Online Appendix to:

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

(not intended for publication)

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This online appendix supplements the paper "Improving College Access and Success for Low-Income Students: Evidence from a Large Need-based Grant Program". It provides details on the computation of students' living expenses in France (section A), of low-income students' access to higher education (section B), the validity of the research design (section C), the discontinuities in BCS grants awarded to applicants (section D), the enrollment effects of incremental changes in the amount of cash allowance awarded (section E), the robustness of baseline estimates (section F), the heterogeneity of enrollment effects by components of applicants' Family Needs Assessment score (section G), the persistence of awarded grants over time (section H), the complete set of parametric estimates (section I), the cost-benefit analysis of the BCS program (section J), and the analysis of students' decision making process (section K).

A Estimation of Students' Living Expenses

To evaluate the share of students' living expenses that are covered by the different levels of grants awarded through the BCS program, we use data from a recent survey on students' social and economic conditions (*Enquête Conditions de Vie des Étudiants*). This survey was conducted in 2009-2010 by the *Observatoire de la Vie Étudiante* (OVE) and provides detailed information on the expenditures of a representative sample of approximately 33,000 students enrolled in French higher education institutions. Based on these data, we estimate the average cost of studies over the length of an academic year (nine months) from the expenses incurred by students who live outside of their parents' home, either in a university residence hall or in a private accommodation (the survey indicates that approximately two thirds of students live away from home). Average expenses are computed separately for BCS grant recipients (for each level of grant) and for non-recipients, net of the housing benefits to which most students are entitled if they live away from home. Data on tuition fees, social security contributions and amounts of grants come from administrative records.

We estimate the average living expenses of students who live away from home to be around 6,300 euros over the length of the academic year. The survey data indicate that students who are not supported by the BCS program spend on average 6,800 euros on living expenses, which is to be compared to approximately 5,500 euros (not deducting the grant allowance) for students who are supported by the program (**Table A**). Level 1 grants are estimated to cover approximately a third of the expenses incurred by recipients while level 6 grants cover approximately 90 percent of their expenses.

B Low-Income Students' Access to Higher Education

Our analysis of the BCS grant program is performed on a specific group of students, which consists of high school graduates who applied for a BCS grant before deciding on whether to enroll or re-enroll in university. In order to compare this group to the more general population of low-income adolescents in France, we used data from a cohort study which was carried out between 1995 and 2011 to follow the educational career of a representative sample of approximately 17,000 students who entered junior high school in 1995 (*Panel d'élèves du second degré, recrutement 1995-2011*, DEPP – Ministère de l'Éducation Nationale).

The information provided in this data can be used to construct a proxy for low-income status, which is based on whether a student received State financial aid while in high school. Among students in the sample, approximately 19 percent received this form of financial support. Since the eligibility for secondary school aid is based on stricter income requirements than the BCS higher education grant, it is reasonable to assume that the vast majority of high school aid recipients in the sample would have been eligible for the BCS grant had they decided to pursue higher education. The data further allow us to construct a measure of ability, which is based on students' score on the standardized test which is taken at the start of junior high school (*Évaluations de sixième*).

The summary statistics reported in **Table B** show that secondary school aid recipients are less likely to graduate from high school and go to college than students from higher income families. They are also of lower average academic ability at junior high school entry, with an average percentile rank lower by approximately 0.6 of a standard deviation. Among the cohort of secondary school aid recipients, 52 percent left the educational system with less than the high school diploma (*Baccalauréat*), 12 percent left after graduating from high school, and 36 percent pursued post-secondary education. The corresponding figures for non-recipients are respectively 31 percent, 12 percent and 57 percent. Moreover,

the table suggests that receiving financial aid in high school is a good predictor of eligibility for a BCS grant in higher education, since among secondary school aid recipients who pursued post-secondary studies, 81 percent received a BCS grant.

In the sample, the group which most closely ressembles the population of BCS grant applicants is the subsample of low-income students who graduated from high school. Unfortunately, the survey data do not provide information on whether the students applied for a BCS grant. However, Table B indicates that the fraction of low-income high school graduates who attended college (75 percent) is similar to the fraction of first-year BCS grant applicants in our estimation sample who eventually enrolled in university (see Table 4). Although this comparison should be taken with caution, since it is based on datasets which are not directly comparable, it suggests that a 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. This latter group corresponds to approximately half of the full population of low-income adolescents in France and, as one would expect, is positively selected on ability. When compared to high school aid recipients who dropped out of school without the *Baccalauréat*, those who graduated from high school are of higher average ability (51 vs. 28 percentile rank), i.e., a difference of one standard deviation. Low-income high school graduates are, however, of substantially lower average ability than high school graduates who were not eligible for high school aid (51 vs. 63 percentile rank).

The broad picture that emerges from these observations is that the impact of the BCS grant is estimated with reference to a population of students who belong to the upper half of the educational attainment distribution among low-income students. This reference population can be considered as comparable to the target population of most large-scale means tested grant programs around the world, since these programs impose similar high school graduation requirements

as the French BCS. Our results, however, cannot be generalized the population of low-income high school dropouts, whose responsiveness to financial aid could be very different.

C Validity of the Research Design

C.1 McCrary (2008) Test

To check for the absence of manipulation of the forcing variables – parental income and Family Needs Assessment (FNA) score – we examined whether the density of parental income is continuous at the eligibility cutoffs using the test developed by McCrary (2008). This test, which is performed for each treatment sample separately, consists of running kernel local linear regressions of the log of the density separately on both sides of the thresholds.

The results from the McCrary test are reported in **Table C1**. Regardless of the treatment sample considered, the test statistic fails to reject the null hypothesis that the log difference in height around the discontinuity points is equal to zero. The McCrary tests thus suggest that the probability of submitting an application does not change discontinuously at the income thresholds and that applicants immediately above the cutoffs are unable to manipulate their FNA score or parental income to qualify for higher levels of financial aid.

C.2 Balancing Tests for Returning Applicants

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.

Suppose that some applicants are able to falsify their parents' tax notice to fall below a given income threshold. In this scenario, incomes below current eligibility thresholds would be more likely to be under-reported than incomes

above. We would therefore expect the previously declared income to be higher on average for returning applicants below the current income thresholds than for applicants above.

The results of the balancing tests (**Table C2**) indicate that the observable characteristics of returning applicants in their previous application are well balanced on both sides of the cutoffs, since none of the coefficients are significantly different from zero (Panel A). Furthermore, a chi-squared test based on a system of seemingly unrelated regressions with as many equations as baseline covariates cannot reject the null hypothesis that the discontinuity gaps are jointly equal to zero (Panel B). Most noticeably, the parental income and FNA score that were recorded in the previous application of returning 2009 and 2010 applicants show no significant jumps at the current year thresholds. These findings are consistent with the assumption that there is no manipulative sorting around the income cutoffs.

D Discontinuities in Awarded Grants

Table D reports the estimated discontinuities in the grants awarded to applicants at the different income eligibility thresholds, along three dimensions: i) the fraction of applicants who are awarded a conditional grant; ii) the amount of cash allowance predicted by the grant eligibility formula; and iii) the actual amount of allowance awarded by the student service agency.

The estimates in Panel A show that approximately 90 percent of theoretically eligible applicants were awarded a conditional grant. The remaining 10 percent are either applications that were withdrawn by applicants or applications that were disqualified by the student service agency due to non-compliance with the minimum academic requirements or because of missing supporting documents. Moreover, the fact that hardly any applicant above the L0/No grant cutoffs was granted a fee waiver indicates that the assessment formula was not breached for students marginally above the threshold.

The estimates reported in Panel B indicate that the discontinuities in the actual amount of conditional grant awarded to applicants are very close to the predicted ones, i.e. 1,342 euros vs. 1,494 euros (L1/L0 cutoffs), 543 vs. 606 euros (L6/L5 to L2/L1 cutoffs) and amounts close to zero on both sides of the L0/No grant cutoffs. Most of the observed discrepancy between the actual and predicted differences in the average amount of allowance awarded is driven by the fact that approximately 10 percent of applications were turned down by the student service agency for the reasons mentioned above.

E Enrollment Effects of Allowance Increments

To investigate whether the enrollment effects of relatively small increments in the amount of cash allowance awarded to applicants vary across the different income eligibility cutoffs, we partitioned the L1-L6 group into five distinct subgroups, i.e., L2/L1, L3/L2, L4/L3, L5/L4 and L6/L5. The results from this analysis are displayed in **Table E**. For each income eligibility threshold, the table reports the estimated discontinuities in the amount of cash allowance awarded to applicants (column 2) and the associated discontinuities in college enrollment rates (column 4).

While the estimates are relatively noisy, they provide suggestive evidence in favor of a linear effect of BCS grants on enrollment. Larger increments in the amount of cash allowance tend to cause stronger enrollment effects. Furthermore, the assumption that these effects are proportionally similar to that of the 1,500 euros allowance cannot be rejected at conventional levels of significance. The estimates indicate that being eligible to a level 2 grant as opposed to a level 1 grant (which corresponds to a 757 euros increment in the amount of allowance) increases college enrollment by a significant 1.5 percentage point, which corresponds to approximately half the enrollment effect of a level 1 grant of 1,500 euros. By contrast, the enrollment impact of the smaller 226 euros increment at the L6/L5 threshold is close to zero, which is what would be expected

if the effect of the grant was close to linear.

In light of these results, it seems that the most likely explanation for our finding that the enrollment effect of the 600 euros increment is small and only marginally significant is that we have only borderline power to detect an effect as large as 40 percent of the one we find for the 1,500 euros allowance.

F Robustness Checks

In this section, we perform a number of tests to assess the robustness of our baseline estimates. Specifically, we i) investigate the sensitivity of the estimated enrollment effects of grants to the choice of bandwidth in the non-parametric estimation; ii) test for jumps at non-discontinuity points by running placebo regressions; iii) 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; and iv) 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.

F.1 Sensitivity to the Choice of Bandwidth

We investigate the sensitivity of our non-parametric estimates to the choice of the bandwidth and find that changing the bandwidth size to half or twice the value of the optimal bandwidth yields results that are very similar to those obtained with Imbens and Kalyanaraman (2012)'s bandwidth selection algorithm (see Panel B in **Table F1**).

F.2 Testing for Jumps at Non-Discontinuity Points

To test for jumps at non-discontinuity points (panel C of **Table F1**), we run a series of placebo regressions in which the income thresholds are artificially set at the midpoints between the actual eligibility thresholds. Since these midpoints do not correspond to any change in applicants' grant eligibility status, we should expect to find no significant jumps in enrollment rates. The points estimates are indeed close to zero and non-significant in all specifications.

F.3 Robustness to Sample Selection Criteria

Our estimation sample is restricted to applicants who passed the *Baccalauréat* exam and listed an undergraduate or a graduate college degree program for each of their pre-registration choices. We further excluded late applicants who submitted their application after June 30 (around 14 percent of all applicants) and applicants whose FNA score varies across their pre-registration choices through the points awarded under the distance to university criterion (around 13 percent).

It should be noted that these sample selection criteria do not imply that our sample is restricted to single-college applicants. In fact, 21 percent of applicants in the estimation sample applied to several colleges (as opposed to 30 percent in the full sample), since multiple-college applicants are included as long as the universities they listed are in the same distance interval from their parents' home (i.e., 0-29 km, 30-249 km and 250+ km).

The reason why we excluded the 13 percent of applicants whose FNA score varies across their pre-registration choices through the points awarded under the distance to university criterion is that these applicants' eligibility for a BCS grant varies from one pre-registration choice to another, a feature which cannot be easily handled within the RD framework. In particular, these applicants' relative income-distance to cutoffs cannot be univocally defined as it depends on the pre-registration choice considered. Hence two applicants who are located at the same distance from the income thresholds on their first choice can be assigned

to different income eligibility groups on their other choices, which introduces multiple discontinuities away from the baseline thresholds.

a) In order to try and evaluate how this restriction might affect the external validity of our estimates, we performed a number of additional checks.

First, we compared the observable characteristics of applicants whose FNA score varies across their pre-registration choices with those of applicants included in the estimation sample (**Table F2**). The results suggest that although applicants with a varying FNA score (column 2) tend to submit more pre-registration choices (3.29 vs. 1.75) and are more likely to apply for university housing than applicants in the estimation sample (46 percent vs. 34 percent), they are fairly similar in terms of gender, age, average *Baccalauréat* percentile rank, parental income and college enrollment rates.

Second, we estimated the college enrollment effects of grants for the subsample of applicants whose FNA score varies across their pre-registration choices (using the eligibility thresholds that apply to their first choice). The point estimates, which are displayed in Panel B of **Table F3** are comparable to the baseline estimates (Panel A) but are imprecise due to the small sample size. Moreover, the estimated enrollment effects hardly change when these applicants are added back to the baseline sample (Panel D). These results show that our conclusions are robust to the inclusion of applicants with multiple FNA scores.

b) The justification for excluding late applicants (i.e., those who submitted their application after June 30) is that contrary to on-time applicants, they could be influenced in their decision to apply for a grant by the income thresholds that determine their eligibility for the different levels of grant, since these thresholds are updated early in July. To investigate this issue, we carried out a series of McCrary tests on the subsample of late applicants, who represent approximately 13 percent of the full sample. The results (which are reported in **Table F4**) show evidence of significant discontinuities in the density of late applicants' parental income at the eligibility thresholds between a level 0 grant (fee waiver) and a level 1 grant (1,500 euros allowance) as well as at the eligibility thresholds

between no grant and a level 0 grant. This suggests that some late applicants decided not to apply for a grant based on their knowledge of the updated cutoffs. Because the validity of the RD design is likely to be violated in the presence of such behavioral responses, we considered it necessary to exclude late applicants from the estimation sample.

To investigate how the exclusion of late applicants could affect the external validity of our estimates, we compared their observable characteristics to those of applicants included the estimation sample. The comparison (**Table F2**) indicates that late applicants are more often male (45 percent vs. 39 percent), are of lower ability (52.6 vs. 56.7 *Baccalauréat* percentile rank) have a slightly higher average parental income (24,100 euros vs. 22,857 euros) and are less likely to apply for university housing (15 percent vs. 34 percent) than on-time applicants. The fact that their average college enrollment rate is substantially higher than that of on-time applicants (89 percent vs. 77 percent) tends to suggest that at the time they submit their application, they are more determined to pursue higher education, which could translate into a lower responsiveness to financial incentives. Although they should be considered with extreme caution due to the potential violation of local random assignment, the RD estimates reported in Panel C (**Table F3**) are consistent with the hypothesis that the enrollment decisions of late applicants are less responsive to financial aid than those of on-time applicants, as the point estimates are close to zero and statistically insignificant. Despite this finding, extending the estimation sample to both late applicants and applicants with multiple FNA scores yields estimates for the college enrollment effect of grants which are very similar to the baseline estimates (Panel E).

With the caveat that late applicants could be less responsive to financial incentives, our results do not appear to be driven by the exclusion of late applicants and of applicants who listed universities in different distance intervals.

F.4 Robustness to Enrollment in Selective Higher Education Institutions

Our final robustness check addresses 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.), which account for approximately a third of total enrollment in higher education. As emphasized in the paper, we restricted the estimation sample to grant applicants who listed only non-selective higher education institutions (i.e., public universities) among their pre-registration choices. The purpose of this restriction was to minimize the risk of misclassifying applicants who do not appear in the SISE data as not being enrolled in higher education. This type of misclassification would represent a threat to our estimation strategy if a non-negligible share of applicants in our sample ended up enrolling in selective institutions and changed their behavior at the eligibility thresholds. The availability of supplementary data on the universe of undergraduate students enrolled in selective higher education institutions for the academic year 2010-2011 allows us to address this issue for prospective undergraduate students who applied for a grant in 2010.

The bottom panel of **Table F1** shows that the fraction of undergraduate applicants who applied only to public universities but ended up being enrolled in a selective higher education institutions is very small (less than 1 percent). Moreover, the regression results show no evidence of significant discontinuities in the probability of attending such institutions at the various income eligibility thresholds. We are therefore confident that our baseline estimates capture the full impact of grant eligibility on applicants' enrollment in higher education.

G Heterogeneity of Enrollment Effects

In **Table G**, we 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 and distance to university). Specifically, we partitioned the data into the following groups:

- by FNA score: 0-1 point, 2-3 points, 4 points or more;
- by number of siblings: no sibling, one sibling, two siblings or more;
- by distance between parents' home and college: 0-29 km, 30-249 km, 250 km and beyond.

To some extent, these partitions can allow us to explore whether the impact of grants is sensitive to an objective component of attendance costs (distance to university) and to variation in household income per capita (number of siblings). It should be stressed, however, that there are some difficulties in interpreting the results from this disaggregation exercise.

The main issue is 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 within each treatment group. The average parental income of applicants in the L1/L0 sample is for instance 23,071 euros for those with a zero FNA score vs. 33,136 euros for those with an FNA score of 4 points. This is because the income eligibility thresholds between two consecutive levels of grant are an increasing function of the applicant's score, as the grant schedule follows an implicit equivalence scale that gives a weight of $\frac{1}{9}$ to each additional point on the FNA score.[1] The points grouping is therefore superimposed on a parental income partition which could mitigate our ability to detect variations induced by higher attendance costs or by lower household income per capita.

[1]The income eligibility threshold $z_{k,s}$ for a level k grant when the applicant's FNA score is s can be derived from the zero FNA score threshold $z_{k,0}$ using the following formula: $z_{k,s} = z_{k,0}(1 + \frac{c}{9})$.

Another interpretation problem relates to the (potentially unobservable) confounding factors that are correlated with the components of the FNA score and that could affect the magnitude of applicants' responses to grant eligibility. For instance, due to the higher geographical concentration of graduate degree programs, the average distance to university is typically lower for college entrants (82 km) than for masters' students (149 km). Any heterogeneity in the effects of grants across the components of the FNA score could therefore reflect the influence of factors other than the cost of attendance or the household income per capita.

With these caveats in mind, we estimated the college enrollment effects of the three treatments considered (fee waivers, annual cash allowance of 1,500 euros and average increment of 600 euros) for different partitions of the data along the FNA score, as defined above.

Overall, the results do not point to strong heterogeneity in the enrollment effects of grants by FNA score (Panel B) or by its components, i.e., number of siblings (Panel C) and distance to college (Panel D). If anything, the estimates in column 4 suggest that the enrollment effects of the 1,500 euros cash allowance tend to increase with the number of points, which would be compatible with the assumption that these effects are stronger for students who face higher attendance costs. The estimates are, however, not significantly different from one another. Moreover, the partitions by number of siblings and by distance to university do not exhibit clear monotonic patterns in the enrollment effects.

The point estimates in column 6 indicate that the impact of being eligible for a 600 euros increment in the amount of cash allowance is larger for applicants with an FNA score of 2 points or less than for students with a higher score but again, the effects are not significantly different and the partitions by components of the FNA score do not reveal any clear pattern.

Our inability to detect significant differences across the groups defined on the basis of the FNA score is partly driven by sample size limitations, but could also reflect the fact that due to the equivalization of income that is implicit in the

BCS grant eligibility formula, 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.

H Persistence in Grants Awarded

When we examine the impact of financial aid on student persistence, it is important to determine whether the college enrollment and degree completion effects that we detect in t+1 and t+2 should be attributed only to initial differences in applicants' grant eligibility status in year t, or whether they could also be driven by persistent differences in the amount of grant received in subsequent years. To address this issue, we compared the discontinuities in the amount of grants awarded in t, t+1 and t+2 by first-year undergraduate and graduate applicants.

We compare in **Table H1** the discontinuities in the amounts of grant awarded in t, t+1 and t+2 to first-year undergraduate and graduate applicants, at the L1/L0 income thresholds that were used to determine their grant eligibility for a cash allowance of 1,500 euros in year t. The 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 cash allowance received in subsequent years (t+1 and t+2). While the amount of conditional grant for which applicants were eligible in year t exhibits the expected 1,476 euros jump at the L1/L0 cutoff (Panel A), the estimated discontinuities in the amounts of grant that they received in subsequent years are much smaller, between 70 and 90 euros in year t+1 (Panel B) and, for undergraduate applicants, around 70 euros in year t+2 (Panel C). These small persistent differences are mainly due to the fact that, as evidenced in section 5.5 of the paper, eligibility for a level 1 grant in year t increases the probability of re-enrolling in college in subsequent years, and hence of re-applying for and of potentially being awarded a grant. 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 therefore 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.

I Supplementary Tables: Parametric Estimates

As an alternative to the non-parametric estimates, we also implemented a parametric approach based on a split polynomial approximation (Lee, 2008).

The split polynomial approximation uses all available observations at a given threshold $\overline{z}$ and chooses a flexible polynomial specification to fit the relationship between the outcome of interest y_i and the forcing variable z_i (parental income) on either side of the cutoff. The treatment effect is estimated as the discontinuity at the cutoff. Specifically, we estimate the following model using OLS:

$$y_i = \alpha + \beta.T_i + \sum_{s=1}^{p} \delta_s.(z_i^*)^s + T_i.\sum_{s=1}^{p} \gamma_s.(z_i^*)^s + \epsilon_i \quad (1)$$

where T_i is a treatment dummy equal to one if $z_i \leqslant \overline{z}$, p is the order of the polynomial function and $z_i^* = (z_i - \overline{z})/\overline{z}$ is the relative distance between the applicant's parental income and the eligibility threshold $\overline{z}$. The parameter of interest β measures the jump between the two regression lines at the threshold $\overline{z}$. In the baseline specifications, we use third-order polynomials for the full samples and second-order polynomials when we consider subsamples.[2] Our sensitivity analysis shows that our baseline results are robust to varying the order of the polynomial function.

The complete set of parametric estimates are reported in **Tables I1 to I5**, which are designed as companions to the tables which report the non-parametric estimates. Both methods yield very similar results.

[2]The samples used in the estimations are restricted to be symmetric around each cutoff and we selected the size of the relative income-distance to cutoff window to ensure that observations located on either side of each cutoff do not cross the previous and next income thresholds for a given FNA score. We further restricted the income intervals around the pooled L6/L5 to L2/L1 cutoffs to be non-overlapping, in order to avoid using the same observation on both sides of the cutoffs.

J Cost-Benefit Analysis of the BCS Program

To get a sense of the cost-effectiveness the BCS program, we performed simple back-of-the-envelope calculations, which involve comparing the costs of providing level 1 BCS grants of 1,500 euros with the benefits that recipients derive from higher levels of educational attainment.

The cost of inducing more students to enroll in higher education through the provision of level 1 grants can be roughly approximated as i) the cost of distributing grants to all eligible applicants; ii) the additional cost of providing college education to students who would not have attended university if they had not received financial assistance under the program; and iii) the earnings foregone by these students.

Consider 1,000 prospective undergraduate students and 1,000 prospective graduate students who apply for a grant before starting a degree program and who are immediately below the income threshold that entitles them to the annual cash allowance of 1,500 euros. Our estimates (Panel A of Table 5 in the paper) suggest that among the group of prospective undergraduates, 783 students eventually enroll in college, of which 734 would have done so without the grant and 49 are students who enroll because they are eligible for the grant. Among the group of prospective graduates, 770 students eventually enroll in college, of which 733 would have done so without the grant and 37 are students who enroll because they are eligible for the grant From this initial cohort, 627 undergraduate students and 687 graduate students are still enrolled after one year, which is 39 undergraduates and 49 graduates more than would have been observed without the grant. These figures translate into a nominal cost of the grants of 1.17 million euros for undergraduate applicants and 1.15 million euros for graduate applicants, or 24,000 euros per additional undergraduate and 31,000 euros per additional graduate student induced by the grant to attend college in the first year. Most students who are eligible for a grant in the first year remain eligible in the following year, the average amount of grant received by these students in the second year being 1,200 euros. Taking into account

this extra cost would add a further 15,400 euros per additional student at the undergraduate level and 22,200 euros at the graduate level.

The program costs should also include the provision of two years of college education. The French Ministry of Education indicates that the average annual cost per student enrolled in university was 10,770 euros in 2011 (MEN, 2013, Table 10.5). To compute the present discounted cost of two years of college education at the time applicants decide on whether to enroll in an undergraduate/graduate degree program or to enter the labor force, we used a discount rate of 3 percent, which yields a present discounted cost of 21,200 euros for two years of college education.

Finally, the cost of the program should include the earnings foregone by applicants who are induced to attend college for two years. Based on data from the French Labor Force Survey 2011 (*Enquête Emploi en continu* 2011), we estimated the present discounted value of these foregone earnings (which include gross wages and social security contributions) to be approximately 40,000 euros per undergraduate applicant and 50,000 euros per graduate applicant.

The total present discounted cost of inducing one more student to attend college for two years through the provision of level 1 grants is therefore estimated to be around 100,000 euros at the level of undergraduate studies and around 125,000 euros at the level of graduate studies. 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.

We approximate the benefits from college education by estimating lifetime earnings differentials between individuals with different levels of educational attainment. Our estimates are based on a sample of 31,240 workers in the age range between 18 and 60 years, which we constructed from the French Labor Force Survey 2011 and grouped into one-year age cells. The data indicate that individuals who attended some college without completing a three-year undergraduate degree earn 13 percent more, on average, than high school graduates,

whereas individuals holding a master's degree earn 35 percent more than those who hold a bachelor's degree. Present discounted values of lifetime earnings for different levels of education are computed assuming a 3 percent discount rate and an annual real wage growth rate of 1 percent. Our estimates indicate that over the period spanning from their entry into the labor market to the end of their working career, undergraduate applicants induced to enroll in college would earn approximately 145,000 euros more in present discounted value terms than if they had not pursued undergraduate studies. The corresponding figure for graduate applicants is 425,000 euros.

According to our computations, the net present discounted value of distributing cash allowances of 1,500 euros to prospective students is much larger for graduate applicants (approximately 300,000 euros) than for undergraduate applicants (approximately 40,000 euros). It would take approximately 15 years to balance the costs and benefits of distributing these grants for graduate applicants, as opposed to 30 years for undergraduates.

K College Attendance Decision: Discussion of Alternative Hypotheses

Considering the magnitude of the returns to higher education in France, especially at the master's level, one might wonder why the marginal grant applicants decide not to enroll in college as a result of not being eligible for a 1,500 euros grant, instead of borrowing a similar amount of money to finance their studies.

To address this issue, we consider a simple model of the decision of whether or not to attend university, which is based on the net present value (NPV) of college education. The model implicitly assumes a linear utility function and risk-neutral individuals. The costs of college education consist of fees and foregone earnings during college, while the benefits consist of higher wages. We calculate the NPV of college education for a marginal student who is not eligible for the 1,500 euros grant but gets a fee waiver. We assume that this student could take instead a

loan equivalent to the amount of the grant during two years, to be repaid during the first ten years of her working life. The expected returns to higher education are calculated using the French Labour Force Survey (see details in section J above). We only consider private benefits (i.e., net wages, after the paiement of social security contributions but before income tax, as income tax in France depends on the family structure).

In the baseline scenario, we assume that students have accurate expectations of their probability of success in college, and of their returns. From our results, an undergraduate student might expect to stay in college for two years, before dropping out, whereas a graduate student might expect to get a degree after two years. If the discount rate and the interest rate are equal, the NPV of college education with a 3 percent interest rate would be roughly 54,000 euros for undergraduate students and 198,000 euros for graduate students. These estimates suggest that college education is a profitable investment for reasonable values of the interest and discount rates. These baseline calculations point to three potential explanations for why a significant fraction of grant applicants decide to forego college education as a result of not being eligible for a 1,500 euros grant. First, credit market imperfections could drive up the borrowing rate and increase the cost of a loan. Second, high time preferences could lower the NPV of future earnings. Third, if students lack information, they might underestimate the benefits from college education.

To investigate the credibility of these different explanations, we consider each of them in turn. We first vary the borrowing rate (r), keeping other parameters at their baseline level, then the discount rate (δ), and finally the expected college premium (E). For each parameter, we calculate the value that would drive the NPV of college education to zero, other things being equal. The calculations, which are reported in **Table J**, suggest that credit market imperfections would need to be implausibly large to explain why the marginal applicant does not find it profitable to take a loan to finance her studies. To drive down the net present value of college education to zero, the borrowing rates would need to be equal to

86 percent at the undergraduate level and to 166 percent at the graduate level.

We then turn to behavioral explanations: the discount rate that would bring the NPV of college education to zero is equal to 9.1 percent at the undergraduate level and 18.5 percent at the graduate level.

Finally, we find that the marginal applicant would need to severely underestimate the returns to education in order to forego college studies as a result of not being eligible for the grant. Other things being equal, the expected returns would have to be three times lower (4 percent instead of 14 percent) at the undergraduate level, and eight times lower at the graduate level (4 percent instead of 32 percent) to drive the NPV down to zero.

References

Imbens, G. and Kalyanaraman, K. (2012). "Optimal Bandwidth Choice for the Regression Discontinuity Estimator". *The Review of Economic Studies*, 79(3), pp. 933–959.

Lee, D. S. (2008). "Randomized Experiments from Non-Random Selection in U.S. House Elections". *Journal of Econometrics*, 142(2), pp. 675–697.

McCrary, J. (2008). "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test". *Journal of Econometrics*, 142(2), pp. 698–714.

MEN (2013). *Repères et Références Statistiques sur les Enseignements, la Formation et la Recherche - Édition 2013*. Ministère de l'Éducation Nationale.

Appendix Table A – Average Expenses (in Euros) of College Students Living Away from Home, by Level of Grant (Academic Year 2009-2010)

Level of Grant	Tuition Fees and Social Security	Living Expenses	Amount of Grant	Average Share of Living Expenses Covered by the Grant (Percent)
No grant	391	6,814	0	-
Level 0	0 (Exemption)	5,360	0	0
Level 1	0 (Exemption)	5,434	1,476	34
Level 2	0 (Exemption)	5,376	2,223	52
Level 3	0 (Exemption)	5,615	2,849	62
Level 4	0 (Exemption)	5,567	3,473	77
Level 5	0 (Exemption)	5,491	3,988	88
Level 6	0 (Exemption)	5,513	4,228	94

Notes: Data on college students' expenses are gathered from the *Enquête Conditions de vie des Étudiants* survey which was conducted by the *Observatoire de la Vie Étudiante* (OVE) during the academic year 2009-2010. The sample is restricted to undergraduate and graduate students living away from home, either in university residence halls or in private accommodations (13,164 observations). The amounts are computed by the authors over the length of the academic year (nine months). Data on social security contributions, grant levels and tuition fees come from administrative records. All amounts are expressed in 2011 euros.

Appendix Table B – Educational Attainment by Low-Income Status in Secondary Education

Low-Income Status in Secondary Education:	**All Students**	**Financial Aid Recipients** (19% of students)	**Non Recipients** (81% of students)
A. Full Sample			
Percentile rank on Junior High School Entry Test	51	39	54
(s.d.)	(27)	(25)	(26)
B. By Level of Educational Attainment			
Less than High School Diploma (*Baccalauréat*)			
Fraction of Sample (Column)	0.35	0.52	0.31
Percentile rank on Junior High School Entry Test	32	28	33
(s.d.)	(21)	(21)	(22)
High School Diploma (*Baccalauréat*)			
Fraction of Sample (Column)	0.12	0.12	0.12
Percentile rank on Junior High School Entry Test	50	44	52
(s.d.)	(24)	(23)	(24)
Post-Secondary Education			
Fraction of Sample (Column)	0.53	0.36	0.57
Percentile rank on Junior High School Entry Test	64	54	65
(s.d.)	(22)	(22)	(24)
Higher Education BCS Grant Recipient	0.36	0.81	0.30
Number of observations	15,723	3,053	12,670

Notes: Computations are based on data from the *Panel d'Élèves du Second Degré, Recrutement 1995-2011* (2011, DEPP – Ministère de l'Éducation Nationale). Students' low-income status is proxied by whether they received financial aid while in Junior High School (*Bourses des Collèges*). Students' ability is proxied by their percentile rank on a specific standardized test which is taken at Junior High School entry (*Évaluations de sixième*). Standard errors of test score percentile ranks are in parentheses.

Appendix Table C1 – McCrary (2008) Test for Manipulation of the Assignment Variable at Different Income Eligibility Thresholds

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)
Log Difference in Frequency Bins	-.022	-.000	.009
	(.027)	(.018)	(.016)
Z-stat	.81	.01	.59
Bandwidth	.0788	.0535	.0167
Bin Size	.0006	.0004	.0001
N	96,390	194,513	284,601

Notes: The McCrary test is performed separately for each treatment sample. The "fee waiver" sample (column 1) includes grant applicants whose parental income is close to 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 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 (column 3) 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 McCrary test is performed using all available years (2008 to 2010). The assignment variable is defined as the relative distance between an applicant's parental income and the income threshold that determines eligibility for the level of grant considered (this threshold being a function of the applicant's family needs assessment score). The table rows show the estimated discontinuity in the density function of the assignment variable at the threshold, its standard error (in parentheses), the associated z-statistic, the estimated optimal bandwidth, bin size and the number of observations. The optimal bandwidth and bin size are obtained using the selection procedure proposed by McCrary (2008). Z-test values lower than 1.64 suggest no statistical evidence of a discontinuity in the density of the assignment variable at the income eligibility thresholds.

Appendix Table C2 – Balance of Applicants' Baseline Characteristics in the Year Preceding the Application, at Different Income Eligibility Thresholds (2009 and 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 (2009 and 2010 Applicants)						
Applied for a Grant in Previous Year	.402	.008	.638	-.003	.708	.000
		(.009)		(.007)		(.005)
		73,962		83,512		152,448
		[73,962]		[136,184]		[193,633]
Parents' Taxable Income in Previous Application (Euros)	41,677	350	32,651	98	21,930	-177
		(414)		(151)		(154)
		29,079		62,371		51,403
		[36,601]		[82,172]		[133,196]
Family Needs Assessment Score in Previous Application	3.29	-.03	3.41	.01	3.81	.01
		(.09)		(.05)		(.04)
		15,530		43,836		91,980
		[36,601]		[87,172]		[133,196]
Amount of Grant Received in Previous Year (Euros)	112	5	463	12	1,722	10
		(13)		(17)		(18)
		46,852		58,430		160,971
		[73,962]		[136,184]		[193,633]
Enrolled in College in Previous Year	.652	-.001	.723	-.003	.721	.002
		(.011)		(.006)		(.006)
		39,191		101,659		106,694
		[73,962]		[136,184]		[193,633]
B. All Baseline Characteristics Jointly (For Repeated Applications)						
χ^2-stat		1.10		.54		4.26
P-value		.894		.970		.372

Notes: The table shows non-parametric regression discontinuity estimates to assess the difference in the value of the baseline characteristics of applicants (in the year preceding their application) at the current year income eligibility thresholds. The sample is restricted to 2009 and 2010 applicants since we have no previous year information for 2008 applicants. 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 in the preceding year (for repeated applications only) 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. All amounts are expressed in 2011 euros. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table D – Discontinuities in Conditional Grants Awarded to Applicants 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)
Awarded a Conditional Grant	.001	.861***	.915	.002	.922	-.002
		(.006)		(.003)		(.004)
		30,967		145,971		97,570
		[96,390]		[194,513]		[284,601]
Predicted Amount of Cash Allowance (Euros)	0	0	0	1,494***	2,575	606***
		(0)		(0)		(7)
		96,390		127,855		210,522
		[96,390]		[194,513]		[284,601]
Actual Amount of Cash Allowance (Euros)	0	1	7	1,342***	2,386	543***
		(1)		(6)		(13)
		96,390		54,579		127,904
		[96,390]		[194,513]		[284,601]

Notes: The table reports the estimated discontinuities in the grants awarded to applicants at the different income eligibility thresholds, along three dimensions: i) the fraction of applicants who are awarded a conditional grant, ii) the amount of cash allowance predicted by the grant eligibility formula and iii) the actual amount of allowance awarded by the student service agency. Each coefficient comes from a separate regression where the running variable is the applicant's relative income-distance to the 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. 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. All amounts are expressed in 2011 euros. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table E – Discontinuities in Conditional Grants Awarded to Applicants and in Enrollment Rates at Income Eligibility Thresholds between Level 1 and Level 6 Grants

Outcome:	**Amount of Conditional Cash Allowance (Euros)**		**Enrolled in College**	
	Baseline Mean (1)	Non-Parametric Estimates (2)	Baseline Mean (3)	Non-Parametric Estimates (4)
Income Eligibility Thresholds:				
Level 2 vs. Level 1	1,493	757***	.792	.015***
		(1)		(.006)
		64,426		105,331
		[127,805]		[127,805]
Level 3 vs. Level 2	2,249	633***	.780	.008
		(0)		(.005)
		116,440		116,440
		[116,440]		[116,440)
Level 4 vs. Level 3	2,883	631***	.778	.011*
		(1)		(.011)
		89,092		74,783
		[102,095]		[102,095]
Level 5 vs. Level 4	3,514	519***	.772	.002
		(1)		(.009)
		52,462		46,761
		[87,809]		[87,809]
Level 6 vs. Level 5	4,035	226***	.752	-.003
		(2)		(.011)
		33,542		30,273
		[40,525]		[40,525]

Notes: The table reports the estimated discontinuities in the amounts of conditional cash allowance awarded to applicants (column 2) and in their college enrollment rates (column 4) at the different income eligibility thresholds between level 1 and level 6 grants. Each coefficient comes from a separate regression where the running variable is the applicant's relative income-distance to the eligibility thresholds. The window size for the relative income-distance to cutoff is ±0.10. Columns 1 and 3 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. All amounts are expressed in 2011 euros. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table F1 – Discontinuities in College Enrollment Rates at Different Income Eligibility Thresholds: Robustness Checks

Treatment Sample: (Income Eligibility Thresholds)		**Fee Waiver** (L0/No Grant)		**€1,500 Allowance** (L1/L0)		**€600 Increment** (L6/L5 to L2/L1)	
	Bandwidth Size	Baseline Mean (1)	Non-Parametric Estimates (2)	Baseline Mean (3)	Non-Parametric Estimates (4)	Baseline Mean (5)	Non-Parametric Estimates (6)
A. Baseline Estimates (2008-1010 Applicants)							
Enrolled in College	Optimal	.773	.003	.786	.027***	.775	.007*
			(.009)		(.004)		(.004)
			50,388		194,513		203,752
			[96,390]		[194,513]		[284,601]
B. Sensitivity Analysis (2008-1010 Applicants)							
Enrolled in College	Half	.773	.006	.786	.027***	.775	.008
			(.013)		(.005)		(.006)
			22,387		121,582		101,831
			[96,390]		[194,513]		[284,601]
Enrolled in College	Twice	.773	.004	.786	.027***	.775	.008**
			(.007)		(.004)		(.003)
			84,872		194,513		284,601
			[96,390]		[194,513]		[284,601]
C. Placebo Regressions at Midpoints Between Income Eligibility Thresholds (2008-1010 Applicants)							
Enrolled in College	Optimal	.786	-.003	.796	-.001	.777	-.001
			(.010)		(.007)		(.004)
			34,783		64,291		226,696
			[61,761]		[131,492]		[325,304]
D. Enrolled in other Higher Education Institutions (2010 Undergraduate Applicants)							
Enrolled in Other Higher Education Institutions	Optimal	.010	.001	.007	.002	.006	.001
			(.003)		(.002)		(.002)
			13,401		23,584		44,041
			[29,774]		[53,215]		[74,625]

Notes: Panel A reports the estimated discontinuities in the college enrollment rates of grant applicants at the different income eligibility thresholds. Panel B evaluates the robustness of the baseline estimates to the choice of bandwidth in the non-parametric specification (setting the bandwidth to half and twice the size of the optimal bandwidth). 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. Panel C shows the results of placebo regressions in which the income thresholds are artificially set at the midpoints between the actual eligibility thresholds. Panel D reports the estimated discontinuities in the probability of being enrolled in higher education institutions other than public universities (for 2010 undergraduate applicants only). 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. 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.

Appendix Table F2 – Baseline Characteristics of Different Samples of Applicants

Sample:	On-time Applicants with a Single FNA Score (1)	On-time Applicants with Multiple FNA Scores (2)	Late Applicants (3)
A. Baseline Characteristics in the Year of Application			
Male	.389	.373	.450
	(.488)	(.484)	(.497)
Age	20.97	21.10	20.89
	(2.36)	(2.29)	(2.53)
Baccalauréat Percentile Rank	56.67	58.40	52.56
	(23.95)	(23.63)	(23.82)
Number of Pre-registration Choices	1.75	3.29	1.34
	(1.05)	(.81)	(.78)
Parents' Taxable Income (Euros)	22,857	22,965	24,100
	(15,576)	(14,425)	(16,143)
Family Needs Assessment Score	3.69	3.97	3.44
	(2.95)	(2.96)	(2.94)
Applied for University Housing	.338	.457	.150
	(.473)	(.498)	(.357)
Successful Housing Application	.155	.187	.045
	(.362)	(.390)	(.207)
Enrolled in College	.766	.782	.894
	(.423)	(.413)	(.308)
Number of observations	933,191	139,854	168,906
B. Baseline Characteristics in the Year Preceding the Application (2009 and 2010 Applicants)			
Applied for a Grant in Previous Year	.665	.639	.448
	(.472)	(.480)	(.497)
Parents' Taxable Income in Previous Application (Euros)	21,557	21,358	22,394
	(13,344)	(13,054)	(14,682)
Family Needs Assessment Score in Previous Application	3,86	3.89	3.64
	(2.97)	(3.02)	(3.00)
Amount of Grant Received in Previous Year (Euros)	1,512	1,444	832
	(1,734)	(1,729)	(1,491)
Enrolled in College in Previous Year	.710	.599	.528
	(.454)	(.490)	(.499)
Number of observations	648,804	99,977	101,061

Notes: The table compares the observable characteristics of different samples of grant applicants, in the year of application (Panel A) and in the year preceding the application (Panel B). All samples are restricted to applicants who passed the *Baccalauréat* high school graduation exam and who listed an undergraduate or a graduate college degree program for each of their pre-registration choices. The sample in column 1 (which is the baseline sample used in the analysis) is further restricted to on-time applicants (i.e., who submitted their application before July) with a single Family Needs Assessment (FNA) score across their pre-registration choices. The sample in column 2 is restricted to on-time applicants whose FNA score varies across their pre-registration choices through the points awarded to the distance to university criterion. The sample in column 3 is restricted to late applicants, i.e. those who submitted their application after June 30 and whose FNA score is either constant or varying across their pre-registration choices. The statistics on the FNA score of applicants with multiple FNA scores are computed based on their first choice's score. All amounts are expressed in 2011 euros.

Appendix Table F3 – Sensitivity of College Enrollment Estimates to the Sample Selection Criteria

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. Baseline Estimates: On-Time Applicants with a Single FNA Score across pre-Registration Choices						
Enrolled in College	.773	.003	.786	.027***	.775	.007*
		(.009)		(.004)		(.004)
		50,388		194,513		203,752
		[96,390]		[194,513]		[284,601]
B. On-Time Applicants with Multiple FNA Scores across pre-Registration Choices						
Enrolled in College	.787	-.029	.781	.022	.768	.002
		(.023)		(.015)		(.011)
		7,252		16,331		28,797
		[13,246]		[28,348]		[42,901]
C. Late Applicants (with Single or Multiple FNA Scores across pre-Registration Choices)						
Enrolled in College	.933	.014	.933	.004	.910	.001
		(.010)		(.006)		(.007)
		14,606		34,010		33,023
		[21,428]		[34,010]		[41,585]
D. On-Time Applicants with Single or Multiple FNA Scores across pre-Registration Choices (A+B)						
Enrolled in College	.774	.001	.786	.028***	.774	.007**
		(.007)		(.004)		(.003)
		93,204		222,861		308,141
		[109,636]		[222,861]		[327,502]
E. All Applicants with with Single or Multiple FNA Scores across pre-Registration Choices (A+B+C)						
Enrolled in College	.799	.003	.807	.025***	.789	.006*
		(.007)		(.004)		(.003)
		80,313		209,155		293,166
		[131,064]		[256,871]		[369,087]

Notes: The table reports the estimated discontinuities in the college enrollment rates of grant applicants at the different income eligibility thresholds, for different samples of BCS grant applicants. All samples are restricted to applicants who passed the *Baccalauréat* high school graduation exam and who listed an undergraduate or a graduate college degree program for each of their pre-registration choices. The sample in Panel A (which is the baseline sample used in the analysis) is further restricted to on-time applicants (i.e., who submitted their application before July) with a single Family Needs Assessment (FNA) score across their pre-registration choices. Panel B is restricted to on-time applicants whose FNA score varies across their pre-registration choices through the points awarded to the distance to university criterion. Panel C is restricted to late applicants who submitted their application after June 30 and whose FNA score is either constant or varying across their pre-registration choices. The sample in Panel D combines the two samples in Panels A and B, i.e., includes on-time applicants with single or multiple FNA scores. The sample in Panel E combined the three samples in Panels A, B and C, i.e., includes on-time or late applicants with single or multiple FNA scores. Each coefficient comes from a separate regression where the running variable is the applicant's relative income-distance to the eligibility threshold associated with her first pre-registration choice. 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 treatment 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.

Appendix Table F4 – McCrary (2008) Test for Manipulation of the Assignment Variable at Different Income Eligibility Thresholds: Sample of Late Applicants

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)
Log Difference in Frequency Bins	-.107*	-.074**	-.022
	(.057)	(.035)	(.038)
Z-stat	1.88	2.11	.58
Bandwidth	.0819	.0746	.0193
Bin Size	.0013	.0010	.0003
N	21,428	34,089	41,619

Notes: The McCrary test is performed separately for each treatment sample among the population of late applicants (i.e., students who submitted their application to a BCS grant after June 30). The "fee waiver" sample (column 1) includes late applicants whose parental income is close to the eligibility thresholds between no grant and a level 0 grant (fee waiver). The "1,500 euros allowance" sample (column 2) includes late 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 (column 3) includes late 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 McCrary test is performed using all available years (2008 to 2010). The assignment variable is defined as the relative distance between an applicant's parental income and the income threshold that determines eligibility for the level of grant considered (this threshold being a function of the applicant's family needs assessment score). The table rows show the estimated discontinuity in the density function of the assignment variable at the threshold, its standard error (in parenthesis), the associated z-statistic, the estimated optimal bandwidth, bin size and the number of observations. The optimal bandwidth and bin size are obtained using the selection procedure proposed by McCrary (2008). Z-test values lower than 1.64 suggest no statistical evidence of a discontinuity in the density of the assignment variable at the income eligibility thresholds. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table G – 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. Baseline Estimates						
Full Sample	.773	.003 (.009)	.786	.027*** (.004)	.775	.007* (.004)
B. By Family Needs Assessment Score						
0-2 points	.757	-.004 (.011)	.769	.023*** (.008)	.758	.016*** (.006)
3-4 points	.792	.012 (.014)	.794	.026*** (.009)	.782	.002 (.009)
5 points or more	.792	.003 (.018)	.804	.033*** (.008)	.787	.001 (.007)
C. By Number of Siblings						
No Sibling	.757	.000 (.014)	.772	.022*** (.007)	.765	.017* (.009)
One Sibling	.786	.006 (.012)	.795	.036*** (.008)	.781	.013* (.007)
Two Siblings or more	.781	.000 (.020)	.789	.022* [.012]	.776	-.012 (.010)
D. By Distance to College						
0-29 km	.729	.006 (.015)	.740	.036*** (.008)	.733	-.002 (.010)
30-249 km	.816	.008 (.011)	.817	.020*** (.006)	.810	.014** (.007)
250 km and beyond	.778	-.031 (.027)	.792	.035** (.014)	.780	.004 (.017)

Notes: The table reports the estimated discontinuities in the college enrollment rates of several subgroups of grant applicants defined on the basis of the Family Needs Assessment (FNA) score and of its components (number of siblings and distance to university), 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.

Appendix Table H1 – Persistence in Grants Awarded in t, t+1 and t+2 at the 1,500 euros Allowance Eligibility Cutoff (in t), 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)						
Cash Allowance Entitlement in t (euros)	0	1,476***	0	1,476***	0	1,476***
		(0)		(0)		(0)
		13,993		9,515		19,748
		[23,672]		[16,883]		[40,555]
B. Outcome in Year t+1 (2008 and 2009 Applicants)						
Cash Allowance Received in t+1 (euros)	227	89***	260	70*	241	70**
		(30)		(41)		(28)
		14,010		7,788		16,952
		[23,672]		[16,883]		[40,555]
C. Outcome in Year t+2 for Undergraduate Students (2008 Applicants)						
Cash Allowance Received in t+2 (euros)	243	69*				
		(41)				
		7,732				
		[10,951]				

Notes: Panel A reports the estimated discontinuities in the amounts of conditional cash allowance for which applicants entering the first year of an undergraduate or graduate degree program are eligible, at the income eligibility thresholds between level 0 (fee waiver only) and level 1 (fee waivers plus an annual cash allowance of 1,500 euros) grants. Panels B and C report the estimated discontinuities in the amounts of cash allowance received by these applicants in years t+1 and t+2, at the income thresholds that were used to determine their grant eligibility in year t. 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 average amount of cash allowance 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. All amounts are expressed in 2011 euros. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table I1 – Balance of Applicants' Baseline Characteristics in the Year of Application, at Different Income Eligibility Thresholds (2008-2010 Applicants): Parametric Estimates [Companion of Table 2]

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)	Parametric Estimates (2)	Baseline Mean (3)	Parametric Estimates (4)	Baseline Mean (5)	Parametric Estimates (6)
A. Each Baseline Characteristic Separately						
Male	.401	-.006	.406	.000	.392	.009
		(.015)		(.009)		(.007)
		96,390		194,513		284,601
Age	20.49	.05	20.62	.06*	20.84	.04
		(.07)		(.04)		(.03)
		96,390		194,513		284,601
Baccalauréat Percentile Rank	61.18	-.23	60.02	.07	56.70	.48
		(.74)		(.45)		(.38)
		89,139		178,151		254,720
Number of pre-Registration Choices	1.89	-.08**	1.71	.01	1.72	.01
		(.03)		(.02)		(.02)
		96,390		194,513		284,601
Parents' Taxable Income (Euros)	48,115	-96	34,208	9	22,238	10
		(261)		(118)		(96)
		96,390		194,513		284,601
Family Needs Assessment Score	2.58	-.03	3.21	.00	3.75	.01
		(.07)		(.05)		(.04)
		96,390		194,513		284,601
Applied for University Housing	.429	-.017	.319	.002	.315	-.007
		(.015)		(.009)		(.007)
		96,390		194,513		284,601
Successful Housing Application	.114	.007	.123	.002	.158	-.003
		(.010)		(.006)		(.006)
		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 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 parametric specifications include a cubic function of the running variable, which is allowed to differ on either side of the cutoffs. Robust standard errors are shown in parentheses. Sample sizes for each outcome are reported below the standard errors. 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.

Appendix Table I2 – Discontinuities in College Enrollment Rates at Different Income Eligibility Thresholds: Parametric Estimates [Companion of Appendix Table F1]

Treatment Sample: (Income Eligibility Thresholds)		**Fee Waiver** (L0/No Grant)		**€1,500 Allowance** (L1/L0)		**€600 Increment** (L6/L5 to L2/L1)	
	Order of Polynomial	Baseline Mean (1)	Parametric Estimates (2)	Baseline Mean (3)	Parametric Estimates (4)	Baseline Mean (5)	Parametric Estimates (6)
A. Baseline Estimates (2008-1010 Applicants)							
Enrolled in College	3	.773	.000	.786	.028***	.775	.006
			(.013)		(.007)		(.006)
			96,390		194,513		284,601
B. Sensitivity Analysis (2008-1010 Applicants)							
Enrolled in College	2	.773	.002	.786	.027***	.775	.006
			(.009)		(.006)		(.005)
			96,390		194,513		284,601
Enrolled in College	4	.773	.017	.786	.025***	.775	.010
			(.016)		(.009)		(.008)
			96,390		194,513		284,601
C. Placebo Regressions at Midpoints Between Income Eligibility Thresholds (2008-1010 Applicants)							
Enrolled in College	3	.786	-.005	.796	-.001	.777	-.001
			(.013)		(.009)		(.006)
			61,761		131,492		325,304
D. Enrolled in other Higher Education Institutions (2010 Undergraduate Applicants)							
Enrolled in Other Higher Education Institutions	3	.010	-.001	.007	.001	.006	.002
			(.005)		(.003)		(.002)
			29,774		53,215		74,625

Notes: Panel A reports the estimated discontinuities in the college enrollment rates of grant applicants at the different income eligibility thresholds. Panel B evaluates the robustness of the baseline estimates to varying the order of the polynomial approximation in the parametric specification (using second and fourth-order polynomials). 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. Panel C shows the results of placebo regressions in which the income thresholds are artificially set at the midpoints between the actual eligibility thresholds. Panel D reports the estimated discontinuities in the probability of being enrolled in higher education institutions other than public universities (for 2010 undergraduate applicants only). 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 parametric specifications include a polynomial function of the running variable, which is allowed to differ on either side of the cutoffs. Robust standard errors are shown in parentheses. Sample sizes are reported below the standard errors. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table I3 – Discontinuities in College Enrollment Rates at Different Income Eligibility Thresholds, by Subgroup of Applicants: Parametric Estimates [Companion of Table 4]

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)	Parametric Estimates (2)	Baseline Mean (3)	Parametric Estimates (4)	Baseline Mean (5)	Parametric Estimates (6)
A. By Year of Application						
2008 Applicants	.753	.016	.780	.030***	.769	.008
		(.020)		(.010)		(.008)
2009 Applicants	.782	-.003	.788	.027***	.777	.010
		(.016)		(.010)		(.008)
2010 Applicants	.778	-.001	.789	.024**	.778	.001
		(.015)		(.009)		(.008)
B. By Gender						
Females	.768	.009	.788	.021***	.773	.002
		(.012)		(.007)		(.006)
Males	.780	-.008	.782	.036***	.778	.011
		(.015)		(.009)		(.007)
C. By Level of Study						
First Year	.761	-.002	.755	.041***	.740	.008
		(.018)		(.012)		(.010)
Second Year	.855	.015	.835	.017*	.841	.011
		(.016)		(.010)		(.008)
Third Year	.742	-.004	.795	.023**	.771	.005
		(.021)		(.011)		(.010)
Fourth Year	.711	.001	.741	.041**	.731	-.002
		(.028)		(.016)		(.014)
Fifth Year	.750	-.004	.776	.019	.749	-.007
		(.030)		(.018)		(.015)
D. By *Baccalauréat* Percentile Rank						
First Quartile	.740	.004	.748	.036***	.746	.007
		(.023)		(.013)		(.010)
Second Quartile	.767	-.026	.791	.036***	.783	.004
		(.020)		(.012)		(.010)
Third Quartile	.803	.010	.813	.028***	.814	.008
		(.018)		(.011)		(.009)
Fourth Quartile	.835	.006	.847	.017*	.843	.010
		(.016)		(.010)		(.009)

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 parametric specifications include a third-order polynomial (full sample) or a quadratic function (subgroups) of the running variable, which is allowed to differ on either side of the cutoffs. Robust standard errors are shown in parentheses. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table I4 – Discontinuities in College Enrollment and Student Persistence Rates at the 1,500 euros Allowance Eligibility Cutoff, First-Year Undergraduate and Graduate Applicants: Parametric Estimates [Companion of Table 5]

Sample:	**First-Year Undergraduates (U)**		**First-Year Graduates (G)**		**All First-Year Applicants (U + G)**	
	Baseline Mean (1)	Parametric Estimates (2)	Baseline Mean (3)	Parametric Estimates (4)	Baseline Mean (5)	Parametric Estimates (6)
A. Outcome in Year t of Application (2008 and 2009 Applicants)						
Enrolled in College in t	.734	.047***	.733	.043**	.733	.045***
		(.017)		(.021)		(.013)
		23,672		16,883		40,555
Completed all First Year Credits in t (G)			.468	.050**		
				(.023)		
				16,883		
B. Outcome in Year t+1 (2008 and 2009 Applicants)						
Enrolled in College in t+1	.588	.045**	.638	.045**	.609	.045***
		(.020)		(.023)		(.015)
		23,672		16,883		40,555
Enrolled in Second Year Level in t+1	.376	.032*	.429	.045*	.398	.037**
		(.019)		(.023)		(.015)
		23,672		16,883		40,555
Completed First and Second Year Credits in t+1 (U)	.239	.016				
		(.017)				
		23,672				
Obtained Master's Degree in t+1 (G)			.378	.046**		
				(.023)		
				16,883		
C. Outcome in Year t+2 for Undergraduate Students (2008 Applicants)						
Enrolled in College in t+2	.509	.039				
		(.029)				
		10,951				
Enrolled in Third Year Level in t+2	.302	.020				
		(.026)				
		10,951				
Obtained Bachelor's Degree in t+2	.255	.018				
		(.025)				
		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 parametric specifications include a quadratic function of the running variable, which is allowed to differ on either side of the cutoffs. Robust standard errors are shown in parentheses. Sample sizes are reported below the standard errors. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table I5 – Discontinuities in College Enrollment and Degree Completion Rates at the 1,500 euros Allowance Eligibility Cutoff, Final Year Undergraduate or Graduate Applicants: Parametric Estimates [Companion of Table 6]

Sample:	**Final Year Undergraduates (U)**		**Final Year Graduates (G)**		**All Final Year Applicants (U + G)**	
	Baseline Mean (1)	Parametric Estimates (2)	Baseline Mean (3)	Parametric Estimates (4)	Baseline Mean (5)	Parametric Estimates (6)
A. College Enrollment (2008 to 2010 Applicants)						
Enrolled in College in Graduation Year	.795	.023**	.776	.019	.789	.022**
		(.011)		(.018)		(.010)
		45,780		20,360		66,140
B. Degree Completion (2008 to 2010 Applicants)						
Obtained Degree in Graduation Year	.587	.031**	.566	.035*	.580	.032***
		(.014)		(.021)		(.012)
		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 parametric specifications include a quadratic function of the running variable, which is allowed to differ on either side of the cutoffs. Robust standard errors are shown in parentheses. Sample sizes are reported below the standard errors. *: p<0.10; **: p<0.05; ***: p<0.01.

Appendix Table J – Net Present Value of College Education under Alternative Scenarios

Parameters:	**Interest Rate** (r)	**Discount Rate** (δ)	**Expected College Premium** (E)	**Net Present Value** (euros)
A. Undergraduate Level				
Baseline	3%	3%	14%	54,000
High Borrowing Rate	**86%**	3%	14%	0
High Discount Rate	3%	**9.1%**	14%	0
Low Expected Returns	3%	3%	**4%**	0
B. Graduate Level				
Baseline	3%	3%	32%	198,000
High Borrowing Rate	**166%**	3%	32%	0
High Discount Rate	3%	**18.5%**	32%	0
Low Expected Returns	3%	3%	**4%**	0

Notes: In the baseline scenario, the net present value of college education is computed under the assumption that the expected returns correspond to the observed average returns, with the annual interest rate and discount rate both equal to 3 percent and the growth rate of real wages equal to 1 percent. The returns to college education are computed using the French Labor Force Survey 2011. At the undergraduate level, the return to some college vs. high school diploma is 14 percent. At the graduate level, the return to a master's degree vs. a bachelor's degree is 32 percent.