

# Does Financial Aid Improve the Educational Outcomes of High-Achieving Low-Income Students? Evidence from the French *aide au mérite*\*

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**Preliminary draft. Comments welcome.**

## Abstract

How effective is financial aid targeted at high-achieving low-income students in increasing enrollment and graduation from higher education? Theoretically, financial aid reduces the cost of higher education and should increase enrollment and graduation by reducing students' need to work while studying. However high-achieving students, even from disadvantaged backgrounds, might enrol and successfully complete their degree regardless of whether they obtain financial support, i.e. they may not be inframarginal students. This paper exploits a financial aid scheme introduced in France in 2008, the *aide au mérite*, which granted an additional 1,800 euros annually to high-achieving low-income students who attended a higher education institution. Using a regression discontinuity design and rich administrative data on students who obtained the end of high school exam in 2009-2014, I find that this policy had no impact on enrollment in the year in which the student left high school, and a small positive effect on persistence in 3<sup>rd</sup> year (last year of an undergraduate degree). I do not uncover clear patterns in terms of heterogeneity by gender or parental income. Additional analyses are being undertaken to assess the effect of the policy on other important outcomes (e.g. geographic mobility, high school students' motivation) and on understanding the underlying mechanisms.

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# 1 Introduction

Attending (and graduating from) university provides an array of significant pecuniary and non-pecuniary benefits. Yet the gap in attendance and graduation between students of different socio-economic backgrounds remains large, which in turn has important economic and individual consequences. In order to remediate these gaps between children of affluent and low-income backgrounds, many countries have put in place grant systems that provide financial support to students. Such systems give rise to a normative question: given a fixed budget constraint, what is the optimal allocation of this aid? Which students should be eligible? And how much should they receive? Since it is very difficult to ex-ante predict a student's response to financial aid, it is very common to use students' financial background and academic record as eligibility criteria. How effective are such need-based merit grants in modifying enrollment and graduation behaviors?

This paper analyses the effect of a financial aid scheme targeted at high-achieving low-income students on enrollment, persistence and graduation in higher education. This new financial aid, the *aide au mérite*, was introduced in 2008 in France and granted an additional 1,800 euros annually, over the course of their undergraduate studies, to high-achieving low-income students who attended a higher education institution. The only criteria to be eligible to the *aide au mérite* were that the student (i) had to be eligible to a need-based grant and (ii) scored at least 16 out of 20 (i.e. in the top 5%) at the *Baccalauréat* (henceforth Bac), the French end of high school exam.

Though the amount appears small in absolute terms, it is important to keep in mind that (i) tuition fees in France are very low (around 170€ for a bachelors degree in a public university, plus around 200€ for student social security) so that financial aid aims to help cover living expenses not tuition fees, (ii) the *aide au mérite* was very generous when compared to the need-based grants these students received (125% and 43% of respectively the minimum and maximum need-based grant amounts for the 2009-10 academic year, see Table 1), and (iii) it represented about a third of the average student budget, estimated to be 700€ per month by [Fack and Grenet \(2015, p.5\)](#), a sizable share. These elements underscore that the amount of the *aide au mérite* could reasonably lead to important behavioral responses.

Using administrative data on the universe of students obtaining the Bac in 2009-2014<sup>1</sup> and exploiting the sharp discontinuity in eligibility at the 16/20 Bac grade threshold in a regression discontinuity design, I estimate the causal effect of eligibility to the *aide au mérite* on enrollment in higher education, on persistence into 2<sup>nd</sup> and 3<sup>rd</sup> year, and on graduation. The identification strategy relies on the running variable (Bac

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<sup>1</sup>The 2008 Bac cohort is not analysed due to incompleteness in the higher education data for the 2008-09 academic year.

grade) not being manipulated. Since the Bac grade is an average of a large number of individual exams, the potential for grade manipulation by students is highly implausible. However, review juries can discretionarily increase the grade of students near important grades (8/20, 10/20, 12/20, 14/20 and 16/20<sup>2</sup>), which they extensively do (see Figure 2). I therefore employ a "donut" RD design and drop observations of students whose Bac grade is in the plausible range of discretionary adjustment. The results are robust to alternative range choices.

Theoretically, being eligible to financial aid unambiguously reduces the cost of pursuing a higher education degree and should overall increase enrollment into higher education. However, the causal effect is only positive for inframarginal students, that is students who would not have attended higher education had they not been eligible to financial aid. Indeed, in a context with very low tuition fees many students may well attend higher education regardless of whether they are eligible to financial aid. Since the aide au mérite targeted students in top 5% of the Bac grade distribution it is possible that most of these very high-achieving low-income eligible students' decision to attend higher education will not be affected by the policy. The effects on the "intensive" margin, persistence and graduation, are more ambiguous. Though obtaining financial aid reduces the need to work during one's studies and/or affording housing closer to the HEI, eligible students were so high-achieving that it is ex-ante unclear whether this additional aid influenced their ability to move on to the following year and eventually graduate on time.

I find that the aide au mérite had no impact on enrollment in a higher education institution in the year in which the student obtained the Bac. The effect does not differ across gender or need-based financial aid amount, suggesting that with respect to the extensive margin, the finding likely reflects a true no effect and not heterogeneous effects that balance out on average. These results are somewhat consistent with those of [Fack and Grenet \(2015\)](#) who exploit discontinuities in the eligibility criteria of the French need-based grants and find that the effects of providing 1,500€ in cash allowances on enrollment is decreasing with the Bac grade quartile of the student. The effect is only about 1.8 percentage points for students in the top 20% of the Bac grade distribution while it is almost twice as large for students scoring in the bottom 20%. This suggests that very high-achieving students' decision to enrol in a higher education institution, even if they come from disadvantaged backgrounds, is largely unconditional to the financial support they receive from the state.

Additionally, I find no effect on persistence in 2<sup>nd</sup> year two years after the Bac and

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<sup>2</sup>Obtaining a grade of 8 enables students to re-sit the Bac in order to obtain it, obtaining a grade of 10 (and above) enables students to obtain the Bac, and obtaining a grade between [12, 14), [14, 16) and [16, 20] awards a certain distinction, respectively *Assez Bien* (Quite Good), *Bien* (Good) and *Très Bien* (Very Good). These distinctions do not play a role in admission into a selective higher education institution, except in some very specific instances.

small positive significant effects in 3<sup>rd</sup> year three years after the Bac, though the latter results are quite sensitive to the bandwidth size. The difference between the 2<sup>nd</sup> and 3<sup>rd</sup> year results may hint at the possibility that the aid has no effects in the first few years of study but might help in staying enrolled until the end of one's degree. This could be explained, for example, if the effects of lagging behind a bit more each year when having to work while studying only becomes visible after a few years. More analyses need to be undertaken to better understand what is driving the effect found for persistence in 3<sup>rd</sup> year.

Lastly, I am currently undertaking analyses to assess the effect of the policy on other outcomes such as geographic mobility and high school students' motivation which have not yet been studied much in the literature and might yield interesting insights on the effect financial aid may have on non-academic outcomes. In particular, the effect on geographic location has largely been ignored since most merit aid in the US is at the state-level and therefore only awarded if the eligible student attends one of the state's public university.

The rest of the paper is organised as follows. Section 2 provides institutional background. Section 3 describes the data used. Section 4 details the empirical strategy I adopt. Section 5 discusses the main results and robustness checks. Section 7 concludes.

## 2 Institutional Background

### 2.1 Higher Education in France

**Structure.** A very clear overview of the French higher education landscape, its costs and financial aid schemes can be found in [Fack and Grenet \(2015\)](#), and I therefore only describe the key institutional elements needed to understand the analysis here. High school students wishing to pursue post-secondary education essentially have the choice between three types of institutions: public universities, selective post-secondary schools (the vocationally oriented *Sections de Technicien Supérieur* (STS) and the academically oriented *Classes Préparatoires aux Grandes Écoles* (CPGE, also known as *prépas*)) and other private schools.<sup>3</sup> The only criteria to continue into higher education in France is to obtain the Bac, the French end of high school exam. The Bac grade obtained does not play any role in one's likelihood of being accepted in a selective degree except in very few instances.

Public universities offer general and vocational 3-year undergraduate degrees (*Licence*), graduate degrees (*Master*) and post-graduate degrees (*Doctorat*). The vast ma-

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<sup>3</sup>Mostly engineering and business schools as well as institutions not attached to a university (accounting, architecture, ...), art schools, and paramedical and social schools.

majority of their general degrees are not selective, other than having obtained the Bac, though their vocational degrees (*Diplôme universitaire de technologie (DUT)*) are. STS offer 2-year degrees while students enrolling in a CPGE study for two (or three) years, after which they take competitive exams in the hope of getting into a selective school (the so-called *Grandes Écoles*) or enrolling in the third year of a bachelors degree in a public university. 77.9% of high school students who obtained the Bac in 2009 were enrolled in a higher education institution in the 2009-10 academic year (MESR, 2009). Among them, 55.2% were enrolled in a public university (of which 19.5% in a vocational degree), 24.9% in STS, 9.6% in CPGE, and 10.3% in other private institutions.

**Cost.** The cost of higher education in France is predominantly driven by living costs, as annual tuition fees at public universities are set at very low levels (171€ in 2009-10 at the undergraduate level; in addition students pay a contribution to social security of around 200€). The cost of studying in a STS or CPGE will depend on whether the institution is public (no tuition fees, only student social security fee) or private (up to several thousand euros per year). Fack and Grenet (2015) estimate, using data from 2010, that the total average budget for a nine-months academic year is around 6,300€, i.e. 700€ per month. This amount very likely constitutes a financial barrier to low-income students wishing to continue their studies into higher education.

## 2.2 Need-Based Financial Aid

The main higher education financial aid program is a need-based system called the *bourses sur critères sociaux* (BCS), which I will refer to as "need-based grants" for intelligibility. In 2009-10, around 565,000 students benefited from a need-based grant, representing about over a third of students enrolled in a degree giving right to need-based grants (MESR, 2009).

**Eligibility criteria.** Eligibility to these need-based grants is assessed every year based on the combination of two criteria:

1. **Financial resources:** parents' total gross income in year  $n - 2$ ,
2. **Disadvantage points (up to 17):**
  - Number of additional dependent children: *2 points per additional dependent child, 4 points per additional dependent child in HE,*
  - Distance to the higher education institution: *30-249 km = 1 point,  $\geq 250$  km = 2 points.*

**Amounts.** Each parental income and disadvantage points combination is allocated a given *echelon* of financial aid, which in turn determines the amount of aid given to the

student during that academic year.<sup>4</sup> Between 2009-10 and 2012-13 there were 7 echelons, from 0 (least generous) to 6 (most generous). In 2013 two additional echelons were created, 0 bis (between 0 and 1) and 7 (most generous). Need-based grants are handed out in ten installments (July and August are excluded). Table 1 shows the annual amounts of aid given to each echelon between 2009 and 2014<sup>5</sup>. Echelon 0 students were only exempted from paying tuition and student social security fees and did not receive cash allowance while echelon 6 students receive just over 4,000€ (in addition to being exempt from tuition and student social security fees). These amounts in themselves do not provide sufficient financial support for students to live off it exclusively, requiring parents to help out if they can and students to work on the side of their studies. According to the French Labor Force Survey, on average between 2013 and 2015 23% of students were employed at some point during their studies, of which 33% in a job not linked to their studies and not only over the summer.

**Table 1: Need-Based Grants Amounts by Echelon**

Echelon	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Aide au mérite (% 2009-10)
0	Exemption from tuition and student social security fees						-
0 bis	-	-	-	-	1,000	1,007	-
1	1,445	1,525	1,606	1,640	1,653	1,665	125
2	2,177	2,298	2,419	2,470	2,490	2,507	83
3	2,790	2,945	3,100	3,165	3,190	3,212	65
4	3,401	3,590	3,779	3,858	3,889	3,916	53
5	3,905	4,122	4,339	4,430	4,465	4,496	46
6	4,140	4,370	4,600	4,697	4,735	4,768	44
7	-	-	-	-	5,500	5,539	-

*Notes:* Amounts are not adjusted for inflation.

**Application timeline.** Students electronically apply for need-based grants between January and April/May. It is possible to apply after this deadline if justified. Importantly, applications for need-based grants are made before knowing one's Bac grade, reducing the possibility that students may apply for need-based grants after obtaining above 16/20 at the Bac in order to receive the aide au mérite. Moreover, applications to higher education institutions are mostly done by the end of January through a centralised platform called *Application Post-Bac* (APB).<sup>6</sup> The vast majority of institutions

<sup>4</sup>Appendix Table A1 shows the combinations of (maximum parental income, points) and the related echelon for the academic year 2009-10.

<sup>5</sup>Students in the académies of Créteil, Paris and Versailles received an additional 153 euros annually.

<sup>6</sup>APB was replaced by *Parcoursup* in 2018.

were on APB though there were some exceptions (Sciences Po, Dauphine, etc.), the application deadlines of which varied by institution.

## 2.3 Aide au mérite

The aide au mérite was introduced for the 2008-2009 academic year.<sup>7</sup> It consisted in 1,800€ per year (9 installments of 200€) over at most 3 years (the standard duration of a bachelor degree in France). Budget-wise the aide au mérite corresponded to approximately 35-40 million euros, or about 3% of the need-based grants budget.

**Eligibility criteria.** There are two eligibility criteria:

1. Being eligible to need-based grants<sup>8</sup>, and
2. Obtaining 16/20 or over at the Bac<sup>9</sup>

To actually receive the aide au mérite, the student had to be enrolled in a higher education institution.

**Application timeline.** Applying the aide au mérite did not require any particular request by the student so long as they had submitted an application for need-based grants.

**Annual quotas.** Each educational *académie* (region) was allocated annually a certain number of aide au mérite that they could grant to eligible high school students in their geographic purview. About 5% of students appear to not have received the aide au mérite due to these quotas. It is unclear how the aide au mérite were actually allocated among eligible students though the non-recipients do not appear to have had worse Bac grades. I come back to this in Section 4.

## 3 Data and Descriptive Statistics

### 3.1 Data

I use data from four administrative sources provided by the statistical offices of the French Ministry of Education (MENJS-DEPP) and the Ministry of Higher Education

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<sup>7</sup>All details regarding the aide au mérite can be found in the [circulaire N°2008-1013 du 12 juin 2008](#) (in French).

<sup>8</sup>Students whose parents did not pay income tax were also eligible though in practice such cases appear to be extremely rare and are excluded in the analysis.

<sup>9</sup>The official criteria is actually to have obtained a mention *Très Bien* at the Bac, which corresponds to obtaining 16/20 or over. For ease of understanding, I use the latter formulation.

(MESRI-SIES): (i) OCEAN - Bac (*Organisation des Concours et des Examens Académiques et Nationaux*), which covers the universe of high school students taking the Bac; (ii) AGLAE (*Application pour la Gestion du Logement et de l'Aide à l'Étudiant*), which covers the universe of applications applications for higher education public grants; (iii) SISE (*Système d'Information sur le Suivi de l'Étudiant*), which covers almost all students enrolled and graduating from a higher education institution (other than STS and CPGE) and (iv) BPBAC (*Base Post-Bac*), which covers the universe of students enrolled in a STS or CPGE. I merge these datasets using a unique student identifier.

**OCEAN - Bac.** For each student, the dataset provides information on the high school (location, type), the Bac track, the grades obtained in each individual exam and the overall average, as well as socio-demographic characteristics such date of birth, gender, parents' occupation, department of residence, etc.

**AGLAE.** This dataset is produced based on data from the CNOUS (*Centre national des oeuvres universitaires et scolaires*), the public organism in charge of providing student bursaries, university halls of residence, student cultural activities and student restaurants. It contains information on which type of aid the student applied for, whether she obtained the grant, what was the reason for the rejection, the echelon, whether the student obtained the aide au mérite, the institution and degree registered in the grant application, as well as various socio-demographic characteristics.

**SISE.** For each student, it contains information on the higher education institution and degree enrolled in, the year in the degree, the length of the degree, whether the degree has been obtained or not, as well as various socio-demographic characteristics.

**BPBAC.** For each student, it contains information on the institution and degree enrolled in, the year in the degree, the length of the degree, as well as various socio-demographic characteristics.

**Coverage.** As some paramedical and social diplomas as well as some artistic and cultural higher education institutions are not covered by SISE, [Bonneau et al. \(2021\)](#) estimate that for the 2016-17 academic year around 90% of students in higher education were covered by the SISE and BPBAC data.

## 3.2 Sample

I restrict my sample to high school students who (i) obtained the Bac at the June session between 2009 (included) and 2014 (included), (ii) had a unique and non-missing



student identifier, (iii) obtained the Bac only once over this period<sup>10</sup>, (iv) did not have a missing Bac grade, (iv) was eligible to a need-based grant in Bac year.<sup>11</sup>

### 3.3 Descriptive Statistics

Table 2 provides some descriptive statistics. Out of the roughly 1 million students in the sample, about 55,000 were eligible to the aide au mérite. On the "extensive" margin, just over 90% of the sample enrolled in a higher education institution in the year they obtained the Bac. This figure is very high, reflecting the fact that high school students who apply for need-based grants are very likely to pursue higher education. Only half of the sample is enrolled in 2nd year 2 years after the Bac, and less than a third in 3rd year 3 years after the Bac. These statistics are in line with the very high failure rate in public universities at the end of the first year and the relatively low "on time" (after 3 years) graduation rate.

Only 5% of the sample obtained above 16/20 at the Bac, a necessary condition to be eligible to the aide au mérite. This proportion matches very closely Hoxby and Avery (2013)'s percentage of "high-achieving" students<sup>12</sup>, corresponding to approximately 4% of US high school students.

**Table 2:** Descriptive Statistics

Bac cohort	2009	2010	2011	2012	2013	2014	2009-14
Number obs.	164,535	165,282	177,499	187,093	183,442	184,769	1,062,620
Bac grade $\in [14, 18]$	26,590	25,141	27,731	32,373	37,627	39,661	189,123
Eligible to aide au mérite in Bac year	7,054	6,640	7,356	9,111	12,267	12,367	54,795
Female (%)	57.16	56.93	56.70	55.81	56.19	56.88	56.59
16 or above at Bac (%)	4.29	4.02	4.14	4.87	6.69	6.69	5.16
Enrolled in Bac year (%)	90.49	90.97	89.86	89.88	91.40	91.25	90.64
Enrolled in 2 <sup>nd</sup> year 2 years after Bac (%)	51.11	51.86	50.94	50.76	50.76	50.63	50.99
Enrolled in 3 <sup>rd</sup> year 3 years after Bac (%)	29.19	29.84	28.95	28.49	29.14	28.97	29.08
Obtained a degree 3 years after Bac (%)							

Notes:

## 4 Empirical Strategy

I use a regression discontinuity design to estimate the causal effect of being eligible to the aide au mérite on higher education outcomes. Specifically, I exploit the eligibility discontinuity at 16/20 at the Bac: need-based grant-eligible students scoring at

<sup>10</sup>I make this restriction in order to avoid students potentially strategically retaking the Bac in order to obtain above 16. Extremely few students obtain the Bac more than once over the period (0.003%).

<sup>11</sup>Appendix Table A2 details the number of observations obtained for each restriction.

<sup>12</sup>Defined as "a student who scores at or above the 90<sup>th</sup> percentile on the ACT comprehensive or the SAT I (math and verbal) and who has a high school grade point average of A- or above."

or above this threshold are automatically eligible to the aide au mérite, while students scoring just below are not. Estimating an OLS regression of the outcome on a dummy variable for being eligible to the aide au mérite would yield a biased estimate because eligible students have higher grades than non-eligible students, which is correlated with higher education outcomes. On either side of the threshold, students are very similar and only differ with respect to their eligibility to the aide au mérite (Imbens and Lemieux, 2008; Lee and Lemieux, 2010; Cattaneo et al., 2019).

**Running variable.** The running variable is the student's Bac grade. The Bac grade is the average of individual subjects' exam scores weighted by the subject's coefficient. Students typically have about 10 or more individual exams. The Bac grade is obtained from the OCEAN - Bac data. I denote the running variable  $Bac\ grade_i$  as student  $i$ 's Bac grade. This grade lies between 0 and slightly above 20.<sup>13</sup> If  $Bac\ grade_i$  is at or above 16, then the student is eligible to the aide au mérite, otherwise the student isn't.  $aide\ au\ mérite_i$  is the treatment indicator variable: it is equal to one if  $Bac\ grade_i$  is above 16 and zero otherwise.

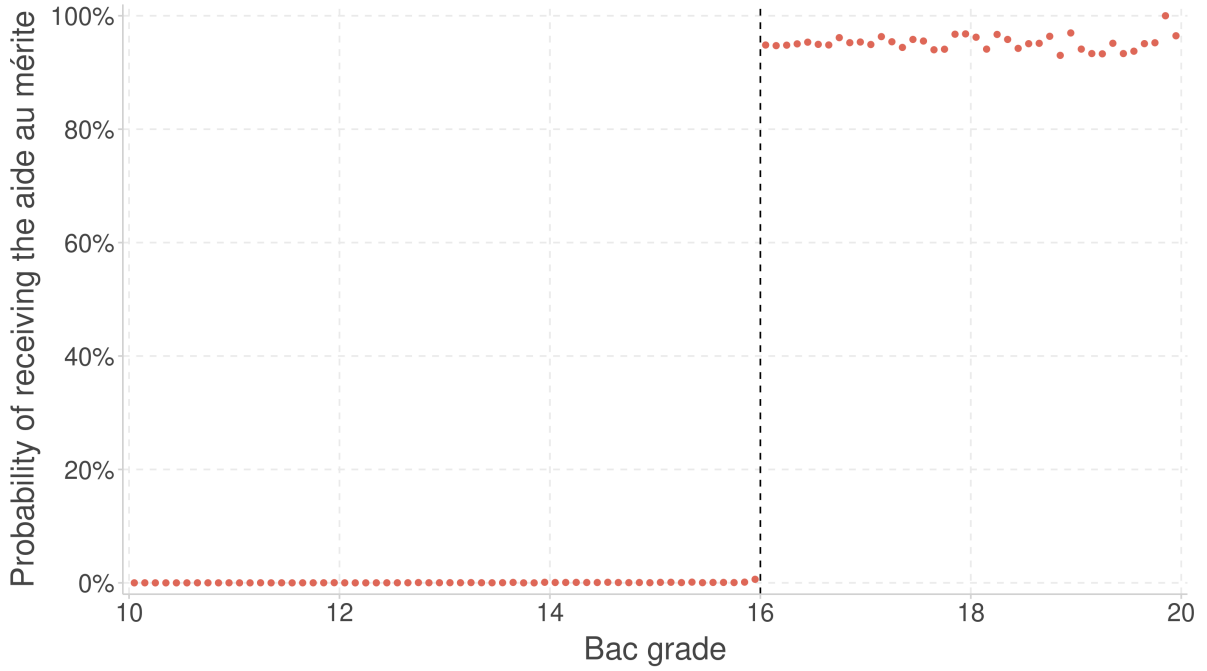
As discussed in Section 2, the number of aide au mérite that could be allocated to eligible students was actually capped. In particular educational *académie* were annually given an unknown number to allocate to students in its geographic purview. Since eligible students who do not enrol in a higher education do not end up actually receiving the aide au mérite, the only way to assess how binding this annual quota is, is to analyse the probability of receiving the aide au mérite conditional on actually enrolling in a higher education institution. Figure 1 shows the probability of receiving the aide au mérite conditional on actually enrolling in a higher education institution as a function of Bac grade. As can be seen a handful of students (130) scoring just under 16 appear to receive the aide au merite in the data. This concerns so few students that it is not of particular importance.

What matters more are students who fulfill both criteria (eligible to need-based financial aid and obtain above 16) and enrolling in a higher education institution and yet in the data are marked as not receiving the aide au merite. Indeed, conditional on being eligible to need-based financial aid, obtaining above 16 /20 at the Bac and enrolling in a higher education institution, the probability of receiving the aide au merite is around 95%, suggesting the annual quota on the number of aide au mérite to be awarded was binding. Since I conduct an intent-to-treat analysis, and as students cannot know in advance whether they will actually receive the aide au mérite or not, this is not pose a big problem for the analysis. And in any case, only 5% are untreated, a sufficiently

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<sup>13</sup>Though the maximum grade that can be obtained in each individual subjects is 20, students can obtain above 20 at the Bac due to taking various optional subjects such as latin, an additional language, music, etc. Such cases make the French national headlines each year due to their rarity.

**Figure 1: Treatment Discontinuity At the 16/20 Threshold**



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small share to not affect the results.

Nonetheless, in Appendix Figures [A1](#) I compare the characteristics of students who actually received the aide au merite and those who fulfilled all the required criteria and yet did not receive it. This comparison reveals no significant differences in the distribution of grades, nor gender, parent occupation or need-based grant echelon.

**Local average treatment effect.** Any discontinuity in the higher education outcomes between students around the 16 threshold can be interpreted as the causal effect of being eligible to the aide au mérite. In that sense, it should be interpreted as an intent-to-treat estimate, as I analyse the effect of eligibility, not actually receiving the aide au mérite. The difference between the two is driven by eligible students.

Given student  $i$ 's outcome  $y_{i,t}$ , the causal effect is identified by:

$$\beta^{RDD} = \lim_{\varepsilon \rightarrow 16^+} \mathbb{E}(y_i | \text{Bac grade}_i = \varepsilon) - \lim_{\varepsilon \rightarrow 16^-} \mathbb{E}(y_i | \text{Bac grade}_i = \varepsilon) \quad (1)$$

$\beta^{RDD}$  is the causal effect of being eligible to the aide au mérite on the educational outcome of interest for students who obtained a Bac grade very close to 16.

**Main specification.** My main specification for estimating the causal effect of the aide au mérite is as follows:

$$y_i = \alpha + \beta \text{Bac grade}_i + \lambda \text{Bac grade}_i \times \text{aide au mérite}_i + \gamma \text{aide au mérite}_i + \theta X_i + \varepsilon_i, \quad (2)$$

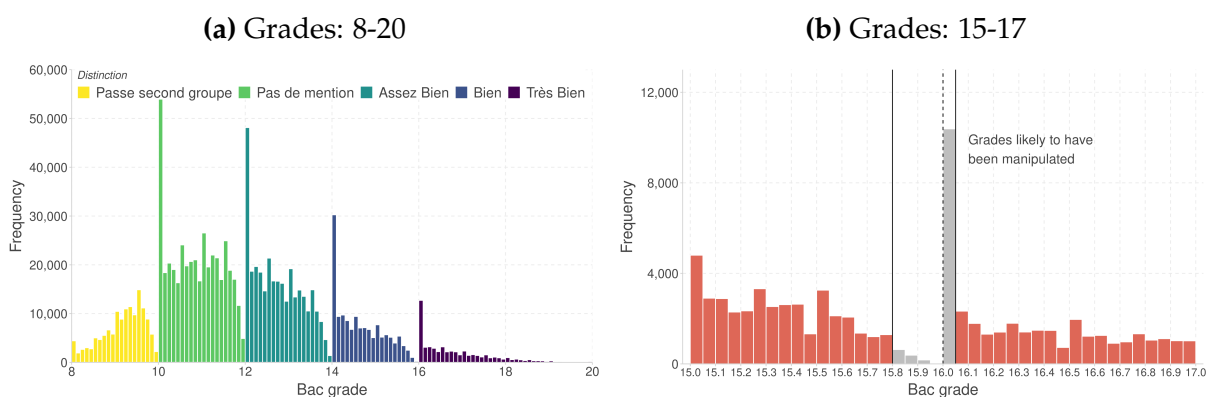
where  $y_i$  is student  $i$ 's educational outcome regressed on  $i$ 's Bac grade, the treatment indicator  $\text{aide au mérite}_i$ , the interaction between both variables, and a vector of pre-Bac control variables  $X_i$ . This vector includes gender, Bac track and Bac cohort fixed effects. Adding the control variables is not needed for identification but they can improve the estimates' efficiency (Calonico et al., 2019).  $\varepsilon_i$  is the error term.

Following Cattaneo et al. (2019)'s guidelines, the coefficient of interest is estimated nonparametrically using local linear regressions. Specifically, linear regressions are fit on both sides of the threshold using a triangular kernel which gives more weight to observations near the threshold. The size of the bandwidth is computed using the mean squared error optimal bandwidth selection procedure. Since this procedure is data-driven, the bandwidth size varies for each outcome and specification. Inference is based on Calonico et al. (2019)'s' robust bias-corrected procedure, which corrects for estimated bias in the point estimate to construct the confidence interval. As such, (i) the bandwidth used for point estimation differs from that used for inference, though both are computed using data-driven procedures, and (ii) the confidence interval is not centered around the point estimate (but around the point estimate plus the estimated bias; see Cattaneo et al. (2019) for more details).

**Identifying assumption.** The main identifying assumption underpinning the regression discontinuity design is that at the limit of the 16/20 threshold students scoring just below are very similar to those just above. This assumption is valid if there is no possibility for manipulating one's Bac grade. It is indeed almost impossible for a student to manipulate her grade since she has a very high number of individual exams (typically at least 10). However, as evident from Figure 2, the distribution of Bac grades is not continuous around the meaningful cutoffs: obtaining at least 10 implies the student obtains the Bac, at 12, 14 and 16 students are awarded various honours called *mention*, respectively mention Assez Bien (Quite Good), mention Bien (Good) and mention Très Bien (Very Good). The reason for these very sharp discontinuities is that jurys review students' grades and can use their discretion to increase the grades of students very close to these important thresholds. This "manipulation" of original grades by jurys poses an important threat to the identification strategy since adjusted students differ from non-adjusted ones (see Appendix Figure A2) and therefore the comparison above/below 16/20 is not valid anymore.

To overcome this challenge I adopt a "donut" RDD strategy, consisting in dropping

**Figure 2:** Distribution of Bac grades, 2009-2014



Notes:

the potentially manipulated values (Barreca et al., 2016; Canaan and Mouganie, 2018). This is a relatively common method used in cases where there is non-random heaping in the running variable and has been used by Canaan and Mouganie (2018) who use the 10/20 discontinuity to estimate returns to education and drop observations between 9.65 and 10.05.<sup>14</sup> It is impossible to identify precisely which students have been upgraded and which have not. Based on Figure 2, I drop observations between 15.8 (included) and 16.05 (excluded) from the baseline regressions.<sup>15</sup> In the robustness checks I show that the baseline results are not that sensitive to choosing alternative donut limits nor to including all observations.

**Robustness.** I assess the robustness of the main results by (i) estimating (2) using a second-order polynomial, (ii) varying the size of the bandwidth used for point estimation, (iii) changing the limits of the donut observations, and (iv) conducting a placebo analysis at grades 14/20 and 15/20 where no effect should be found.

## 5 Main Results

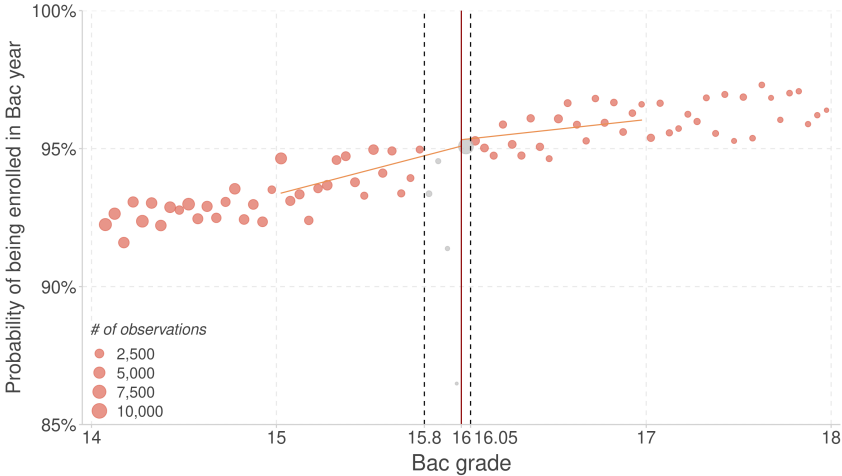
In this section I present the main results from my analysis. The educational outcomes analysed are enrollment in Bac year, persistence two years after the Bac, persistence three years after the Bac, and graduation three years after the Bac.

<sup>14</sup>Since the authors used a survey with a relatively small sample size, they could not observe as I do that there is also heaping in covariates that are predictors of the outcome.

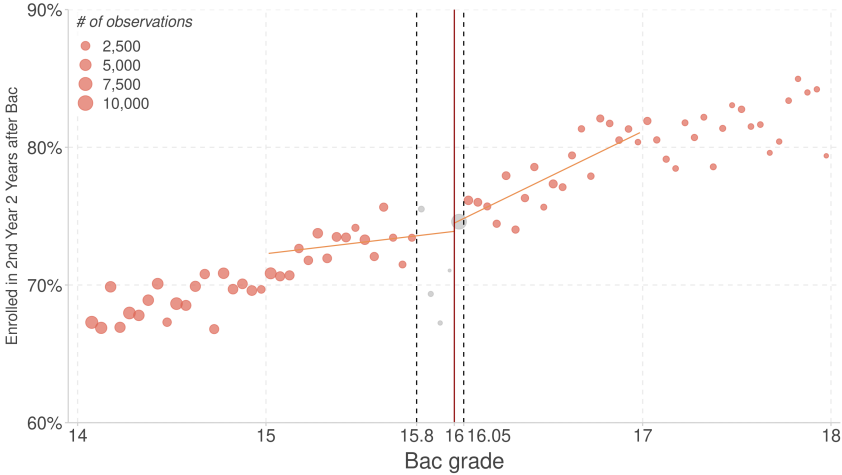
<sup>15</sup>Discussions with members of adjustment jurys suggest that upgrading of students below 15.8 is highly implausible and that the maximum grade achieved after upgrading is usually 16 or ever so slightly above.

**Figure 3:** Enrollment and Persistence of Need-Based Grants Applicants as a Function of Bac Grade

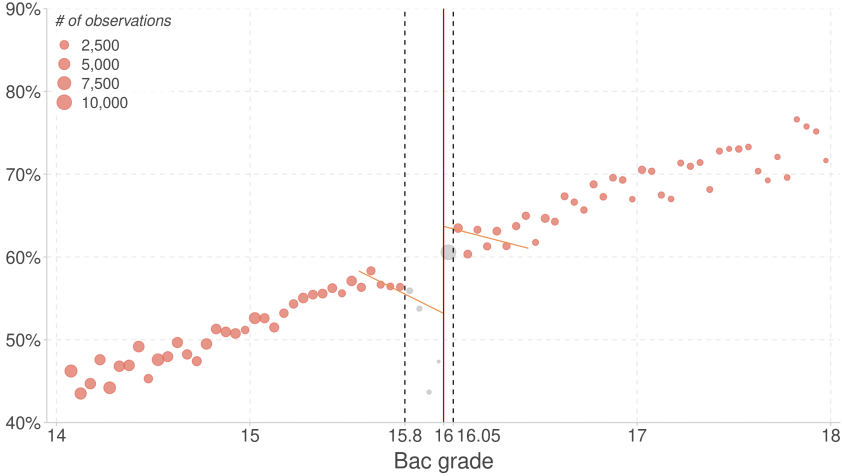
**(a) Enrollment in Bac year**



**(b) Enrollment in 2<sup>nd</sup> year 2 years after Bac**



**(c) Enrollment in 3<sup>rd</sup> year 3 years after Bac**



Notes:

**Table 3:** Effect of Eligibility to aide au mérite on Higher Education Outcomes

	<i>Enrollment</i>		<i>Persistence 2<sup>nd</sup> Year</i>		<i>Persistence 3<sup>rd</sup> Year</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
Eligibility	0.004 (0.004)	0 (0.004)	0 (0.007)	0.001 (0.009)	0.051*** (0.011)	0.038** (0.017)
Robust <i>p</i> -value	0.281	0.939	0.999	0.945	0	0.027
# obs. left	59,107	63,827	56,453	42,249	27,931	18,923
# obs. right	40,783	33,846	40,331	29,216	32,213	20,621
Poly. order	1	1	1	1	1	1
Bandwidth	[14.7, 17.3]	[14.62, 17.38]	[14.74, 17.26]	[14.92, 17.08]	[15.18, 16.82]	[15.34, 16.66]
Donut		✓		✓		✓
Controls		✓		✓		✓
Mean [15.5, 15.8]	0.945	0.945	0.732	0.732	0.569	0.569

*Notes:*

Footnote

## 5.1 Enrollment

I first investigate the causal effect of eligibility to the aide au mérite on the probability of enrolling in a higher education institution in the year the student obtains the Bac. Figure 3 panel (a) displays the probability of being enrolled in Bac year as a function of the Bac grade. Each dot corresponds to a 0.05 grade bin which includes the lower bound and excludes the upper bound, and the orange line is the local linear regression with a triangular kernel applied to the MSE-optimal bandwidth, when excluding observations between 15.8 (included) and 16.05 (excluded).

Enrollment for these students is very high: conditional on applying for a need-based grant, the probability of enrolling in a HEI in the year of the Bac for students obtaining around 16 is approximately 95%. There is a slightly positive relationship between this probability and Bac grade though it is relatively mild. We can clearly see graphically that non-adjusted students between 15.8 and 16 (excluded) fare less well than their lower grade counterparts. In fact students scoring between 15.95 and 16 (excluded) have “only” a 87% probability of enrolling in higher education in the Bac year though the sample size is very small ( $n = 38$ ).

Appendix Table A3 reports the regression discontinuity estimates for this relationship. Columns (1) and (4) report estimates using all observations using a first order and second order polynomial respectively, columns (2) and (5) report estimates dropping observations between 15.8 (included) and 16.05 (excluded), and columns (3) and (6) report estimates obtained when dropping those observations and including controls (gender, Bac track, and cohort fixed effects). The estimates from the local linear regressions are of the same magnitude, between 0 and 0.004 for first order polynomial

regression and not significant at conventional levels. These results imply that eligibility to the aide au mérite did not have any effect on enrollment in higher education in the Bac year. The estimates are very similar when using a second order polynomial, between -0.001 and 0.011.

This null result may at first appear to be inconsistent with the headline finding of [Fack and Grenet \(2015\)](#) who exploit discontinuities in the eligibility criteria of the French need-based grants and find that the effects of eligibility to a 1,500€ cash allowance increases enrollment by 2.7 percentage points. However, the populations under study differ. When restricting their attention to students in the top 20% of Bac grade scorers (still significantly less high achieving than aide au mérite eligibles), the effect is only 1.8 percentage points while it is almost twice as large for students scoring in the bottom 20%. This is suggestive that very high-achieving students from disadvantaged backgrounds are less responsible to the amount of financial support they receive from the state.

As pointed out by [Oreopoulos \(2020, JEL\)](#), financial barriers, on average, are not the main barrier to college attendance. Academic preparedness likely plays a much larger role, and thus students eligible to the aide au mérite are highly prepared, at least academically, to pursue higher education and successfully so.

## 5.2 Persistence

Second, I investigate the effect of eligibility to the aide au mérite on persistence in higher education. Specifically, I assess whether eligibility in Bac year had an effect on being enrolled in 2<sup>nd</sup> year 2 years after the Bac and in 3<sup>rd</sup> year 3 years after the Bac. Persistence in higher education is a particularly important outcome in the French context because, despite quite high enrollment rates in first year, close to 50% of students either change degree, repeat or drop out after their first year. Moreover, persistence serves as a useful measurable intermediate outcome for students enrolled in degrees for which it is not obvious to measure graduation, typically students enrolled in a CPGE, which do not deliver diplomas.

Figure 3 panels (b) and (c) display the probability of being enrolled in 2<sup>nd</sup> year 2 years after the Bac and in 3<sup>rd</sup> year 3 years after the Bac respectively. For both outcomes, persistence is quite strongly increasing with Bac grade: the probability of being in 2<sup>nd</sup> (3<sup>rd</sup>) year 2 (3) years after the Bac is around 70% (45%) for students scoring just above 14 and almost 85% (80%) for those at 18. There is no clear discontinuity at 16 for either outcome though as can be seen graphically, the estimate for persistence in 3<sup>rd</sup> is largely driven by the (very) narrow MSE-optimal bandwidth.

Appendix Tables [A4](#) and [A5](#) report the associated regression discontinuity estimates. The layout of the table follows that for enrollment. For persistence in 2<sup>nd</sup> year,



all the linear (first order) estimates are very close to 0 and non significant. This is suggestive that being eligible to the aide au mérite in Bac year had no effect on whether one persisted into 2<sup>nd</sup> year 2 years later. Regarding 3<sup>rd</sup> year persistence, the results are somewhat ambiguous. The coefficients are relatively large (4-10 percentage points) and significant at least at the 5% level. The point estimate when excluding donut observations and adding controls suggests that, on average, being eligible to the aide au mérite in Bac year increases the probability of being in 3<sup>rd</sup> year 3 years after the Bac by 3.8 percentage points. This is quite a large effect when compared to the baseline probability for students scoring between 15.5 and 15.8 of 57%, i.e. around a 7% increase. However, as was clear graphically, the MSE-optimal bandwidth is very narrow and is to a large extent the reason for the large effect.

### 5.3 Graduation

[to do]

### 5.4 Robustness

**Bandwidth size.** I assess the robustness of my baseline results to varying the size of the bandwidth. Specifically, I re-estimate the regressions for each outcome and vary the size of the bandwidth from 0.5 points on either side of the threshold, i.e. 15.5-16.5, to 4 points, i.e. 12-20, in 0.1 points increments.<sup>16</sup> Figure A3 presents the estimates and the associated 95% (robust) confidence intervals.<sup>17</sup> The baseline results do not appear particularly sensitive to the bandwidth choice, except for persistence in 3<sup>rd</sup> year where the magnitude of the effect decline sharply with bandwidth size, stabilising around 0.75 percentage points, but remains significant at the top 5% level (or just barely so) in the local linear regressions.

**Donut size.** I also assess the sensitivity of the baseline results to changing the boundaries of the donut interval. Specifically, I re-estimate the regressions with controls for each outcome and exclude observations for all combinations of lower bounds between 15.7 and 16 in 0.05 points increments and for upper bounds between 16 and 16.2 in 0.05 points increments as well.<sup>18</sup> Appendix Figure A5 displays the point estimates and sig-

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<sup>16</sup>I fix the bandwidth used for inference ( $b$  bandwidth in `rdrobust` terminology) to the inference bandwidth obtained in the baseline results with donut and controls. This is done to ensure that the same confidence interval is obtained at the MSE-optimal point estimate bandwidth. Otherwise when setting a point estimate bandwidth ( $h$  bandwidth), `rdrobust` by default sets the inference bandwidth to the same value.

<sup>17</sup>For completeness, Appendix Figure A4 shows the results of this sensitivity check for the specification without exclusions or controls. The main results are largely unchanged though the coefficients are more strongly increasing with the narrower bandwidth.

<sup>18</sup>Recall that students whose grade is adjusted are overwhelmingly adjusted to exactly 16 or ever so

nificance levels obtained for this sensitivity test. As with the bandwidth, the baseline results reported above do not appear to change markedly, both in terms of magnitude and significance, when the range of observations that are dropped changes. The only exception is persistence in 3<sup>rd</sup> year where the point estimates are of relatively similar magnitude and significance when excluding observations up to 16.05 but of very small magnitude and insignificant for any greater donut upper bound. Such variability, added to the sensitivity to the bandwidth size, suggests if there is a positive effect it is likely quite moderate.

**Placebos.** Lastly, I use 2 placebos to verify that the effects found are not driven by something else, for example statistical idiosyncrasy or the psychological effect of being awarded the Very Good distinction. Specifically, I estimate regression discontinuity at grades 14 and 15. At grade 14 there is also bunching in the running variable and there might also be some psychological impact on students of having obtained a distinction (Good) but where there is no difference in financial aid between students on both sides of the grade. At grade 15 no effect should be observed as it is a pure placebo. Appendix Figure A6 displays the estimates for the three outcome variables at grades 14 and 15. Overall the coefficients at those grades tend to be very small in magnitude and statistically insignificant for the donut specifications<sup>19</sup>, suggesting the results at the 16 threshold identify the causal effect of the aide au mérite rather than other factors such as statistical issues related to grade adjustments or the psychological benefit of obtaining the Very Good distinction.

## 5.5 Heterogeneity

In an attempt to better understand what the mechanisms explaining the results may be, I explore the heterogeneity of the effects by gender and by need-based financial echelon. The objective is in a sense to find out whether a particular subgroup of students are more responsive to the additional financial aid awarded by the aide au mérite.

**By gender.** Figure A7 displays the point estimates and 95% robust confidence intervals for the the three outcomes by gender.<sup>20</sup> The results indicate eligibility to the aide au mérite had no statistically differential effect between men and women though the point estimates are consistently larger for women than for men. Even for women, estimates remain quite small in magnitude (close to 0 for enrollment, 1.5-3 for persistence).

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slightly above (e.g. 16.01).

<sup>19</sup>The only exception is for grade 14 in the donut without controls specification when the outcome is persistence in 3<sup>rd</sup> year 3 years after the Bac. The coefficient is 0.05 and significant at the 1% level.

<sup>20</sup>The specification with control variables only includes Bac track and Bac cohort fixed effects.

**By need-based financial aid echelon.** Figure A8 displays the point estimates and 95% robust confidence intervals for the three outcomes by need-based grants echelon. Note that echelon 0bis and 7 were introduced in 2013 and therefore are estimated on only two Bac cohorts (2013 and 2014). Though the results are complex to interpret because for each echelon the bandwidths used for point estimation and inference vary and might influence the results, overall no clear pattern of heterogeneity appears.

For enrollment, all estimates are very small in magnitude (less than 0.02), strongly suggesting that the effect of the aide au mérite did not vary by need-based grant echelon. This might be surprising since the aide au mérite corresponded to a large increase in financial aid but could be explained by the fact that (i) the targeted students are not inframarginal students and (ii) the aide au mérite was not that well-known. For persistence in 2<sup>nd</sup> and 3<sup>rd</sup> year, none of the estimates are statistically significant except for echelon 1 for 3<sup>rd</sup> year. The coefficients for echelon 3 are negative and quite large in magnitude though this is most likely due to the bandwidth choice rather than an actual true negative effect on the subgroup. The largest effects are found for echelons 0bis, 1 and 2 though they are very imprecisely estimated. It is unclear whether this imprecision arises from large heterogeneity within these groups or from (relatively) small sample sizes.

Additional analyses are needed to better understand these results.

## 6 Other Outcomes

As we've seen, eligibility to the aide au mérite appears to not have had any effect on various higher education outcomes, such as enrollment, persistence or graduation. Moreover, no clear result emerges from the heterogeneity analysis suggesting that the null result is most likely not driven by the averaging out of heterogeneous effects. That being said, the policy may have had effects on non-education outcomes.

### 6.1 Geographic Location

[ongoing analysis - initial results suggest no effect on attended university's localisation]

### 6.2 High School Students' Motivation

[to do]

## 7 Conclusion

How effective is financial aid targeted at high-achieving low-income students in increasing enrollment and graduation from higher education? This paper attempted to answer this question by evaluating the effect of a financial aid scheme introduced in France, the aide au mérite, which gave an additional 1,800 euros annually to low-income high-achieving students. Using a regression discontinuity design and rich administrative data on students who obtained the Bac between 2009 and 2014, I find that the aide au mérite had no effect on enrollment in the Bac year, no effect on being in 2<sup>nd</sup> year 2 years after the Bac and a very small positive effect on being in 3<sup>rd</sup> 3 years after the Bac. The latter outcome can largely be thought of as proxying graduation since bachelors degrees in France last 3 years.

The heterogeneity analysis did not reveal any striking patterns, suggesting that the targeted group of students was largely unresponsive to the policy. The reasons for this lack of effect likely reside in the fact that targeted students were high-achievers academically (top 5% of their Bac cohort) and fully ready for a tertiary education. Though unobserved, the policy may have nonetheless had an effect on students' grades and mental health thanks to the freeing up of the financial constraint.

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**Does Financial Aid Improve the Educational Outcomes of  
High-Achieving Low-Income Students?  
Evidence from the French *aide au mérite***

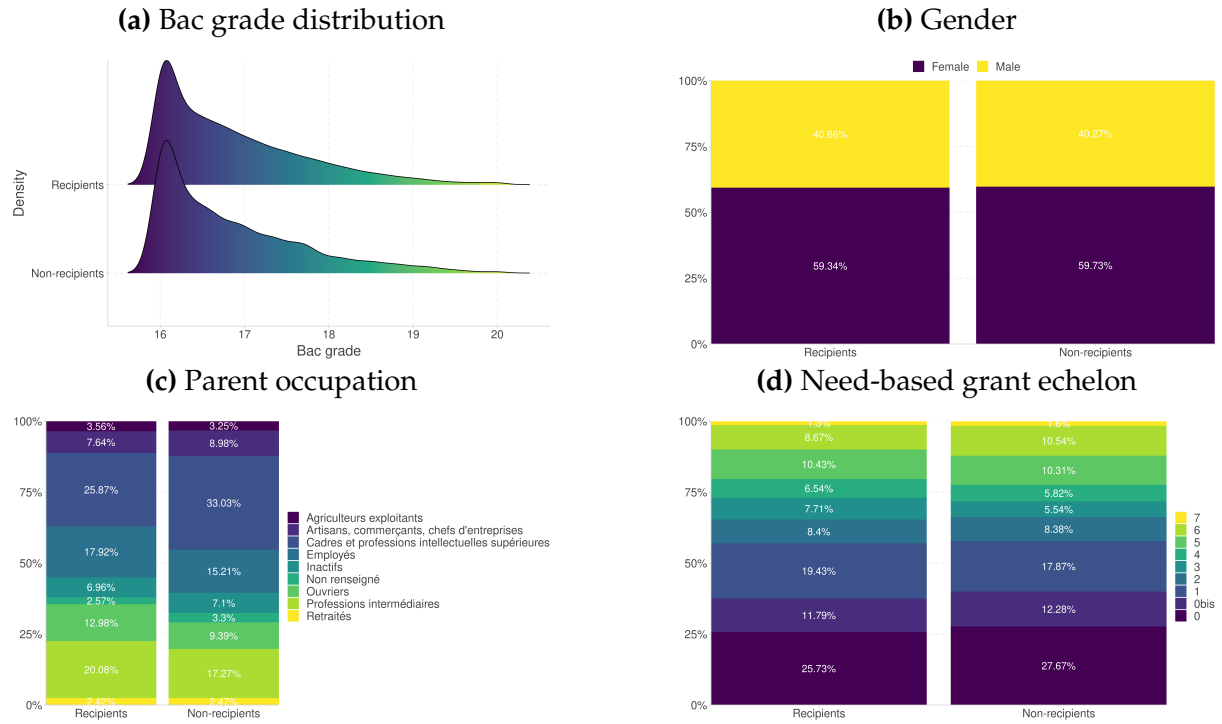
**Appendix**

Gustave Kenedi

**A Additional details on the aide au mérite in the data**

## B Appendix Figures

**Figure A1:** Comparison Between aide au mérite Recipients and Non-Recipients Due to Binding Quota



Notes:

**Figure A2: Probability of Being a Girl with Respect to Bac Grade**

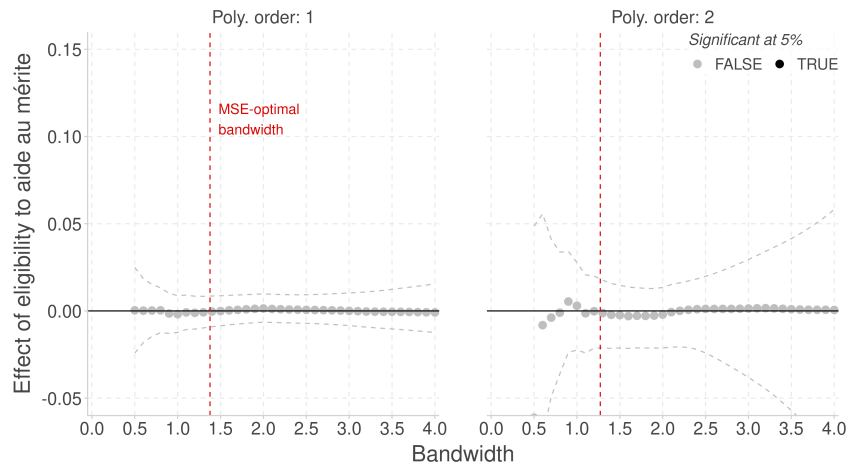


*Notes:*

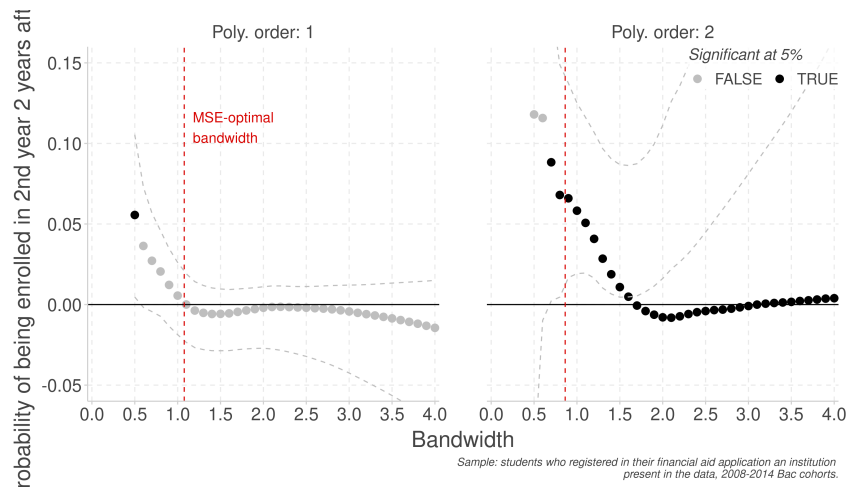


**Figure A3:** Effect of Eligibility to aide au mérite on Higher Education Outcomes by Bandwidth Size - With Donut

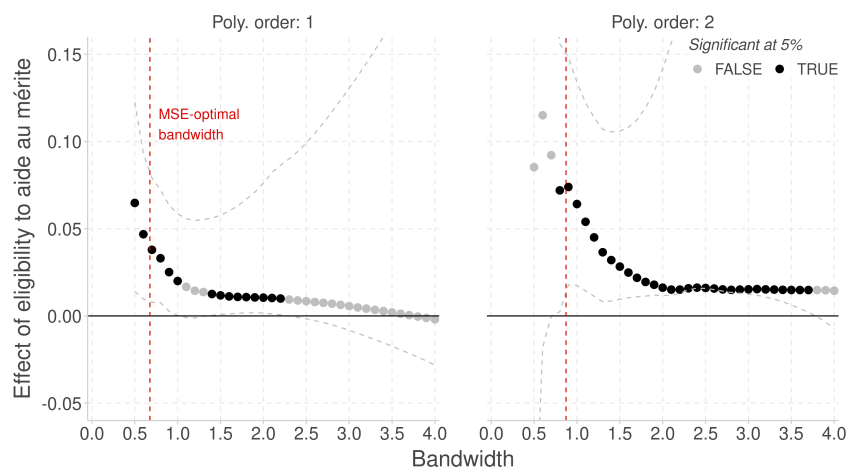
**(a) Enrolled in Bac year**



**(b) Enrolled in 2<sup>nd</sup> year 2 years after Bac**

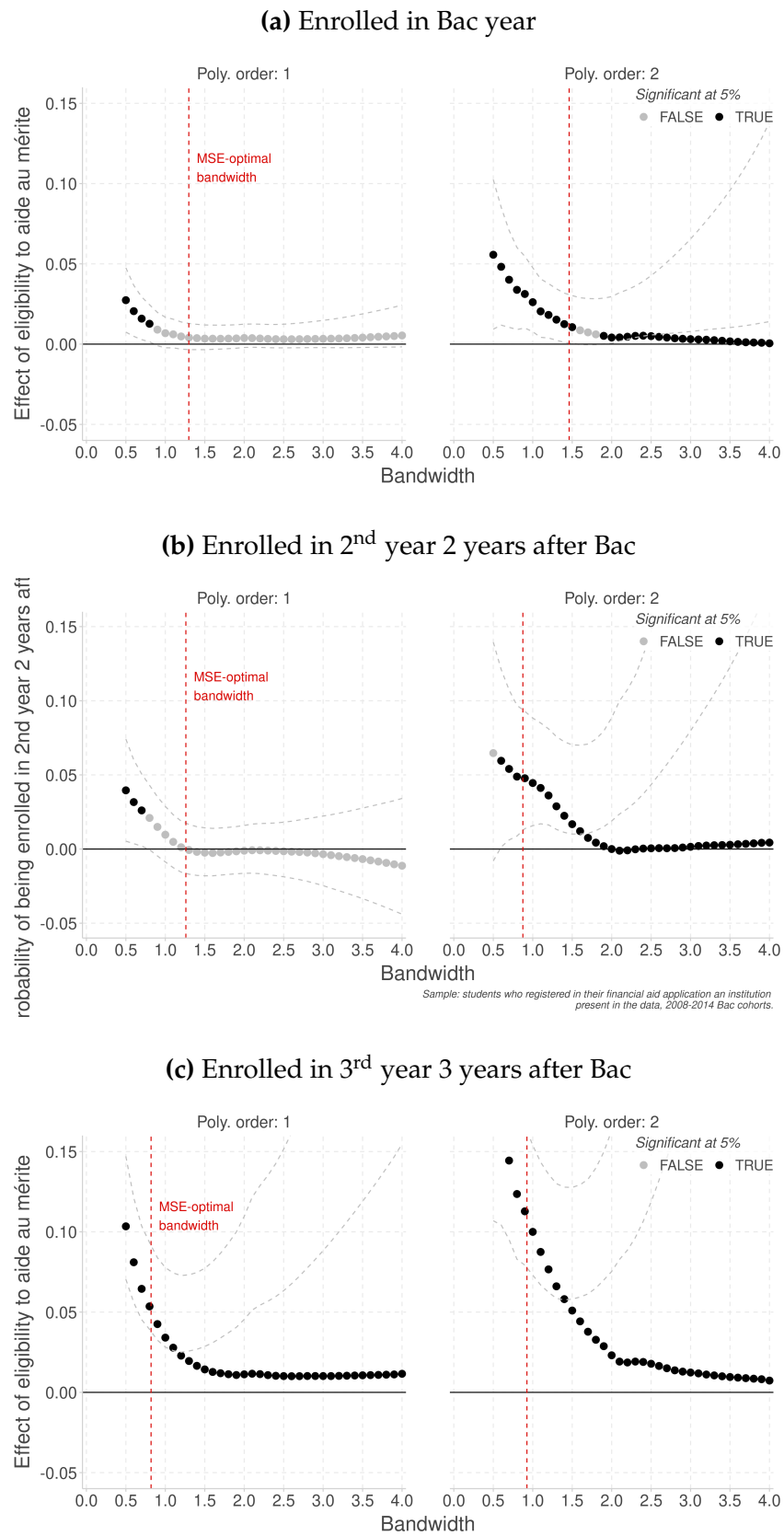


**(c) Enrolled in 3<sup>rd</sup> year 3 years after Bac**



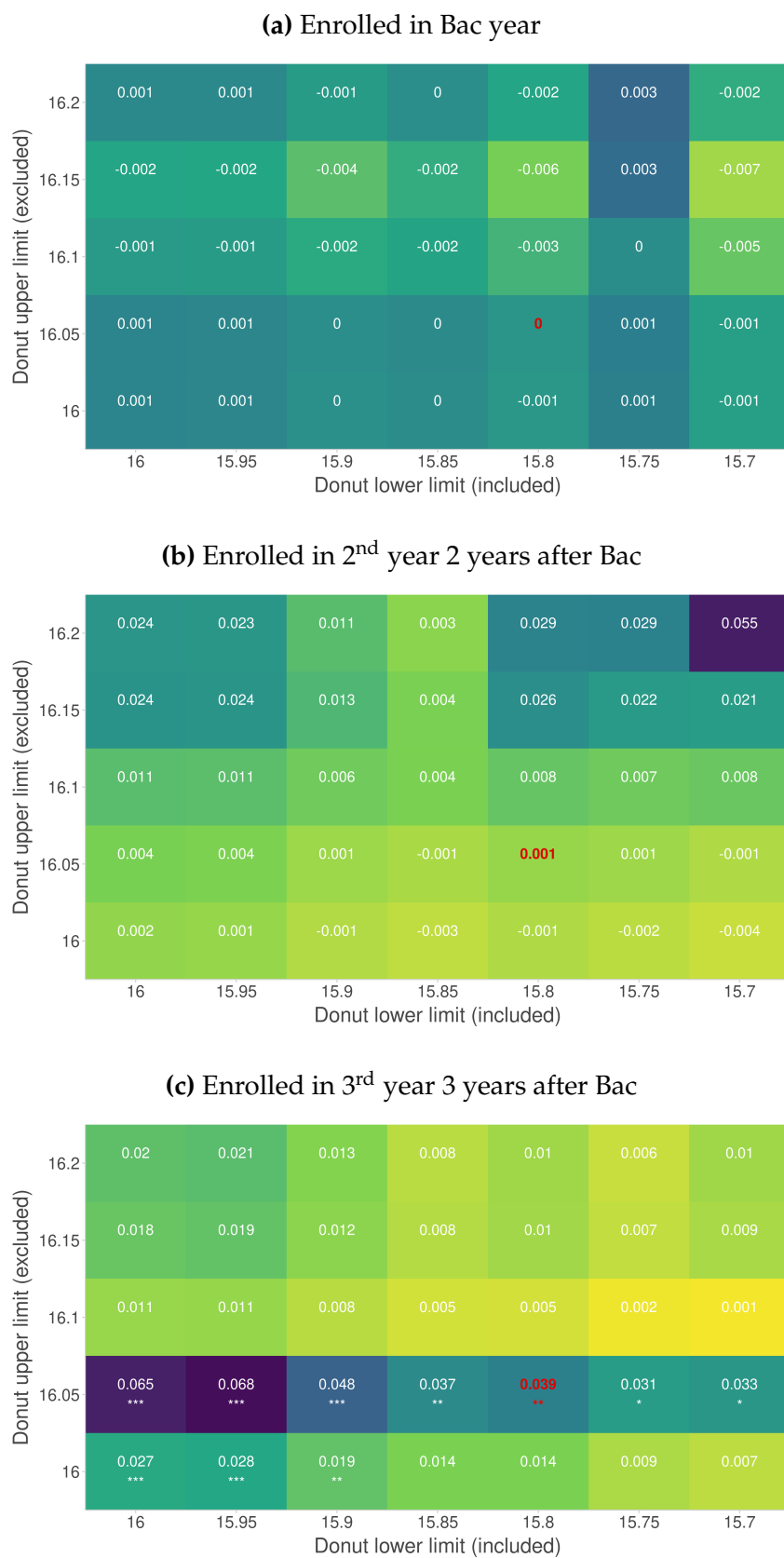
Notes:

**Figure A4:** Effect of Eligibility to aide au mérite on Higher Education Outcomes by Bandwidth Size - Without Donut or Controls

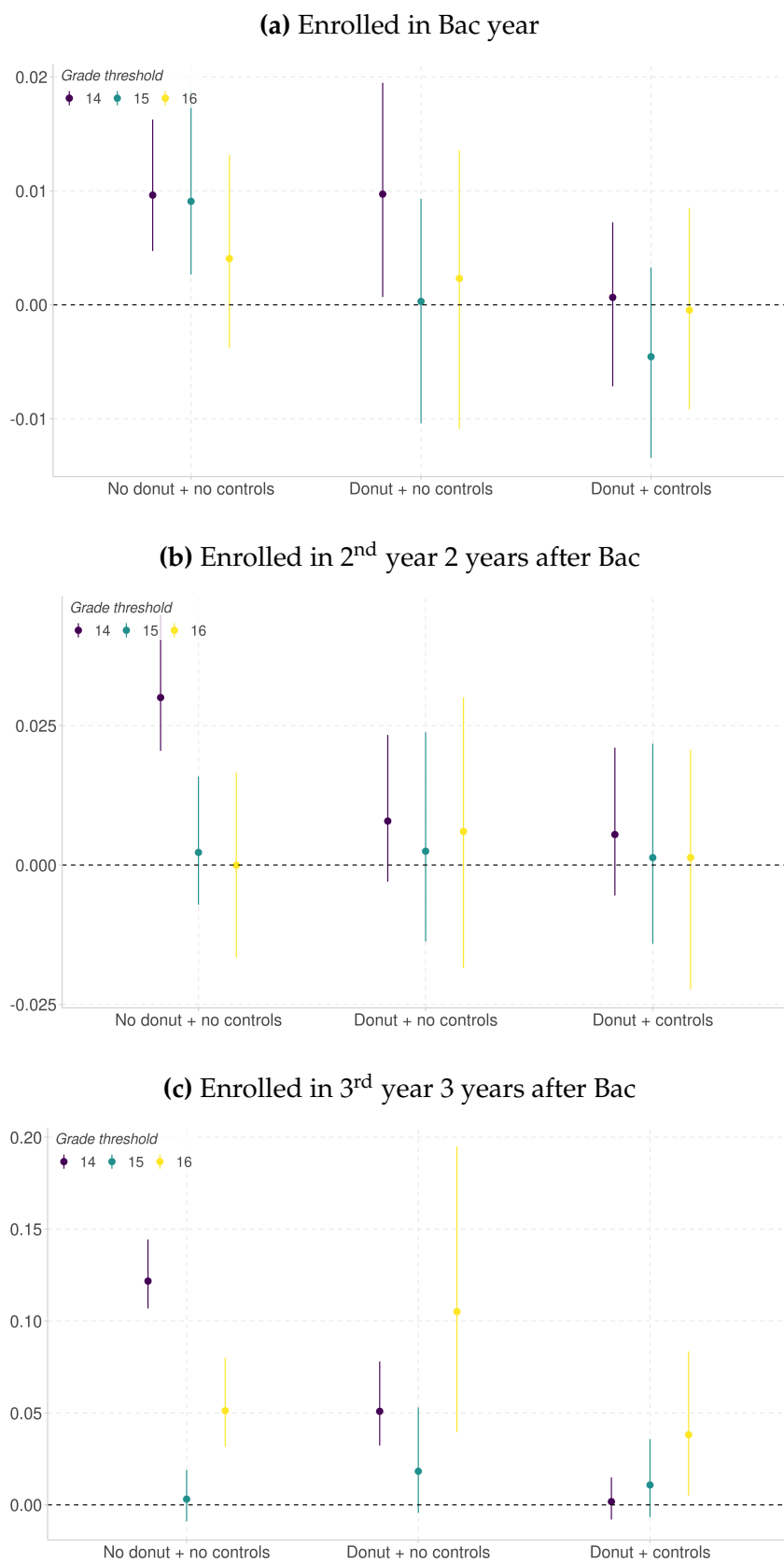


Notes:

**Figure A5: Effect of Eligibility to aide au mérite on Higher Education Outcomes by Donut Size - With Controls**

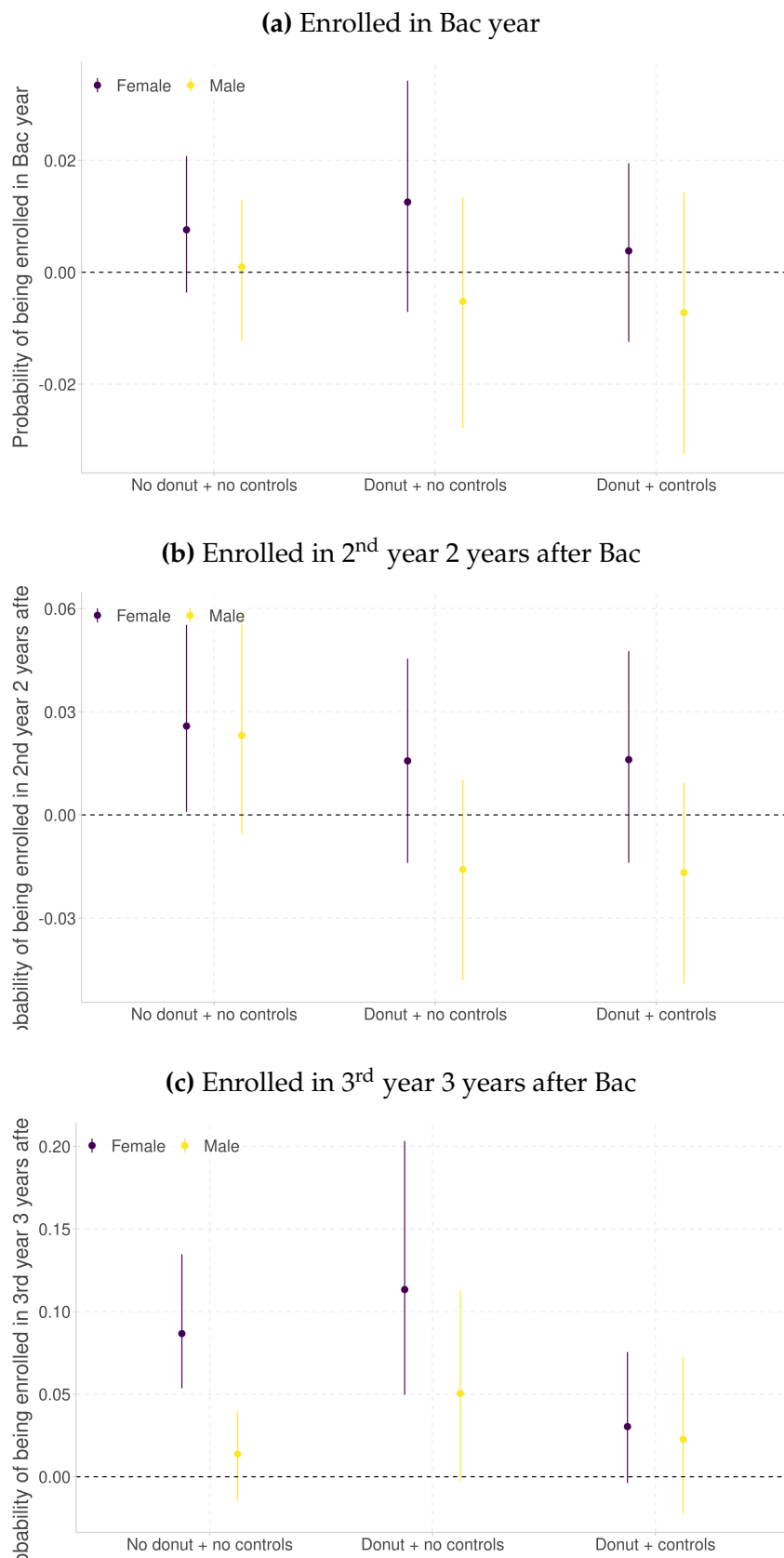


**Figure A6:** Effect of Eligibility to aide au mérite on Higher Education Outcomes - Placebos



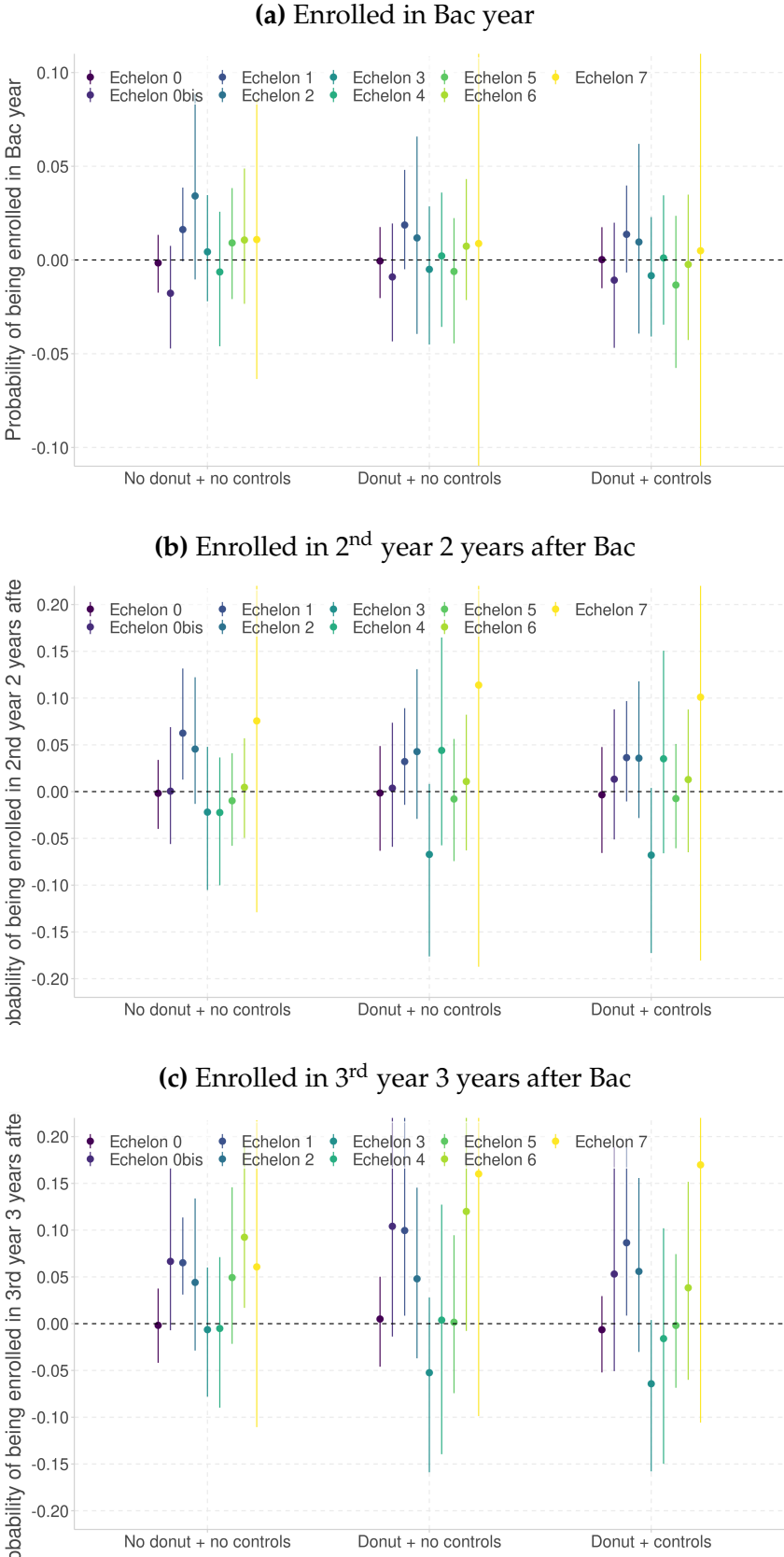
*Notes:*

**Figure A7: Effect of Eligibility to aide au mérite on Higher Education Outcomes by Gender**



*Notes:*

**Figure A8: Effect of Eligibility to aide au mérite on Higher Education Outcomes by Financial Aid Echelon**



*Notes:*

## C Appendix Tables

**Table A1:** Parent Income Condition and Points for the 2009-10 Academic Year

Points	Echelon #						
	0	1	2	3	4	5	6
0	32,440	22,060	17,830	15,750	13,710	11,710	7,390
1	36,040	24,510	19,810	17,500	15,230	13,010	8,210
2	39,650	26,960	21,790	19,250	16,760	14,310	9,030
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
16	90,110	61,280	49,530	43,750	38,080	32,530	20,530
17	93,720	63,730	51,510	45,500	39,610	33,830	21,350

*Source:* [Arrêté du 18 août 2009](#) fixant les plafonds de ressources relatifs aux bourses d'enseignement supérieur du ministère de l'enseignement supérieur et de la recherche pour l'année universitaire 2009-2010 .

**Table A2:** Number of Observations at Each Sample Restriction

Restriction ↓ / Bac cohort →	2009	2010	2011	2012	2013	2014	2009-2014
Raw number of obs.	652,109	648,555	690,726	753,742	712,160	745,818	4,203,110
+ Obtained the Bac in June session	550,483	544,209	581,087	626,263	608,782	646,121	3,556,945
+ Unique and non-missing student identifier	525,552	520,859	556,712	588,513	578,586	606,892	3,377,114
+ Obtained the Bac only once over the period	524,557	519,373	554,997	586,538	576,968	605,626	3,368,059
+ Bac grade not missing	523,782	518,859	554,592	586,155	576,577	605,446	3,365,411
+ Eligible to need-based grants in Bac year	164,535	165,282	177,499	187,093	183,442	184,769	1,062,620

*Notes:*

**Table A3: Effect of Eligibility to aide au mérite on Enrollment in Bac Year**

	<i>First order</i>			<i>Second order</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligibility	0.004 (0.004)	0.002 (0.005)	0 (0.004)	0.011* (0.006)	0.014 (0.012)	-0.001 (0.008)
Robust <i>p</i> -value	0.281	0.83	0.939	0.086	0.239	0.897
# obs. left	59,107	35,694	63,827	71,871	37,177	56,045
# obs. right	40,783	27,438	33,846	43,035	27,444	32,429
Poly. order	1	1	1	2	2	2
Bandwidth	[14.7, 17.3]	[15.02, 16.98]	[14.62, 17.38]	[14.54, 17.46]	[15.01, 16.99]	[14.73, 17.27]
Donut		✓	✓		✓	✓
Controls			✓			✓
Mean [15.5, 15.8]	0.945	0.945	0.945	0.945	0.945	0.945

*Notes:*

Footnote

**Table A4: Effect of Eligibility to aide au mérite on Enrollment in 2nd Year 2 Years after Bac**

	<i>First order</i>			<i>Second order</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligibility	0 (0.007)	0.006 (0.01)	0.001 (0.009)	0.048*** (0.02)	0.07** (0.03)	0.067** (0.031)
Robust <i>p</i> -value	0.999	0.64	0.945	0.009	0.014	0.018
# obs. left	56,453	37,181	42,249	31,943	30,594	29,387
# obs. right	40,331	27,444	29,216	33,385	25,337	25,276
Poly. order	1	1	1	2	2	2
Bandwidth	[14.74, 17.26]	[15.01, 16.99]	[14.92, 17.08]	[15.12, 16.88]	[15.13, 16.87]	[15.14, 16.86]
Donut		✓	✓		✓	✓
Controls			✓			✓
Mean [15.5, 15.8]	0.732	0.732	0.732	0.732	0.732	0.732

*Notes:*

Footnote



**Table A5:** Effect of Eligibility to aide au mérite on Enrollment in 3rd Year 3 Years after Bac

	<i>First order</i>			<i>Second order</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligibility	0.051*** (0.011)	0.105*** (0.037)	0.038** (0.017)	0.11*** (0.02)	0.115*** (0.039)	0.073** (0.032)
Robust <i>p</i> -value	0	0.003	0.027	0	0.003	0.019
# obs. left	27,931	7,645	18,923	34,363	25,954	30,832
# obs. right	32,213	14,625	20,621	34,432	23,597	25,426
Poly. order	1	1	1	2	2	2
Bandwidth	[15.18, 16.82]	[15.56, 16.44]	[15.34, 16.66]	[15.07, 16.93]	[15.2, 16.8]	[15.12, 16.88]
Donut		✓	✓		✓	✓
Controls			✓			✓
Mean [15.5, 15.8]	0.569	0.569	0.569	0.569	0.569	0.569

*Notes:*

Footnote