

[8] If E(Yl)=E(Xl'βl+εl)=E(Xl'βl)+E(εl)=E(Xl)'βl, E(βl)=βl and E(εl)=0 by assumption.

where the function Q_τ is the τ-quantile population of the unconditional Y distribution, 1{.} is an indicator function and $f_Y(.)$ is the Y distribution density. The estimator is given by:

$$\widehat{RIF(y; Q_\tau)} = \widehat{Q_\tau} + \frac{\tau - 1\{y \leq Q_\tau\}}{\hat{f}_Y(Q_\tau)} \quad (7)$$

The indicator function in the point is estimated by the Kernel density. It is possible to separate the estimation for each group, so we have:

$$\hat{\gamma}_{g,\tau} = \left(\sum_{i \in G} X_i X_i\right)^{-1} \sum_{i \in G} \widehat{RIF}\left(Y_{gi}; Q_{g,\tau}\right) X_i \quad (8)$$

where g = A, B.

In an equivalent manner to the decomposition one can write for any quantile, with $\widehat{D}^\tau$ being the total difference between the groups, composed of an unexplained and an explained difference, as mentioned above.

$$\widehat{D}^\tau = E(X_A)\left(\hat{\gamma}_{A,\tau} - \hat{\gamma}_{B,\tau}\right) + (E(X_A) - E(X_B))\hat{\gamma}_{B,\tau} \quad (9)$$

The combination of the Oaxaca-Ransom decomposition model with the RIF-Regression provides a new way to verify the impact of quotas on performance, since the method developed by Firpo *et al*. (2009) is recent and, to the best of our knowledge, has not yet been used for this purpose.

In general, the following equation (Equation 10) correlates the school performance of quota students and non-quota students as the independent variables, described in Table A1 (Annex). The β's are the coefficients associated with the continuous or count variables (age in years), the γ's are the coefficients associated with the binary variables (the variables of father's education, mother's education and ethnicity have a dummy for each level of education or for each ethnicity). The n refers to the coefficient associated with being a quota student. The dependent variable is in logarithm, because it smoothens the distribution and the interpretation of differentials is in a percentage.

$$\ln Specific\ Grade = \alpha + \beta_1\ Overall\ Grade + \beta_2\ Age + \beta_3\ Discrepancy + \beta_4\ Study\ Hours + \beta_5\ Per\ capita\ income + \gamma_1\ Foreign\ Language + \gamma_{2Immigrant} + \gamma_3\ Married + \gamma_4\ Male + \gamma_{5,6,7,8,9}\ Father's\ Education + \gamma_{10,11,12,13,14}\ Mother's\ Education + \gamma_{15}\ Exchange\ program + \gamma_{16}\ Public\ High\ School + \gamma_{17}\ Relative\ with\ a\ degree + \gamma_{18}\ Aid + \gamma_{19,20,21,22} Race + \pi\_1\ Quota + \varepsilon \quad (10)$$

Among the advantages of this empirical strategy, it is worth emphasizing the fact that it makes it possible to assign an effect for each variable that determines the performance level of the quota and the non-quota students along different points in the distribution.

4 Results and discussion

This section describes the results of the aforementioned models for the following modalities: social, racial, public school quota and more than one quota. The following tables are subdivided into mean results and performance quantiles. In addition to the separation along the distribution, the result tables also contain the mean of the natural logarithm of quota students groups' grades (Prediction 1) and the non-quota group's (Prediction 2). The total difference is presented by observable attributes (explained) and the unobservable difference is presented by covariates (unexplained).

4.1 Racial Quotas

Table 1 shows the differences in performance between the racial quota beneficiaries and non-beneficiaries in five different grade quantiles. The total difference results show that it always favors the non-beneficiaries, except in the .90 quantile, where the difference is not statistically significant. The mean total difference is 7.6%, but when analyzing the quantiles, the lower tail of the distribution presents a difference of 13.1%, gradually declining to reach 4.8% in the fourth analyzed quantile. In the last quantile, the difference becomes statistically equal to zero.

Table 1. Results differences – Racial Quotas

	Mean	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**
Prediction 1	3.932	3.468	3.753	4.006	4.189	4.331
Prediction 2	4.008	3.598	3.851	4.076	4.237	4.346
Difference	-0.076***	-0.131***	-0.098***	-0.07***	-0.048***	-0.015
	(0.016)	(0.038)	(0.023)	(0.019)	(0.015)	(0.015)
Explained	-0.086***	-0.155***	-0.117***	-0.068***	-0.043***	-0.027***
	(0.007)	(0.015)	(0.01)	(0.007)	(0.005)	(0.004)
Unexplained	0.01	0.024	0.018	-0.002	-0.005	0.012
	(0.013)	(0.035)	(0.021)	(0.016)	(0.013)	(0.014)

Source: Prepared by the authors.
Note: Standard error in parentheses. *p <0.1, **p <0.05, ***p <0.01.

The unexplained difference is not statistically significant between the groups in the mean and throughout the distribution of results. The difference explained by observable attributes (grade in the general examination, parent's education, among others), however, is 8.6% in the mean and 6.8% in the median of the distribution. This difference has a declining behavior along the distribution, which means that the difference in attributes is more pronounced for people who have the worst grades. In the lower tail, the difference observed by the covariates is 15.5%, while in the upper tail it declines to 2.7%.

Pereira (2013) corroborates these results, stating that affirmative actions do not have a positive influence on quota students, since it would be a late measure for the correction of inequalities originating in the initial series. The historical factors still have influence, because the group of self-declared black students has not yet been given the same opportunities as the group of white students (Su, 2005). Color/race may not be the factor with the greatest contribution to inequality of opportunity, but it has a relevant effect if associated with other circumstances, being decisive to prevent access (Carvalho and Waltenberg, 2015).

Su (2005) further argues that increased opportunities for black people would lead to increases in the efforts and capital accumulation of these students, noticeable by the reduction of the performance differential, which is not statistically significant in the last quantile. Along the same lines, Velloso (2009) infers that the absence of systematic differences in income in favor of non-quota students in the last quantile contradicts one of the main arguments of those who criticize the quota system, that this would be generating a decline in the academic standard of public universities.

Winther and Golgher (2010), just like Vilela *et al*. (2017), emphasize the diversity of ethnicities caused by affirmative action policy and the fact that there would be no great difference between the performance of quota and non-quota students at the time of their entry into higher education. However, evidence shows that differences in performance remain in most quantiles and are highest in the lowest quantiles.

4.2 Social Quotas

Table 2 shows the difference in results between the group of people who did not use admission quotas and the group of people who used social quotas (up to 1.5 minimum wages per capita). Again, as in Table 1, the total difference between the groups is not for the quota students, either in the mean or in the quantiles, however, there is a tendency to reduce this difference along the quantiles, starting at 11.4% (q.10) and ending at 2.7% (q.90).

Table 2. Results differences – Social Quotas

	Mean	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**
Prediction 1	3.938	3.484	3.736	4.005	4.196	4.32
Prediction 2	4.008	3.598	3.851	4.076	4.237	4.346
Difference	-0.07***	-0.114***	-0.115***	-0.072***	-0.04**	-0.027*
	(0.002)	(0.038)	(0.026)	(0.022)	(0.017)	(0.016)
Explained	-0.08***	-0.146***	-0.120***	-0.071***	-0.04***	-0.022***
	(0.007)	(0.013)	(0.009)	(0.006)	(0.005)	(0.004)
Unexplained	0.01	0.032	0.005	-0.000	-0.001	-0.004
	(0.014)	(0.034)	(0.024)	(0.02)	(0.016)	(0.015)

Source**:** Prepared by the authors.
Note: Standard error in parentheses. *p <0.1, **p <0.05, ***p <0.01

The difference explained by observable attributes is significant in both the mean and along the quantiles and follows the trend of the total difference: it decreases along the total distribution. The difference by positive attributes is 8% in the mean and 7.1% in the median. In the lower tail of the distribution there is the largest difference (14.6%), while in the upper tail the difference is the smallest (2.2%). As with the model for racial quotas, there is no significant differential in skill or effort (variable depending on selection level, future salaries and quality of the pairs).

According to Gutterres and França (2016), social quotas would be insufficient measures to reduce inequalities that originate in the family and school backgrounds. Vidigal (2018) points out that these effects should be considered under a selection bias of students, who, admitted under the low income quotas, have an ambiguous actual performance, given their form of admission. Waltenberg and Carvalho (2012) elucidate that the ambiguity of the results comes from the excluding analysis of students who entered the university through affirmative action and who finished the course, that is, the performance of dropout students or students who have not yet graduated is not evaluated.

McCowan (2005) argues that discussions on the expansion of higher education consider that there is a need to broaden access equitably, including socially disadvantaged students. It is known that the university system itself cannot correct the inequalities of a low quality education, however, significant changes in the education system can be made together with measures at the initial levels. Campos *et al*. (2017), along the same lines, show that reserving places for low-income students would be one of the actions in order to promote a more equitable access, along with distance learning and government financing policies.

4.3 Education Quotas

The total difference between the groups of students who attended public high schools and non-quota students, students from public or private schools, is on average low (1.1%) when compared to the results verified for the racial quotas and low income, it is higher in the median (1.9%) and reaches 2.4% in the fourth quintile (q.75).

Table 3. Results differences – Education Quotas

	Mean	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**
Prediction 1	3.997	3.597	3.849	4.06	4.213	4.327
Prediction 2	4.008	3.598	3.851	4.076	4.237	4.346
Difference	-0.011*	-0.001	-0.002	-0.016**	-0.024***	-0.019***
	(0.006)	(0.014)	(0.009)	(0.006)	(0.005)	(0.005)
Explained	-0.038***	-0.067***	-0.06***	-0.036***	-0.02***	-0.012***
	(0.003)	(0.008)	(0.005)	(0.003)	(0.003)	(0.003)
Unexplained	0.027***	0.066***	0.058***	0.02***	-0.004	-0.007
	(0.005)	(0.013)	(0.008)	(0.005)	(0.004)	(0.004)

Source: Prepared by the authors.
Note: Standard error in parentheses. *p <0.1, **p <0.05, ***p <0.01.

The difference explained by attributes is always favorable to the group of non-quota students, that is, those who do not beneficiate from quotas are in advantage in attributes explained by covariates. The mean and median explained differences are very similar: 3.8% and 3.6%, respectively. There is, throughout the distribution, a clear reduction of differences by attributes. While the difference at the beginning of the distribution is 6.7%, the difference at the end of the distribution is 1.2%, i.e. a drop of 5.5 percentage points.

Here there is a difference, pro quotas, which is not observable of 2.7% on average. This difference can be attributed to skill or effort. This difference is observed in the first two quantiles (6.6% and 5.8%, respectively) and in the median (2%), but then becomes not statistically different from zero. According to Gutterres and França (2016), for affirmative actions associated with education, students are able to compensate for inequalities prior to entering higher education.

Table 3 also shows that there are no differences in the lowest quantiles (q. 10 and q. 25) and the differences remain slightly stable in the others, results that diverge when compared to the previous ones. In this case, based on the premise that there was a difference between quota and non-quota students at the beginning of the course, the quota students' effort during graduation would compensate the lower educational background, positively impacting the grade (Pereira, 2013).

This result shows that students benefiting from the education quota policy may be more motivated or there may be a selection bias for the best students (Gutterres and França, 2016).

Under the same view, Vilela *et al*. (2017) argue that the affirmative actions do not have a significant impact on the average grade of the admitted students, since there are students eligible for the modalities of quotas with good grades and in sufficient numbers so that there is no reduction of the average grade.

The difference in performance between students who entered the university through the quota system and those who entered through the regular admission system is not significant (Almeida and Rodrigues, 2020). A considerable number of students admitted through quotas value the approval at the university, which would be hampered without it, engaging in their studies in order to overcome the gaps of the previous education, compared to classmates with better quality educational experiences (Velloso, 2009). As for better quality basic education, Gutterres and França (2016) point out the existence of high-quality public schools, such as military schools and technical schools.

4.4 Two or More Quotas

Table 4 presents the results of the Oaxaca-Ransom and RIF-Regression models for quota students who fit into two or more categories (social, racial, and having attended public high schools). It should be noted that it is not possible to know which combined criteria were chosen by the students. The results show that there is no significant difference for the mean or the initial quantiles, but from the median the difference is favorable to non-quota students, varying between 2.6% and 3.1%.

Table 4. Results differences – Two or More Quotas

	Mean	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**
Prediction 1	4.002	3.625	3.846	4.05	4.21	4.315
Prediction 2	4.008	3.598	3.851	4.076	4.237	4.346
Difference	-0.006	0.027	-0.005	-0.027**	-0.026***	-0.031***
	(0.01)	(0.023)	(0.015)	(0.012)	(0.009)	(0.009)
Explained	-0.053***	-0.096***	-0.084***	-0.047***	-0.026***	-0.016***
	(0.005)	(0.011)	(0.008)	(0.005)	(0.004)	(0.003)
Unexplained	0.046***	0.122***	0.078***	0.02*	-0.001	-0.016*
	(0.009)	(0.022)	(0.014)	(0.011)	(0.008)	(0.008)

Source: Prepared by the authors.
Note: Standard error in parentheses. *p <0.1, **p <0.05, ***p <0.01.

The difference explained by observable attributes is, on average, 5.3% in favor of the group that did not enter the university through the quota system. This difference has a downward trend throughout the distribution, starting at 9.6% and ending at 1.6% at the upper tail, always favorable to the non-quota group.

The unexplained difference (intrinsic skills or effort) is, on average, 4.6% favorable to quota students. This difference peaks at the beginning of the distribution (12.2%) and declines until it becomes not statistically different from zero in the fourth quintile (q.75) and favors the non-quota students in the upper tail of the distribution.

The opposite result was verified by Weiner and Melguizo (2018), in which there was no significant difference between the general and specific knowledge of the quota students for racial or social reasons and that of their non-quota peers. However, a similarity was found between quota and non-quota students with a high average in specific knowledge exams.

In this case, there was a smaller mean and a statistically significant difference for the last quintiles (q.50, q.75, q.90), corroborating the premise that, even with the difference between quota and non-quota students, the effort of the first during graduation can compensate for possible inefficient educational formations and positively impact the grades (Pereira et al. 2015). It should be emphasized that, in addition to the income, there are other measures of interest for inclusion policies, such as access, dropping out and graduation time (Weiner and Melguizo, 2018). Overall, according to Waltenberg and Carvalho (2012), performance gaps would be considered a modest price paid by society for the diversity and equalization of opportunities of access to higher education.

5 Final considerations

Within the institutional framework of the Quotas Law, this work aimed to investigate the performance differentials among the groups of students benefited and not benefited by affirmative actions, through the 2016 ENADE. To do so, the Oaxaca-Ransom decomposition model was used, with two regressions, the first one by the means and the second by unconditional quantile (RIF-Regression). It is noteworthy that this work is innovative when analyzing the four groups of quota students (racial, social, public schools and mixed quotas), as well as in the methodological sense - Oaxaca-Ransom - and the use of data that contemplate the graduates after the implementation of quotas for low-income students.

In the performance test among students benefited by racial quotas, education quotas, mixed quota and without quotas, the quantiles related to the highest performances present similar performances, and - to the median - the best performances are favorable to non-quota students. The highest differentials were observed in the lower quintiles, except in the education modality, which showed no significant difference levels.

Regarding racial quotas, the greatest difference in performance was observed, on average, between quota and non-quota students. However, this difference decreases along the quantiles, making it insignificant among the best performances. The result indicates that there is an absence of systematic differences in income in favor of non-quota students. In the analysis of the social quotas modality, which guarantee the access of students with up to 1.5 minimum wages per capita income, the verified difference should consider the inequalities prior to entering higher education, in addition to the selection bias, which generates ambiguous results.

With regard to quotas for students who have attended public high schools, the applied models reported that the quota students seem to strive more (unobserved characteristics) to compensate for possible gaps in their education or that there is a selection bias for the best students. The beneficiaries of these quotas would be successful in compensating for the inequalities prior to entering higher education. Also, it is worth noting the existence of Brazilian public schools with excellence in teaching.

As for the observed results for two criteria, the quota and non-quota students presented the smallest performance difference in the mean. This means that a greater guarantee of access would be selecting students willing to overcome barriers, such as a lower quality basic education, positively impacting the grades obtained during graduation.

Finally, it can be inferred that there are performance differences among groups of beneficiary students and non-beneficiaries of the quotas policy. Although the quota policy makes the access to higher education for groups in unequal conditions possible and some evidence point to a big gap in proficiency at the time of entry into higher education, the significant difference in favor of non-quota students in the worst performance highlights the need for policy adjustments. It is worth mentioning that these small differences can be considered a cost that Brazilian society would be willing to pay for past inequalities.

As a limitation, we point out that the sample analyzed comprises only the graduating students, which may make it difficult to analyze the behavioral differences of quota and non-quota students throughout the courses. For future research, it is also recommended to use other variables of interest, such as access, dropping out, study time and income coefficients, which may contribute to the evaluation of inclusion policies, such as quota policy.

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Appendice

Table A1. independent and dependent variables

Variable	**Description**	**M**	**SD**
Specific grade LN	Specific exam grade in logarithm	4.00	0.32
Overall grade	Overall exam grade	52.15	16.25
Age	Age in years	25.95	4.98
Discrepancy	Years between high school and college	3.18	3.88
Study hours	Weekly hours dedicated to studies	5.96	3.76
Per capita income	Family income per capita in minimum wages	2.58	3.39
Foreign language	1 if they studied a foreign language during college, 0 if not	0.44	0.5
Immigrant	1 if the state where they study is different from the state where they were born, 0 if not	0.09	0.28
Married	1 if they have a spouse, 0 if not	0.12	0.32
Male	1 for male, 0 otherwise	0.31	0.46
Uneducated father	1 if the father did not attend school, 0 if he did	0.04	0.2
Father Elementary School 1	1 if the father completed the first cycle of elementary school, 0 if not	0.20	0.4
Father Elementary School 2	1 if the father completed the second cycle of elementary school, 0 if not	0.14	0.34
Father High School	1 if the father attended high school, 0 if not	0.34	0.47
Father Degree	1 if the father has a degree, 0 if not	0.2	0.39

Father Graduate School	1 if the father attended graduate school, 0 if not	0.08	0.27
Uneducated mother	1 if the mother did not attend school, 0 if she did	0.02	0.14
Mother Elementary School 1	1 if the mother completed the first cycle of elementary school, 0 if not	0.14	0.35
Mother Elementary School 2	1 if the mother completed the second cycle of elementary school, 0 if not	0.12	0.32
Mother High School	1 if the mother attended high school, 0 if not	0.36	0.48
Mother Degree	1 if the mother has a degree, 0 if not	0.22	0.34
Mother Graduate School	1 if the mother attended graduate school, 0 if not	0.14	0.34
Exchange Program	1 if they have been in an exchange program, 0 if not	0.15	0.67
Public High School	1 if they attended a public school throughout high school, 0 if not	0.5	0.5
Relative with a degree	1 if some relative has a degree, 0 if not	0.75	0.43
Financial Aid	1 if they received some financial aid during college, 0 if not	0.31	0.46
White	1 if self-declared white, 0 if not	0.53	0.16
Black	1 if self-declared black, 0 if not	0.09	0.28
Pardo	1 if self-declared pardo, 0 if not	0.03	0.16
Indigenous	1 if self-declared indigenous, 0 if not	0.35	0.48
Yellow	1 if self-declared yellow, 0 if not	0.002	0.05
Racial Quota	1 if racial quota student, 0 if not	0.026	0.16
Social Quota	1 if social quota student, 0 if not	0.02	0.14
Public Education Quota	1 if public education quota student, 0 if not	0.148	0.36
Two or More Quotas	1 if two or more quotas student, 0 if not	0.043	0.2
	Total of observations	**22,290**	

Source: Prepared by the authors.
Note: M represents the mean and DP is the standard deviation.