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# Unequal Access to Higher Education Based On Parental Income: Evidence from France

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# Unequal access to higher education based on parental income: evidence from France\*

Cécile Bonneau<sup>†</sup>      Sébastien Grobon<sup>‡</sup>

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## Abstract

In this paper, we provide new stylized facts on inequalities in access to higher education by parental income in France. On average, an increase of 10 percentile ranks in the parental income distribution is associated with a 5.8 percentage point (p.p.) increase in the proportion of children accessing higher education – 4.2 p.p. in the bottom half of the income distribution and 9.3 p.p. in the top half –. This overall level of inequality is surprisingly close to that observed in the United States. We then document how these inequalities in access to higher education by parental income combine with inequalities related to parental occupation or degree. Finally, we assess the redistributivity of public spending on higher education and more generally of all public spending on young adults and their parents, and present a new accounting method to take into account the tax contribution of parents in our redistributivity analysis.

**JEL Codes:** H52, I2, J62.

**Keywords:** Higher education, Intergenerational social mobility, Income measurement, Education public spending, France

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# 1 Introduction

Since the 1960s, the number of students has increased significantly in developed countries. For example, it has been multiplied by eight in France (from 310,000 enrolled students in 1960 to 2,551,000 in 2015 (MENESR-DEPP, 2021)). Is this increase in access to higher education due to massification really associated with equal opportunities? In this paper, we reassert the persistence of strong inequalities in access to higher education by observing these inequalities from an innovative perspective, according to parental income.

Although educational inequalities according to social origins (e.g. parents' education or occupation) have been widely documented since pioneering work in sociology in the 1960s in France (Bourdieu and Passeron (1964); Boudon (1973)) as well as in the United States (Blau and Duncan, 1967), very few studies address this economic dimension of inequalities. This perspective has been studied recently in the United States (Chetty et al. (2014), Chetty et al. (2020)) and in Norway (Bütikofer et al., 2019) but remains rare in most countries.

The study of inequality by parental income provides a continuous measure of the effects of social background, which is more suitable for international comparisons. However, access to higher education is rarely studied in relation to parental income for two main reasons. The first is related to the lack of administrative data on parental income and the presence of significant biases in self-reported income (Moore and Welniak, 2000), which makes it difficult to interpret survey results. The second problem concerns the representativeness of the survey. The specific situation of young adults raises difficult issues for survey design, such as multiple residences. This concern is important because unrepresentative samples are subject to homogeneity bias and may underestimate the relationship between parental income and child outcomes (Solon, 1992).

In this article, we use an innovative survey focused on young adults<sup>1</sup> – where young adults are surveyed regardless of their housing status (at home, in their own apartment, or in student housing) – combined with administrative data on parental income to provide novel estimates of inequalities in access to higher education by parental income in France. To the best of our knowledge, we present the first comparison of the level of inequality in access to higher education by parental income between the United States and a European country, with a representative sample of the whole population and a reliable measure of parental income. We organize our analysis into three parts.

In the first part, we present new statistics on access to higher education by parental income in France. Following the literature, we use the percentile rank of parental pre-tax income<sup>2</sup> to study access to higher education across the income distribution. We find large differences in access to higher education as a function of parental income: at the bottom of

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<sup>1</sup>The National Survey of Youth Resources or *Enquête Nationale sur les Ressources des Jeunes*, DREES-INSEE, 2014.

<sup>2</sup>We rank young adults aged 18-24 in 2014 by their parents' pre-tax income. The rank specification is more commonly used to measure intergenerational mobility than the log of income because it leads to more stable estimates (Chetty et al., 2014).

the income distribution, less than 40 percent of individuals have access to higher education between the ages of 18 and 24, compared to around 90 percent at the top of the income distribution. On average, a 10-percentile increase in the parental income distribution is associated with a 5.8 percentage point (p.p.) increase in participation in higher education. Access to master’s degrees and selective programs is more uneven. In the bottom 60 percent of the income distribution, less than 10 percent of children for master’s degrees and less than 5 percent of children for selective programs have access to these programs, compared to about 40 percent at the very top of the income distribution. We then compare our estimates to those obtained in the United States by Chetty et al. (2020). We find a slightly lower level of inequality but very close to that observed in the United States, despite the important institutional differences between the two countries. However, the functional form is different: the effect of income on access to higher education is linear in the United States, whereas in France it is much higher in the upper half of the parental income distribution than in the lower half: a 10-percentile increase in the parental income distribution is associated with a 4.2 p.p. increase in access to higher education in the lower half of the income distribution and 9.3 p.p. in the upper half.

In the second part of the paper, we characterize how these income inequalities in access to higher education are related to other dimensions of inequalities such as parental occupation and parental degree. These three variables characterizing parental background (parental income, parental degree and parental occupation) are only weakly correlated. We decompose the higher education access gap using Oaxaca-Blinder decompositions (Oaxaca (1973), Blinder (1973)) and observe that parental degrees explains between 50 and 60 percent of the higher education access gap between different income groups. We also observe a complementarity between parental occupation or degree and parental income in explaining access to higher education. For a given level of parental income, the more privileged the parents’ occupation or the higher the parents’ degree, the higher the proportion of individuals accessing higher education. Conversely, for a given occupation and parental degree, the higher the percentile rank of parental income, the higher the proportion of individuals accessing higher education and selective tracks.

In the final section of the paper, we combine our estimates of inequality in access to higher education with new data on higher education spending to assess the redistributive profile of public and private spending on higher education. Despite the fact that we lack disaggregated data for the most expensive elite programs, we find substantial differences in higher education spending along the parental income distribution. On average, children in the bottom third of the income distribution (P0-P30) receive around 7,500 euros of investment in higher education, compared to around 27,000 for those in the top 10 percent of the income distribution – which are broken down into 18,000 of public investment and 9,000 of private investment through the tuition fees paid by their parents –. We also examine how redistribution through higher education public spending changes when taking into account

the taxes needed to fund it, instead of considering all taxes as is generally the case in the literature. For this purpose, we present a new accounting method that requires estimating the share of taxes to be considered outside the analysis sample, in a sample representative of all taxpayers. This method seems to us to be more consistent with the fact that, on the one hand, parents of young adults are not the only taxpayers financing higher education and, on the other hand, that not all of their taxes are devoted to this expenditure item. Higher education public spending remain regressive when taxes paid by parents to finance these spending are taken into account: average net benefit remains twice higher in the top third of the parents' income distribution than in the bottom third. In a final specification, we also include public support for young adults and their parents – direct through family benefits and indirect through tax deductions –, and intra-family transfers to measure overall inequality in human capital investment, broadly defined, by parental income.

**Related literature.** Our paper builds on several strands of the literature. First, it relates to the extensive literature on intergenerational mobility reviewed by Black and Devereux (2011). Ensuring broad and equitable access to higher education can be seen as a corollary of Rawls' theory of justice (Rawls, 1971) and his second principle of equality of opportunity, which means that the assignment of individuals to a place in the social hierarchy is not fixed by birth. The lack of consensus on the level of social mobility in France compared to other countries (Dherbécourt, 2020)<sup>3</sup> makes it all the more important to provide comparable evidence on the distribution of access to higher education by parental income across countries, as higher education access gap is known to be one of the main mechanisms of social mobility (Blau and Duncan (1967), Chetty et al. (2020)).

Our paper refers more directly to the literature that attempts to estimate the elasticity of educational attainment with respect to parental income<sup>4</sup> (Taubman (1989), Haveman and Wolfe (1995), Mayer (1997), Blau (1999)). Our estimate of the impact of parental income on access to higher education in France makes two contributions to this perspective. First, the vast majority of studies devoted to the relationship between parental income or wealth and children's educational attainment are based on the U.S. context, while the effect of income on university access has not been evaluated in most European countries.<sup>5</sup> Second,

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<sup>3</sup>According to Lefranc and Trannoy (2005), intergenerational correlation of earnings appears to be weaker in France than in the United States but stronger than in the Nordic countries, which implies an average level of social mobility. Alesina et al. (2018) find that social mobility is strong in France, and comparable to that observed in Sweden. On the contrary, Corak (2013) and Perez-Arce et al. (2016) show that social mobility is low in France compared to what one would expect given an average level of income inequality. Consequently, the French situation would not fit as expected into the "Gatsby curve", which shows a negative correlation between the level of social mobility and the level of income inequality of different countries. More recently, Kenedi and Sirugue (2021) also find a strong persistence of income over generations in France, similar to that observed in the United States by Chetty et al. (2014).

<sup>4</sup>This literature has found much variation in the estimates: Taubman (1989) finds that the elasticity of educational attainment with respect to parental income ranges from 3 to 80 percent, and Mayer (1997) reports that the average effect of a 10 percent increase in parental income on years of schooling ranges from 0.024 to 0.104 years.

<sup>5</sup>An exception to this is Bütikofer et al. (2019), who study this relationship in Norway. The authors find that parental education is a much better predictor of children's educational attainment than parental

our results cover the entire distribution of parental income and apply to a representative sample of all young adults aged 18 to 24 in France. This makes them complementary to studies that attempt to measure a causal impact of income on educational attainment using an instrument whose validity is local by definition – *i.e.* at a specific point in the parental income distribution – (Shea (2000), Acemoglu and Pischke (2001), Maurin (2002), Løken (2010)).<sup>6</sup> Some studies rely on identification strategies based on quasi-random assignment but yield results that are either very specific to a local population (Akee et al., 2010) or focus on short-term impact at the youngest age (Duflo, 2003).

The stylized facts developed here also contribute to the literature explaining the importance of income in children’s educational attainment. Two main channels have been identified. The first is related to parents’ direct investments in their children’s education. Traditional models of human capital investment (Becker and Tomes, 1979) emphasize the importance of credit constraints in explaining low-income families’ low access to higher education. The scarcity of student credit in France due to limited tuition fees does not exclude a high income effect due to the cost of student living, especially since the majority of higher education institutions are located in large cities with high living costs. Our data include detailed parental transfers and show strong differences across students that could contribute to the effect of parental income on persistence in higher education. The second channel is related to long-run factors associated with parental income (parental degree, parental occupation, transmission of aspirations or risk aversion, etc.), including the intergenerational transmission of academic skills or abilities.<sup>7</sup> Although our data do not allow us to disentangle the causal mechanisms

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income. Nevertheless, they observe some nonlinearities in the income distribution for access to certain degrees. The nonlinearities in their analysis point to the importance of studying access to higher education considering the entire distribution of income and not just the average impact of income on access to higher education. In France, Ben-Halima et al. (2014) show an increase in the effect of father’s income on educational outcomes between 1993 and 2003 using a parental income variable estimated on the basis of other observable characteristics (father’s occupation and education). We update and extend this work with a survey matched with administrative tax sources, which allows us to directly study the relationship between parental income and children’s education without the need to estimate parental income.

<sup>6</sup>Using income variation related to union status or industry, Shea (2000) finds that parental income due to luck has a negligible impact on children’s human capital, but he argues that there may be confounding factors because union status is likely to be nonrandom and could be correlated with different parental investments in children’s education. Acemoglu and Pischke (2001) use changes in the distribution of family income between the 1970s and 1990s and find that a 10% increase in family income is associated with a 1.4% increase in the probability of attending a four-year college. Nevertheless, their identification strategy can only identify the "causal" impact of income on education if changes in relative wealth structure are not associated with other changes in relative parental quality. Maurin (2002) uses the socioeconomic status of grandparents as a predictor of parental income and finds that the higher the household income, the less likely the child is to repeat a grade in elementary school. But there must be no transmission of ability across generations for the grandparent socioeconomic instrument to be valid. Løken (2010) uses the Norwegian oil shock of the 1970s and 1980s to examine the long-term effect of family income on children’s educational attainment. She finds no effect of income on the educational attainment of families whose income was affected by the oil shock.

<sup>7</sup>The importance of this transmission has been confirmed in France by recent studies (Gurria (2016), Herbaut (2019), Barhoumi and Caille (2020)), while other studies carried out in the American context have found an increasing relationship over the last twenty years between family income and educational attainment conditional on academic skills (Belley and Lochner, 2007). An important debate in this literature is related to the decomposition between the nature and nurture effects of intergenerational transmission of abilities. Using donor children in Denmark, Lundborg et al. (2020) find that once genetic transmission is taken into

at play in explaining the influence of parental income on educational attainment, the detailed structure of the survey allows us to analyze descriptively the different contributions of various parental background characteristics in explaining access to higher education (e.g., parental income, parental education and parental occupation) and to estimate the contribution of earlier educational attainment (middle school and high school graduations) to inequalities in access to higher education.

Lastly, our paper contributes to the literature on the redistributive impact of public spending on higher education. The empirical question of the degree of regressivity of spending on higher education has been the subject of intense methodological debate since the 1970s.<sup>8</sup> We provide in Table 1 a review of results on the redistributivity of educational spending obtained in different institutional settings and with different methodological choices. The issue of redistribution via in-kind transfers has recently received new attention in distributional accounts research (Piketty et al. (2018), Accardo et al. (2021)). The study of redistribution through higher education spending is all the more important in France because the share of public financing of higher education is very high, while tuition fees paid by households are very limited. Our study updates and extends the work of Albouy et al. (2002) in the French context by focusing on higher education spending with data that for the first time breaks down the costs of different higher education tracks and fields.

[place Table 1 here]

Our paper is structured as follows. We begin in Section 2 by presenting the institutional context of the French higher education system. Section 3 describes the data used, the main variables of our analyses and our methodology. In Section 4, we present our main results in terms of access to higher education according to parental income. Section 5 reports on the complementarity between the different aspects of inequality, those related to parental income and those related to parents' occupation or degree. Section 6 examines the redistribution that occurs through public spending on higher education, related to these inequalities in access to higher education and Section 7 concludes.

## 2 Institutional background

**French higher education system.** The French higher education system is characterized by a high degree of institutional differentiation and academic hierarchy of the different tracks.

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account, only the mothers' education matters in explaining the children's school performance.

<sup>8</sup>The first empirical studies, conducted in the United States from 1969 onwards, gave rise to a controversy between Hansen and Weisbrod (1969), on the one hand who find higher education spending in California to be anti-redistributive – individuals at institutions with the least subsidies being less wealthy on average – and Pechman (1970), on the other hand, who claim that higher education spending in California is redistributive – wealthy people paying more in taxes than they receive in subsidies compared to less wealthy people –.



Higher education is divided into three main tracks: a technical and vocational track,<sup>9</sup> a non-selective academic track (university) and a selective academic track composed of elite graduate schools (*Grandes écoles*). Among first-year students in 2014-2015, about 35% were enrolled in the technical and vocational track, 45% in the university track, and about 20% in the selective academic track (MENESR-DEPP, 2015). The coexistence of two academic tracks is a specificity of French higher education. Until 2018, access to university was formally granted to anyone holding the high school graduation exam (*Baccalauréat*<sup>10</sup>) whereas access to the elite graduate schools was very selective. Admission to these programs is based on national competitive exams (*Concours*), and candidates must follow an intensive 2 to 3 year training course called *Classes Préparatoires aux Grandes Écoles (CPGE)* – hereafter referred to as preparatory courses – to be able to take the competitive exams. Access to these preparatory courses after high school is already very selective, as the number of seats is very limited.<sup>11</sup>

The elite graduate schools play a central role in the training of elites in France. Historically, they were developed after the French Revolution to train a political, economic, scientific, military or academic elite, selected according to "meritocratic" criteria. In the most recent cohorts, about 6% of a generation graduates from one of these schools (Bonneau et al., 2021) and the passage through these selective training programs very often conditions access to dominant positions, whether in politics, business or engineering.

**Financing of higher education.** Most French higher education institutions are publicly funded, with tuition fees set at a very low level. In 2014-2015, tuition fees in the public sector were set at 184 euros for undergraduate students, 256 euros for master's students, 391 euros for Ph.D. students, and 610 euros for most engineering schools.<sup>12</sup> The private sector represented only about 18% of total enrollment in higher education institutions (MENESR-DEPP, 2015). All universities are public and the private sector includes mainly business schools, about one third of engineering schools and other specialized schools (journalism schools, paramedical and social schools, cultural and artistic schools, etc.). Tuition fees for business schools generally range from 9,000 to 15,000 euros per year and those for private engineering schools are around 7,000 euros per year.<sup>13</sup>

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<sup>9</sup>Composed of technical programs (*Institut Universitaire de Technologie (IUT)*) and vocational programs (*Sections de Technicien Supérieur (STS)*).

<sup>10</sup>Of all the students who obtained their high school diploma (whether academic, technological or vocational), 75% enrolled in higher education – 99% of those holding an academic high school diploma – (MENESR-DEPP, 2015).

<sup>11</sup>These students represent only around 3 percent of the total student enrollment (MENESR-DEPP, 2015). In 2014-2015, 39% of the students in preparatory courses obtained their high school graduation exam with highest honors – *i.e.*, with a GPA of 16/20 or higher – as opposed to 3% of the students in the technical and vocational track and 6% of the students in the university (Bonneau et al., 2021).

<sup>12</sup>Order of August 12, 2014 setting tuition rates for public higher education institutions under the authority of the ministry of higher education (<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000029409760/>).

<sup>13</sup>There are a number of private schools specializing in fields that are often not well covered by public higher education: video games, digital, cinema, animation, design, fashion, etc. These schools cost around 8,000 euros per year.

**Public support for young adults and their parents.** In France, public support for students is mainly composed of need-based scholarships (*Bourses sur critères sociaux*) and housing benefits (*Aide personnalisée au logement (APL)*).<sup>14</sup> Young adults as a whole are also eligible for housing benefits<sup>15</sup> and other public support (unemployment benefits, disability benefits, family benefits if they have children, guaranteed minimum income but with very restrictive conditions up to age 25, integration contract (*CIVIS*)).<sup>16</sup> Parents whose child is included in their income tax return benefit from tax deductions until the age of 21, and until the age of 25 but only if their child is a student. Family benefits are paid to parents on a means-tested basis, depending on the number of children and their age, until the child turns 20. The various public support programs available to young adults and their parents are described in more detail in Appendix A.1.1.

### 3 Data and Methodology

In this section, we first describe our data, the construction of our main analysis sample, present summary statistics, and define the key variables and concepts used in our analysis. Then, we briefly present the methods used in our study, namely, Oaxaca decompositions, Gupta decompositions, and a new accounting method to assess the redistributivity of higher education spending, taking into account the taxes needed to finance these spending. See Appendix A.1.3 for a more detailed description of the methods used.

#### 3.1 Data

Our primary data source is the National Survey of Youth Resources (*Enquête Nationale sur les Ressources des Jeunes* (hereafter referred to as ENRJ)), conducted jointly by the *Direction de la Recherche, des études, de l'évaluation et des Statistiques (DREES)* and the *Institut National de la Statistique et des études économiques (INSEE)* in 2014. The survey interviewed a representative sample of young adults (aged 18 to 24) and their parents. The sample size is more limited than in studies based on administrative data, but these data offer the advantage of combining detailed questions about young adults' educational background and the resources they have to live on (including detailed questions about transfers received from their parents), with the reliability of administrative data on parental income. Parental income is obtained from administrative tax data for parents interviewed in the survey. Matched

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<sup>14</sup>These financial aids represent 51% and 47% respectively of all public support received by students. 41% of the students in our sample receive a need-based scholarship for an average amount of 280 euros per month and 37% receive housing benefits for an average amount of 171 euros per month.

<sup>15</sup>Due to strict income eligibility requirements, only 13% of non-student young adults receive housing benefits, for an average amount of 225 euros per month.

<sup>16</sup>In practice, only 9% of the individuals in our sample receive at least one of these benefits (unemployment benefits, disability benefits, family benefits, guaranteed minimum income, integration contract) for an average amount of around 650 euros per month.

parental income is individual income before transfers. It includes wages, unemployment benefits, pensions, alimony, disability pensions, life annuities, agricultural income, industrial and commercial income, and noncommercial income. Capital income is not included (property income, rent, finance, and securities).<sup>17</sup> A total of 5,776 young adults and 6,304 parents responded to the survey, and in 5,197 cases, both the young adult and at least one parent responded. The survey includes weights to assess nonresponse bias.

The last part of our analysis includes additional data on higher education spending and tax contributions. In national accounts, data on higher education expenditures are usually only displayed in three categories,<sup>18</sup> regardless of the track or field of study (MENESR-DEPP, 2021). We supplement these existing data with data from a survey of higher education institutions, the "Cost Awareness Survey" (*Connaissance des coûts*, Boiteau and Jameux (2019)) aimed at better assessing the expenditures of different higher education institutions. This recent survey was conducted between 2016 and 2019 from 65 higher education institutions representing approximately one-third of all French students. This survey allows us to break down the costs between the different tracks and fields and to determine the cost of higher education without taking into account the costs associated with research, which are taken into account in the more aggregated data. The data thus allow for a more accurate estimate of public spending on higher education for each individual.<sup>19</sup> The link with the ENRJ survey data also makes it possible to account for private investment in higher education through tuition fees paid by parents, whereas this distinction is not generally made in the literature on France.

Data on taxes paid by all taxpayers come from the Tax and Social Income Surveys<sup>20</sup> (*Enquêtes Revenus fiscaux et sociaux* (hereafter referred to as ERFS); Insee, 2014), which we use in conjunction with ENRJ data on the tax contribution of parents of young adults. To impute indirect and corporate taxes paid by each decile of taxpayers and parents, we rely on aggregate distributional account estimates (Accardo et al. (2021), Germain (2021)).

### 3.2 Sample Definition

In our main analysis sample, we include all respondents (aged 18 to 24) of the survey for whom at least one parent was interviewed (n=5,197). When the parents are still living together, only one of the two parents was interviewed and answered questions about their

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<sup>17</sup>We do not include property and capital incomes in France because it is not possible to identify them independently of the incomes of all household members, thus also including the incomes of non-decohabiting young adults. Taking into account property and capital incomes would mainly change the ranking within the last decile, but should only marginally change the ranking of individuals in the rest of the distribution.

<sup>18</sup>In 2014-2015, on average, vocational programs costed 14,150 euros per student, preparatory courses 15,620 euros and university programs 10,980 euros.

<sup>19</sup>See Appendix A.1.2.3 for more details on these new higher education cost data and Table A6 for annual public spending per student, broken down by track and field of study.

<sup>20</sup>A survey matched with administrative sources on income from the various administrations concerned (DGFIP-Cnaf-Cnav-CCMSA).

partner.<sup>21</sup> When parents are separated (for 26% of individuals in our sample), the two were interviewed in 46% of cases and only one in 54% of the cases, in which case we have no information on the non-responding parent apart from the young adult's responses. When analysing spending on higher education, we restrict ourselves to individuals aged 22-24, who are the most advanced in their education in our sample.

### 3.3 Baseline characteristics

Table 2 presents some descriptive statistics of our sample of young adults aged 18-24 years old, by quintile of parental pre-tax income. On average, individuals in our sample are 20.9 years old and 49 percent are female. The average pre-tax income of parents – the sum of the father's pre-tax income and the mother's pre-tax income – increases from 8,657 euros per year in the bottom quintile of the income distribution to 95,478 euros per year in the top quintile, with an average of 43,099 euros per year. Parents' of students or former students are richer on average, with an annual pre-tax income of 52,499. About 13 percent of parents of young adults have a bachelor's or master's degree, compared with about 20 percent of parents of students or former students. Higher income quintiles tend to have a greater proportion of parents from high socioeconomic status (SES) and with advanced degrees. About 40 percent of individuals in the top quintile have a father from a high SES, compared with less than 3 percent in the bottom quintile.<sup>22</sup> About two thirds of the parents are still living together while one quarter are separated. Separated parents tend to be more represented at the bottom of the income distribution, partly mechanically because we sometimes have no information on non-responding parents.<sup>23</sup> The father is unknown or deceased in 6 percent of cases, while this is the case for 1.5 percent of the mothers. In regards to geographic origin, just under 20 percent of the individuals in our sample have at least one parent living in the Paris region and 30 percent in an urban unit with more than 100,000 inhabitants (excluding Paris). The proportion of individuals in the Paris region or in large urban units is higher at the top of the income distribution. A concern could be that the top deciles of the distribution concentrate the oldest parents in our sample and thus the oldest young adults, which would bias the estimate of inequality in access to higher education by parental income. This is not the case because neither the age of youth nor the age of their parents is statistically different across income groups.

[place Table 2 here]

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<sup>21</sup>67% of the young adults in the sample have their parents still living together. In 68% of cases, the mother answered the parents' questionnaire.

<sup>22</sup>The overlap of these different dimensions of inequality is explored in Section 5 in more details.

<sup>23</sup>When the parents are separated, the two were interviewed in 46% of cases and only one in 54% of the cases, in which case we have no information on the non-responding parent and, in particular, we do not have an income variable for non-responding separated parents.

### 3.4 Variable definitions

In this section, we briefly define the key variables used to measure access to higher education by parental income. Appendix A.1.1 provides more details on the definition of our main variables of analysis.

**Access to higher education.** We define individuals (aged 18-24 in our sample) as having access to higher education if they are enrolled in higher education in the year of the survey, if they have already obtained a higher education degree, or if they have reached a higher education level without necessarily having obtained the corresponding degree. Similarly, we define access to a specific track (master’s degree, medical school, selective higher education, etc.) as being currently enrolled in, graduating from, or having obtained a level of one of these tracks without necessarily graduating.

**Selective higher education.** We define selective programs as preparatory courses, elite graduate schools, medical studies and Ph.D. programs. The degree of selectivity of each of these programs can be assessed by ranking all students on the basis of their performance on the high school graduation exam. In 2016-2017, the median rank of students in university (except for medical studies) is 50.2, while that of students in medical studies is 68.1, that of students in preparatory courses is 84.9, and that of students in elite graduate schools is 72.8 (Bonneau et al., 2021).

**Parental Income.** Following Chetty et al. (2014),<sup>24</sup> our preferred specification focuses on the percentile rank of parental pre-tax income. We add the father’s pre-tax income and the mother’s pre-tax income, regardless of the parents’ marital status. To further assess the representativeness of our sample, we compare the distribution of pre-tax incomes of parents in our sample and individuals aged 42-60 in the ERFSS, another survey with a much larger sample size (n=50,096) where income is collected from tax sources as well. Overall, pre-tax income data are very similar in both samples (see Table A3). We also observe how our parental income deciles fall in relation to the income deciles of the general population. Overall, parents are slightly wealthier than households in the general population, as they are further along in their life cycle but the two distributions are very close (Table A4 and Figure A1).

**Parental tax income versus self-reported income.** Our data show that parental self-reported income is weakly correlated with parental income obtained from tax administrative sources. The deciles obtained with self-reported income coincide for only 35 percent of youth with those constructed from administrative data, and the correlation rate of the two variables is only 0.66. The gap in access to higher education is significantly underestimated – by about 5 to 10 percentage points (depending on the specification) at the top of the income distribution – when self-reported income is used instead of administrative income.

**Parents’ occupation.** For occupations, we rely on the Department of Education’s sta-

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<sup>24</sup>This paper shows that using a rank specification provides much more stable estimates of intergenerational mobility than using the logarithm of parental income and allows for the inclusion of zeros in parental income.

tistical service (DEPP<sup>25</sup>) grouping into four socioeconomic statuses (SES). High SES includes professionals, managers, CEOs, teachers, professionals and artists. Medium-high SES corresponds to intermediate occupations, technicians, foremen and supervisors. Medium-low SES refers to farmers, artisans, shopkeepers and employees. Low SES is defined as blue-collar workers and non-working people. Table A1 in the Appendix details the four SES categories and the corresponding occupations.

**Parents' diploma.** We have information on the highest degree obtained by parents. We define six categories: those with an elementary school certificate or less, those with a middle school certificate, those with a high school diploma or equivalent, those with a two-year degree, those with a bachelor's or master's degree, and those with an M.D. or Ph.D..

**Place of residence of parents.** When we study heterogeneity by parental residence, we define three categories: Parisian area, urban units with more than 100,000 inhabitants (except Paris) and urban units with less than 100,000 inhabitants. When both parents do not live in the same city, we retain the larger one.

**Financial transfers received from parents.** The financial transfers considered are direct monetary aid and indirect parental transfers (via payment of rent, tuition, food, etc.). These transfers received from parents are reported by young adults in the survey. Since parents of students give proportionally more to their child than if he or she were not studying, we construct a potential financial transfer variable that estimates what a young adult would have received, if he or she were studying, based on his or her observable characteristics.<sup>26</sup>

### 3.5 Methods

**Oaxaca-Blinder decompositions.** To decompose the higher education access gap by parental income, we rely on Oaxaca-Blinder decompositions methods (Blinder (1973), Oaxaca (1973)). This statistical approach, commonly used in the economic literature, consists of breaking down the observed gaps into an "explained" part, which comes from the differences between the average observable characteristics of the two groups (in our case, parental diplomas) and an "unexplained" part, which is not attributable to these characteristics.<sup>27</sup>

Applied to our context of inequalities in access to higher education between children whose parents are at the top of the income distribution (noted  $T$ ) and children whose parents are at the bottom (noted  $B$ ), the method consists first in estimating the effect of parental diplomas<sup>28</sup> on access to higher education for the entire population and for our two subgroups. Then, these different estimations are combined to obtain:

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<sup>25</sup>*Direction de l'évaluation, de la prospective et de la performance.*

<sup>26</sup>Indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives.

<sup>27</sup>See Appendix A.1.3 for more details on the Oaxaca-Blinder estimation methods.

<sup>28</sup>Introduced in 14 dummies, 7 for the father's diploma and 7 for the mother's.

$$\underbrace{\bar{Y}^T - \bar{Y}^B}_{\text{observed gap}} = \underbrace{(\bar{\mathbf{X}}^T - \bar{\mathbf{X}}^B)\hat{\boldsymbol{\beta}}^*}_{\text{"explained" gap}} + \underbrace{\bar{\mathbf{X}}^T(\hat{\boldsymbol{\beta}}^T - \hat{\boldsymbol{\beta}}^*) + \bar{\mathbf{X}}^B(\hat{\boldsymbol{\beta}}^* - \hat{\boldsymbol{\beta}}^B)}_{\text{"unexplained" gap}} \quad (1)$$

The first term of the equation,  $(\bar{\mathbf{X}}^T - \bar{\mathbf{X}}^B)\hat{\boldsymbol{\beta}}^*$ , measures the share of the access rate gap between top income children and bottom income children that is attributable to differences in the average observable characteristics – in our case parental diplomas – of these two groups of individuals; the second term,  $\bar{\mathbf{X}}^T(\hat{\boldsymbol{\beta}}^T - \hat{\boldsymbol{\beta}}^*) + \bar{\mathbf{X}}^B(\hat{\boldsymbol{\beta}}^* - \hat{\boldsymbol{\beta}}^B)$ , measures the share of this gap that cannot be explained by these characteristics.

**Gupta decompositions.** We decompose both the access gap to higher education and the differences in the cost of public higher education between individuals from the top income decile ( $T$ ) and individuals from the bottom income decile (noted  $B$ ) using a standard rate decomposition method developed by Das Gupta (Das Gupta, 1991).

When the outcome is defined as a product of other variables of interest, the method defines a way to calculate the contribution of each of these variables to the overall gap in the outcome variable between two subpopulations.

We write  $r$  the outcome variable of interest and  $x_1, \dots, x_k$  the  $k$  explanatory factors such that  $r(x_1, \dots, x_k) = \prod_{n=1}^k x_n$ .

In the general case where  $k \geq 3$ , the contribution of each factor  $C(x_i)$  can be expressed as:

$$C(x_i) = \sum_{j=1}^{k-1} \frac{R(j-1, i)}{k \binom{k-1}{j-1}} (x_i^T - x_i^B) \quad (2)$$

Where  $R(j, i)$  is the sum of all possible values of the product of  $k - 1$  factors (excluding  $x_i$ ), out of which  $j$  factors from population  $T$  and all other factors from population  $B$  (Li, 2017).

Applied to our setting, we first decompose the higher education access gap between individuals in the top ( $T$ ) and bottom ( $B$ ) income deciles into a middle school graduation gap, a high school graduation gap for those who passed the middle school graduation exam, and a higher education access gap for those who passed the high school graduation exam. Then, we decompose the differences in public cost of higher education between individuals in the top ( $T$ ) and bottom ( $B$ ) income deciles into a part related to the access gap to higher education, a part related to differences in length of study, and a part related to differences in annual cost.<sup>29</sup>

**Redistributivity of public spending for young adults.** In the last part of the paper, we assess the redistributive effect of public spending on higher education and develop a new accounting method to compute higher education spending net of the tax share needed to finance it. We assume that higher education is financed by households through direct and indirect taxation and by firms through corporate taxes, but not by direct contributions from

<sup>29</sup>See Appendix A.1.3 for more details on this method and its application to our particular setting.

firms (as is the case for apprenticeships, for example) nor by the issuance of public debt. As we can see in Table 1, results obtained concerning the redistribution of higher education spending depend very much on the methodological choice.<sup>30</sup> Our estimation proposes a static closure of expenditures and revenues that draws on recent developments in distributed national accounts.<sup>31</sup> In our case, the way in which taxes are taken into account is somewhat complicated by the fact that, unlike in the distributed national accounts literature, we are only interested in one specific expenditure item: higher education spending. Our method is designed to be consistent with the fact that, on the one hand, parents of young adults are not the only taxpayers financing higher education and, on the other hand, that not all of their taxes are devoted to this expenditure item. We focus on a 6-year period corresponding to expenditures on students when they are between 18 and 24. We thus do not consider the public expenditures associated with individuals who continue their education after age 24.

We first estimate the share of taxes to be taken into account by computing the total amount of unallocated taxes (income tax, VAT, corporate tax and other indirect taxes) out-of-sample in a representative sample of all taxpayers.<sup>32</sup> Unallocated taxes paid by all French taxpayers over 6 years amount to 1.480 billion euros. We then compute the total amount of public spending on higher education in our representative sample of young adults aged 18 to 24. We rely on much more detailed per-student cost data than is typically used for higher education in France (see Section 3.1 and Table A6 for more details on higher education public spending data). A total of 4 percent of all unallocated taxes must be devoted to funding the cost of higher education. This proportion is consistent with official data from national accounts.<sup>33</sup>

Then, we calculate the mean net benefit for each parental income decile  $d$  as follows:

$$Net\_Benefit_d = \frac{1}{n_d} \sum_{i=1}^{n_d} (S_i^{HE} - (0.04 \times Taxes_i \times 6)) \quad (3)$$

With  $Net\_Benefit_d$  the mean net benefit for young adults aged 22 to 24 whose parents

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<sup>30</sup>When taxes are not taken into account, the authors generally find that higher education spending is anti-redistributive. Conversely, when all taxes paid by households are taken into account, the authors generally conclude that higher education spending is redistributive because rich people pay more in taxes than they receive in subsidies for public higher education.

<sup>31</sup>Although this analysis is the most appropriate for our data, other methodologies for analyzing tax contributions would be possible. A dynamic life-cycle approach, inspired by the contingent repayment loan model, might consider that youth finance their own education ex post by paying taxes.

<sup>32</sup>We use the 2014 Tax and Social Income Surveys (ERFS).

<sup>33</sup>2021 Finance Bill indicates an amount of 220 billion euros for the sum of the taxes we are considering here (VAT, income tax, corporate tax and domestic consumption tax on petroleum and energy products) and an amount of 10 billion euros for higher education spending excluding university research, i.e. a ratio of 4.5% between these two figures (see <https://www.budget.gouv.fr/budget-etat/> for unallocated tax amounts and [https://www.budget.gouv.fr/budget-etat/ministere?annee=118&loi\\_finances=50&type\\_budget=all&ministere=34726&programme=30340&type\\_donnee\\_budget=ae&op=Valider](https://www.budget.gouv.fr/budget-etat/ministere?annee=118&loi_finances=50&type_budget=all&ministere=34726&programme=30340&type_donnee_budget=ae&op=Valider) for higher education spending). We cannot report these figures for 2014, the year of the survey, because government spending was not reported broken down by spending item at that time.



belong to income decile  $d$ ,  $S_i^{HE}$  4 to 6 years of cumulative higher education spending for young adults  $i$ ,  $Taxes_i$  the sum of taxes (income tax, VAT, corporate tax, and energy and excise taxes) paid annually by parents of young adult  $i$ ,<sup>34</sup> and  $n_d$  the number of young adults whose parents belong to the income decile  $d$ .

## 4 Unequal access to higher education based on parental income

In this section, we present our main results in terms of access to higher education and to different programs according to parental income in France. Then, we present a comparison of the correlations between parental income and children’s access to higher education in France and the United States.

### 4.1 Strong inequalities in access to higher education for different income groups

The proportion of 18- to 24-year-olds who have access to higher education increases sharply with parental income (Figure 1): about 35 percent of individuals aged 18-24 whose parents are in the bottom quintile of the income distribution (P0-P20) are or have been students, compared with nearly three times as many in the top decile (around 90 percent).

[place Figure 1 here]

Access to master’s degrees and selective programs – defined here as preparatory courses, elite graduate schools, medical studies and Ph.D.<sup>35</sup> – is more unequal (Figure 2). Up to the 7th income decile for master’s degrees and up to the 9th income decile for selective programs, less than 10% of individuals access these studies. On the other side of the distribution, more than 40 percent of individuals whose parents are in the top 2 percent of the income distribution (P99-P100) reach the master’s level or enter a selective program between the ages of 18 and 24. Figure C8 in the Appendix shows the access rate to law and medical studies. Access to these specific fields is highly uneven. For medical school, the access rate for individuals in the top 2 percent (P99-P100) is around ten times the access rate for

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<sup>34</sup>Our database includes administrative data on parents’ income tax contributions. We impute the share of income devoted to VAT, corporate income tax, and other indirect taxes in each standard of living decile of the general population (*i.e.* not only parents of young adults) by dividing the tax revenue from that decile by their pre-tax income in the distributed national accounts (Accardo et al. (2021), Germain (2021)). Table A7 shows for each standard of living decile the proportion of income dedicated to each of these different taxes, as used for our imputations.

<sup>35</sup>See Section 3.4 and Appendix A.1.1 for more details on the definition of this variable.

individuals in the bottom 80 percent of the income distribution (P0-P80): 20 percent versus around 2 percent.

[place Figure 2 here]

In Appendix C.3.1, we present results for heterogeneity by gender, and parents' place of residence. Female students have more access to higher education at a given parental income, but have less access than their male counterparts to selective higher education. At the top of the income distribution (10th decile), the proportion of female students accessing selective programs between 18 and 24 is half that of male students (Figure C4). This is consistent with the fact that at the start of the 2014 academic year, while female students represented 55% of total student enrollment, they represented only 42% of preparatory courses enrollment and 27% of engineering school enrollment (MENESR-DEPP, 2016). This results supports the evidence of an early construction of gender inequalities prior to labor market entry and the existence of strong gender stereotypes influencing educational choices (Carrell et al. (2010), Ceci and Williams (2011), Carlana (2019)). Geographical inequalities in access to higher education are also observed. Individuals whose parents belong to the middle of the income distribution (P30-P70) access higher education at much higher rates when at least one of their parents lives in the Parisian area. At the top of the income distribution (10th decile), having a parent living in a large urban unit (more than 100,000 inhabitants) significantly increases the chances of accessing selective higher education (Figure C5).

These inequalities in terms of access to higher education and selective programs are reflected in inequalities in educational attainments. To observe this, we limit ourselves to individuals aged 22 to 24, who are the most advanced in their studies in our sample. Nearly 50 percent of 22- to 24-year-olds whose parents are in the top 5 percent of the income distribution have obtained a bachelor's degree, compared with less than 15 percent of those whose parents are in the bottom 10 percent of the income distribution (Figure 3). Among the 10th income decile, almost everyone obtains at least a high school diploma, while about half of individuals in the 1st decile have no high school diploma.

[place Figure 3 here]

**Linearity of the income effect.** In the literature studying the impact of parental income on access to higher education, no consensus is found regarding the linearity of the income effect. Chetty et al. (2014) and Chetty et al. (2020) show that, in the United States, access to education grows linearly with parental income. In Norway, Bütikofer et al. (2019)

found strong non-linearities at the top and bottom of the income distribution.<sup>36</sup> and Løken et al. (2012) find a concave relationship with larger marginal effects of family income on children’s educational attainment at the lower end of the family income distribution.

On a purely descriptive basis, we find a non-linear relationship in France: the effect of income on access to higher education is around twice as large in the top half as in the bottom half of the income distribution (Table 3). Having parents in the fifth versus third income quintile increases the likelihood of attending college by 31 percentage points, while having parents in the first versus third income quintile decreases that likelihood by 16 percentage points. For access to master’s degrees and selective studies, the coefficient on income is rarely significant in the bottom half of the distribution but is very high in the top half of the income distribution and even much higher in the top 20 percent of the income distribution (see Table C11 and Table C12 in the Appendix C.3.4). When no controls are included, having parents in the fifth income quintile relative to the third quintile increases the probability of going to master’s degree (respectively selective programs) by 20 percentage points (respectively 18 percentage points (p.p.)) compared to only 6.4 p.p. (respectively 4.0 p.p.) for the fourth income quintile relative to the third.

[place Table 3 here]

The stronger income effect in the second half of the distribution is somewhat counterintuitive. If the income effect were related to credit constraints, one would expect the impact to be larger at the bottom than at the top of the distribution, as households at the bottom of the distribution are more financially constrained. This tends to show that much of the income effect is not directly related to financial barriers but rather to other characteristics correlated with income, such as parental occupation and education, something we explore further in the second part of the paper (also see below and Appendix C.3.2 for the presentation of some correlates of higher education access gap by parental income).

**Robustness checks.** A first concern with our data is that individuals at the bottom of the income distribution might enter higher education at a later age than those at the top of the income distribution, and we would then overestimate inequality in access to higher education. To overcome this potential bias, we perform robustness checks by removing individuals who are still in high school between the ages of 18 and 24 (Figure B2 in the Appendix) and then focusing on individuals between the ages of 21 and 24 (Figure B3 in the Appendix). Removing those who are still in high school mechanically increases the proportion of individuals in higher education or with a higher education degree, but the gradient across the different

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<sup>36</sup>Due to our small sample size, we are unable to replicate the machine learning techniques used by Bütikofer et al. (2019), but we observe the coefficient of different parental income quintiles, relative to the third quintile, by successively adding controls for parental background (Table 3).

income deciles is almost the same.<sup>37</sup> Restricting our sample to those aged 21-24 also makes very little difference in the gap in access to higher education across income deciles (although standard errors are larger due to the smaller sample size).<sup>38</sup>

A second concern is the underestimation of inequality in access to higher education due to the fact that our parental income is calculated over one year, thus likely influenced by transitory fluctuations (Solon, 1992). We perform a robustness check using the parents' household taxable income,<sup>39</sup> an administrative tax variable available in our sample at the household level for years  $t$  and  $t - 2$  (Table B8). Higher education access rates by parental income decile for parental household taxable income in year  $t$  and in year  $t - 2$  are slightly different but never statistically different from each other. These results are consistent with Chetty et al. (2014) finding that the measure of social mobility is little affected by the number of years used to measure parental income (see figure III panel B of Chetty et al. (2014)).

**Correlates of higher education access gap.** The detailed questions asked to parents and young adults in the survey allow us to identify variables correlated with parental income that may be potential mechanisms to explain the higher education access gap. Although descriptive, these correlations could facilitate future research on causal mechanisms.

In the student subpopulation, nine out of ten parents financially support their child, whether through expenses, in-kind support, or regular monetary support<sup>40</sup>. But the amounts of total transfers received are very uneven. At the bottom of the income distribution, students receive an average of 3,000 euros per year in direct and indirect transfers from their parents, compared to about 10,000 euros at the very top of the distribution (Figure C6(a)). While direct public support – mainly composed of need-based scholarships and housing benefits for the student population – are somewhat larger at the bottom of the income distribution, the amounts involved do not compensate for the significant differences in parental financial transfers (Figure C6). These large differences in the ability of parents to finance their children's education may explain why access to higher education can be much more difficult at the bottom of the income distribution, as students must find their own means of financing their education – working while studying<sup>41</sup> or obtaining a loan, but the latter is very uncommon

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<sup>37</sup>A 10 percentile point increase in parental income is associated with a 5.8 percentage point increase in the proportion of children accessing higher education in the whole sample – 4.2 in the first half of the income distribution and 9.3 in the second half – compared to a 5.9 percentage point increase when removing those who are still in high school – 4.6 in the first half and 7.0 in the second half –.

<sup>38</sup>For this age group, a 10 percentile point increase in parental income is associated with a 5.7 percentage point increase in the proportion of children accessing higher education – 4.7 in the first half and 10.1 in the second half –. The differences between these coefficients and those obtained in our main specification are not statistically significant.

<sup>39</sup>This variable does not exactly correspond to the variable we use in our main analysis because the variable used in our main analysis (sum of the father's pre-tax income and mother's pre-tax income) is not available in year  $t - 2$ .

<sup>40</sup>Financial transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey.

<sup>41</sup>In France in 2013, 46% of students work during the academic year, and for 13% of them, this activity

in France<sup>42</sup> –. Table 3 shows that the coefficient of the percentile rank of parental income on the probability of accessing higher education is only marginally affected when potential financial transfers received from parents are taken into account.<sup>43</sup> Results are very similar for access to master’s degrees and selective programs (tables C11 and C12). This suggests that credit constraints are less relevant in explaining the higher education access gap than other factors correlated with parental income, which we explore further in Section 5.

Aspirations also differ significantly along the parental income distribution. At the top of the income distribution, individuals aged 18-19 years old<sup>44</sup> plan to study much longer than those at the bottom of the distribution (Figure C7): around 80 percent of those in the top 10 percent of the income distribution want to obtain a graduate degree (a master or a Ph.D.), compared with about 30 percent in the bottom decile of the income distribution. These differentiated aspirations by parental income are strongly, but not entirely, related to parental education. Parental degree explains about three-quarters of the differential educational aspirations across income groups, suggesting that young adults are influenced by their parents’ educational background when choosing their studies (see Oaxaca-Blinder decompositions<sup>45</sup> in Table 4, column (4)).

Inequalities in access to higher education are related to differences in ability, which are correlated with parental income. Our data do not include measures of academic ability or performance, but do provide information on prior degrees earned. This allows us to quantify how much of the inequality in access to higher education is due to differences in access to the middle school graduation exam and the high school graduation exam. The gap in access to higher education is 53 percentage points (p.p.) between the richest 10 percent and the poorest 10 percent aged 20 or older,<sup>46</sup> – 91% vs. 38% –, but the gap is reduced to 46 percent among those with a middle school certificate, and to 24 percent among those with a high school certificate. We use Das Gupta’s rate decomposition method<sup>47</sup> (Das Gupta, 1991) to quantify the contribution of differential access to these different certifications on inequalities in access to higher education. The middle school certification access gap accounts for 18 percent of the overall higher education access gap, but the contribution of the high school

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is highly detrimental to their studies – defined as a paid activity unrelated to studies, carried out at least half-time and more than 6 months per year – (OVE, 2014). Some empirical evidence (Beffy et al., 2013) has shown that holding a regular part-time job has significant negative effects on the likelihood of graduating from college.

<sup>42</sup>In 2013, on average, less than 1% of students’ overall resources came from student loans in France (OVE, 2014).

<sup>43</sup>This variable is what a young adult would have received, if studying, based on what students with similar characteristics get from their parents. See Appendix A.1.1 for more details on the construction of this variable.

<sup>44</sup>We reduce our sample to the youngest to avoid aspirations being influenced by completed years of schooling in higher education.

<sup>45</sup>See Section 3.5 and Appendix A.1.3 for more details on these decompositions methods and Section 5.2 for Oaxaca decompositions of access gap to higher education, master’s degree and selective programs.

<sup>46</sup>We exclude 18- and 19-year-olds, which avoids underestimating access to the high school graduation exam among high school repeaters.

<sup>47</sup>See Section 3.5 and Appendix A.1.3 for more details on this decomposition method.

certification access gap among middle school graduates is three times as large, amounting to 54 percent. These two steps do not fully explain the gap in access to higher education, as 29 percent of the access gap is not explain by previous credentials (see Table C10 in the Appendix). These results confirm that access to a high school diploma remains a necessary condition for access to higher education, although it is not sufficient. The contribution of the high school diploma to access to selective programs and masters’ degrees is not negligible either (about a quarter), but the bulk of the differential in access to these programs seems to take place after access to higher education. The residual contribution of access disparities among those who have entered higher education is about 50 percent (see Table C10 in the Appendix).

## 4.2 Comparison with the United States

Very few studies have linked access to higher education to parental income on a nationally representative basis. One exception to this is Chetty et al. (2020) in the United States, which studies college access between in the years individuals turn 19 to 22 using large administrative data. In order to be as close as possible to the sample covered by these authors and to avoid the bias associated with individuals still in high school, we consider all individuals aged 21-24 who are currently enrolled in higher education or who have already graduated from higher education.<sup>48</sup> The definition of income is not exactly the same as in the rest of our study because our main specification focuses on individual income, whereas here, in order to be more comparable to Chetty et al. (2020), we consider parents’ household income, divided by two when we have both father and mother’s household income.<sup>49</sup>

Surprisingly enough, given the differences in institutional contexts, inequalities appear to be almost as pronounced in France as in the United States (Figure 4). In the United States, an increase of one decile in parental income is associated with an increase in the proportion of young people entering higher education of 6.1 percentage points compared to 5.7 percentage points in France. In both countries, the proportion of individuals studying at the top of the income distribution is around 90 percent. However, the functional form of the effect of income on access to higher education differs between the two countries. The income effect is linear in the United State, whereas in France, this effect is around twice bigger in the top half of the income distribution than in the bottom half – an increase of one decile in parental income is associated with an increase in the proportion of young people entering higher education of

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<sup>48</sup>These individuals are most likely to have entered higher education between the ages of 19 and 22. We exclude the youngest individuals from our sample to limit the small bias coming from those retained in high school.

<sup>49</sup>We do not include property and capital incomes in France because it is not possible to identify them independently of the incomes of all household members, thus also including the incomes of non-decohabiting young adults. Taking into account property and capital incomes would mainly change the ranking within the last decile, but should only marginally change the ranking of individuals in the rest of the distribution. Chetty et al. (2020) study cohorts born between 1980 and 1982 in the United States, whereas the survey used in our study focuses on cohorts born between 1990 and 1996 in France.

4.6 in the first half of the income distribution and 9.6 in the second half –.

[place Figure 4 here]

The fact that the magnitude of the income effect is close between these two countries is surprising. One would expect the link between parental income and access to higher education to be stronger in the United States for at least three different reasons. First, higher education is much more expensive in the United States than in France. In 2014-2015, average tuition in the United States was \$9,139 at public four-year colleges for in-state students and \$31,231 at private nonprofit institutions (Baum et al., 2014), compared to between 184 and 610 euros for most programs in France (see Section 2 for more details). Second, the level of income inequality is higher in the United States than in France, which means that there are more differences in income between the top and bottom deciles in the United States than in France. Table A5 in the Appendix compares the distribution of parental income in France and the United States. In 2012 dollars, the standard deviation of parental household income is \$353,430 in the United States and \$53,127 in France. In 2014, the share of the top income decile was 46% in the United States versus 33% in France in 2014 (<https://wid.world/data/>). Third, the return to higher education is higher in the United States – about 14% – than in France – about 10% – (Psacharopoulos and Patrinos, 2018). Due to a strong correlation between parents' and children's education, when looking at the overall impact of parental income without controlling for parental education, one would expect the country with the highest return to education to have a stronger link between parental income and children's educational attainment.

Nevertheless, several arguments could explain this higher than expected level of inequality in the French context. The absence of a unified high school system in France implies an early orientation leading students of low socioeconomic status more often to short and less valued vocational tracks. Moreover, the French education system is characterized by a strong effect of social origin on academic performance before higher education.<sup>50</sup> Some programs in the United States offer higher and more frequent scholarships than in France. Eventually, the dual system of higher education in France (with predominantly non-selective universities and elite graduate schools) could explain the strong relationship observed between parental income and access to selective programs in France. Although counterintuitive, this proximity between the French and American cases is consistent with the paradox of a lower level of social mobility in France than might be expected given its relatively low level of income inequality (known as the "great Gasby curve paradox"). This result also extends the scope of Landersø and Heckman (2017)'s finding of a similar influence of family background on educational

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<sup>50</sup>According to the results of the 2015 PISA survey, 20 percent of the variation in science performance is explained by socioeconomic status in France, compared to only 11 percent in the United States, with the OECD average being 12.9 percent (Gurria, 2016).

outcomes between the United States and Denmark, despite the fact that the Danish welfare state provides free university education and that social mobility is much higher in Denmark than in the United States.

In this first section, we presented novel estimates of inequality in access to higher education by parental income in France – using reliable income data obtained from administrative tax sources – and compared our estimate to that observed in the United States. The next section examines the interactions between parental income, degree and occupation in explaining inequalities in access to higher education.

## 5 Complementarity of inequalities related to parents' income, education or occupation

Inequalities in access to higher education are mainly studied in terms of social background (e.g., parents' degree or occupation) but very few studies address the economic dimension of these inequalities. In this section, we examine the complementarity between inequalities in access to higher education related to parental income, parental degree, and parental occupation. The aim is to observe whether the different dimensions of inequality overlap or combine to explain the higher education access gap.<sup>51</sup> We first present the Oaxaca-Blinder decompositions that allow us to quantify the share of the gap in access to higher education by parental income attributable to parental degree and the share not explained by this observable characteristic. We then observe how the coefficient on income changes when we introduce different controls for parental background. Although descriptive, these estimates show that the effect of income on access to higher education is not entirely attributable to parental education and occupation. This indicates the existence of a complementarity of the different dimensions of inequality to explain the gap in access to higher education between individuals from different socio-economic backgrounds.

### 5.1 Correlation of parental background variables

One might worry that income does not add information to that contained in parental occupation or degree. We first check that this is not the case by computing correlations between pre-tax income and parental occupation or degree. The results are presented in Table A2 in the Appendix. Pre-tax income variables are weakly correlated with occupation and degree, this is particularly true for fathers (for whom the correlation coefficients are 0.38 and 0.41 respectively versus 0.50 and 0.46 for mothers). Thus, when we try to predict the pre-tax income decile using a logit model with the other social origin variables as predictors, the

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<sup>51</sup>We grouped parental occupation in 4 categories – high SES, medium-high SES, medium-low SES and low SES – (see Section 2, Appendix A.1.1 and Table A1 for more details on the construction of this variable). We measure parental degrees with six categories – primary school or lower, middle school diploma, high-school diploma, Two-year degree, Bachelor or master degree, and M.D. or Ph.D. –.



prediction is very poor, with only about 30% of observations classified in the correct parental pre-tax income decile when using occupation (39 categories) as a covariate, 23% when using degree (6 categories) as a covariate, and 29% when using both parental occupation and degree as predictors. Results are very similar when we predict separately for mothers and fathers.

## 5.2 Oaxaca-Blinder decompositions

We first decompose the income effect on access to higher education into a part related to parental education and a part not explained by this characteristic. To do this, we rely on Oaxaca-Blinder decompositions<sup>52</sup>.

Applied to inequality in access to higher education, master's degree and selective programs, these decompositions show that while parental education explains some of the access gap through parental income, about half of the observed gap is due to other factors. We apply these decompositions to different outcomes – overall access to higher education, access to master's degree or selective programs – and between different subgroups of parental income – bottom 50/top 50, bottom 20/top 20, and bottom 10/top 10 –. Table 4 shows the detailed results of these decompositions. Among individuals whose parents are in the bottom decile of the income distribution, 36 percent had access to higher education between the ages of 18 and 24, compared to 89 percent of individuals whose parents belong to the top decile of the income distribution. Of these 53 percentage points of difference in access, 31 points (58% of the gross difference) are "explained" by parental degree.<sup>53</sup> The residual difference of 22 percentage points (42% of the gross difference) cannot be explained by parental degree. The application of the Blinder-Oaxaca decomposition method to the analysis of inequalities in access to master's degrees and selective programs leads to conclusions similar to those obtained for access to higher education as a whole. The results of these decompositions (see columns (2) and (3) of Table 4) indicate that inequalities in access to master's degrees and selective programs across income groups are only partly explained by differences in parental education between individuals from high and low income families: differences in parents' educational backgrounds explain less than half of the unequal probability of accessing a master's degree between individuals from low income and high income families and about 60 percent of difference in access rates to selective programs. The results of the decompositions for other income groups – top 20 and bottom 20 of the income distribution; top 50 and bottom 50 of the income distribution – are very similar, with parental degree still explaining between 50 percent and 60 percent of the gap in access to higher education, master's degrees and selective programs.

[place Table 4 here]

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<sup>52</sup>See Section 3.5 and Appendix A.1.3 for more details on this statistical decomposition method.

<sup>53</sup>Father's degree accounts for 16 percentage points, and mother's degree for 15 percentage points.

The Oaxaca-Blinder decompositions confirm that the differences in access to higher education by parental income that we measure are only partially related to differences in parental degree: about half of the access gap is not attributable to parental degree.

### 5.3 Complementarity of several dimensions of inequalities

We further explore the complementarity of the different dimensions of inequality by observing the evolution of the coefficient of parental income on access to higher education, master's degrees and selective programs, when we successively add various parental background controls.

Table 5 presents the coefficients of a regression of access to higher education on the percentile rank of parents' income, fathers' and mothers' degrees (6 categories for each parent), fathers' and mothers' occupations (6 categories for each parent), potential financial transfers<sup>54</sup> received from parents, marital status and urban unit size. These regressions show a complementarity between inequalities related to parental income, parental occupation and parental education in explaining access to higher education.

For a given occupation and parental degree, the higher the percentile rank of parental income, the greater the proportion of individuals accessing higher education and different tracks. For example, individuals whose mothers obtained a high school diploma as their highest degree (12 years of education) are 38 percent to access higher education between the ages of 18 and 24 when their parents are in the bottom quintile of the income distribution and 74 percent to access it when their parents are in the top quintile. The coefficient on the percentile rank of parental income is equal to 0.58 without controls and is greatly reduced when controls are added – reduced by around half when controls for parental occupation or degree are added, and divided by a factor of around four when controls for occupation and degree are added simultaneously –, but it remains significant at the 1% level in all specifications. When parental degree and occupation are included as controls, a 10 percentile point increase in parental income is still associated with a 1.5 percentage point increase in access to higher education. We cannot give a causal interpretation to the residual effect of income, because it could be related to unobservable parent characteristics correlated with their income. However, this residual effect of parental income demonstrates a complementarity between inequalities related to parents' occupation and degree and a more economic dimension of inequality, related to parental income. In other words, the share of parents' income that is not related to their occupation or degree still matters in explaining access to higher education, master's degrees and selective programs.

Conversely, for a given level of parental income, the more privileged the parents' occupation or the higher the parents' degree, the higher the proportion of individuals accessing higher education. With respect to parental occupation, for a given level of parental income,

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<sup>54</sup>This variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her observable characteristics.

the more selective the track, the higher the occupational group that is determinant in explaining access to this track. The main gap in access to overall higher education is between individuals from "medium-low SES" and from "low SES," while the main access gap is between individuals from "high SES" and from "medium-high SES" for selective programs (see Table 5 for higher education and Table C14 in the Appendix for selective programs). With respect to parental education, having parents who have had access to higher education or obtained a certain degree significantly increases the probability of accessing higher education or obtaining that specific degree: a form of educational reproduction seems to be at play here. For instance, 84 percent of individuals whose mother has a higher education degree (14 years of education or more) have access to higher education between the ages of 18 and 24, compared to 45 percent of those whose mother does not have a higher education degree. For all levels of parental degree, with the exception of the Ph.D., having a mother with this degree compared to a mother without a degree has a significantly greater effect on access to higher education than the same degree for the father. This result, which suggests a strong transmission of education from mother to child, is consistent with some previous findings in the literature (Currie and Moretti (2003), Sacerdote (2007), Chevalier et al. (2013), Lundborg et al. (2020)).

[place Table 5 here]

Overall, the results explaining access to master's degrees and selective programs (tables C13 and C14 in the Appendix) are very similar and indicate a complementarity between "economic", "social", and "educational" factors that is very comparable to that of access to higher education as a whole.

In this section, we have described how the gap in access to higher education by parental income, observed in the first section, may interfere with other factors, such as parental education and occupation. The existence of a residual effect of parents' income demonstrates a complementarity between the dimensions of inequality usually studied in the literature – those related to parents' occupation and diploma – and a more economic dimension of inequality, related to parental income. In the last section of the paper, we show how inequalities in access to higher education creates an anti-redistributional pattern of public spending in higher education, even after accounting for the taxes paid by households to finance this public spending.

## 6 Unequal public expenditure for young adults

In this section, we further analyze the implications of the inequality of access to higher education by parental income measured above by assessing the redistributive profile of higher education expenditures and then of all expenditures dedicated to young adults in France.

Table 1 presents a review of the literature on the redistribution of education spending obtained in different institutional settings and with different methodological choices. Usually, spending on K12 education tends to be redistributive while spending on higher education tends to be regressive. The table also shows that the results obtained are highly dependent on methodological choices. When all taxes are taken into account, the authors generally conclude that education spending is progressive, even in higher education, which is not the case if not all taxes are taken into account. In our study, we focus only on spending on higher education and consider taxes that finance this specific spending (as not all taxes are dedicated to this spending).<sup>55</sup> We adopt a cross-sectional analysis (i.e., not using a life-cycle perspective) assessing progressivity in terms of parental pre-tax income. The benefit of higher education is implicitly evaluated here at its cost price, as is the case in the literature (Smeeding et al. (1993), Allègre et al. (2012)). We use more recent and disaggregated data on the costs of public higher education than the existing literature, and we also account for private investment in higher education and human capital more generally – through tuition and parental financial transfers to students –. By convention, expenditures are considered over a 6-year period corresponding to the 18-24 years of age of young adults, which corresponds to the scope of our data.

After a brief presentation of the data, we assess the redistribution of public and private spending on higher education, which we complement by taking into account the contribution of parents through the taxes that finance this spending. We then extend the redistribution analysis to all public spending on young adults and their parents – including social and family benefits as well as tax deductions – and finally to all public and private spending, including all parental financial transfers.

## 6.1 Public and private spending on higher education

In the previous literature on the redistribution of education spending, higher education spending is aggregated into one (Albouy et al., 2002) or three categories (Allègre et al., 2012). We rely on more comprehensive data ("Cost Awareness Survey" data) breaking down student costs by fields and tracks. Table A6 in the appendix shows the considerable per-student cost disparities observed by track and field. To study inequality throughout the higher education trajectory, we restrict ourselves to individuals aged 22-24, who are the most advanced in their education in our sample, and retain the higher cost between highest degree earned, highest level of education attained, or current education. Section 3.1 and Appendix A.1.2.3 provide more detail on these new higher education cost data and the method used to calculate the total cost of educational trajectories from the available information.

We first observe the distribution of higher education public spending among all individuals, regardless of their parental income. About 40 percent of individuals have zero spending

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<sup>55</sup>See Section 3.5 and the Appendix A.1.3 for more details on the accounting method developed here for assessing the redistribution of public spending on young adults.

because they did not enter higher education and only 10 percent of individuals receive more than 25,000 euros of investment in higher education during their studies between the ages of 18 and 24 (see Figure C11 in the Appendix). The 1 percent of individuals with the highest public spending on higher education receive about 65,000 euros over 6 years of study. They receive 2.6 times more spending than individuals at the 90th percentile of higher education spending and 10 times more spending than individuals at the median of public spending on higher education (65,000 euros versus 6,500 euros on average). Gender differences in access to selective programs (Figure C4 (b)) mechanically translate into differences in public investment for male and female students (Figure C13). Public higher education spending on male students is significantly higher than spending on female students at the 2nd decile of the gender spending distribution and above. This shift is even more pronounced at the top of the distribution. The 10% of male students with the highest spending on higher education receive an average 11,000 euros more public spending during their studies than their female counterparts.

## **6.2 Inequality in public spending on higher education by parental income**

Inequalities in access to higher education by parental income lead to differences in public spending on higher education. Spending on higher education is higher for those at the top of the income distribution than for those at the bottom (Figure 5). Those in the bottom 30 percent of the income distribution receive between 7,000 and 8,000 euros of investment in higher education between the ages of 18 and 24, compared to about 27,000 euros – of which 18,000 euros correspond to public spending – for those in the top 10 percent of the income distribution (Figure 5a). Substantial differences in private investment in higher education are also observed: parents at the bottom of the income distribution pay an average of 300 euros in tuition fees for their child over six years compared to more than 9,000 euros at the top of the income distribution. The ratio of higher education spending between top and bottom income deciles (D10/D1) is equal to 3.4 while that of public investment alone is 2.3.

Another way to observe inequalities in public spending for higher education is to observe the correlation between the percentile rank of parental income and the percentile rank of public spending on higher education (see Figure C12 in the Appendix). A significant correlation between parental income and public spending on higher education is observed. On average, a one percentile increase in parental income is correlated with a 0.4 percentile increase in the distribution of public spending on higher education. Individuals whose parents are in the lowest 1% of pre-tax income are in the 22nd percentile rank of public spending for higher education on average, while those whose parents are in the highest 1% are in the 62nd percentile rank of public spending on average.

[place Figure 5 here]

**Decomposition of inequalities in spending between the extensive and the intensive margins.** These inequalities in public spending appear to be primarily due to differences in access: inequality is much less pronounced when focusing only on those having had access to higher education (Figure 5b). When they do enter higher education, individuals in the top and bottom decile of the income distribution benefit from roughly the same public investment (about 20,000 euros between the ages of 18 and 24). Those at the top of the distribution, however, still benefit from a much higher private investment in higher education: about 10,000 euros over 6 years on average, compared to 700 euros for those at the bottom of the income distribution.

We use Gupta’s rate decomposition method (Das Gupta, 1991) to further decompose public expenditure inequalities between an extensive margin – access to higher education – and an intensive margin – differences in the cost of higher education among those who had access to higher education, linked to both the length of study and differences in annual cost –.<sup>56</sup> Inequalities in access account for about 70 percent of the inequalities in spending between the top and bottom income deciles (see first column of Table 6 and Figure C9 in the Appendix). The remaining 28 percent of the expenditure gap between individuals at the top and bottom of the income distribution is mostly explained by differences in the length of studies (26 percent). Among those who have had access to higher education, those at the bottom of the income distribution pursue higher education for an average of 2.9 years, compared to 3.9 years for those at the top of the income distribution (see Figure C10 in the Appendix). In our main specification, there are almost no differences in annual public spending among students whose parents are at the top or bottom of the income distribution.

[place Table 6 here]

**Robustness check: matching richer individuals to better-endowed programs.** We may be concerned that this result of equal annual public spending for those who access higher education may be related to our limited ability to match students to the exact program in which they are enrolled and to disaggregate higher education spending for some of the most selective programs (elite graduate schools in particular). The contribution of access inequalities to inequalities in public spending would then be overestimated.

We simulate two variants of public spending on higher education to predict how a more uneven distribution of public spending within each track and field might change this result (see second and third column of Table 6). When we assume that within a particular track and field of study, the most affluent consistently benefit from the most expensive programs

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<sup>56</sup>See Section 3.5 and Appendix A.1.3 for more details on this decomposition method.

(column 2), and if we also account for the most expensive elite graduate schools that we attribute to the most affluent (column 3),<sup>57</sup> the contribution of inequality of access declines significantly, but remains equal to at least half of the total differences in public spending on higher education between the poorest and richest individuals.

### 6.3 Net benefit for parents taking into account taxes financing higher education

One objection to the finding of regressive government spending is the idea that wealthier parents contribute more to the funding of higher education through their taxes. We estimate a net benefit measuring the degree of redistribution of public spending on higher education, after deducting the share of taxes paid by parents and needed to finance these spending. We consider a static framework in which young adults' higher education is funded by a contribution from all taxpayers, including their parents. Overall, 4% of all taxes over six years are needed to finance public higher education spending.<sup>58</sup> The net benefit to parents of students or former students is therefore defined as the public funding of their young adult's higher education minus 4% of their unallocated taxes paid over 6 years. We compute this net benefit for young adults aged 22-24 who are the most advanced in their studies. See Section 3.5 and Appendix A.1.3 for more details on this methodology.

The average net benefit to parents is 8,311 euros over 6 years (see Table 7). Parents of young adults benefit from horizontal solidarity since their children's higher education expenses are largely financed (75 percent according to our data) by taxes paid by taxpayers without young adults. This average figure hides heterogeneity between households whose young adults have access to higher education and those who do not: the net benefit is almost twice as high as the average net benefit for the former (15,900 euros), and is negative (-1,900 euros on average) for parents whose young adults never access higher education but still contribute to its financing.

Taking into account the taxes paid by households to finance higher education spending does not change the fact that this spending is regressive but it does change the situation at the very top of the income distribution. Net benefit is still twice as high in the top third of the distribution (11,700 euros) as in the bottom third (5,900 euros). It increases with parental income in the second half of the distribution (from P50 to P90), up to around 15,800 euros (see Table 7 and Figure 7). Due to a higher level of taxation and despite more frequent access to higher education, the top decile of the income distribution receives a net benefit half that of the ninth decile (8,200 euros versus 15,800 euros). This net advantage is nevertheless higher than that of the first income decile (8,200 versus 6,900 euros).

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<sup>57</sup>See Appendix B.2.2 for more details on the assumptions made in these counterfactual scenarios associating the wealthiest individuals with the best-endowed programs.

<sup>58</sup>If these spending were to be funded by parents of students or former students alone, 23% of their tax contribution over six years would be required.

[place Table 7 here]

These results taking into account the taxes paid by parents in financing public higher education should not be seen as legitimizing or minimizing inequalities in access to higher education since the payment of a tax, unlike a social security contribution for instance, is not expected to provide privileged access to the public services funded by the tax. The considerable disparities in permanent income by parental income are of a much greater order of magnitude than the differences in funding for public higher education (Allègre et al., 2012). The main challenge, therefore, is not so much to revise the higher education funding system,<sup>59</sup> but rather to ensure more equal access along the parental income distribution to higher education and its selective programs.

## 6.4 Distribution of public and private spending for young adults by parental income

In order to obtain a complete picture of inequality in human capital investment, this final section extends the analysis of the redistribution of higher education spending to all public spending on young adults and their parents. Finally, we add financial parental transfers to young adults to observe inequalities in human capital investment in a broad sense.<sup>60</sup>

**Total public spending benefiting young adults and their parents.**<sup>61</sup> The mean-testing of scholarships leads to a progressive distribution of public support (see Figures 6a and 6b). But the addition of regressive tax deductions offsets this progressivity. The amount of tax deductions and public support is slightly lower around the median parental income, creating a small U-shape pattern.<sup>62</sup> Due to the regressivity of public spending on higher education and roughly constant public support across the income distribution, total public spending on young adults and their parents remains regressive. Young adults and their parents in the top 10 percent of the income distribution receive 75 percent more total public spending than those in the bottom 10 percent (see Table 7 and Figure 7).

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<sup>59</sup>Through the introduction of much higher tuition fees that would depend on parental income, for example, as this could distort higher education enrollment decisions in the middle of the income distribution. This could also accentuate the dualism of French higher education with, on the one hand, well-endowed institutions welcoming highly privileged students and, on the other hand, much less well-endowed institutions welcoming more disadvantaged students.

<sup>60</sup>Table C15 in the Appendix presents the distribution of annual parents' financial transfers and annual public spending for young adults and their parents. Strong disparities in terms of parents' financial transfers, public support and tax deductions for parents are observed. The top 5 percent of individuals receiving the most financial transfers from their parents receive nearly 10 times more than individuals at the median of parental transfers. The top 5 percent of parents who benefit the most from tax deductions receive nearly 30 times more annual tax deductions than individuals receiving the median tax deduction.

<sup>61</sup>See Section 2 and Appendix A.1.1 for a description of the public support and tax deductions benefiting young adults and their parents.

<sup>62</sup>This is less the case among young people who have access to higher education, where the least affluent receive slightly more public support than the most affluent.



[place Figure 6 here]

**Total inequality in public and private spending on young adults.** Inequality of opportunity results from the combination of these regressive public expenditures with even more unequal private expenditures, which our data allow us to quantify here in a novel way. Cumulated over a six-year period, private spending on young adults aged 22 or older gives rise to considerable inequality: while young adults whose parents belong to the poorest 10 percent receive about 6,600 euros in parental transfers, those who belong to the richest 10 percent receive nearly 40,000 euros, or about six times as much (Table 7). Thus, total public and private spending is 2.5 times higher for young adults whose parents belong to the top decile of the income distribution than for those whose parents belong to bottom decile (see the dotted gray line in Figure 7). Although only a portion of this expenditure is an educational investment in the strict sense, it nonetheless contributes to the youth’s empowerment and well-being. It can affect the young person’s educational and job-seeking choices, as well as his or her level of human capital in the broader sense.

[place Figure 7 here]

## 7 Conclusion

Using a detailed survey of young adults linked to administrative data on their parents’ income, we provide evidence of inequality in access to higher education and selective programs by parental income. On average, a 10 percentile rank increase in the distribution of parental income is associated with a 5.8 percentage point increase in the proportion of children accessing higher education. The level of inequality in access to higher education according to parental income observed in France is very similar to that observed in the United States. Economic inequalities created by income interfere, but do not fully overlap, with inequalities created by social origins in terms of parental socioeconomic status or degree. Spending on higher education is regressive, even after accounting for the taxes paid by parents to fund higher education. Nevertheless, the main concern remains the inequality of access to higher education and particularly selective programs between different income groups, which creates large differences in educational investment and thus contributes to permanent income differences later in the life cycle and strongly limits social mobility.

Our analysis documents the existence of strong differences in parental transfers among students, which call for increased scholarships to better cover the costs associated with higher education. The fact that access to previous credentials is highly unequal also calls for earlier and stronger skills support for low income students. The large differences in access to selective

programs, even among those who have obtained the high school graduation exam, point to the need to provide targeted, transparent, and clear information about different higher education programs to disadvantaged students. As income inequality and inequality related to parental socioeconomic status do not fully overlap, our results also suggest that reliable data on parental income should be further developed in educational data. It would also allow for a better comparison of inequalities in access to higher education between countries. Eventually, detailed data on spending differentials in higher education, especially for selective programs such as elite graduate schools, would allow a more systematic estimation of the redistribution effect of public spending on higher education that would be useful for the public debate.

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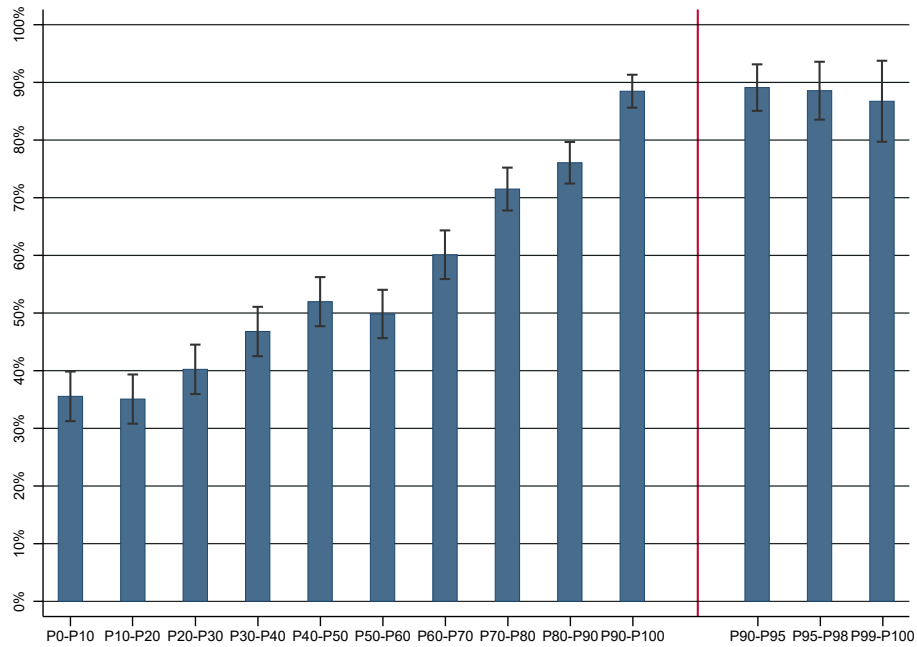
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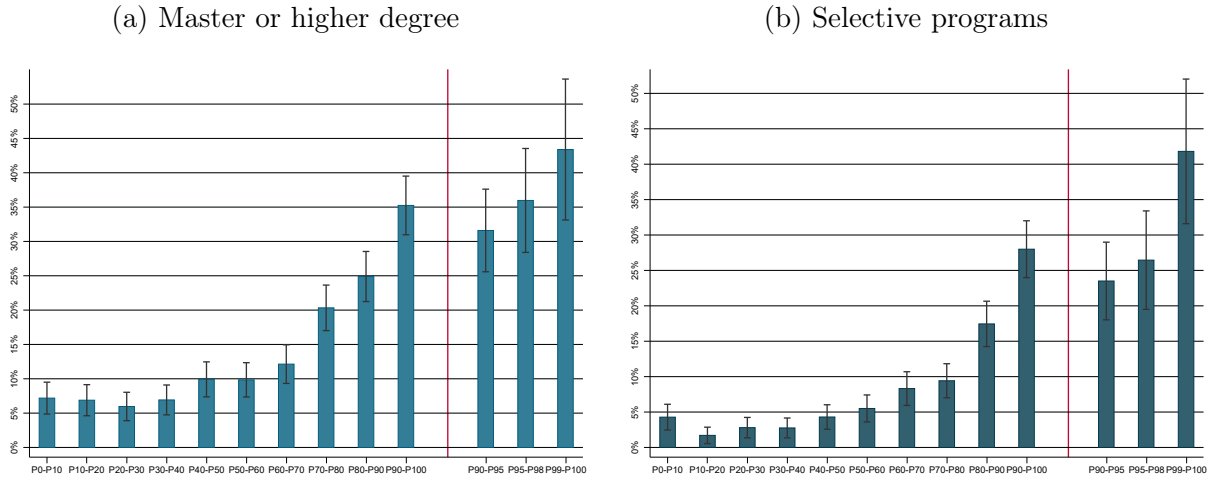
# Figures

Figure 1: Proportion of individuals accessing higher education, by parents' pre-tax income



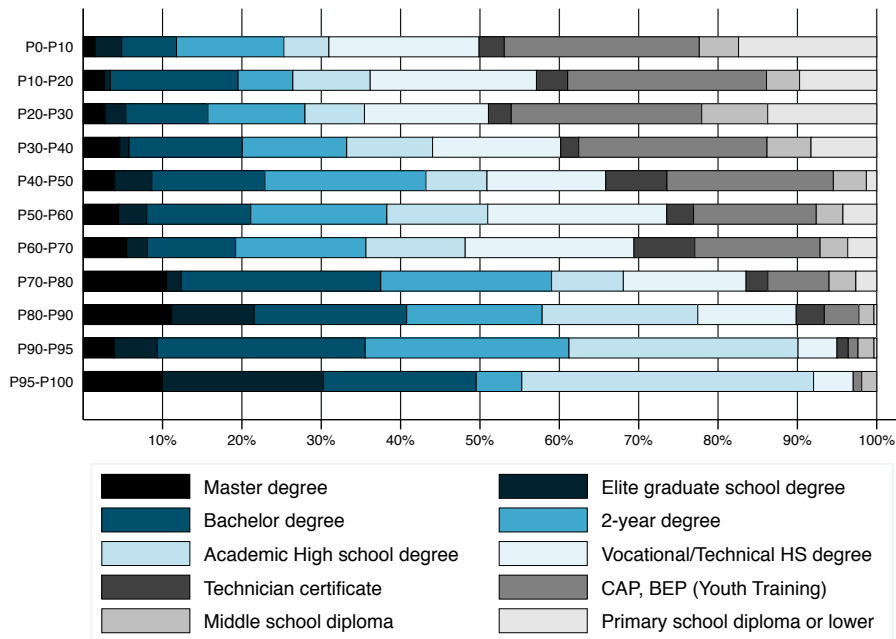
*Notes:* This figure displays the proportion of individuals aged 18-24 who are currently enrolled, have had access to higher education without necessarily obtaining a degree, or already hold a higher education degree, by parental income. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are calculated based on this definition. We further decompose the distribution into the top 10 percent of the income distribution (x-axis). The black line represents the standard errors.

Figure 2: Proportion of individuals accessing masters' degree or selective programs, by parents' pre-tax income



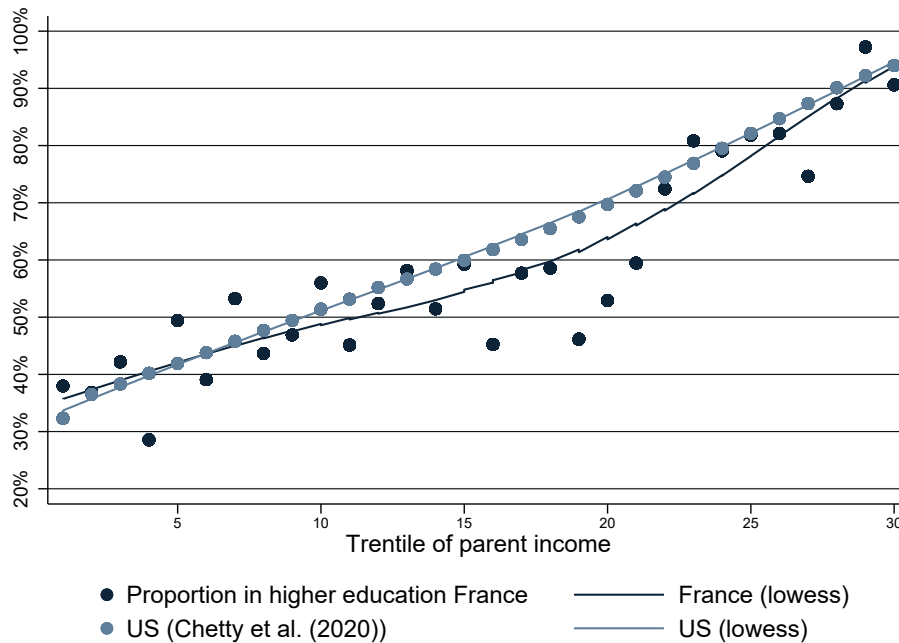
Notes: These figures show the proportion of individuals entering master's programs or selective programs between the ages of 18 and 24, according to parental income. Panel (a) displays the proportion of individuals aged 18-24 currently enrolled in, who have already reached the master level, without necessarily obtaining the diploma or already holding a master's degree or higher, by parental income. Panel (b) shows the proportion of 18-24 year olds currently enrolled in, who have obtained a certain level of selective programs without necessarily having graduated or already holding a degree from a selective program, by parental income. We define selective programs as preparatory courses, elite graduate schools, medical studies and Ph.D. The degree of selectivity of each of these programs can be assessed by ranking all students on the basis of their performance on the high school graduation exam. In 2016-2017, the median rank of students in university (except for medical studies) is 50.2, while that of students in medical studies is 68.1, that of students in preparatory courses is 84.9, and that of students in elite graduate schools is 72.8 (Bonneau et al., 2021). The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. We further decompose the distribution into the top 10 percent of the income distribution (x-axis). The black line represents the standard errors.

Figure 3: Highest degree obtained, by parents' pre-tax income



Notes: This figure depicts the highest diploma obtained by individuals aged 22 to 24, by parental income. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. We further decompose the distribution into the top 10 percent of the income distribution in vintile (x-axis).

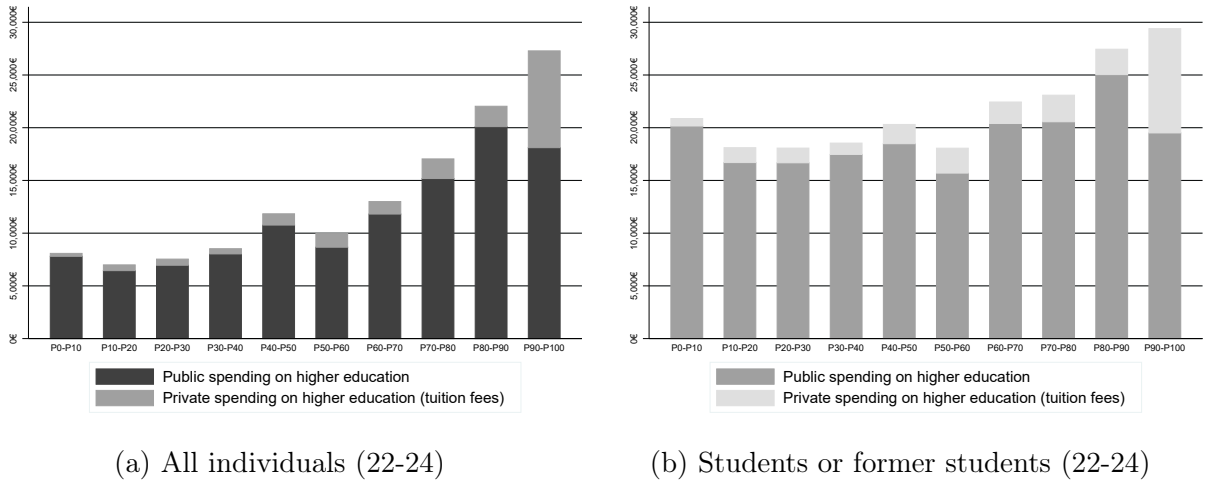
Figure 4: Access to higher education in France and the United States, by parents' pre-tax income



*Notes:* This figure shows the proportion of individuals accessing higher education between the ages of 18 and 21 in France and in the United States, by parental income (based on figures from Chetty et al. (2020) for the United States). In France, the parental income used is the sum of the father's pre-tax household income and the mother's pre-tax household income, in 2014, divided by two when we have both the father's and mother's household income. In the United States, the parental income used is the mother's total pre-tax income at the household level plus the father's total pre-tax income at the household level for each year from 1996 to 2000, divided by 10 or by 5 if only one parent is identified (Chetty et al., 2020). This definition of income for France at the household level is distinct from that used in the rest of the paper for reasons of comparability with Chetty et al. (2020). We do not include property and capital incomes for France because it is not possible to identify them independently of the incomes of all household members, thus also including the incomes of non-decohabiting young adults. Taking into account property and capital incomes would mainly change the ranking within the last decile, but should only marginally change the ranking of individuals in the rest of the distribution. Chetty et al. (2020) study cohorts born between 1980 and 1982 in the United States, whereas the survey used in our study focuses on cohorts born between 1990 and 1996 in France.<sup>63</sup>

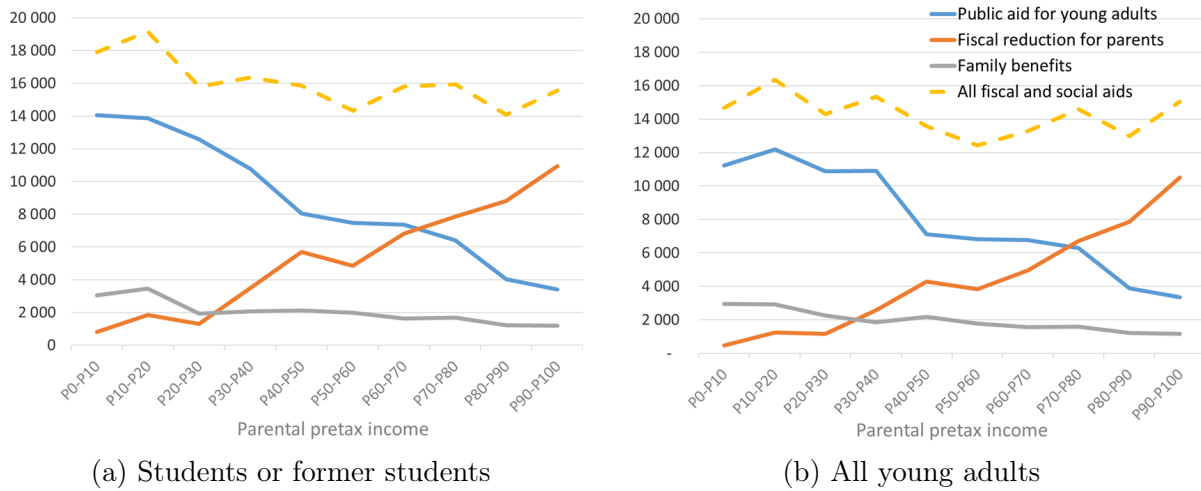
<sup>63</sup>A previous version of our study (see the French Council of Economic Analysis focus <https://www.cae-eco.fr/enseignement-superieur-un-acces-inegal-selon-le-revenu-des-parents>) used older data from Chetty et al. (2014). The update of Chetty et al. (2020) including Pell Grant recipients who were not counted in the 1098-T data used for Chetty et al. (2014) makes the estimates of higher education access by parental income in France and the United States even more similar.

Figure 5: Inequalities in public and private spending on higher education



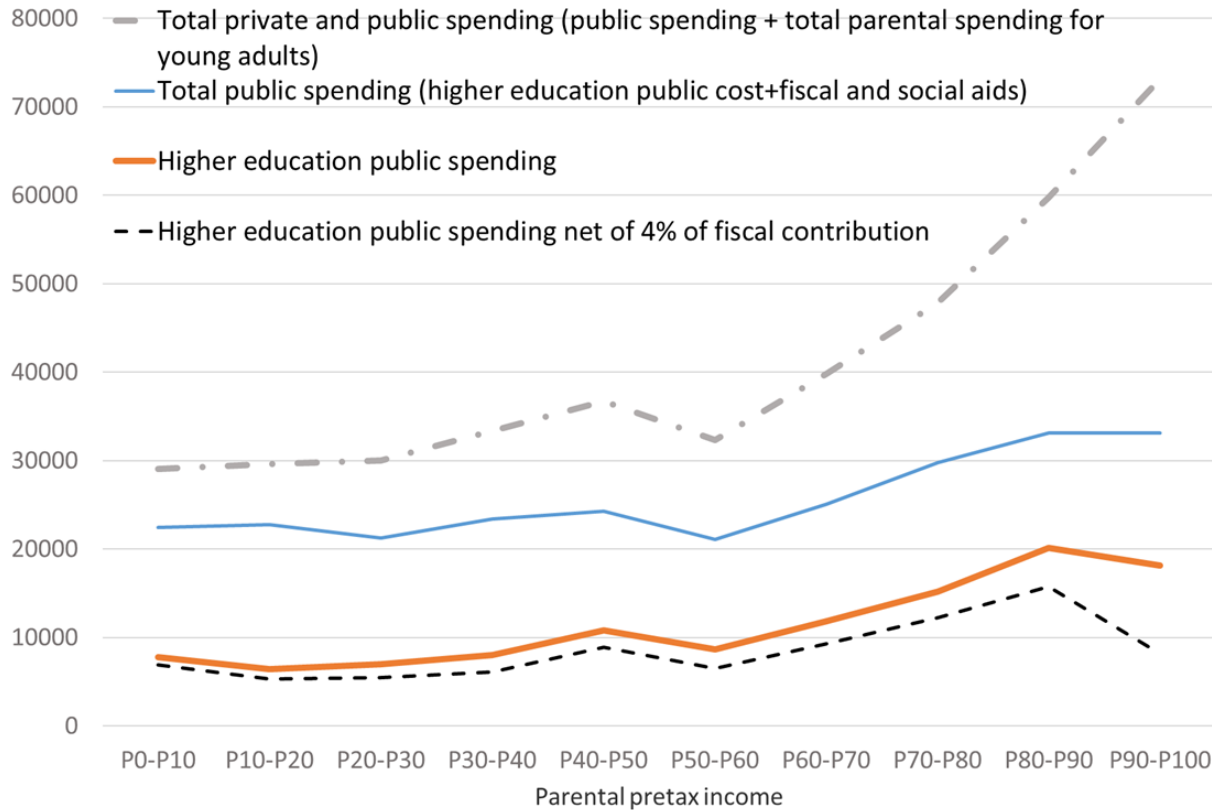
*Notes:* These figures display the disparities in public and private spending on higher education, by parental income. Panel (a) displays the total amount of public and private investment in higher education for all individuals over the course of their education from age 18 to 24, as a function of parental income. Panel (b) depicts the total amount of public and private investment in higher education for students or former students over the course of their education from age 18 to 24, by parental income. We restrict ourselves to individuals aged 22-24, who are the most advanced in their education in our sample. Private spending corresponds to tuition fees paid by the parents and accumulated over the 6-year period, taking into account the number of years of education completed by each individual. They are declared in the survey by the youth and the parents and we average the two values to limit declaration bias. For former students, we infer the amounts of tuition paid based on the average amounts reported by individuals in their parental income decile. In the calculation of public spending, we are able to disaggregate expenditures by track and field of study through the "Cost Awareness" survey (see Table A6 for the annual amount for each field of study and discipline combination). We are not able to associate students with the specific university in which they studied and therefore we do not take into account the intra-track and intra-field variance. For this reason, we present robustness tests in Table B9 where we associate the wealthiest individuals with the best endowed programs. These robustness tests correspond to an upper bound on inequality in public spending on higher education. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition (x-axis). We use the "Cost Awareness" survey and MENESR-DEPP (2021) for higher education spending.

Figure 6: Public support for young adults and their parents over a 6-year period, by parents' pre-tax income



*Notes:* These figures represent the amount of public support received by young adults and their parents over 6 years (when young adults are 18 to 24 years old), by parents' pre-tax income. Panel (a) shows the amount of public support and tax deductions for students or former students, by parental income. Panel (b) shows the same figures for all individuals. We restrict ourselves to individuals aged 22-24 to present cumulative amounts over six years. Public support for young adults includes need-based scholarships, housing benefits, unemployment benefits, guaranteed minimum income, disability benefits, integration contract, and family benefits. We consider direct public support to parents through family benefits and indirect public support through tax deductions related to the presence of a young adult. Tax deductions are granted to all parents whose child is attached to their tax return until the age of 20, and then only to parents whose child is a student until the age of 24. Tax deductions correspond either to the half share (or share) of tax deduction or to the deduction of the pension (without age limit) paid to the young adult, depending on whether or not the young adult is attached to the parents' tax household. Family benefits paid to parents until their child reaches the age of 20 are imputed on the basis of official scales ([https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/af\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/af_cm/) and [https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/cf\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/cf_cm/)). Total family benefits are divided by the total number of children concerned to isolate the amounts paid for the surveyed young adult. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition (x-axis).

Figure 7: Total public and private expenditure received by young adults over a 6-year period, by parents' pre-tax income



Notes: This figure plots the total public and private spending on young adults and public spending dedicated to their parents over six years.

The solid orange line shows public expenses for higher education received by young adults aged 22 to 24 over a 6-year period (between 18 and 24). This corresponds to the dark grey bars in the Figure 5. The dotted dark blue line shows the same figure, net of 4 percent of parental tax contribution – corresponding to the share of all taxpayers unallocated taxes needed to finance higher education –. The solid blue line shows the total public expenditures, related to public spending on higher education, public support, and tax deductions to their parents (see Figure 6 for more details on the distribution of public support for young adults and their parents). The dotted grey line is the total public spending and total private spending received by young adults over the period. Private spending corresponds to financial transfers received from parents. Amounts over six years are imputed based on years of study (students receive more parental transfers than non-students) and parental income decile. The parental transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition (x-axis). We use the "Cost Awareness" survey and MENESR-DEPP (2021) for higher education spending. We calculate the share of taxes needed to finance public spending on higher education out of sample, in a representative sample of all taxpayers (ERFS). We rely on Germain (2021) for the imputation coefficients for indirect and corporate taxes by standard of living decile.

# Tables

Table 1: Synthesis of the economic literature on the redistributivity of education spending

Authors and year	Country	Parental background	Taxes taken into account	Higher Education only	Result in terms of redistributivity
Hansen & Weisbrod (1969)	U.S. (California)	Average income by university	Yes	Yes	Regressive
Hansen (1970)	U.S. (Wisconsin)	Average income by university	Yes	Yes	Regressive
Pechman (1970)	U.S. (California)	Income deciles	Yes	Yes	Progressive
Horriere & Petit (1972)	France	Social origins (occupation)	Yes	Yes	Regressive
Fields (1975)	Kenya	Social origins	No	Yes	Regressive
Hatchuel (1976)	France	Social origins (occupation)	Yes	No	Progressive
Mendès-France (1987)	France	Social origins (occupation)	No	No	Progressive until 15 Higher Ed. regressive
Lemelin (1992)	Quebec	Education level of parents	No	Yes	Regressive
Antoninis & Tsakloglou (1999)	Greece	Income quintiles	No	No	Progressive
Barbaro (2003)	Germany	Income	Yes	Yes	Progressive
Albouy <i>et al.</i> (2002)	France	standard of living	Yes	No	Progressive until 8th decile Higher Ed. regressive
O'Donoghue (2002)	European Union	Income	Yes	No	Progressive
Johnson (2006)	U.S.	Income decile	Yes	Yes	Progressive
Allègre <i>et al.</i> (2012)	France	Permanent income (life cycle)	Yes	No	Progressive

*Notes:* This table summarizes the results of the empirical literature on the progressivity or regressivity of educational expenditures, obtained in various countries and institutional contexts. The "parental background" column specifies which parental social origin variable is used in the analysis (education level, occupation or income. In this case, we specify which income concept is used). The column "taxes taken into account" indicates whether the author deducts the taxes paid by the parents (either partially or entirely) or not. The "higher education only" column specifies states whether the analysis is devoted solely to higher education spending or to all education spending.

Table 2: Baseline characteristics

Quintile of income	P0-P20	P20-P40	P40-P60	P60-P80	P80-P100	Total	Students or former students
	n=963	n=1,033	n=1,083	n=1,091	n=1,027	n=5,197	n=2,963
<b>Age of young adults</b>	21.1 (2.0)	21.0 (2.1)	20.9 (2.0)	20.9 (2.0)	20.8 (2.0)	20.9 (2.0)	21.0 (2.0)
<b>Age of fathers</b>	55.5 (6.59)	53.8 (7.29)	51.8 (5.67)	53.3 (6.17)	53.0 (6.13)	53.2 (6.41)	53.5 (6.30)
<b>Age of mothers</b>	50.0 (6.33)	49.9 (6.09)	49.7 (5.51)	49.9 (4.80)	50.8 (4.74)	50.1 (5.59)	50.6 (5.33)
<b>Female</b>	51.8%	48.2%	49.2%	49.9%	47.4%	49.3 %	53.1 %
<b>Pre-tax income of parents</b>	8,657 (6,139)	23,997 (3,614)	36,748 (3,655)	50,687 (5,125)	95,478 (59,216)	43,099 (39,969)	52,499 (46,420)
<b>Fathers' occupation</b>							
Low SES	39.2%	50.5%	46.1%	28.4%	6.8%	33.1%	22.2%
Medium-low SES	51.0 %	34.2%	24.6%	21.5%	13.4%	27.5%	26.2%
Medium-high SES	5.8%	11.9%	22.7%	30.3%	20.6%	19.2%	22.0%
High SES	4.0 %	3.3%	6.6%	19.9%	59.2%	20.2%	29.6%
<b>Mothers' occupation</b>							
Low SES	30.9%	23.4%	18.4%	12.2%	3.7%	17.5%	10.7%
Medium-low SES	60.9%	61.3 %	62.6%	48.9%	26.6%	51.8%	45.5%
Medium-high SES	5.5%	11.7%	13.1%	27.4%	30.5%	17.9%	24.1%
High SES	2.7%	3.6 %	5.9%	11.6%	39.2%	12.9%	19.7%
<b>Fathers' diploma</b>							
Primary school degree or lower	40.3%	31.1%	21.1%	9.3%	2.6%	17.9%	11.0%
Middle School degree	4.7%	5.8%	5.5%	6.5%	4.0%	5.3%	4.4%
High-School degree	41.5%	55.7%	60.4%	57.2%	28.9%	49.1%	44.6%
Two-year degree	6.8%	4.6%	7.7%	14.4%	19.1%	11.4%	15.4%
Bachelor or Master's degree	5.7%	2.4%	4.4%	11.6%	35.8%	13.5%	20.0%
Ph.D.	1.0%	0.3%	0.9%	0.9%	9.7%	2.9%	4.7%
<b>Mothers' diploma</b>							
Primary school degree or lower	46.0%	31.9%	18.9%	9.0%	2.5%	21.3%	11.6%
Middle School degree	8.5%	10.2%	9.0%	7.2%	3.4%	7.6%	6.5%
High-School degree	35.7%	45.1%	54.3%	51.1%	29.4%	43.1%	39.8%
Two-year degree	5.2%	7.5%	9.6%	20.3%	24.3%	13.6%	20.1%
Bachelor or Master degree	4.4%	5.0%	7.5%	11.6%	33.9%	12.7%	19.1%
Ph.D.	0.3%	0.4%	0.8%	0.9%	6.6%	1.8%	3.0%
<b>Marital status of parents</b>							
Parents live together	35.2%	59.7%	73.1%	83.0%	81.5%	66.5%	71.1%
Parents are separated	43.8%	29.2%	22.4%	16.2%	17.2%	25.8%	22.5%
Father unknown or deceased	17.8%	8.3%	2.9%	0.5%	0.9%	6.1%	4.9%
Mother unknown or deceased	2.5%	2.8%	1.6%	0.3%	0.4%	1.5%	1.5%
Parents unknown or deceased	0.6 %	0%	0%	0%	0%	0.1%	0.1%
<b>Biggest urban units among both parents</b>							
Less than 100,000 inhabitants	52.4%	58.6%	57.6%	58.5%	39.4%	53.3%	49.9%
More than 100,000 inhabitants	34.0%	27.3%	28.4%	28.3%	32.0%	30.0%	30.0%
Parisian area	13.6%	14.1%	13.9%	13.3%	28.6%	16.7%	20.0%

*Notes:* The sample is constructed from the ENRJ survey. Only individuals for whom a young adult and at least one parent responded to the questionnaire are included in our sample. The number of observations in each parental income decile is not the same because we take into account the survey weights assessing the non-response bias when creating the deciles. The mother's occupation is missing for 4 percent of the observations and the father's for 9 percent of the observations. The mother's diploma is missing for 4 percent of the observations and the father's for 17 percent of the observations. When the parents are separated, both were questioned in 46 percent of the cases and only one in 54 percent of the cases, in which case we have no information on the non-resident parent apart from the young adult's answers. When both parents do not live in the same city, we retain the larger one.



Table 3: Access to higher education by parents' pre-tax income quintile

<b>Access to higher education</b>	(1)	(2)	(3)	(4)	(5)
Baseline	0.57	0.57	0.57	0.57	0.57
<b>Parents' income quintile</b>					
Parents' income quintile=1	-0.16***	-0.14***	-0.13***	-0.011	-0.075**
Parents' income quintile=2	-0.074***	-0.063***	-0.065***	-0.0063	-0.021
Parents' income quintile=3	0	0	0	0	0
Parents' income quintile=4	0.15***	0.14***	0.090***	0.11***	0.086***
Parents' income quintile=5	0.31***	0.29***	0.11***	0.15***	0.068***
<b>Control variables included</b>					
Log of potential financial transfers		X			X
Father Occupation (26 categories)			X		X
Mother Occupation (26 categories)			X		X
Father Diploma (6 categories)				X	X
Mother Diploma (6 categories)				X	X
Family situation					X
Urban unit size					X
Observations	5,197	4,455	4,801	4,094	4,078

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

*Notes:* This table presents the estimates of parental income on access to higher education (1), when successively adding controls for potential financial transfers (2), parental occupation (3), parental education (4), and all these controls simultaneously with family status and urban unit size (5). The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Quintiles are calculated based on this definition. We omit the third quintile. The coefficients should thus be interpreted as the difference from the baseline probability of access for individuals with parents in the third income quintile. The potential financial transfer variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives). Parents' occupation is introduced in dummy variables for each of the 26 categories of occupation (see Table A1 for the details of the categories), separately for the father and the mother. Parents' education is introduced in dummy variables for each of the 6 categories of degree (elementary school certificate or less, middle school certificate, high school diploma or equivalent, two-year degree, bachelor's or master's degree, and M.D. or Ph.D.), separately for the father and the mother. The family situation is introduced in 5 categories: parents together, separated, father unknown, mother unknown or parents unknown. Urban unit size is introduced in three categories: Parisian area, urban unit of more than 100,000 inhabitants, urban unit of less than 100,000 inhabitants. When both parents do not live in the same city, we retain the largest one. These regressions show that the effect of income on access to higher education is not linear. The income effect is about twice as large in the top half of the income distribution as in the bottom half. The coefficients do not change much with the inclusion of the potential financial transfer variable. In the upper half of the income distribution, the coefficients are reduced by about two when controls for parental occupation or degree are included, and by a factor of two to five when all controls are included simultaneously. When parental degree is controlled for, the income coefficients are no longer significant in the bottom half of the income distribution.

Table 4: Oaxaca-Blinder decompositions

	Higher education		Master's degrees		Selective programs		Aspiration higher than master degree	
Access rate of top decile (%)	88.5		35.2		28.0		77.8	
Access rate of bottom decile (%)	35.6		7.2		4.3		30.7	
Gross difference	52.9	100.0%	28.1	100.0%	23.7	100.0%	47.1	100.0%
"Explained" part (%)	31.0	58.6%	13.0	46.3%	14.4	60.8%	33.9	72.0%
Degree (father)	16.1	30.4%	9.3	33.1%	8.8	37.1%	18.1	38.4%
Degree (mother)	14.9	28.2%	3.7	13.2%	5.6	23.6%	15.8	33.5%
"Unexplained" part (%)	21.9	41.4%	15.1	53.7%	9.3	39.2%	13.2	28.0%
Access rate of top quintile (%)	82.2		30.1		22.7		67.8	
Access rate of bottom quintile (%)	35.3		7.0		3.0		35.3	
Gross difference	46.9	100.0%	23.0	100.0%	19.7	100.0%	32.5	100.0%
"Explained" part (%)	28.1	59.9%	12.4	53.9%	9.8	49.7%	23.8	73.2%
Degree (father)	12.1	25.8%	6.2	27.0%	3.7	18.8%	14.3	44.0%
Degree (mother)	16.1	34.3%	6.3	27.4%	6.1	31.0%	9.5	29.2%
"Unexplained" part (%)	18.8	40.1%	10.6	46.1%	9.9	50.3%	8.7	26.8%
Access rate of top half (%)	69.2		20.5		13.7		53.6	
Access rate of bottom half (%)	41.9		7.4		3.2		37.0	
Gross difference	27.3	100.0%	13.1	100.0%	10.6	100.0%	16.6	100.0%
"Explained" part (%)	17.4	63.7%	6.6	50.4%	5.8	54.7%	13.5	81.3%
Degree (father)	6.6	24.2%	2.1	16.0%	2.4	22.6%	7.6	45.8%
Degree (mother)	10.8	39.6%	4.4	33.6%	3.4	32.1%	5.9	35.5%
"Unexplained" part (%)	9.9	36.3%	6.6	50.4%	4.7	44.3%	3.1	18.7%

*Notes:* This table shows the results of the Oaxaca-Blinder decomposition of access to higher education, master's degrees, selective programs, and educational aspirations for different income groups (top decile vs. bottom decile; top quintile vs. bottom quintile; top half vs. bottom half). The parental income used is the percentile rank calculated from the sum of the father's pre-tax income and the mother's pre-tax income. Deciles and quintiles are computed based on this category. The explanatory variables included in the decomposition are fathers' education and mothers' education. Separate dummy variables are included for father's degree (7 items) and mother's degree (7 items). In column (4), we restrict ourselves to individuals aged 18-19 to avoid educational aspirations being influenced by completed years of schooling.

Table 5: Access to higher education based on parents' income, occupation and diploma

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Parent's income percentile rank</b>	0.58***	0.57***	0.23***	0.29***	0.15***	0.15***
Log of potential financial transfers		0.0033				-0.0044
Father Primary school			0		0	0
Father Middle School			0.0092		-0.019	-0.020
Father High School			0.046**		0.029	0.034
Father Two-year degree			0.18***		0.12***	0.13***
Father Bachelor or Master degree			0.20***		0.14***	0.13***
Father Ph.D.			0.25***		0.18***	0.19***
Mother Primary school			0		0	0
Mother Middle School			0.13***		0.11***	0.12***
Mother High School			0.15***		0.12***	0.13***
Mother Two-year degree			0.35***		0.29***	0.29***
Mother Bachelor or Master degree			0.31***		0.22***	0.23***
Mother Ph.D.			0.32***		0.22***	0.21***
Father Low SES				0	0	0
Father Medium-low SES				0.14***	0.11***	0.11***
Father Medium-high SES				0.14***	0.098***	0.098***
Father High SES				0.23***	0.14***	0.14***
Mother Low SES				0	0	0
Mother Medium-low SES				0.081***	0.054***	0.055***
Mother Medium-high SES				0.23***	0.13***	0.14***
Mother High SES				0.26***	0.15***	0.16***
Parents live together						0
Separated parents						-0.076***
Parisian area						0
Urban unit of more than 100,000 inhabitants						-0.029
Urban unit of less than 100,000 inhabitants						-0.039*
Observations	5197	5197	4094	4427	4065	4022
$R^2$	0.113	0.113	0.184	0.168	0.201	0.207

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

*Notes:* This table reports the estimates of parental income percentile rank, potential financial transfers, parents' education, parents' occupation, family status and urban unit size on access to higher education. The parental income used is the percentile rank calculated from the sum of the father's pre-tax income and the mother's pre-tax income. The potential financial transfer variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives). For parent's education we define six categories: those with an elementary school certificate or less, those with a middle school certificate, those with a high school diploma or equivalent, those with a two-year degree, those with a bachelor's or master's degree, and those with an M.D. or Ph.D.. The mother's degree is missing for 4 percent of observations and the father's degree is missing for 17 percent of observations. For occupations, we rely on the Department of Education's statistical service grouping into four socioeconomic statuses (SES). High SES includes professionals, managers, CEOs, teachers, professionals and artists. Medium-high SES corresponds to intermediate occupations, technicians, foremen and supervisors. Medium-low SES refers to farmers, artisans, shopkeepers and employees. Low SES is defined as blue-collar workers and non-working people. Table A1 details the four SES categories and the corresponding occupations. The mother's occupation is missing for 4% of the observations and that of the father for 9% of the observations. When both parents do not live in the same city, we retain the largest one, as access to higher education is potentially easier if at least one parent lives in a city with a major university center, and the student can potentially avoid paying rent to access college.

Table 6: Decomposition of differences in public spending on higher education

	(1) Main specification	(2) Association of wealthier individuals to better-endowed programs	(3) Assumption (2) + wealthier individuals attend more costly elite graduate schools
Access to higher education	72	53	48
Length of study	26	19	18
Annual public spending	3	27	34

*Notes:* This table shows the contribution of the different variables – access to higher education, differences in the lengths of study for students, differences in annual public spending for students – to the total difference in public higher education spending between individuals in the top 10 percent and in the bottom 10 percent of the income distribution (in percent). The parental income used is the sum of the father’s pre-tax income and the mother’s pre-tax income. Deciles are computed based on this definition. To decompose the contribution of different factors, we rely on Gupta decomposition methods (Das Gupta, 1991). See Section 3.5 and Appendix A.1.3 for more details on this decomposition method. Column (1) represents our main specification. Column (2) represents the results obtained by assigning wealthier individuals to programs that are better endowed in their track and field of study. In this simulation, we assign for each combination of programs and fields, the 10th (respectively 25th) percentile of the distribution of student-weighted costs – or the nearest higher percentile when we do not have enough observations to observe the 10th or 25th percentile – to individuals whose parents are in the bottom 10 percent (respectively 25 percent) of the income distribution and the 75th percentile (respectively 90th percentile) – or the nearest lower percentile – to those whose parents are in the top 25 percent (respectively 10 percent) of the income distribution. Column (3) represents the same simulation as in column (2) with additional assumptions about the cost of highly selective elite graduate schools. We assume that individuals from the top decile of the income distribution, when they enter elite graduate schools (engineering schools, institutes of political studies, or other specialized schools), have access to better endowed schools. We assume that individuals in the top 5 percent of the income distribution have access to schools with endowments three times the typical endowment and that those in the next 5 percent of the income distribution have access to schools with endowments twice the typical endowment. See Appendix B.2.2 for more details on these simulations.

Table 7: Average public and private spending on young adults over a 6-year period, by parents' pre-tax income (in euros)

	(1) Public spending for higher education (A)	(2) 4% of fiscal contribution of parents over 6 years (B)	(3) Net benefit for higher education (A)-(B)	(4) Fiscal deductions and public support received (C)	(5) Total public spending received (A)+(C)	(6) Parental financial transfers (D)	(7) Total public and private spending (A)+(C)+(D)
P0-P10	7,807	941	6,866	14,667	22,474	6,604	29,077
P10-P20	6,444	1,144	5,300	16,341	22,785	6,815	29,600
P20-P30	6,958	1,525	5,433	14,290	21,248	8,784	30,032
P30-P40	8,031	1,900	6,131	15,348	23,379	10,002	33,382
P40-P50	10,768	1,894	8,870	13,571	24,243	12,495	36,704
P50-P60	8,669	2,188	6,481	12,434	21,103	11,258	32,361
P60-P70	11,813	2,541	9,272	13,294	25,107	14,740	39,847
P70-P80	15,180	2,909	12,271	14,592	29,772	18,102	47,874
P80-P90	20,103	4,353	15,750	12,986	33,089	26,676	59,765
P90-P100	18,106	9,954	8,151	15,033	33,139	39,990	73,129
Total	11,135	2,822	8,311	14,294	25,420	15,041	40,460

*Notes:* This table shows the distribution of various public and private expenditures on young adults and their parents, based on parents' pre-tax income. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are calculated based on this definition. Column (1) reports public spending on higher education received between the ages of 18 and 24. For this computation, we restrict ourselves to individuals aged 22 to 24 years who are the most advanced in their studies in our sample. Column (2) shows the amounts corresponding to 4 percent of taxes paid by parents over six years (when their young adult is 18 to 24 years old). This 4 percent is the share of all unallocated taxes that is dedicated to funding higher education. This figure is calculated out of sample, in a representative sample of all taxpayers (ERFS). We use Germain (2021) for the imputation coefficients for indirect and corporate taxes by standard of living deciles (see Section 3.5 and Appendix A.1.3 for more details on this methodology). Column (3) shows the net benefit for higher education, which we define as total public spending on higher education less 4 percent of parents' taxes. Column (4) reports other public expenditures dedicated to young adults and their parents. We include in these other public expenditures public support for young adults (need-based scholarships, housing benefits, unemployment benefits, guaranteed minimum income, disability benefits, integration contract, and family benefits), and the direct and indirect public support for their parents (family benefits and tax deductions). Column (5) contains the total public spending on young adults and their parents over six years, i.e., the sum of public spending on higher education and other public support. Column (6) indicates the amount of parents' financial transfers over six year. The financial transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey. Column (7) corresponds to the sum of public expenditures and financial transfers from parents over six years. It can be thought of as total investment in human capital, broadly defined.

# Appendix

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## A.1 Variables, data and methods

### A.1.1 Variables definitions

#### A.1.1.1 Study

**Access to higher education.** We define individuals (aged 18-24 in our sample) as having access to higher education if they are currently enrolled in higher education, have already obtained a higher education degree, or have had access to some level of higher education, even if they have not obtained a higher education degree. Similarly, we define access to a specific track (master’s degree, medical school, selective higher education, etc.) as being currently enrolled in, graduating from, or having reached a certain level in these programs even without having graduated.

**Selective higher education.** We define selective tracks as preparatory courses, elite graduate schools, medical studies and Ph.D. tracks. The degree of selectivity of each of these tracks can be assessed by ranking all students on the basis of their performance on the high school graduation exam. In 2016-2017, the median rank of students in university (except for medical studies) is 50.2, that of students in technical training (*IUT*) is 47.0 and that of students in the vocational track (*STS*) is 30.3, while that of students in preparatory courses is 84.9, that of students in elite graduate schools is 72.8 and that of students in medical studies is 68.1 (Bonneau et al., 2021).

#### A.1.1.2 Income

**Parental Income.** Following Chetty et al. (2020),<sup>64</sup> our preferred specification focuses on the percentile rank of parental pre-tax income. Unless otherwise specified, we keep the definition of these ranks fixed by positions in the overall distribution, even when analyzing subgroups. Because some youth have separate parents who do not belong to the same household, we sum the father’s pre-tax income and the mother’s pre-tax income. We also generate variants using disposable income and household standard of living.<sup>65</sup> We replace negative income with zero. We cannot rely on multiple years of parental income data, so our measure of income is likely to be affected by transitory fluctuations (Solon, 1992). This could lead us to underestimate the true level of inequality due to measurement error attenuation bias.<sup>66</sup> Although our main specification focuses on individual income, in the comparison with the United States, in order to be more comparable to Chetty et al. (2020), we consider the parents’ household income, divided by two when we have both the father’s and mother’s household income. We do not include property and capital incomes in France because it is not possible to identify them independently of the incomes of all household members, thus also including the incomes of non-decohabiting young adults. Taking into account property and capital

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<sup>64</sup>This paper shows that using a rank specification provides much more stable estimates of intergenerational mobility than using the logarithm of parental income and allows for the inclusion of zeros in parental income.

<sup>65</sup>In the case where parents are separated and living with a new spouse, we halve the disposable income of this new household before adding it to the disposable income of the other parent’s household (also halved only in the case where this parent has a new partner). Results are available upon request.

<sup>66</sup>However, Chetty et al. (2014) indicate in their study that the results for the impact of parental income on access to higher education do not depend on the number of years used to measure parental income (Figure III. B.). We also perform a robustness check with a slightly different measure of parental income for which we have data for year  $t$  and  $t - 2$  (see Table B8).

incomes would mainly change the ranking within the last decile, but should only marginally change the ranking of individuals in the rest of the distribution.

Another concern is that the top deciles of the distribution concentrate the oldest parents in our sample and thus the oldest young adults, which would bias the estimate of inequality in access to higher education by parental income. This is not the case because neither the age of youth nor the age of their parents is statistically different across income groups (see Table 2). To further assess the representativeness of our sample, we compare the distribution of pre-tax incomes of parents in our sample and individuals aged 42-60 in the Tax and Social Income Surveys (ERFS) – 92% of parents of young adults aged 18-24 fall into this age range in our data –, another survey where income is collected from tax sources. This survey has a larger sample size with 50,096 households interviewed in 2014. Table A3 in the Appendix shows the comparison between the income distribution in the two surveys. Overall, pre-tax income data (ENRJ) are very similar in both samples. On average, parents in our data have 43,098 euros of pre-tax income and those in ERFS have 43,121 euros per year. The t-test for the difference in means is -0.97. Parents in our sample have slightly higher disposable income and lower standard of living than individuals aged 42 to 60 in ERFS, due to the presence of children.

Because we are considering income deciles among parents of young adults and not deciles in the general population, it is also interesting to know where our income categories fall relative to the income distribution of the general population. Table A4 compares the values of the deciles in the two distributions, and Figure A1 provides descriptive statistics on these income categories. Overall, parents are slightly wealthier than households in the general population, but the two distributions are very close – if not nearly identical in terms of standard of living (see Figure A1c) –.

**Parental tax income versus self-reported income.** Parental income from administrative tax sources is rarely available in databases for young adults, and surveys most often contain self-reported income. Our data show that the latter is poorly correlated with tax income, including in terms of rank. The deciles obtained with self-reported income coincide for only 35 percent of youth with those constructed from administrative data, and the correlation rate of the two variables is only 0.66. This confirms the importance of using administrative data for the income variables. Using self-reported income instead of tax income leads to a significant underestimation of inequalities in access to higher education according to parents' income – by 5 to 10 percentage points (depending on the specification) at the top of the distribution –.

### A.1.1.3 Other parental background variables

**Parents' occupation.** For occupations, we rely on the Department of Education's statistical service (DEPP<sup>67</sup>) grouping into four socioeconomic statuses (SES). High SES includes professionals, managers, CEOs, teachers, professionals and artists. Medium-high SES corresponds to intermediate occupations, technicians, foremen and supervisors. Medium-low SES refers to farmers, artisans, shopkeepers and employees. Low SES is defined as blue-collar workers and non-working people. Table A1 details the four SES categories and the corresponding occupations. The mother's occupation is missing for 4% of the observations and that of the father for 9% of the observations.

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<sup>67</sup> *Direction de l'évaluation, de la prospective et de la performance.*



Table A1: Grouping of occupations

Socioeconomic statuses (SES)	Corresponding occupations
<b><u>High SES</u></b>	
23	Entrepreneurs with 10 or more employees
31	Liberal professions
33	Public service executives
34	Professors, scientific professions
35	Information, arts and entertainment professions
37	Administrative and commercial executives of companies
38	Engineers and technical company executives
42	Teachers and assimilated
73	Former executives
<b><u>Medium-high SES</u></b>	
43	Intermediate professions in health and social work
44	Clergy, religious
45	Administrative intermediary professions of the public service
46	Administrative and commercial intermediary professions of companies
47	Technicians
48	Foremen, supervisors
74	Former intermediary professions
<b><u>Medium-low SES</u></b>	
11	Smallholder farmers
12	Farmers on medium farm
13	Large-scale farmers
21	Craftsmen
22	Traders and assimilated
52	Civilian employees and civil servants
53	Police and military
54	Administrative employees of companies
55	Commercial employees
56	Staff in direct personal services
71	Former farmer operators
72	Former craftsmen, traders, business leaders
75	Former employees
<b><u>Low SES</u></b>	
62	Skilled industrial type workers
63	Skilled artisan type workers
64	Drivers
65	Skilled workers in handling, warehousing and transport
67	Unskilled industrial workers
68	Unskilled artisan type workers
69	Agricultural workers
76	Former workers
80	Inactive

*Notes:* This table details the occupations corresponding to the grouping into four SES categories used in our analyses. This grouping corresponds to the official grouping of the Department of Education's statistical service (*Direction de l'évaluation, de la prospective et de la performance (DEPP)*).

**Parents’ diploma.** We have information on the highest degree obtained by parents. We define six categories: those with an elementary school certificate or less, those with a middle school certificate, those with a high school diploma or equivalent, those with a two-year degree, those with a bachelor’s or master’s degree, and those with an M.D. or Ph.D.. The mother’s degree is missing for 4 percent of observations and the father’s degree is missing for 17 percent of observations.

**Correlation of parental background variables.** Table A2 displays the correlations between pre-tax income and parental occupation or degree. Pre-tax income variables are weakly correlated with occupation and degree, especially for fathers (for whom the correlation coefficients are 0.38 and 0.41 respectively versus 0.50 and 0.46 for mothers).

Table A2: Correlation of parental background variables

	Father pre-tax income	Mother pre-tax income	Father occupation (4 categories)	Mother occupation (4 categories)	Father diploma (6 categories)	Mother diploma (6 categories)
Father pre-tax income	1.00					
Mother pre-tax income	0.12	1.00				
Father occupation (4 categories)	0.38	0.27	1.00			
Mother occupation (4 categories)	0.23	0.50	0.46	1.00		
Father diploma (6 categories)	0.41	0.25	0.60	0.42	1.00	
Mother diploma (6 categories)	0.29	0.46	0.47	0.62	0.58	1.00
Sample size	5197					

*Notes:* This table presents the correlation between the different parental control variables included in our analysis. For parents’ occupations, we rely on the Department of Education’s statistical service grouping into four socioeconomic statuses (SES). Table A1 details the four SES categories and the corresponding occupations. The mother’s occupation is missing for 4% of the observations and that of the father for 9% of the observations. For parent’s education we define six categories: those with an elementary school certificate or less, those with a middle school certificate, those with a high school diploma or equivalent, those with a two-year degree, those with a bachelor’s or master’s degree, and those with an M.D. or Ph.D.. The mother’s degree is missing for 4 percent of observations and the father’s degree is missing for 17 percent of observations.

**Place of residence of parents.** When we study heterogeneity by parental place of residence, we define three categories: Parisian area, urban units with more than 100,000 inhabitants (except Paris) and urban units with less than 100,000 inhabitants. When both parents do not live in the same city, we retain the largest one, as access to higher education is potentially easier if at least one parent lives in a city with a major university center, and the student can potentially avoid paying rent to access college.

#### A.1.1.4 Parental financial transfers

**Financial transfers received from parents.** The financial transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey.

**Potential financial transfers.** Parents of students give proportionately more to their child than if he or she were not studying. When we look at the links between financial transfers and access to higher education, we construct a potential financial transfer variable that estimates what a young adult would have received, if he or she were studying, as a function of his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of the urban unit where the young adult lives).

#### A.1.1.5 Public support for students, young adults and their parents

**Public support for students.** In France, student financial aid consists of two main programs. First, need-based scholarships (*Bourses sur critères sociaux*) are awarded to approximately 35% of students (MENESR-DEPP, 2015) for an amount varying from 100.7 euros to 553.9 euros per month (over 10 months) depending on the parents' income. Secondly, housing benefits (*Aide personnalisée au logement*) are given to tenants whose income is below a certain threshold, regardless of their educational status. No condition is imposed on the parents' income so that many students who have decohabited receive housing subsidies, the amount depending on the rent, the location of the housing and the composition of the household. For students, most public support comes from the need-based scholarships and the housing benefits, which represent respectively 51.4% and 46.6% of all public support received by students. 41% of the students in our sample receive a need-based scholarship for an average amount of 280 euros per month and 39% receive housing benefits for an average amount of 171 euros per month.

**Public support for all young adults.** Public support includes need-based scholarships, housing benefits, unemployment benefits, guaranteed minimum income, disability benefits, integration contract (*CIVIS*), and family benefits. Due to strict income eligibility requirements, only 13% of non-student young adults receive housing benefits, for an average amount of 225 euros per month. Only 9% of the individuals in our sample receive at least one of the following benefits (unemployment benefits, disability benefits, family benefits, guaranteed minimum income, integration contract) for an average amount of around 650 euros per month. The Earned Income Tax Credit (*Prime d'activité*) and the Youth Guarantee (*Garantie Jeune*), which were introduced after the survey date, are not included here.

**Tax deductions for young adults' and students' parents** Tax deductions are granted to all parents whose child is attached to their tax return until the age of 21, then only to parents whose child is a student until the age of 25. They are part of a system of tax splitting linked to the family quota ensuring a proportional reduction of the taxes paid and increasing with the number of children – the first two children each count for half a share and from the third child onwards, each

child counts for a full share in the calculation of the family quota –. These deductions are granted only to parents whose young adult is still attached to their tax household. When the young adult is no longer attached to the tax household, the parents can deduct from their taxable income the pension they pay to their child, without age limit, up to a maximum of 3542 euros if the child lives with his or her parents and 5959 euros otherwise. We use the information from the survey on the attachment of the young adult to the tax household to take into account one or other of the tax deduction situations.

**Family benefits for parents of young adults.** Family benefits are paid to parents on a means-tested basis according to the number of children and their age. Family allowances are paid from two dependent children under 20 years of age and family supplement from three dependent children aged 4 to 20 years.<sup>68</sup> We only consider the portion of family benefits related to the young adult himself or herself and not to his or her siblings (e.g., if there are three dependent children, we divide the total amount of family benefits received by three).

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<sup>68</sup>Family allowances and family supplement scales can be found at the following links: [https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/af\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/af_cm/) and [https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/cf\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/cf_cm/).

## A.1.2 Data

### A.1.2.1 Representativeness of the sample

Table A3: Comparison of income distributions in ENRJ and ERFS samples

	<b>ENRJ (2014)</b> (Parents of young adults)	<b>ERFS (2014)</b> (One member of the household between 42-60 years old)	<b>t-test</b>
<b>Mean age</b>	50.01 (5.93)	50.18 (6.7)	-0.1935
<b>Pre-tax income</b>			
Mean	43,098	43,121	-0.9705
Median	36,506	35,460	
P10	9,462	9,380	
P90	80,558	78,010	
P99	180,781	187,080	
<b>Disposable income</b>			
Mean	48,225	41,748	8.6657
Median	42,947	35,110	
<b>Standard of living</b>			
Mean	22,439	24,104	-5.2675
Median	19,527	20,715	
<b>Number of observations</b>	5,197	19,244	

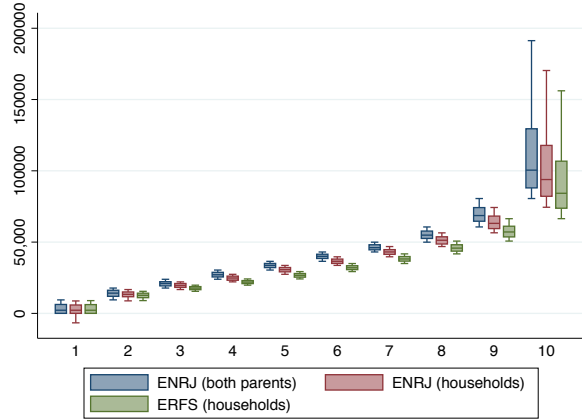
*Notes:* This table compares the distribution of different income variables for parents in our database (ENRJ) and individuals aged 42 to 60 in another tax survey with a much larger sample (ERFS). The two samples are very similar in terms of pre-tax income. Individuals in our sample (parents of young adults) have slightly higher disposable incomes and a slightly lower standard of living than individuals in the ERFS sample, due to the presence of children.

Table A4: Comparison of pre-tax income deciles of parents and pre-tax income deciles of all households

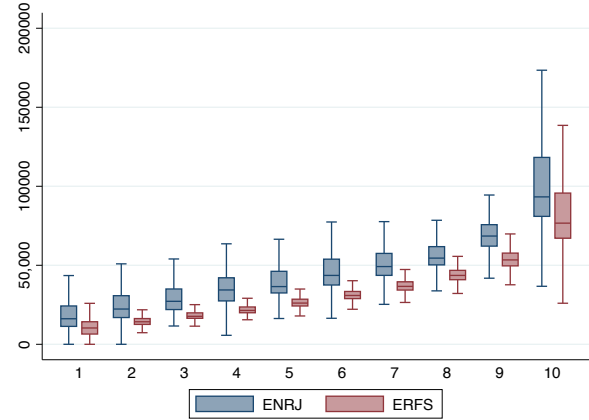
	<b>ENRJ (2014)</b> (Parents of young adults)	<b>ENRJ (2014)</b> (Households of parents)	<b>ERFS (2014)</b> (All households)
<b>P10</b>	9,462	8,725	8,950
<b>P20</b>	17,762	16,716	15,470
<b>P30</b>	23,918	22,083	19,790
<b>P40</b>	30,390	27,406	24,150
<b>P50</b>	36,506	33,631	29,300
<b>P60</b>	43,070	39,679	34,960
<b>P70</b>	49,945	46,867	41,730
<b>P80</b>	60,626	56,477	50,710
<b>P90</b>	80,558	74,277	66,420
<b>P95</b>	100,344	93,820	84,240
<b>P97</b>	121,464	112,197	100,380
<b>P99</b>	180,781	169,324	154,080
<b>Number of observations</b>	5,197	5,878	50,096

*Notes:* This table compares the distribution of pre-tax parental income in our database (ENRJ) with that of households in another tax survey with a much larger sample size (ERFS). The first column corresponds to the values of the deciles of our main income variable of analysis, which is the sum of the individual pre-tax incomes of the father and mother, whether or not both parents belong to the same household; the second and third columns compare pre-tax incomes at the household level, considering separated parents in two different households – and including the pre-tax income of the parents’ spouse if the parent has a new partner in the household –, between the two surveys considered. This makes it possible to compare the income distribution of the general population with that of young adult parents using an exactly comparable income concept.

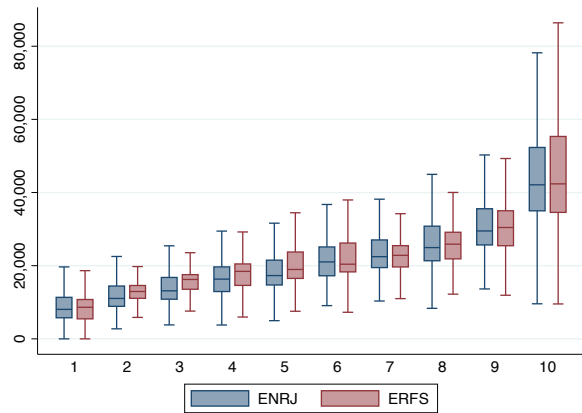
Figure A1: Comparison of the income distribution of parents and the income distribution of the general population



(a) Pre-tax income



(b) Disposable income



(c) Standard of living

*Notes:* This figure shows the comparison of various income variables (pre-tax income, disposable income, standard of living) between our sample of parents of young adults (ENRJ) and the general population (ERFS). In Panel (a), the first boxplot corresponds to the deciles values of our main analysis income variable, which is the sum of the individual pre-tax incomes of the father and mother, whether or not both parents belong to the same household; the second and third boxplots compare pre-tax incomes at the household level, considering separated parents in two different households – and including the pre-tax income of the parents’ spouse if the parent has a new partner in the household –, between ENRJ and ERFS sample. This makes it possible to compare the income distribution of the general population with that of young adult parents using an exactly comparable income concept. Each boxplot graph displays the first quartile (P25), the median (P50), the last quartile (P75), as well as the lower adjacent value (i.e., the farthest observation that is within one and a half interquartile ranges of the lower end of the box) and the upper adjacent value.

### A.1.2.2 Comparison of parental income distribution in France and the United States

Table A5: Comparison of parental income distribution in France and the United States

Income distribution	United States	France
Mean	87,219	60,630
Std. Deviation	353,430	51,833
Median	60,129	53,127
Observations	9,867,736	5,197

*Notes:* This table compares the distribution of parental income in France and the United States. The U.S. data come from Table III in the online Appendix of Chetty et al. (2014). In both cases, family income is pre-tax household income, divided by two when both father's and mother's household incomes are available. All amounts are in 2012 dollars. We do not include property and capital income in France because it is not possible to identify it independently of the incomes of all household members, thus also including the incomes of non-decohabiting young adults. In the United States, family income is the average household income from 1996 to 2000 because Chetty et al. (2014) studies cohorts born between 1980 and 1982. In France, family income is 2014 because the survey we use was conducted in 2014.



### A.1.2.3 Public spending on higher education

**Cost of studies by track and field of study.** In national accounts, data on higher education expenditures are usually only displayed in three categories,<sup>69</sup> regardless of the track or field of study (MENESR-DEPP, 2021). We supplement these existing data with data from a survey of higher education institutions, the "Cost Awareness Survey" (*Connaissance des coûts*, Boiteau and Jameux (2019)) aimed at better assessing the expenditures of different higher education institutions. This recent survey was conducted between 2016 and 2019 from 65 higher education institutions representing approximately one-third of all French students. Not all waves of the survey have been conducted yet, but the institutions sampled are representative of all public institutions of higher education under the supervision of the Department of Higher education. This data allows us to break down the costs between the different tracks and fields of study and to determine the cost of higher education without taking into account the costs associated with research, which are taken into account in the more aggregated data. The data thus allow for a more accurate estimate of public spending on higher education for each individual. Per student annual public spending on higher education varies considerably depending on the track and field of study as shown in table A6. On average, students in undergraduate degrees cost 3,648 euros per year, those in graduate degrees 5,318 euros and those in engineering schools 10,584 euros. Scientific fields – with the exception of medical studies – are much more expensive than the humanities (up to two times more in bachelor degree), as students have more tutorials and practical work, with a much lower student/faculty ratio. For engineering schools, technical training (*IUT*), bachelor’s degrees (vocational or academic), and master’s degrees, public expenditures are divided into 9 fields: Humanities, Arts, Languages; Markets and Organizations; Mathematics, Engineering, Computer Science; Law; Sciences of Matter, Earth and the Universe; Social Sciences; Life Sciences; Medical and Miscellaneous containing what cannot be classified in one of the previous categories.

**Elite graduate schools and variance in spending within tracks and fields of study.** Despite their quality, these new data still have some limitations. We are not able to differentiate public spending among the elite graduate schools<sup>70</sup> – we thus attribute the average cost of engineering schools to the other public graduate schools –, which might lead us to underestimate inequalities in public spending. Some of these schools have indeed very high spending per student (for example, Berné and Métivier (2015) found that some specific elite graduate schools have spending of 60,000 euros per student per year) and an access rate that remains very unequal (Bonneau et al., 2021). More generally, public spending still varies greatly within tracks and fields, which we do not take into account because we cannot link students to the exact university in which they are or were enrolled. We address these issues by simulating the effect of assigning wealthier individuals to better-endowed programs and to more expensive elite graduate schools on our results (see Appendix B.2.2). Unlike

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<sup>69</sup>In 2014-2015, on average, vocational programs costed 14,150 euros per student, preparatory courses 15,620 euros and university programs 10,980 euros.

<sup>70</sup>The survey is representative of institutions under the supervision of the Ministry of Higher Education and Research while some institutions, notably some engineering schools, are under the supervision of other ministries (Ministry of the Economy, Ministry of the Army, Ministry of Agriculture, etc.). Business schools are not included in the survey either. We therefore supplement this survey with specific data on business school student costs (<https://www.cefdg.fr/fr/ecoles-et-formations-visees>). On average, public funding covers about 5 percent of student costs for these private programs.

university programs, we cannot break down the costs of vocational programs and preparatory courses by field because we do not have detailed expenditure data for these programs, which are located in some specific high schools. Since both are national programs and the course load, student/teacher ratio, and teacher salaries are set by the state, we can assume that there is little disciplinary variation in these programs. In the same way that we remove the costs of research in university programs, we consider here only the costs of training: 85.3 percent of total costs for preparatory courses and 86.7 percent for vocational programs.

**Construction of educational spending over the entire educational trajectory.** To study inequalities throughout the higher education trajectory, we restrict ourselves to individuals aged 22-24, who are the most advanced in their education in our sample. We retain the higher cost between students' highest degree obtained, highest level of education attained, or current studies. We partially account for re-orientations. For instance, someone who is enrolled in a master's program but has an engineering degree has the cost of the full engineering school program plus the cost of one year of a master's degree in their field. In the absence of complete information on individual trajectories in the data, we do not account for individuals who repeat in the same program. It is likely that this approximation leads us to underestimate the cost of university students who repeat: 27 % of first year students (MENESR-DEPP, 2020) but also of students in preparatory courses who often repeat the second year of the program – 9.1 % in economic preparatory courses, 20 % in humanities preparatory courses and 22.1 % in scientific preparatory courses (*Bulletin officiel de l'éducation nationale n°18*, 3 May 2012 ([https://www.education.gouv.fr/pid285/bulletin\\_officiel.html?pid\\_bo=26454](https://www.education.gouv.fr/pid285/bulletin_officiel.html?pid_bo=26454))) –.

**Parents' private spending on higher education.** We account for private investment in higher education through tuition paid by parents. We average the tuition paid reported by young adults and parents to limit measurement error. Since our cost data represent the cost of expenditures and not the resources of the universities, in cases where the tuition paid is less than 650 euros, we subtract the tuition paid by parents from the total cost to obtain the net public cost. When the tuition is more than 7,500 euros, we consider it is private education and the net public cost is set at 5 % of the tuition paid. Between these two extreme limits that we have to fix by convention, we consider public cost data as the public cost and tuition as the private cost. For individuals who had already graduated from college (16 percent of the individuals in our sample and 29 percent of those aged 22-24), we cannot know whether they were enrolled in a public or private program because we do not have information on the tuition paid by their parents (we infer this from the tuition paid by individuals currently in college in the same parental income decile). We assume that all these individuals were enrolled in public programs.

Table A6: Per student annual public spending

Track	Field of study	Public cost over one year (in euros)
Vocational track ( <i>STS</i> )		12372
Preparatory courses ( <i>CPGE</i> )		13401
Bachelor degree (non vocational) ( <i>Licence</i> )	Humanities, Arts, Languages	3428
	Markets & Organizations	2974
	Math, Engineering, Computer science	5327
	Law	2450
	Material, Earth and Universe Sciences	6232
	Social Sciences	3486
	Life Sciences	4919
	Various	3648
Bachelor degree (vocational) ( <i>Licence professionnelle</i> )	Humanities, Arts, Languages	4892
	Markets & Organizations	5401
	Math, Engineering, Computer science	7727
	Law	5373
	Material, Earth and Universe Sciences	9437
	Social Sciences	5327
	Life Sciences	7044
	Various	6383
Technical training ( <i>IUT</i> )	Markets & Organizations	7541
	Math, Engineering, Computer science	11278
	Law	7025
	Material, Earth and Universe Sciences	11663
	Social Sciences	7545
	Life Sciences	10055
	Various	9514
Master degrees	Humanities, Arts, Languages	5393
	Markets & Organizations	4764
	Math, Engineering, Computer science	7332
	Law	4021
	Material, Earth and Universe Sciences	8894
	Social Sciences	4734
	Life Sciences	6478
Engineering Schools	Math, Engineering, Computer science	10441
	Material, Earth and Universe Sciences	11968
	Social Sciences	11318
	Life Sciences	11858
	Various	10584
First year of medical studies ( <i>PACES</i> )	Medicine	2437
Medical studies (except first year)	Medicine	4361
Paramedical Trainings	Medicine	2728
Institute of Political Studies ( <i>IEP</i> )		4033
Business schools		389
Other elite graduate schools		10584

*Notes:* This table presents higher education annual public expenditures, for different tracks, degrees and fields. This data is from MENESR-DEPP (2021) for vocational track and preparatory courses, from the *Commission d'évaluation des formations et diplômes de gestion* (CEFDG) for business schools (<https://www.cefdg.fr/fr/ecoles-et-formations-visees>) and calculated from the *Cost Awareness* survey for all other tracks. In the computation of the average annual cost per student, we weight each program by the number of registered students.

## A.1.3 Methods

### A.1.3.1 Oaxaca decompositions

The decomposition method developed by Blinder (1973) and Oaxaca (1973) is commonly used in the economic literature to explain the average differences observed between two groups of individuals based on a set of observable characteristics of the members of these groups. Initially developed to analyze wage differentials between women and men and between whites and blacks in the United States, this statistical approach consists of breaking down the observed gaps into an "explained" part, which comes from the differences between the average observable characteristics of the two groups (e.g., education or work experience) and an "unexplained" part, which is not attributable to these characteristics.

Applied to our context of inequalities in access to higher education and selective fields of study between children whose parents are at the top of the income distribution (noted  $T$ ) and children whose parents are at the bottom (noted  $B$ ), the method consists in estimating the following equation for the entire population studied:

$$Y_i = \mathbf{X}_i \boldsymbol{\beta}^* + \epsilon_i \quad (4)$$

In this equation, the dependent variable  $Y_i$  takes the value 1 if student  $i$  has accessed higher education and 0 otherwise  $\mathbf{X}_i$  is the vector of observable characteristics retained in the analysis;<sup>71</sup>  $\boldsymbol{\beta}^*$  is a vector of coefficients measuring the average effect of each of these explanatory variables on the probability of access to higher education;  $\epsilon_i$  denotes the error term capturing the influence of all unobservable characteristics (i.e. those not included in the vector  $\mathbf{X}_i$ ) on the variable of interest  $Y_i$ . Then, the previous equation is estimated separately for each of the two groups considered: children whose parents are at the top of the income distribution (equation 5) and children whose parents are at the bottom (equation 6):

$$Y_i^T = \mathbf{X}_i^T \boldsymbol{\beta}^T + \epsilon_i^T \quad (5)$$

$$Y_i^B = \mathbf{X}_i^B \boldsymbol{\beta}^B + \epsilon_i^B \quad (6)$$

The coefficients estimated using these three equations are noted respectively  $\boldsymbol{\beta}^*$ ,  $\boldsymbol{\beta}^T$  and  $\boldsymbol{\beta}^B$ . These three equations (4, 5, and 6) are then combined to decompose the access rate gap between the two groups as follows:

$$\underbrace{\bar{Y}^T - \bar{Y}^B}_{\text{observed gap}} = \underbrace{(\bar{\mathbf{X}}^T - \bar{\mathbf{X}}^B) \hat{\boldsymbol{\beta}}^*}_{\text{"explained" gap}} + \underbrace{\bar{\mathbf{X}}^T (\hat{\boldsymbol{\beta}}^T - \hat{\boldsymbol{\beta}}^*) + \bar{\mathbf{X}}^B (\hat{\boldsymbol{\beta}}^* - \hat{\boldsymbol{\beta}}^B)}_{\text{"unexplained" gap}} \quad (7)$$

The first term,  $(\bar{\mathbf{X}}^T - \bar{\mathbf{X}}^B) \hat{\boldsymbol{\beta}}^*$ , measures the share of the access rate gap between top income

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<sup>71</sup>In our case, the parents' diplomas, introduced in 14 dummies, 7 for the father's diploma and 7 for the mother's diploma.

children and bottom income children that is attributable to differences in the average observable characteristics (in our case parental diplomas) of these two groups of individuals; the second term,  $\overline{\mathbf{X}}^T(\hat{\beta}^T - \hat{\beta}^*) + \overline{\mathbf{X}}^B(\hat{\beta}^* - \hat{\beta}^B)$ , measures the share of this gap that cannot be explained by these characteristics. If the vector  $\mathbf{X}_i$  includes indicators of mother's degree and father's degree, the first term of the equation ("explained" gap) will measure the share of differences in access rates related to the fact that children at the bottom of the income distribution tend to have less educated parents than those at the top of the distribution, and that having more educated parents increases the likelihood of accessing higher education. The second term of the equation ("unexplained" gap) will measure the residual part of the differences in access rates, which refers to factors other than average parental diplomas. These factors could include, for example, the role of financial constraints or unequal access to information on higher education programs among income groups, as these dimensions are likely to influence study choices independently of parental diplomas. In our study, this statistical method is used to decompose the differences of access rates to higher education, master's degrees, selective programs (preparatory courses, elite graduate school, medical studies, Ph.D.) and differential aspirations between the top and bottom half, the top and bottom quintile, and the top and bottom decile of the income distribution (see Table 4 for detailed results).

### A.1.3.2 Gupta decompositions

We decompose both the access gap to higher education and the differences in the cost of public higher education between individuals from the top income decile ( $T$ ) and individuals from the bottom income decile (noted  $B$ ) using a standard rate decomposition method developed by Das Gupta (Das Gupta, 1991). When the outcome is defined as a product of other variables of interest, the method defines a way to calculate the contribution of each of these variables to the overall gap in the outcome variable between two subpopulations.

We write  $r$  the outcome variable of interest and  $x_1, \dots, x_k$  the  $k$  explanatory factors such that  $r(x_1, \dots, x_k) = \prod_{n=1}^k x_n$ .

When  $k = 2$ , the contribution of each factor  $C(x_1)$  and  $C(x_2)$  can be written as:

$$\begin{cases} C(x_1) = \frac{1}{2}(x_2^T + x_2^B)(x_1^T - x_1^B) \\ C(x_2) = \frac{1}{2}(x_1^T + x_1^B)(x_2^T - x_2^B) \end{cases} \quad (8)$$

In the general case where  $k \geq 3$ , the contribution of each factor  $C(x_i)$  can be expressed as:

$$C(x_i) = \sum_{j=1}^{k-1} \frac{R(j-1, i)}{k \binom{k-1}{j-1}} (x_i^T - x_i^B) \quad (9)$$

Where  $R(j, i)$  is the sum of all possible values of the product of  $k - 1$  factors (excluding  $x_i$ ), out of which  $j$  factors from population  $T$  and all other factors from population  $B$  (Li, 2017).

For instance, when  $k = 3$ , the contribution of the first factor to inequalities between individuals from top ( $T$ ) and bottom ( $B$ ) income deciles is obtained with:

$$C_1 = \left( \frac{x_2^B \times x_3^B}{3} + \frac{x_2^B \times x_3^T + x_3^B \times x_2^T}{6} \right) \times (x_1^T - x_1^B)$$

In our context, we first decompose the gap in access to higher education between individuals whose parents are at the top of the income distribution (noted  $T$ ) and individuals whose parents are at the bottom (noted  $B$ ) income groups based on access to previous credentials. The rate of access to higher education for each  $G$  group (with  $G \in (B, T)$ ) can be defined as follows:

$$HE^G = MSC^G \times HSC_{MSC}^G \times HE_{HSG}^G$$

With  $HE^G$  the rate of access to higher education for individuals in group  $G$ ,  $MSC^G$  the rate of access to middle school certificate for individuals in group  $G$ ,  $HSC_{MSC}^G$  the rate of access to high school certificate for individuals in the  $G$  group who had access to middle school certificate and  $HE_{HSG}^G$  the rate of access to higher education for individuals in the  $G$  group who had access to high school certificate. See Table C10 for results obtained with this decomposition method.

Second, we decompose differences in public spending on higher education between individuals in top ( $T$ ) and bottom ( $B$ ) income deciles based on differences in access to higher education, length of study, and spending for each year of higher education. Formally, higher education public spending for individuals in group  $G$  (with  $G \in (B, T)$ ) can be defined as:

$$PS^G = HE^G \times LS_{student}^G \times AC_{student}^G$$

With  $PS^G$  higher education public spending for individuals in group  $G$ ,  $HE^G$  higher education access rate of individuals in group  $G$ ,  $LS_{student}^G$  average length of studies for students in group  $G$  and  $AC_{student}^G$  average annual public cost for students in group  $G$ . Results of the contribution of each of these factors to higher education cost differences are presented in Table 6.

### A.1.3.3 Redistributivity of public spending for higher education

We assess the redistribution that occurs through public spending on higher education and propose an accounting method to account for the taxes paid by parents and used to finance this particular public spending. As can be seen from Table 1, the results obtained concerning the redistribution of education spending depend strongly on the methodological choices made. When taxes are not taken into account, the authors generally find that higher education spending is anti-redistributive. Conversely, when all taxes paid by households are taken into account, the authors generally conclude that higher education spending is redistributive because rich people pay more in taxes than they receive in subsidies for public higher education. This section details and motivates the assumptions that underlie our calculation of the degree of redistribution of public spending on higher education, once parental tax contributions are taken into account. These assumptions concern the scope of higher education spending considered, the length of study considered, the taxes involved in financing higher education, and the share of taxes needed to finance this expenditure. These results taking into account the taxes paid by parents in financing public higher education – and which may therefore lead to lower spending inequalities after taxes are taken into account – should not be seen as legitimizing or minimizing inequalities in access to higher education since the payment of a tax, unlike a social security contribution for instance, is not expected to provide privileged access to the public services funded by the tax.

**Scope of higher education public spending.** We propose to restrict our analysis to higher education spending only. A broader scope of public spending could have been considered, including public support for students as well as tax deductions and family benefits for their parents. In practice, it is complicated to separate public spending on students from overall public spending on young adults, and for this reason it seemed preferable to limit our analysis to spending on higher education. Some expenditures are exclusively dedicated to students: higher education funding, need-based scholarships, tax deductions for parents of students aged 21-25. For other expenditures, it is difficult to know whether the expenditure is related to student status or not. All young people are theoretically eligible for housing subsidies, but since these subsidies depend on the resources of young adults (and not their parents), they benefit students who have decohabited and less to young adults in employment. Similarly, tax deductions related to the attachment of a child to the tax household between the ages of 18 and 21 are not conditional on that child being a student, but *de facto* they benefit parents of students more because young adults in employment have a greater interest in filling out their own tax returns.

**Period considered.** Our sample includes young adults between the ages of 18 and 24 and thus covers a 6-year period. This period covers the vast majority of student pathways. However, expenditures dedicated to individuals who continue their studies after age 24 are not included. We similarly consider tax contributions over a 6-year period by multiplying the annual parental contribution by 6. To compute higher education public spending, we restrict ourselves to individuals aged 22-24, who are the most advanced in their studies in our sample.

Total public spending on higher education for 18-24 year olds is therefore:

$$S_{all}^{HE} = \sum_{j=1}^y (S_j^{HE} \times Weight_j) \quad (10)$$

With  $y$  the total number of young adults in our sample and  $S_j^{HE}$  the expenditure on completed higher education over 6 years for young adult  $j$  (imputed on the basis of expenditure on individuals aged 22-24 in the same parental income decile), and  $Weight_j$  the weight assigned to young adult  $j$  in the survey such that  $\sum_{j=1}^n Weight_j = Y$  with  $Y$  the total number of young adults in the general population.

**Taxes that fund higher education.** The literature on distributed national accounting takes into account all taxes and the redistribution that takes place through direct government support and indirect in-kind transfers (e.g., public funding of education or health). In our case, the way in which taxes are taken into account to study the redistribution of the public financing system of higher education is somewhat complicated by the fact that we are only interested in one specific item of expenditure, higher education expenditure. Unlike what has generally been done previously in the literature, where taxes are considered as a whole, we decide to consider only unallocated taxes (those that participate in the financing of higher education) and only to the extent that they finance higher education. Deducting only the taxes needed to cover the expenditures under consideration is more consistent with the fact that parents of young adults are not the only taxpayers financing higher education and that not all of their taxes are devoted to this expenditure item.

We assume that higher education is financed by households through direct and indirect taxation

and by firms through corporate taxes, but not by direct contributions from firms (as is the case for apprenticeship, for example) nor by the issuance of public debt. Taxes most likely to contribute to the financing of higher education are income tax, VAT, corporate taxes that are allocated to households, and other indirect taxes – tax on energy products (*TICPE*) and excise duties –. We do not take into account social contributions, nor taxes dedicated to the financing of social security (*CGS* and *CRDS*). We also do not take into account local taxes, which contribute only marginally to the financing of higher education.

Our sample consists of parents of young adults. Since these individuals are not the only ones involved in funding higher education, we need to estimate the share of taxes to be considered out of sample. We use the 2014 Tax and Social Income Survey,<sup>72</sup> a representative sample of all taxpayers in France, for this purpose.

We calculate the total amount of unallocated taxes paid over six years by French taxpayers:

$$Taxes_{all} = 6 \times \sum_{i=1}^n [(IT_i + VAT_i + CT_i + E_i) \times Weight_i] \quad (11)$$

With  $Taxes_{all}$  the total amount of unallocated taxes paid by all taxpayers over a six-year period;  $n$  the total number of observations in the survey,  $IT_i$  the income taxes paid by  $i$ ,  $VAT_i$  the value added taxes paid by  $i$ ,  $CT_i$  the corporate taxes paid by  $i$ ,  $E_i$  the energy and excise taxes paid by  $i$ , and  $Weight_i$  the weight assigned to individual  $i$  such that  $\sum_{i=1}^n Weight_i = N$  with  $N$  the total number of taxpayers in the general population. Total unallocated taxes paid by all French taxpayers over six years amounts to 1483 billion euros. Finance bills indicate amounts that are of the same order of magnitude.

**Proportion needed to finance higher education spending.** We calculate the share of unallocated taxes needed to fund public spending on higher education with the ratio:

$$Share\_Taxes^{HE} = \frac{S_{all}^{HE}}{Taxes_{all}} \quad (12)$$

With  $Share\_Taxes^{HE}$  the share of taxes dedicated to public spending on higher education between 18 and 24;  $S_{all}^{HE}$  the sum of total public spending on higher education dedicated to individuals aged 18 to 24 and  $Taxes_{all}$  the sum of all unallocated taxes paid by all taxpayers over six years. In total, 4 percent of all unallocated taxpayers' taxes must be devoted to financing the cost of higher education.<sup>73</sup>

**Taxes paid by parents.** Taxes paid by parents include administrative data on parental income tax contributions directly available in our database. The amounts of other taxes paid by parents are imputed as follows: we calculate the share of income devoted to VAT, corporate tax, and other

<sup>72</sup> *Enquête sur les revenus fiscaux et sociaux* (ERFS), 2014

<sup>73</sup> 2021 Finance Bill indicates an amount of 220 billion euros for the sum of the taxes we are considering here (VAT, income tax, corporate tax and domestic consumption tax on petroleum and energy products) and an amount of 10 billion euros for higher education spending excluding university research, i.e. a ratio of 4.5% between these two figures (see <https://www.budget.gouv.fr/budget-etat/> for unallocated tax amounts and [https://www.budget.gouv.fr/budget-etat/ministere?annee=118&loi\\_finances=50&type\\_budget=all&ministere=34726&programme=30340&type\\_donnee\\_budget=ae&op=Valider](https://www.budget.gouv.fr/budget-etat/ministere?annee=118&loi_finances=50&type_budget=all&ministere=34726&programme=30340&type_donnee_budget=ae&op=Valider) for higher education spending). We cannot report these figures for 2014, the year of the survey, because public spending was not presented broken down by expenditure item.



indirect taxes in each standard of living decile by dividing the tax revenue coming from that decile by their total income (including public support received). We use the results of the distributed national accounts (Accardo et al. (2021), Germain (2021)) for this purpose, and standard of living deciles of the whole population are used to be consistent with the figures in this work – unlike in the rest of the article, where the deciles correspond to pre-tax parental income –. The proportion of income devoted to these different taxes by each standard of living decile, shown in Table A7 below, is then applied to each parent’s pre-tax income in our database.

Table A7: Taxes as a proportion of pre-tax income, by living standard of the overall population

	Distributional national accounts at the macro level			ENRJ administrative data
	VAT	Energy and excise taxes	Corporate tax	Income tax
D1	0,17	0,06	0,02	0,01
D2	0,14	0,05	0,01	0,03
D3	0,12	0,04	0,01	0,02
D4	0,12	0,04	0,01	0,03
D5	0,11	0,04	0,01	0,03
D6	0,11	0,03	0,01	0,04
D7	0,11	0,03	0,01	0,05
D8	0,10	0,03	0,02	0,05
D9	0,10	0,03	0,02	0,08
D10	0,08	0,01	0,11	0,13
Total	0,11	0,03	0,04	0,04
Public support included in pre-tax parental income	Yes	Yes	No	/

*Notes:* This table specifies the share of pre-tax income dedicated to different taxes (VAT, energy and excise taxes, corporate tax and income tax), by general population standard of living decile. For instance, the total amount of VAT paid by households in the first decile of standard of living corresponds to 17% of their total pre-tax income (including public support). The share of income devoted to VAT, corporate tax, and other indirect taxes in each standard of living decile is obtained by dividing the tax revenue coming from that decile by their total income (including public support received). We use the results of the distributed national accounts (Accardo et al. (2021), Germain (2021)) for this purpose, and the standard of living deciles for the whole population are used in this table to be consistent with the figures in this work-unlike in the rest of the article, where the deciles correspond to pre-tax parental income. For income tax, we use the administrative variable available in our survey.

**Net benefit from higher education public spending.** We then apply the share of taxes devoted to public funding of higher education (4 percent) to the taxes paid by parents. This gives us the amount of taxes paid by parents that is likely to be allocated to higher education. We finally subtract this amount from the higher education expenditures received by their child to obtain their net benefit (i.e., the benefit of public funding of higher education net of the taxes paid by parents and devoted to these expenditures).

Average net benefit for each parental income decile  $d$  is thus calculated as follows:

$$Net\_Benefit_d = \frac{1}{n_d} \sum_{i=1}^{n_d} (S_i^{HE} - (0.04 \times Taxes_i \times 6)) \quad (13)$$

With  $Net\_Benefit_d$  the average net benefit for higher education public spending for young adults whose parents belong to income decile  $d$ ,  $S_j^{HE}$  spending on higher education over 6 years for young adult  $j$  whose parents belong to decile  $d$  (imputed based on the spending of individuals aged 22-24 in the same decile of parents' income),  $Taxes_j$  the sum of taxes (income tax, VAT, corporate tax, and energy and excise taxes) paid annually by parents of young adult  $j$  belonging to decile  $d$ ,  $n_d$  the sample size of young adults whose parents belong to income decile  $d$ .

**Total public support for young adults and their parents.** In the last part, we extend the analysis of redistribution to all public spending on young adults and their parents, whereas the above was limited to spending on higher education. We include public support for young adults and their parents (family benefits) and tax deductions for parents related to the presence of a young adult.

The method of computing public spending on higher education was presented above. Tax deductions and public support are first calculated for the survey year: the public support considered are either already available in the survey or imputed from the official scales (for family benefits and fiscal deductions). In the absence of panel data, we extend these annual amounts to a six-year period using the average amounts for each income decile, separately for the years in which the individual is studying or not among the six years considered:

$$PS_j = [PS_{student_d} \times Years_{HE_j}] + [PS_{non\_student_d} \times (6 - Years_{HE_j})] \quad (14)$$

$$TD_j = [TD_{student_d} \times Years_{HE_j}] + [TD_{non\_student_d} \times (6 - Years_{HE_j})] \quad (15)$$

With  $PS_j$  the total amount of public support for the young adult  $j$  over 6 years;  $TD_j$  the total amount of tax deductions for parents of  $j$  over 6 years;  $PS_{student_d}$  the average amount of annual public support received by students in  $j$ 's income decile;  $PS_{non\_student_d}$  the average amount of annual public support received by non-students in  $j$ 's income decile;  $TD_{student_d}$  the average amount of annual tax deductions received by parents of students in  $j$ 's income decile;  $TD_{non\_student_d}$  the average amount of annual tax deductions received by parents of non-students in  $j$ 's income decile; and  $Years_{HE_j}$  the number of years  $j$  is in higher education between 18 and 24.

Family benefits are imputed on the basis of official scales on a two-year basis for family allowances, and three years for the family supplement<sup>74</sup> and information available in the survey on the age of the youth and his or her siblings. The total amounts for which the family is eligible are divided by the number of children to obtain the amount received for the youth we consider.

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<sup>74</sup>Family benefits scales can be found at the following links: [https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/af\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/af_cm/) and [https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/cf\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/cf_cm/).

We then compute average total public spending on young adults and their parents:

$$S_d^{public} = \frac{1}{n_d} \sum_{j=1}^{n_d} (S_j^{HE} + S_j^{soc\_fisc}) \quad (16)$$

$$S_j^{soc\_fisc} = PS_j + FB_j + TD_j \quad (17)$$

With  $S_d^{public}$  the average total public expenditure for young adults and their parents in income decile  $d$ ,  $S_j^{HE}$  the expenditure on higher education for  $j$  between 18 and 24 years old – imputed on the basis of the expenditure of individuals aged 22 to 24 in the same parental income decile – ,  $S_j^{soc\_fisc}$  the total expenditure on public support and tax deductions over six years defined as  $S_j^{soc\_fisc} = PS_j + FB_j + TD_j$  with  $PS_j$  public support for the young adult  $j$  between 18 and 24 years old,  $FB_j$  family benefits paid to the parents of the young adult  $j$  between 18 and 21,  $TD_j$  tax deductions for the parents of  $j$  over six years.

**Total public and private investment in human capital.** Finally, we present total spending (both public and private through parental transfers) on young adults. Although much of this spending is not devoted to investment in higher education, it can be viewed as an investment in human capital in the broadest sense. Average total spending on young adults by income decile is defined as follows:

$$S_d^{total} = \frac{1}{n_d} \sum_{j=1}^{n_d} (S_j^{HE} + S_j^{soc\_fisc} + T_j) \quad (18)$$

With  $S_d^{total}$  average total public and private investment for individuals in income decile  $d$ ;  $n_d$ ,  $S_j^{HE}$  and  $S_j^{soc\_fisc}$  defined as previously; and  $T_j$  the total amount of parental transfers for young adult  $j$ . Financial transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey.

$T_j$  is computed for each individual  $j$  as such:

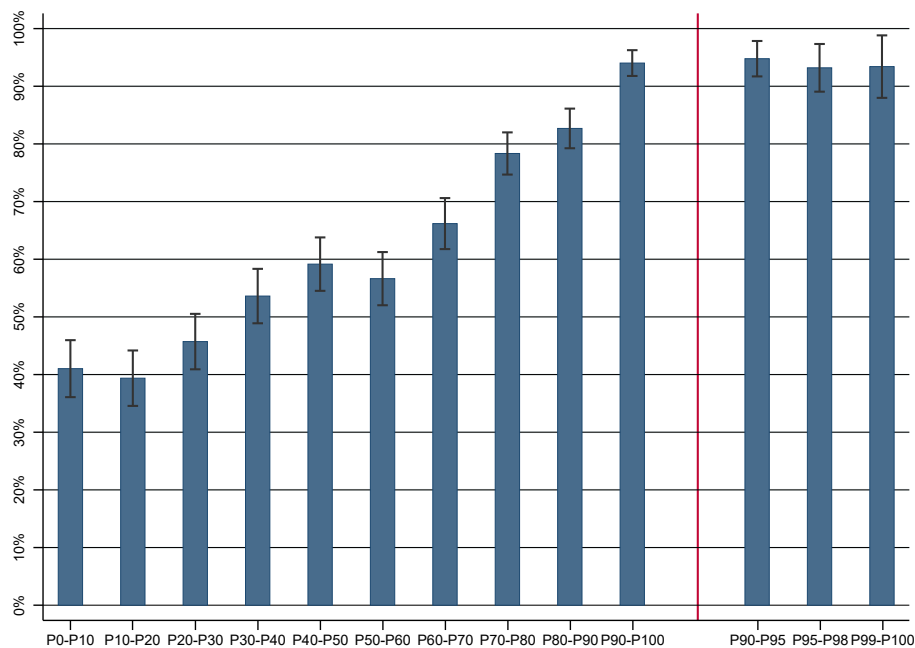
$$T_j = [T_{student_d} \times Years_{HE_j}] + [T_{non\_student_d} \times (6 - Years_{HE_j})] \quad (19)$$

With  $T_{student_d}$  the average amount of annual parental transfers received by students in  $j$ 's income decile; and  $T_{non\_student_d}$  the average amount of annual parental transfers received by non-students in  $j$ 's income decile, and  $Years_{HE_j}$  the number of years  $j$  is in higher education between 18 and 24.

## B.2 Robustness checks

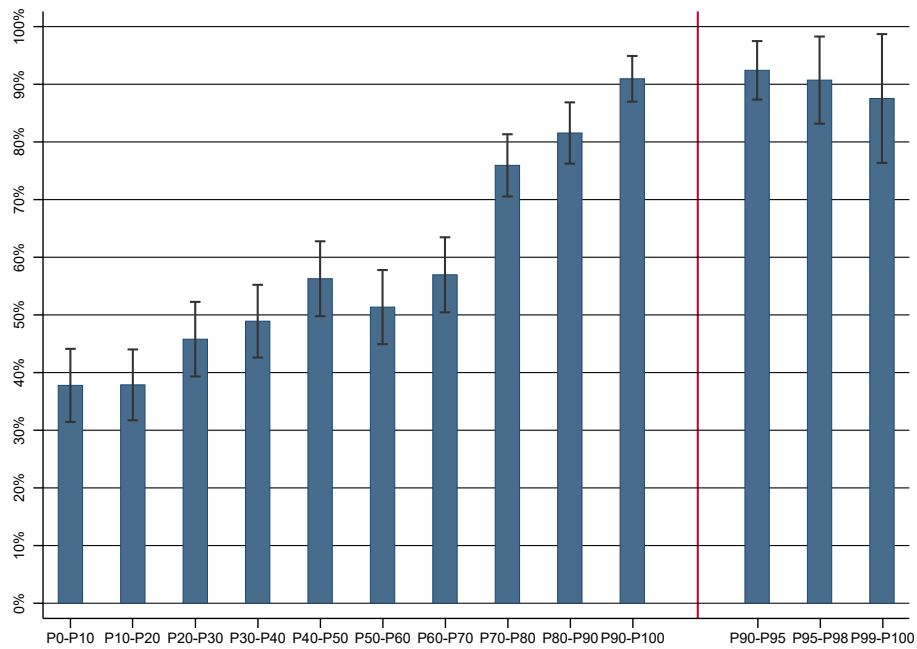
### B.2.1 Access to higher education

Figure B2: **Robustness check 1:** Proportion of individuals accessing higher education among those not retained in high school, by parents' pre-tax income



*Notes:* This figure plots the proportion of individuals aged 18-24 (not retained in high school) who are currently enrolled, have had access to higher education without necessarily obtaining a degree, or already hold a higher education degree, by parental income. In this robustness test, we restrict our sample to individuals who are not retained in high school. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are calculated based on this definition. We further decompose the distribution into the top 10 percent of the income distribution (x-axis). The black line represents the standard errors.

Figure B3: **Robustness check 2:** Proportion of individuals (21-24) accessing higher education, by parents' pre-tax income



*Notes:* This figure displays the proportion of individuals aged 21-24 who are currently enrolled, have had access to higher education without necessarily obtaining a degree, or already hold a higher education degree, by parental income. In this robustness test, we restrict our sample to individuals aged 21-24. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are calculated based on this definition. We further decompose the distribution into the top 10 percent of the income distribution (x-axis). The black line represents the standard errors.

Table B8: **Robustness check 3:** Sensitivity of results to using multiple years of parental income

<b>Access rate to higher education</b>				
<i>Parental income variable used:</i>				
	Household taxable income in year $t$	Household taxable income in year $t - 2$	Average of household taxable incomes in years $t$ and $t - 2$	Parental pre-tax income (main specification)
<i>Parental income decile</i>				
P0-P10	0.40 (0.35, 0.44)	0.45 (0.41, 0.49)	0.40 (0.36, 0.44)	0.36 (0.31, 0.40)
P10-P20	0.37 (0.33, 0.42)	0.33 (0.29, 0.37)	0.37 (0.33, 0.41)	0.35 (0.31, 0.39)
P20-P30	0.41 (0.37, 0.46)	0.39 (0.35, 0.44)	0.40 (0.36, 0.44)	0.40 (0.36, 0.45)
P30-P40	0.46 (0.42, 0.50)	0.51 (0.47, 0.55)	0.47 (0.43, 0.51)	0.47 (0.43, 0.51)
P40-P50	0.54 (0.50, 0.58)	0.50 (0.46, 0.54)	0.51 (0.47, 0.55)	0.52 (0.48, 0.56)
P50-P60	0.54 (0.50, 0.58)	0.49 (0.45, 0.53)	0.50 (0.46, 0.54)	0.50 (0.46, 0.54)
P60-P70	0.61 (0.57, 0.65)	0.62 (0.58, 0.67)	0.63 (0.59, 0.67)	0.60 (0.56, 0.64)
P70-P80	0.66 (0.61, 0.70)	0.65 (0.61, 0.69)	0.66 (0.62, 0.69)	0.71 (0.68, 0.75)
P80-P90	0.74 (0.70, 0.78)	0.79 (0.75, 0.82)	0.77 (0.74, 0.81)	0.76 (0.72, 0.80)
P90-P100	0.82 (0.79, 0.86)	0.82 (0.79, 0.86)	0.83 (0.80, 0.87)	0.88 (0.86, 0.91)
<i>Regression coefficients</i>				
Full sample	4.9 (4.4, 5.3)	4.8 (4.4, 5.3)	5.1 (4.6, 5.5)	5.8 (5.3, 6.2)
Bottom half	3.7 (2.4, 5.0)	2.2 (1.0, 3.5)	3.1 (1.8, 4.3)	4.2 (2.9, 5.5)
Top half	7.1 (5.8, 8.3)	8.1 (6.9, 9.3)	7.8 (6.6, 9.0)	9.3 (8.1, 10.0)

*Notes:* Our main analyses are based on a single year of parental income: the survey year (2014). In this table we present the sensitivity of our results to using multiple years of parental income. The parental income used in our main specification is the sum of the father's pre-tax income and the mother's pre-tax income. To perform this robustness check between year  $t$  and  $t - 2$ , we use a slightly different concept of income. Our data do not include individual tax incomes in year  $t - 2$ , so we rely on the parents' household taxable income that is available for both year  $t$  and  $t - 2$ . In the case where parents are separated and living with a new spouse, we halve the household taxable income of this new household before adding it to the household taxable income of the other parent's household (also halved only in the case where this parent has a new partner). Deciles are calculated based on each income definition. The regression coefficients panel reports estimates of a regression of parental income percentile on access to higher education. They should be interpreted as the average change in the rate of access to higher education for an increase of 10 percentile ranks (i.e., one decile) in the parental income distribution. "Bottom 50" refers to the bottom half of the parental income distribution – with the income variable considered – and "top 50" refers to the top half of the parental income distribution – with the income variable considered –. Standard errors in parentheses.

## B.2.2 Matching richer individuals to better-endowed programs

The adjusted R-squared of the regression of student costs on all combinations of programs and fields is about 25 percent, meaning that there is still variance that we cannot account for because we are not able to link students to the exact university in which they are enrolled. This could lead to a downward bias in the regression of higher education spending if wealthier individuals are able to attend better-endowed programs.

We thus perform a robustness check by assigning, for each combination of programs and fields, the 10th (respectively 25th) percentile of the distribution of student-weighted costs – or the nearest higher percentile when we do not have enough observations to observe the 10th or 25th percentile – to individuals whose parents are in the bottom 10 percent (respectively 25 percent) of the income distribution and the 75th percentile (respectively 90th percentile) – or the nearest lower percentile – to those whose parents are in the top 25 percent (respectively 10 percent) of the income distribution. Our main results are relatively close to those found with this assumption of extreme concentration of wealthier individuals in more expansive programs, meaning that there is not much variation in costs within programs enrolling a large portion of the student body. In our main specification, individuals in the top decile of the income distribution receive 2.3 more public investment in higher education than those in the bottom decile (Table B9). When richer programs are associated with richer individuals, individuals in the top 10 percent of the income distribution benefit 3.0 times more than those in the bottom decile.

One of the other limitations of the cost data used is that we are not able to differentiate public spending among the most selective elite graduate schools, which could lead us to underestimate inequities in public spending. Indeed, some of these schools have very high per-student expenditures – for example, Berné and Métivier (2015) found that specific elite graduate schools have expenditures of 60,000 euros per student per year – and an access rate that remains very unequal (Bonneau et al., 2021). In a final specification, we assume both that wealthier individuals have access to better-endowed university programs, as previously and that individuals from the top decile of the income distribution, when they enter elite graduate schools (engineering schools, institutes of political studies, or other specialized schools), have access to better endowed schools. Individuals in the top decile of the income distribution account for about 30 percent of elite graduate school enrollment in our sample. We assume that individuals in the top 5 percent of the income distribution have access to schools with endowments three times the typical endowment and that those in the next 5 percent of the income distribution have access to schools with endowments twice the typical endowment. In this latter specification, we find that individuals at the top of the income distribution benefit from 3.4 times as much as individuals at the bottom of the income distribution.

In our main specification, access inequality explains about 70 percent of the inequality in public spending on higher education between individuals in the top and bottom income deciles. When we allocate better-endowed programs to wealthier individuals, the contribution of access inequality to public spending inequality decreases mechanically but remains equal to at least half of total spending differences (see Table 6).

Table B9: Sensitivity of results to the student-program matching

		(1)	(2)	(3)
Decile of parental income		Main specification	Association of wealthier individuals to better-endowed programs	Assumption (2) + assumptions on the cost of elite graduate schools
All individuals	D1	7,807	7,107	7,107
	D2	6,444	6,029	6,029
	D3	6,958	6,749	6,749
	D4	8,031	8,031	8,031
	D5	10,768	10,768	10,768
	D6	8,669	8,669	8,669
	D7	11,813	11,813	11,813
	D8	15,180	15,897	15,897
	D9	20,103	21,629	21,629
	D10	18,106	21,182	24,258
D10/D1 Ratio		2.3	3.0	3.4
Students or former students	D1	20,163	18,355	18,355
	D2	16,693	15,616	15,616
	D3	16,672	16,171	16,171
	D4	17,467	17,467	17,467
	D5	18,484	18,484	18,484
	D6	15,698	15,698	15,698
	D7	20,398	20,398	20,398
	D8	20,563	21,534	21,534
	D9	25,039	26,940	26,940
	D10	19,505	22,819	26,134
D10/D1 Ratio		1.0	1.2	1.4

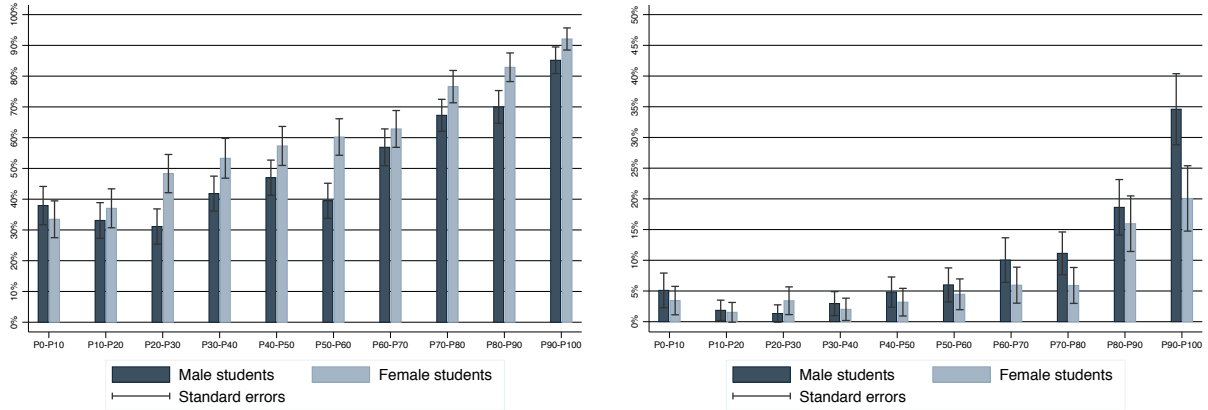
*Notes:* This table presents public spending on higher education by parental income decile under different assumptions. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. Column (1) represents our main specification. Column (2) represents the results obtained by assigning wealthier individuals to programs that are better endowed in their track and field of study. In this simulation, we assign for each combination of programs and fields, the 10th (respectively 25th) percentile of the distribution of student-weighted costs – or the nearest higher percentile when we do not have enough observations to observe the 10th or 25th percentile – to individuals whose parents are in the bottom 10 percent (respectively 25 percent) of the income distribution and the 75th percentile (respectively 90th percentile) – or the nearest lower percentile – to those whose parents are in the top 25 percent (respectively 10 percent) of the income distribution. Column (3) represents the same simulation as in column (2) with additional assumptions about the cost of highly selective elite graduate schools. We assume that individuals from the top decile of the income distribution, when they enter elite graduate schools (engineering schools, institutes of political studies, or other specialized schools), have access to better endowed schools. We assume that individuals in the top 5 percent of the income distribution have access to schools with endowments three times the typical endowment and that those in the next 5 percent of the income distribution have access to schools with endowments twice the typical endowment.



## C.3 Additional results

### C.3.1 Heterogeneity results

Figure C4: Access to higher education and selective programs by gender and parents' pre-tax income

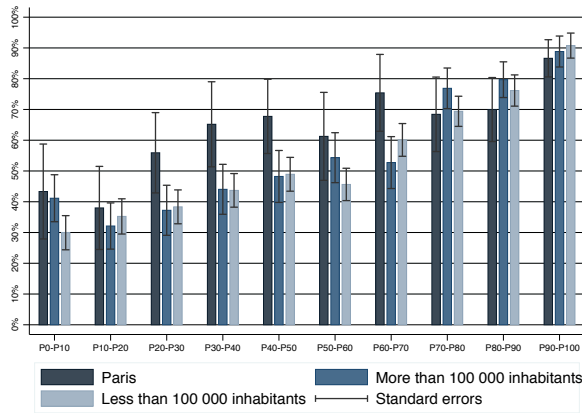


(a) Higher education

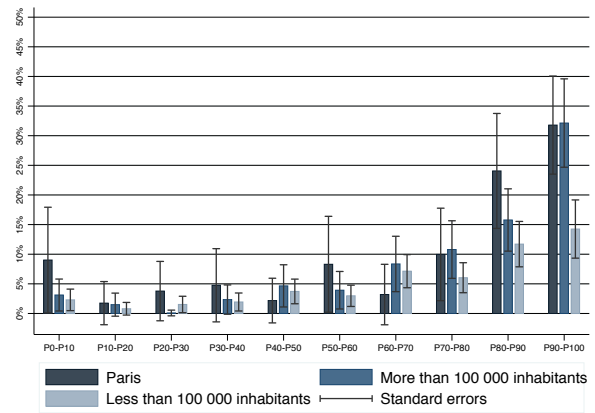
(b) Selective programs

*Notes:* These figures show the access rate between 18 and 24 years old to higher education (panel (a)) and selective programs (panel (b)) by gender and parents' pre-tax income. Individuals are considered to have access to higher education (resp. to selective programs) if they are currently enrolled in higher education (resp. in selective programs) have obtained a higher education degree (resp. a degree from a selective program) or have reached a certain level of higher education (resp. a certain level in a selective program) without necessarily obtaining the corresponding degree. We define selective programs as preparatory courses, elite graduate schools, medical studies and Ph.D. The degree of selectivity of each of these programs can be assessed by ranking all students on the basis of their performance on the high school graduation exam. In 2016-2017, the median rank of students in university (except for medical studies) is 50.2, while that of students in medical studies is 68.1, that of students in preparatory courses is 84.9, and that of students in elite graduate schools is 72.8 (Bonneau et al., 2021). The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. The black line represents the standard errors.

Figure C5: Access to higher education and selective programs by urban size and parents' pre-tax income



(a) Higher education

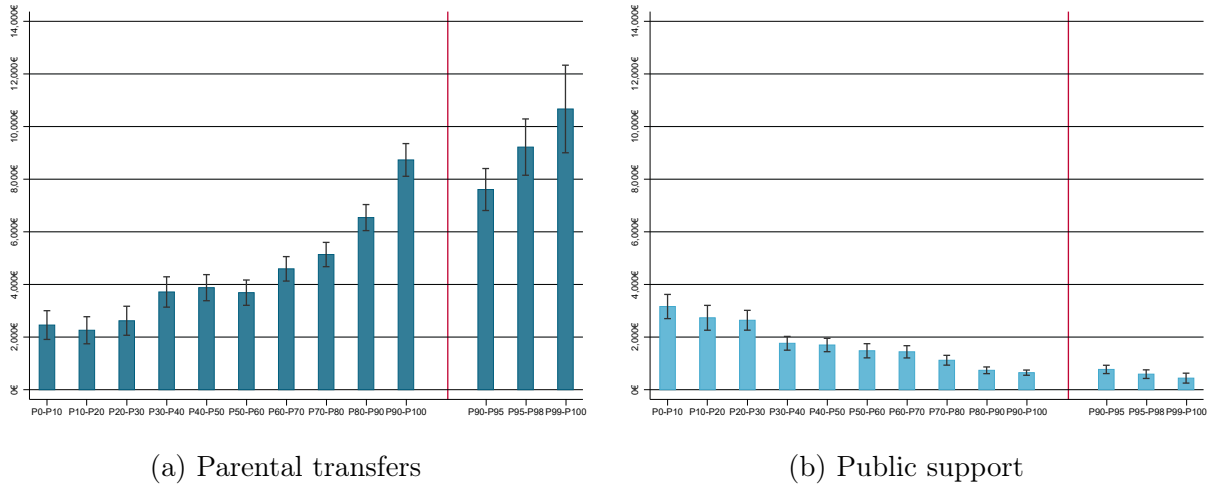


(b) Selective programs

*Notes:* These figures show the access rate between 18 and 24 years old to higher education (panel (a)) and selective programs (panel (b)) by urban size and parents' pre-tax income. Individuals are considered to have access to higher education (resp. to selective programs) if they are currently enrolled in higher education (resp. in selective programs) have obtained a higher education degree (resp. a degree from a selective program) or have reached a certain level of higher education (resp. a certain level in a selective program) without necessarily obtaining the corresponding degree. We define selective programs as preparatory courses, elite graduate schools, medical studies and Ph.D. The degree of selectivity of each of these programs can be assessed by ranking all students on the basis of their performance on the high school graduation exam. In 2016-2017, the median rank of students in university (except for medical studies) is 50.2, while that of students in medical studies is 68.1, that of students in preparatory courses is 84.9, and that of students in elite graduate schools is 72.8 (Bonneau et al., 2021). When both parents do not live in the same city, we retain the larger one. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. The black line represents the standard errors.

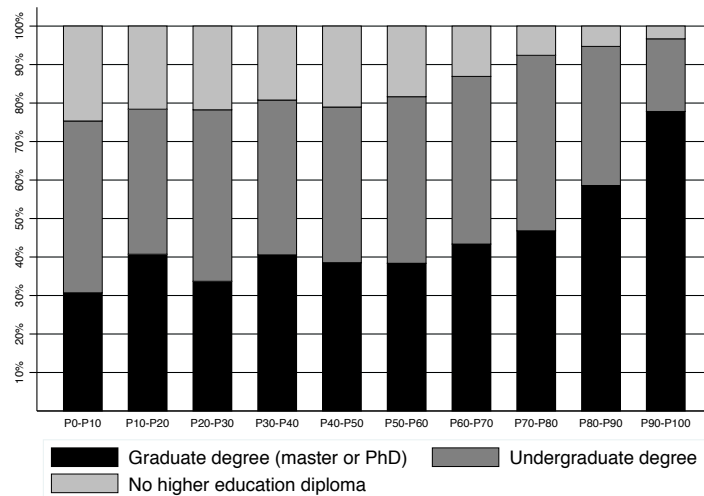
### C.3.2 Correlates of higher education access gap

Figure C6: Annual public support and parental transfers for students, by parents' pre-tax income



*Notes:* These figures represent the annual amounts of parental transfers and public support received by students, by parental income. We restrict the sample to young adults currently studying (i.e. enrolled in a higher education program). Panel (a) shows the amount of parental transfers received by students over a year. The financial transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey. Panel (b) shows the annual amount of public support received by students over a year. For students, public support is mainly composed of need-based scholarships and housing benefits – which represent respectively 51.4% and 46.6% of all public support received by students –. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. We further decompose the distribution into the top 10 percent of the income distribution (x-axis). The black line represents the standard errors.

Figure C7: Educational aspirations, by parents' pre-tax income



*Notes:* This figure shows the educational aspirations of individuals aged 18 and 19, based on parental income. These educational aspirations are reported by young adults in the survey. We restrict ourselves to individuals aged 18 and 19 to avoid having educational aspirations influenced by completed years of schooling in higher education. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition.

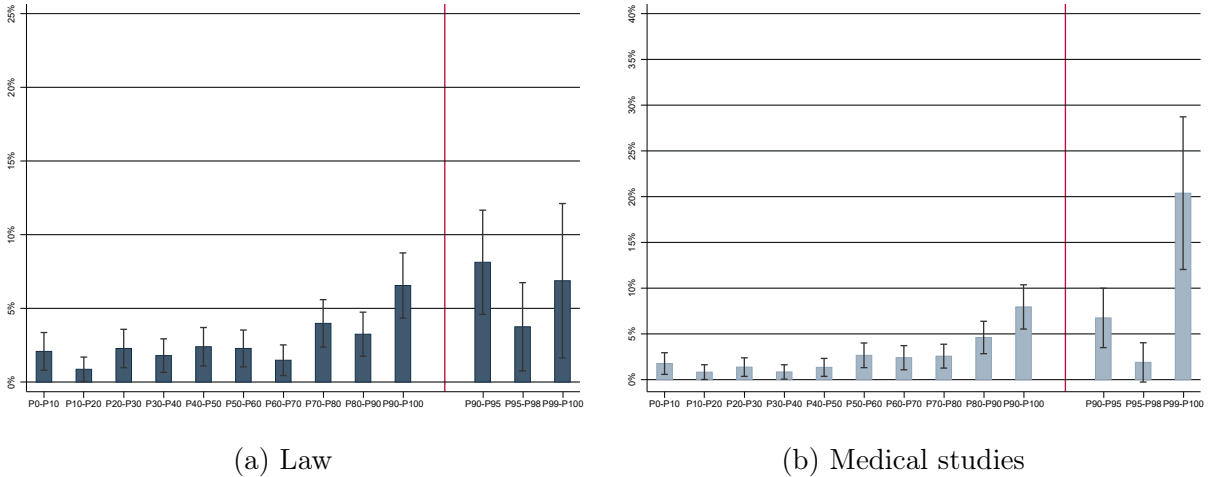
Table C10: Decomposition of access rate differences by previous educational attainment

Contribution of previous credentials to access disparities (in percent)	Higher education	Selective programs	Master's degrees
Middle school graduation	18	10	8
High school graduation	54	27	22
Access to higher education	–	16	14
Residual differential access	29	47	56

*Notes:* This table reports the contribution of the different variables – middle school graduation, high school graduation for those who passed the middle school graduation exam, higher education access gap for those who passed the high school graduation exam – to the total difference in access to higher education, selective programs and master's degrees between individuals in the top and bottom 10 percent of the income distribution (in percent). To decompose the contribution of different factors, we rely on Gupta decomposition methods (Das Gupta, 1991). See Section 3.5 and Appendix A.1.3 for more details on this decomposition method.

### C.3.3 Access to specific fields

Figure C8: Access to law or medical studies, by parents' pre-tax income



*Notes:* These figures show the access rate to law (Panel (a)) and medical studies (Panel (b)) between 18 and 24 years old, based on parental income. We define an individual as having access to a certain field of study if he or she is currently enrolled in that field, has obtained a degree in that field, or has obtained a certain level in that field without necessarily obtaining a corresponding degree. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Deciles are computed based on this definition. We further decompose the distribution into the top 10 percent of the income distribution (x-axis). The black line represents the standard errors.

### C.3.4 Regression results for access to masters' degrees and selective programs

Table C11: Access to master's degree by parents' pre-tax income quintile

Access to master's degree	(1)	(2)	(3)	(4)	(5)
Baseline	0.12	0.12	0.12	0.12	0.12
<b>Parents' income quintile</b>					
Parents' income quintile=1	-0.028*	-0.025*	-0.020	0.023	-0.0035
Parents' income quintile=2	-0.034**	-0.032**	-0.035**	-0.011	-0.016
Parents' income quintile=3	0	0	0	0	0
Parents' income quintile=4	0.064***	0.062***	0.033**	0.047***	0.032*
Parents' income quintile=5	0.20***	0.20***	0.079***	0.11***	0.064***
<b>Control variables included</b>					
Log of potential financial transfers		X			X
Father Occupation (26 categories)			X		X
Mother Occupation (26 categories)			X		X
Father Diploma (6 categories)				X	X
Mother Diploma (6 categories)				X	X
Family situation					X
Urban unit size					X
Observations	5,197	4,455	4,801	4,094	4,078

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

*Notes:* This table presents the estimates of parental income on access to master's degree (1), when successively adding controls for potential financial transfers (2), parental occupation (3), parental education (4), and all these controls simultaneously with family status and urban unit size (5). The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Quintiles are calculated based on this definition. We omit the third quintile. The coefficients should thus be interpreted as the difference from the baseline probability of access for individuals with parents in the third income quintile. The potential financial transfer variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives). Parents' occupation is introduced in dummy variables for each of the categories of occupation (see Table A1 for the details of the 26 categories), separately for the father and the mother. Parents' education is introduced in dummy variables for each of the 6 categories of degree (elementary school certificate or less, middle school certificate, high school diploma or equivalent, two-year degree, bachelor's or master's degree, and M.D. or Ph.D.), separately for the father and the mother. The family situation is introduced in 5 categories: parents together, separated, father unknown, mother unknown or parents unknown. Urban unit size is introduced in three categories: Parisian area, urban unit of more than 100,000 inhabitants, urban unit of less than 100,000 inhabitants. When both parents do not live in the same city, we retain the largest one. These regressions show that the effect of income on access to master's degree is not linear. The income effect is about twice as large in the top half of the income distribution as in the bottom half. The coefficients do not change much with the inclusion of the potential financial transfer variable. In the upper half of the income distribution, the coefficients are reduced by about two when controls for parental occupation or degree are included, and by about three when all controls are included simultaneously. When parental degree is controlled for, the income coefficients on access to masters' programs are no longer significant in the bottom half of the income distribution.

Table C12: Access to selective programs by parents' pre-tax income quintile rank

<b>Access to selective programs</b>	(1)	(2)	(3)	(4)	(5)
Baseline	0.10	0.10	0.10	0.10	0.10
<b>Parents' income quintile</b>					
Parents' income quintile=1	-0.019	-0.014	-0.029**	-0.011	-0.032*
Parents' income quintile=2	-0.021*	-0.017	-0.017	-0.0067	-0.013
Parents' income quintile=3	0	0	0	0	0
Parents' income quintile=4	0.040***	0.037***	0.025**	0.020	0.016
Parents' income quintile=5	0.18***	0.17***	0.094***	0.083***	0.057***
<b>Control variables included</b>					
Log of potential financial transfers		X			X
Father Occupation (26 categories)			X		X
Mother Occupation (26 categories)			X		X
Father Diploma (6 categories)				X	X
Mother Diploma (6 categories)				X	X
Family situation					X
Urban unit size					X
Observations	5,197	4,455	4,801	4,094	4,078

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

*Notes:* This table presents the estimates of parental income on access to selective programs (1), when successively adding controls for potential financial transfers (2), parental occupation (3), parental education (4), and all these controls simultaneously with family status and urban unit size (5). The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Quintiles are calculated based on this definition. We omit the third quintile. The coefficients should thus be interpreted as the difference from the baseline probability of access for individuals with parents in the third income quintile. The potential financial transfer variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives). Parents' occupation is introduced in dummy variables for each of the categories of occupation (see Table A1 for the details of the 26 categories), separately for the father and the mother. Parents' education is introduced in dummy variables for each of the 6 categories of degree (elementary school certificate or less, middle school certificate, high school diploma or equivalent, two-year degree, bachelor's or master's degree, and M.D. or Ph.D.), separately for the father and the mother. The family situation is introduced in 5 categories: parents together, separated, father unknown, mother unknown or parents unknown. Urban unit size is introduced in three categories: Parisian area, urban unit of more than 100,000 inhabitants, urban unit of less than 100,000 inhabitants. When both parents do not live in the same city, we retain the largest one.

Table C13: Access to master's degree based on parents' income, occupation and diploma

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Parent's income percentile rank</b>	0.28***	0.27***	0.14***	0.12***	0.085***	0.084***
Log of potential financial transfers		0.0031				-0.0015
Father Primary school			0		0	0
Father Middle School			-0.013		-0.024	-0.025
Father High School			0.021		0.020	0.025
Father Two-year degree			0.079***		0.054**	0.059**
Father Bachelor or Master degree			0.12***		0.075***	0.070***
Father Ph.D.			0.21***		0.16***	0.16***
Mother Primary school			0		0	0
Mother Middle School			-0.0028		-0.0066	-0.0042
Mother High School			0.011		0.0076	0.013
Mother Two-year degree			0.12***		0.098***	0.10***
Mother Bachelor or Master degree			0.099***		0.062**	0.060**
Mother Ph.D.			0.18***		0.13***	0.12**
Father Low SES				0	0	0
Father Medium-low SES				0.049***	0.032**	0.031**
Father Medium-high SES				0.035**	0.017	0.017
Father High SES				0.16***	0.099***	0.097***
Mother Low SES				0	0	0
Mother Medium-low SES				0.0018	-0.0051	-0.0062
Mother Medium-high SES				0.068***	0.031	0.032
Mother High SES				0.11***	0.055**	0.056**
Parents live together						0
Separated parents						-0.031**
Parisian area						0
Urban unit of more than 100,000 inhabitants						-0.018
Urban unit of less than 100,000 inhabitants						-0.049***
Observations	5197	5197	4094	4427	4065	4022
$R^2$	0.055	0.055	0.100	0.092	0.108	0.112

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

*Notes:* This table reports the estimates of parental income percentile rank, potential financial transfers, parents' education, parents' occupation, family status and urban unit size on access to master's degree. The parental income used is the percentile rank calculated from the sum of the father's pre-tax income and the mother's pre-tax income. The potential financial transfer variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives). For parent's education we define six categories: those with an elementary school certificate or less, those with a middle school certificate, those with a high school diploma or equivalent, those with a two-year degree, those with a bachelor's or master's degree, and those with an M.D. or Ph.D.. The mother's degree is missing for 4 percent of observations and the father's degree is missing for 17 percent of observations. For occupations, we rely on the Department of Education's statistical service grouping into four socioeconomic statuses (SES). High SES includes professionals, managers, CEOs, teachers, professionals and artists. Medium-high SES corresponds to intermediate occupations, technicians, foremen and supervisors. Medium-low SES refers to farmers, artisans, shopkeepers and employees. Low SES is defined as blue-collar workers and non-working people. Table A1 details the four SES categories and the corresponding occupations. The mother's occupation is missing for 4% of the observations and that of the father for 9% of the observations. When both parents do not live in the same city, we retain the largest one, as access to higher education is potentially easier if at least one parent lives in a city with a major university center, and the student can potentially avoid paying rent to access college.

Table C14: Access to selective programs based on parents' income, occupation and diploma

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Parent's income percentile rank</b>	0.23***	0.21***	0.12***	0.10***	0.087***	0.081***
Log of potential financial transfers		0.0056***				0.0019
Father Primary school			0		0	0
Father Middle School			-0.025		-0.027	-0.028
Father High School			-0.015		-0.013	-0.010
Father Two-year degree			0.051***		0.039**	0.043**
Father Bachelor or Master degree			0.11***		0.083***	0.077***
Father Ph.D.			0.13***		0.10***	0.10***
Mother Primary school			0		0	0
Mother Middle School			0.0086		0.0084	0.011
Mother High School			0.0040		0.0051	0.0091
Mother Two-year degree			0.090***		0.087***	0.091***
Mother Bachelor or Master degree			0.075***		0.054***	0.055***
Mother Ph.D.			0.18***		0.14***	0.14***
Father Low SES				0	0	0
Father Medium-low SES				0.020*	0.0014	-0.000075
Father Medium-high SES				0.017	-0.0030	-0.0044
Father High SES				0.12***	0.053***	0.050***
Mother Low SES				0	0	0
Mother Medium-low SES				0.0039	0.0012	0.0024
Mother Medium-high SES				0.041***	0.0055	0.0059
Mother High SES				0.10***	0.041**	0.043**
Parents live together						0
Separated parents						-0.048***
Parisian area						0
Urban unit of more than 100,000 inhabitants						-0.0037
Urban unit of less than 100,000 inhabitants						-0.031**
Observations	5197	5197	4094	4427	4065	4022
$R^2$	0.056	0.057	0.110	0.090	0.115	0.121

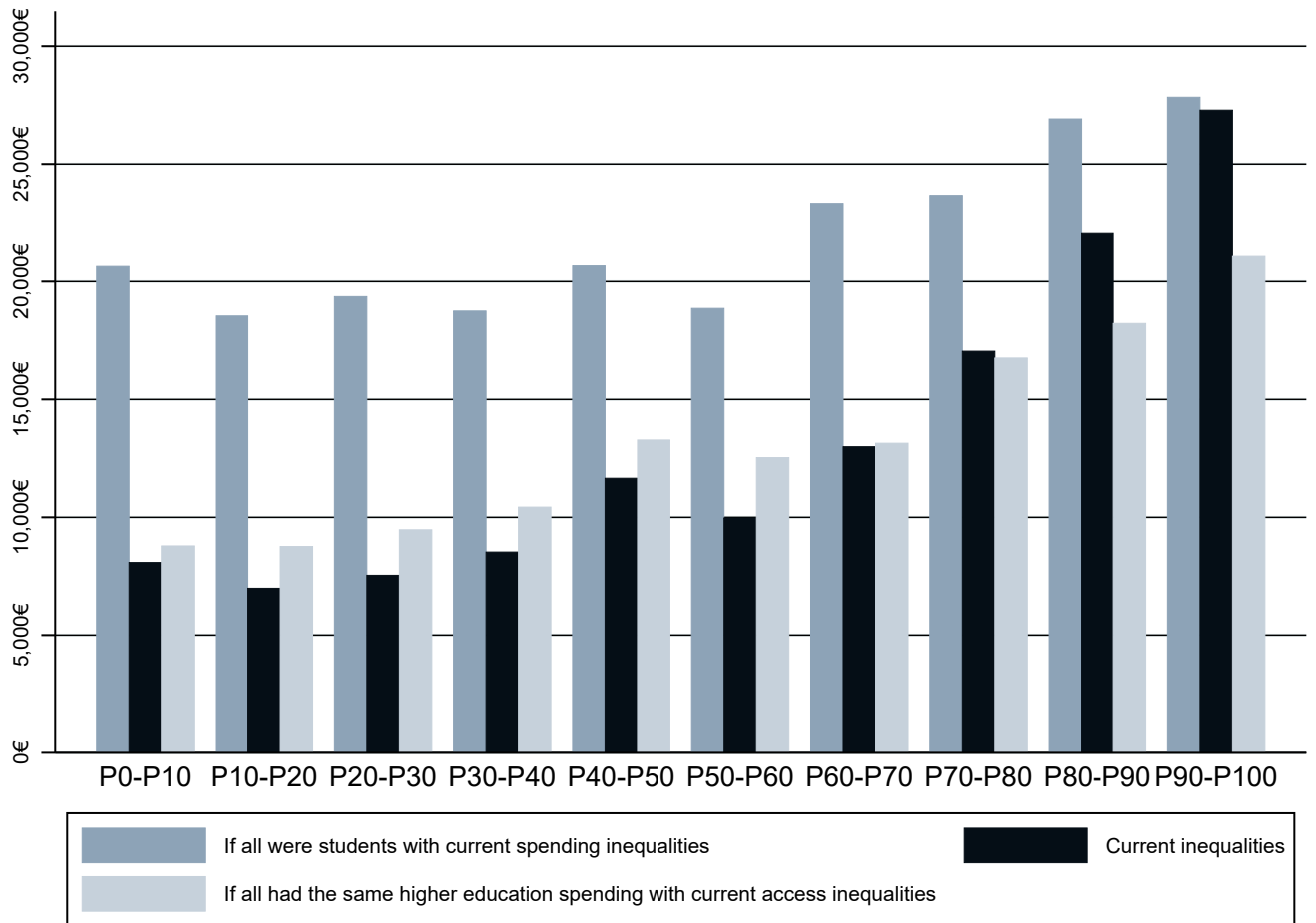
\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

*Notes:* This table reports the estimates of parental income percentile rank, potential financial transfers, parents' education, parents' occupation, family status and urban unit size on access to selective programs. The parental income used is the percentile rank calculated from the sum of the father's pre-tax income and the mother's pre-tax income. The potential financial transfer variable represents what a young adult would have received from his or her parents, if he or she were studying, based on his or her characteristics (indicators for parents' income decile, number of siblings, father's degree, mother's degree, father's occupation, mother's occupation, parents' marital status, and size of urban unit where the young adult lives). For parent's education we define six categories: those with an elementary school certificate or less, those with a middle school certificate, those with a high school diploma or equivalent, those with a two-year degree, those with a bachelor's or master's degree, and those with an M.D. or Ph.D.. The mother's degree is missing for 4 percent of observations and the father's degree is missing for 17 percent of observations. For occupations, we rely on the Department of Education's statistical service grouping into four socioeconomic statuses (SES). High SES includes professionals, managers, CEOs, teachers, professionals and artists. Medium-high SES corresponds to intermediate occupations, technicians, foremen and supervisors. Medium-low SES refers to farmers, artisans, shopkeepers and employees. Low SES is defined as blue-collar workers and non-working people. Table A1 details the four SES categories and the corresponding occupations. The mother's occupation is missing for 4% of the observations and that of the father for 9% of the observations. When both parents do not live in the same city, we retain the largest one, as access to higher education is potentially easier if at least one parent lives in a city with a major university center, and the student can potentially avoid paying rent to access college.



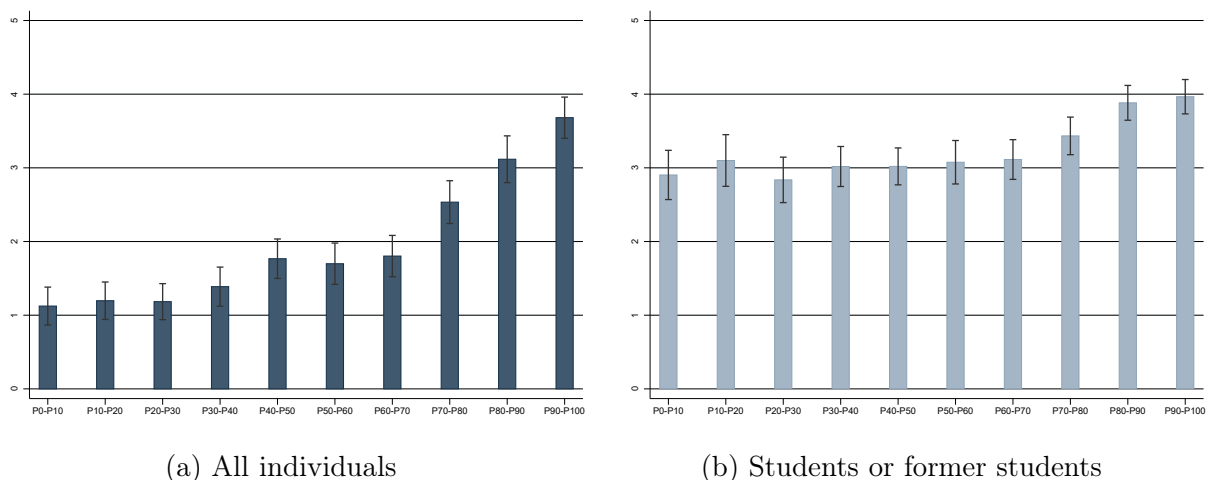
### C.3.5 Decompositions of inequalities in public spending on higher education

Figure C9: Extensive and intensive margins



*Notes:* This figure shows the decomposition of inequality in public investment in higher education between an extensive margin – differences in access to higher education – and an intensive margin – differences in spending on higher education for those who access it, related to both inequality in length of study and inequality in annual spending –. We restrict ourselves to individuals aged 22-24 who are the most advanced in their studies in our sample. The dark curve represents the current level of inequality in public spending on higher education (corresponding to Figure 5a). The left-hand curve represents the level of inequality that would result if all individuals accessed higher education with the current level of spending inequality. The right-hand curve represents the level of inequality that would be obtained if all individuals had the same expenditure (calculated over 22-24 year olds) on higher education with the current level of inequality of access. The parental income used is the sum of the father’s pre-tax income and the mother’s pre-tax income. Deciles are calculated based on this definition (x axis).

Figure C10: Unequal lengths of study



*Notes:* These figures plot the duration of studies for all individuals (Panel (a)) and individuals accessing higher education between the ages of 18 and 24 (Panel (b)), according to parental income. We restrict ourselves to individuals aged 22 to 24 years who are the most advanced in their studies in our sample. The parental income used is the sum of the father’s pre-tax income and the mother’s pre-tax income. Deciles are computed based on this definition. The black line represents the standard errors.

### C.3.6 Distribution of public spending for young adults

Throughout the paper we study the distribution of public spending by parental income. The question arises of the distribution of these expenditures within the population, regardless of parental income. We therefore present the distribution of public expenditures dedicated to young adults and their parents in this section.

Figure C11 shows the distribution of public spending on higher education aggregated over a student’s career (ages 18-24). About 40 percent of individuals have zero spending because they did not enter higher education. Only 10 percent of individuals receive more than 25,000 euros of investment in higher education over the course of their education (ages 18 to 24). The 1 percent of individuals with the highest public spending on higher education receive about 65,000 euros over 6 years of study. They receive 2.6 times more spending than individuals at the 90th percentile of higher education spending and 10 times more spending than individuals at the median of public spending on higher education (65,000 euros versus 6,500 euros on average).

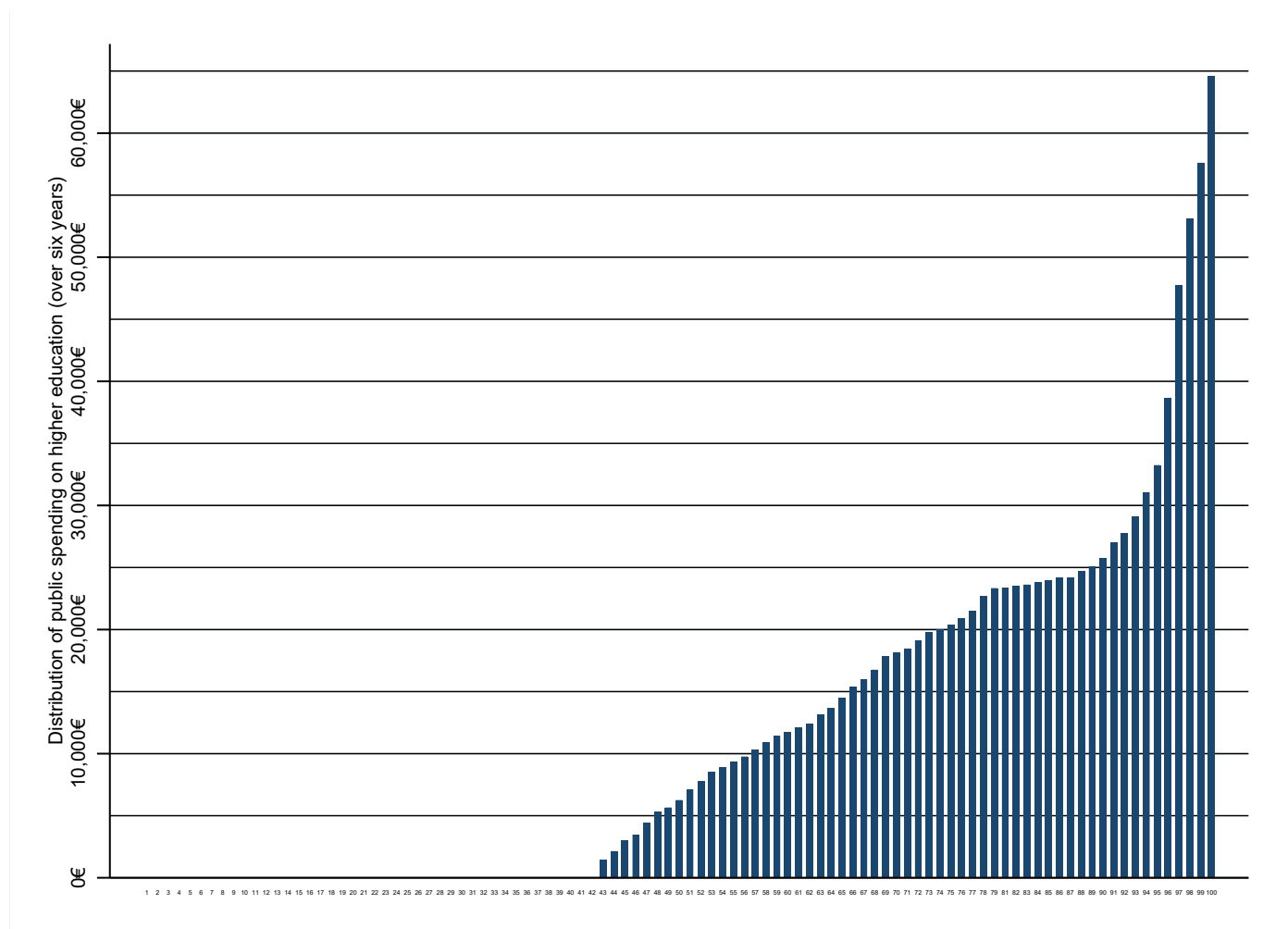
Figure C12 displays the correlation between the percentile rank of parents’ income and the percentile rank of public spending on higher education. A significant correlation between parental income and public spending on higher education is observed. On average, a one percentile increase in parental income is correlated with a 0.4 percentile increase in the distribution of public spending on higher education. On average, individuals whose parents are in the lowest 1% of pre-tax income are in the 22nd percentile rank of public spending on higher education, while those whose parents are in the highest 1% are in the 62nd percentile rank of public spending.

Figure C13 presents the distribution of higher education public spending by gender. Due to strong gender inequalities in access to selective programs (see Figure C4 (b)), strong inequalities in public spending between male and female students are observed. Deciles are calculated separately by gender. In all deciles of higher education public spending from the 2nd decile onward, male students receive significantly more public spending than female students. This finding is particularly

pronounced at the very top of the distribution. The 10 percent of male students who benefit from the highest spending on higher education benefit from 11,000 euros more over the course of their studies (from 18 to 24) than the 10 percent of female students who benefit from the highest spending on higher education (55,000 euros versus 44,000 euros).

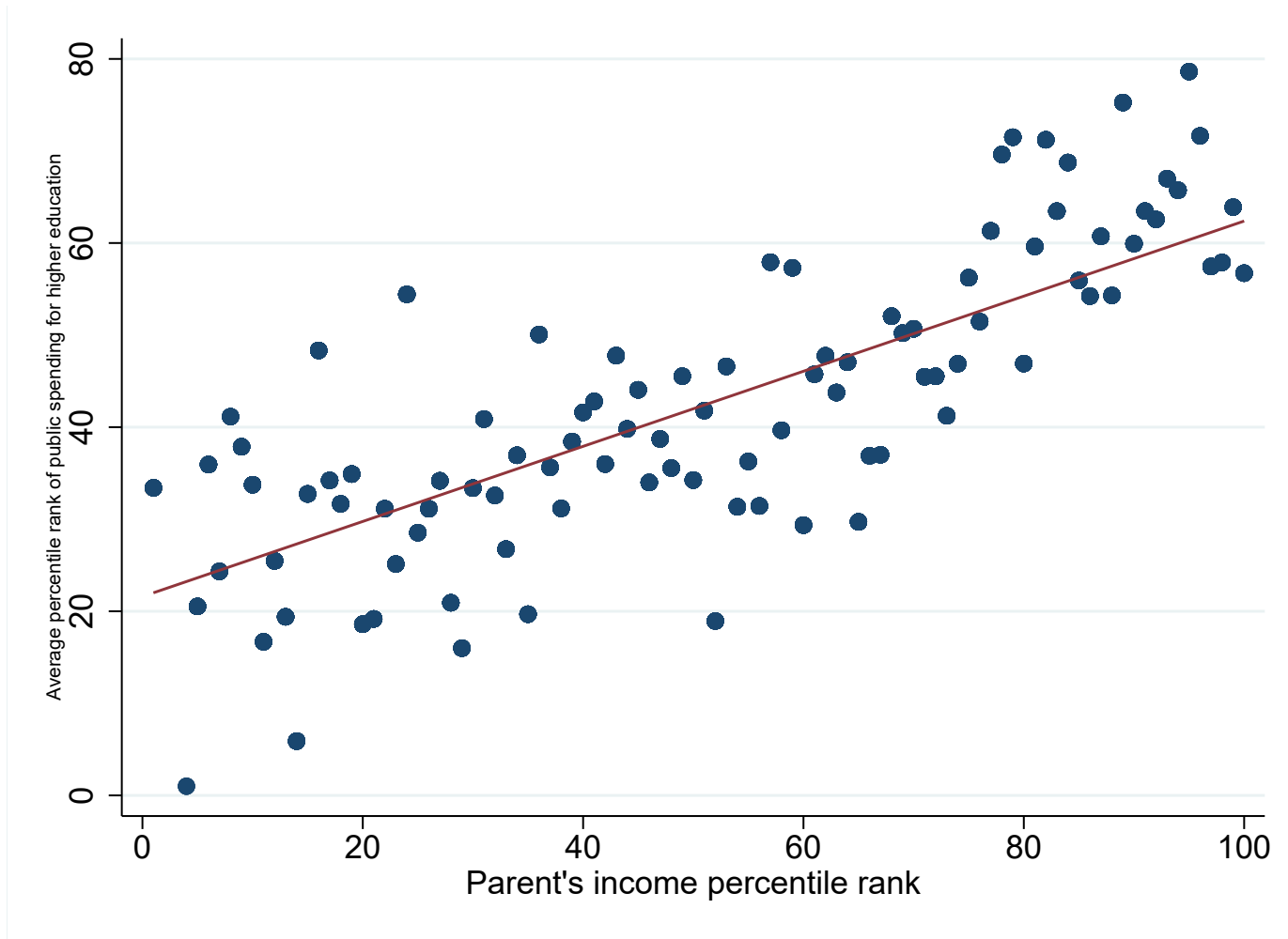
Table C15 presents the distribution of annual parents' financial transfers and annual public spending for young adults and their parents, for all individuals and separately for students and non-students. Strong disparities in terms of parents' financial transfers, public support and tax deductions for parents are observed. The top 5 percent of individuals receiving the most financial transfers from their parents receive nearly 10 times more than individuals at the median of parental transfers. The top 5 percent of parents who benefit the most from tax deductions receive nearly 30 times more annual tax deductions than individuals at the median tax deduction.

Figure C11: Distribution of public spending for higher education



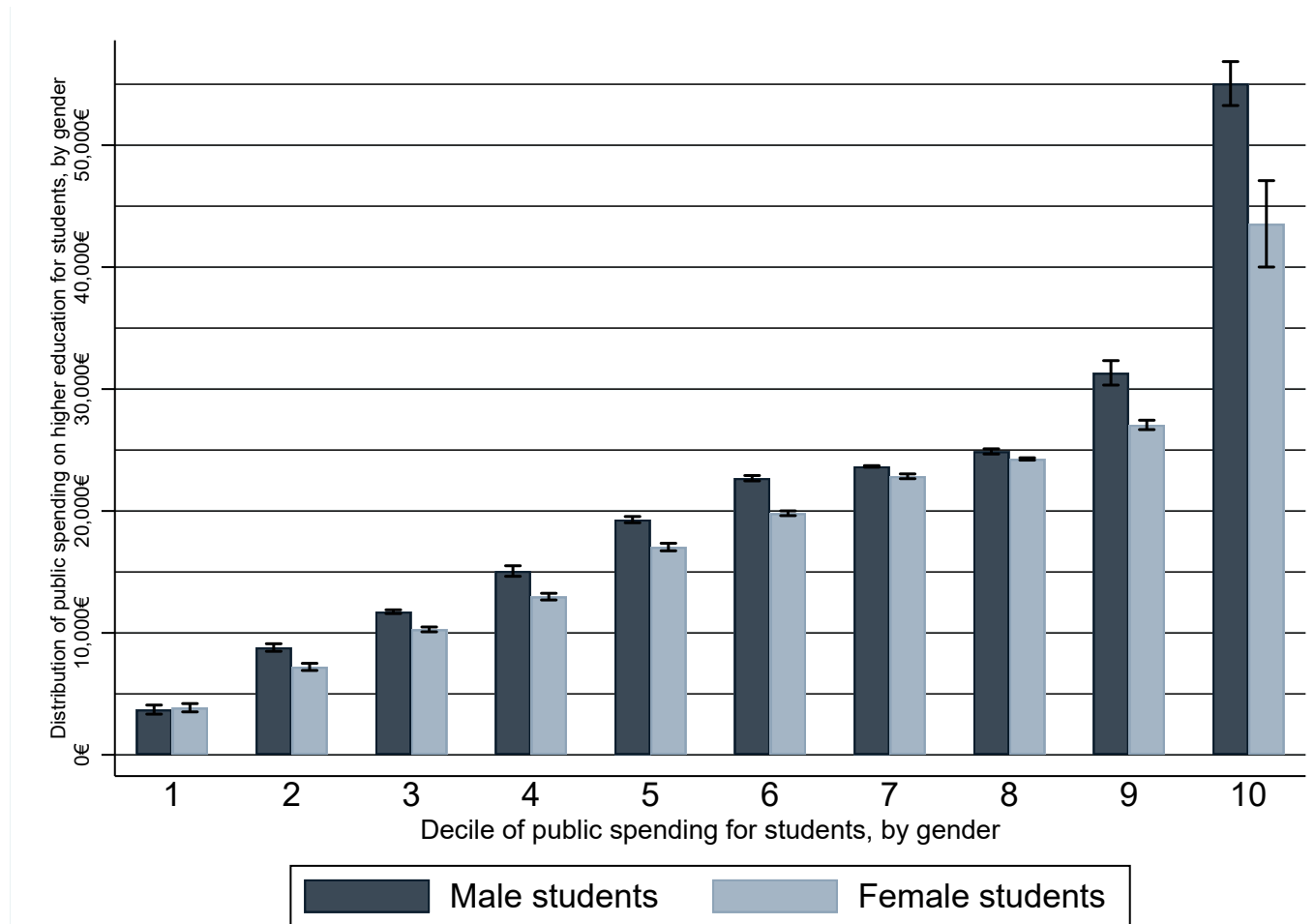
Notes: This figure displays the distribution of public spending on higher education over 6 years (18-24 years), by percentile of public spending. 42% of the 22-24 year olds have zero spending because they did not enter higher education. Unlike the rest of our analyses, we do not take into account parental income in calculating this distribution. We restrict ourselves to individuals aged 22-24, who are the most advanced in their studies in our sample.

Figure C12: Rank-rank correlation



*Notes:* This figure plots the correlation between the percentile of parental income and the percentile of public spending on higher education. The red line corresponds to the linear regression of parents' income percentile rank on the percentile rank of public spending for higher education. The parental income used is the sum of the father's pre-tax income and the mother's pre-tax income. Percentiles are computed based on this definition. We restrict ourselves to individuals aged 22-24, who are the most advanced in their studies in our sample.

Figure C13: Distribution of public spending for higher education among students, by gender



*Notes:* This figure shows the distribution of public spending on higher education for students, over 6 years (18-24 years), by gender and decile of public spending. Deciles are computed separately by gender. Unlike the rest of our analyses, we do not take into account parental income in calculating this distribution. We restrict ourselves to individuals aged 22-24, who are the most advanced in their education in our sample.

Table C15: Distribution of public support for young adults and their parents

	Parents' financial transfers	Public support for young adults	Tax deductions for parents	Family benefits for parents
<b>All individuals</b>				
Average	2,825	1,382	779	308
Standard deviation	4,013	2,425	1,094	658
P5	0	0	0	0
P10	0	0	0	0
P25	200	0	0	0
P50	1,240	0	120	0
P75	3,789	1,950	1,189	0
P90	8,072	4,448	2,518	1,265
P95	11,140	6,270	3,403	1,968
<b>Students</b>				
Average	5,226	1,479	1,086	343
Standard deviation	5,009	1,986	1,072	666
P5	0	0	0	0
P10	360	0	0	0
P25	1,550	0	0	0
P50	3,740	700	861	0
P75	7,652	2,100	1,683	485
P90	11,610	4,320	2,400	1,188
P95	14,838	5,421	3,183	1,968
<b>Non-students</b>				
Average	1,259	1,318	583	285
Standard deviation	2,009	2,672	1,062	652
P5	0	0	0	0
P10	0	0	0	0
P25	0	0	0	0
P50	480	0	0	0
P75	1,600	1,440	678	0
P90	3,612	4,500	2,653	1,265
P95	5,180	7,416	3,403	1,968

*Notes:* This table presents the distribution of annual parents' financial transfers and annual public support for young adults and their parents for all young adults and separately for students and non-students. The parental transfers taken into account are regular direct financial aid, the amount paid for housing, weekly savings from provisions given to the child, expenses for gasoline, car maintenance, insurance, public transport passes, train tickets, telephone, internet, leisure expenses and complementary health insurance. These transfers received from parents are reported by young adults in the survey. Public support includes need-based scholarships, housing benefits, unemployment benefits, guaranteed minimum income, disability benefits, integration contract, and family benefits. Tax deductions correspond either to the half share (or share) of tax deduction or to the deduction of the pension paid to the young adult, depending on whether or not the young adult is attached to the parents' tax household. Family benefits paid to parents until their child reaches the age of 20 are imputed on the basis of official scales ([https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/af\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/af_cm/) and [https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations\\_generales/cf\\_cm/](https://www.ipp.eu/baremes-ipp/prestations-sociales/0/3/prestations_generales/cf_cm/)). Total family benefits are divided by the total number of children concerned to isolate the amounts paid for the surveyed young adult.

## D.4 List of tables and figures

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