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# Decomposing Heterogeneity in Inequality of Educational Opportunities: Family Income and Academic Performance in Brazilian Higher Education

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**Abstract:** Access to higher education depends on the interaction between social origins and academic performance: background resources boost academic skills; but even when controlling for performance, privileged students are more likely to make ambitious choices and further transitions. Recent literature has shown that inequality in educational choices is heterogeneous across countries. However, it is still not well understood how different institutional designs within countries may affect the workings of those effects and how they can strengthen or weaken the inequality of educational opportunities. Using high-quality register data from the Brazilian higher education system, our work contributes to this understanding by investigating how SES and performance interact and drive students' choice between three different tracks: not entering higher education, entering the private system, or entering the public system. We developed a strategy to encompass multinomial choices and decompose the inequalities into primary and secondary effects. Using the Shapley Value decomposition strategy, we correct an intrinsic asymmetry that biased previous results. Our findings suggest affluent students enjoy dual advantages: high exam performance amplifies access to public universities (indirect effect) and family resources offset subpar performance, ensuring private university access (direct effect). We found no signs of multiplicative advantages.

**Keywords:** direct effects; indirect effects; compensatory advantages; performance; family resources

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A long tradition of sociological studies has found that access to higher education depends on the interaction between social origins and academic performance (Boudon 1974; Jackson 2013; Troiano, Torrents, and Daza 2021). On the one hand, background resources boost academic skills (indirectly acting to produce inequality in educational choices); on the other hand, even within the same level of academic performance, privileged students are more likely to make ambitious choices or continue their educational careers (Girard and Bastide 1963; Boudon 1974; Breen and Goldthorpe 1997). Recent literature has shown that inequality in educational choices can be heterogeneous and that family resources typically compensate for low academic performance (Bernardi and Triventi 2020). This idea of a "compensatory advantage" implies that: (1) inequalities in educational outcomes will be greater the lower the academic performance because the most privileged students are insensitive to it—they advance their educational careers anyway (Bernardi 2012);

(2) gains in educational performance can have an important role for individuals from underprivileged social backgrounds, as they rely solely on performance for educational success (Bernardi and Triventi 2020).

National educational systems may affect the magnitude and relative importance of inequalities in performance and choice (Van de Werfhorst and Mijs 2010; Jackson and Jonsson 2013). Studies from several countries have documented that compensatory advantages vary over time and place, such as in Italy (Bernardi and Triventi 2020), Spain (Bernardi and Cebolla 2014; Troiano et al. 2021), France (Herbaut 2019), and Norway (Wiborg and Grätz 2022). However, it is still not well understood how different institutional designs *within* countries may affect the workings and heterogeneity of those effects and how they can strengthen or weaken the inequality of educational opportunities. Comparing the educational systems of different countries implies abstracting socioeconomic and demographic differences, and changing major institutional frameworks and economic structures. Within-country comparisons help control for these contexts while allowing for the identification of how the same underlying population makes choices and produces inequality when faced with different institutional settings. Our work contributes to understanding this dynamic, substantively by exploring the nuances of within-country inequalities and methodologically by employing novel analytical techniques.

Higher education institutions are organized into segments with different levels of stratification and selectivity in many countries (Arum, Gamoran, and Shavit 2007; Van de Werfhorst and Mijs 2010). Jackson and Jonsson (2013) argued that although stratification tends to increase the inequality of choice, selectivity tends to reduce it (see also Bukodi, Goldthorpe, and Zhao 2021). This observation suggests that within a single national setting, diverse effects can coexist. In Russia, for example, the divide between academic and vocational paths is associated both with patterns of compensatory advantage, and increasing chances of upward mobility (Yastrebov, Kosyakova, and Kurakin 2018). In contrast, in Finland, the segmentation between academic and polytechnics pathways is associated with the emergence of compensatory and multiplicative advantages increasing inequality overall (Heiskala, Erola, and Kilpi-Jakonen 2021). Our research suggests that the highly selective public sector restrains compensatory advantages, which are more pronounced in access inequality to private institutions. Similar patterns have been identified in Chile, another Latin American nation characterized by the growth of higher education based on the expansion of private institutions (Ceron, Bol, and Van de Werfhorst 2022). This kind of horizontal stratification still needs to be further addressed by the literature that focuses on the complex interaction between socioeconomic status and educational achievement.

Relaying on high-quality register data from various sources, we studied how inequality due to educational performance and choices varies according to students' socioeconomic status in two distinct sectors of the Brazilian higher education system. Therefore, we modeled students' choice of accessing higher education in the public or private sector or not accessing it at all. Brazil has a dual system: on one side, a highly selective and moderately stratified tuition-free public sector and, on the other, an unselective and highly stratified paid private sector (Salto 2018). Combining population-level educational administrative data, we followed the educational

paths of the entire cohort of high school graduates in Brazil in 2012 (more than a million students) who could take the college entry exam in the next five years, and eventually entered a public or private undergraduate course in this period. The data allowed us to obtain students' official national academic performance scores and socioeconomic background information as well as to track whether they continued their studies. If they succeed in continuing, they enter a free public academically selective college or a private non–academically selective institution. Our main hypothesis is that the institutional design of the Brazilian higher education system allows privileged students to implement strategies that bolster their opportunities both in academically selective and tuition-free public universities, as well as in mostly open-door private colleges.

We developed a strategy that allows us to identify sectoral heterogeneous effects inspired by how Bernardi and Triventi (2020) decomposed gaps between students distributed across different levels of proficiency and social origins. Our method extends the original approach to encompass multinomial choices and heterogeneous indirect effects—that is, the effects of family resources on academic performance. As in previous studies, we focused on how students from similar educational performances and distinct social origins differ in their transition to higher education. However, we added a step to explicitly account for the overrepresentation of privileged students in the upper tails of the educational performance distribution. Therefore, our analytical strategy allows us to distinguish how much this concentration of economically privileged students at the top of the performance distribution matters in the structuring of socioeconomic gaps between students from different social origins. In other words, we explicitly measure the proportion of the socioeconomic gaps that are explained by the fact that privileged students can turn their socioeconomic position into better educational performance while also paying attention to how students with the same academic performance but lower socioeconomic origins differ in their educational choices. Furthermore, by making use of the Shapley Value decomposition strategy (Shorrocks 2013), we correct an intrinsic asymmetry in the counterfactual results of Bernardi and Triventi (2020) that caused their original method to produce biased results for the heterogeneous direct effects. Our results are presented more intuitively as percentage points rather than odds ratios, the former being more canonical in the literature (cf. Erikson et al. 2005; Buis 2010; Karlson 2013).

In the next section, we delve into the intricacies of educational choices, emphasizing the heterogeneous effects of social background and the importance of institutional designs. The third section provides a contextual background and discusses particular aspects of the Brazilian educational landscape. The fourth section outlines our data sources and methodological approach. The findings are detailed in the fifth section. Finally, the article concludes with a discussion of the results and their implications. We also suggest potential avenues for future research.

## Educational Choice, Heterogeneous Effects of Social Background, and Institutional Designs

The literature on Inequality of Educational Opportunities distinguishes two paths through which social origins can affect educational attainment. They are known as indirect (primary) and direct (secondary) effects (Girard and Bastide 1963; Boudon 1974; Breen and Goldthorpe 1997; Morgan 2012; Jackson 2013). The former encompasses how background resources affect the academic abilities of individuals and, on aggregate, the educational performance distribution, which constitutes an indirect route through which origins express their effects on later-life results. The latter describes the socioeconomic disparities in educational choices that persist even when educational performance is considered, indicating that social background exerts a direct effect on educational outcomes. It is important to stress that this use of the term "effect" is meant to follow the convention established in the literature since Boudon's (1974) seminal work. The terminology, however, does not imply the identification of causal effects (Morgan 2002; Morgan 2012). Although we are aware of these limitations in terms of causal inference, we follow a long tradition of studies that focus on accurate descriptions of educational inequality.

Several factors account for inequality in educational performance, such as the home environment, household composition, cultural capital, health and nutrition, school effects, and psychological mechanisms (Jackson 2013). By contrast, inequality in choices is usually associated with a cost-and-benefit analysis of individuals who weigh the investments needed and prospects. According to the rational choice tradition, the educational choices of high-status groups are motivated by the desire to avoid downward mobility (Erikson and Jonsson 1996; Breen and Goldthorpe 1997). Consequently, their offspring are more apt to navigate the perils associated with educational shortcomings, and they may benefit from parental assistance to rectify missteps and offset unfavorable life circumstances (Bernardi, 2012; Holm, Hjorth-Trolle, and Jæger 2019). Existing research has shown that direct effects are often more pronounced among students of privileged socioeconomic origins, measured mostly by parental education and/or income, with poor performance (Bernardi and Cebolla-Boado 2014; Bernardi and Triventi 2018), leading researchers to label these results as "compensatory effects" of social background on students' educational opportunities. As Bernardi and Triventi (2020) note, compensatory advantages are a specific type of heterogeneous direct effect of the socioeconomic background. In these settings, students from advantaged backgrounds but with poor performance still move to more valued academic tracks, whereas disadvantaged students with the same level of performance would pick less valuable routes or even drop out. Thus, affluent children are less reliant on negative educational outcomes.

However, compensatory advantages are not the only type of heterogeneous direct effect that can exist. For instance, Heiskala et al. (2021) showed there can be a "multiplicative advantage" setting, in which direct effects benefiting upper classes can accumulate or even amplify along the educational performance strata—a "boosting effect" phenomenon also observed by Bernardi and Ballarino (2016). Examining the role of intake rules and the dual model of higher education in the Finnish system that differentiates between academically selective universities and

nonselective vocational institutions, Heiskala et al. (2021) show that vocational institutions incorporate low-performing students from higher social origins, a typical compensatory advantage result. On the other hand, well-performing students from affluent classes have a significantly greater probability of enrolling in university that is much higher than what would be due only to performance, a result that suggests what the authors name a multiplicative advantage effect.

From a broader perspective, "compensation" occurs when the lack of one kind of asset or resource is counterbalanced by the presence of another. In some cases, it can be an inequality-reducing strategy if those who benefit from compensation are underprivileged (cf. Erola and Kilpi-Jakonen 2017), as is the case with compensatory policies such as affirmative actions or welfare payments. It only takes the form of "compensatory advantages," an inequality-bearing mechanism, when those who benefit from it are privileged. On the other hand, the multiplicative effects of background resources can only produce more disparities; they operate as a cumulative advantage (DiPrete and Eirich 2006).

Compensatory behaviors by parents follow the main implications of the rational choice theory: more resources are allocated to those with lower academic performance to prevent them from experiencing downward social mobility (Breen and Goldthorpe 1997; Bernardi and Cebolla-Boado 2014). It is not fully understood how parents' compensation is linked to more ambitious choices in later transitions, once performance is controlled for. Bernardi and Valdés (2021) and Valdés (2022) suggest that high–socioeconomic status (SES) students are more insensitive to low performance and that they form "sticky expectations" that disregard prior academic results. Multiplicative or reinforcing parental behavior arises when high-performing children may benefit more. Parents may also respond to their children's academic performance or other factors that are correlated with later academic performance, such as very early observed abilities or talents (Grätz and Wiborg 2020). According to Grätz and Torche (2016), this reinforcing behavior is more prevalent among high-SES families, whereas low-SES parents do not respond to ability differences, indicating a lack of reinforcement or compensation.

Another important point concerns how the proportion of groups across the educational distribution relates to inequality of opportunity. Bernardi and Triventi (2018) draw attention to how the total inequality between groups is a function of the probability of students from a particular group making an educational transition, given their performance as well as the proportion of students from different socioeconomic levels at different points in the educational distribution. This proportion is typically a component of exercises that aim to implement a decomposition of inequality between groups, highlighting how composition matters in understanding inequality (Shorrocks 1984). Previous studies on educational stratification have mostly used multivariate and simulation strategies that are incapable of incorporating compositional effects. Consequently, less attention has been paid to indirect effects in the literature. Although Bernardi and Triventi (2020) account for this compositional effect in calculating gaps between socioeconomic groups in their educational transitions, their attention also focuses on simulations involving mainly the direct effect that comes from the predicted probabilities calculated in postestimation multivariate models. In contrast, we propose herein a decomposition strategy of

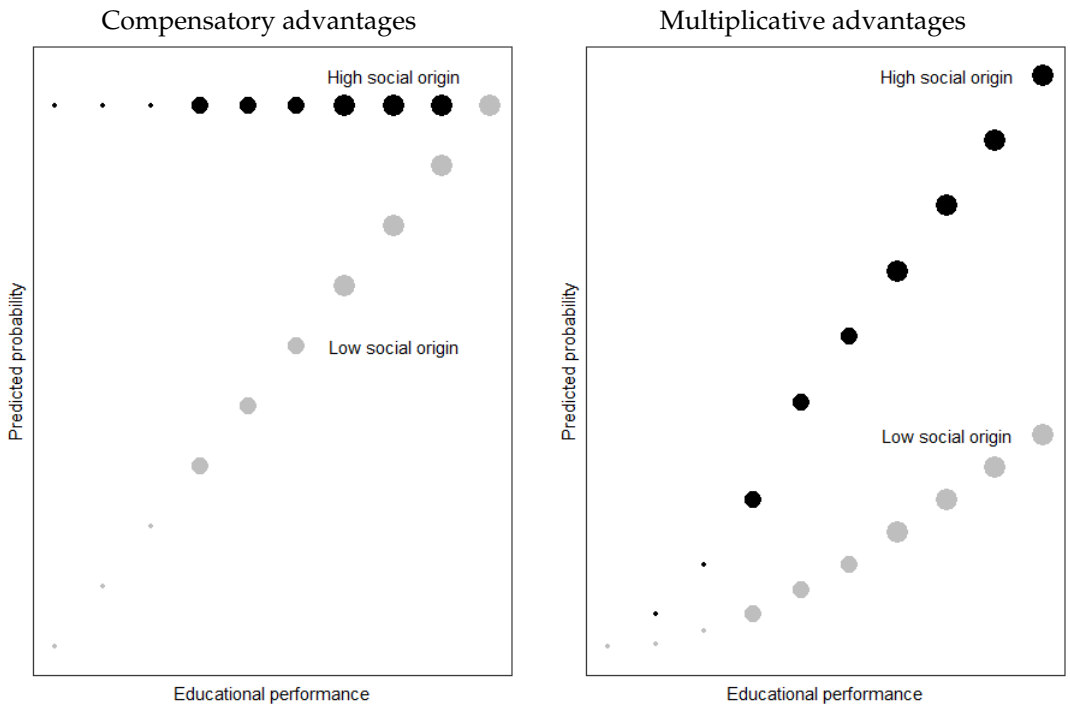


**Figure 1:** Examples of heterogeneous direct effects. Elaborated based on Heiskala, Erola, and Kilpi-Jakonen (2021) and Bernardi and Cebolla-Boado (2014).

gaps between different socioeconomic background groups of students competing for a place in Brazilian higher education that allows us to highlight compositional and mean effects in a way that translates perfectly into the indirect and direct ways of reasoning about educational stratification. Thinking in terms of compositional and mean effects is crucial because, as we will see below, the Brazilian education system is composed of academically selective and nonselective sectors. Therefore, understanding how students' previous educational trajectories enable or hinder their allocation to different possibilities of transitioning to higher education is as important as understanding which decisions are made by students from different backgrounds with the same performance.

Figure 1 illustrates two (nonexhaustive) examples of the heterogeneous direct effects reviewed thus far. The functional form and sign of how association patterns fit are empirical. The size of the circle represents the proportion of students in a given educational performance stratum, which is an empirical question. The total gap between any two groups relevant for study is the area formed between the circles, which represents the total inequality between the two groups.

A critical question is whether various institutional conditions can influence one type of heterogeneous direct effect. Higher education in a particular country may be characterized by different levels of differentiation and standardization (Van de Werfhorst and Mijs 2010) exhibiting varying degrees of stratification and selectivity. Jackson and Jonsson (2013) argued that although stratification generally increases the direct effect of origin, selectivity often works to mitigate these disparities. This

implies the possibility of the coexistence of multiple types of heterogeneous effects within the same national context.

The idea that institutions may shape the format of the heterogeneous effect is not novel; however, previous research has addressed this research question, mostly by following cross-country comparisons (e.g., Jackson 2013; Grätz and Wiborg 2020; Bernardi and Valdés 2021). The comparison of educational systems across different countries involves overlooking socioeconomic and demographic disparities and altering significant institutional frameworks and economic structures. By contrast, comparisons within a country facilitate the control of these variables. Additionally, it enables an analysis of how the same underlying population makes choices under identical conditions.

Competitive and highly socially valued tracks may disproportionately attract privileged students' attention, making them more likely to be a *locus* of compensatory or even multiplicative advantages. This might be true, especially if the intake rules are followed by expensive tuition fees, which makes this route inaccessible to lower classes, even when their students perform well. Meanwhile, the indirect effect of social background on academic performance might still play a role if financial costs are low or nonexistent. In this case, wealthier families can better prepare their children to compete in higher education. However, it is not clear how secondary effects would behave in this case if there were compensatory or multiplicative advantages, or even some other kind of heterogeneous direct effect (for instance, due to the inequality of information — cf. Bernardi and Boado, 2014).

Previous research has shown that students' social background effects do not work in the same way in different sectors of the educational system (Jerrim, Chmielewski, and Parker 2015; Yastrebov et al. 2018; Heiskala et al. 2021; Ceron et al. 2022). In this study, we examined the predominant effect within the same population depending on the transition and sector of the higher education system. Specifically, our analysis aimed to identify how various socioeconomic strata respond to distinct institutional frameworks, considering both their available resources and academic performance. By methodically assessing these responses and their aggregate effects, we intend to contribute a nuanced understanding of how different segments of society exploit or are hindered by the structural design of higher education systems.

## Brazilian Context

Since the 1950s, Brazil has witnessed changes in the inequality of educational opportunities with the increased expansion of primary education and the subsequent expansion of secondary and tertiary education from the 1990s onward (Ribeiro, Ceneviva, and Brito 2018). Throughout the 2010s, the country reached the expansion peak of undergraduate programs, registering 8.6 million student enrollments in 2020—against only 1.5 million in 1990—and a net enrollment rate of 25.5 percent of the population aged between 18 and 24 years old. Compared to other countries with similar development levels, the proportion of Brazilians who access and conclude higher education is low. In Brazil, 21 percent of people aged between 25 and 34 years were enrolled in a higher education institution in 2019; in Mexico, this

proportion was 24 percent, in Colombia 30 percent, in Chile 34 percent, in Argentina 40 percent, and 45 percent in member countries of the Organisation for Economic Co-operation and Development (OECD; OECD 2020).

Until the early 1990s, tertiary education represented a system primarily catering to the wealthiest segments of the population and predominantly attended by racially advantaged groups (whites) and students from families with higher educational backgrounds and greater household income per capita (Collares 2011; Marteleto, Marschner, and Carvalhaes 2016). More recently, this pattern has changed in favor of less unequal access. Based on household data, Salata (2018) demonstrated that the higher education system only addressed the growing demand originating from education levels after 2010. Other authors, stemming from similar sources, also found this same inflection movement toward more equitable and inclusive opportunities of access (Carvalho and Waltenberg 2015; Marteleto et al. 2016).

In terms of market organization of higher education, we can situate Brazil as a binary system (see Arum et al. 2007) because there is a marked distinction between institutions within a tuition-free and academically selective public sector and a paid, academically unselective private sector (Salto 2018). The public sector comprises 22 percent of enrollments and is characterized by a predominance of universities with didactic–scientific autonomy, devotion to research, and a greater diversity of fields of study. Historically, although tuition-free, the public sector has attracted students from families with higher household per capita incomes and parents with higher educational attainment. This apparent paradox is due to the highly competitive admission process drawn from content-based tests, which strongly depend on previous educational performance. Therefore, it is socioeconomically feasible to attend primary and secondary schools.

On the other hand, the private sector prioritizes courses with low economic cost and high demand, which account for 78 percent of enrollments in a growing trend over the past decades (Carvalhaes, Medeiros, and Santos 2023). Within this sector, a select group of renowned religious-affiliated colleges with a tradition of research began to share the market with competitive profit-oriented mass private colleges owned by large business conglomerates, with an exclusive focus on teaching programs. There is also a minor and selected group of renowned private colleges that are high quality and/or research oriented, attracting students from privileged backgrounds.

In this context, the public sector's attractiveness to Brazilian students and their families is due to various reasons. In addition to not charging tuition fees, this sector has the greatest diversity of fields of study, both in terms of scientific areas and resource-intensive and expensive majors in terms of infrastructure, such as those in the healthcare and engineering fields (Balbachevsky and Sampaio 2017). The public sector also features full-time professors (Schwartzman 2013), has institutional profiles that cater to both scientific and vocational areas, and is, on average, academically selective. Studies tracking the career paths of students in the job market indicate that students who have graduated from the public sector, on average, have higher salaries and job stability (Caseiro and Maciente 2023). Although some private institutions emulate the public sector (Schwartzman, Silva Filho, and Coelho 2021), their numbers are small and concentrated in large rich cities. We must also

mention niche institutions focused on the professionalization of elites in business, finance, and economics, which are even smaller and mainly distributed in the country's wealthiest cities, such as São Paulo and Rio de Janeiro. Therefore, on average, there is a considerable incentive for students and their families to pursue studies in the public sector. From 2004 on, Brazil has more than 2,000 higher education institutions, among which about 88 percent are private and only 12 percent are public. The Federal Government conducts a centralized high-stakes exam, Enem (*Exame Nacional do Ensino Médio*—National Exam of the Upper Secondary Level), for students who are willing to apply for tuition-free public institutions or who wish to participate in programs that subsidize tuition in the private sector. Enem was administered by the National Institute for Educational Studies and Research (INEP) of the Ministry of Education's Statistics Bureau. Access to the majority of public and private institutions was strictly granted by Enem test scores. Only a small number of institutions do not use Enem scores, and instead rely on their own local exams. Enem scores are decisive, as a young person's educational trajectory depends directly on them to allow for better academic choices. However, students may take the exam as many times as they want to.

Although inequality of educational opportunity in Brazil has been extensively studied, our study stands out as the first at the national level to adopt a research design that tracks the same students at two distinct points in time: specifically, at the end of high school and at the commencement (or absence) of higher education. Consequently, analysis of educational trajectories has been nearly absent, leaving crucial aspects, such as the transition from secondary to higher education and the interaction between educational performance, socioeconomic status, and horizontal stratification, largely unexplored. As detailed in the next section, we used longitudinal data built with different high-quality and official register data, with academic performance directly measured as Enem scores.

The Brazilian case is characterized by two factors that make the country an interesting case for studying the stratification of educational opportunities. First, the country conducts one centralized high-stakes exam for students who have completed secondary education and are willing to apply either to tuition-free public institutions or participate in programs that subsidize tuition in the private sector. Second, the public sector is considered to have, on average, higher quality and greater diversity of options in fields of study and, crucially, does not charge tuition fees to students (Carvalhaes et al. 2023). These characteristics make the public sector highly attractive to students with different socioeconomic profiles. Access to the majority of public and private institutions is strictly granted by the scores achieved in the high-stakes centralized exam that we analyze. We observed a cohort of students who registered and participated in the Brazilian high-stakes test Enem. By combining data from the exam with administrative data from the higher education system, we can determine whether a cohort of students who participated in the exam entered higher education and, if so, whether they did so in public or private institutions.

# Data and Methods

## *Data*

We built a panel based on the intersection of three administrative databases produced by INEP of Brazil's Ministry of Education's Statistics Bureau. Our starting point was the yearly Basic Education Census, through which we obtained cohort data of 1.69 million young people who graduated from secondary school in 2012. We had access to a restricted data set[1] with the Individual Taxpayer Registration Number (CPF, in Portuguese). This allowed us to track individuals in each edition of the Higher Education Census from 2013 to 2017 to identify those who enrolled in a higher education institution within five years of completing high school. We considered only the first enrollment; therefore, we did not compute subsequent dropouts and reentries into the system.

Some of our independent variables are available in the Enem data set from 2012 to 2016.[2] Enem is a nonmandatory standardized national exam conducted on two different days. The main goal of the exam is to test the knowledge level of secondary school students using 180 multiple-choice questions distributed across four areas of knowledge: language, mathematics, human sciences, and natural sciences. In addition, the participants must write an argumentative essay. The exam serves as an admission test for enrolling in most public universities in the country, as well as for applying to a set of scholarship policies and student credits in private higher education. Enem candidates completed a socioeconomic questionnaire containing information about their families, households, and educational history. In addition to exam scores, these are the only available data to investigate how family income and academic performance combine with access to higher education on a national scale in Brazil.

From the total number of high school graduates in 2012, we excluded approximately 57,000 observations (3.3 percent) for which we lacked an identification number. Of the 96.7 percent of high school graduates monitored in our analysis, two-thirds (65.8 percent) took some edition of the Enem between 2012 and 2016. On the one hand, 69.4 percent of the high school graduates who took Enem enrolled in a higher education institution; on the other hand, 30.6 percent were unable to access this level of education during our monitoring period. Among those who did not take Enem, the proportions were practically reversed: 74.9 percent did not enroll in a higher education institution in Brazil, whereas 25.1 percent did. Using these data, we were attentive to the selectivity and possible self-selection bias of the more motivated and prepared candidates. Nonetheless, we advocate the use of data insofar as they allow us to monitor a heterogeneous cohort of students. Thus, the level of inference in this study was a cohort of students who concluded high school in 2012 and took Enem between 2012 and 2016. Given the profile of the exam and the high incentives to take it, this population is fitting to study the association between income (dis)advantages and entry into higher education.

### Dependent Variable and Focal Variables

Our dependent variable was enrollment in higher education, analyzed through a nominal categorical variable (0 = no entry; 1 = entry in the public sector; 2 = entry in the private sector). The focal variables were students' family income per capita and the Enem score.

Originally, family income per capita was a categorical variable with 17 bins, defined as the range or fraction of the minimum wage in the year of the exam. We calculated household income per capita by dividing the midpoint of the minimum wage range by the number of inhabitants in the household and using the official price index (INPC) to deflate them to July 2023 values. We then recoded these values into income deciles. To measure academic performance, we used the average score on Enem, a continuous variable computed from the simple arithmetic average of the scores on the four objective tests, disregarding the argumentative essay. Only the scores of the individuals present on the two days of the examination were counted. The proficiency scale of the exam ranged from 0 to 1,000 points, comparable to the 2009 edition, and the exams were prepared from a reference matrix that reflected the main curricular content taught in high school. We also divided the performance scores into deciles.

### Empirical Strategy

Our empirical strategy for estimating the inequality in educational opportunities and the heterogeneous direct and indirect effects is based on a decomposition strategy inspired by the approach of Bernardi and Triventi (2020). The total observed inequality ($INE$) between two social strata—an upper one ($U$) and a lower one ($L$)—is the difference in the probability of making a specific educational choice. Once we analyze a multinomial setup, it is possible to obtain an inequality measure for each choice $C$: No Access (not making the transition to the higher education; Eq. [1.1]), Public (enrolling in a public sector tertiary institution; Eq. [1.2]), and Private (enrolling in a private tertiary institution; Eq. [1.3]).

$$INE(\text{No Access}) = P_U(\text{No Access}) - P_L(\text{No Access}) \tag{1.1}$$

$$INE(\text{Public}) = P_U(\text{Public}) - P_L(\text{Public}) \tag{1.2}$$

$$INE(\text{Private}) = P_U(\text{Private}) - P_L(\text{Private}) \tag{1.3}$$

The quantities of interest, $P_U(C)$ and $P_L(C)$, for any choice $C$, can be obtained as predicted probabilities from a multinomial regression given the stratum (see details in the next subsection). Cutting performance into deciles, we can write. $INE(\text{C})$ as:

$$INE = \sum_{d=1}^{10} [P_{U,d} \times I_{U,d} - P_{L,d} \times I_{L,d}]. \tag{2}$$

To simplify the notation, we omit the choice category from the expression above. This new equation clarifies that inequality is driven by both the composition of the performance distribution within the stratum, and the difference in the probability of transition among those with the same performance. These two components are

closely related to the key concepts of indirect and direct effects of social origin. Direct effects are differences in educational performance between students from distinct social origins, which on aggregate lead to different distributions within the stratum. Direct effects manifest as inequality in educational decisions among equally performing students—in other words, a persisting direct effect of social origins, once we control for performance. Equation (3) allows for exact decomposition that differentiates these components:

$$\begin{aligned} INE &= \left[\sum_{d=1}^{10}\left(\frac{P_{U,d}+P_{L,d}}{2}\right)\times(I_{U,d}-I_{L,d})\right] + \left[\sum_{d=1}^{10}(P_{U,d}-P_{L,d})\times\left(\frac{I_{U,d}+I_{L,d}}{2}\right)\right] \\ &= \underbrace{\left[\sum_{d=1}^{10}\overline{P_d}\times\Delta I_d\right]}_{\substack{\text{Indirect Effect}\\ \text{(Due to Performance Distribution)}}} + \underbrace{\left[\sum_{d=1}^{10}\Delta P_d\times\overline{I_d}\right]}_{\substack{\text{Direct Effect}\\ \text{(Due to different probabilities of choice)}}} . \end{aligned} \tag{3}$$

Equation (3) is an algebraic manipulation of Equation (2): The composition/indirect effect indicates how much of the inequality is due only to the difference in performance composition between income quantiles ($\Delta I_d$) and the direct effect isolates the impact of the difference in probability of making the academic choice ($\Delta P_d$). This strategy of averaging and differentiating for obtaining "pure components" is standard in the literature of decomposition of inequality indexes, and it is consistent with the Shapley value method (Shorrocks 2013; Elbers 2023), which assures us to obtain the ceteris paribus/partial effect of a component of interest. In addition, the components add up to the total index and allow us to present the disaggregated results by the performance strata.

As previously argued, compensatory advantages (CAs) can be regarded as a type of heterogeneous secondary effect along a performance distribution (Bernardi and Triventi 2020). More specifically, and by definition, CAs must only exist *below the top* of the performance distribution; it is how much insufficient proficiency is compensated by social background resources, shifting the educational choice of the richer. In other words, the probability difference in the top performance decile $P_{U,10} - P_{L,10}$ is part of the direct effect, which should not be regarded as a compensatory advantage. Thus, all the differences in excess observed in the performance deciles $d$ below must reveal the degree of CA.

*Compensatory Advantages Setting*

$$\underbrace{(P_{U,d}-P_{L,d})}_{\substack{\text{Probability difference at}\\ \text{Performance Decile d}}} > \underbrace{(P_{U,10}-P_{L,10})}_{\substack{\text{Probability difference at}\\ \text{highest Performance Decile}}}$$

However, multiplicative disadvantages are characterized by a situation in which the direct effects increase along the performance distribution. In other words, when $(P_{U,10} - P_{L,10})$ is typically higher than $(P_{U,d} - P_{L,d})$, for $10 > d$. This gives us:

*Multiplicative Advantages Setting*

$$\underbrace{(P_{U,d} - P_{L,d})}_{\substack{\text{Probability difference at} \\ \text{Performance Decile d}}} < \underbrace{(P_{U,10} - P_{L,10})}_{\substack{\text{Probability difference at} \\ \text{highest Performance Decile}}} .$$

Strictly speaking, in a pure compensatory advantage setting, in all pairwise comparisons of performance strata $d$ and $d+1$ (not only $d$ and 10), we would see $(P_{U,d} - P_{L,d})$ larger than $(P_{U,d+1} - P_{L,d+1})$. Likewise, in a pure multiplicative advantage setting, all pairwise comparisons would give $(P_{U,d} - P_{L,d})$ smaller.

The total amount of heterogeneous direct effects can then be given by:

$$\text{Heterogeneous Direct Effects} = \sum_{d=1}^{10} [\,(P_{U,d} - P_{L,d}) - (P_{U,10} - P_{L,10})\,] \times \overline{I_d}. \quad (4)$$

This equation sums up both types of differential advantages. If the results are positive, compensatory advantages dominate; if they are negative, multiplicative advantages dominate. Inequality due to incomplete information and other possible kinds of heterogeneous direct effects must be evaluated more carefully, by analyzing what happens within each performance strata $d$.

Bernardi and Triventi (2020) proposed a similar index to assess compensatory advantages. Equation (4) provides an estimate that differs from that strategy. The authors elaborated on a counterfactual simulation in which the direct effect at the bottom levels was set at that observed in the top performance stratum: $P^S_{U,d} = P_{L,d} + (P_{U,10} - P_{L,10})$. They then used this simulated quantity instead of $P_{U,d}$ in Equation (2) to obtain $INE^S$ (the $S$ script stands for "simulated"). By making $INE - INE^S$, we obtain an estimate of CA that does not control for changes in composition, though it is possible to show that:

$$INE - INE^S = \sum_{d=1}^{10} [(P_{U,d} \times I_{U,d} - P_{L,d} \times I_{L,d}) - (P_{U,10} \times I_{U,d} - P_{L,10} \times I_{U,d})].$$

We can clearly see by rewriting Equation (4) as $\sum_{d=1}^{10}[(P_{U,d} \times \overline{I_d} - P_{L,d} \times \overline{I_d}) - (P_{U,10} \times \overline{I_d} - P_{L,10} \times \overline{I_d})]$. Notice that in our version, all performance terms are fixed ($\overline{I_d}$), while Bernardi and Triventi's (2020) are allowed to vary: both $I_{U,d}$ and $I_{L,d}$ were used. In other words, their estimates of direct effects are contaminated by a certain amount of compositional (or indirect) effects. Furthermore, this expression is a measure of the heterogeneous direct effects of all kinds, not only comparative advantages. In fact, our approach is wider and more general. We compare the differences between the results from the two strategies, Bernardi and Triventi's (2020) and ours, to assess how each strategy performs and what the substantive implications are.

### *Comparing Probabilities and Controlling for Variables*

The predicted probability ($\hat{P}$) of making a particular academic choice ($C$) for an individual $i$ is obtained by plugging his vector of observed variables ($\mathbf{x}_i$) into the inverse link function ($\eta$). In a multinomial regression model with $j$ categories this is given by:

$$\hat{P}_i(C) = \frac{x_i \widehat{\beta}_{j=C}}{\sum_j \exp(x_i \widehat{\beta}_j)} = \eta(X = x_i).$$

It is widely known that in nonlinear models the independent variables all interact when producing a predicted value (Mize 2019). This means that the effect of moving from an income level $L$ to a higher one $U$ is individual-specific. Because of this, we use discrete marginal effects—also called Average Discrete Changes (ADCs). First, for all individuals in the data set, we set the income variable at $U$ and then let the vector $\mathbf{x}_{-\text{Income},i}$ of all the other explanatory variables (except income) be equal to their observed values. Plugging it all in the equation below, we get:

$$\hat{P}^*_{U,i} = \eta(\text{Income} = U,\ X_{-\text{Income}} = x_{-\text{Income},i}) \tag{5}$$

Where $\hat{P}^*_{U,i}$ is a counterfactual predicted probability for individual $i$, if he had income level $U$. And the same is done for Income $= L$:

$$\hat{P}^*_{L,i} = \eta(\text{Income} = L,\ X_{-\text{Income}} = x_{-\text{Income},i}). \tag{6}$$

The ADC can then be obtained by making:

$$\text{Average Discrete Change} = \sum_i \left\{ w_i \times \left[ \hat{P}^*_{U,i} - \hat{P}^*_{L,i} \right] \right\} \tag{7}$$

Where $w_i$ is a vector of sampling weights that must add up to one: $\sum_i w_i = 1$ (if the sample is unweighted, $w_i = 1/n$). Equation (7) shows that ADCs are on purpose affected by the joint marginal distribution of all explanatory variables—as $w_i$ is the empirical frequency with which any combination $\mathbf{x}_i$ occurs.

However, it is possible to recalibrate these weights in order to match marginal distribution(s) of (a) variable(s) of interest, keeping constant all the other marginal distributions as well as the statistical association among them. More specifically, we want to obtain weights that match the marginal distribution of Performance when Income $= U$ and when Income $= L$, holding the other aspects of the distribution constant as observed in the whole sample. To achieve this, we use Raking Iterative Proportional Fitting, a statistical technique usually used to adjust contingency tables and calibrate samples to known population margins (for a similar use, see Elbers 2023). The procedure is explained in the Statistical Appendix A of the online supplement.

We then obtain $w_i^{P|\text{Income}=U}$ and $w_i^{P|\text{Income}=L}$, which are recalibrated sample weights for all the individuals. Both add up to the total number of observations and also to the observed frequency of all the other variables in the model, except performance. Using $w_i^{P|\text{Income}=U}$, performance distribution will be equal to that

we observe when conditioning the sample to Income $= U$, and using $w_i^{P|\text{Income}=L}$ performance distribution will be like conditioning it to $L$.

We can then recalculate the quantities of interest necessary to build INE:

$$\hat{P}^*_{U,d} = \frac{\sum_{i \in d}\left[\hat{P}^*_{U,i} \times w_i^{P|\text{Income}=U}\right]}{\sum_{i \in d}\left[w_i^{P|\text{Income}=U}\right]} \quad \hat{P}^*_{L,d} = \frac{\sum_{i \in d}\left[\hat{P}^*_{L,i} \times w_i^{P|\text{Income}=L}\right]}{\sum_{i \in d}\left[w_i^{P|\text{Income}=L}\right]}$$
$$\hat{I}^*_{U,d} = \sum_{i \in d}\left[w_i^{P|\text{Income}=U}\right] \quad \hat{I}^*_{L,d} = \sum_{i \in d}\left[w_i^{P|\text{Income}=L}\right]$$

Which we can then plug in to Equation (2) to obtain a version of $INE$ that controls for the independent variables distribution (by making it equal for both $U$ and $L$) and that also takes into account how performance behaves for the richer and the poorer.

Confidence intervals were obtained with Parametric Bootstrap (see Statistical Appendix B of the online supplement).

## Robustness Check

*Pairwise comparisons and total inequality.* Our preferred inequality measure, presented in Equation (2), is not sensitive to trends and variation of inequality in the middle of income distribution. And comparing only the top and bottom strata is somewhat arbitrary. One may ask how results would perform if other comparison among income classes was made. There is an $INE(U, L)$ for all pairs $U$ and $L$, such that $U > L$. As a robustness check, we calculated all the pairwise comparisons among an upper and a lower stratum. Results are presented in the Annex.

However, pairwise comparisons are numerous—and this makes the overall picture not easy to grasp. One way of summarizing that information is by composing a "Total Inequality" index, by adding up all the pairwise $INE(U, L)$ values:

$$\textit{Total INE} = \sum_{U>L}\left\{\sum_{d=1}^{10}\left[P_{U,d} \times I_{U,d} - P_{L,d} \times I_{L,d}\right]\right\}. \tag{8}$$

*Total INE* is the sum of all probability differences between an upper and a lower stratum. In other words, it takes into account all the inequality among strata. Its value can be higher than 1, though—which makes it a little less interpretable. *INE*(*top 10 percent, bottom 10 percent*) can be regarded as a good measure if it shows the same trends and behavior as *Total INE*, although with different inequality levels. *Total INE* can also be decomposed into primary (composition) and secondary (mean) effects.

*Alternative model specifications.* In our preferred model specification (or "Full Model"), the explanatory variables are the main effects of income deciles and performance deciles, used both as categorical variables and their interaction effects. We added controls for the year of the Enem exam (as a set of dummy variables), gender (male, female), race (white or non-white), age and age squared, administrative category of the secondary school the student had previously attended (public/municipal,

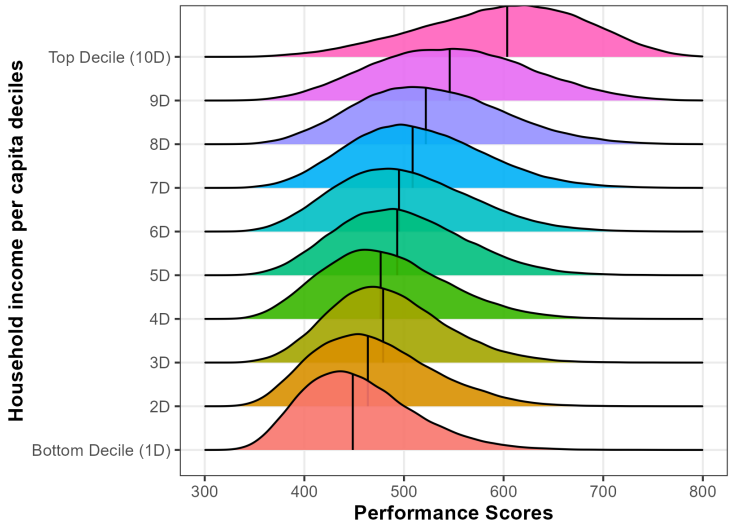


**Figure 2:** Performance distribution (Enem Score), by household per capita income decile. *Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).

public/state, public/federal, or private), location of residence (rural or urban), and the state of the country (27 categories).

To assess the sensitivity of the results to the choice of SES focal variables, we estimated four alternative specifications: (1) using income as quintiles (instead of deciles); (2) using the highest parental education (primary, secondary, tertiary, or higher education); (3) using income as deciles, but adding parental education as a control; and (4) using a simplified equivalence scale (the square root of the number of dwellers) for calculating the per capita income values, and then dividing them into deciles. Table 4 presents the results.

# Results

## *The Access to Higher Education*

In 2012, approximately 1.7 million young people aged between 16 and 22 years graduated from high school, of whom 1,133,027 took Enem and thus comprised the cohort of this study.[3] Approximately 781,000 young people (68.9 percent) from the 2012 cohort were enrolled in a higher education institution within five years, among which 592,000 (75.8 percent) were in the private sector and 189,000 (24.2 percent) were in the public sector. Approximately 39.5 percent of enrollees in the public sector are children of parents with a university degree and 20.3 percent belong to the richest income decile. Conversely, in the private sector, 26.6 percent of students had parents with a higher education diploma, while those belonging to the richest decile comprised 11.7 percent of enrollees.

Figure 2 illustrates how the Enem scores vary according to social origin. As family income increases, mean performance also increases, but the distribution becomes more spread and left-skewed. On average, enrollees in public universities

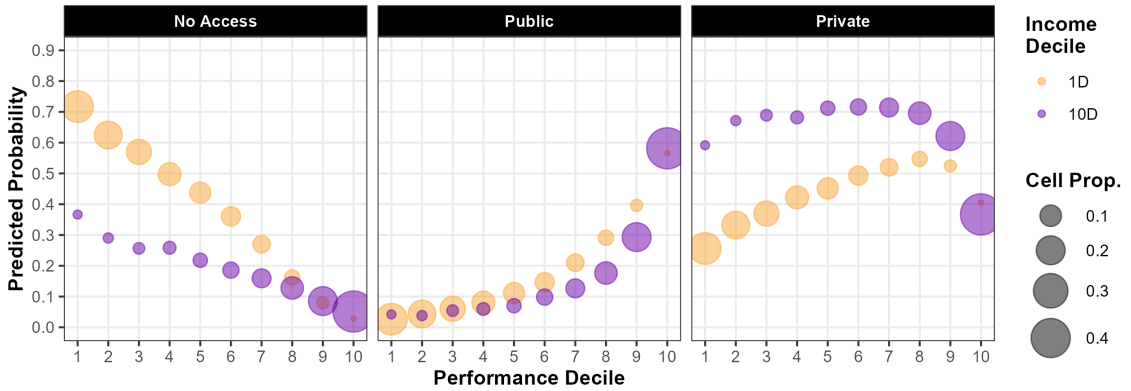


**Figure 3:** Probabilities of no access, access to public, and access to private higher education, by performance decile, for the bottom (1D) and top (10D) income decile. *Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).

score 581.1 points, compared to 510.1, for enrollees in private colleges—a hiatus equivalent to a 0.91 standard deviation (SD) of the cohort's average score. Only the top income stratum has a median performance above that threshold.

Figure 3 displays the counterfactual predicted probabilities of being at each academic destination by performance decile computed using Equations (5) and (6). They represent an individual's choice if all their characteristics are held constant, except for their income level. Circle sizes represent the size of each income-performance cell: actual observed proportion of students. Across panels, heights referring to the same income decile and performance levels add up to one; within a panel, circle sizes of the same color also add up to one (as they represent the conditional distribution of performance by income decile).

The slope of the trend underscores the significance of academic performance in academic choices, whereas the difference in height between points within a performance level is influenced by income. Regardless of their performance level, individuals in the top income decile are more likely to avoid the "no access" route compared to those in the bottom decile. However, this advantage steers them toward the private sector rather than the public sector. In private higher education, the influence of performance on the wealthy diminishes as their probabilities remain consistently high and relatively uniform. This suggests that when seeking admission to a private college, the income level of the wealthiest individuals has little bearing on whether they achieve high or low scores on Enem.

For poorer students, the socioeconomic barriers of private institutions hinder their chances of admission, even with high performance scores. In contrast, the poor have a higher probability of entering the public sector than the rich within any performance strata, except the highest, once they have avoided their most likely destination—to be out of higher education. Admission to public universities is, by design, highly dependent on educational performance, which makes them less affected by socioeconomic factors. Figure 3 also shows that, as performance increases, the circle sizes expand for the top income groups. This means that the dominance of elite groups in the Brazilian higher education public sector is

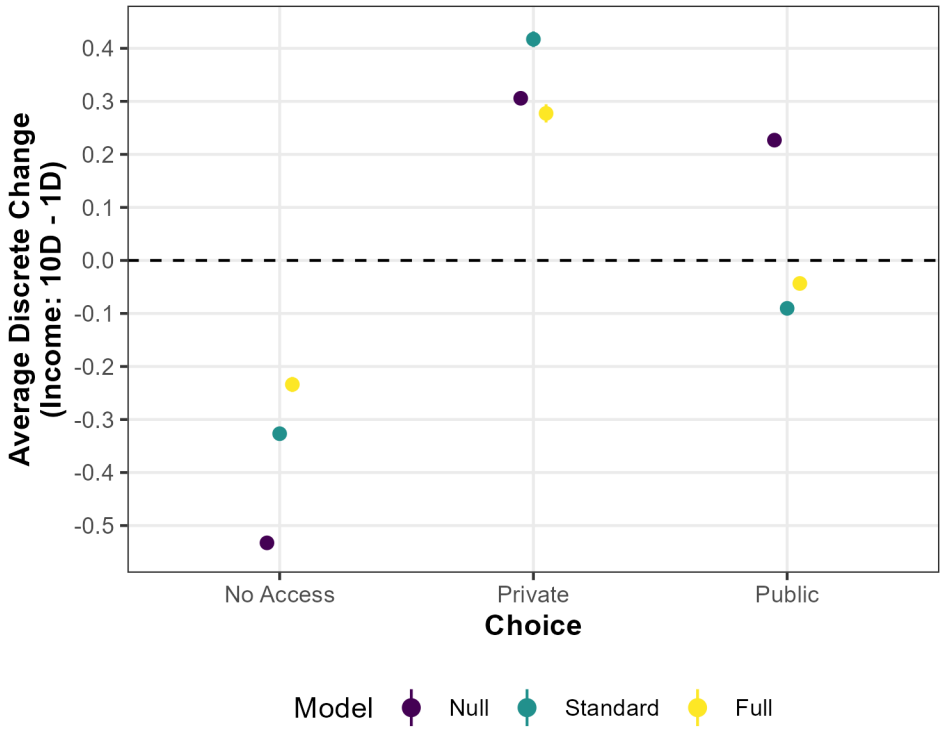


**Figure 4:** Average Discrete Change in probability when we move from the bottom to the top income decile, three different models. *Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP). Point ranges represent a 99 percent confidence interval.

driven by the composition effect. In other words, they tend to concentrate on high-performance levels.

Figure 4 presents the Average Discrete Change (ADC; see Eq. [7]) when moving from the bottom to the top income decile in the three multinomial models. The Null Model has only income deciles as predictors and is intended to reveal the total effects of SES on the probabilities. The Standard Model adds performance score deciles and interactive effects between them and income. This allowed us to determine the direct effects of SES. The Full Model added control variables and revealed a finer version of the same direct effects. The majority of changes in the effects became apparent when transitioning from the Null to the Standard Model. This finding suggests that performance alone plays a significant role in mediating the effect, with control variables having less influence on the estimates. It is important to note that because the sample size was very large, the confidence interval bounds were very small and barely visible in the graph.

For the public sector choice, the inclusion of performance scores not only diminishes the effect of income but also makes it change direction, becoming negative. In the private sector, income increases after performance inclusion. However, introducing control variables in the full model returns it to a level similar to that of the Null Model. In other words, income remains relevant as before. In fact, for both

"No Access" and "Private" choices, the direct effect is quite robust: the Average Discrete Change exceeds 20 percentage points in absolute value.

The results of this section provide insight into the various strategies employed by students from diverse socioeconomic backgrounds when competing for a spot in higher education. The change in the effect direction for the public sector suggests that the dominance of affluent groups in this segment is due to the increased likelihood of their children performing well on the centralized high-stakes exam, which grants them access to selective higher education. By contrast, a different pattern emerges when examining access to the private sector. Once performance is considered, the direct influence of income becomes apparent across various social groups. This topic is further explored in the following section.

### *Indirect Effects and Heterogeneous Direct Effects*

The inequality measures described in the Empirical Strategy section allow us to decompose and further understand the descriptive findings thus far. Table 1 presents the terms and calculations for the probability gaps captured by the $INE$ index. We compared students in the first and 10th income deciles. Columns A to H present the elements of Equation (2).

The top income bin is 42 percentage points (p.p.) less likely to have no access to higher education than the bottom stratum. Instead, they are 26.4 p.p. more likely to be present in the tertiary public sector and 15.6 p.p. in the private sector (see Table 1, column H). These INE values can be read as the amount of disproportional "displacement" among income classes, analogous to a Dissimilarity Index. The total displacement increases to zero: $(-0.420) + 0.264 + 0.156 = 0$.

Among students who did not enter higher education, this result was highly dependent on the low-performing deciles. In the public sector, $INE$ is entirely anchored in the highest-performing decile: notice, in panel B, column G, that the 10th performance decile (0.255) accounts for almost all content of $INE(\text{Public})$ (0.264). Finally, we find a more heterogeneous scenario for the private sector (panel C, column G). Although poorer students were less likely to enter this sector across all performance levels, the sector incorporated them in a greater proportion (see column A). From the 7th performance decile on, there is a larger quantity of wealthier students (panel C, column E), which combined with their greater likelihood of entry into the sector (panel C, column D), ends up producing the observed academic choice gap.

Table 2 presents the decomposition of $INE$ into indirect and direct effects according to Equation (3). The direct effects are further decomposed into heterogeneous components, as shown in Equation (4). Additionally, we present estimates produced by making use of Bernardi and Triventi's (2020) strategy (column D).

Column A of Table 2 reveals that the indirect effect accounts for 63.6 percent of socioeconomic disparities in the decision to pursue higher education. This implies that the advantage enjoyed by the most privileged students is primarily a result of their social background, which propels them into higher-performance deciles. Nevertheless, the total direct effect remained significant, contributing 36.4 percent of the overall inequality. Note that the heterogeneous direct effect component

**Table 1:** Comparing bottom and top 10% income strata: average probabilities of access to higher education, performance composition and inequality in academic choice (*INE*).

| | (A) | (B) | (C) | (D) | (E) | (F) | (G) | (H) |
|---|---|---|---|---|---|---|---|---|
| **Performance decile ($d$)** | **Bottom 10% of income ($L$)** | | | **Top 10% of income ($U$)** | | | $INE$ | |
| | $\hat{P}^*_{L,d}$ | $\hat{I}^*_{L,d}$ | $\hat{P}^*_{L,d} \times \hat{I}^*_{L,d}$ $(A) \times (B)$ | $\hat{P}^*_{U,d}$ | $\hat{I}^*_{U,d}$ | $\hat{P}^*_{U,d} \times \hat{I}^*_{U,d}$ $(D) \times (E)$ | $INE_d$ $(F) - (C)$ | $INE$ $\sum(G)$ |
| **Panel A - No access** | | | | | | | | |
| 1D | 0.717 | 0.248 | 0.178 | 0.366 | 0.014 | 0.005 | −0.173 | |
| 2D | 0.625 | 0.182 | 0.114 | 0.290 | 0.017 | 0.005 | −0.109 | |
| 3D | 0.570 | 0.144 | 0.082 | 0.257 | 0.023 | 0.006 | −0.076 | |
| 4D | 0.498 | 0.116 | 0.058 | 0.259 | 0.029 | 0.007 | −0.050 | |
| 5D | 0.437 | 0.096 | 0.042 | 0.218 | 0.037 | 0.008 | −0.034 | −0.420 |
| 6D | 0.361 | 0.076 | 0.027 | 0.186 | 0.050 | 0.009 | −0.018 | |
| 7D | 0.270 | 0.060 | 0.016 | 0.159 | 0.073 | 0.012 | −0.005 | |
| 8D | 0.162 | 0.043 | 0.007 | 0.128 | 0.110 | 0.014 | 0.007 | |
| 9D | 0.079 | 0.025 | 0.002 | 0.085 | 0.198 | 0.017 | 0.015 | |
| 10D | 0.029 | 0.009 | 0.000 | 0.051 | 0.447 | 0.023 | 0.023 | |
| **Panel B – Public** | | | | | | | | |
| 1D | 0.027 | 0.248 | 0.007 | 0.042 | 0.014 | 0.001 | −0.006 | |
| 2D | 0.043 | 0.182 | 0.008 | 0.038 | 0.017 | 0.001 | −0.007 | |
| 3D | 0.060 | 0.144 | 0.009 | 0.054 | 0.023 | 0.001 | −0.007 | |
| 4D | 0.080 | 0.116 | 0.009 | 0.059 | 0.029 | 0.002 | −0.008 | |
| 5D | 0.111 | 0.096 | 0.011 | 0.070 | 0.037 | 0.003 | −0.008 | 0.264 |
| 6D | 0.147 | 0.076 | 0.011 | 0.098 | 0.050 | 0.005 | −0.006 | |
| 7D | 0.210 | 0.060 | 0.013 | 0.127 | 0.073 | 0.009 | −0.003 | |
| 8D | 0.291 | 0.043 | 0.013 | 0.176 | 0.110 | 0.019 | 0.007 | |
| 9D | 0.396 | 0.025 | 0.010 | 0.293 | 0.198 | 0.058 | 0.048 | |
| 10D | 0.566 | 0.009 | 0.005 | 0.582 | 0.447 | 0.260 | 0.255 | |
| **Panel C – Private** | | | | | | | | |
| 1D | 0.256 | 0.248 | 0.064 | 0.592 | 0.014 | 0.008 | −0.055 | |
| 2D | 0.332 | 0.182 | 0.061 | 0.672 | 0.017 | 0.012 | −0.049 | |
| 3D | 0.370 | 0.144 | 0.053 | 0.689 | 0.023 | 0.016 | −0.037 | |
| 4D | 0.422 | 0.116 | 0.049 | 0.682 | 0.029 | 0.020 | −0.029 | |
| 5D | 0.451 | 0.096 | 0.043 | 0.712 | 0.037 | 0.026 | −0.017 | 0.156 |
| 6D | 0.493 | 0.076 | 0.037 | 0.716 | 0.050 | 0.036 | −0.002 | |
| 7D | 0.520 | 0.060 | 0.031 | 0.714 | 0.073 | 0.052 | 0.021 | |
| 8D | 0.547 | 0.043 | 0.024 | 0.696 | 0.110 | 0.077 | 0.053 | |
| 9D | 0.524 | 0.025 | 0.013 | 0.622 | 0.198 | 0.123 | 0.110 | |
| 10D | 0.405 | 0.009 | 0.004 | 0.367 | 0.447 | 0.164 | 0.160 | |

*Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).
*Note:* $P_{L,\,d}$ and $P_{U,\,d}$ are predicted probabilities estimated with the full multinomial model. $I_{L,d}$ and $I_{U,d}$ are the observed performance distributions within income strata.

**Table 2:** Decomposition of INE: indirect and direct effects.

| | (A) | (B) | (C) | (D) | (E) |
|---|---|---|---|---|---|
| **Academic choice** | **Indirect effect** | **Direct effect** | **Heterogeneous direct effect** | **B&T (2020) strategy** | **INE** |
| **Panel A - Absolute values** | | | | | |
| | $\sum(\overline{P_d} \times \Delta I_d)$ | $\sum(\Delta P_d \times \overline{I_d})$ | $\sum(\Delta P_d - \Delta P_{10}) \times \overline{I_d}$ | $INE - INE^S$ | $(A) + (B)$ |
| No access | −0.267 | −0.153 | −0.175 | −0.065 | −0.420 |
| Public | 0.293 | −0.029 | −0.044 | −0.052 | 0.264 |
| Private | −0.026 | 0.181 | 0.219 | 0.117 | 0.156 |
| **Panel B - Contributions to INE** | | | | | |
| | $100 \times \frac{(A)}{(E)}$ | $100 \times \frac{(B)}{(E)}$ | $100 \times \frac{(C)}{(E)}$ | $100 \times \frac{(D)}{(E)}$ | |
| No access | 63.6% | 36.4% | 41.8% | 15.5% | 100.0% |
| Public | 110.8% | −10.8% | −16.7% | −19.8% | 100.0% |
| Private | −16.5% | 116.5% | 141.1% | 75.5% | 100.0% |

*Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).
*Note:* Table 2 was computed from Table 1.
*B&T:* Bernandi and Triventi's (2020) strategy of estimating compensatory advantage.

(column C) is larger than the total direct effect from both the absolute (panel A) and relative (panel B) perspectives. This indicates that, if the direct effects are uniform across the performance distribution, the overall level of inequality will be lower. Therefore, heterogeneity plays a pivotal role and this phenomenon is consistent across all academic choices.

The public and private sectors exhibited different patterns. In the public sector, the remarkable inequality measure of 110.8 percent was attributed to the direct effect. The indirect effects, however, work in opposite directions, indicating that within any given performance level, individuals from lower socioeconomic backgrounds are more likely to choose the public sector than their wealthier counterparts. The heterogeneous direct effect drives wealthier individuals away from this choice, contributing to a 16.7 percent reduction in the total inequality. However, in the private sector, these effects operate in the opposite manner. Inequality is mostly due to direct effects (116.5 percent), as shown in panel B, column B. In contrast, indirect effects are significantly smaller in magnitude and act in the reverse direction (-16.5 percent). This suggests that in private institutions, prior performance does not necessarily confer an advantage to wealthier students; in other words, there are no multiplicative effects. Heterogeneous direct effects increase the likelihood of high-SES individuals making this choice by 21.9 percentage points (panel A, column C)—an effect that represents 141.1 percent of the net total inequality related to this academic track.

Figure 5 shows a breakdown of the indirect and direct effects within each performance decile. Notably, the indirect effects tended to increase across performance levels for all educational choices, and the pronounced magnitude of this effect observed in the public sector was largely driven by the top three performance strata.

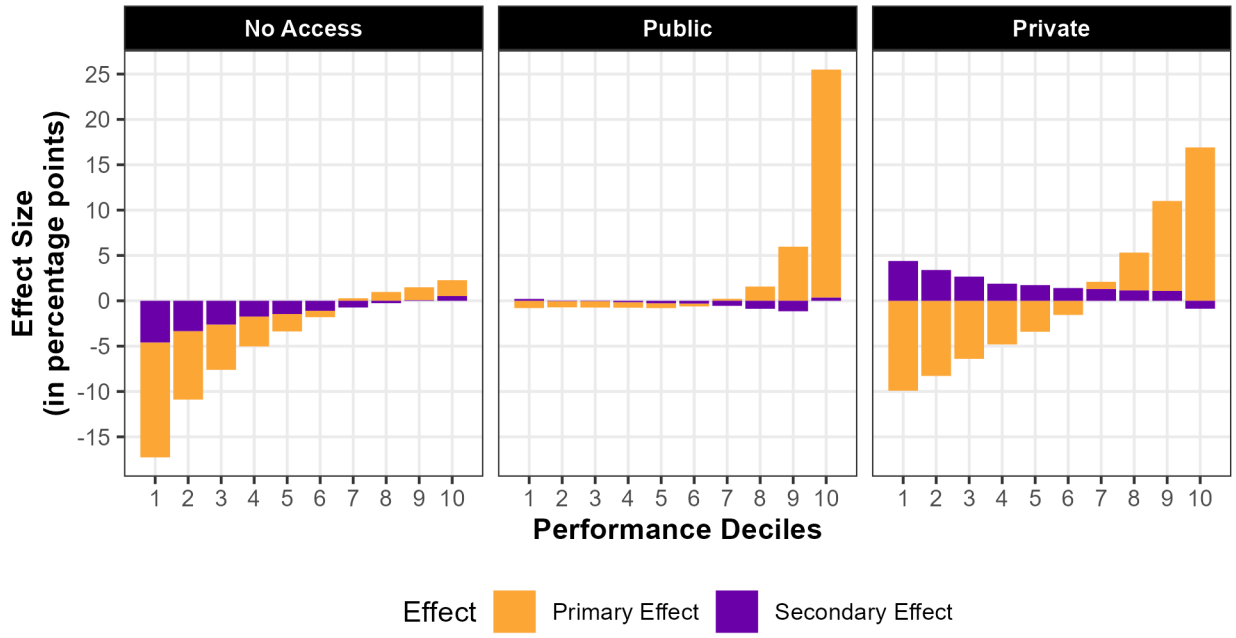


**Figure 5:** Decomposition of INE: indirect and direct effects at each performance decile. *Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).

Heterogeneous direct effects in the private sector create a compensatory advantage. They are positive and decreasing, meaning that high-SES individuals with low performance are more likely to pick this route, even after performance is accounted for.

A striking result is that the direct effect of origin drives high-SES individuals away from the public sector in almost all strata except for the highest one. This pattern is especially strong in the eighth and ninth performance deciles. This means that, by choice, students from privileged origins pick a private course instead of a public one, despite having enough performance to enter most fields in a public institution. One possible explanation is that even though their performance is high, it might still not be enough to enter into the most prestigious careers in a public university, so they choose their preferred career in private.

Interestingly, the direct effects observed within the public segment deviate from established patterns of segmented higher education systems (Yastrebov et al. 2018; Heiskala et al. 2021). However, in the case of Chile, where the distinction between public and private sectors is significant and the private sector exhibits greater heterogeneity than the public sector, a similar (not identical) set of direct and indirect effects on access to public and private higher education institutions combine to increase inequality (Ceron et al. 2022). Nevertheless, the patterns of direct effects observed in Brazil (Figure 5) were not described for the Chilean case.

In Figure 6, we compare the estimates of heterogeneous direct effects obtained using our strategy with those produced by Bernardi and Triventi's (2020) approach. The result signs did not change, but the heterogeneous direct effect trends varied


**Figure 6:** Heterogeneous secondary effect at each performance decile. *Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP). The ribbons represent the 95 percent confidence intervals. CA: compensatory advantage, according to our estimation method. B&T: Bernandi and Triventi's (2020) strategy of estimating compensatory advantage.

significantly between the methods. By mixing performance composition and different probabilities of choice, the Bernardi and Triventi (B&T) strategy produces biased results. Differences are considerably high and far out from confidence intervals margins.

## *Robustness Check*

Table 3 presents the results using total inequality (as described in Eq. [8]), instead of comparing the bottom and top income strata. The total INE bears results in the same direction and with relatively similar magnitudes, which means that the bottom and top comparisons are valid. Complementarily, a detailed pairwise comparison is presented in the Annex (Table A2). This indicates that the effect size increased as the strata separated from each other. However, the general trend remained the same.

Table 4 shows that the results point to the same direction if we replace the focal variable and/or change the model specification. Nevertheless, the magnitude of the observed effects varied, depending on the number of SES categories. Specifically, the greater the number of categories included, the greater the observed inequality. By controlling for parental education in the fourth column model, we effectively measured the income effect, disentangled from the influence of cultural capital. This means that we are no longer addressing SES in a broad sense. Notably, the underlying results remained consistent, reinforcing the complex interplay between

**Table 3:** Decomposition of Total INE: indirect and direct effects.

| | (A) | (B) | (C) | (D) | (E) |
|---|---|---|---|---|---|
| **Academic choice** | **Indirect effect** | **Direct effect** | **Heterogeneous direct effect** | **B&T (2020) strategy** | **INE** |
| | | | **Panel A - Absolute values** | | |
| | $\sum(\overline{P_d} \times \Delta I_d)$ | $\sum(\Delta P_d \times \overline{I_d})$ | $\sum(\Delta P_d - \Delta P_{10}) \times \overline{I_d}$ | $INE - INE^S$ | $(A) + (B)$ |
| No access | −4.059 | −2.612 | −3.080 | −2.192 | −6.671 |
| Public | 4.410 | −0.507 | −1.375 | −1.437 | 3.903 |
| Private | −0.351 | 3.118 | 4.455 | 3.628 | 2.768 |
| | | | **Panel B - Contributions to INE** | | |
| | $100 \times \frac{(A)}{(E)}$ | $100 \times \frac{(B)}{(E)}$ | $100 \times \frac{(C)}{(E)}$ | $100 \times \frac{(D)}{(\mathbf{E})}$ | |
| No access | 60.8% | 39.2% | 46.2% | 32.9% | 100.0% |
| Public | 113.0% | −13.0% | −35.2% | −36.8% | 100.0% |
| Private | −12.7% | 112.7% | 161.0% | 131.1% | 100.0% |

*Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).
*B&T:* Bernandi and Triventi's (2020) strategy of estimating compensatory advantage.

**Table 4:** Sensitivity to model specification.

| | **Focal variable in each model specification** | | | | |
|---|---|---|---|---|---|
| **Choice** | **Income as deciles** *(preferred model)* | **Income as quintiles** | **Parents' education instead of income** | **Income as deciles + control for parents' education** | **Income as deciles with equivalence scale** |
| | | | **Panel A - INE** | | |
| No access | −0.420 | −0.335 | −0.275 | −0.354 | −0.427 |
| Private | 0.156 | 0.132 | 0.080 | 0.104 | 0.160 |
| Public | 0.264 | 0.203 | 0.195 | 0.250 | 0.267 |
| | | | **Panel B - Indirect effects** | | |
| No Access | −0.267 | −0.217 | −0.160 | −0.276 | −0.266 |
| Private | −0.026 | −0.005 | −0.014 | −0.016 | −0.034 |
| Public | 0.293 | 0.222 | 0.173 | 0.292 | 0.300 |
| | | | **Panel C – Heterogeneous direct effects** | | |
| No Access | −0.175 | −0.144 | −0.128 | −0.124 | −0.187 |
| Private | 0.219 | 0.196 | 0.179 | 0.165 | 0.225 |
| Public | −0.044 | −0.052 | −0.051 | −0.041 | −0.038 |

*Source:* Prepared by the authors based on cross-referencing databases from the CEB, Enem, and CES (INEP).

socioeconomic factors and educational outcomes. Finally, using the equivalence scale strategy did not change either the direction or the magnitude of the results.

## Discussion and Conclusion

Considering a panel of high school graduates, our findings suggest that students from affluent socioeconomic backgrounds enjoy dual advantages. First, their likelihood of high performance in high-stakes and centralized exams for higher education amplifies their accessibility to selective and tuition-free public universities (the indirect/performance composition effect). Second, their advantaged socioeconomic standing offers a safeguard as even subpar performance can be offset by family resources, ensuring access to private universities (heterogeneous direct effects conforming to a compensatory advantage pattern). Our study did not reveal any signs of multiplicative or informational inequality. However, we cannot entirely rule out their existence as they might be in play in specific fields or careers within sectors.

Even when delivering identical performances, different strata do not possess equivalent admission chances. Individuals from privileged backgrounds tend to secure enrollment at a higher ratio, thus avoiding the "No Access" route. In addition, affluent students with low to average scores had a high probability of enrolling in private universities. Conversely, when scoring in the highest-performance strata, they tended to choose the public sector. The less affluent, alternately, are wholly dependent on high scores and devoid of any buffer against poor performance. The safeguard for the wealthier encompasses the ability to navigate the socioeconomic hurdles of enrolling in a private institution, accounting for 141.1 percent of the net total inequality concerning this academic path.

The public sector, which is particularly selective regarding Enem scores, tends to buffer the direct effects of socioeconomic inequality. Nevertheless, they are still present, although in the opposite direction from what would be expected, they drive away high-performing, high-SES individuals from this route. It is possible that these individuals still do not score high enough on exams to access the most competitive fields of study at a high-prestige public university, so they end up relying on family resources to attend the desired field in a private institution. High-performing low-SES students, in turn, probably adjust their preferences according to fields that are reachable at their performance level.

Brazil's trajectory toward the expansion of higher education parallels the escalating participation of the private sector. After the educational reforms of the 1960s, the nation experienced an asymmetrical expansion of for-profit institutions. Since then, even after the cessation of military dictatorship in 1985, there has been a colossal expansion of higher education, which has intensified markedly over the past 20 years (Senkevics 2021; Carvalhaes et al. 2023). Although a significant influx of public universities has been noted, the overwhelming majority remain private. Public institutions remain the most selective locus, absorbing most students from affluent family backgrounds and social groups, particularly within highly selective fields of study (Carvalhaes and Ribeiro 2019). However, as we showed, this was because of an indirect effect. Public universities also tend to fulfill a redistributive role in educational opportunities, being the locus of central public policies, such as racial affirmative actions (Vieira and Arends-Kuenning 2019; Machado and Szerman 2021; Mello 2022).

Qualitative research by Senkevics (2021) suggests that high-performing students, who fall short of the stringent exam thresholds required for entry into highly competitive fields such as medicine at public institutions, often leverage their families' financial resources to enroll in costly private universities, particularly in private medical schools. Conversely, high-achieving students from less affluent backgrounds may recalibrate their academic aspirations, opting for slightly less competitive disciplines within public universities. Senkevics (2021) utilizes interviews with Brazilian higher education applicants to reveal that for students from disadvantaged backgrounds, the pursuit of merit is seen as the key to unlocking educational opportunities that are more readily accessible to their wealthier counterparts. Securing a place in public and tuition-free universities often necessitates lowering their expectations to ensure entry into any available program. This dynamic warrants further investigation in future studies.

Moreover, the literature focusing on other contexts reports disparity across cases in the importance of direct and indirect effects in shaping educational inequalities. Jackson and Jonsson (2013) showed that direct effects in Germany, Holland, Italy, and Sweden are substantially more important than indirect, whereas the inverse was true for the United States, France, and England. In Russia's case, studied by Jackson, Khavenson, and Chirkina (2020), direct effects constituted between 55 percent and 85 percent of access probability depending on the proficiency metric used. However, these cross-country studies were unable to distinguish within-country variations. As we saw, in the Brazilian case, the kind of effect that matters most depends on the sector. Other studies also investigate the consequences of segmentation within the same national educational system in Russia, Finland, and Chile (Yastrebov et al. 2018; Heiskala et al. 2021; Ceron et al. 2022). In all three cases the selective academic sector is characterized by the predominance of indirect or primary effects, whereas compensatory advantages and direct effects emerge in the less selective vocational, technical, or private segments. However, the comparison of heterogeneous effect patterns between public and private academic institutions is not equivalent to comparisons across other institutional segmentations. The private sector tends to be highly heterogeneous and includes a few expensive and less selective institutions that attract higher-class students with subpar performances or who do not want to go to the more selective public sector. Further investigation is necessary to understand the consequences of the expansion of higher education based on private institutions, a trend present in Chile, Brazil, and many other national contexts.

Our study also makes a methodological contribution by developing a decomposition-based method for both direct and indirect heterogeneous effects. It extends previous strategies available in the literature in several ways: it allows for multinomial choices, returns results in a more intuitive metric, and corrects the bias that is present in an important part of the literature. We believe that our methodological approach can also be useful to improve the analysis about other cases of heterogeneous effects in educational inequality.

We again caution against any interpretation of this work as causal, as remarked in previous sections. Descriptive work is valuable as a foundation for further inquiry, providing contextual understanding, and identifying patterns (Gerring

2012). This type of work also enables other researchers to look for the "effects" of certain causes. Our descriptive results combining educational performance and trajectory in Brazil report findings that suggest interesting directions for future work from both sociological and policy perspectives. By decomposing the socioeconomic gaps between students of different social origins in their access to higher education, we call attention to the extent to which previous educational performance matters, in which sector of the higher education system, and for students of different income strata. Future research can follow this track by examining schools, teachers, and other processes (e.g., shadow education) to gain a better understanding of the mechanisms that structure the significant overrepresentation of rich students at the upper tails of educational performance. In addition, our results indicate that educational choice is net of educational performance. Following up on that, future studies should try to understand to what extent educational choice plays out due to different access to information, educational expectations, and/or other individual and family-level processes. In particular, researchers should try to understand what structures the decision not to continue studying is and why students with sufficient academic performance enter public tuition-free education. Hopefully, new work will also be able to follow up on these results with more granulated outcomes, incorporating fields of study and other institutional variables, to gain a better understanding of how direct and indirect effects operate simultaneously in a differentiated educational system. The conclusions of this study have some limitations. First, our research inference level pertains to high school graduates who participated in Enem; we did not encompass all youths eligible to enroll in higher education, but rather those with a manifest, and therefore selected demand. Second, our sole horizontal stratification dimension was the differentiation between the public and private sectors. Nevertheless, we could broaden this study to include a myriad of other dimensions that also divide higher education into varying strata of quality, prestige, and economic return, such as university fields of study, academic level, and teaching modality.

The findings call for a continued examination of the intricate interplay between socioeconomic status and educational access, emphasizing the need for policies that address these disparities and promote equitable access to higher education. As Brazil continues to evolve in its higher education landscape, this study serves as a crucial reference point for understanding and addressing the challenges of educational inequality.

## Notes

1 Access to this information was granted by INEP via the Protected Data Access Service (Sedap). Only the researcher responsible in the administrative process was granted access. We emphasize that this research complies with security protocols and does not disclose individuals or institutions.

2 Regarding which edition of Enem to use for each individual, we used the one immediately prior to entry in a higher education institution, as it reflected the information closest to the moment of attempting admission. If the individual had not enrolled or had not participated in the Enem edition prior to admission, we used the most recent edition,

as it provided the best information available on that candidate, possibly reflecting the best condition for applying for admission.

3 Over half were women (59.2 percent); the vast majority were aged up to 18 (87.3 percent); black, brown, or indigenous people account for 49.9 percent. Most students concluded high school in public schools (78.5 percent) and in urban areas (97.4 percent). Only 22.6 percent of them have at least one parent with a university degree, reinforcing how access to higher education promotes upward social mobility. See more details in Table A1, in the Annex.

## References

Arum, Richard, Adam Gamoran, and Yossi Shavit. 2007. "More Inclusion than Diversion: Expansion, Differentiation, and Market Structure in Higher Education." Pp. 1–35 in *Stratification in Higher Education: A Comparative Study*, edited by Yossi Shavit, Richard Arum, and Adam Gamoran. Redwood City, CA: Stanford University Press. https://doi.org/10.1515/9780804768146-003

Balbachevsky, Elizabeth, and Helena Sampaio. 2017. "Brazilian Post-Secondary Education in the 21st Century: A Conservative Modernization." Pp. 155–66 in *Responding to Massification: Post-Secondary Education Worldwide,* edited by Philip G. Altbach, Liz Reisberg, and Hans de Wit. Rotterdam, The Netherlands: Sense Publishers. https://doi.org/10.1007/978-94-6351-083-7_13

Bernardi, F. 2012. "Unequal Transitions: Selection Bias and the Compensatory Effect of Social Background in Educational Careers. *Research in Social Stratification and Mobility* 30(2):159–74. https://doi.org/10.1016/j.rssm.2011.05.005

Bernardi, Fabrizio, and Gabriele Ballarino. 2016. *Education, Occupation and Social Origin: A Comparative Analysis of the Transmission of Socio-Economic Inequalities*. Cheltenham, UK: Edward Elgar Publishing. https://doi.org/10.4337/9781785360459

Bernardi, F., and Cebolla, H. 2014. "Social Class and School Performance as Predictors of Educational Paths in Spain." *Revista Española de Investigaciones Sociológicas* 146:3–22. https://doi.org/10.5477/cis/reis.146.3

Bernardi, F., and Cebolla-Boado, H. 2014. "Previous School Results and Social Background: Compensation and Imperfect Information in Educational Transitions." *European Sociological Review* 30(2):207–17. https://doi.org/10.1093/esr/jct029

Bernardi, F., and Triventi, M. 2020. "Compensatory Advantage in Educational Transitions: Trivial or Substantial? A Simulated Scenario Analysis." *Acta Sociologica* 63(1):40–62. https://doi.org/10.1177/0001699318780950

Bernardi, F., and Valdés, M. 2021. "Sticky Educational Expectations: A Cross-Country Comparison." *Research in Social Stratification and Mobility* 75:1–13. https://doi.org/10.1016/j.rssm.2021.100624

Boudon, R. 1974. *Education, Opportunity and Social Inequality*. Hoboken, NJ: John Wiley and Sons.

Breen, R., and Goldthorpe, J. 1997. "Explaining Educational Differentials: Towards a Formal Rational Action Theory." *Rationality and Society* 9(3):275–305. https://doi.org/10.1177/104346397009003002

Buis, M. L. 2010. "Direct and Indirect Effects in a Logit Model." *The Stata Journal* 10(1):11–29. https://doi.org/10.1177/1536867X1001000104

Bukodi, E., Goldthorpe, J., and Zhao, Y. 2021. "Primary and Secondary Effects of Social Origins on Educational Attainment: New Findings for England." *British Journal of Sociology* 72(3):627–50. https://doi.org/10.1111/1468-4446.12845

Carvalhaes, F., Medeiros, M., and Santos, C. 2023. "Higher Education Expansion and Diversification: Privatization, Distance Learning, and Market Concentration in Brazil, 2002–2016." *Higher Education Policy* 36:578–98. https://doi.org/10.1057/s41307-022-00275-z

Carvalhaes, F., and Ribeiro, C. A. C. 2019. "Estratificação Horizontal da Educação Superior no Brasil: Desigualdades de Classe, Gênero e Raça em um Contexto de Expansão Educacional." *Tempo Social* 31(1):195–233. https://doi.org/10.11606/0103-2070.ts.2019.135035

Carvalho, M., and Waltenberg, F. 2015. "Desigualdade de Oportunidades no Acesso ao Ensino superior no Brasil: Uma Comparação entre 2003 e 2013." *Economia Aplicada* 19(2):369–96. https://doi.org/10.1590/1413-8050/ea124777

Caseiro, L. Z., and Maciente, A. 2023. "Desigualdades de Remuneração entre Egressos dos Cursos de Graduação em Ciências, Tecnologias, Engenharias e Matemática (CTEM)." *Texto para Discussão* 2947:1–74. https://doi.org/10.38116/td2947-port

Ceron, F., Bol, T., and Van de Werfhorst, H. 2022. "The Dynamics of Achievement Inequality: The Role of Performance and Choice in Chile." *International Journal of Educational Development* 92:102628. https://doi.org/10.1016/j.ijedudev.2022.102628

Collares, Ana Cristina Murta. 2011. "Educational Inequalities and the Expansion of Postsecondary Education in Brazil, from 1982 to 2006." PhD dissertation, University of Wisconsin, Madison.

DiPrete, T., and Eirich, G. 2006. "Cumulative Advantage as a Mechanism for Inequality: A Review of Theoretical and Empirical Developments." *Annual Review of Sociology* 32(1):271–97. https://doi.org/10.1146/annurev.soc.32.061604.123127

Elbers, B. 2023. "A Method for Studying Differences in Segregation across Time and Space." *Sociological Methods & Research* 52(1):5–42. https://doi.org/10.1177/0049124121986204

Erikson, R., Goldthorpe, J., Jackson, M., Yaish, M., and Cox, D. 2005. "On Class Differentials in Educational Attainment." *Proceedings of the National Academy of Sciences* 102(27):9730–33. https://doi.org/10.1073/pnas.0502433102

Erikson, Robert, and Jan O. Jonsson, eds. 1996. *Can Education Be Equalized? The Swedish Case in Comparative Perspective*. Boulder, CO: Westview Press.

Erola, Jani, and Elina Kilpi-Jakonen. 2017. "Compensation and Other Forms of Accumulation in Intergenerational Social Inequality." Pp. 3–24 in *Social Inequality across the Generations: The Role of Compensation and Multiplication in Resource Accumulation*, edited by Jani Erola and Elina Kilpi-Jakonen. Cheltenham, UK: Edward Elgar Publishing. https://doi.org/10.4337/9781786432568.00006

Gerring, J. 2012. "Mere Description." *British Journal of Political Science* 42(4):721–46. https://doi.org/10.1017/S0007123412000130

Girard, A., and Bastide, H. 1963. "La Stratification Sociale et la Démocratisation de L'enseignement." *Population* 18(3):435–72. https://doi.org/10.3917/popu.p1963.18n3.0472

Grätz, M., and Torche, F. 2016. "Compensation or Reinforcement? The Stratification of Parental Responses to Children's Early Ability." *Demography* 53(6):1883–904. https://doi.org/10.1007/s13524-016-0527-1

Grätz, M., and Wiborg, Ø. 2020. "Reinforcing at the Top or Compensating at the Bottom? Family Background and Academic Performance in Germany, Norway, and the United States." *European Sociological Review* 36(3):381–94. https://doi.org/10.1093/esr/jcz069

Heiskala, L., Erola, J., and Kilpi-Jakonen, E. 2021. "Compensatory and Multiplicative Advantages: Social Origin, School Performance, and Stratified Higher Education Enrolment in Finland." *European Sociological Review* 37(2):171–85. https://doi.org/10.1093/esr/jcaa046

Herbaut, E. 2019. "Les Inégalités D'accès à L'enseignement Supérieur Français: Avantages Cumulatif et Compensatoire au Cours de L'enseignement Secondaire." *Revue Française de Sociologie* 60(4):535–66. https://doi.org/10.3917/rfs.604.0535

Holm, A., Hjorth-Trolle, A., and Jæger, M. 2019. "Signals, Educational Decision Making, and Inequality." *European Sociological Review* 35(4):447–60. https://doi.org/10.1093/esr/jcz010

Jackson, Michelle. 2013. "Introduction: How Is Inequality of Educational Opportunity Generated? The Case for Primary and Secondary Effects." Pp. 1–33 in *Determined to Succeed? Performance versus Choice in Educational Attainment*, edited by Michelle Jackson. Redwood City, CA: Stanford University Press. https://doi.org/10.2307/j.ctvqsdrjr.15

Jackson, Michelle, and Jan O. Jonsson. 2013. "Why Does Inequality of Educational Opportunity Vary across Countries? Primary and Secondary Effects in Comparative Context." Pp. 306–37 in *Determined to Succeed? Performance versus Choice in Educational Attainment*, edited by Michelle Jackson. Redwood City, CA: Stanford University Press. https://doi.org/10.2307/j.ctvqsdrjr.15

Jackson, M., Khavenson, T., and Chirkina, T. 2020. "Raising the Stakes: Inequality and Testing in the Russian Education System." *Social Forces* 98(4):1613–35. https://doi.org/10.1093/sf/soz113

Jerrim, J., Chmielewski, A., and Parker, P. 2015. "Socioeconomic Inequality in Access to High-Status Colleges: A Cross-Country Comparison." *Research in Social Stratification and Mobility* 42:20–32. https://doi.org/10.1016/j.rssm.2015.06.003

Karlson, K. B. 2013. "Summarizing Primary and Secondary Effects." *Research in Social Stratification and Mobility* 33:72–82. https://doi.org/10.1016/j.rssm.2013.01.001

Machado, C., and Szerman, C. 2021. "Centralized College Admissions and Student Composition." *Economics of Education Review* 85:1–14. https://doi.org/10.1016/j.econedurev.2021.102184

Marteleto, L., Marschner, M., and Carvalhaes, F. 2016. "Educational Stratification after a Decade of Reforms on Higher Education Access in Brazil." *Research in Social Stratification and Mobility* 46:99–111. https://doi.org/10.1016/j.rssm.2016.08.004

Mello, U. 2022. "Affirmative Action, Centralized Admissions and Access of Low-Income Students to Higher Education." *American Economic Journal* 14(3):166–97. https://doi.org/10.1257/pol.20190639

Mize, T. 2019. "Best Practices for Estimating, Interpreting, and Presenting Nonlinear Interaction Effects." *Sociological Science* 6:81–117. http://dx.doi.org/10.15195/v6.a4

Morgan, Stephen L. 2002. *On the Edge of Commitment: Educational Attainment and Race in the United States*. Redwood City, CA: Stanford University Press.

Morgan, S. 2012. "Models of College Entry in the United States and the Challenges of Estimating Primary and Secondary Effects." *Sociological Methods & Research* 41(1):17–56. https://doi.org/10.1177/0049124112440797

OECD – Organisation for Economic Co-Operation and Development. 2020. *Education at a Glance 2020: OECD Indicators*. Paris, France: OECD Publishing.

Ribeiro, Carlos Antonio Costa, Ricardo Ceneviva, and Murillo Marschner Alves de Brito. 2018. "Educational Stratification among Youth in Brazil: 1960-2010." Pp. 47–68 in *Paths of Inequality in Brazil: A Half-Century of changes*, edited by Marta Arretche. New York, NY: Springer Publishing. https://doi.org/10.1007/978-3-319-78184-6_3

Salata, A. 2018. "Ensino Superior no Brasil das Últimas Décadas: Redução nas Desigualdades de Acesso?" *Tempo Social* 30(2):219–53. https://doi.org/10.11606/0103-2070.ts.2018.125482

Salto, D. 2018. "To Profit or Not to Profit: The Private Higher Education Sector in Brazil." *Higher Education* 75(5):809–25. https://doi.org/10.1007/s10734-017-0171-8

Schwartzman, Simon. 2013. "Higher Education, the Academic Profession, and Economic Development in Brazil." Pp. 28–55 in *The Global Future of Higher Education and the Academic Profession: The BRICs and the United States*, edited by Philip G. Altbach, Liz Reisberg, Maria Yudkevich, Gregory Androuschchak, and Yaroslav Kuzminov. London, UK: Palgrave Macmillan.

Schwartzman, S., Silva Filho, R., and Coelho, R. 2021. "Por uma Tipologia do Ensino Superior Brasileiro: Teste de Conceito." *Estudos Avançados* 35(101):153–86. https://doi.org/10.1590/s0103-4014.2021.35101.011

Senkevics, A. S. 2021. "O Acesso, ao Inverso: Desigualdades à Sombra da Expansão do Ensino Superior Brasileiro." PhD dissertation, University of São Paulo. Biblioteca Digital.

Shorrocks, A. 1984. "Inequality Decomposition by Population Subgroups." *Econometrica* 52(6):1369–85. https://doi.org/10.2307/1913511

Shorrocks, A. 2013. "Decomposition Procedures for Distributional Analysis: A Unified Framework Based on the Shapley Value." *The Journal of Economic Inequality* 11:99–126. https://doi.org/10.1007/s10888-011-9214-z

Troiano, H., Torrents, D., and Daza, L. 2021. "Compensation for Poor Performance through Social Background in Tertiary Education Choices." *Studies in Higher Education* 46(6):1–16. https://doi.org/10.1080/03075079.2019.1666262

Valdés, M. 2022. "Unequal Expectations? Testing Decisional Mechanisms for Secondary Effects of Social Origin." *Social Science Research* 105:1–17. https://doi.org/10.1016/j.ssresearch.2021.102688

Van de Werfhorst, H. G., and Mijs, J. J. 2010. "Achievement Inequality and the Institutional Structure of Educational Systems: A Comparative Perspective." *Annual Review of Sociology* 36:407–28. https://doi.org/10.1146/annurev.soc.012809.102538

Vieira, R., and Arends-Kuenning, M. 2019. "Affirmative Action in Brazilian Universities: Effects on the Enrollment of Targeted Groups." *Economics of Education Review* 73:1–12. https://doi.org/10.1016/j.econedurev.2019.101931

Wiborg, Ø., and Grätz, M. 2022. "Parents' Income and Wealth Matter More for Children with Low than High Academic Performance: Evidence from Comparisons between and within Families in Egalitarian Norway." *Research in Social Stratification and Mobility* 79:1–11. https://doi.org/10.1016/j.rssm.2022.100692

Yastrebov, G., Kosyakova, Y., and Kurakin, D. 2018. "Slipping Past the Test: Heterogeneous Effects of Social Background in the Context of Inconsistent Selection Mechanisms in Higher Education." *Sociology of Education* 91(3):224–41. https://doi.org/10.1177/0038040718779087

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