Law of Social Quotas and School Choice

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Abstract

This paper intends to identify if the Law of Social Quotas, Law enacted by the Brazilian government in 2012 that guarantees 50 % of the seats in all federal universities for students who studied all high school period in public schools, has an impact on the school choice of students enrolled in private elementary schools. As before 2012 most Brazilian universities already had adopted some affirmative action, we analyze, building on a Diff-Diff regression, the impact of the Law in two states: Minas Gerais and São Paulo. In Minas Gerais, state where the law represents a significant institutional change in the access to public higher education, we estimate a 24% increase in the average probability of migration of the treated cohort. In São Paulo, where this change does not occur at the same level, the estimated increase is only 3%. We also estimate that in Minas Gerais the law have lower impact on students from higher quality private schools.

Keywords: Affirmative action; Difference-in-Difference; Law of Social Quotas; School choice.

Introduction

In August 2012, the law n° 12,711, better known as Law of Social Quotas (LQ), was sanctioned by the Brazilian government. According to the law, all Brazilian federal universities must reserve 50% of its seats for students who studied all three years of high school in public institutions. Considering that in Brazil one of the main goals of the students enrolled in a private high school is to join a public university, this work intends to identify if the LQ impacts the school choice of students enrolled in the last year in private elementary schools.

For this purpose, we employ a Differences-in-Differences regression, using as the treatment groups all students enrolled in the 9th grade of private elementary school in 2011 and 2012. The law is sanctioned in 2012 and comes into effect in the first entrance exam of 2013, therefore the LQ affects all students in the treatment group enrolled in private schools in 2012. The control groups are composed of students enrolled in the 5th grade of private elementary school in 2011 and 2012. Unlike the students enrolled in 9th grade in 2012, 5th grade students are not affected, since the LQ benefits those who studied only high school in public institutions and therefore the decision to migrate or not to public institution in 6th grade will not set up if they will be benefited.

As the changes imposed by the law apply only to federal universities, we hope that its impact is greater in states where the number of seats in federal universities compared to state and municipal universities is higher. Still, there are states where federal universities have implemented affirmative actions (AA) similar to the LQ before 2012. Therefore, in these states, the law does not represent a significant institutional change in access to higher education. To work around these issues, we conducted a delimitation of the database to analyze in greater depth two states: Minas Gerais and São Paulo.

We observe that in Minas Gerais, state in which more than 80% of seats in public universities are in federal institutions; and only 1 of the 11 federal universities in the state adopted an AA similar to the LQ before 2012, the law is responsible for an increase of 1.8 p.p. on the probability of migration to public schools, which represents a 24% increase in the average probability of migration of the treatment group. In São Paulo, where only 15% of students enrolled in public higher education institutions are in federal universities and 2 of the 3 federal universities in the state adopted AA similar to the LQ before 2012, the impact of the law is 0.3 p.p., an increase of less than 2%. Moreover, we find that in Minas Gerais the impact of the law is lower for students coming from higher quality elementary schools.

The results found in this essay corroborate the evidence presented in recent studies that

analyze the impact of color-blind affirmative action in school choice, as Estevan et al. (2012) and Cullen et al. (2013). We conclude that the implementation of AA that benefit a specific group of schools in the access to higher education can lead to strategic behavior on school choice.

This work will continue as follows: on the first chapter, it will be exposed a brief overview of basic education environment in Brazil and the description of the LQ. On the second chapter, we will conduct a literature review on the impact of color-blind affirmative actions on school choice and the determinants for private school choice. Then, the identification strategy is defined and the database is presented. Finally, on chapter 5, it is presented the results for Minas Gerais and São Paulo; and then we conclude this work.

Institutional Environment

In Brazil, the higher education system consists of profit or nonprofit private institutions, and public institutions, which can be bonded to federal, state, or municipal domain. About 71% of students enrolled in the higher education system study in private institutions. Regarding students enrolled in the public system, about 63% are enrolled in federal, 33% in state and less than 5% in municipal universities. Public institutions are necessarily free as private are mostly paid.

These shares differ from one state to another. In Minas Gerais, state with the second highest number of students enrolled in public universities, the federal institutions play a major role. About 87% of all students enrolled in the public higher education system are in one of the 11 federal universities located in the state. In São Paulo, state with the highest number of higher education students, only 15% studies in federal institutions.

Besides the gratuity, the public institutions are renowned by its educational standards. 8 of the 9 institutions with the highest grade in the General Courses Index (IGC), ranking developed by the National Institute of Educational Research (INEP), are public. The result of these factors, gratuity and quality, is the high competition for a seat in one of these institutions. In public universities there is a average of 21.3 candidates per seat, compared to 2.3 in private institutions.

In this dispute, take advantage those who had a better preparation during elementary and high school. Opposed to what happen in higher education, these are the ones who studied in private schools. In the University of São Paulo (USP), best ranked university in the country, 28.5% of new students in 2013 finished high school in public institutions, while in the municipality of São Paulo, about 82% of high school students are enrolled in public schools[1].

In 2013, the IDEB[2] for private high schools in Minas Gerais was 5.8, compared to 3.6 of public schools. In São Paulo, we observe a lower but still significant difference. The grade for private schools is 5.6 while for public schools is 4.5. These differences are higher when we compare elementary schools, as we observe in table (1).

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[1]Emilio et al. (2004) identify a significant increase in the probability of joining USP for students who attended the high school only in private institutions and / or held a preparatory course for the entrance exam.

[2]The National Index of Basic Education (IDEB) is developed by the Minister of Education (MEC) in order to evaluate the basic education in the country. The score is calculated based on a learning indicator, measured through external educational assessment, and a flow indicator, measured from the pass rates, dropout and age-grade distortion.

Table 1: IDEB grade by school network - Minas Gerais e São Paulo

	Minas Gerais		São Paulo	
	Public	Private	Public	Private
High School	3,6	5,8	4,5	5,6
Elementary School $5 - 9^{th}$	4,6	6,3	4,4	6,3
Elementary School $1 - 4^{th}$	5,9	7,6	5,8	7,3

Source: INEP.

Taking ENEM[3] into consideration, main entrance exam for the federal universities, these differences are persistent. In 2012, the mean score in math for private schools in Minas Gerais was 617, while for public school the score was 488. In São Paulo, the private schools scored 604, while public schools only 483.

Not only the performance of private schools in external assessments and entrance exams is superior but also the participation in these tests. In Minas Gerais, 25.588 students from private schools and 110.356 students from public schools performed the ENEM in 2012. These values represent 97% and 55% of the number of students enrolled in the last year of high school for private and public network. In São Paulo the participation in the test is much lower. Only 79% of private school students and 45% of public schools conducted the test in 2012.

This difference in participation between Minas Gerais and São Paulo happens for a reason. The access to Brazilian universities is generally done through annual or biannual tests, called *"vestibular"*, and students are selected according to their classification in this exam[4].All federal universities adopt ENEM as it entrance exam or use its grade as a significant part of the vestibular. Conversely, São Paulo biggest state universities, USP and UNICAMP, have its own entrance exam and only in the last years started to use ENEM as a minor part of the students' final grade. Therefore, because in São Paulo the federal universities play a minor role in the public higher education system, the participation in ENEM is much lower than we observe in Minas Gerais.

What does not change from one state to another is the relevance of the public universities

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[3]National High School Exam.

[4]In public universities, 92% of students were selected through the vestibular, while in private, about 86%. Statistical Synopsis of Higher Education, 2013. National Institute of Educational Studies Anísio Teixeira (INEP).

in the higher education system. In Brazil, one of the purposes behind the choice for private schools is raising the chances to join a public university. This is not only reflected in performance differences between private and public schools in external evaluations and entrance exams, but also by school curriculum's and pedagogical methods which are largely focused on the result in the vestibulares.The average grade of a school in ENEM is the main quality indicator used for high schools and the number of approved in the major public universities is constantly used as *marketing* by schools. Thus, investment in higher quality private school in basic education is a way to increase the entry chances in a public university, which in addition to its gratuity are generally the most renowned institutions in the country.

In the next section we will describe the LQ, pointing out the mechanism that it can impact the school choice of students enrolled in private elementary schools.

Law of Social Quotas

Sanctioned on 29th August 2012, law n° 12,711, known as Law of Social Quotas (LQ), decrees that at least 50% of the seats offered by federal institutions of higher education should be reserved for students who have completed high school fully in the public school system. Half of the reserved seats should be filled by students from families earning less than 1.5 minimum salary. Still, the reserved seats should be filled in proportion at least equal to that of blacks, brown skinned and indians in the population of the state housing the institution, according to the latest Census of the Brazilian Institute of Geography and Statistics (IBGE)[5]. The federal universities have a period of four years to fully comply with the specifications required by law, and, already in 2013, at least 25% of the seats should be reserved for students of the beneficiary groups. Figure 1 shows an example of how the seats shall be filled in a course with 100 seats.

Despite its imposing character, LQ served more to delimit the beneficiary group and expand the number of reserved seats than inaugurating the adoption of AA in Brazil. In 2012, year that the law was not yet in force, 30,264 seats had been reserved for some kind of policy in federal universities. However, there was no uniformity in the definition of beneficiaries. While in some institutions were included only black and brown students, in others the quotas was only valid for students who had completed half of elementary school and all high school in public institution and/or from low-income families. Contemplating both social and racial targets and creating a minimum level for the adoption of quotas, the LQ gives a unified character for AA in Brazilian federal universities.

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[5]Law of Social Quotas: http://www.planalto.gov.br/ccivil03/ato2011-2014/2012/lei/l12711.html

Figure 1: Minimum percentage of reserved seats by beneficiary group - Law of Social Quotas
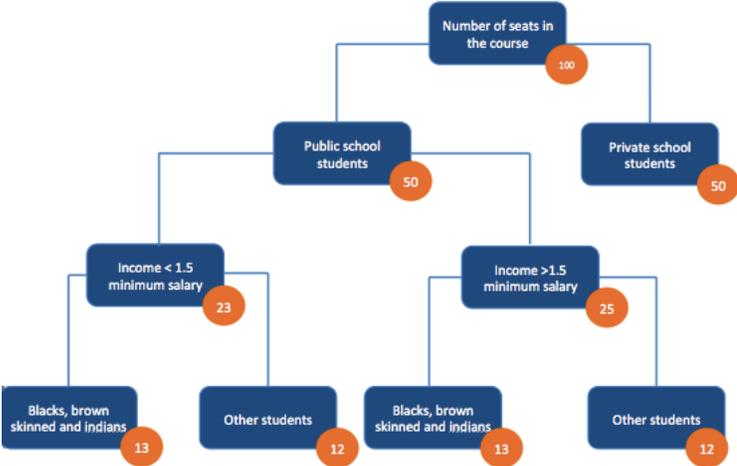
It is not the scope of this work to discuss whether such centralization in AA setting is positive or not, however it is worth highlighting the significant surge in the number of reserved seats. In the first year of the law, 2013, 59,432 seats were reserved for quotas, an increase of almost 50% over the previous year. The pace of expansion remained within one year, reaching 77,374 seats in 2014 Feres Junior et al. (2013). It is worth mentioning that part of the increase in the number of quotas is due to an increase in the number of seats in federal universities and not just the percentage of reserved seats.

Another important point to note is that, unlike the case of others AA that had been applied before 2012, black, brown or low-income students who study as fellows in private schools are no longer covered. Despite the seat reservation for these two groups, the only way a student falls within the target group is attending high school fully in public institutions, which implies that students of any racial or income group can benefit from the law, as long as they course the three years of high school in a public institution[6].

Therefore, in order to benefit from the quotas and increase the chances of admission in a federal university, the LQ creates an incentive for students enrolled in the final year of private elementary school to migrate to a public institution in the first year of high school.

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[6]Later we will delimit the database and discourse about all AA prior to the LQ in the analyzed states

Literature Review

This literature review is divided into two subsections. First, we analyze the works that deal with the AA impact, especially color-blind actions, on high school students. Then we try to understand the determinants that lead families to enroll their children in private schools.

Affirmative Actions and School Choice

The term "color-blind affirmative action", used by Fryer et al. (2003), refers to AA which do not take the race as the main factor for defining the beneficiary group. This type of policy emerged in some states of the U.S.A. in response to court decisions that prohibited the adoption of "color-sighted" policies, i.e., policies that explicitly benefited black students. The states of Texas, Florida and California then implemented policies known as "percentage plans" in which a certain percentage of the best students of all state public schools had guaranteed seats at a state university. In the case of Texas, it was approved the House Bill 588, which guaranteed a seat in state universities for all students who graduated among the top ten percent of their school. Indirectly, this law created an incentive for students slightly below the top ten percent threshold in their school to change to a lower performing institution.

In order to examine this effect, Estevan et al. (2012) use a Diff-Diff methodology to estimate the impact of the "Top-ten Percent law" on ethnic segregation in Texas high schools. The empirical analysis indicates the reduction in segregation in the last two years of high school in relation to the 9th grade of elementary school, unaffected by the law. There is student's migration from higher performing schools, those with a minor amount of underrepresented students, to lower performing schools on the last years of high school. Still, the authors find that the students who are more inclined to migrate to a lower performing school are those who are not in a financial disadvantage.

In other empirical work approaching the same topic, Cullen et al. (2013) found similar results. In order to identify possible changes in the pattern of school choice, the authors employ a conditional logit model based on individual level data to analyze the high school choice of the students enrolled in the final year of elementary school in the period before and after the law. It is estimated that between 5 and 25% of students who have either reason, based on their grades in 9th grade, and opportunity, based on the existence of more than one high school in their neighborhood, change of school in response to the law.

These two works highlight that policies that ensure benefits in access to higher education

for a specific group of schools can lead to strategic behavior by the students of the non-beneficiary schools. This becomes more evident when there are no barriers in the access to benefited schools, as is generally the case of free public schools in Brazil. In the case of LQ, such strategic response can lead to increased migration of private school students to public schools in the 1st year of high school.

However, despite similar incentives involved, no work analyzing the impact of LQ on the school choice was carried out using Brazilian data. While some studies estimate the AA effect on student effort[7], others analyze the efficiency of different types of AA[8].

Determinants of School Choice

Since the aim of this work is to identify if the LQ is related to an increased likelihood of migration to public institution, it is essential to know what are the main factors that drive the choice for private school education.

In one of the first works to treat empirically on the subject, Long and Toma (1988) use the 70's and 80's US Census to identify the determinants for private school choice. Based on a linear probability model, the authors find that family income, religious affiliation and supply of private schools in the student municipality positively affect the likelihood that this student is enrolled in private schools. In order to estimate the determinants of that same choice, Menezes-Filho et al. (2011), building on censored regression models and using data from the National Survey by Household Sampling (PNAD) and Household Budget Survey (POF), estimate that the mother's education, family income, and the supply and cost of private schools in the student municipality positively affect the probability of enrollment in private institution.

Opice (2015) use a linear probability model based on individual level data of São Paulo state students' to identify the variables associated with the migration probability from public to private institutions at the end of two cycles of elementary school, ie, 5th and 9th year. The author finds that mother's education, family income and student's grade on a standardized test positively affect the probability of migrating to a private institution. It is also observed

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[7]Ferman and Assuncao (2005) and Francis and Tannuri-Pianto (2012) analyze the impact of racial quotas implemented in the states of Bahia and Rio de Janeiro in the grades of the students of the beneficiary group in ENEM. The studies found different results, indicating that AA can either increase or decrease the effort of students, depending on the proportion of reserved seats.

[8]Fryer et al. (2003) develop a theoretical model to understand the effect of color-blind affirmative action in the admission process of universities. The adopted model suggests that color-blind policies are less efficient than color-sighted.

that white students and students enrolled in higher performing public schools are more likely to migrate to a private institution in the next year.

Regarding the private school market, the seminal work of Epple and Romano (1998) develops a theoretical model in order to find a equilibrium in the allocation between students, differentiated by income and ability, and public and private schools, where private schools can discriminate prices. In equilibrium public schools receive the poorest and lower ability students while emerges a strict hierarchy of private schools, generating segregation within the education system.

Menezes-Filho et al. (2014) analyze the impact of a public policy that increases the participation of poorer students in the basic education system, the Bolsa Família[9]. The authors point out that this policy increases the educational inequality within the public school system, as it stimulates the entry of students (who were excluded from the educational system) in public institutions. It is estimated that the increase in educational inequality is related to an increase in the probability of a private school opening in a given municipality, as some students from the public system begin to demand a private alternative due to the decrease in the quality of education.

Finally, another factor that can affect the school choice for a private institution is the quality of public schools in the family council. Estevan (2014) analyzes the impact of an exogenous increase in municipal spending on public education on the share of students enrolled in the 1st elementary school cycle in private schools. The results indicate that the increase in spending reduces enrollment in private schools[10]. Epple et al. (2004), from a panel of 15,590 American students, found that family income and the ability of a student positively influence the likelihood of enrolling in a private school. The research also points out that in municipalities where public spending on education are lower, the impact of income on the probability of enrolling in private schools is higher.

Although there is no work that specifically addresses the migration from private to public schools, the literature of school choice points to some variables: mother education, family income, student ability and offer and cost of private schools in the student municipality.

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[9]A conditional cash transfer of the Brazilian government that demands school participation
[10]In another study, Estevan (2009) shows that this exogenous increase in spending is related to improvement in quality indicators of public schools.

Identification Method

The main objective of this empirical study is to identify if the LQ impact the school choice of Brazilian students enrolled in private schools. For this purpose, we will analyze the variation in the migration probability of private elementary school students to public institutions. In this context, the students treated by the law are those who can benefit in the access at federal universities by changing to a public high school, namely the ones enrolled in the last year of private elementary schools.

The school census database does not provide information on the socioeconomic variables that influence the migration decision. As the omission of variables that vary over time and impact the migration to public schools may lead to endogeneity problems when estimating the impact of the law on migration by OLS[11], we will use the Differences-in-Differences (DD) methodology to work around this issue and obtain a consistent method of identification.

We will consider here that a student enrolled in a private school only makes the choice to change or not to the public system once a year, at the end of the school year. To identify the change on the migration probability, we shall have four cohorts, two for the treatment group and two for the control group. Students enrolled in the 9th year of private elementary schools in 2011 and 2012, make the first and second treatment cohort. The law is sanctioned in 2012 and comes into effect in the first entrance exam of 2013, so it affects all students in the treatment group enrolled in private schools in 2012. The control cohorts are composed of students enrolled in 5th year of private elementary school in 2011 and 2012. As the 9th year, 5th year is also an end of cycle, and thus the migration cost is similar. However, the law does not affect students of the 5th year, since the LQ benefits those who have studied only the high school in public institution and therefore the decision to migrate or not to a public school in the following year will not define if they will benefit.

Then we have an unbalanced panel with different students in each cohort and in each year. We will define the structural function that models the probability of a student enrolled in a private school in a given year to migrate to a public school the next year as the linear probability model described below:

$$Y_{ist} = \alpha \cdot year_t + \beta \cdot treat_s + \theta \cdot (year_t \cdot treat_s) + \Gamma \cdot X_{ist} + u_{ist} \qquad (1)$$

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[11]This issue arouse because all variables that vary over time and impact the migration to public schools are correlated with the variable that captures the impact of the Law of Quotas and also with the dependent variable, the student school choice.

Where Y_{ist} is a binary variable that values 1 if the student i of group s in year t changes to public school in year $t+1$, and 0 otherwise. X_{ist} is a vector containing all the variables that influence the public school choice. θ is our coefficient of interest.

Based on the results presented in the literature, the X_{ist} vector contains the following variables: per capita family income, number of siblings, parents' education, quality of public schools and relative supply of private schools in the municipality of student i in year t, cost of private education and other unobservable variables that do not change in time.

Since most of these variables are not available in the database used, we will control only for the quality of public schools and relative supply of private schools in the municipality of student i in year t. Therefore, all other variables are included in the error term:

$$u_{ist} = \lambda \cdot W_{ist} + v_{ist} \tag{2}$$

Where W_{ist} is the X_{ist} vector without the variables that will be included as control in the model: quality of public schools and relative supply of private schools in the city of student i in year t.

Including the IDEB of public schools, $IDEB_{ist}$ and the ratio of the number of private and public schools in the municipality of student i in year t, OF_{ist}, control variables for the quality of public schools and private schools offer, we came to the second regression that will be estimated:

$$Y_{ist} = \alpha \cdot year_t + \beta \cdot treat_s + \theta \cdot (year_t \cdot treat_s) + \gamma \cdot IDEB_{ist} + \phi \cdot OR_{ist} + u_{ist} \tag{3}$$

For identification, it is necessary that:

$$\begin{aligned} &\{E[Y_{ist}|X_{ist}, s=1, t=1] - E[Y_{ist}|X_{ist}, s=1, t=0]\}- \\ &\{E[Y_{ist}|X_{ist}, s=0, t=1] - E[Y_{ist}|X_{ist}, s=0, t=0]\} = \theta \end{aligned} \tag{4}$$

Which brings us to the identification hypothesis:

$$\begin{aligned} &E[u_{ist}|X_{ist}, s=1, t=1] - E[u_{ist}|X_{ist}, s=1, t=0] = \\ &E[u_{ist}|X_{ist}, s=0, t=1] - E[u_{ist}|X_{ist}, s=0, t=0] \end{aligned} \tag{5}$$

If the identification hypothesis is valid, the DD estimators for regression (3.3) will be consistent and unbiased. For this to occur, it is enough condition that all the variables

included in v_{ist} vector and that are not specified in equation (4.1), including: per capita family income, number of siblings, parents' education and cost of private education; do not vary significantly from 2011 to 2012. In the descriptive analysis section, these hypotheses will be analyzed using the National Survey by Household Sampling (PNAD) data.

Finally, analyzes will be performed using errors clustered by school and year, and including socioeconomic characteristics for the municipality of student i[12]. The first analysis will be done for two reasons: i) the school choice of a student (or group of students) may have an impact on the decision of their classmates, resulting in correlation between individual errors[13]; ii) exogenous factors that affect a school in a given year, can affect the migration decision of all students from this school.

Database

To identify the migration of students from private to public institutions, we will use the School Census database. Since 2007, this database provides information on an individual level of all students enrolled in primary education in public or private Brazilian schools. Through an identification code it is possible to follow the school and class in which a student is enrolled and, therefore, whether at some point this student made the decision to migrate from network.

A delimitation of the base will be made to investigate with deeper dept the impact of the law in two states. First, we will analyze only Minas Gerais, the Brazilian state with the largest number of federal universities, 11 in total, and a relatively low presence of state universities[14], institutions vying candidates with federal universities, but that are not required to adopt the LQ. Also, we will perform the same exercise for São Paulo, the Brazilian state with the lowest share of federal universities in the public higher education system. About 85% of São Paulo students enrolled in public higher education institutions are in state universities, which were not obliged to follow the LQ and did not implemented any AA in 2012.

Before 2012, most federal universities already had adopted some form of AA. Therefore, we delimit the base exactly to specifically examine the case of each state and examine whether in the observed regions the LQ may be treated as an institutional change capable of influence

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[12]As the analysis period is relatively short (only 2 years) we will not consider the possibility for biased variances of DD estimators, as noted in Bertrand et al. (2002).

[13]As the classes are generally small and the correlation between the students characteristics of the same class is too high, we will not cluster the errors to the class level, as this would make any estimator not statistically significant.

[14]About 10% of the seats offered in the public higher education system in 2012.

the school choice. The states of São Paulo and Minas Gerais were chosen for analysis for three reasons:

1. These are the two states with the highest number of students enrolled in higher education in the country;

2. In both states, the percentage of students enrolled in public higher education institutions and who were born in the state is approximately 90%, therefore students enrolled in high schools in these states seek a seat in a university within the own state;

3. While Minas Gerais has the highest share of students in the public system enrolled in federal universities among the top five states, São Paulo has the lowest. As the LQ applies only to the federal universities, we expect different impacts of the law in each state.

For the descriptive statistics and analysis of the validity of the assumptions of identification, we will use data from the National Survey by Household Sampling (PNAD), more specifically the information on per capita family income, number of people in the family and number of years of education of the reference person in the family[15]. We will also use 2010 Census data for the construction of socioeconomic variables of the municipalities, which will serve as a control in the empirical analysis, and the IDEB information at the municipal level in order to build an indicator on the quality of public schools.

Attrition

We define attrition as students who are observed in the Census in one year, but who are not found in the next year, though they remain in school in the same state[16]. In the table below, we have the percentage of students in each cohort that disappears from the database in the following year. Despite the attrition is much higher for the treatment group compared to the control group, we observed that this percentage does not change significantly over time and especially between 2011 and 2012 cohorts, periods analyzed in the estimated model.

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[15]Person responsible for the family, or so considered by other family members. Variable used as a proxy for years of study of a parent.

[16]As we will conduct the analysis by state, if a student migrate to another state he will be out of our database in the next period. We consider that the disappearance of the database due to the migration to other states or countries is a random factor that does not change significantly from one year to the next.

Table 2: Percentage of attrition by treatment and control cohorts - Minas Gerais e São Paulo

	Minas Gerais		São Paulo	
	Control	Treatment	Control	Treatment
2012	7,11%	14,99%	3,19%	11,60%
2011	6,34%	14,59%	2,63%	10,61%
2010	5,78%	15,17%	4,14%	10,84%
2009	7,69%	17,75%	3,71%	10,38%
2008	7,46%	16,08%	4,57%	10,68%

In this work, the attrition can be a problem for the identification if: i) the disappearance of the student from the database is correlated to some dependent variable of school choice; ii) the students' disappearance on the panel is caused by some mistake in the students register in a new school. In the first case, using School Census data of 2007 to 2010, Oliveira and Soares (2012) show that the attrition observed in the Census is not correlated with socioeconomic variables of the student. The second case can be a more serious issue. We expect that the probability of change in the identification code and the consequent disappearance of our database is higher for those students who change schools. This occurs because the cause of the disappearance can be due to registration errors of the student in a new institution, which can derail their identification by the Census. If there is an increase in migration to public institutions from one year to the other, it is possible that there is an increase in the disappearance of students from our database and, therefore, the estimated parameters are biased. Note that this problem would make our estimates more conservative, since in the case where the variation in migration probability for public schools is higher for the treatment group, we expect that some of the students in the treatment group will disappear from the database due to the change identification code. Thus, the observed variation will be lower than the actual variation. Considering that, we will not take this issue into account in our analysis.

Case Studies

Minas Gerais

Minas Gerais is the state with the largest number of federal universities and students enrolled in federal universities. In 2012, 45,668 students were enrolled in the 11 federal universities[17] located in the state. Among the students enrolled in public higher education institutions, 87% study in federal universities. Moreover, according to PNAD, 89% of students enrolled in federal institutions were born in Minas Gerais and about 96% live in the state for over four years.

Historic of Affirmative Actions

Before 2013, seven federal universities had some type of affirmative action[18]. Just in one university[19] the definition of the target group was the same as in the LQ. In the other six institutions, to benefit the student should have attended all high school and between 50 and 100% of elementary school in public institutions. In state universities, since 2004, about 40% of the seats were reserved for students from families with income below 1.5 minimum salary (of this percentage, about 20% are reserved for black students, and the rest to students coming from public schools).

The LQ is an institutional change to the extent that, to benefit from the quotas, students need only to attend all high school period in public school. Before 2012, students enrolled in the final year in a private elementary school and who studied the last 4 years in private institutions could not benefit from the change to a public institution in the first year of high school. In a first analysis, we classify as affected by the law a student who studies only the last year of elementary school in a private institution in 2012. However, a student who has studied 5 years of elementary school in public schools and only the last one in a private school could benefit from AA in place before 2012. Therefore these students would receive treatment in two periods. Although only 5% of the students who have studied the last year in a private elementary school have studied their last 4 or more years in public schools, we will hold a robustness test using the students who have studied the last 3 years in the private school[20].

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[17]Highest number of federal universities in a single Brazilian state.

[18]They are: UFTM, UFV, UFOP, UFJF, UFSJ, UFMG, UFVJM.

[19]UFOP

[20]As the School Census offer individual level data with population coverage only from 2007, we can only observe the students enrolled in the cohort 2011 in the last 3 years.

Descriptive Statistics

In figure (2), we observe the average probability of migration to public institutions in the period before and after the LQ. We see that the trends are parallel to for the 2008 and 2009 cohorts and, in 2010, there is a break in the downward trend for the treatment group, not accompanied by the control group. We can not guarantee that this interruption is due to the anticipation of the law by the students in the treatment group in 2011, so we will employ a third difference regression, in order to take into account the variation in the period immediately before the implementation of the Law. In 2012 cohorts, the first ones to be treated by LQ, we observe a significant increase in the average probability of migration of the treatment group compared to the control group, which remain on a smaller scale, in the following period.

Figure 2: Average probability of migration to public schools by cohort - Minas Gerais
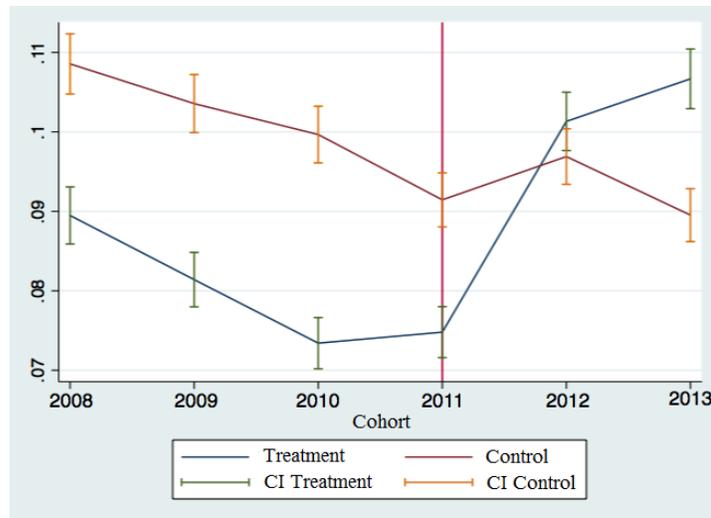
Using the PNAD database, we conducted mean tests to identify possible changes in the dependent variables for school choice that we do not observe in the School Census. These are the variables grouped in X_{ist} vector. None of the variables varies significantly in the analyzed period.

Table 3: Mean tests for socioeconomic characteristics by cohorts - Minas Gerais

	Treatment			
	2011	2012	Difference	p-value
Per capita Income	1459,69	1862,78	403,09	0,14
# of people in the family	3,88	3,81	-0,06	0,73
Years of study of R.P*	14,37	14,30	-0,06	0,89
	Control			
	2011	2012	Difference	p-value
Per capita Income	1627,46	1433,02	-194,44	0,48
# of people in the family	3,68	3,59	-0,08	0,67
Years of study of R.P*	14,27	14,85	0,57	0,15

*Reference person in the family

Results

The results presented in table (4) indicate that the LQ had a positive impact on school choice. In the model that includes the control variables and municipal socioeconomic characteristics and building on a linear probability regression, the estimated impact, statistically significant at the 1% confidence level, is of 1.8 percentage points, a 24% increase compared to the migration probability of the non treated cohort. Clustering errors by school and year model (4), the impact becomes statistically significant only at 10%. The complete results of all regressions below are shown in the Appendix.

Table 4: Minas Gerais - 2012/2011

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	0.0211***	0.0179***	0.0182***	0.0182*
	(0.00351)	(0.00338)	(0.00338)	(0.0103)
Observations	107,107	105,065	105,065	105,065
R-squared	0.001	0.005	0.007	0.007
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

In order to obtain a more robust estimate, it was estimated a third difference, table (5), comparing the cohorts in periods where there is treatment, 2011 and 2012[21], with cohorts of a placebo period, 2010 and 2011. The coefficient of interest is positive but lower than estimated in the previous regression, statistically significant at 5% level for all specifications, except when clustered errors are included.

Finally, we present the results for the period following the implementation of the law, table (6). The aim is to identify if the impact on school choice happens fully in the year of its implementation or if, because of any asymmetry of information or some aspect inherent to the law format[22], it continues over the following years. The results indicate that the impact

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[21] The treatment occurs for the cohort of students enrolled in 9th year in 2012.

[22] As the minimum percentage of reserved seats increases to 2016, the impact can extend throughout this period.

Table 5: Minas Gerais - Third Difference - 2012/2011 - 2011/2010

	(1)	(2)	(3)	(4)
THIRD DIFFERENCE	0.0115**	0.0118**	0.0119**	0.0119
	(0.00490)	(0.00491)	(0.00487)	(0.0103)
Observations	210,456	210,244	210,244	210,244
R-squared	0.002	0.002	0.015	0.015
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

in this period, although smaller, is still positive. However, when the errors are clustered, the estimated coefficient is not statistically significant[23].

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[23]In this regression the control variables were not included because we had not IDEB information to analyze the variation in the analyzed period.

Table 6: Minas Gerais - 2013/2012

	(1)	(2)	(3)
LAW OF QUOTAS	0.0127***	0.0111***	0.0111
	(0.00364)	(0.00360)	(0.00801)
Observations	107,718	107,718	107,718
R-squared	0.000	0.019	0.019
Municipality Characteristics		YES	YES
Cluster - School and Year			YES

Robust standard errors in parentheses

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

As we observe a positive and statistically significant impact on school choice, it is worth investigating if the impact of the LQ is the same for student coming from private schools with different levels of quality. The cost resulting from the loss in quality of education and, consequently, reduction in the probability of getting a seat in a public institution shall be higher for students who migrate from higher quality private schools. Therefore, it is possible that, for students from these schools, the impact of the law is smaller. In the next section, we will analyze this phenomenon.

Heterogeneity

In this section, we will analyze whether the impact of the law on migration is different for students from schools with different levels of quality. As we do not have information regarding the monthly price of all private schools in the country[24], and there is no mandatory external evaluation for private elementary schools in Minas Gerais, we will use infrastructure data and the quality of school faculty to build a proxy for school quality.

In table (7), we observe the percentage of some infrastructure items and the average percentage of teachers with post-graduate degree in the schools of the control and treatment groups in Minas Gerais. As can be seen, in private schools the variation in the infrastructure items is very low, since most schools have all the items listed in Schools Census[25]. Therefore, we will use only two variables to build a quality indicator, the number of computers per student and the percentage of teachers with post-graduate degree in the school of student i.

Table 7: Percentage of schools by infrastructure item and average percentage of teachers with post-graduate degree - Minas Gerais

	Treatment		Control	
	2011	**2012**	**2011**	**2012**
Library	98,10%	98,89%	97,54%	98,28%
Sciences Lab	86,76%	85,77%	75,50%	75,21%
Computer Lab	92,93%	89,88%	92,70%	90,83%
Internet	99,62%	99,62%	97,92%	98,66%
Computers per student	0,04	0,04	0,03	0,03
Teachers with post-graduate degree	46,36%	44,36%	47,06%	44,46%

To estimate the possible heterogeneity in the impact of the Law, we will conduct two analyzes. First, we included the variables that represent the percentage of teachers with post-graduate degrees, POS_{ist}, and the number of computers per student, $COMP_{ist}$ in the school of student i, in addition to their interactions with the variable of interest. The estimated regression is:

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[24]This variable would be a good indicator for the per student expenditure in each school.

[25]We did not include other infrastructure variables present in the School Census in this analysis, because for most of them the prevalence is almost absolute in the population of private schools.

$$Y_{ist} = \alpha \cdot year_t + \beta \cdot treat_s + \theta \cdot (year_t \cdot treat_s)+$$
$$\gamma \cdot IDEB_{ist} + \phi \cdot OR_{ist} + \sigma \cdot POS_{ist} + COMP_{ist}+ \qquad (6)$$
$$\rho \cdot \varsigma \cdot (POS_{ist} \cdot year_t \cdot treat_s + \varrho \cdot (COMP_{ist} \cdot year_t \cdot treat_s) + u_{ist}$$

Then, we classify schools according to quartile they are placed in the distribution of POS_{ist} and $COMP_{ist}$. The binary variables $POS1_{ist}$ and $COMP1_{ist}$ in regression (5.1) will take the value of 1 for schools that are in the first quartile in the distribution of number of computers per student and teachers with post-graduate degrees, respectively, and 0 otherwise. Considering only the observed variables, these are considered the highest quality schools, representing 26.8% and 26.9% of all students enrolled in Minas Gerais private schools.

$$Y_{ist} = \alpha \cdot year_t + \beta \cdot treat_s + \theta \cdot (year_t \cdot trat_s)+$$
$$\gamma \cdot IDEB_{ist} + \phi \cdot OR_{ist} + \sigma \cdot POS1_{ist} + COMP1_{ist}+ \qquad (7)$$
$$\rho \cdot \varsigma \cdot (POS1_{ist} \cdot year_t \cdot trat_s + \varrho \cdot (COMP1_{ist} \cdot year_t \cdot treat_s) + u_{ist}$$

The results of table (8) show that the impact of the LQ is lower in schools with a higher percentage of teachers with post-graduate degrees. All estimates are statistically significant at 1% level. The results also indicate that students from schools with more computers per student are more impacted by LQ. However, the results for the variable $COMP_{ist}$ do not remain significant when added to the model control variables, student's city characteristics, and clustered errors.

Table 8: Minas Gerais - 2012/2011 - First heterogeneity test

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	0.107***	0.0954***	0.0942***	0.0942***
	(0.00732)	(0.00706)	(0.00705)	(0.0208)
POS	0.0858***	0.0687***	0.0714***	0.0714***
	(0.00678)	(0.00661)	(0.00671)	(0.0159)
COMP	-0.129***	-0.0873***	-0.0793***	-0.0793*
	(0.0206)	(0.0199)	(0.0200)	(0.0468)
POS x LAW OF QUOTAS	-0.207***	-0.181***	-0.177***	-0.177***
	(0.0137)	(0.0132)	(0.0132)	(0.0340)
COMP x LAW OF QUOTAS	0.0917**	0.0404	0.0353	0.0353
	(0.0384)	(0.0368)	(0.0368)	(0.0705)
Observations	107,107	105,065	105,065	105,065
R-squared	0.005	0.008	0.010	0.010
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

The estimated coefficients of table (9) are consistent with that ones observed in the previous regressions. Students from schools with the highest percentage of teachers with post-graduate degrees, about 26% of our base, are less impacted by LQ. Estimates for the variable $COMP1_{ist}$ are not significant in three of the four estimated regressions and therefore does not seem to affect the school choice.

Table 9: Minas Gerais - 2012/2011 - Second heterogeneity test

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	0.0344***	0.0316***	0.0315***	0.0315***
	(0.00397)	(0.00383)	(0.00383)	(0.0117)
POS1	0.0284***	0.0235***	0.0242***	0.0242***
	(0.00245)	(0.00237)	(0.00238)	(0.00703)
COMP1	0.00228	0.00465**	0.00399*	0.00399
	(0.00231)	(0.00224)	(0.00225)	(0.00572)
POS1 x LAW OF QUOTAS	-0.0622***	-0.0576***	-0.0562***	-0.0562***
	(0.00466)	(0.00448)	(0.00447)	(0.0118)
COMP1 x LAW OF QUOTAS	0.00914*	0.00342	0.00326	0.00326
	(0.00498)	(0.00477)	(0.00477)	(0.0106)
Observations	107,107	105,065	105,065	105,065
R-squared	0.003	0.007	0.009	0.009
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

The results presented in this section indicate that students from schools with better quality teaching staff, measured here as the percentage of teachers with post-graduate degrees, are less impacted by the LQ. We did not find consistent results for the infrastructure variable used, number of computers per student[26]. In the hypothesis that the quality of the teaching staff is a valid proxy for school quality, we conclude that the LQ has less impact on the school choice of students who studied the last year of elementary school in higher quality private institutions.

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[26]As noted earlier, in the population of private schools, most schools have all the infrastructure of items present in the school census, therefore we do not have a consistent indicator to evaluate differences in the quality of the infrastructure in these schools.

Robustness

In this section, we will perform two robustness tests. First, we will use a different control group, students enrolled in the 1st grade of private high schools, to estimate the same parameters shown in table (4). Then, we will use as a control and treatment group students enrolled in the 5th and 9th year in private schools, respectively, and who studied the last 3 years also in private schools.

The table below shows the results for the first analysis. Although smaller, the coefficient of interest is positive and statistically significant for the models (1) to (3). In the model (4), the estimated result is no longer significant.

Table 10: Minas Gerais - 2012/2011 - Different control group

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	0.00969***	0.0108***	0.0110***	0.0110
	(0.00319)	(0.00306)	(0.00305)	(0.00747)
Observations	104,939	104,108	104,108	104,108
R-squared	0.006	0.007	0.012	0.012
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

Regarding students who have studied the last 3 years in private school, and, therefore, were not impacted by AA in place before the LQ, we note that the coefficient of interest remains positive and statistically significant at 1%. For this group of students, we estimate a rise in 1.4 percentage points on the probability of migration to public schools, an increase of 28% compared to the migration probability of the treatment group in the period prior to the law.

Table 11: Minas Gerais - 2012/2011 - Second robustness test

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	0.0146***	0.0131***	0.0125***	0.0125*
	(0.00391)	(0.00377)	(0.00376)	(0.00657)
Observations	43,256	43,059	43,059	43,059
R-squared	0.006	0.006	0.010	0.010
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

São Paulo

São Paulo is the Brazilian state with the highest number of students enrolled in the public higher education system. However, 85% of the students are in state or municipal institutions, which are not required to adopt the quotas specified by the LQ. Also, these institutions do not incorporated new AA in 2012. According to PNAD, 88% students enrolled in São Paulo federal universities were born in the state and about 89% live in the state for more than four years.

Historic of Affirmative Actions

Before 2013, 2 of the 3 federal universities in the state, University of São Carlos (UFS-CAR) and Federal University of ABC (UFABC), adopted AA for students from public schools. The beneficiary group was similar to the LQ, students who studied only high school in public institutions, and therefore the LQ does not represent a significant institutional change in the access to public higher education. Two of the three São Paulo state universities, University of São Paulo (USP) and University of Campinas (Unicamp) adopted bonus policies[27]. At Unicamp, the policy is aimed at self-declared black, brown or indigenous students who have completed high school fully in public school. The bonus policy of Unicamp started in 2003 and has not undergone any significant change in 2012. USP implemented a similar bonus policy in 2006, which also did not change in 2012.

The LQ does not represent a significant change in the access to higher education in São Paulo, since most of the seats in the higher education system are in state institutions, which have not changed their bonus policies in 2012. Also, the federal universities in the state already had AA with a beneficiary group similar to the LQ.

Descriptive Statistics

In figure (3), we observe the average probability of migration to public institutions in the period before and after the LQ. We see that the trends are parallel in the period prior to the LQ and that there is no significant change in the period immediately after the implementation of the Law.

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[27]In the bonus policies, benefit applicants receive an increase in their grade on the entrance exam, unlike quota policies in which there is an explicit reservation of seats for a certain benefitiary group.

Figure 3: Average probability of migration to public school by cohort - São Paulo
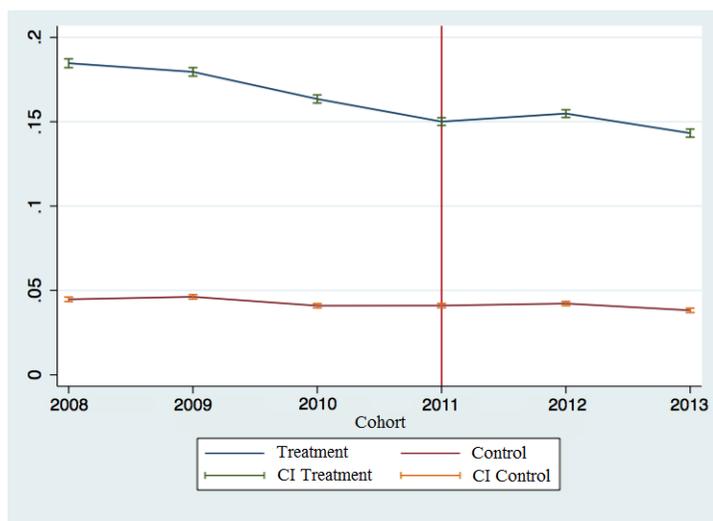
In the table below the mean tests are presented. We note that none of the analyzed variables vary significantly from 2011 to 2012, for both treatment and control cohorts.

Table 12: Mean tests for socioeconomic characteristics by cohorts - São Paulo

	Treatment			
	2011	2012	Difference	p-value
Per capita Income	1635,38	1745,42	110,03	0,61
# of people in the family	3,85	4,07	0,21	0,14
Years of study of R.P*	15,50	15,38	-0,12	0,58
	Control			
	2011	2012	Difference	p-value
Per capita Income	1573,21	1691,60	118,38	0,68
# of people in the family	3,91	3,82	0,97	0,48
Years of study of R.P	15,61	15,47	-0,19	0,30

Results

The estimated parameters indicate that the LQ had an impact of only 0.3 percentage points on the migration probability to public schools, statistically significant at 10%. The result is six times lower than in Minas Gerais and represents a rise of only 2% in the average probability of migration of the treated cohort. This result is consistent with the difference in the role of federal universities in each state and the degree of change that the LQ represent in the access to higher education.

The estimated impact of the LQ is slightly higher when we add the control variables and municipal characteristics, and is no longer statistically significant when we cluster the error for year and school.

Table 13: São Paulo - 2012/2011

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	0.00352*	0.00425**	0.00433**	0.00433
	(0.00187)	(0.00211)	(0.00211)	(0.00587)
Observations	388,009	317,819	317,819	317,819
R-squared	0.035	0.037	0.038	0.038
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

When analyzing the period after the implementation of the LQ, we find a reverse impact, but also extremely low. Although statistically significant at 1%, we see a reduction in the migration probability of approximately 0.7 percentage points. By including clustered errors, the estimated parameter is not statistically significant.

Table 14: São Paulo - 2013/2012

	(1)	(2)	(3)
LAW OF QUOTAS	-0.00753***	-0.00772***	-0.00772
	(0.00193)	(0.00193)	(0.00496)
Observations	360,126	360,126	360,126
R-squared	0.035	0.039	0.039
Municipality Characteristics		YES	
Cluster - School and Year		YES	YES

Robust standard errors in parentheses

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

Robustness

For São Paulo, we will hold only one robustness test using as control group students enrolled in 2011 and 2012 in the 1st year of high school. In this case, the estimated impact is only -0.1 percentage points and statistically equal to zero for all estimated regressions.

Table 15: São Paulo - 2012/2011 - Different control group

	(1)	(2)	(3)	(4)
LAW OF QUOTAS	-0.00143	-0.000623	-0.00117	-0.00117
	(0.00198)	(0.00222)	(0.00222)	(0.00544)
Observations	359,360	298,799	298,799	298,799
R-squared	0.025	0.027	0.029	0.029
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

We note that in the state of São Paulo, the LQ does not represent a significant change in access to higher education. The estimated regressions indicate that the law had no impact on the school choice of students enrolled in the final year of private elementary schools.

Conclusion

By establishing that 50% of the seats in all federal universities should be reserved for students who studied high school fully in public schools, the LQ creates an incentive for students enrolled in the final year of private elementary schools to migrate to public institutions in the first year of high school.

Building on a Diff-Diff regression, we found that in Minas Gerais, state where the law represents a significant institutional change in the access to public higher education, the migration probability to public schools of students enrolled in the final year of elementary school increases by about 1.8 percentage points, a 24% increase compared to the period before the Law. In São Paulo, where the law does not represent a significant institutional change, the estimated increase is only 3%. Robustness tests performed indicate that the results are consistent using a second control group.

We also observed that, in Minas Gerais, students from higher quality private schools, measured as the percentage of teachers who have post-graduate degree in the school of these students, are less impacted by Law.

The results in this essay goes in line with the literature that analyzes the impact of color-blind affirmative actions on school choice as Estevan et al. (2012) and Cullen et al. (2013). We conclude that the implementation of AA that benefit a specific group of schools in the access to higher education can lead to strategic behavior in the students school choice.

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Appendix

Table A1 - Minas Gerais - 2012/2011

VARIABLES	(1)	(2)	(3)	(4)
YEAR	0.00545**	0.00689***	0.00844***	0.00844
	(0.00248)	(0.00244)	(0.00247)	(0.00865)
TREATMENT	-0.0166***	-0.0117***	-0.0115***	-0.0115*
	(0.00238)	(0.00229)	(0.00229)	(0.00662)
LAW OF QUOTAS	0.0211***	0.0179***	0.0182***	0.0182*
	(0.00351)	(0.00338)	(0.00338)	(0.0103)
IDEB		-0.000928	-0.0104***	-0.0104
		(0.00250)	(0.00316)	(0.0120)
PRIVATE SCHOOL OFFER		-0.0528***	-0.0356***	-0.0356***
		(0.00264)	(0.00326)	(0.0114)
INCOME INEQUALITY			-0.193***	-0.193
			(0.0536)	(0.193)
POVERTY			0.000480	0.000480
			(0.000560)	(0.00189)
PER CAPITA INCOME			-2.68e-05*	-2.68e-05
			(1.41e-05)	(5.29e-05)
EDUCATIONAL IDHM			-0.0529*	-0.0529
			(0.0298)	(0.129)
Constant	0.0914***	0.122***	0.304***	0.304**
	(0.00173)	(0.0114)	(0.0295)	(0.119)
Observations	107,107	105,065	105,065	105,065
R-squared	0.001	0.005	0.007	0.007
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

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

Table A2 - Third Difference - Minas Gerais - 2012/2011|2010/2011

VARIABLES	(1)	(2)	(3)	(4)
TREATMENT	-0.0263***	-0.0266***	-0.0237***	-0.0237***
	(0.00245)	(0.00246)	(0.00245)	(0.00540)
YEAR	-0.00822***	-0.00934***	-0.00798***	-0.00798
	(0.00251)	(0.00254)	(0.00254)	(0.00650)
LAW OF QUOTAS	0.00960***	0.00969***	0.00992***	0.00992
	(0.00342)	(0.00342)	(0.00340)	(0.00768)
PLACEBO	-0.00822***	-0.00818***	-0.00817***	-0.00817
	(0.00251)	(0.00252)	(0.00250)	(0.00568)
PLACEBO X TREAT.	0.00960***	0.00962***	0.00983***	0.00983
	(0.00342)	(0.00343)	(0.00340)	(0.00686)
PLACEBO. X TREAT	0.0137***	0.0135***	0.0133***	0.0133
	(0.00353)	(0.00354)	(0.00351)	(0.00833)
THIRD DIFFERENCE	0.0115**	0.0118**	0.0119**	0.0119
	(0.00490)	(0.00491)	(0.00487)	(0.0103)
IDEB		0.00475**	-0.00239	-0.00239
		(0.00191)	(0.00234)	(0.00598)
INCOME INEQUALITY			-0.653***	-0.653***
			(0.0377)	(0.0948)
POVERTY			0.00676***	0.00676***
			(0.000416)	(0.00103)
PER CAPITA INCOME			7.37e-05***	7.37e-05***
			(9.77e-06)	(2.54e-05)
EDUCATIONAL IDHM			-0.189***	-0.189***
			(0.0207)	(0.0564)
Constant	0.0997***	0.0789***	0.468***	0.468***
	(0.00182)	(0.00861)	(0.0210)	(0.0571)
Observations	212,852	212,636	212,636	212,636
R-squared	0.001	0.002	0.016	0.016
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

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

Table A3 - Minas Gerais - 2013/2012

VARIABLES	(1)	(2)	(3)
YEAR	-0.00737***	-0.00706***	-0.00706
	(0.00246)	(0.00245)	(0.00608)
TREATMENT	0.00443*	0.00829***	0.00829
	(0.00258)	(0.00257)	(0.00564)
LAW OF QUOTAS	0.0127***	0.0111***	0.0111
	(0.00364)	(0.00360)	(0.00801)
INCOME INEQUALITY		-0.730***	-0.730***
		(0.0538)	(0.128)
POVERTY		0.00850***	0.00850***
		(0.000584)	(0.00140)
PER CAPITA INCOME		7.61e-05***	7.61e-05**
		(1.39e-05)	(3.52e-05)
EDUCATIONAL IDHM		-0.202***	-0.202**
		(0.0302)	(0.0821)
Constant	0.0969***	0.486***	0.486***
	(0.00178)	(0.0240)	(0.0632)
Observations	107,718	107,718	107,718
R-squared	0.000	0.019	0.019
Municipality Characteristics		YES	YES
Cluster - School and Year			YES

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

Table A4 - Minas Gerais - 2012/2011 - Different control group

VARIABLES	(1)	(2)	(3)	(4)
YEAR	0.0168***	0.0132***	0.0149***	0.0149***
	(0.00199)	(0.00195)	(0.00198)	(0.00321)
TREATMENT	0.0271***	0.0245***	0.0247***	0.0247***
	(0.00210)	(0.00202)	(0.00202)	(0.00503)
LAW OF QUOTAS	0.00969***	0.0108***	0.0110***	0.0110
	(0.00319)	(0.00306)	(0.00305)	(0.00747)
IDEB		0.00285	-0.00622**	-0.00622
		(0.00226)	(0.00289)	(0.00559)
PRIVATE SCHOOL OFFER		-0.0351***	-0.0234***	-0.0234***
		(0.00238)	(0.00286)	(0.00535)
INCOME INEQUALITY			-0.283***	-0.283***
			(0.0473)	(0.0876)
POVERTY			0.00161***	0.00161
			(0.000556)	(0.001000)
PER CAPITA INCOME			-7.12e-06	-7.12e-06
			(1.28e-05)	(2.53e-05)
EDUCATIONAL IDHM			-0.164***	-0.164**
			(0.0256)	(0.0663)
Constant	0.0477***	0.0564***	0.340***	0.340***
	(0.00132)	(0.0103)	(0.0267)	(0.0591)
Observations	104,939	104,108	104,108	104,108
R-squared	0.006	0.007	0.012	0.012
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

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

Table A5 - Minas Gerais - 2012/2011 - First heterogeneity test

VARIABLES	(1)	(2)	(3)	(4)
YEAR	0.00816***	0.00873***	0.0108***	0.0108
	(0.00247)	(0.00243)	(0.00246)	(0.00867)
TREATMENT	-0.0148***	-0.0104***	-0.0102***	-0.0102
	(0.00237)	(0.00228)	(0.00228)	(0.00658)
LAW OF QUOTAS	0.107***	0.0954***	0.0942***	0.0942***
	(0.00732)	(0.00706)	(0.00705)	(0.0208)
IDEB		-4.06e-05	-0.0115***	-0.0115
		(0.00250)	(0.00314)	(0.0119)
PRIVATE SCHOOL OFFER		-0.0521***	-0.0372***	-0.0372***
		(0.00264)	(0.00319)	(0.0112)
INCOME INEQUALITY			-0.206***	-0.206
			(0.0505)	(0.187)
POVERTY			0.000374	0.000374
			(0.000544)	(0.00185)
PER CAPITA INCOME			-2.46e-05*	-2.46e-05
			(1.33e-05)	(5.09e-05)
EDUCATIONAL IDHM			-0.0304	-0.0304
			(0.0295)	(0.128)
POS	0.0858***	0.0687***	0.0714***	0.0714***
	(0.00678)	(0.00661)	(0.00671)	(0.0159)
COMP	-0.129***	-0.0873***	-0.0793***	-0.0793*
	(0.0206)	(0.0199)	(0.0200)	(0.0468)
POSxLQ	-0.207***	-0.181***	-0.177***	-0.177***
	(0.0137)	(0.0132)	(0.0132)	(0.0340)
COMPxLQ	0.0917**	0.0404	0.0353	0.0353
	(0.0384)	(0.0368)	(0.0368)	(0.0705)
Constant	0.0554***	0.0882***	0.272***	0.272**
	(0.00345)	(0.0114)	(0.0294)	(0.118)
Observations	107,107	105,065	105,065	105,065
R-squared	0.005	0.008	0.010	0.010
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

Robust standard errors in parentheses

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

Table A6 - Minas Gerais - 2012/2011 - Second heterogeneity test

VARIABLES	(1)	(2)	(3)	(4)
YEAR	0.00542**	0.00696***	0.00883***	0.00883
	(0.00248)	(0.00244)	(0.00246)	(0.00866)
TREATMENT	-0.0166***	-0.0117***	-0.0115***	-0.0115*
	(0.00238)	(0.00229)	(0.00229)	(0.00659)
LAW OF QUOTAS	0.0344***	0.0316***	0.0315***	0.0315***
	(0.00397)	(0.00383)	(0.00383)	(0.0117)
IDEB		-0.00182	-0.0129***	-0.0129
		(0.00252)	(0.00315)	(0.0119)
PRIVATE SCHOOL OFFER		-0.0526***	-0.0377***	-0.0377***
		(0.00264)	(0.00319)	(0.0113)
INCOME INEQUALITY			-0.210***	-0.210
			(0.0501)	(0.186)
POVERTY			0.000542	0.000542
			(0.000543)	(0.00185)
PER CAPITA INCOME			-2.03e-05	-2.03e-05
			(1.33e-05)	(5.08e-05)
EDUCATIONAL IDHM			-0.0373	-0.0373
			(0.0294)	(0.128)
POS1	0.0284***	0.0235***	0.0242***	0.0242***
	(0.00245)	(0.00237)	(0.00238)	(0.00703)
COMP1	0.00228	0.00465**	0.00399*	0.00399
	(0.00231)	(0.00224)	(0.00225)	(0.00572)
POS1xLQ	-0.0622***	-0.0576***	-0.0562***	-0.0562***
	(0.00466)	(0.00448)	(0.00447)	(0.0118)
COMP1xLQ	0.00914*	0.00342	0.00326	0.00326
	(0.00498)	(0.00477)	(0.00477)	(0.0106)
Constant	0.0838***	0.119***	0.305***	0.305***
	(0.00183)	(0.0114)	(0.0294)	(0.118)
Observations	107,107	105,065	105,065	105,065
R-squared	0.003	0.007	0.009	0.009
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

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

Table A7 - São Paulo - 2012/2011

VARIABLES	(1)	(2)	(3)	(4)
YEAR	0.00122	0.00161	3.59e-06	3.59e-06
	(0.000902)	(0.00109)	(0.00118)	(0.00319)
TREATMENT	0.109***	0.108***	0.109***	0.109***
	(0.00132)	(0.00131)	(0.00132)	(0.00370)
LAW OF QUOTAS	0.00352*	0.00425**	0.00433**	0.00433
	(0.00187)	(0.00211)	(0.00211)	(0.00587)
IDEB		-0.00902***	-0.00797***	-0.00797
		(0.00167)	(0.00207)	(0.00614)
PRIVATE SCHOOL OFFER		-0.0377***	-0.0310***	-0.0310***
		(0.00138)	(0.00149)	(0.00379)
INCOME INEQUALITY			-0.362***	-0.362***
			(0.0253)	(0.0701)
POVERTY			0.00657***	0.00657***
			(0.000511)	(0.00145)
PER CAPITA INCOME			3.73e-05***	3.73e-05**
			(5.29e-06)	(1.48e-05)
EDUCATIONAL IDHM			0.161***	0.161**
			(0.0221)	(0.0630)
Constant	0.0410***	0.110***	0.101***	0.101*
	(0.000639)	(0.00748)	(0.0208)	(0.0595)
Observations	388,009	317,819	317,819	317,819
R-squared	0.035	0.037	0.038	0.038
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

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

Table A8 - São Paulo - 2013/2012

VARIABLES	(1)	(2)	(3)
YEAR	-0.00404***	-0.00352***	-0.00352
	(0.000920)	(0.000925)	(0.00216)
TREATMENT	0.113***	0.113***	0.113***
	(0.00133)	(0.00133)	(0.00357)
LAW OF QUOTAS	-0.00753***	-0.00772***	-0.00772
	(0.00193)	(0.00193)	(0.00496)
INCOME INEQUALITY		-0.437***	-0.437***
		(0.0267)	(0.0691)
POVERTY		0.0104***	0.0104***
		(0.000525)	(0.00136)
PER CAPITA INCOME		3.77e-05***	3.77e-05***
		(5.52e-06)	(1.44e-05)
EDUCATIONAL IDHM		0.131***	0.131**
		(0.0248)	(0.0623)
Constant	0.0422***	0.0897***	0.0897*
	(0.000637)	(0.0194)	(0.0467)
Observations	360,126	360,126	360,126
R-squared	0.035	0.039	0.039
Municipality Characteristics	YES	YES	
Cluster - School and Year			YES

Robust standard errors in parentheses

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

Table A9 - São Paulo - 2012/2011 - Different control group

VARIABLES	(1)	(2)	(3)	(4)
YEAR	0.00618***	0.00657***	0.00544***	0.00544*
	(0.00111)	(0.00128)	(0.00135)	(0.00282)
TREATMENT	0.0984***	0.0973***	0.0971***	0.0971***
	(0.00139)	(0.00138)	(0.00138)	(0.00368)
LAW OF QUOTAS	-0.00143	-0.000623	-0.00117	-0.00117
	(0.00198)	(0.00222)	(0.00222)	(0.00544)
IDEB		-0.00796***	-0.0102***	-0.0102*
		(0.00175)	(0.00211)	(0.00584)
PRIVATE SCHOOL OFFER		-0.0352***	-0.0273***	-0.0273***
		(0.00141)	(0.00149)	(0.00363)
INCOME INEQUALITY			-0.479***	-0.479***
			(0.0261)	(0.0691)
POVERTY			0.00742***	0.00742***
			(0.000544)	(0.00144)
PER CAPITA INCOME			3.90e-05***	3.90e-05***
			(5.41e-06)	(1.45e-05)
EDUCATIONAL IDHM			0.216***	0.216***
			(0.0233)	(0.0622)
Constant	0.0517***	0.114***	0.134***	0.134**
	(0.000774)	(0.00788)	(0.0214)	(0.0581)
Observations	359,360	298,799	298,799	298,799
R-squared	0.025	0.027	0.029	0.029
Control Variables		YES	YES	YES
Municipality Characteristics			YES	YES
Cluster - School and Year				YES

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