

Do Affirmative Actions for access to higher education stimulate minority entrepreneurship? An empirical analysis of a policy adopted at a University in Northeast Brazil

Ações Afirmativas para acesso ao ensino superior estimulam o empreendedorismo de minorias? Uma análise empírica de uma política adotada em uma universidade do Nordeste do Brasil

¿Las Acciones Afirmativas para el acceso a la educación superior estimulan el emprendimiento de minorías? Un análisis empírico de una política adoptada en una universidad del Nordeste de Brasil

Grupo temático 12 - Avaliação de Políticas Públicas

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ABSTRACT

This study examines the impact of an Affirmative Action policy, involving an additional admission score in the admission of high school graduates from public schools, on individuals' likelihood of starting a new business. Focusing on an elite university in Brazil's impoverished region, we employ the Regression Discontinuity Design (RDD) method and leverage a comprehensive dataset from three sources: candidates' database at the Federal University of Rio Grande do Norte (UFRN) from 2010 to 2012; data on company openings and partnerships from the Brazilian Federal Revenue until 2021 (covering UFRN enrollment and up to five years post-graduation); and the RAIS dataset from the Brazilian Ministry of Labor and Employment. Comparing candidates on the margin of attending or not attending this elite university, we find no statistically significant effects on entrepreneurial activity. However, we observe that candidates admitted through Affirmative Action, particularly males, experience an increase in education years and a higher probability of completing college compared to those from the same group with insufficient entrance scores. This suggests that academic training generates opportunities for formal employment, thereby increasing the opportunity cost of pursuing entrepreneurship.

Keywords: Affirmative Actions. Bonus. Minority Entrepreneurship. Access to the University. Entrepreneurial Behavior.

RESUMO

Este estudo examina o efeito de uma política de Ação Afirmativa, que aplicava uma pontuação adicional (bônus) na admissão de egressos de escolas públicas, na probabilidade de indivíduos iniciarem um novo negócio. Focando em uma universidade de destaque em uma região empobrecida do Brasil, empregamos o método de Desenho de Regressão com Descontinuidade (RDD) e utilizamos um conjunto abrangente de dados de três fontes: dados administrativos sobre candidaturas à Universidade Federal do Rio Grande do Norte (UFRN), nos processos de admissão de 2010 a 2012; dados sobre abertura de empresas e sociedade da Receita Federal do Brasil até 2021 (cobrindo o período de matrícula na UFRN e até cinco anos após a graduação); e o conjunto de dados da RAIS do Ministério do Trabalho e Emprego do Brasil. Comparando candidatos marginalmente acima e marginalmente abaixo da nota de corte para frequentar a UFRN, não encontramos efeitos estatisticamente significativos na atividade empreendedora. No entanto, observamos que os candidatos admitidos por meio da Ação Afirmativa,

particularmente os do sexo masculino, apresentam um aumento nos anos de escolaridade e uma maior probabilidade de concluir o ensino superior em comparação com aqueles do mesmo grupo com pontuações insuficientes para a entrada. Isso sugere que a formação acadêmica pode gerar oportunidades de emprego formal, aumentando assim o custo de oportunidade de seguir o empreendedorismo.

Palavras-chave: Ações Afirmativas. Bônus. Empreendedorismo de Minorias. Acesso à Universidade. Comportamento Empreendedor.

RESUMEN

Este estudio examina el efecto de una política de Acción Afirmativa que otorgaba una puntuación adicional (bonificación) en el proceso de admisión a egresados de escuelas públicas, sobre la probabilidad de que los individuos inicien un nuevo negocio. Centrándonos en una universidad destacada en una región empobrecida de Brasil, empleamos el método de Diseño de Regresión Discontinua (RDD) y utilizamos un conjunto integral de datos provenientes de tres fuentes: datos administrativos sobre postulaciones a la Universidad Federal de Rio Grande do Norte (UFRN), en los procesos de admisión de 2010 a 2012; datos sobre apertura de empresas y participación societaria de la Receita Federal do Brasil hasta 2021 (cubriendo el período de matrícula en la UFRN y hasta cinco años después de la graduación); y el conjunto de datos de la RAIS del Ministerio de Trabajo y Empleo de Brasil. Al comparar a los candidatos marginalmente por encima y marginalmente por debajo del puntaje de corte para ingresar a la UFRN, no encontramos efectos estadísticamente significativos en la actividad emprendedora. Sin embargo, observamos que los candidatos admitidos mediante la Acción Afirmativa, particularmente los hombres, presentan un aumento en los años de escolaridad y una mayor probabilidad de completar la educación superior en comparación con aquellos del mismo grupo con puntajes insuficientes para el ingreso. Esto sugiere que la formación académica puede generar oportunidades de empleo formal, aumentando así el costo de oportunidad de dedicarse al emprendimiento.

Palabras clave: Acciones Afirmativas. Bonificación. Emprendimiento de Minorías. Acceso a la Universidad. Comportamiento Emprendedor.

1. Introduction

Entrepreneurship is important for economic growth, especially in developing countries (Castellanza, 2020; Kimmitt et al., 2020; Urbano & Alvarez, 2014). In recent years, factors that stimulate the intention to undertake a business have been the subject of many studies, from a behavioral, economic, and/or sociocultural perspective (Lerner & Malmendier, 2013; Markussen & Røed, 2017; Meoli et al., 2020). However, they have focused mainly on the use of empirical data from developed countries, with the literature being scarce on emerging countries, such as Brazil, Russia, India, China, and South Africa (Bruton et al., 2021; Foo et al., 2020) despite the increase in entrepreneurship in these countries (Foo et al., 2020).

What are the basic conditions to undertake a business in emerging markets? Factors such as training and the intersection of family income (Carvalho et al., 2022), innovation policies (Foo et al., 2020), access to credit and financing (Singh et al., 2022), intergroup contact (Wu et al., 2021), and affirmative actions (AA) have been shown to encourage entry into entrepreneurial activity by historically disadvantaged social groups (Fairlie & Marion, 2012). These basic conditions are fundamental to increasing the representation of minority groups in entrepreneurship, such as the poor (Lee et al., 2019; Shelton & Minniti, 2018), blacks (Deskins & Ross, 2018), women (Naldi et al., 2019; Vracheva & Stoyneva, 2020) and migrants (Verver et al., 2019).

Although not widely studied, the limited educational opportunity of these groups may restrict them from opening their own business (Liu et al., 2019; Thomas, 2009). The human capital obtained through education is a strong driver of entrepreneurship (Dilli & Westerhuis, 2018; Margaça et al., 2020), especially for those holding a higher education degree (Margaça et al., 2020; Millan et al., 2014) or enrolled in a higher education course (Meoli et al., 2020). On the other hand, higher education can promote access to careers with high salaries, discouraging entry into entrepreneurial activity (Liu et al., 2019; Thomas, 2009).

Despite previous research has advanced considerably our understanding of the impact of higher education on entrepreneurial behavior, the results are not consensual and there is still a gap about its effect on those benefiting from AA policies (Fairlie & Marion, 2012; Marion, 2017). The entrepreneurial behavior of groups with minority status (public school graduates, women, poor, black, or indigenous, for example) is of political importance in many developing nations (Urbano & Alvarez, 2014) being of interest, especially in Brazil, given the role of entrepreneurship in generating employment and livelihood in this country (Castellanza, 2020; Kimmitt et al., 2020), where a significant portion of the population lives below the poverty line and for whom entrepreneurship might be the only way to access income. Therefore, this paper contributes to the literature that discusses the effect of attending a university, with AA, on the entrepreneurship of minority groups.

In this article, we analyze the effect of an affirmative action policy implemented in a Brazilian federal university. The admission policy in this university, as in most universities of the country, was solely based on grades obtained in an entrance exam. The affirmative action policy added a 10% bonus to the grade of candidates that attended public high schools. The policy was implemented in 2009 and lasted until 2012. To perform the analysis, we constructed a unique dataset by merging three different Brazilian databases. The first one consists of the data of all candidates for admission to the university that took the entrance tests between 2010 and 2012; the second is the Brazilian official registry of formal workers for 2017; and the third contains open data from the Federal Revenue on the opening and corporate structure of Brazilian companies, covering the period from 2010 to 2021. The Regression Discontinuity Design (RDD) technique was used to verify whether the affirmative action policy encouraged participation in entrepreneurial activity by the benefited candidates who gained access to the university only because of the policy to those of the same socio and demographic status but whose grades were not enough to place them among the selected students.

In summary, no statistically significant effects of becoming an entrepreneur were found when comparing minority candidates on the margin of attending or not this elite university. However, candidates, specifically males, who entered university because of the affirmative action policy had an increase in years of education and in the probability of completing college, compared to candidates of the same group, but whose entrance scores were not enough to guarantee their admission. So, academic training can generate prospects for formal employment, increasing the opportunity cost of entrepreneurship as stated in Fairlie and Marion (2012).

The remaining sections of this article are organized as follows: the second section presents a literature review; the third section describes the data and method; the fourth section presents the results; the fifth section presents a discussion of the results, and the sixth section has the final considerations.

2. Theoretical Background

2.1 Affirmative Actions and Minority Group Entrepreneurship

Given the role of entrepreneurial activity as a source of employment, as well as a channel for socioeconomic mobility, developing nations encourage entrepreneurial behavior of underrepresented individuals through different subsidies (Foo et al., 2020) such as access to finance (Singh et al., 2022), for hiring minority (including women's) companies (Fairlie & Marion, 2012; Marion, 2017), and to access higher education and qualification (Cunningham & Menter, 2021).

Researchers argue that the adversities faced by nascent entrepreneurs who belong to economically disadvantaged and minority groups require affirmative actions of different natures (Cunningham & Menter, 2021; Fairlie & Marion, 2012; Marion, 2017). It is necessary to reduce inequalities in entrepreneurship rates and, therefore, help to overcome the social, financial, and even personal limits imposed on the entrepreneurial initiatives of these groups (Deskins & Ross, 2018; Shelton & Minniti, 2018).

Literature on the impact of certain affirmative actions on the development of entrepreneurship is still incipient (Fairlie & Marion, 2012; Chatterji et al., 2014; Marion, 2017). In addition to this scarcity, the effects of affirmative action on the entrepreneurial behavior of minorities and the survival of companies are not treated separately, a fact that hampers discussions and broader analysis (Marion, 2017).

Companies that are owned by minority members are usually located in areas that concentrate a minority public of the same profile, a fact that can generate eventual segregation, inhibit the possibility of establishing partnerships

and networking with other entrepreneurs, as well as causing low survival rates for enterprises (Marion, 2009; Bates et al., 2018).

In California, an affirmative action program sought to encourage businesses belonging to blacks, Asians, and women in the road construction sector, encouraging state-funded hiring and government incentives. Evaluation of this program identified a growth in establishments belonging to these groups, mainly to black people (Marion, 2009, 2011), the emergence of new construction companies owned by them, and a significant increase in purchases at minority group companies (Marion, 2009, 2011).

The effect of a specific affirmative action on entrepreneurship depends on the purpose of the policy and the context in which it was implemented (Deskins & Ross, 2018; Marion, 2017). An affirmative action instituted with an objective different from boosting entrepreneurship may have an impact on business opening rates. This may be the case with educational policies, the object of this research. Another case would be that of policies to encourage traditional work since individuals can become more involved in entrepreneurial activity by benefiting from a hiring policy for formal jobs (Chatterji et al., 2014). However, policies aimed at hiring minority groups in traditional jobs may have divergent results (Chatterji et al., 2014; Fairlie & Marion, 2012). The hypothesis that the opportunity cost of opening new ventures decreases as hiring opportunities for traditional jobs are reduced is supported by Fairlie and Marion (2012), but this hypothesis was not confirmed by the research of Chatterji et al. (2014).

The elimination of affirmative action programs for access to employment for historically disadvantaged groups in California and Washington has led to a modest increase in the rate of self-employment among women and minorities (Fairlie & Marion, 2012). In contrast, after the implementation of affirmative action programs to encourage hiring for traditional jobs, in some US cities, there was an increase in entrepreneurship rates among minority groups, relative to white individuals (Chatterji et al., 2014).

The implementation of some affirmative actions can have a dual effect, constituting a motivating (Chatterji et al., 2014; Marion, 2011) or an inhibitor factor of entrepreneurship (Fairlie & Marion, 2012). It is also noteworthy that it is possible for minority entrepreneurs, benefiting from affirmative actions, to hire or associate with individuals who are also from the same group, an interesting fact for public policymakers since the incentive for the growth of companies led by disadvantaged people can reduce the unemployment rate of other individuals belonging to the same minority category (Deskins & Ross, 2018).

In summary, the research identified in the literature indicates that affirmative action for accessing minorities to the labor market influences the opportunity cost of starting a business (Chatterji et al., 2014; Fairlie & Marion, 2012). In addition, AA helps minority-owned companies survive (Deskins & Ross, 2018; Marion, 2009, 2017). However, none of the consulted studies analyzed how AA for access to higher education influences the entrepreneurial behavior of beneficiary individuals. This research seeks to fill this gap.

2.2 The Influence of Higher Education on Entrepreneurial Behavior

One of the first studies to discuss the relationship between education and the decision to become self-employed by minorities in the USA was the work of Thomas (2009). He identified that men were more likely to undertake a business and that financial resources and having entrepreneurial parents were the factors that most positively affected this propensity. However, he also pointed out that academic success reduced the probability of an individual aspiring to have a business since they would tend to seek better opportunities in other occupations, as well as would wish to obtain more education and experience before starting a business. Young aspiring entrepreneurs would not recognize the importance of a university education in starting and succeeding in a business.

Further studies report mixed results of higher education on starting a business, whereas there may be a positive (Dilli & Westerhuis, 2018; Millan et al., 2014; Piva & Rovelli, 2021) or negative relationship (Liu et al., 2019; Thomas, 2009). The association between entrepreneurship and education can be mediated by the types of businesses, so the higher the educational attainment, the greater the involvement with entrepreneurial activity in high-growth fields, which require high levels of skill. In contrast, fields that require low skill levels and are in low-growth sectors are negatively related to higher educational attainment (Liu et al., 2019; Thomas, 2009).

The research by Liu et al. (2019) corroborates that of Thomas (2009) by identifying that participation in continuing education in Taiwan did not significantly correlate with youth entrepreneurship. They show that young entrepreneurs tend not to participate in continuing education, citing reasons such as "lack of time" and "lack of necessary courses". In addition, they found that most black entrepreneurs select business niches that offer a low barrier to entry, that is, they seek to operate in low-growth, unprofitable sectors, in agreement with Bates et al. (2018).

The value of entrepreneurship education was also studied by Millan et al. (2014), who sought to estimate whether an individual's propensity to undertake a business was related to their level of education and the population's education level. They found a significantly positive relationship between years of education of both the individual and the population, and the success of a business, including business survival and the likelihood of hiring and retaining employers for a longer period.

Therefore, the findings of the study by Millan et al. (2014) imply that entrepreneurship and higher education access policies should be considered together. In this same perspective, Dilli and Westerhuis (2018) and Sharma (2021) highlight that educational opportunities can eliminate gender disparities in innovative entrepreneurial activities.

Dilli and Westerhuis (2018) examined the role of higher education choice in subjects such as Science, Technology, Engineering, and Mathematics (STEM) in promoting entrepreneurial activity. With data from the Global Entrepreneurship Monitor (GEM), the survey results showed that countries with greater gender equality in science education have higher rates of entrepreneurial activity in sectors intensive in these areas of knowledge.

In this context, Piva and Rovelli (2021) sought to identify factors that reduce gender inequality in entrepreneurship. They investigated the relationship between university education in fields such as STEM and the entry of female and male recent graduates into entrepreneurship. The results showed that training in economics and management reduces the gender imbalance in entrepreneurship among recent graduates. However, inequality is greater among graduates who attended courses with students from fields other than STEM, a fact associated with the peer effect on the propensity to undertake a business (Lerner & Malmendier, 2013; Markussen & Røed, 2017).

In short, the evidence is twofold. On the one hand, attending university encourages teaching, research, and innovation, generating an overflow of knowledge and efforts to promote entrepreneurship among academics (Cunningham & Menter, 2021; Lehmann et al., 2020). On the other hand, increasing the training possibilities (Liu et al., 2019; Thomas, 2009) and possibly, as a consequence, employability, can raise the opportunity cost of minority entrepreneurship (Fairlie & Marion, 2012).

Although affirmative action for access to higher education is widely recognized as a key variable for generating positive results, both academically and in the labor market, no study has investigated the effects of AA on entrepreneurial behavior in the context of an emerging country such as Brazil. Thus, to contribute to this gap, this research used an empirical method of high reliability to estimate the treatment effects of an affirmative action policy on admission to a university on the propensity of starting a business, as will be presented in the next section.

3. Data and Method

3.1 Context of the UFRN Bonus Policy

The Federal University of Rio Grande do Norte (UFRN) is a public institution located in the state of Rio Grande do Norte, which is part of the Brazilian Northeast Region. This region has the highest poverty rate in the country. Until 2012, students were admitted annually based on their scores in a local entrance test, which has since been replaced by a national one. In 2006, a policy was implemented to benefit students who attended public elementary and high schools. This policy consisted of a bonus added to their entrance exam score. Until 2009, the bonus varied depending on the chosen course and only a small number of students benefited from it. From 2010 to 2011, the bonus was standardized at an additional 10% of the entrance exam score for students who attended the last three years of elementary school (grades 7 to 9) and all three years of high school in the public school system. In 2012, the requirement for attending public school was extended to include grades 2 to 9. In our work, we analyze the effect of this standardized bonus and extended requirement on the future likelihood of starting a business.

We divided the students into five categories: 1) those who did not apply to have the bonus (Nonapplicants); 2) those who applied but were considered not eligible (Ineligible applicants); 3) those who were eligible but even with the bonus were not approved in the entrance test (Eligible unapproved applicants); 4) those who received the bonus and were approved but would have been approved even without the bonus (Eligible approved non-binding applicants); and, 5) those who were only approved due to the bonus (Eligible approved binding applicants).

As previously discussed, the time frame of 2010 to 2012 was chosen, because since 2006, the year of implementation of the bonus policy, the eligibility criteria changed over the years, becoming more standardized from 2010 onward when it also began to benefit a relatively significant number of students.

3.2 Data

The data set for the study was obtained by merging three databases based on individuals' national registry numbers, the "Cadastro de Pessoas Físicas" (CPF). The first database contains personal, socioeconomic, and academic information collected at the admission exam for UFRN between 2010 and 2012 (gender, race, age, income, course, score in the entrance test, and school origin). The second data registers the opening of businesses and partnerships in Brazilian companies made public by the "Receita Federal" (the Brazilian Internal Revenue Service). The third database encompasses labor market information available at "Relação Anual de Informações Sociais" (RAIS 2017) from the "Ministério do Trabalho e Emprego" (Ministry of Labor and Employment). Unfortunately, the dataset does not contain information on informal entrepreneurship, since the data cover only the formal sector.

Table 1 presents the descriptive statistics for the complete sample of candidates for the UFRN Entrance Exam, between 2010 and 2012.

Table 1 Descriptive Statistics for Candidates for the UFRN Entrance Exam between 2010 – 2012

	Nonapplicants		Ineligible applicants		Eligible unapproved applicants		Eligible approved non-binding applicants		Eligible approved binding applicants	
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Demographic characteristics										
<i>Gender Female</i>	0.535	0.498	0.555	0.496	0.665	0.472	0.515	0.499	0.516	0.499
<i>Age (Years old)</i>	21.42	6.32	19.69	4.48	20.36	5.65	20.28	5.24	21.34	6.51
<i>Married</i>	0.045	0.207	0.077	0.266	0.061	0.241	0.069	0.254	0.055	0.229
<i>BBI</i>	0.395	0.488	0.504	0.500	0.529	0.499	0.505	0.500	0.492	0.500
<i>White</i>	0.595	0.490	0.483	0.499	0.458	0.498	0.486	0.499	0.502	0.500
<i>Preparatory course</i>	0.520	0.499	0.436	0.495	0.432	0.495	0.483	0.499	0.475	0.499
<i>Mother college completion</i>	0.236	0.424	0.083	0.276	0.047	0.213	0.055	0.228	0.055	0.228
<i>Father college completion</i>	0.197	0.397	0.053	0.224	0.020	0.141	0.027	0.162	0.029	0.168
Household Income										
<i>0–1 MWs</i>	0.079	0.269	0.297	0.457	0.442	0.496	0.316	0.464	0.330	0.470
<i>1–5 MWs</i>	0.517	0.499	0.630	0.482	0.538	0.498	0.640	0.480	0.621	0.485
<i>5–10 MWs</i>	0.250	0.433	0.060	0.238	0.017	0.131	0.039	0.194	0.041	0.199
<i>10–20MWs</i>	0.109	0.312	0.009	0.097	0.002	0.042	0.004	0.066	0.005	0.073
<i>> 20 MWs</i>	0.044	0.205	0.003	0.052	0.0002	0.016	0.0003	0.019	0.0004	0.022
UFRN admission										
<i>First phase score</i>	526.45	84.28	460.94	67.63	442.78	50.85	524.25	59.13	507.62	60.37
<i>Enrolled</i>	0.266	0.441	0.143	0.350	0.018	0.131	0.959	0.196	0.948	0.221
<i>Average grade</i>	7.16	2.18	7.13	2.14	na*	na*	7.49	1.96	7.33	1.92
<i>Rate of sucess</i>	0.655	0.335	0.650	0.325	na*	na*	0.722	0.310	0.721	0.311
<i>Entrepreneur</i>	0.023	0.149	0.026	0.160	0.022	0.146	0.019	0.136	0.023	0.149
Labor Market (RAIS)										
<i>Years of education</i>	15.18	3.75	15.21	3.89	14.18	2.63	15.32	3.89	15.54	3.91

<i>College Completion</i>	0.496	0.494	0.450	0.4975	0.226	0.474	0.491	0.500	0.623	0.4847
Observations	47,186		8,139		14,414		2,722		2,049	

Note: The sample comprises candidates to UFRN between 2010 and 2012, including (a) all people who took the entrance exam and were admitted and (b) all people who were not admitted. We divided the students into five categories: 1) those who did not apply to have the bonus (Nonapplicants); 2) those who applied but were considered not eligible (Ineligible applicants); 3) those who were eligible but even with the bonus were not approved in the entrance test (Eligible non approved applicants); 4) those who received the bonus and were approved but would have been approved even without the bonus (Eligible approved non-binding applicants); and, 5) those who were only approved due to the bonus (Eligible approved binding applicants). *Variables related to academic success after university attendance were unavailable for unapproved candidates.

Source: The authors.

Eligible candidates to the bonus affirmative action had to ask to be in the benefited group at the inscription to the exam and to present documents to prove their claim. A candidate could be eligible for the policy and not request to receive the bonus, both because of a lack of information about the policy or for a lack of supporting documentation.

Table 1 compares five groups of candidates previously defined and shows that black, brown, or indigenous individuals (BBI) represented approximately 50.5% of the Eligible approved non-binding applicants. Nonapplicants had higher incomes and were mostly white (59.5%). Moreover, the groups of beneficiaries (Eligible non approved applicants, Eligible approved non-binding applicants, and Eligible approved binding applicants) were, on average, in the lower income brackets and had a lower percentage of parents with higher education compared to the candidates without the bonus. Therefore, the policy was reaching racial minorities and income-disadvantaged groups.

Other variables that deserve to be highlighted are the academic performance indicators: “Average Grade” (the average of the final academic performance in the curricular components in which the student concluded weighted by the number of hours of each course) and “Rate of success” (the percentage of the workload used by the student that was converted into approval). Academic results between applicants and nonapplicants are similar, demonstrating that those who benefited from the policy have an academic performance as good as candidates admitted without the policy.

Furthermore, when we segregate the data by gender, according to RAIS data, approximately 56% of female quota applicants completed their degree compared to around 44% of male quota applicants who completed college. This suggests that females achieve higher academic attainment.

This study compares candidates who entered the university with scores close to the cutoff with candidates who did not enter and were slightly below the cutoff, using the Regression Discontinuity Design (RDD) (Cattaneo et al., 2020). To identify how close individuals were to being admitted or not at the university, we computed normalized entry scores, based on the combined grades from the first and second phases of the exam. Normalization of the scores was carried out because the admission score for the UFRN entrance exam varied according to each course. Based on a study by Francis-Tan and Tannuri-Pianto (2018), the normalized score of a candidate i , NS_i , is given by:

$$NS_i = \frac{S_{ict} - C_{ct}}{SD_{ct}}, \quad (I)$$

where, S_{ict} is the score of a candidate i in the entrance exam for course c in year t ; C_{ct} is the score of the last student ranked for course c and year t (C_{ct} is the course specific cutoff); and SD_{ct} is the standard deviation of the score for course c and year t .

The execution/operationalization of the RDD model used the robust package (Calonico et al. 2020). The estimator is non-parametric and has currently become the recommended RDD estimation approach (Cattaneo et al., 2020). The choice of the non-parametric approach is justified by the fact that the determination of the average

effect of the treatment on the cutoff point is based on recent techniques of local polynomials (Cattaneo et al., 2020), improving the estimation capacity (Calonico et al., 2020).

For this approach, a general, reduced, non-parametric model would basically be the one presented by:

$$Y_i = \beta_0 + \beta_1 A_i + f(NS_i) + \theta_i + \epsilon_i, \quad (II)$$

in which the estimation of the effect of attending university as a beneficiary of the bonus policy on a certain variable Y_i of interest would be obtained by regressing the variable with an indicator of being above the cutoff and thus admitted to the university (dummy A_i) and the function $f(NS_i)$, which is a continuous polynomial function around the threshold, that is, the normalized cutoff (NS_i). Thus, as a standard of the non-parametric model implemented by Calonico et al. (2020), a Triangular Kernel Function is used that adjusts the regression around the cutoff. In addition, θ_i would be a vector of controls, covariates containing fixed effects of the characteristics of the students, being used for adjustment, improving the efficiency of the estimator (Calonico et al., 2020). Finally, ϵ_i is the model error.

The main variable of interest is “Entrepreneur”, which represents whether a given individual has become a formal entrepreneur (opened or established a partnership in a company). This is a dichotomous variable that indicates whether the individual who was not involved in entrepreneurial activity became an entrepreneur after joining the university and up to five years after completing graduation (Markussen & Røed, 2017). In a second set of models, we study the impact of the bonus on academic performance variables that are available at the Ministry of labor dataset, RAIS. Therefore, we have information for both approved and unapproved candidates. For these models, the main variables of interest are “Years of education” and “College completion”.

A first set of model specifications involves analyzing the impact of the bonus on entrepreneurial behavior among two groups of individuals, the treatment and control groups. In the first specification, the treatment group comprises those who met the criteria to receive the bonus and were admitted to the university (Eligible approved), while the control group consists of those who were also eligible for the bonus, but their grades were not sufficient to gain admission (Eligible unapproved). The second specification of the model narrows down the treatment group to only those individuals who would not have entered the university if the bonus was not in place (Eligible approved binding applicants). The control group remains the same as the first specification. The third specification has a different nature from the first two. Here, both treatment and control groups were approved to the university. The treatment group comprises eligible candidates who would have been approved to the university regardless of the policy being in place (Eligible approved non-binding applicants), while the control group includes those who were only admitted because the policy existed (Eligible approved binding applicants).

For the RDD proposed in this study to be valid, the conditions of continuity of the attribution variable (running variable that determines the cutoff) and of covariates must be satisfied (Cattaneo et al., 2020). For this, the McCrary Test (2008) was performed, analyzing the density distribution of the variable around the cutoff point (Cattaneo et al., 2020). The p-value was 0.8528, confirming the continuity in the attribution variable, namely the normalized test scores, for the set of observations of those receiving the bonus (Eligible applicants). For the candidates not receiving the bonus (Ineligible), the p-value was 0.4211, showing that there was continuity within the 95% confidence interval. Therefore, there was no statistically significant discontinuity.

4. Results

4.1 Effect on Entrepreneurship of Joining the University with the Bonus

We tested the effect of attending university on all candidates who received the bonus (eligible applicants) using the three specifications described above. Table 2 presents the RD estimates for these three specifications, both with and without controlling for other covariates, including indicators for a mother with a college degree, a father with a college degree, previous enrollment in a higher education course, attendance at a preparatory course, and age. Table 2 also presents the treatment and control groups for each specification, for clarity.

Table 2 Entrepreneurship around UFRN admission cutoffs for eligible applicants in 2010–2012

Model Specification	Both genders					
	I	II	III	I	II	III
Treated	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants
Control	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants
Entrepreneur	-0,00657 (0,0855)	-0,0145 (0,0107)	-0,0024 (0,0058)	-0,00662 (0,00841)	-0,0143 (0,0106)	-0,0027 (0,0059)
<i>p-value</i>	0,442	0,175	0,686	0,431	0,177	0,650
Observations	10.625	7.903	8.576	10.625	7.903	8.576
Individual Characteristics	No	No	No	Yes	Yes	Yes

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

Note: Some models. control a set of individual characteristics, including a mother with a college degree, a father with a college degree, if he had previously enrolled in a higher education course, if he took a preparatory course, and age.

Source: The authors.

In general, there does not seem to be a significant difference in the probability of a beneficiary candidate (a student from public schools) becoming an entrepreneur due to attending UFRN. This is evidenced by the lack of significant discontinuity around the cut-off point. Additionally, there is no significant difference identified around the cutoff for candidates who were only approved due to the bonus and those who received the bonus but obtained high enough scores to be admitted without it. Therefore, even though they attended UFRN, there was no discernible effect on the propensity of beneficiaries to become entrepreneurs, as the estimates are insignificant at conventional levels.

4.1.1 Analysis by gender of candidates with bonus

We divided the sample by gender, as males are generally less risk-averse and more likely to pursue riskier occupations such as entrepreneurship. Table 3 provides evidence that the overall results are not dependent on gender, as the effects for both genders were small and insignificant at conventional significance levels.

Table 3 RD estimates of entrepreneurship around UFRN admission cutoffs for eligible applicants in 2010 – 2012 – Male and Female

Model Specification	Male Applicants			Female Applicants		
	I	II	III	I	II	III
Treated	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants
Control	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants
Entrepreneur	-0.00891 (0.01672)	-0.0043 (0.0173)	-0.0287 (0.0217)	-0.00634 (0.000954)	-0.0202 (0.0125)	0.0032 (0.0066)

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<i>p</i> -valor	0.594	0.805	0.185	0.506	0.104	0.628
Observations	4,450	3,130	3,459	6,175	4,773	5,117
Individual Characteristics	No	No	No	No	No	No
Entrepreneur	-0.00897 (0.0165)	-0.0045 (0.0173)	-0.0285 (0.0215)	-0.00637 (0.00937)	-0.0212 (0.0126)	0.0020 (0.0067)
<i>p</i> -valor	0.587	0.797	0.185	0.497	0.091	0.762
Observations	4,450	3,130	3,459	6,175	4,773	5,117
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes

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

Note: Some models. control a set of individual characteristics, including a mother with a college degree, a father with a college degree, if he had previously enrolled in a higher education course, if he took a preparatory course, and age.

Source: The authors.

4.2 Schooling

To investigate if attendance at the university has influenced the schooling achievement of candidates, we used the same RDD model to study the total years of education and the probability of completing college. As before, three different categories of graduated students were analyzed, without separating by gender: students who received the bonus (Eligible Applicants), students who were ineligible to receive the bonus (Ineligible), and students who were eligible but did not ask to receive the bonus (Eligible nonapplicants). Results are presented in Table 4.

Table 4 Estimates of school achievements

Model Specification	Both genders					
	I	II	III	I	II	III
Treated	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants
Control	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants
Years of education	0.398*** (0.0122)	0.0884 (0.0743)	0.0721 (0.0562)	0.318*** (0.0156)	0.0613 (0.0572)	0.0661 (0.0705)
College Completion	0.0859** (0.0348)	0.0481 (0.0351)	0.0522 (0.0674)	0.0822** (0.0352)	0.0422 (0.0371)	0.0503 (0.0498)
Observations	4,811	10,450	3,270	4,811	10,450	3,270
Individual Characteristics	No	No	No	Yes	Yes	Yes

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

Note: Some models. control a set of individual characteristics, including a mother with a college degree, a father with a college degree, if he had previously enrolled in a higher education course, if he took a preparatory course, and age. Source: The authors.

Candidates receiving the bonus who attended UFRN have about 0.39 more years of education and approximately 9 percentage points more chance of completing college, compared to eligible bonus applicants who were not admitted, significant at a 5% level. In contrast, no significant effects were identified for both eligible nonapplicants and ineligible candidates who attended UFRN, compared to eligible nonapplicants and ineligible candidates who were not admitted, respectively.

Subsequently, regressions stratified by gender were also estimated for the probability of completing higher education and years of education. The results presented in Table 5 demonstrate that the estimates for the probability of college completion are significant only for the male gender, in the case of eligible applicants, and also for ineligible candidates. In the case of females, the results were significant only for more years of education.

Table 5 Estimates of college completion - Male and Female

Model Specification	Male Applicants			Female Applicants		
	I	II	III	I	II	III
Treated	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants	Eligible approved applicants	Eligible approved binding applicants	Eligible approved non-binding applicants
Control	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants	Eligible unapproved applicants	Eligible unapproved applicants	Eligible approved binding applicants
Years of education	0.791* (0.469)	0.0591 (0.167)	0.0827 (0.159)	0.104 (0.0671)	0.145** (0.0632)	0.179 (0.175))
College Completion	0.129** (0.0513)	0.08123* (0.04274)	0.01988 (0.07207)	0.0369 (0.0458)	0.04228 (0.04535)	0.04265 (0.09658)
Observations	2,298	5,506	2,024	2,513	4,944	1,246
Individual Characteristics	No	No	No	No	No	No
Years of Education	0.659* (0.394)	0.0531 (0.238)	0.0743 (0.0484)	0.103 (0.0722)	0.106** (0.0495)	0.147 (0.568)
College Completion	0.120** (0.0523)	0.07814* (0.04335)	0.01767 (0.06912)	0.0364 (0.0462)	0.03798 (0.04501)	0.08875 (0.09233)
Observations	2,298	5,506	2,024	2,513	4,944	1,246
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes

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

Note: Some models. control a set of individual characteristics, including a mother with a college degree, a father with a college degree, if he had previously enrolled in a higher education course, if he took a preparatory course, and age.

Source: The authors.

Male ineligible candidates who attended UFRN were about 8 percentage points more likely to complete college, significant at the 10% level, than male ineligible candidates who did not attend UFRN. Male students

receiving the bonus were approximately 13 percentage points more likely to complete college than male-eligible candidates who asked for the bonus, but who did not attend UFRN and had 0.79 more years of education.

Ineligible candidates who attend UFRN have about 0.14 more years of education (compared to ineligible candidates who did not attend UFRN), although the effect on the probability of completing the course is not statistically significant. However, attending the institution did not affect the probability of training for women benefiting from the AI and for those eligible who entered without the bonus.

5. Discussion

There is a small literature that associates affirmative action with the entrepreneurship of minority groups, with emphasis on the studies by Fairlie and Marion (2012), Chatterji et al. (2014), and Marion (2011, 2017). None of these studies have analyzed policies for university access, but they argue that increasing work opportunities for minorities can encourage or inhibit the likelihood of these groups starting a business. Our analyzes suggest that attending university increases training opportunities and, consequently, may increase participation in the formal labor market, to the detriment of starting one's own business.

Different reasons can lead university students not to choose entrepreneurship as a career, among them are the risk of failure as many young people are averse to the risk of entrepreneurship, and the difficulty in reconciling academic life with entrepreneurial activity. Therefore, the reasons for the absence of significant effects in the sample of candidates who received the bonus for admission to UFRN could be inferred from the idea that policies to facilitate the access of minority subgroups to higher education can encourage them to continue their studies, staying at the university longer in response to better future perspectives of public employment.

The lack of effect of attending the university on entrepreneurship, identified in this work, was also discussed by Liu et al. (2019) and Thomas (2009), but they did not use the discontinuity generated by the eligibility rule in the admission process. They did not find a significant relationship between attending a higher education institution and becoming an entrepreneur and even found that academic success could reduce the probability of the individual's aspiration to have their own business. Also, young entrepreneurs tend not to participate in continuing education, due to lack of time.

Affirmative action may be less effective in promoting entrepreneurial behavior due to the satisfactory performance of eligible candidates who attended UFRN. In our sample, the vast majority of candidates benefiting from the policy have completed college and presented similar academic indices to those of their ineligible class peers which may explain why we found effects on school achievements.

Francis-Tan and Tannuri-Pianto (2018) reported that quota students who attend UnB have about 0.49 more years of education and are about 11 percentage points more likely to complete college compared to unapproved quota candidates. In comparison, we found that candidates receiving the bonus who attended UFRN have about 0.39 more years of education and approximately 9 percentage points higher chance of completing college compared to eligible unapproved applicants.

Despite the gender disparity in education and the fact that there is no perceptible effect on the probability of being an entrepreneur, the results suggest that male students who graduated from public schools and benefited from affirmative action may be encouraged to stay longer at the university. These effects on college completion, higher for males, are consistent with those of Francis-Tan and Tannuri-Pianto (2018), who identified that at the University of Brasília (UnB), female students who entered the university via an affirmative quota system benefited little from attending university concerning the educational outcome and the job market work.

A research question requiring deeper investigation is: Why are the benefits of attending an affirmative action university lower for female quota applicants? Regarding the absence of an impact of AA on female participation in academic achievement, a possible explanation for the results among women is that the effect of attending UFRN is counteracted by other factors. It could be that women face various obstacles such as gender stereotypes and lack of parental support, which may make it harder for them to pursue higher education. However, since this study compares approved versus unapproved participants, it is also possible that unapproved female participants seek other academic opportunities outside UFRN, such as attending other public or even private universities, to catch up with approved participants.

6. Concluding Remarks

This study empirically explores the effects of an affirmative action policy for access to higher education in a Brazilian university (UFRN) on entrepreneurial behavior. The analysis of the data using Regression Discontinuity Design showed that AA has no significant effects on the entrepreneurship of eligible candidates.

Students from public schools, considered to have minority status in this work, due to their socioeconomic characteristics, do not increase their probability of becoming entrepreneurs when they are marginally above the cut-off and enter UFRN. Additionally, candidates, specifically males, who entered university with the policy had an increase in years of education and in the likelihood of completing college. Despite the lack of evidence about the effect of affirmative action on the entrepreneurship of minority groups, in response to future perspectives generated by higher education, affirmative action can induce more schooling in certain groups, generating fewer incentives for choosing entrepreneurship as a career.

This article is unprecedented in examining the relationship between affirmative action for university access and the entrepreneurial behavior of quota students. Therefore, this area of study is still in its early stages, and this paper can provide valuable insights for future research. Our study contributes to the existing research on education and its impact on entrepreneurship within minority groups. Additionally, it focuses on one country, Brazil, which has significant potential to investigate the relationship between affirmative action and entrepreneurship, given that higher education and entrepreneurial activity are critical for promoting social mobility, reducing economic disparities, and fostering equality.

One limitation of this work is that the data provide no information on the causes of the decisions to open or not a business. For example: was it because the student aspired to higher wages with training? Was it because of fear of taking the risk of entrepreneurship? Identifying these causes is a difficult task that is open for investigation in other studies.

Future research may be able to extend the analysis. It would be interesting to study the effects of affirmative action policies from other Brazilian universities on entrepreneurial behavior. Other universities have created their affirmative actions, so future research can study how these Educational Equity Policies influence entry into entrepreneurial activity, as well as what has changed after these policies were replaced by other national legislation. In addition, future researchers should adopt a qualitative and/or longitudinal approach and explore other variables and/or methods that could help explain the impact of AA on entrepreneurial behavior.

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