



Socioeconomic Adversity and Higher Education: Is the Quota Law a Potential Bridge to Social Mobility in Brazil?¹

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Abstract: This article aims to contribute to the debate on the role of the Quota Law regarding the potential social mobility of students with high socioeconomic adversity, using administrative data from a federal university in Brazil. We used Confirmatory Factor Analysis technique to construct an adversity index, composed of variables that may negatively affect access to higher education, such as students' socioeconomic background, parental education, and ethnicity. We classified courses by expected earnings and assessed how background is associated with course choice. Then, we used regression models estimated by the Generalized Method of Moments (GMM) to identify the relative importance of the interaction between quota categories with the adversity index and the score on the admission exam (National High School Examination –

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Exame Nacional do Ensino Médio - ENEM) to predict course choice and consequent possibility of social mobility. The results showed that quotas can reduce the negative effects of socioeconomic adversity on social mobility. However, they are not completely sufficient to “break” the effects of the low quality of secondary education in relation to ENEM performance and, consequently, social mobility.

Keywords: higher education; public policy; educational policy; social mobility

Adversidad socioeconómica y educación superior: ¿La Ley de Cuotas es un puente para la movilidad social en Brasil?

Resumen: Este artículo busca contribuir al debate sobre el papel de la Ley de Cuotas sobre el potencial de movilidad social de estudiantes con alta adversidad socioeconómica, utilizando datos administrativos de una Universidad Federal en Brasil. Utilizamos la técnica Análisis Factorial Confirmatorio para construir un índice de adversidad, compuesto por variables que pueden afectar negativamente el acceso a la educación superior, como el origen socioeconómico de los alumnos, la educación de los padres y la etnia. Clasificamos los cursos por ganancias esperadas y evaluamos cómo el origen está asociado con la elección del curso. Utilizamos modelos de regresión estimados mediante el Método de Momentos Generalizados (GMM) para identificar la importancia relativa de la interacción entre las categorías de cuotas con el indicador de adversidad y la puntuación en el examen de ingreso (Examen Nacional de Educación Media - ENEM) para prever la elección del curso y la posibilidad de movilidad social. Los resultados mostraron que las cuotas pueden lograr reducir los efectos negativos de la adversidad en la movilidad social. Pero, no son completamente suficientes para “romper” los efectos de baja calidad de la educación secundaria en relación con el desempeño en el ENEM y, consecuentemente, en la movilidad social.

Palabras clave: educación superior; política pública; política educativa; movilidad social

Adversidades socioeconômicas e ensino superior: A Lei de Cotas é uma ponte para a mobilidade social no Brasil?

Resumo: Este artigo tem como objetivo contribuir para o debate sobre o papel da Lei de Cotas quanto ao potencial de mobilidade social de estudantes com alta adversidade socioeconômica, utilizando dados administrativos de uma Universidade Federal no Brasil. Utilizamos a técnica de Análise Fatorial Confirmatória para construir um índice de adversidade, composto por variáveis que podem afetar negativamente o acesso ao ensino superior, como origem socioeconômica dos alunos, educação dos pais e etnia. Classificamos os cursos por ganhos esperados e avaliamos como a origem está associada à escolha do curso. Em seguida, utilizamos modelos de regressão estimados pelo Método dos Momentos Generalizados (GMM) para identificar a importância relativa da interação entre as categorias de cotas com o indicador de adversidade e a nota no exame de admissão (Exame Nacional do Ensino Médio – ENEM) para prever a escolha do curso e consequente possibilidade de mobilidade social. Os resultados mostraram que as cotas podem conseguir reduzir os efeitos negativos da adversidade socioeconômica na mobilidade social. No entanto, não são completamente suficientes para “quebrar” os efeitos da baixa qualidade do ensino secundário em relação ao desempenho no ENEM e, consequentemente, na mobilidade social.

Palavras-chave: ensino superior; política pública; política educacional; mobilidade social

Socioeconomic Adversity and Higher Education: Is the Quota Law a Potential Bridge to Social Mobility in Brazil?

This article aims to contribute to the debate on whether preferential admissions of high socioeconomic adversity students to higher education institutions (HEIs) can improve social mobility. For this, we studied the case of admissions to a Brazilian federal university, following the implementation of the social quota policy (Quota Law – 12,711/2012), which mandated public Federal Institutions of Higher Education (FIHE)² in Brazil to admit at least a 50% share of high socioeconomic adversity students to their programs. A distinctive feature of this case is that FIHEs do not charge tuition fees and represent the best institutions in the country (the university is 11th among the 63 Federal Universities in Brazil in 2019 - *Folha University Ranking*; 2019). Furthermore, Brazil is an unequal country (ranked as the 7th most unequal country in the world in 2019 - United Nations Development Program, 2021), where access to HEIs has historically skewed toward socioeconomically privileged classes (Cavalcanti et al., 2019; Childs & Stromquist 2015; Francis & Tannuri-Pianto, 2012; Telles, 2004).

To implement the study, we developed an index of social adversity that incorporates socioeconomic background, gender, and ethnicity, for students of a Brazilian FIHE. To build the index we used the Confirmatory Factor Analysis (CFA) technique. Additionally, we analyzed the relationship between this index and the score in the Brazilian National High School Exam (*Exame Nacional do Ensino Médio* - ENEM) with the average wage of each undergraduate course, used as a proxy to social mobility, through regression models estimated by the Generalized Method of Moments (GMM). From a sample of student's data, we used information about family's economic and educational profile, ethnicity, gender, and the course of choice. The results demonstrate that, for the institution analyzed, the quota law was successful in getting high socioeconomic adversity students admitted. Those admitted by using the quota system are disproportionately from high socioeconomic adversity backgrounds, i.e., black, brown-skin, and Indigenous people whose parents, tend to have lower education and family income. However, our results reveal a course-level segregation within the university since quota students are concentrated in lower prestige courses with lower earnings potential. In this aspect, despite the success of the Quota Law (QL) in promoting the access of disadvantaged people to the FIHE in Brazil, the empirical results show that this is not completely sufficient to resolve the mobility challenge.

In addition to this introduction, our paper is structured into five further sections. In the next two, we introduce the Quota Law and its implementation in Brazil and briefly review previous academic work and theories on social mobility, course choice, and higher education. In the remaining sections, we present the methodology, results, and conclusions, respectively.

The Brazilian Quota Law and its Implementation

Briefly, the higher education system in Brazil consists of two types of institutions: private universities that require students to pay monthly fees and tuitions; and federal and state universities that are publicly funded and maintained by the federal and state government, respectively. The goals of public institutions are offering free higher education to the population and performing research, innovation, and extension projects (interaction between university and society). An interesting characteristic of Brazilian public universities is that they are the best regarding teaching and research quality.

² Public Federal Higher Education Institutions in Brazil comprise Federal Universities and Federal Institutes. They are government funded and autonomous in terms of teaching and research and extension (Law of Guidelines and Bases of National Education – LDB 9.394/1996). They do not charge students any tuition fees:

https://www2.senado.leg.br/bdsf/bitstream/handle/id/544283/lei_de_diretrizes_e_bases_2ed.pdf

However, strong inequalities have been noted in access to Brazilian public higher education. Socioeconomic factors are barriers to access, such as low income, ethnicity (black, brown-skin, and Indigenous people), and graduating in a public high school, that generally present the lowest quality in Brazil (Lopes, 2017). According to the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE), 7.9% of the population had higher education in 2010, and only 8.8% of these were Black people.³ These percentages changed to 21% and 35.1% in 2020, respectively. We highlight that more than 50% of the Brazilian population consist of Black and brown-skin people.

To change this scenario, the Social Quota Law represents one of the most important higher education policies in Brazil. Its primary goal is to minimize inequalities and democratize FIHE access, which do not charge tuition fees. It states that at least 50% of FIHE vacancies must be reserved to socioeconomically disadvantaged students from Brazilian high schools. The quota holders are Black, brown-skin, and Indigenous students and White students from low-income families (Quota Law – 12,711/2012). According to ENEM scores, the candidates who fall into the distinct categories of quota classification compete for vacancies in undergraduate and technical courses, for the most diverse academic areas.

FIHE use the Unified Selection System (*Sistema de Seleção Unificada* - SISU) web platform to process applications for specific courses and universities. Admissions are decided based on a range of criteria. A cut-off score is determined for each course, in each university, and across quota categories. Moreover, the score also considers aptitude to the course, future expectation about the job market, the distance between the hometown to the university city, etc. Although FIHE in Brazil are free, students must also consider the permanence costs, which vary according to the size of the city and/or if the FIHE offers accommodation facilities and alimentation support. In these aspects, the undergraduate course choice engages in a set of complex factors (Feld & Alves, 2020).

About the literature involved in the Brazilian HE social policies and affirmative action before the QL, Lopes (2017) and Francis and Tannuri-Pianto (2012) stand out. The common evidence in these studies was that the HE system continued reproducing social inequalities in Brazil, despite affirmative action being adopted. To specific QL studies, most of them address sociological aspects and academic performances. Some examples of this are Queiroz et al. (2015); Childs and Stromquist (2015); Castro et al. (2017); Guarneri and Melo-Silva (2017); Wainer and Melguizo (2017); and Senkevics (2018). Generally, they show improvements in accessibility and slight differences in academic performance between quota and no-quota holders.

In a broader perspective, McCowan and Bertolin (2020) have analyzed trends of the widening access and completion in higher education in Brazil from 2000 to 2018. Considering social groups and socioeconomic variables, the authors drew out the implications of these HE trends for questions regarding social justice and educational and socioeconomic inequalities. Although Brazilian HE policies, including QL, have been contributing to HE access of socially high socioeconomic adversity students, the authors also show, in a descriptive analysis, that these policies have not presented vast success in promoting social mobility.

This present paper fits into the research about the potential of HE policies to promote social mobility. Like McCowan and Bertolin (2020), we analyze the Brazilian context. However, this paper contributes to the development of a broad-based metric of students' socio-economic adversity from a specific FIHE case, examining to what extent the quotas reflect such adversity and considering stratification by adversity at the course level. Following the primary goal of the law, it is uncontested that the QL increased the access of poor, Black, brown-skin, and Indigenous people into the FIHE. However, gaining access to higher education does not automatically guarantee social mobility and reduction in earning inequalities (McCowan & Bertolin, 2020).

³ Wider explanation about HE System in Brazil is at McCowan and Bertolin (2020), Medeiros, Melo-Netto, and Gomes (2016) and Childs and Stromquist (2015).

Although the ultimate test of this will be following the undergraduate performance in the labor market, our study on segregation at the subject level offers an important early indicator.

Literature and Theoretical Ideas: Social Mobility, Choice, and Higher Education

In this section, we present how the literature, and theoretical ideas has shown the relationship between higher education access, including subject choices and its potential for social mobility. Regarding increases in social mobility, despite being considered multi-faceted and complex, the understanding of how it happens and what are its main promoting factors is important since it offers numerous economic and social benefits (OECD, 2015). Among varied factors, higher education contributes to social mobility.

Marginson (2018, p. 4) defines social mobility in two forms: absolute and relative. To the author, the absolute “is the incidence of rising social positions” created by more opportunities. Relative is “the odds of a low social-economic status (SES) background person succeeding compared to the odds of a high SES person succeeding. When the relative social mobility advances, the structure of society has become more equal” (Marginson, 2018, p. 4).

Given the important role of HE for economic and social benefits (see McMahan, 2004; also Hermansson et al., 2017) it is unsurprising that for governments worldwide, widening access to HE has become a key policy for promoting social mobility (Billingham, 2018; Marginson, 2016, 2018; Mountford-Zimdars & Sabbagh, 2013). In this policy context, an incentive for HE creates new courses and increases vacancies and competition between educational institutions (Callender and Doughert, 2018). However, as participation rates have risen (Lee & Lee, 2016), skeptical voices have emerged questioning whether the expected benefits have materialized (Pritchett, 2001).

Marginson (2018) discusses the interplay between higher education expansion, social mobility, and inequality. He demonstrates, with historical record from the USA and Europe, that widening participation does not necessarily lead to social mobility and reduced inequality. The author argues that the USA is an example of widening participation coinciding with a drastic increase in income inequality.

According to Piketty (2014), one type of inequality in society is that of a relatively small group of people who are at the top of income hierarchy due to extremely high earnings from labor (“hypermeritocratic society”). Marginson (2018) argues that HE has a role in this social inequality since it “helps to select people into high-income earning tracks in business and the business service professions,” i.e., high-financial prestige professions. Students from high socioeconomic background have favorable conditions to enter the most competitive and prestigious courses. In this sense, inequality trends to persist despite efforts to widening participation.

Findlay and Hermansson (2019) discuss the debate about what drives the lack of success of widening participation initiatives in Scotland. Under a costs/benefits perspective, the authors conclude that lower socioeconomic young people use a rational choice between the market job and the HE, i.e., the costs made HE less attractive.

Regarding students’ access to HE and their course choices⁴, the dependence on students’ family social and economic background is clear (Callender & Doughert, 2018; Mountford-Zimdars & Sabbagh, 2013). In this context, Bourdieu (1990) contributed with an important theoretical literature. Bourdieu states that the social and professional positions of individuals are determined by economic, cultural, social, and symbolic capitals. Economic refers to the wealth and income of

⁴ According to the Student Choice model, students need to make course and university choices according to their skills and abilities, career job offers, institution quality, and, among others, the tuition fee, and overall costs for maintenance (Boliver, 2013; Callender & Doughert, 2018). As Brazilian public HE institutions case do not fit totally in the context, we are specifically considering the family social and economic background to HE choice.

individuals and their families. Cultural refers to what is socially valued and, therefore, requires personal effort and work to be achieved. Social capital is the result of the beneficial social relationships that the individuals build over the course of their life or inherit from their families. Finally, symbolic capital comes from the prestige and reputation given by society.

An additional reflection is that the choice of course and university can influence the level of access to benefits, given labor market conditions, occupational wages, and the value of tuition fees. In this context, Labaree (1997), Goyette and Mullen (2006), Shaw et al. (2007), Callender and Jackson (2008), Triventi (2013a, 2013b), Crawford (2014), Marginson (2016), Britton et al. (2016), and Callender and Dougherty (2018) studied the growth trend of HE and social stratification. They point out that social inequalities limit the outcomes of HE, which is formed by a stratified structure of universities, subjects, and opportunities. In this context, students from wealthy families predominate in elite universities and high-level professional degrees. Thus, the outcome of a policy aimed at increasing equity and social mobility in HE will depend on the forms of stratification.

In short, students' social and economic background is a crucial factor for access to HE and high-level vocational training. However, in developing countries, such as Brazil, the best HE institutions are public (federal and state). Unlike in developed countries, such as the United States and the United Kingdom, for example, some of the best public universities in Brazil are public. These universities are entirely free, autonomous, and state-funded. Thus, paying fees and tuition is not a barrier for students. In this case, the so-called Student Choice model (Boliver, 2013; Callender & Dougherty, 2018) does not entirely fit the Brazilian public system since the student does not choose the Course and University considering their financial conditions to pay tuition and taxes (Callender & Johnson, 2008). Therefore, the factor that directly determines the competition for vacancies in public universities is the ENEM score.

Depending on ENEM scores, vacancies are distributed among general students and students who are framed into social and racial quota categories (Quota Law - 2012). Thus, like developed countries, Brazil has widened access to HE, allowing Black, brown-skin, and socioeconomically high adversity Indigenous students to qualify. However, since the payment of tuition fees is not a limiting factor, this study seeks to examine the potential of this policy on social mobility, considering the inherent adversities of the students' classes.

Methodology

Dataset

Our dataset corresponds to a microdata about students' different variables from the Federal University of Viçosa (UFV), Minas Gerais, Brazil. Although UFV was founded in 1922 and is considered a medium university regarding the annual budget (about 221 million dollars in 2019), it is among the most important Federal Universities in Brazil and has students from all country. According to Folha University Ranking (RUF, 2019), UFV ranks 11th best among 63 Federal Universities in Brazil. Specifically, for teaching, research, and innovation, UFV is ranked the 9th, 10th, and 3rd, respectively.

Besides RUF, "frequently, the UFV is highlighted in educational rankings in the Brazil and worldwide. It has already been, for three times, among the top one hundred higher education institutions in the world in Agricultural and Forest Sciences, according to the QS World University Rankings, and among the best in Minas Gerais State, according to the Times Higher Education ranking and Brics & Emerging Economies" (UFV 2021⁵).

This research considers the analysis of UFV as a case. However, it is important to report that the Quota Law applies the same rules and proportion of quotas for all Federal Universities (50%). In this way, the paper indicates the potential effects of the Law under the social mobility to the UFV. It can reflect similarly to what happens with other Federal Universities.

⁵ <https://www.ufv.br/apresentacao/>

Regarding the dataset, except for the wage information, it was available on the UFV School Registry in February 2021. After eliminate data about dropout students, we have a sample of 18,289 observations from students who were attending undergraduate courses from 2013 to 2020 (post QL) and that used the SiSU to enter the UFV. Table 1 describes the variables used.

Table 1
Descriptions of variables

Variable	Description	Percentage %	
Total family income	Dummy variables with value one when the student belongs to each one of the eight family income categories in minimum wage ranges and zero if not:		
	1. Less than 1	11.48	
	2. Between 1 and 3	35.68	
	3. Between 3 and 5	22.39	
	4. Between 5 and 7	12.94	
	5. Between 7 and 10	8.32	
	6. Between 10 and 20	6.31	
	7. Between 20 and 30	1.79	
	8. More than 30	1.09	
Father and Mother schooling level	Dummies with value one for the highest level of education that the student's parent has completed:	Father	Mother
	1. Illiterate	4.09	2.86
	2. Incomplete primary	25.66	19.30
	3. Complete primary	8.25	6.41
	4. Incomplete high school	7.20	5.80
	5. Complete high school	25.49	26.28
	6. Incomplete undergraduate	5.05	5.07
	7. Complete undergraduate	15.96	20.52
	8. PhD	8.30	13.77
Gender	Dummy with value one for female students.	48.85	
Quota categories	Dummies with value one for quota category for each student:		
	1. Wide competition	58.71	
	2. Black, brown-skin and Indigenous people from public high schools, with per capita family income up to 1 minimum wage	12.82	
	3. Whites from public high schools, with per capita family income up to 1 minimum wage	8.02	
	4. Black, brown-skin and Indigenous People from public high schools	12.94	
	5. Whites from public high school	7.52	
Distance	Road distance in km from the student's hometown to Viçosa, Minas Gerais, Brazil	Mean 250.66	
ENEM	Student Admission Score to in the National High School Exam. The maximum ENEM score is 1000 points. We divided this value by 10 as to standardized as 0 to 100.	64.56	
Wage	Average wage paid by the Brazilian job market to the professionals of each course.	US\$984.75 ⁶	

⁶ Value of march of 2024.

Finally, “Wage” addresses the average salary paid by the Brazilian job market to the professionals of each academic course. This variable measures the average market wage⁷, subject’s status, and presents a proxy to social mobility. This data is from the General Register of Employed and Unemployed (*Cadastro Geral de Empregados e Desempregados - CAGED*), available on the Ministry of Economy website.

Other proxies for income social mobility have been used in the literature, such as those that measure the intergenerational differences in earnings among families or age groups (Corak 2012; OECD 2015, 2018). But, the wage values are used as a proxy to social mobility in this paper for the follow reasons: a) Quota Law is quite new police and, because of these, there is no time enough to have robust data about the situation of ex quota holder students into the job market; b) there is still no research or institution in Brazil that follows the lives of former students over time, their outcomes of insertion into the job market and income; and, c) the average course wage indicates potential future income.

Adversity Index Construction

The Adversity Index of this study is constructed using the Confirmatory Factor Analysis (CFA). Based on theoretical assumptions, this is a multivariate statistical technique that allows quantifying unobservable latent variables that are determined by a larger set of observable variables. For this study, denoting the latent adversity index as *Adversity* and the set of j observable variables that describe the profile of the students i as *Prof*, we have:

$$Prof_{ij} = \mu_j + \lambda_j Adversity_i + \delta_{ij} \quad (1)$$

where μ is the intercept, λ are the factor loadings, and δ are errors. The variables that are part of the *Prof* set are all those defined in Table 1. According to Kolenikov (2009), being (1) an identified model, the estimates use Maximum Likelihood. A chi2 Wald test is used to goodness-of-fit of the index.

The Adversity Index (*Adversity*) summarizes the academic adversity level of HE students. It aggregates information about the variables: family income, parents’ education, ethnicity (Black, brown-skin or Indigenous People), and distance from hometown to university city.

The variables parent’s education and family income represent the family background and the potential transmission of economic, social, and cultural capital from parents to children, as advocated by scholars such as Coleman (1988) and Bourdieu (1990). These variables were used in a similar index, called “Disadvantage Index”, built by Gaertner (2011).

According to Haveman and Wolfe (1995), for families with better socioeconomic and educational status, the cost of students’ living expenses in educational institutions would not be a restrictive factor. Therefore, it does not make differences in Brazil; this transmission generally occurs positively between generations (Bonamino et al., 2010; Dunn, 2004).

Regarding the distance variable, it is a proxy to the students’ costs to the geographical mobility between the university city and the hometown (Dillon & Smith 2017). Mobility expenses can be considered an influential factor for a student’s stay or dropout decisions. According to Campos (2019), geographic mobility is a relevant and positive factor to explain UFV dropout.

The Adversity Index standardized value ranges from 0 to 100, where 100 *Adv* value represents higher student adversity (and, thus, lower socioeconomic background)⁸. We used the software *Stata 16* to estimate the Index.

⁷ A Brazilian minimum wage in May 2020 is about US\$181.00 or £147.00.

⁸ Standardized: $Adv_i = \frac{Adversity_i - \min(Adversity\ value)}{\max(Adversity\ value) - \min(Adversity\ value)}$

QL and Social Mobility

To identify if the QL contributes to social mobility, regardless of the challenges to public high school students related to adversities and ENEM, we estimated two equations Generalized Moments Method (GMM) estimator (Cameron & Trivedi, 2005). This technique was adopted since ENEM is an endogenous variable (Woodridge test significant), partially explained by the adversity index.

$$\ln wage_{ij} = \vartheta + \beta ENEM_i + \theta_n \sum_{n=1}^q Adv_n + \alpha_1 Quota^z ENEM_i + \alpha_2 Quota^z Adv_i + e_{ij} \quad (2)$$

$wage_{ij}$ is the average's wage of the Subject j to the student i ; $ENEM$ is the standardized ENEM score; Adv_n is the Adversity Index; $Quota^z$ are dummies for the z quota categories; and e_{ij} the error term.

The coefficients of the interaction variables $Quota^z ENEM_i$ and $Quota^z Adv_i$ show if the ENEM and Adversity effects under the dependent variable ($wage$) is different between quota categories. The idea is that if a student comes from a low-income family and/or is quota holder, and she/he is in a higher average wage a Subject has, higher the possibilities to positive social mobility. We used the software *Stata 16* to estimate the regression models.

Results

Quantifying Student Adversity

All variables proved to be statistically relevant in the composition of the Adversity Index according to the chi2 Wald test. Table 2 shows the descriptive statistics of the Index.

Overall, in this sample of 18,289 students, half of them present an Adv up to 63.53, and the standard deviation of 16.90 shows that there is a significant variation among the mean adversity of the students. Considering the component variables, the Adv variations can be analyzed, according to the family background and by schooling level of students' parents.

Table 2

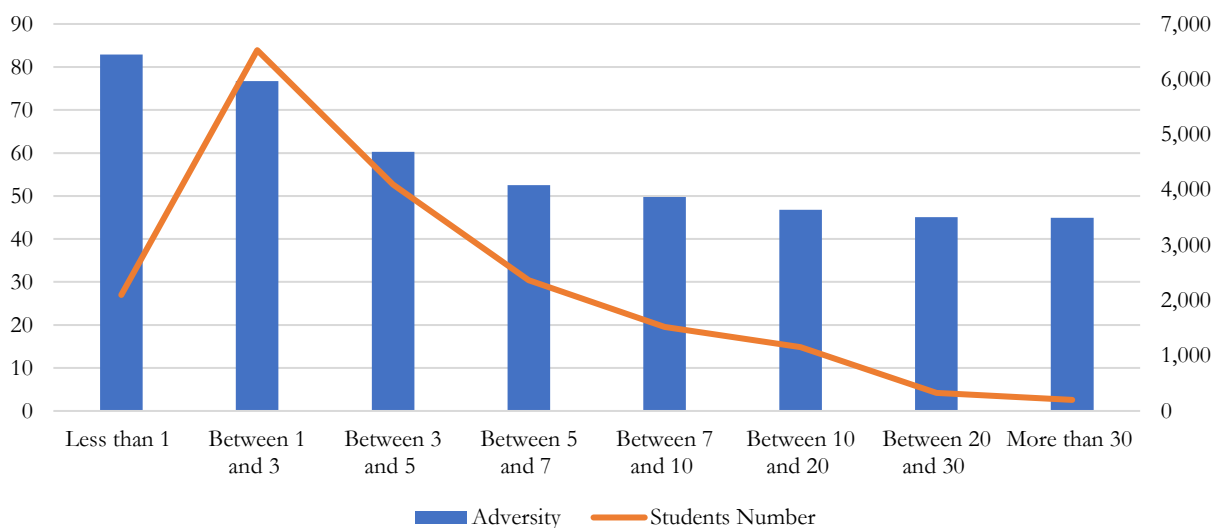
Adversity Index descriptive statistics

Percentile	1%	5%	10%	25%	50%	75%	90%	95%	99%
	40.47	42.50	44.67	51.20	63.53	78.04	91.54	98.42	99.88
Mean	65.56								
Standard Deviation	16.91								

Source. Research results.

The Adv decreases by parents' education level. Lower parents' schooling level leads to higher student adversity. For all schooling levels, mean Adv is higher for mothers than for fathers. By analyzing the familiar-income and classes (Figure 1), we noted that lower-income means was associated with wider adversity. An exception was found for students with familiar income above 30 minimum wages, a socioeconomic profile that presents the lowest number of students. Moreover, it is interesting to note that Adv varies positively more to less affluent people. Therefore, students who come from families with lower levels of income and if their mother has a low education level present higher adversity.

Figure 1
Adversity Index by familiar income



Although the students' distribution is similar between genders, women present a higher mean *Adv* than men. The *Adv* values are 67.94 and 63.29, and the frequency is 8,934 and 9,355, respectively.

Figure 2 shows the differences among the adversity levels by QL categories. The adversity is wider to quota holders, especially to those with a per capita family income below 1 minimum wage. Regarding ethnicity, black, brown-skin, and Indigenous people are the students with the most adversity. It is a reflex of Brazilian society, where most Black people are less affluent and disadvantaged. Briefly, the factors that contribute to higher academic adversity are low income, low parents' education, and Black, brown-skin, and Indigenous.

Figure 2
Adversity Index by Quota Categories

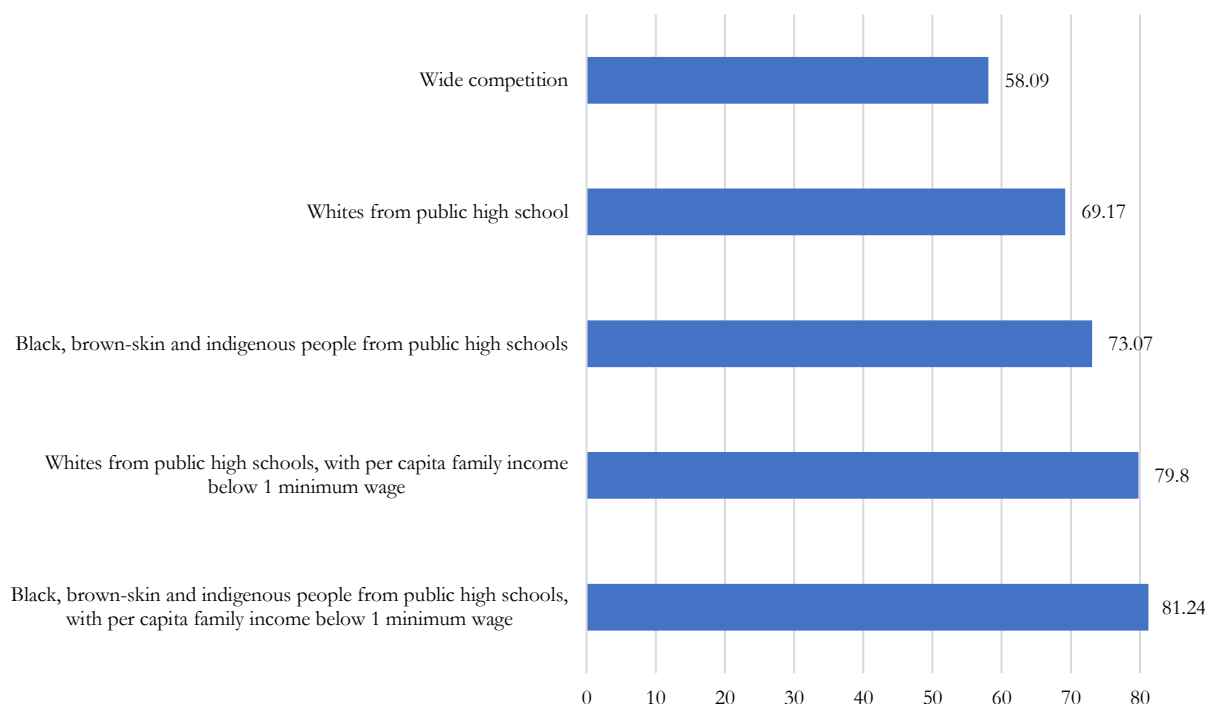


Figure 3 presents the relationship between each course and the average value of the Adversity Index (*Adv*), job market wage, and ENEM score. From 46 courses, 21 present an Adversity Index above the overall average, which is 65.56. Most of the worst courses in terms of adversity, average wages, and ENEM scores are part of the Humanities Centre and of the Teaching Certificates (see trend lines). On the other hand, most of the less adverse courses with highest wages are from traditional prestigious subjects, such as Medicine, Law, and those from the Exact Sciences Centre, which is the case of Engineering.

Figure 3 shows a negative correlation between adversity and social mobility, represented by the wage variable. Considering the mean, students from the highest adversity have chosen low-prestige courses in terms of wage. Courses with higher adversity are those with the lowest average salaries within the Brazilian job market.

As discussed in Section 2, it is worth mentioning that, in Brazil, public high schools present more problems with the quality of education compared to private schools. These public schools suffer from infrastructure problems, lack of teachers and low salaries, overcrowding, high age-grade distortion, and a considerable part of the students are from high socioeconomic adversity and/or unstructured families (Ministry of Education - MEC, School Census; 2019).

We used the variable “ENEM” as proxy for the quality of high school attended. Lower ENEM scores and being from public school is associated with lower quality of high school education. We highlight that Medical and Law courses are among those with less adversity. Notably, these courses demand the highest cut scores in ENEM, and receive the most economic and social prestige in Brazil. On the other hand, those with less “prestige” are those with the highest *Adv*, such as the case of students that attend Teaching Certificates, Pedagogy, and Early Years Education, who must deal with the most adversities during their academic life. Considering that, from 2013 to 2020, at least 40%⁹ of quota holders have entered one of UFV’s courses, it is expected that the QL will contribute to social mobility, regardless of the ENEM scores and the Adversity.

It suggests us the hypothesis that Quotas mediated the link between ENEM and earnings, and consequently the social mobility. Excluding the choices by real options, such as aptitudes and expectancies reasons, students can be enrolled in several courses by using their ENEM scores. Therefore, low public high school quality, represented by ENEM scores, can reduce the expected social mobility. However, this dynamic is reduced by quotas.

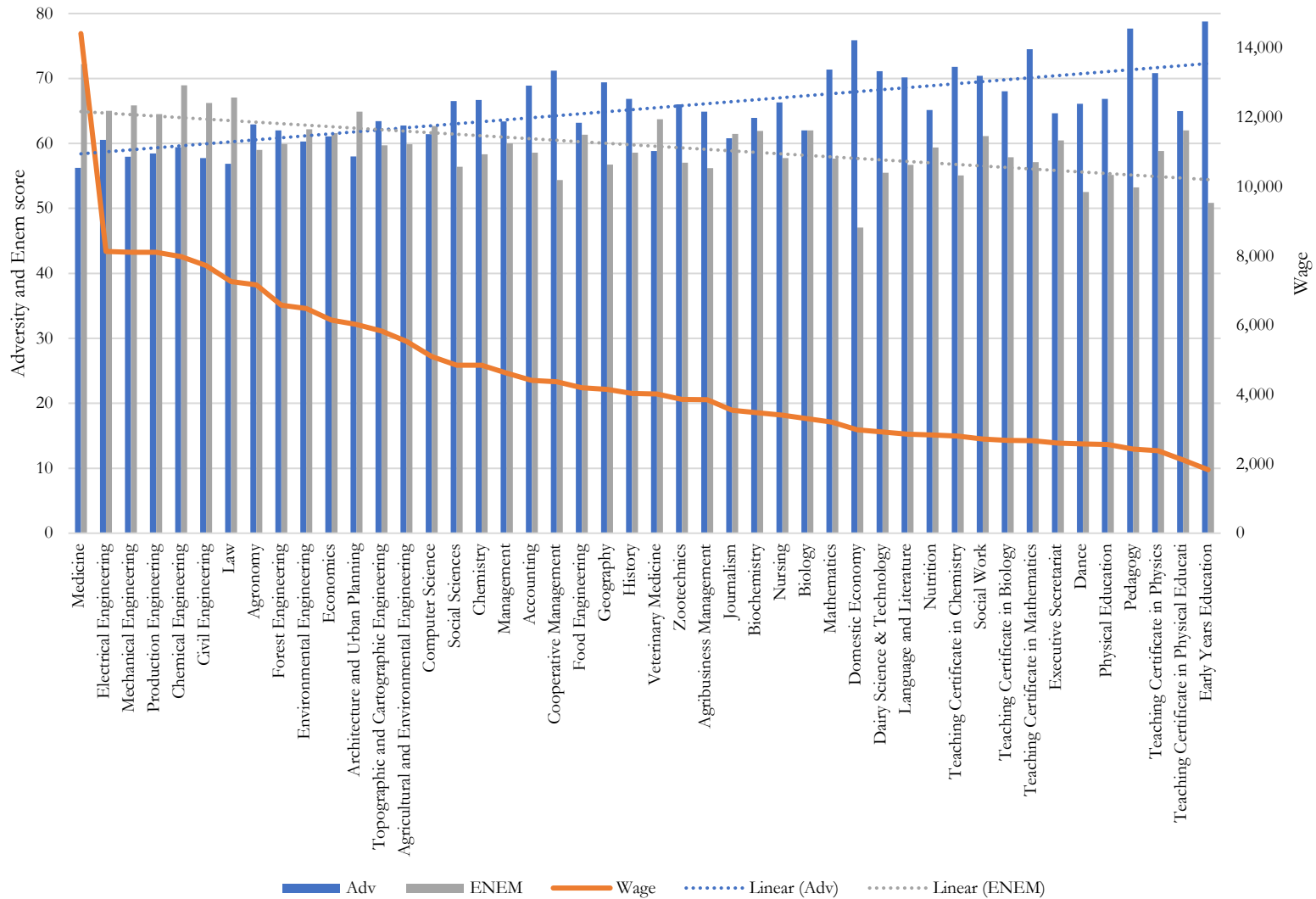
By exclusive analysis on quota holders, we also hypothesize that quota moderates the relationship between adversity and earnings once it allows low-income students (high adversity) access to prestigious subjects. For example, in Medicine and Law, the mean of adversity for wide competition is about 49, whereas this number is about 74 for quota students with per capita family income below 1 minimum wage. In general, this difference is higher among high-earning courses (statistical correlation is equal to 0.57). It signalizes a potential social mobility.

To evaluate these hypotheses, we present two regression models in the next section. The first aims to answer if, in general, quota changes the effect of the adversity and the ENEM under the expected wages (proxy to social mobility). The second equation responds the same but considering the different quota categories.

⁹ From 2016 onwards, Universities had the obligation to offer at least 50% of the spaces to quota holders. Before this was the transition time.

Figure 3

Average Adversity for the 46 undergraduate courses and their average wages. Data from UFV



Has Quota Mediated the Link between Adversity and ENEM, and, Consequently, the Social Mobility?

Table 3 shows the results of two equations, which show interaction variables between quota and adversity and between quota and ENEM. Regarding the goodness-of-fit, Wald, J and F statistics show models significance, quality, and validity instruments. The equations have test In Equation 1, we have aggregated quota variables, whereas Equation 2 shows interaction variables by categories. They are: C2 - Black, brown-skin and Indigenous people from public high schools, with per capita family income below 1 minimum wage; C3 - Whites from public high schools, with per capita family income below 1 minimum wage; C4 - Black, brown-skin and Indigenous people from public high schools; and C5 - Whites from public high school. C1 – Wide Competition was used as a reference category, that is, the coefficients of the other quota categories must be interpreted in comparison with C1.

The results show a negative effect of adversity on expected earnings. In general, higher adversity means that the course is less prestigious in terms of expected wage. Meanwhile, regarding ENEM, higher scores are associated with choosing a course that is more prestigious in terms of expected wage. These results statistically confirm what we see in Figure 3.

Table 3
Results of social mobility models

Variables	Equation (1)	Equation (2)
Adversity	-0.0006*** (0.0002)	-0.0006*** (0.0002)
ENEM	0.0195*** (0.0019)	0.0193*** (0.0019)
Quota*Adversity	0.0016*** (0.0003)	
Quota_C2*Adversity		0.0020*** (0.0004)
Quota_C3*Adversity		0.0010*** (0.0004)
Quota_C4*Adversity		0.0013*** (0.0004)
Quota_C5*Adversity		0.0005 (0.0003)
Quota*ENEM	-0.0008** (0.0004)	
Quota_C2*ENEM		-0.0010* (0.0005)
Quota_C3*ENEM		-0.0003 (0.0005)
Quota_C4*ENEM		-0.0003 (0.0004)
Quota_C5*ENEM		-0.0002 (0.0004)
Gender	-0.0462*** (0.0027)	-0.0460*** (0.0002)

Variables	Equation (1)	Equation (2)
Constant	2.4237*** (0.1388)	2.4361*** (0.1329)
Wald Statistic	2,177.64	2,306.68
Wooldridge endogeneity test – <i>p</i> -value (H0: variables are exogenous)	0.0000	0.0011
J statistic χ^2 test - <i>p</i> -value (H0: valid instruments)	0.0668	0.7877
F statistic - <i>p</i> -value (H0: weak instruments)	0.0000	0.0000
Instrument variables	Instrumented: ENEM Instruments: adversity, gender, quota_adv, ENEM_quota, school_m4, f_income3, gender.	Instrumented: ENEM Instruments: adversity, gender, quota_c2*adv, quota_c3*adv, quota_c4*adv, quota_c5*adv, quota_c2*ENEM, quota_c3*ENEM, quota_c4*ENEM, quota_c5*ENEM, school_m4, gender.

Notes. i) ***, **, and * indicate 99%, 95%, and 90% statistical confidence; ii) Robust standard errors in parentheses; iii) Variables description is in Table 1.

Quota holders have reduced negative effect of adversity under the social mobility, which can be seen in the positive coefficient of the interaction variables Quota*Adversity in Equation 2. By analyzing the magnitude, the effect is reverted according to the differences between the coefficients of Adversity and C2, C3, and C4 categories in Quota*Adversity variables. The exception is the C5 (white students from public high school, independent of familiar income), the group with less adversity and the closest to wide competition. It reinforces the hypothesis of QL moderating the relationship between adversity and earnings. Therefore, this higher education policy contributes to improve the social mobility by including students from families with high socioeconomic adversity. This is not enough to nullify the negative effects of adversity, but it can reduce them.

In contrast, a dissimilar result was noted on the Quota*ENEM interaction. Since ENEM restricts access to courses with higher expected wages, C2 quota holders (black, brown-skin, and indigenous people from public high schools, with per capita family income below 1 minimum wage) are even more restricted. The negative and significant coefficient to the Quota*ENEM interaction shows that they need more success in the exam than wide competition and C3, C4, and C5 quota holders (not significant coefficients) if they aim at a high earning course. The students with the most adversity (C2) have more difficulty in ENEM and, consequently, fewer chances to achieve higher social mobility.

These results indicate that Quota Law contributes to reducing the adversity barriers to social mobility in higher education. However, the QL cannot relieve ENEM difficulties significantly, since the negative coefficients of the interaction variables between quota and the exam were not large enough to nullify the individual effect of ENEM. For example, in Equation (1), when the

student is a quota student, the effect of the ENEM on social mobility reduces slightly, going from 0.0195 to 0.0187 ($0.0195 - 0.008 = 0.0187$). Similar results are in Equation (2) for the quota categories. Therefore, the hypothesis that QL mediated the link between ENEM and earnings, and, consequently, social mobility, is not totally right.

Why is stratification still prevalent? Economically, the answer to this question could be based on the low quality of public high school that low-income students, mostly black and brown-skin individuals, have access to in Brazil (Maia & Karruz, 2023). Moreover, many of these students need to work while preparing for ENEM, which can negatively affect the results. So, these students can be less likely to get enough ENEM scores to enter the most prestigious and competitive courses, such as Medicine, Law, and branches of Engineering.

The results presented in this study show how the QL is a policy that fulfils its role, democratizing access to HE in a public university in Brazil. Poor, black, brown-skin, and Indigenous people who have attended high school in public schools (usually of inferior quality) are guaranteed 50% of the vacancies in Brazilian Federal Universities.

However, in terms of stratification, the results on courses and social mobility are like those found on developed countries (Britton et al., 2016; Callender & Dougherty, 2018; Marginson, 2016; Triventi, 2013a, 2013b). These results also corroborate studies conducted in Brazil that analyzed student choices from the sociological perspective, such as those by Nonato (2018), Lopes (2017), Nogueira et al. (2017), and Nogueira and Pereira (2010). In short, a significative part of students with high socioeconomic adversity backgrounds and, consequently, more significant adversity is attending courses with lower social and economic prestige.

Moreover, our dataset indicates that courses with the lowest social and economic prestige disproportionately attract those facing the most adversity. Do these students have more aptitude for these subjects? While there are students that have intellectual skills above the average, in this case, the approach to the definition of social positions of Bourdieu's thought can be used as a relevant justification (economic, cultural, and symbolic capitals).

For Bourdieu (1990), economic, cultural, and symbolic capitals cooperate for individuals. Thus, depending on the amount of each capital the individual holds, they will engage or be more or less likely to benefit from schooling. As a result, students from wealthy socioeconomic backgrounds have more capitals and are favored in the most promising choices. It would be the case for the most prestigious course choices since they are encouraged to maintain or improve their social position once they have the capital to do so. The opposite is true for students from lower social classes.

Translating into the context of the results found in this present study on the QL, the most prestigious courses have less adversity since their students have and had more capital to be able to be in them. Wealthier families can provide more opportunities, such as better high schools, along with motivations and support to pursue higher income and status courses. These results are like the studies by McCowan and Bertolin (2020), Lopes (2017), and Sianou-Kyrgiou and Tsiplakides (2011). Furthermore, the opposite is true for those with lower income and social profiles. According to Bourdieu (1990), the individual seeks what is considered most appropriate, or possible, to their socioeconomic profile.

In the case of exceptions, undergraduate students from high socioeconomic adversity backgrounds attending prestigious courses are part of a minority that has struggled to overcome the absence of economic, social, cultural, and symbolic capital. Therefore, in addition to intellectual capacity, in many cases, they had access to a high quality public high school (few institutions in Brazil), as well as a strong desire to change their social and economic condition.

Finally, gender coefficient shows that the gender inequalities remain into higher education, being the variable with significative coefficient to explain wages. Female students tend to be at a low

prestigious course and will be less likely to access an important social mobility. It is important to note that women are prominently enrolled in courses that involve caring or teaching activities.

Conclusion

We studied admissions data from a Brazilian federal university and found that the Quota Law has been successful as a widening participation strategy for high socioeconomic adversity students in Brazil. Also, the estimated models confirm our hypothesis that the Quota Law mediates the negative weights of adversity in achieving social mobility. However, the hypothesis that Quota Law reduces the ENEM weight to access to prestigious courses is not confirmed.

For the case under analysis, we argue that this QL is important and a necessary, but insufficient step to ensure social mobility and reduce socioeconomic gradient in income inequalities since we found that socioeconomic stratification remains across courses, with the most privileged students being overrepresented in the most prestigious courses and vice versa. This is due to course choices and social mobility being affected by socioeconomic backgrounds, gender inequalities, ethnicity, and, especially, low quality of Brazilian public secondary education, which results in low ENEM scores. This conclusion excludes the choices made according to students' preferences and skills but considers obstacles from adversity influences.

Throughout the country, there are few excellent public high schools, such as federal high schools and military schools (the best but minority Brazilian public schools). In general, students that are quota holders in prestigious courses are from these schools or are outliers in terms of intellectual skills.

Nevertheless, the reality is that most students from low-quality high schools do not have the same opportunities. There are talented students in these schools who have lower chances of having good ENEM scores and, consequently, accessing the most prestigious courses. This problem is related to the reproduction of inequality in politics itself.

Another important conclusion is that Brazilian women are in low wage courses. This reflects gender inequality and a consequent low social mobility to women. For the data analyzed, although ENEM scores average are like men and women (65.17 and 63.92, respectively), the courses that are frequently chosen by women are less prestigious. It is suggested that future investigations be directed towards a more meticulous examination of this matter.

As a final reflection, we can say that the QL, along with other policies that can improve the quality of secondary education, can be successful to promote social mobility. These policies help decrease negative effects from high socioeconomic adversity backgrounds and ethnicity on social mobility. Inequalities in Brazil surely will decrease by successfully promoting social mobility.

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