Improving College Access and Success for Low-Income Students: Evidence from a Large Need-based Grant Program*

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Abstract

Using comprehensive administrative data on France's single largest financial aid program, this paper provides new evidence on the impact of large-scale need-based grant programs on the college enrollment decisions, persistence and graduation rates of low-income students. We exploit sharp discontinuities in the grant eligibility formula to identify the impact of aid on student outcomes at different levels of study. We find that the provision of 1,500 euros cash allowances to prospective undergraduate or graduate students increases their college enrollment rates by 5 to 7 percent. Moreover, we show that need-based grants have positive effects on student persistence and degree completion.

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1 Introduction

Access to higher education has increased substantially over the past two decades. Between 1995 and 2010, the average OECD university entry rate rose from 37 to 62 percent. Despite this widening of participation in higher education, young people with low-educated parents are still less than half as likely to be in higher education compared with their peers in the general population (OECD, 2012). These differences in educational attainment translate into persistent earnings inequalities.

To lower the financial barriers to post-secondary education for low-income students, many countries operate broad-based financial aid programs that provide tuition waivers and cash transfers. These programs are typically need-based, with awards decreasing in parental income. Examples of such schemes include the Maintenance Grant in the UK, the Spanish *Becas*, the Pell Grant in the US and the French *Bourses sur critères sociaux* (hereafter BCS). These programs cover a non-negligible fraction of the student population – up to a third in the US and in France.

Despite the central importance of large need-based financial aid programs in promoting equal access to higher education, and considering the financial stakes involved, relatively little is known about their effectiveness in improving the outcomes of low-income students. This paper aims to fill this gap by providing a comprehensive assessment of France's single largest need-based grant program. We take advantage of the existence of sharp discontinuities in the BCS grant eligibility formula to estimate the impact of financial aid on college enrollment, persistence and degree completion rates for low-income students.

The assessment of need-based grant programs requires going beyond evaluating their impact on college enrollment decisions, since the ability of such programs to improve the educational and labor market outcomes of low-income students ultimately depends on how they affect persistence and degree attainment. Standard models of human capital investment predict that the provision

of financial support should increase initial enrollment rates by lowering the cost of college. The enrollment effects of need-based grants are therefore entirely determined by the behavior of the "marginal" students, i.e., of those who would not have attended college without financial support. In contrast, their impact on persistence and degree completion rates depends on the behavioral responses of both the "marginal" and the "inframarginal" students, the latter group referring to students who would have attended college irrespective of their eligibility for a grant. If marginal students are of substantially lower average ability than inframarginal students, then need-based grants might have only a weak impact on persistence and degree completion rates. The provision of financial support could, however, improve the learning conditions of all students by allowing them to work less, to be more focused on their studies and to eventually complete a degree.[1] Because the combined effect of these "extensive" and "intensive" margin responses is uncertain, the overall impact of financial assistance programs on student persistence and degree attainment is fundamentally an empirical question.

The literature on student aid provides relatively little direct empirical evidence on the impact of large need-based programs on college access and success for low-income students. Most of the existing work focuses on more narrowly defined programs, which have been implemented in the US for specific groups of students and/or are operated at the level of a particular state or university. Examples of such programs include the Veterans' educational benefits (Angrist, 1993; Stanley, 2003; Bound and Turner, 2002), the Social Security Student Benefit Program (Dynarski, 2003) and a variety of state merit-based programs targeted at students who meet certain academic requirements,[2] or at

[1] Many students are constrained to work to fund their studies, which can have adverse effects on their college attainment. In France, over 20 percent of students work on a regular basis during the academic year (OVE, 2011) and recent empirical evidence suggests that holding a regular part-time job has large detrimental effects on the probability of graduating from college (Beffy et al., 2013).

[2] Studies include Dynarski (2008), Abraham and Clark (2006), Cornwell et al. (2006), Kane (2007), Goodman (2008), Leeds and DesJardins (2012).

students who are already in college (Angrist et al., 2009; Goldrick-Rab et al., 2012), as well as state need-based grant programs which supplement federal aid (Castleman and Long, 2012). To overcome the identification issues that arise when estimating the impact of aid on student outcomes, the standard practice has been to use policy changes and eligibility rules as sources of exogenous variation to identify the parameters of interest. Most of the above studies find that the provision of financial support has a positive impact on the targeted groups' college enrollment decisions and a few papers also find positive effects on college attainment. It is, however, unclear whether these results would apply to broader need-based grant programs, which typically serve larger populations and are only awarded on the basis of students' financial needs.

In contrast to this vast body of research, the available evidence on the effects of large-scale need-based programs appears both limited and mixed. A number of authors have investigated the effects of the aforementioned Pell Grants, with a specific focus on initial enrollment decisions and choices amongst colleges. Overall, existing studies find no clear and persuasive evidence that Pell Grants significantly impact college access for the marginal, low-income student.[3] To our knowledge, Bettinger (2004) is the only paper to examine the effect of Pell Grants on student persistence between the first and second year of college, using discontinuities in the eligibility formula.[4] His estimates suggest that Pell Grants tend to reduce dropout rates but the findings are not completely robust to specification. Empirical evidence on the impact of need-based grant programs outside of the US is even more limited and mixed.[5] In these latter

[3]For a review of empirical studies on the Pell Grant program, see Dynarski and Scott-Clayton (2013). The complexity of the Pell Grant Program and its inflationary effect on tuition fees are the two main factors that have been put forward to explain its limited impact on college enrollment. This latter phenomenon is unlikely to occur in France, since most higher education institutions are not free to set their own tuition fees.

[4]Castleman and Long (2012) also use discontinuities to evaluate the impact of grants on degree completion rates, but they consider a program (the Florida Student Access Grant) which supplements Pell Grants. They estimate the effects of this additional subsidy on student outcomes but not the impact of the initial Pell Grant (i.e., of some aid versus no aid).

[5]See Nielsen et al. (2010) for the Netherlands; Steiner et al. (2006; 2011) for Germany; Dearden et al. (2011) for the UK.

studies, the reliance on indirect sources rather than on direct administrative data on grant applicants has typically prevented researchers from exploiting small variations in grant eligibility formulas to identify the programs' effects on student outcomes.

Our paper makes several contributions to the literature on student financial aid. First, we are able to link administrative micro-data on the universe of students applying for need-based grants in French higher education over the period 2008-2010 with data on all students enrolled in French public universities. These administrative data allow us to exploit sharp discontinuities in the assessment formula to estimate the impact of grant eligibility on student outcomes without having to be concerned about student mobility across institutions. Second, our analysis takes advantage of the fact that grant applications have to be renewed every year to estimate the effect of financial aid on applicants' decisions at each level of study, i.e., for those entering college as well as for those who are already enrolled in higher education. Third, we investigate the impact of financial aid on a broader set of outcomes than most previous studies have been able to examine, analyzing not only college enrollment decisions, but also persistence and degree completion rates.

We find that the provision of 1,500 euros cash allowances to prospective undergraduate or graduate students increases their college enrollment rates by approximately 5 to 7 percent. Moreover, our estimates show that the effects of need-based grants are not short-lived since eligibility for the cash allowance has a positive and significant impact on the persistence rates of these students. The effects on degree completion are more mixed. While being eligible for an allowance of 1,500 euros is not found to significantly increase the probability of graduating on time for college entrants, we find evidence of positive and significant degree completion effects for continuing students, of about 5 percent for applicants in the final year of a degree program, and of up to 13 percent for prospective master's students.

We interpret our findings as evidence that need-based grants can improve

the educational outcomes of low-income students, both on the extensive margin of college attendance and on the intensive margin of academic achievement in university. Moreover, the estimated enrollment responses are relatively large given the moderate size of the cash award. We view these findings as consistent with recent studies showing that students can be influenced to make significant decisions by small changes in college application costs.[6] Our results suggest, however, that the net social benefits from need-based grant programs are larger for continuing students than for college entrants.

The remainder of this paper is as follows. Section 2 provides some institutional background on French higher education and outlines the main features of the BCS grant program. Section 3 explains the estimation strategy. Section 4 describes the data. Section 5 examines the validity of the regression discontinuity design, presents the main results and performs a number of robustness checks. Section 6 discusses the implications of our findings and section 7 concludes.

2 Institutional Background

2.1 Higher Education and the Cost of College in France

The French system of higher education comprises various institutions, the vast majority of which are publicly funded.[7] After graduating from high school, students willing to engage in post-secondary education can choose between two main tracks. Out of the of 78 percent of high school graduates who decide to enter higher education,[8] the majority chooses to enroll in public universities (56 percent), which offer academic and vocational undergraduate degrees (mainly three-year degrees called *Licence*), graduate degrees (*Master*) and doc-

[6] See Bettinger et al. (2012), Bulman (2012), Cohodes and Goodman (forthcoming), Hoxby and Turner (2013) and Pallais (forthcoming).

[7] In 2010-2011, private institutions accounted for less than 18 percent of total enrollment in higher education (MEN, 2013).

[8] The figures refer to the academic year 2010-2011.

toral degrees. French universities are not selective as the only requirement for undergraduate admission is to have passed the high school graduation exam (*Baccalauréat*). About a third of the high school graduates who enter higher education choose instead to enroll in special public high schools which offer two types of courses: academically-oriented courses preparing for admission to elite graduate schools (*Classes Préparatoires aux Grandes Écoles*) or professionally-oriented courses leading to advanced vocational degrees (*Sections de Technicien Supérieur*). Admission to either type of course is selective as there are only a limited number of seats available for each program. Outside of these two main tracks, a minority of high school graduates choose to enroll in specialized public or private higher education institutions that lead to specific degree programs (such as schools of art, architecture, journalism, etc.).

In France, the costs of post-secondary education are mainly driven by living expenses, since tuition fees in public universities are set at a very low level (in 2010, annual tuition fees were 174 euros for undergraduate students and 237 euros for graduate students). Living costs incurred by students can, however, be relatively high, as most higher education institutions are located in large cities. Subsidized university residence halls are in very limited supply and housing costs in the private sector can be substantial in some areas, even after taking into account the housing benefits for which most students are eligible if they live away from home. Recent surveys on students' social and economic conditions indicate that on average, college students living away from home spend around 700 euros per month to cover their living expenses. In addition, students have to pay annual tuition fees and social security contributions (around 200 euros per year). According to our computations, the total average budget for a nine-month academic year amounts to 6,300 euros, representing a potentially important barrier to low-income students' access to higher education.[9]

[9]The details of the calculations are provided in the paper's online appendix (section A).

2.2 The BCS Need-Based Grant Program

The *Bourses sur Critères Sociaux* program is France's national financial support scheme for low-income students at the post-secondary level. About a third of students enrolled in higher education receive a BCS grant, for a total cost of 1.7 billion euros in 2010. Other forms of financial support, such as State guaranteed student loans or merit-based grants, which exist on a large scale in many countries, are almost non-existent in France.[10]

The amount of financial aid awarded through the BCS program depends on applicants' parental taxable income and a composite score which takes into account their number of siblings and the distance between their parents' home and the university they plan to attend. The program consists of seven levels of grants (referred to as *échelons*), which range from 0 to 6. Students who qualify for a level 0 grant are exempt from paying tuition fees (if they attend a public university) and social security contributions, but are not eligible for cash benefits. In addition to the fee waivers, students who qualify for a level 1 grant receive an annual cash allowance of approximately 1,500 euros, which we estimate to cover a third of the average living expenses of eligible students who live away from home.[11] This annual allowance increases by smaller increments at each of the higher levels of grant (the average increment being 600 euros) up to a maximum of 4,200 euros per year for a level 6 grant, which would cover approximately 90 percent of the eligible student's average living expenses. The amounts awarded through the BCS program can therefore be regarded as significantly reducing the cost of college education for low-income students.

Our estimation strategy takes advantage of the multiple discontinuities that are generated by the grant eligibility formula to estimate the impact of qual-

[10] A program of State guaranteed loans was introduced in 2008 but with very limited success, since less than 0.5 percent of students in higher education contracted such loans over the first three years of the program. Publicly provided merit-based grants exist but are awarded each year to less than 1,000 undergraduate and graduate students who already qualify for need-based grants.

[11] See the online appendix (section A) for details on the calculation of the share of living expenses covered by the different levels of BCS grant.

ifying for different levels of grant on applicants' outcomes. We detail below the program's eligibility rules and review the application process, emphasizing the features which limit the applicants' ability to manipulate the assignment variables around the eligibility thresholds.

2.2.1 Eligibility Rules

To qualify for a BCS grant, students are required to apply for a full-time degree program at a French higher education institution, to be under 29 years of age at the time of application and to hold a high school diploma (*Baccalauréat*) or an equivalent degree.[12] This latter requirement reflects the fact that in France, as in most countries, access to post-secondary education is conditional upon graduating from high school. The population of students eligible for a BCS grant is therefore positively selected on educational attainment, as only about half of the population of low-income adolescents graduates from high school.[13]

The level of grant to which applicants are entitled is a deterministic function of their parental income and of a discrete-valued family needs assessment (FNA) score called *points de charge*. Parental income is the taxable income that appears on the tax notice that the applicant's parents received in the year preceding the application and corresponds to the amount of taxable income that they earned two years before.[14] During the period covered by our analysis (2008 to 2010), the FNA score was computed on the basis of two criteria: i) number of siblings, and ii) distance to university. Each sibling counts for four points if he/she registered in higher education at the time of application

[12]Eligibility rules are detailed in the *Circulaire 2009-1018 du 2-7-2009, Bulletin officiel de l'Education Nationale n°30 du 23 juillet 2009*. Although some exceptions can be made to the high school graduation requirement, high school dropouts only represent a negligible fraction of BCS grant recipients, as it is the case for the Pell Grant in the US (the "Ability to Benefit" option that allowed students without a traditional high school diploma to qualify for a Pell Grant was removed in 2012).

[13]These estimates are based on the *Panel d'élèves du second degré, recrutement 1995-2011*, DEPP – Ministère de l'Éducation Nationale. See the online appendix (section B) for further discussion.

[14]When parents are divorced or single, applicants are requested to report the taxable income of the custodial parent's household.

and for two points otherwise. Extra points are awarded to applicants whose parents' home is located more than 30 km away from the chosen university, one point up to 249 km and two points beyond. The points for siblings and distance to university are added together to compute the FNA score, which is capped at 17 points. The median score among applicants is 3 points.

The parental income thresholds that determine eligibility for the different levels of grant depend on the applicant's FNA score, generating multiple discontinuities. Figure 1 provides a graphical representation of the full set of income eligibility thresholds that were used in the 2009 round of applications, whereas Figure 2 shows the amount of cash allowance for which applicants with an FNA score of 3 points would qualify depending on their parental income. These applicants would not be eligible for a grant if their parental income was above 46,145 euros, placing their family in the top quintile of the income distribution of household income in France.[15] To qualify for the highest level of grant (level 6), their parental income would need to be below 10,509 euros, which corresponds approximately to the bottom quintile of the household income distribution.

As most large-scale need-based grant programs around the world, the BCS scheme awards grants on a yearly basis. Grants can be renewed up to seven times but students are required to file a new application every year, their parental income and FNA score being reassessed each time. In addition, grant renewal is subject to minimum academic achievement requirements. Grant recipients lose their right to a grant if they fail to obtain 60 credits (which is the number of credits obtained in a typical university year) two years in a row. In other words, grant renewal is suspended after two consecutive failures in a given year level. Eligible students are also required to comply with the attendance requirements set by their university and to take all of the exams. Failure to meet these requirements may lead to the repayment of the allowance

[15]Source: authors' calculations based on the *Enquête Revenus Fiscaux et Sociaux* 2008. All amounts are expressed in 2011 euros.

received by the student.[16]

2.2.2 Application Process

The grant application process for students who are planning to enroll or to re-enroll in a higher education institution begins in the January preceding the start of the academic year and spans over several months. Individual applications are processed by the regional branches of the national student service agency (CNOUS). The main application steps can be summarized as follows.

(i) *Official online application round (January 15 – April 30).* Students apply jointly for need-based grants and for student housing (optional) on a dedicated website.[17] They can submit up to four pre-registration applications, as they may not yet have made a definitive choice regarding the institution or degree program that they plan to attend at the start of the next academic year.

(ii) *Processing of applications (May 1 – Mid-July).* Individuals applications are processed by the local branch of the student service agency upon reception of all supporting documents. The grant schedule is updated in early July, after which applicants receive a conditional grant notification indicating the level of grant to which they are entitled for each of their pre-registration choices.

(iii) *University registration and payment of allowance (Mid-July onwards).* The academic enrollment process begins in mid-July and lasts until the end of September. Upon proof of registration, grant recipients start receiving the first of their nine monthly payments in October and receive the final grant payment in June of the following year.

Two key features of the BCS program limit the applicants' ability to manipulate the information provided to the student service agency in order to

[16]Unfortunately, the extent to which these regulations are enforced in practice cannot be measured from our data. This is because the exact reason for why certain applicants are denied a conditional grant despite being eligible on the basis of their parental income and FNA score is not specified. These grounds include not only the non-compliance with the minimum academic achievement requirements but also the withdrawal of some applications or the failure to send all the supporting documents to the student service agency.

[17]https://dse.orion.education.fr/depot/.

qualify for higher levels of grants than they would normally be entitled to. First, the exact values of the income thresholds that determine the amount of financial support for a given FNA score are unknown to candidates when they submit their application. To get a rough idea of the amount of grant for which they would qualify, they can rely on an online simulator which is based on the current year thresholds,[18] and not on the actual schedule that will be used to assess their eligibility. Income thresholds are updated in early July and their new values cannot be precisely inferred from the previous ones, since the adjustment usually goes beyond the inflation factor. The ability to predict the new thresholds is further complicated by the fact that the online simulator does not explicitly provide the current threshold values, but computes instead the amount of grant based on the user's stated parental income and FNA score. In light of these practical aspects of the application process, it seems unlikely that applicants would have sufficient knowledge to accurately predict how far away they will be from the new thresholds.

The second key obstacle to manipulating the information that enters the financial aid award formula is that applicants are required to submit all supporting documents for their grant application. The only admissible proof of parental income is a paper copy of the applicant's parents' tax notice, which they received in the year immediately preceding the application. The tax notice is also used to determine the number of dependent children in the applicant's family. The points awarded for siblings enrolled in post-secondary education at the time of application are conditional on the submission of their university enrollment certificates. Finally, the distance between the parents' home address (as shown on the tax notice) and the chosen university is computed by the student service agency's geolocation tool.

Not only is the scope for manipulation of the grant eligibility criteria limited, but it is also very unlikely that the updated income thresholds would influence

[18] Users of this online simulator are informed that changes in the grant schedule can affect the level of grant to which they will ultimately be entitled. They are further advised that they should apply for a grant even if they are uncertain about their eligibility.

the decision of whether or not to apply for a grant, since these thresholds are unknown until applications have been fully processed. Moreover, it should be noted that students have an incentive to submit an application even if their parental income falls above most of the thresholds set by the BCS schedule, because they would remain eligible for some form of financial support. Indeed, all students who qualify for a grant of level 0 or above are at least eligible for fee waivers. It is therefore in their interest to file an application even if they do not qualify for the cash allowance. The only income thresholds that are associated with a clear change in incentives to submit an application are those that determine eligibility for a level 0 grant as opposed to no grant a all. Around these thresholds, the number of applications can be expected to decrease rapidly as a function of parental income. However, as long as students cannot predict the exact location of the new thresholds, this decreasing pattern should be continuous. This issue will be examined in more detail in section 5.1.

3 Data and Descriptive Statistics

Our analysis is based on linked individual-level administrative data that allow us to track the enrollment decisions and academic progress of all prospective college students who filed an application for a BCS grant.

We combine three main administrative data sources, which were provided to us by the Statistical office of the French ministry of Higher Education (MESR-DGESIP) and were matched using an encrypted student identifier: i) AGLAE, which covers the universe of applicants to BCS grants over the period 2008 to 2010; ii) SISE, which includes all students enrolled in public universities in academic years 2008-2009 through 2010-2011; and iii) OCEAN, which provides the high school graduation exam (*Baccalauréat*) scores of all high school seniors between 2003 and 2010.

The AGLAE data contain basic information on the socio-demographic characteristics of BCS grant applicants (gender, age, place of residence, etc.), the

full set of variables that determine grant eligibility (including their parental income and FNA score), the amounts of conditional and final grant awarded as well as the degree program attended by the student (for grant recipients only). The SISE dataset covers approximately two thirds of students enrolled in higher education (i.e., all students attending academic or vocational courses in publics universities), and contain basic information on the socio-demographic characteristics of students, detailed information on the university, name and year level of the degree program attended, and a binary variable indicating whether students successfully completed their degree. For the academic year 2010-2011, we supplement the SISE data with an extract of the *Base Centrale de Scolarité*, which includes the universe of undergraduate students enrolled in selective post-secondary vocational education or in preparatory classes to elite graduate schools. Finally, we use the OCEAN data to retrieve individual-level information about the high school graduation results of all grant applicants, which are converted into percentile ranks for each cohort of high school seniors.

Because our enrollment data (SISE) does not cover selective higher education institutions, we restrict our sample to the 62 percent of BCS grant applicants who listed only non-selective institutions among their pre-registration choices, i.e., students who applied for undergraduate or graduate degree programs in public universities. The purpose of this restriction is to enable us to track the college enrollment decisions of BCS grant applicants while minimizing the risk of missing the enrollment of those who do not appear in the SISE data – an issue which we address in section 5.3. High school applicants who failed to pass the *Baccalauréat* exam are excluded from the sample, since they are non-eligible for the grant. To avoid including applicants who could have been aware of the updated income thresholds when deciding on whether or not to apply, we further restrict the sample to those who submitted their application before July.[19] Finally, we drop the relatively small fraction of applicants (13 percent)

[19] Although some late applications are accepted by the student service agency, they represent less than 14 percent of all applications. Late applicants' decision to apply for a grant could be influenced by the income thresholds that determine their eligibility for the different

whose FNA score varies across their pre-registration choices through the points awarded under the distance to university criterion, to avoid the complexities induced by the fact that these applicants can be eligible for different levels of grant across their different choices.[20]

We perform our analysis on a sample of high school graduates who applied for a BCS grant before deciding on whether to enroll or re-enroll in university. To get some sense of how this sample might differ from the more general population of low-income high school graduates, we used data from a cohort study of junior high school students who were followed throughout their educational careers from 1995 onwards.[21] This cohort study does not provide information on whether the students applied for a BCS grant, but it indicates that the fraction of low-income high school graduates who eventually attended college is similar to the fraction of first-year BCS grant applicants in our estimation sample who enrol in university (75 percent) and that 80 percent of these low-income higher education students received a BCS grant. Although this comparison should be viewed cautiously, since it is based on data sources which are not directly comparable, it suggests that a very large fraction of low-income high school graduates apply for a BCS grant and hence that our population of study can be considered as reasonably representative of the more general population of low-income students who graduated from high school.

Table 1 presents some descriptive statistics for our estimation sample of BCS grant applicants, which we split into three groups: i) The "L0/No grant cutoffs" sample (column 1) includes applicants whose parental income is close to

levels of grant, leading to differential application rates at the eligibility cutoffs. Consistent with this assumption, we find evidence of significant discontinuities in the density of late applicants' parental income around the eligibility thresholds to level 0 and level 1 grants (see online appendix, section F). Because the validity of the RD design is likely to be violated in the presence of such behavioral responses, we decided to exclude late applicants from the estimation sample. Including them in the sample does not, however, affect the results.

[20] In practice, including these applicants and using the eligibility thresholds that apply to their first pre-registration choice yields similar results (see online appendix, section F).

[21] *Panel d'élèves du second degré, recrutement 1995-2011*, DEPP – Ministère de l'Éducation Nationale. See the online appendix (section B) for further discussion of the representativeness of our estimation sample.

the eligibility thresholds between no grant and a level 0 grant (fee waiver only); ii) the "L1/L0 cutoffs" sample (column 2) includes applicants in the vicinity of the income thresholds between level 0 and level 1 grants, where students become eligible for an additional cash allowance of 1,500 euros per annum; iii) the "L6/L5 to L2/L1 cutoffs" sample (column 3) pools applicants who are close to the income thresholds between two consecutive levels of grant in the level 1 to level 6 range, where the amount of annual cash allowance increases by 600 euros on average. The table shows that with an average *Baccalauréat* percentile rank of about 60, BCS grant applicants tend to be of slightly higher academic ability than the average high school senior in their cohort. The high proportion of female applicants (around 60 percent) reflects the fact that in France, female students are both more likely to enter higher education and to attend non-selective colleges than males. Approximately 75 percent of applicants in our samples are prospective first- to third-year undergraduate students while the remaining 25 percent are prospective first- or second-year master's students. By construction, the average parental income of applicants in the L6/L5 to L2/L1 sample (21,669 euros) is lower than that of applicants in the other two samples (31,632 euros for the L0/L1 sample and 42,068 euros for the L0/no grant sample). They also tend to have more siblings, which explains their higher FNA score.

4 Empirical Strategy

We use a regression discontinuity design to estimate the impact of need-based grants on applicants' higher education outcomes. Our approach takes advantage of the existence of sizable discontinuities in the amount of financial aid that applicants can receive depending on their parental income and FNA score.

Our goal is to estimate the causal effect of being eligible for a need-based grant on the outcomes of applicants. A simple OLS regression of the outcome of interest (e.g., being enrolled in college) on an indicator for being eligible for a

need-based grant would yield a biased estimate of the effect of grant eligibility because eligibility is partly determined by parental income, and is therefore endogenous. Even after controlling for family income, OLS estimates could be biased due to the endogenous selection of applicants. Since not all eligible individuals participate in the program, the decision to apply for a grant is likely to be correlated with unobservable characteristics that affect the outcomes of interest.

To identify the treatment effect of being entitled to a grant, we exploit the fact that the BCS grant eligibility formula creates discontinuities in the amount of financial aid awarded to applicants. Since the income thresholds between different levels of grant are exogenously given, and assuming that the information provided to the national student service agency cannot be precisely manipulated by applicants, we can focus on applicants who are in the vicinity of a threshold, and consider that those just below are very similar to those just above. The amount of aid for which these applicants qualify can therefore be considered as locally randomly assigned. Under the additional assumption that, in the absence of treatment, the outcome of interest is a smooth function of parental income, the causal effect of grant eligibility is identified by comparing the average outcome of applicants immediately below the income thresholds (treatment group) with that of applicants immediately above (control group).

Let $T_{i,k}$ denote a dummy variable which takes the value one if applicant i is eligible for a grant of level k ($0 \leqslant k \leqslant 6$). For expositional simplicity and without loss of generality, we define eligibility for a level k grant as eligibility for all level of grants up to k, i.e., $T_{i,k} = 1 \Rightarrow T_{i,k'} = 1 \; \forall \; k' < k$.

Eligibility for a level k grant is a function of the applicant's parental income z_i and FNA score s_i:

$$T_{i,k} = \mathbb{1}\{z_i \leqslant \overline{z}_k(s_i)\} \tag{1}$$

where $\mathbb{1}\{.\}$ is the indicator function and $\overline{z}_k(.)$ is a deterministic function that returns the income eligibility threshold for a level k grant when the applicant's

score is s_i.

The amount of conditional aid A_i awarded to applicant i can be defined as the sum of the allowance increments a_k for which the applicant qualifies over all possible levels of grant:

$$A_i = \sum_{k=0}^{6} a_k T_{i,k} \tag{2}$$

We model the relationship between grant eligibility and the outcomes of interest using the following reduced-form equation:

$$y_i = \alpha + \sum_{k=0}^{6} \beta_k T_{i,k} + \epsilon_i \tag{3}$$

In equation (3), the parameters β_k are the treatment effects of switching the applicant's eligibility status from a level $k-1$ grant to a level k grant:

$$\beta_k = E(y_i|T_{i,k} = 1) - E(y_i|T_{i,k-1} = 1) \tag{4}$$

Under the assumption that the conditional mean function $E(\epsilon|z, s)$ is continuous in parental income z at the income eligibility threshold $\overline{z}_k(s)$, the treatment effect β_k is identified by the difference:

$$\lim_{s \uparrow \overline{z}_k(s)} E(y|z, s) - \lim_{s \downarrow \overline{z}_k(s)} E(y|z, s) \tag{5}$$

A specific feature of the BCS grant eligibility formula is that it generates a large number of discontinuity points, which vary with the FNA score and the level of grant considered. As can be seen in Figure 1, there are in total 126 different income eligibility thresholds (7 grant level thresholds for each of the 18 possible values taken by the FNA score). Due to sample size limitations, separate estimations at each income threshold would be very imprecise. We choose instead to pool the eligibility thresholds to construct three distinct treatment samples. Our estimates are therefore not limited to applicants in the neighborhood of a single cutoff but are applicable to a more general population.

(i) The first sample (referred to as the "L0/No grant cutoffs") pools the 18 income thresholds that determine eligibility for a level 0 grant as opposed to no

grant at all. At these thresholds, we identify the treatment effect β_0 of being eligible for fee waivers on the outcomes of applicants.

(ii) The second sample ("L1/L0 cutoffs") pools the 18 income thresholds between level 1 and level 0 grants. At these thresholds, we identify the treatment effect β_1 of being eligible for an annual cash allowance of 1,500 euros, for applicants who already qualify for the fee waiver.

(iii) Our third treatment sample ("L6/L5 to L2/L1 cutoffs") pools the 90 income thresholds between consecutive levels of grant ranging from level 1 to level 6. At these thresholds, the treatment effect is a weighted average of the treatment effects β_2 to β_6, i.e., the impact of being eligible for an incremental annual allowance of approximately 600 euros, with weights equal to the fraction of applicants around each threshold.

We apply the non-parametric approach based on local linear regression described by Lee and Lemieux (2010). We use a triangular (edge) kernel and the optimal bandwidth proposed by Imbens and Kalyanaraman (2012).[22]

5 Results

In this section, we assess the internal validity of the regression discontinuity design in the context of our study before discussing the reduced-form effects of BCS grant eligibility on college enrollment, persistence and degree completion.

5.1 Validity of the Research Design

A key condition for an RD design to produce unbiased estimates of the treatment under consideration is that there is no systematic manipulation of the

[22] We also checked that a parametric approach based on a split polynomial approximation yields similar results (Lee, 2008). While the parametric approach may be sensitive to outcome values for observations far away from the cutoffs, the non parametric approach avoids this problem. To save space and because both approaches yield very similar results, we report only the non-parametric estimates based on local linear regression. The presentation of the parametric method and the complete set of parametric estimates can be found in the online appendix (section I).

forcing variable around the cutoffs. We argued earlier that the grant application process minimizes the scope for manipulation of parental income and FNA score, since the updated income thresholds are unknown to applicants when they file their application. In this section, we formally test for the absence of manipulation of the forcing variables by showing that the distribution of parental income does not exhibit discontinuities at the eligibility thresholds and that the observable characteristics of applicants are balanced at the cutoffs.

To check for the absence of manipulation of the forcing variables, we start by examining whether the density of parental income is continuous at the eligibility cutoffs using the test developed by McCrary (2008). The graphical evidence displayed in Figure 3 suggests that although the number of applicants tends to decrease with parental income around the L1/L0 and the L0/No grant cutoffs, the density of parental income is continuous. The McCrary test statistics, which are reported in the online appendix (section C), confirm that regardless of the treatment sample considered, there is no evidence of significant discontinuities in the density of parental income at the cutoffs.

An alternative approach for testing the internal validity of the RD design is to check whether the observable characteristics of applicants are "locally" balanced on either side of the cutoffs. If there was non-random sorting, we might expect some of these characteristics to differ systematically between applicants immediately above and immediately below a given income threshold. For this purpose, we use the information available on the characteristics of applicants, which includes their gender, age, *Baccalauréat* percentile rank, parental income, FNA score, number of pre-registration choices, whether they applied for accommodation in a subsidized university residence hall and whether their housing application was successful.[23]

The results of the balancing tests, which are performed separately for each

[23]Note that contrary to grant eligibility, the allocation of university accommodation is not determined by reference to income thresholds. The results of the balancing tests confirm that the probability of being offered student accommodation does not change discontinuously at the income thresholds between the different levels of grant.

treatment sample, are reported in Table 2. They indicate that the observable characteristics of applicants are well balanced on both sides of the cutoffs, since less than 10 percent of the coefficients are significant at the 10 percent level (Panel A). Furthermore, a chi-squared test based on a system of seemingly unrelated regression with as many equations as baseline covariates cannot reject the null hypothesis that the discontinuity gaps are jointly equal to zero (Panel B).[24]

The empirical evidence discussed so far supports the internal validity of the regression discontinuity design to evaluate the impact of BCS grants on applicants' outcomes. The next sections present our main results.

5.2 Discontinuities in Awarded Grants

For our identification strategy to yield causal estimates of the impact of grant eligibility on student outcomes, it is important to establish that the amount of conditional grant awarded to applicants changes discontinuously at the eligibility thresholds. For this purpose, we compare the differential amount of conditional grant awarded by the student service agency to applicants on either side of the cutoffs with the predicted discontinuities that would result from a strict application of the grant eligibility formula.

Figure 4 plots, for the different treatment samples, the fraction of applicants who were awarded a conditional grant (left panels) and the average amount of cash allowance awarded (right panels) against their relative income-distance to the thresholds. The graphs in the left panels show that approximately 90 percent of theoretically eligible applicants were awarded a conditional grant. The remaining 10 percent are either applications that were withdrawn or applications that were disqualified by the student service agency due to non-compliance with the minimum academic requirements or because of missing supporting

[24]We further tested for the potential manipulation of parental income and FNA score in current applications by using the information that returning applicants (i.e., 2009 or 2010 applicants who filed an application in 2008 and 2009, respectively) provided in their previous application (see online appendix, section C).

documents. The graphs in the right panels show that the average amount of cash allowance awarded to applicants exhibits sharp discontinuities at the income thresholds and that these discontinuities are of the expected magnitude, i.e., approximately 1,500 euros at the L1/L0 cutoffs, 600 euros at the L6/L5 to L2/L1 cutoffs and amounts close to zero on both sides of the L0/No grant cutoffs. Importantly, the graphical evidence is not indicative of any systematic breaching of the assessment formula for applicants marginally above the thresholds. The corresponding RD estimates (reported in the online appendix, section D) confirm that the discontinuities in the actual amount of conditional grant awarded to applicants are very close to the predicted ones. We next examine how these differences affect college enrollment, persistence and degree completion rates.

5.3 Impact on College Enrollment

To what extent does the eligibility for a need-based grant affect applicants' decision to enroll or to re-enroll in college? To answer this question, we first consider the full sample of applicants, irrespective of their level of study. This sample thus includes college entrants and continuing students.

Figure 5 plots, for each treatment sample, the college enrollment (or re-enrollment) rates of applicants against their relative income-distance to the eligibility thresholds. The solid lines are the fitted values from a third-order split polynomial approximation. Although the enrollment rates of applicants appear relatively similar across the different samples (between 75 and 80 percent), the three treatments considered have strikingly different effects on applicants' enrollment decisions. Enrollment rates are unaffected by fee waivers (graph 5a) but exhibit a clear jump when students become eligible for an annual cash allowance of 1,500 euros (graph 5b). The impact on enrollment rates of subsequent 600 euros increments in the amount of financial aid (graph 5c) is positive but of smaller magnitude.

The RD estimates reported in Table 3 confirm the graphical evidence. They show that applicants' enrollment decisions are affected by the cash allowance component of the BCS grant but not by the fee waiver component. The baseline estimates (Table 3) indicate that eligibility for fee waivers has no significant impact on college enrollment (column 2), which is not entirely surprising given the small amounts involved. In contrast, being eligible for a cash allowance of 1,500 euros increases applicants' enrollment rate by 2.7 percentage points (column 4), the estimate being significant at the 1 percent level. This corresponds to an increase of 3.4 percent from a baseline enrollment level of around 79 percent. Subsequent 600 euros increments in the amount of cash allowance for higher levels of grants are estimated to have a small positive impact on enrollment rates of approximately 0.7 percentage point, but the effect is only significant at the 10 percent level (column 6).

The fact that we find a highly significant 2.7 percentage point effect on enrollment from the first level of grant (1,500 euros) but only a small and marginally significant 0.7 percentage point effect from subsequent 600 euros increments does not necessarily imply that the marginal impact of grants is decreasing in the amount of cash allowance awarded. Since we have only borderline power to detect an effect as large as 40 percent of the estimated effect of the 1,500 euros allowance, we cannot reject the possibility that the impact of grants on enrollment is in fact linear. Consistent with this interpretation, we show in the paper's online appendix (section E) that within the L6/L5 to L2/L1 set of cutoffs (where increments vary between 226 and 757 euros), larger shifts in the amount of cash allowance tend to cause stronger enrollment responses. Assuming a linear effect, our reduced form estimate would translate into a 2 percentage points increase in enrollment rates per 1,000 euros increase in the amount of cash allowance.[25]

In the online appendix (section F), we perform a number of tests to assess

[25]This effect is estimated by scaling the reduced form estimate (2.7 percentage points) to the actual amount of grant awarded to applicants at the L1/L0 cutoffs (1,342 euros, see Section D of the online appendix).

the robustness of our baseline estimates. Specifically, we investigate the sensitivity of the estimated enrollment effects of grants to the choice of bandwidth and test for jumps at non-discontinuity points by running placebo regressions. Moreover, we explore the sensitivity of our results to the sample selection criteria by including late applicants and applicants whose FNA score varies across their pre-registration choices through the points awarded under the distance to university criterion. Finally, we investigate the possibility that our estimates could not be fully capturing the impact of grant eligibility on enrollment decision because our enrollment data (SISE) does not cover selective institutions (preparatory classes to elite graduate schools, advanced vocational courses, business schools, etc.). Our results are robust to all of these sensitivity tests. We are therefore confident that our baseline estimates capture the full impact of grant eligibility on applicants' enrollment in higher education.

5.4 Heterogeneity of Enrollment Effects

We investigate potential heterogeneity in the college enrollment effects of need-based grants by running separate regressions for different subgroups of applicants, based on the year in which they applied, their gender, their level of studies and their academic ability.[26]

The results from this heterogeneity analysis are reported in Table 4. The enrollment effects of the three treatments of interest appear relatively stable across the different years of data (Panel A), which indicates that our results are

[26]We also partitioned the treatment samples into different groups based on applicants' Family Needs Assessment (FNA) score as well as on the components of this score: number of siblings – which induces variation of household income per capita – and distance to university – which measures an explicit component of the cost of attending. Overall, the results (shown in the online appendix, section G) do not point to strong heterogeneity in the enrollment effects of grants by FNA score or by its components. Our inability to detect significant differences across these partitions is partly driven by sample size limitations, but could also reflect the fact that, by construction, applicants assigned to the different groups based on their FNA score (or on the components of this score) have different levels of average parental income. Hence applicants with higher FNA scores are compared to applicants with lower scores but also lower parental income, which could mitigate potential differences in their responses to grant eligibility.

not driven by a single round of applications. While fee waivers and incremental changes in the amount of allowance are not associated with noticeable discontinuities in the enrollment rates by subgroup, some differences arise when we consider the impact of qualifying for a conditional cash allowance of 1,500 euros. A comparison of the point estimates by gender (Panel B) would suggest that being eligible for such an allowance has a larger enrollment effect for males than for females. The difference, however, is not statistically significant. The subgroup analysis provides clearer evidence that the effects of level 1 grants are larger for applicants entering undergraduate or graduate degree programs (which correspond to the first and fourth levels of study, respectively) than for continuing students. The estimates reported in Panel C of Table 4 are about twice as large for the first and fourth level of study (4.2 to 4.3 percentage points) as they are for the other levels of study (1.7 to 2.1 percentage points), the difference being significant at the 10 percent level. These results suggest that the decision to enter university or to pursue graduate studies is more heavily influenced by the provision of financial aid than the decision to proceed to the second or third year of a given degree program.

To explore whether the enrollment responses to grant eligibility vary by level of academic ability, we divided our samples into four groups based on applicants' percentile rank on the *Baccalauréat* exam (Panel D of Table 4). Our results indicate that being eligible for a 1,500 euros allowance has a positive and significant impact on college enrollment throughout the ability distribution. The point estimates suggest, however, that the effects tend to decrease with ability. Although not statistically different, the estimates are twice as large for students in the bottom quartile of the ability distribution (3.4 percentage points) as they are for students in the top quartile (1.8 percentage point). The fact that the cash allowance component of the BCS program seems to have the largest impact on the weakest students raises the question of its effects beyond enrollment. In the next sections, we address this issue by examining the impact of eligibility for a 1,500 euros grant on persistence and degree completion rates.

For the sake of brevity, the results for fee waivers and for incremental changes in the amount of allowance are not reported, as we find no evidence of significant discontinuities at these cutoffs.[27]

5.5 Impact on Student Persistence

To study the impact of financial aid on persistence, we focus on students who applied for a grant to start an undergraduate or a graduate degree program and follow their progress through college. Our data allow us to track 2008 applicants for up to three years, and 2009 applicants for up to two years.

Figure 6 shows that the college enrollment effect of being eligible for a 1,500 euros allowance is not short-lived, since differences in initial enrollment rates at the L1/L0 cutoffs are carried over to the following year. We investigate more precisely the effect of financial aid on persistence in Table 5, by looking separately at undergraduate and graduate applicants, and by focusing on other dimensions of persistence, such as promotion to the next level and degree completion rates.

The first two columns of the table report the estimated impact of financial aid on persistence for first-year undergraduates. For the sample of 2008 and 2009 applicants, eligibility for a 1,500 euros allowance is found to increase initial enrollment rates by 4.9 percentage points (panel A), the effect being significant and of only slightly smaller magnitude (3.9 percentage points) in the following year (first line of panel B). These effects, which are our preferred estimates of the impact of the cash allowance at college entry, correspond respectively to an increase in the enrollment rate of 6.7 percent from the baseline and an increase in the persistence rate of 6.6 percent. To gain a more complete picture of the progress of first-year applicants through college, we analyze whether they proceed to the next level as opposed to repeating the first year or dropping out of college. Our results suggest that financial aid has a positive and significant

[27] Results are available upon request.

3.7 percentage point impact on the probability of being enrolled as a second-year student after one year (second line of panel B), which corresponds to a 9.8 percent increase from the baseline, but the estimated impact of financial aid on the probability of having obtained all first-year and second-year credits after two years of undergraduate studies is not statistically significant (third line of panel B). The enrollment effect of being eligible for a 1,500 euros cash allowance is still detectable for undergraduate students two years after their application, with a marginally significant 4.4 percentage points (or 8.7 percent) enrollment gap in 2010 for prospective undergraduate students who applied for a grant in 2008 (first line of Panel C). The effects on the probability of being enrolled in the third year level after two years and on the probability of graduating on time are positive (respectively 1.9 and 2.1 percentage points) but not statistically significant (second and third lines of Panel C). Overall, our estimates demonstrate a clear impact of financial aid on student persistence for undergraduate applicants but show not significant effects on on-time degree completion. These results should nevertheless be interpreted with caution, since the lack of statistical significance for the effects after two years could be due to the fact that they are estimated on a relatively small sample. Moreover, our data do not allow us to examine degree completion effects beyond a three-year window.

Table 5 indicates that the effects of financial aid on persistence are strong for graduate applicants (column 4). Students who applied for a grant in 2008 or 2009 to start a graduate degree program are not only more likely to enroll in college if they are eligible for a 1,500 euros cash allowance (first line of Panel A). They are also more likely to successfully complete all first-year credits (second line of panel A), to proceed to the next year level (first and second lines of panel B) and to graduate on time (fourth line on panel B). The estimated effects on enrollment, promotion and graduation are of similar magnitude, between 4 and 5 percentage points. These results correspond to 5 percent increase in the enrollment rate of prospective graduate students, and

to a 13 percent increase in their graduation rate. They show that the cash allowance component of BCS grants is particularly effective at the graduate level, as it increases not only enrollment and persistence, but also degree completion. The overall graduation effect is likely to be a mix of the grant's effects on the "marginal" and "inframarginal" students, whose respective contributions cannot be distinguished within our empirical framework. Some of the students who would not have enrolled if they had not been awarded a conditional cash allowance will have completed their degree after joining a master's program. In addition, the grant could allow students who would have attended college irrespective of financial aid to study in better conditions, thus increasing their chances of success.

In the online appendix (section H), we show that the estimated effects of being eligible for a 1,500 euros cash allowance in year t on student outcomes in t+1 and t+2 should be attributed to the initial differences in applicants' eligibility status rather than to the cumulative effect of persistent differences in the amounts of grant that they received in subsequent years. Indeed, our estimates indicate that year-to-year changes in parental income and eligibility thresholds are large enough to almost completely remove discontinuities in the amount of allowance received in years t+1 and t+2 by applicants who were eligible for different levels of grant in year t.

5.6 Impact on Degree Completion

Figure 7 and Table 6 extend the analysis by examining the impact of financial aid on students who applied for a grant before entering the final year of a degree program, either the third year of a bachelor's degree or the second year of a master's degree. The pooled estimates (column 6) indicate that being eligible for a cash allowance of 1,500 euros not only has a positive and significant 1.9 percentage point impact on the enrollment rates of final-year applicants but also increases their chances of completing their degree by a similar order of

magnitude (3.1 percentage points, which corresponds to a 5.3 percent increase from the baseline). The effect are more precisely estimated for the large sample of undergraduate applicants (column 2) than for the smaller sample of graduate applicants (column 4). The fact that low-income students who progressed to the final year of a degree program are positively selected on achievement appears as a plausible explanation for why the estimated degree completion effects of financial aid tend to be larger for third-year undergraduate or second-year graduate students than for college entrants.

6 Discussion

Our results show a significant impact of being eligible for a 1,500 euros cash allowance on enrollment decisions, not only at college entry, but also at higher levels of study. We further find evidence of a positive effect of financial aid on persistence in college. Prospective first-year undergraduate applicants who qualify for the cash allowance are not only more likely to start college, but also to re-enroll in the following year and to progress to the next year level. After two years, the effects on enrollment and degree completion remain positive but are smaller and no longer statistically significant. At the master's level, the effects of financial aid are found to be more persistent, as graduate applicants who are eligible for a 1,500 euros cash allowance are more likely to pursue graduate studies and to complete their master's degree after two years. These findings are consistent with the selection process which occurs in French universities, where admission is not competitive but where the weakest students tend to drop out early. Our estimates suggest that the academic prospects of first-year undergraduates who start college as a result of being awarded a grant are similar to those of other college entrants, many of whom drop out along the way. But as students progress through college, only the more able remain, and grants appear particularly effective in subsidizing low-income students who have reached these higher levels of study. Consistent with this interpretation,

we also find positive effects on degree completion for prospective final-year undergraduate and graduate students.

6.1 External Validity

Our estimates are based on a sample of low-income high school graduates who applied for a BCS grant to start or to continue college studies. As far as we can determine from cohort study data (see online appendix, section B), our sample of first-year grant applicants is reasonably representative of the more general population of low-income high school graduates in France. This latter group, which represents approximately half of the entire population of low-income adolescents, can be considered as comparable to the target population of most large-scale need-based grant programs around the world, i.e., students who meet the requirements for college admissions by holding a high school diploma or an equivalent degree.[28] Our results, however, cannot be readily generalized to the population of low-income high school dropouts and of nontraditional students,[29] who might respond differently to financial aid.

Although the population of need-based grant applicants in France is likely to resemble that of many countries, our results' external validity depends crucially on the institutional features of higher education systems. In France, as in several continental European countries such as Austria, Belgium, Italy and Spain, higher education institutions are mostly public and charge relatively low fees (OECD, 2012). In these countries, need-based grant programs cover part of low-income students' living expenses and the general level of student debt is very low. The French system cannot, however, be directly compared to the US, where tuition fees are much higher and where students are more

[28] High school graduation rates in France are in the same ballpark as in most European countries, but are lower than in the US (OECD, 2012).

[29] The main difference in eligibility criteria between the French BCS grant and the US Pell Grant is that the later imposes no upper age limit, whereas BCS grants are restricted to students under 29 years of age at the time of application. In the US, non-traditional adult students aged 30 or more represent approximately 25 percent of the population of Pell Grant recipients (U.S. Department of Education, 2012, Table 11-A).

likely to take loans and to work to pay for college. For US students who are not eligible for fee waivers, the enrollment effects of BCS-type grants (such as the Pell Grant) are likely to be smaller than our estimates would suggest, especially for students who are credit constrained or debt averse. By contrast, our results are more readily applicable to the many US students who are entitled to both need-based grants and fee waivers.[30] Consistent with this prediction, our estimates for first-year BCS grant applicants are similar to those found in the US for students who can combine grants with fee waivers, whereas the available evidence on the specific impact of Pell grants is much weaker (Kane, 2006).

6.2 Implications for Students' Decision Making Process

Considering the magnitude of the college premium in France, the fact that a significant proportion of grant applicants decide not to enroll in college as a result of not being eligible for a 1,500 euros grant might seem surprising. Using survey data, we estimate the lifetime-earning premium of two years of undergraduate studies to be around 50,000 euros and the premium of holding a master's degree as opposed to a bachelor's degree to be around 200,000 euros.[31] Given these substantial returns, several barriers might explain why non-eligible students do not borrow the amount of the grant to finance their studies.

Net present value calculations indicate that grant applicants would need to be severely financially constrained to forego college education as a result of not being eligible for a 1,500 euros grant. While the extent to which borrowing constraints affect college decisions is widely debated in the US,[32] the fact that less than 0.5 percent of students participate in the State-guaranteed loan pro-

[30] California has several state-funded programs that waive the enrollment fees for eligible students at community colleges (Board of Governors Fee Waiver) and at four-year colleges (Cal Grants). Other States, such as Georgia (HOPE Scholarship) or Massachusetts (John and Abigail Adams Scholarship), also offer merit-based aid to cover fees. These state-funded fee waivers can be combined with Pell Grants for eligible students.

[31] Details of the analysis of students' decision making process are provided in the online appendix (section K).

[32] See Lochner and Monge-Naranjo (2012) for a review.

gram that was introduced in France in 2008 suggests that liquidity constraints are not the most plausible explanation for our findings.

Individual heterogeneity in the expected returns to higher education is an alternative explanation for why a substantial fraction of applicants decide to give up college because they are not eligible for the grant. Our calculations suggest that to rationalize such choices under standard borrowing and discount rates, the marginal applicant would need to considerably underestimate the returns to college education, by a factor of three at the undergraduate level and by a factor of eight at the graduate level. These estimates, however, are based on average returns which might not accurately reflect the potentially lower returns for the marginal applicant. Moreover, low-income students might underestimate their chances of graduating or be more averse to uncertainty in returns, both of which would reduce their expected benefits from college education.[33] While low expected returns could play a key role in explaining undergraduate students' response to the grant, they seem somewhat less plausible at the graduate level.

Psychological factors are another important dimension to take into consideration when analyzing students' decision to enroll in college. High time preferences, which have been cited as a credible explanation for high school students' dropout behavior (Oreopoulos, 2007), could also explain why some grant applicants decide against going to college. Our calculations indicate that for discount rates above 10 percent at the undergraduate level, and above 20 percent at the graduate level, the present discounted costs of college education would outweigh the discounted benefits for grant applicants who are denied financial aid. Available field and laboratory evidence suggests that such high time preferences are not uncommon among the population of adolescents (Frederick et al., 2002; Golsteyn et al., forthcoming). Moreover, psychological

[33]Empirical evidence on the accuracy of students' expectations of the economic returns to college education is scarce and mixed. Rouse (2004) finds no evidence of a systematic underestimation of college returns by economically disadvantaged students, but Betts (1996) does. More recently, Oreopoulos and Dunn (2013) find evidence that providing information on post-secondary education to low-income students tends to increase their expected returns.

factors such as psychic disutility of debt beyond borrowing cost, could explain why non-eligible grant applicants forgo college education instead of taking a loan to cover their study costs (Field, 2009). Consistent with out results, several studies find large behavioral responses to small-scale interventions (Bettinger et al., 2012; Hoxby and Turner, 2013) or to modest institutional changes (Bulman, 2012; Pallais, forthcoming) that reduce college application costs. In particular, Cohodes and Goodman (forthcoming) show that relatively small merit grants induce students to enroll in lower-quality state colleges – a finding that is hard to explain in a classical human capital model.

Although our data do not allow us to precisely identify the mechanisms at play, the college enrollment decisions of need-based grant applicants in France seem more likely to be driven by a combination of low expected returns, high time preferences and psychic costs than by credit constraints. A further exploration of the behavioral and psychological factors that may influence educational choices would be particularly useful for gaining a better understanding of low-income students' response to grants.

6.3 Cost-Benefit Analysis

Simple back-of-the-envelope calculations can be performed to get some sense of the French BCS program's cost-effectiveness.[34] The estimates reported in Panel A of Table 5 show that the provision of 1,500 euros cash allowances increases college enrollment rates by 4.9 percentage points for undergraduate applicants and by 3.7 percentage points for graduate applicants, from a baseline rate of approximately 73 percent in both cases. The costs of inducing more students to enroll in higher education through the provision of such grants includes the distribution of cash allowances to all eligible students, the financing of two years of college education for students who are induced to enroll as a result of the grant, and the earnings foregone by these students while

[34]See the online appendix (section J) for the details of the cost-benefit calculations.

in college. According to our computations, these costs would amount to approximately 100,000 euros per undergraduate student induced to attend some college (without graduating), and 125,000 euros per graduate student induced to complete a master's degree. These costs are to be compared with the benefits from college studies, which include not only private returns, but also social returns, which we measure conservatively through the higher taxes and social security contributions paid. Given the substantial returns to college education in France, we estimate the net present discounted value of distributing cash allowances of 1,500 euros per student induced to attend college to be positive at all levels, but much larger for graduate applicants (300,000 euros) than for undergraduate applicants (40,000 euros). It would take approximately 15 years to balance the costs and benefits of such grants for graduate applicants, as opposed to 30 years for undergraduates.

7 Conclusion

Using a regression discontinuity design, we provide causal evidence on the effects of a large French need-based grant program on college enrollment, persistence and degree completion for low-income students. We find that the provision of 1,500 euros cash allowances to prospective undergraduate or graduate students increases their college enrollment rates by approximately 5 to 7 percent. Moreover, we show that need-based grants have positive effects on student persistence and degree completion.

While our calculations suggest that the BCS grant program is cost-effective for both college entrants and continuing students, they point to larger net social benefits at the graduate level. Improving the effectiveness of need-based grant programs therefore requires identifying adequate policy responses to the non-financial barriers – such as poor academic preparation and insufficient monitoring – that could affect the ability of low-income college entrants to persist to degree completion.

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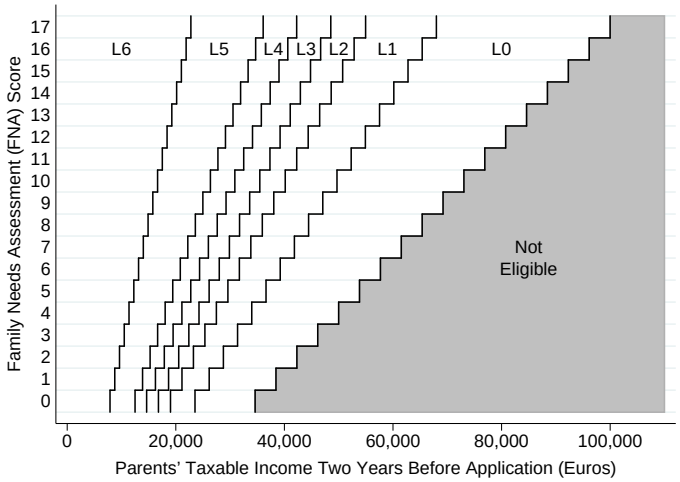
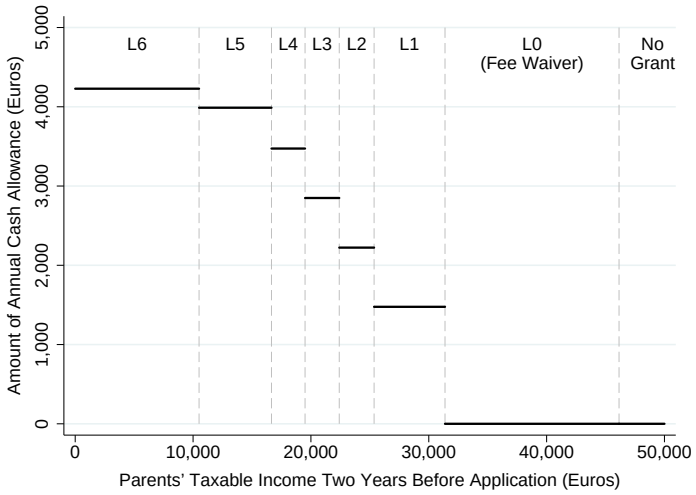
Figure 1 – Income Eligibility Thresholds for the Different Levels of BCS Grant



Notes: The figure shows the income eligibility thresholds for the different levels of grants (denoted L0 to L6) awarded through the French *Bourses sur critères sociaux* program in 2009. The thresholds, which depend on the applicant's family need assessment (FNA) score, apply to parental taxable income earned two years before the application (x-axis). The FNA score (y-axis) is capped at 17 and has a median value of 3. Income thresholds are expressed in 2011 euros.

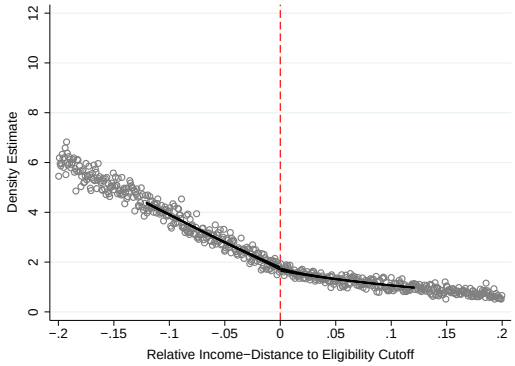
Figure 2 – Amount of Annual Cash Allowance Awarded to Applicants with an FNA Score of 3 Points, as Function of their Parents' Taxable Income



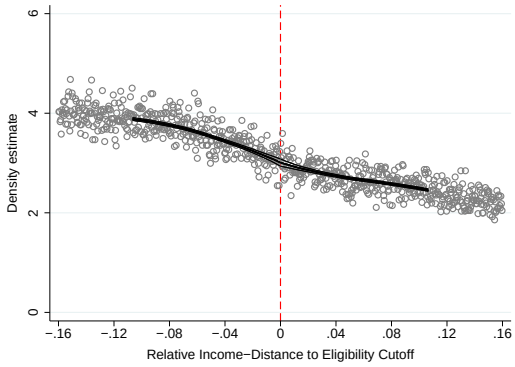
Notes: The figure shows the amount of annual cash allowance awarded in 2009 to BCS grant applicants with a family needs assessment (FNA) score of 3 points (median value), as a function of their parents' taxable income two years before the application. Applicants eligible for a level 0 grant qualify for fee waivers only. Applicants eligible for higher levels of grant qualify for fee waivers and an annual cash allowance, the amount of which varies with the level of grant: 1,476 euros (level 1), 2,223 euros (level 2), 2,849 euros (level 3), 3,473 euros (level 4), 3,988 euros (level 5) and 4,228 euros (level 6). Income thresholds and allowance amounts are expressed in 2011 euros.

Figure 3 – McCrary (2008) Test for Manipulation of the Assignment Variable at Different Income Eligibility Thresholds

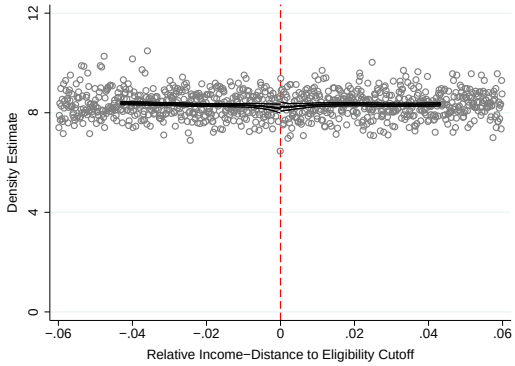
(a) Fee Waiver (L0/No Grant Cutoffs)



(b) €1,500 Allowance (L1/L0 Cutoffs)



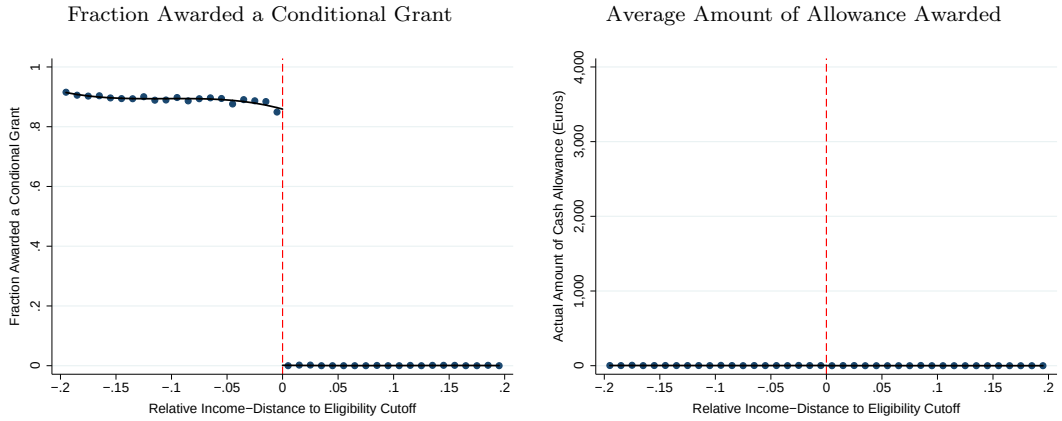
(c) €600 Increment (L6/L5 to L2/L1 Cutoffs)



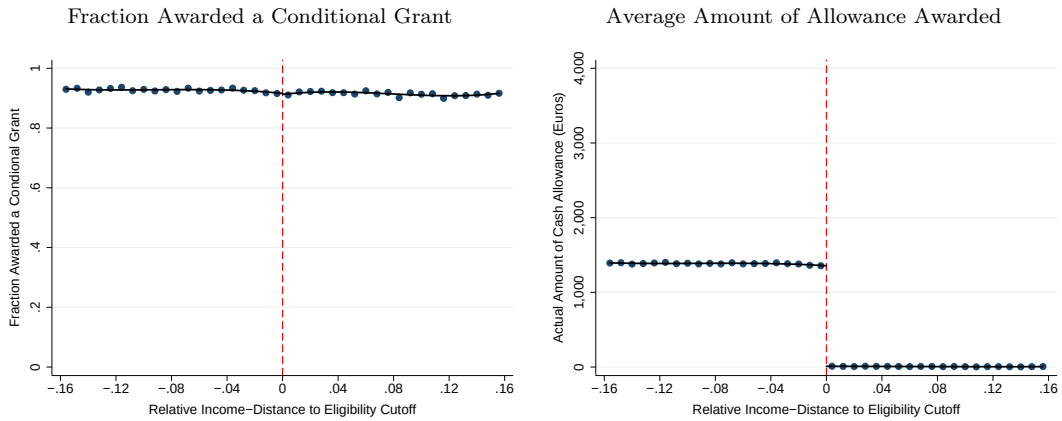
Notes: The figure plots weighted kernel density estimates, performed separately on either side of income eligibility thresholds. The "fee waiver" sample includes applicants whose parental income is close to the eligibility thresholds between no grant and a level 0 grant (fee waiver only). The "1,500 euros allowance" sample includes applicants in the vicinity of the income thresholds between level 0 and level 1 grants, where students (who already qualify for the fee waiver) become eligible for an annual cash allowance of 1,500 euros. The "600 euros increment" sample includes applicants close to the income thresholds between consecutive levels of grant in the level 1 to level 6 range, where the amount of annual cash allowance increases by 600 euros on average. The x-axis is the relative distance between the applicant's parental income and the income eligibility threshold. The optimal bandwidth and bin size are obtained using the selection procedure proposed by McCrary (2008).

Figure 4 – Fraction of Applicants Awarded a Conditional Grant and Average Amount of Allowance Awarded at Different Income Eligibility Thresholds

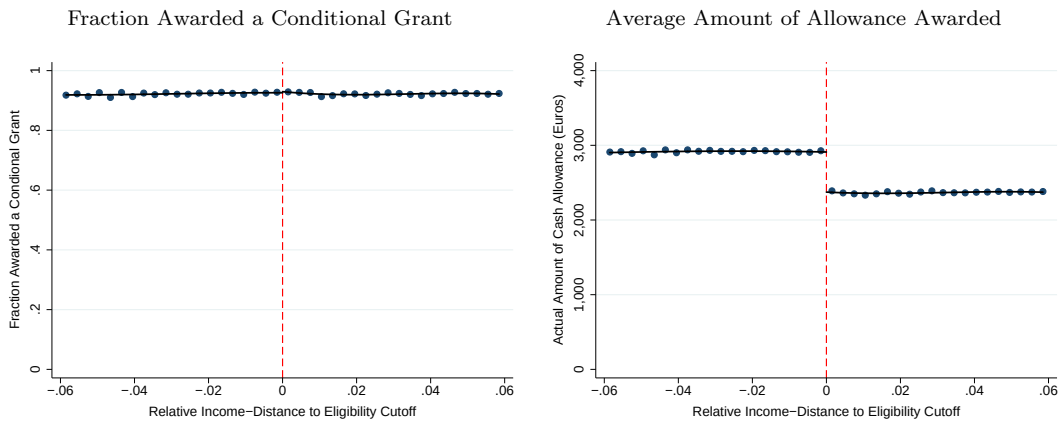
(a) Fee Waiver (L0/No Grant Cutoffs)



(b) €1,500 Allowance (L1/L0 Cutoffs)



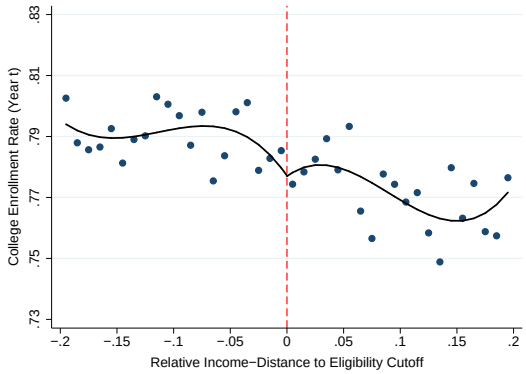
(c) €600 Increment (L6/L5 to L2/L1 Cutoffs)



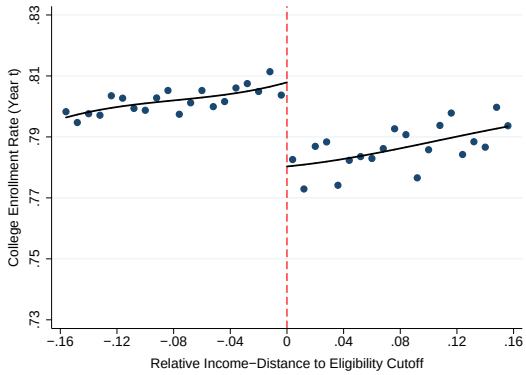
Notes: The circles represent the average fraction of applicants who were awarded a conditional grant (left panels) and the average amount of allowance awarded (right panels) per interval of relative income-distance to the eligibility thresholds. The solid lines are the fitted values from a third-order polynomial approximation which is estimated separately on both sides of the cutoffs. The vertical lines identify the eligibility cutoffs.

Figure 5 – College Enrollment Rate of Grant Applicants at Different Income Eligibility Thresholds

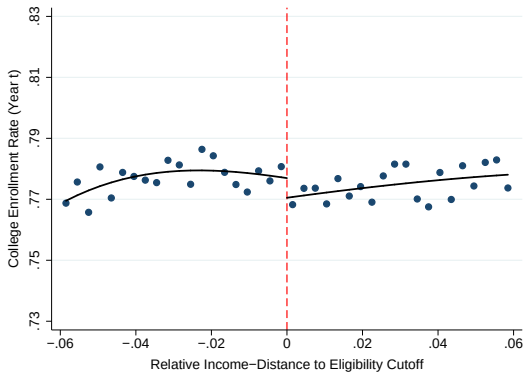
(a) Fee Waiver (L0/No grant Cutoffs)



(b) €1,500 Allowance (L1/L0 Cutoffs)



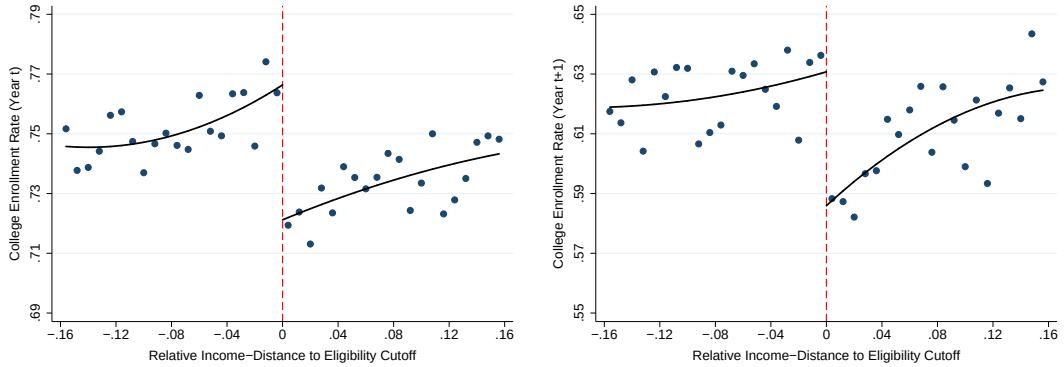
(c) €600 Increment (L6/L5 to L2/L1 Cutoffs)



Notes: The circles represent the mean college enrollment rate of grant applicants per interval of relative income-distance to the eligibility thresholds. The solid lines are the fitted values from a third-order polynomial approximation which is estimated separately on both sides of the cutoffs. The vertical lines identify the eligibility cutoffs.

Figure 6 – College Enrollment and Persistence Rates of First-Year Undergraduate and Graduate Applicants at the 1,500 euros Allowance Eligibility Cutoff

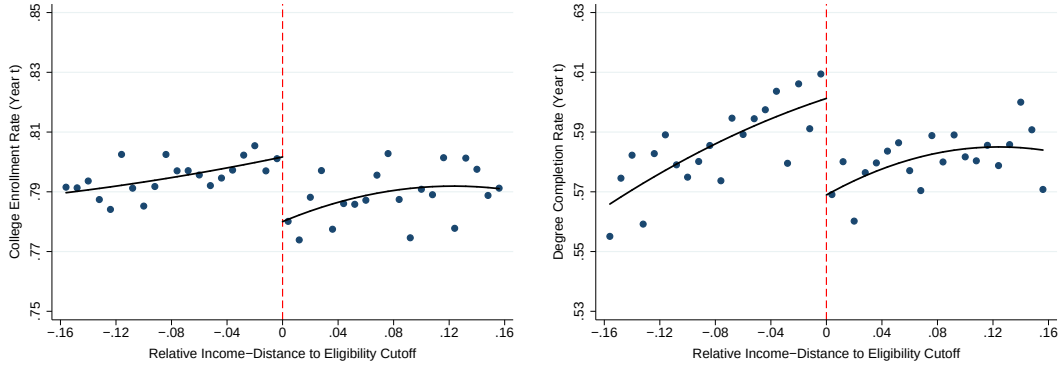
(a) Enrolled in College in Current Year **(b)** Enrolled in College in Following Year



Notes: The circles represent the mean college enrollment rate of first-year undergraduate or graduate applicants in the year of application (left panel) and in the following year (right panel), per interval of relative income-distance to the eligibility thresholds. The sample includes 2008 and 2009 applicants entering the first year of a three-year bachelor's degree or the first year of a two-year master's degree. The solid lines are the fitted values from a second-order polynomial approximation which is estimated separately on both sides of the cutoff. The vertical lines identify the eligibility cutoffs.

Figure 7 – College Enrollment and Degree Completion Rates of Final-Year Undergraduate and Graduate Applicants at the 1,500 euros Allowance Eligibility Cutoff

(a) Enrolled in College in Current Year **(b)** Completed Degree in Current Year



Notes: The circles represent the mean college enrollment (left panel) and the degree completion rate (right panel) of final-year undergraduate or graduate applicants, per interval of relative income-distance to the eligibility thresholds. The sample includes 2008 to 2010 applicants entering the final year of a three-year bachelor's degree or the final year of a two-year master's degree. The solid lines are the fitted values from a second-order polynomial approximation which is estimated separately on both sides of the cutoff. The vertical lines identify the eligibility cutoffs.

Table 1 – Summary Statistics on Applicants to BCS Need-Based Grants at Different Income Eligibility Thresholds (2008-2010)

Treatment Sample: (Income Eligibility Thresholds)	**Fee Waiver** (L0/No Grant) (1)	**€1,500 Allowance** (L1/L0) (2)	**€600 Increment** (L6/L5 to L2/L1) (3)
Applicants:			
Female	.59	.60	.61
Age	20.5	20.6	20.9
	(2.3)	(2.1)	(2.2)
Baccalauréat Percentile Rank	61.2	59.3	56.5
	(23.6)	(23.6)	(23.8)
Number of pre-Registration Choices	1.8	1.7	1.7
	(1.1)	(1.0)	(1.0)
Applications:			
Parents' Taxable Income (Euros)	42,068	31,632	21,669
	(9,066)	(6,815)	(6,469)
Family Needs Assessment Score	2.9	3.4	3.8
	(2.3)	(2.5)	(2.8)
Number of Siblings	.9	1.0	1.2
	(.8)	(.9)	(1.1)
Distance to College (Km)	137	132	132
	(229)	(218)	(230)
Applied for University Housing	.37	.31	.32
Successful Housing Application	.12	.13	.16
Level of Study:			
First Year	.28	.25	.25
Second Year	.26	.28	.27
Third Year	.22	.24	.24
Fourth Year	.14	.14	.14
Fifth Year	.11	.10	.10
Conditional Grant:			
Awarded a Conditional Grant	.70	.92	.92
Amount of Cash Allowance Awarded (Euros)	2	819	2,642
	(64)	(746)	(1,114)
Final grant:			
Receives Grant	.51	.70	.70
Amount of Cash Allowance Received (Euros)	13	658	2,014
	(202)	(759)	(1480)
College Enrollment:			
Enrolled in College	.79	.80	.78
N	96,390	194,513	284,601

Notes: The samples are constructed from the AGLAE administrative dataset, which covers the universe of applicants to need-based grants awarded through the French *Bourses sur critères sociaux* program for the period 2008 to 2010. Only applicants who listed university degree programs on each of their pre-registration choices, who submitted their application before July and whose FNA score does not vary across pre-registration choices are included. The "fee waiver" treatment sample (column 1) includes applicants whose parental income is within ±20 percent of the eligibility thresholds between no grant and a level 0 grant (which consists of a fee waiver). The "1,500 euros allowance" sample (column 2) includes applicants whose parental income is within ±16 percent of the income thresholds between level 0 and level 1 grants, where students (who already qualify for the fee waiver) become eligible for an annual cash allowance of 1,500 euros. The "600 euros increment" sample (column 3) includes applicants whose parental income is within ±6 percent of the income thresholds between consecutive levels of grant in the level 1 to level 6 range, where the amount of annual cash allowance increases by 600 euros on average. The applicants' percentile rank on the *Baccalauréat* high school graduation exam was retrieved from the OCEAN dataset covering the period 2003 to 2010. Information on college enrollment comes from the SISE dataset which includes all students registered in a French public university in academic years 2008-2009 through 2010-2011. All amounts are expressed in 2011 euros. Standard deviations are in parentheses.

Table 2 – Balance of Applicants' Baseline Characteristics in the Year of Application, at Different Income Eligibility Thresholds (2008-2010 Applicants)

Treatment Sample: (Income Eligibility Thresholds)	**Fee Waiver** (L0/No Grant)		**€1,500 Allowance** (L1/L0)		**€600 Increment** (L6/L5 to L2/L1)	
	Baseline Mean (1)	Non-Parametric Estimates (2)	Baseline Mean (3)	Non-Parametric Estimates (4)	Baseline Mean (5)	Non-Parametric Estimates (6)
A. Each Baseline Characteristic Separately						
Male	.401	.005	.406	-.002	.392	.005
		(.011)		(.006)		(.005)
		41,618		141,024		172,909
		[96,390]		[194,513]		[284,601]
Age	20.49	.03	20.62	.04	20.84	.02
		(.04)		(.03)		(.02)
		70,883		108,817		197,075
		[96,390]		[194,513]		[284,601]
Baccalauréat Percentile Rank	61.18	-.04	60.02	.01	56.70	.14
		(.47)		(.24)		(.30)
		61,174		178,151		121,812
		[89,139]		[178,151]		[254,720]
Number of pre-Registration Choices	1.89	-.07***	1.71	.01	1.72	-.00
		(.02)		(.01)		(.01)
		80,517		98,595		178,202
		[96,390]		[194,513]		[284,601]
Parents' Taxable Income (Euros)	48,115	66	34,208	48	22,238	86*
		(217)		(93)		(52)
		33,379		93,392		284,601
		[96,390]		[194,513]		[284,601]
Family Needs Assessment Score	2.58	.02	3.21	.02	3.75	.03
		(.06)		(.04)		(.03)
		31,921		90,340		221,654
		[96,390]		[194,513]		[284,601]
Applied for University Housing	.429	-.016	.319	-.000	.315	-.001
		(.010)		(.006)		(.004)
		63,682		112,060		272,276
		[96,390]		[194,513]		[284,601]
Successful Housing Application	.114	.009	.123	.003	.158	-.001
		(.006)		(.004)		(.003)
		61,252		124,692		260,070
		[96,390]		[194,513]		[284,601]
B. All Baseline Characteristics Jointly						
χ^2-stat		10.95		3.21		6.77
P-value		.204		.920		.561

Notes: The table shows non-parametric regression discontinuity estimates to assess the difference in the value of applicants' baseline characteristics at the income eligibility thresholds between different levels of grant. Panel A evaluates separately whether each baseline characteristic is balanced. Each coefficient comes from a separate regression, where the running variable is the applicant's relative income-distance to the eligibility threshold. The window size for the relative income-distance to cutoff is ±0.20 for the L0/No Grant cutoffs, ±0.16 for the L1/L0 cutoffs and ±0.06 for the L6/L5 to L2/L1 cutoffs. Columns 1, 3 and 5 report the mean value of the dependent variable above the income eligibility thresholds. The non-parametric estimates use the edge kernel, with bandwidth computed following Imbens and Kalyanaraman (2012). Optimal bandwidths are computed separately for each outcome and sample. Robust standard errors are shown in parentheses. The number of observations used in the non-parametric estimations are reported below the standard errors. Full sample sizes are in square brackets. Panel B tests whether the baseline characteristics are jointly balanced by i) estimating a system of seemingly unrelated regressions where each equation represents a different baseline covariate and includes a cubic function of the running variable, which is allowed to differ on either side of the cutoffs and ii) performing a χ^2 test for the discontinuity gaps in all equations being zero. All amounts are expressed in 2011 euros. *: p<0.10; **: p<0.05; ***: p<0.01.

Table 3 – Discontinuities in College Enrollment Rates at Different Income Eligibility Thresholds

Treatment Sample: (Income Eligibility Thresholds)	**Fee Waiver** (L0/No Grant)		**€1,500 Allowance** (L1/L0)		**€600 Increment** (L6/L5 to L2/L1)	
	Baseline Mean (1)	Non-Parametric Estimates (2)	Baseline Mean (3)	Non-Parametric Estimates (4)	Baseline Mean (5)	Non-Parametric Estimates (6)
Baseline Estimates						
Enrolled in College	.773	.003	.786	.027***	.775	.007*
		(.009)		(.004)		(.004)
Sample size						
# of obs. used in estimation		50,388		194,513		203,752
# of obs. in full sample		[96,390]		[194,513]		[284,601]

Notes: The table reports the estimated discontinuities in the college enrollment rates of grant applicants at the different income eligibility thresholds. The window size for the relative income-distance to cutoff is ±0.20 for the L0/No Grant cutoffs, ±0.16 for the L1/L0 cutoffs and ±0.06 for the L6/L5 to L2/L1 cutoffs. Each coefficient comes from a separate regression where the running variable is the applicant's relative income-distance to the eligibility threshold. Columns 1, 3 and 5 report the mean value of the dependent variable above the income eligibility thresholds. The non-parametric estimates use the edge kernel, with bandwidth computed following Imbens and Kalyanaraman (2012). Optimal bandwidths are computed separately for each outcome and treatment sample. Robust standard errors are shown in parentheses. *: p<0.10; **: p<0.05; ***: p<0.01.

Table 4 – Discontinuities in College Enrollment Rates at Different Income Eligibility Thresholds, by Subgroup of Applicants

Treatment Sample: (Income Eligibility Thresholds)	**Fee Waiver** (L0/No Grant)		**€1,500 Allowance** (L1/L0)		**€600 Increment** (L6/L5 to L2/L1)	
	Baseline Mean (1)	Non-Parametric Estimates (2)	Baseline Mean (3)	Non-Parametric Estimates (4)	Baseline Mean (5)	Non-Parametric Estimates (6)
A. By Year of Application						
2008 Applicants	.753	.002	.780	.033***	.769	.009
		(.015)		(.009)		(.006)
2009 Applicants	.782	.002	.788	.025***	.777	.012*
		(.013)		(.008)		(.006)
2010 Applicants	.778	-.001	.789	.025***	.778	.003
		(.013)		(.008)		(.007)
B. By Gender						
Females	.768	.012	.788	.023***	.773	.006
		(.009)		(.006)		(.005)
Males	.780	-.006	.782	.034***	.778	.010
		(.014)		(.007)		(.007)
C. By Level of Study						
First Year	.761	-.001	.755	.043***	.740	.007
		(.016)		(.008)		(.010)
Second Year	.855	.008	.835	.021***	.841	.013*
		(.014)		(.008)		(.007)
Third Year	.742	.005	.795	.021**	.771	.006
		(.018)		(.010)		(.007)
Fourth Year	.711	-.010	.741	.042***	.731	-.001
		(.023)		(.016)		(.012)
Fifth Year	.750	.004	.776	.017	.749	-.003
		(.027)		(.017)		(.012)
D. By *Baccalauréat* Percentile Rank						
First Quartile	.740	-.002	.748	.034***	.746	.005
		(.018)		(.011)		(.009)
Second Quartile	.767	-.012	.791	.040***	.783	.008
		(.020)		(.011)		(.008)
Third Quartile	.803	.004	.813	.030***	.814	.006
		(.014)		(.008)		(.007)
Fourth Quartile	.835	-.000	.847	.018*	.843	.011
		(.015)		(.009)		(.007)

Notes: The table reports the estimated discontinuities in the college enrollment rates of several subgroups of grant applicants, at different income eligibility thresholds. Each coefficient comes from a separate regression where the running variable is the applicant's relative income-distance to the eligibility threshold. The window size for the relative income-distance to cutoff is ±0.20 for the L0/No Grant cutoffs, ±0.16 for the L1/L0 cutoffs and ±0.06 for the L6/L5 to L2/L1 cutoffs. Columns 1, 3 and 5 report the mean value of the dependent variable above the cutoffs. Quartiles of *Baccalauréat* percentile rank are computed separately for each year of application and level of study. The non-parametric estimates use the edge kernel, with bandwidths computed following Imbens and Kalyanaraman (2012). Optimal bandwidths are computed separately for each outcome and sample. Robust standard errors are shown in parentheses. *: p<0.10; **: p<0.05; ***: p<0.01.

Table 5 – Discontinuities in College Enrollment and Student Persistence Rates at the 1,500 euros Allowance Eligibility Cutoff, First-Year Undergraduate and Graduate Applicants

Sample:	**First-Year Undergraduates (U)**		**First-Year Graduates (G)**		**All First-Year Applicants (U + G)**	
	Baseline Mean (1)	Non-Parametric Estimates (2)	Baseline Mean (3)	Non-Parametric Estimates (4)	Baseline Mean (5)	Non-Parametric Estimates (6)
A. Outcome in Year t of Application (2008 and 2009 Applicants)						
Enrolled in College in t	.734	.049***	.733	.037**	.733	.041***
		(.015)		(.017)		(.009)
		16,467		14,071		40,555
		[23,672]		[16,883]		[40,555]
Completed all First Year Credits in t (G)			.468	.047**		
				(.020)		
				12,372		
				[16,883]		
B. Outcome in Year t+1 (2008 and 2009 Applicants)						
Enrolled in College in t+1	.588	.039***	.638	.049**	.609	.049***
		(.014)		(.021)		(.015)
		23,672		10,477		21,739
		[23,672]		[16,883]		[40,555]
Enrolled in Second Year Level in t+1	.376	.037**	.429	.046**	.398	.044***
		(.017)		(.018)		(.014)
		14,982		15,100		23,161
		[23,672]		[16,883]		[40,555]
Completed First and Second Year Credits in t+1 (U)	.239	.022				
		(.015)				
		15,405				
		[23,672]				
Obtained Master's Degree in t+1 (G)			.378	.049**		
				(.022)		
				9,994		
				[16,883]		
C. Outcome in Year t+2 for Undergraduate Students (2008 Applicants)						
Enrolled in College in t+2	.509	.044*				
		(.026)				
		7,437				
		[10,951]				
Enrolled in Third Year Level in t+2	.302	.019				
		(.021)				
		9,065				
		[10,951]				
Obtained Bachelor's Degree in t+2	.255	.021				
		(.017)				
		10,951				
		[10,951]				

Notes: The table reports the estimated discontinuities in the college enrollment and student persistence rates of applicants entering the first year of an undergraduate or graduate degree program, at the income eligibility thresholds between level 0 (fee waiver only) and level 1 (fee waiver plus an annual cash allowance of 1,500 euros) grants. Each coefficient comes from a separate regression where the running variable is the applicant's relative income-distance to the eligibility threshold. The window size for the relative income-distance to cutoff is ±0.16. Columns 1, 3 and 5 report the mean value of the dependent variable above the income eligibility thresholds. The non-parametric estimates use the edge kernel, with bandwidths computed following Imbens and Kalyanaraman (2012). Optimal bandwidths are computed separately for each outcome and sample. Robust standard errors are shown in parentheses. The number of observations used in the non-parametric estimations are reported below the standard errors. Full sample sizes are in square brackets. *: p<0.10; **: p<0.05; ***: p<0.01.

Table 6 – Discontinuities in College Enrollment and Degree Completion Rates at the 1,500 euros Allowance Eligibility Cutoff, Final Year Undergraduate and Graduate Applicants

Sample:	**Final Year Undergraduates (U)**		**Final Year Graduates (G)**		**All Final Year Applicants (U + G)**	
	Baseline Mean	Non-Parametric Estimates	Baseline Mean	Non-Parametric Estimates	Baseline Mean	Non-Parametric Estimates
	(1)	(2)	(3)	(4)	(5)	(6)
A. College Enrollment (2008 to 2010 Applicants)						
Enrolled in College	.795	.021**	.776	.017	.789	.019***
in Graduation Year		(.010)		(.017)		(.007)
		34,261		12,198		66,140
		[45,780]		[20,360]		[66,140]
B. Degree Completion (2008 to 2010 Applicants)						
Obtained Degree	.587	.029***	.566	.035*	.580	.031***
in Graduation Year		(.011)		(.019)		(.009)
		40,789		13,073		64,735
		[45,780]		[20,360]		[66,140]

Notes: The table reports the estimated discontinuities in the college enrollment and degree completion rates of applicants entering the final year of an undergraduate or graduate degree program, at the income eligibility thresholds between level 0 (fee waiver only) and level 1 (fee waiver and annual cash allowance of 1,500 euros) grants. The window size for the relative income-distance to cutoff is ±0.16. Columns 1, 3 and 5 report the mean value of the dependent variable above the income eligibility thresholds. The non-parametric estimates use the edge kernel, with bandwidths computed following Imbens and Kalyanaraman (2012). Optimal bandwidths are computed separately for each outcome and sample. Robust standard errors are shown in parentheses. The number of observations used in the non-parametric estimations are reported below the standard errors. Full sample sizes are in square brackets. *: p<0.10; **: p<0.05; ***: p<0.01.