Does Informing Students about their Chances for Success Affect their Enrollment Choices?

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In France, dropout rates during the intial years of tertiary education are very high. This results in a loss in students' time and in public resources which recent policies have sought to attenuate. One of these, the so-called "Active Orientation" policy, requires universities to provide applicants for entry into the first year of a Bachelor's degree feedback on their likely chances of success in the degree course they apply for. Such feedback is given in the form of three different messages of advice given to students during their final year of high school, once they have expressed their desired enrollment choices. These messages comprise a positive, encouraging message, a neutral one, and a message warning students that their academic skills do not provide them with a sound basis for succeeding in their desired bachelor's degree. In our study we evaluate the effectiveness of this policy by assessing whether receiving a negative feedback, which invites students to reconsider their choices, does indeed have a deterrence effect on candidates. These academically weakest students are the most likely to drop out of university during the first years of higher education, and their reactiveness to such a feedback is thus a crucial measure for the effectiveness of this policy measure. In our empirical analysis we use data stemming from several departments of one large French university, spanning a period of six years.

A recent literature studies the effects that receiving feedback and learning about their ability has on students' educational choices. Our study builds on this literature, and it also extends a companion paper, Pistolesi (2017), which investigates the effect of the Active Orientation policy using the same data as we do, but employing a different empirical strategy: his regression discontinuity design allows to evaluate the effect of the policy on a certain group of students among those who receive negative feedback, namely, those whose academic skills most resemble the skills of students receiving neutral feedback from the university. He assesses the effect of the policy on individuals who receive a negative evaluation as their skill level falls just short of a certain threshold of previous academic performance that the university uses to determine which type of feedback to emit. In order to extend his findings to a wider group of prospective students than only those who are close to the threshold at which the type of feedback emitted changes, we exploit additional sources of variation in our data: as in Pistolesi (2017), we observe students whose academic capacities situate them above or below the threshold the university uses to determine which type of feedback to emit; we also dispose of data spanning the pre- and post-implementation period of the policy, and additionally, we benefit from the fact that some departments of the university implement the policy, whereas others chose to not yet do

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so during the observation period. Our triple-differences estimator exploits all three sources of variation to assess the relative changes in enrollment rates among different groups of students: those situated above versus *below the threshold determining the type of feedback emitted, those applying to departments emitting feedback* versus *those that do not, and those who are candidates before implementation of the policy* versus *those who apply once the policy is put in place.*

In our triple differences estimation on the whole sample, and controlling for observable characteristics like age, gender, nationality and socio-economic status, we find that receiving negative feedback from the university regarding their suitability for a desired degree course does indeed affect students' enrollment choices. The likelihood of enrollment decreases by 12.7 percentage points for students who obtained such feedback from the university. This effect is significant at the 5% level and stable when we including time dummies for each of the post-implementation years, as well as a linear time trend. Additional specifications shed light on possible differences in the effect size among sub-groups of the treated students. We find that the effect is robust across treatment years, but that it's size varies markedly with the academic skills of the students as measured by their high school grade in mathematics. The deterrence effect is strongest for the academically weakest students. For this group, it is close to 16 percentage points, twice as large as for students whose grades relatively good and close to the threshold for receiving a neutral feedback. This underlines the effectiveness of the policy under examination in our paper in providing a valuable signal to those students who are most at risk of failing their undergraduate courses, which leads them to reconsider their choices in order to better align them with their academic potential.

In 2014, 470.000 high-school graduates started their post-secondary education in France. This corresponds to roughly 60 % of a cohort obtaining access to higher education, a higher proportion than ever before. Demand for certain degree courses, as such Health Care or Law, has increased spectacularly over the past ten years, with respectively +30 % and +18 % of registered first year students (MSER, 2015). Providing adequate conditions to enable such a large number of entrants to succeed in their studies represents a major challenge for the French education system. This problem is accentuated by the fact that these students come from diverse educational backgrounds. Additionally, French universities are not allowed to impose entry requirements and students are free to choose their field of study. As a consequence, academic skills among students entering the higher education system are very heterogeneous (OECD, 2010).

Faced with this situation, the French government adopted a certain number of policies to increase the proportion of students completing their undergraduate studies successfully[1]. Some of the main measures put in place intervene early, before students even enter university. From the moment students indicate their desired course of study, the aim is to assist them in their choices and guide them towards the degree best suited to their educational background and individual abilities. It is crucial to offer advice at this early point in students' higher education careers, as many seek to enter degree courses they are ill prepared for, paving the way to low performance, discouragement, and subsequent drop-out. It is estimated that a majority of those failing the final examinations of their freshman year (about 50 % of each entering cohort), do so due to a mismatch between course requirements and their skills (Gury, 2007).

The so-called «Active Orientation» policy (henceforth AO), in place since 2009, aims to improve this match between students and their chosen degree courses. Under this policy, universities are asked to inform students completing their last year of high-school about their likely chances of success in the degree courses they have declared their intention to enroll in. Universities are free to choose in which way they convey this information to students. Most of them elect to give students expressing an interest in enrolling individual written feedback on the quality of the match to their chosen degree course. This feedback is based on their grades at high school, other information about their previous educational career, and the motivation letter they addressed to the university. As these recommendations are not binding, it is important for universities and policy-makers to assess whether prospective students do indeed take into account the information they are given when deciding where to enroll. This is particularly salient in the case of the students who are weakest academically and thus incur the highest risk of failure in their freshman year.

In this article, we examine the effect of recommendations emitted by one French university on students' enrollment decisions. We focus on those students receiving negative feedback, which encourages them to reconsider their choices[2]. These students are at risk of not being able to cope with the requirements of the degree they intend to enroll for, notably because they lack the necessary skills in mathematics and abstract reasoning. We do indeed find an impact of the university expressing its reservations regarding students' enrollment, cautioning that their skills may not be sufficient to ensure successful completion of the degree: receiving such feedback reduces the proportion of students enrolling for the degree course in question by 12 percentage points. This effect varies in size among the degree courses concerned and is not always significant at the five percent level. We thus find evidence that the academically weakest applicants, who may also be the least well informed about course requirements, do reconsider their choices when cautioned against enrolling, such that the AO policy does indeed help attenuate mismatches between students and their chosen degree courses.

Many recent studies show the importance of incomplete information in human capital investment decisions, both regarding the perceived payoff to different educational choices, and regarding students' perception of their own abilities. Some also testify of the possibility to improve choices by providing additional information. As an example, Jensen (2010) studies eighth graders from the Dominican Republic, documenting students' misperception of the returns to education. In his sample, pupils largely underestimate returns, and those randomly assigned to receive complementary information about the true payoffs are found to complete more years of education as a result. In the United States, Stinebrickner and Stinebrickner (2014) elicit freshmen's beliefs about their own academic ability and about the payoff to the degree course they are enrolled in. Following the cohort over time, they observe how these beliefs evolve and how they affect students' choices. For their sample, they find that drop-out rates can be explained by the evolution of individuals' beliefs in these two domains[3]. Echoeing this, on a French sample, Beaupère and Boudesseul (2009) describe the very patchy knowledge students who fail their first year of university have of the requirements of the university system, suggesting that here, too, additional information might have improved choices.

In this article, we take advantage of a natural experiment to measure the causal effect of the recommendations sent to prospective students on their enrollment choices for their first year at

university. The data we use stem from several departments of a large French university. From a certain point in time onwards, one of these departments elects to give all students indicating the desire to enroll the type of feedback described above, while the other one does not provide such feedback to prospective students. We compare enrollment rates between the treated students, *i.e.* those applying to the department providing feedback after a certain point in time, to untreated students: those applying to the same department, but before the implementation of the feedback policy, as well as those applying to different departments, in order to obtain an estimate of the causal effect of the feedback policy.

We thus contribute to the literature evaluating the effect of the provision of additional information to students or their parents on the former's educational careers. In the context of a US public school choice plan, Hastings and Weinstein (2008) examine whether providing supplementary information helps parents from disadvantaged backgrounds to pick good schools for their children, where school quality is defined by the proportion of students successfully graduating. Both the natural experiment and the field experiment whose data they exploit confirm that obtaining such information indeed orients parents towards better schools, and that attaining a school of better quality improves pupils' academic achievement. Avery (2010) carries out a field experiment to measure the impact of college counselling on high-achieving students from low-income backgrounds. Though many students did not attend all the counselling sessions the intervention offered, he finds that students' choices are affected, notably regarding their propensity to apply to more competitive colleges. Bettinger *et alii* (2012) implement a field experiment to evaluate whether students from disadvantaged backgrounds benefit from receiving assistance in applying for financial aid for college attendance. They find that the treatment group exhibits higher college attendance and persistence rates. Remarkably, benefits even trickle down a generation: among the children of the original treated participants they find that two year college completion rates increase by 8 percentage points, from 28 % to 36 %. Oreopoulos and Dunn (2013) provide information about the benefits of post-secondary education to high-school students, and as a consequence observe the treated to expect higher returns and also a higher educational attainment for themselves, as opposed to a control group who did not receive the information. In France, a randomized field experiment run by Goux, Gurgand and Maurin (2017) informs low-achieving students about high-school options which are adapted to their abilities. The group of students whose aspirations thus became more realistic, and who as a consequence chose the programs they were most suited for, were found to show a significant reduction in grade repetition and high-school drop-out. Azmat and Iriberri (2010) carry out a field experiment in secondary schools to examine the effect that providing students with feedback about their past performance has on their future educational attainment . They find that compared to the control group, the treatment group receiving such information saw mean grades improve by about 5%. Arcidiacono (2004) estimates a dynamic model of choice of university and major in which students have imperfect information about their skills. On French data, Beffy *et alii* (2012) estimate a sequential model of schooling decisions. Students choose their major comparing expected earnings and non-monetary characteristics of each major.

Of the numerous and diverse studies examining different angles of the impact of imperfect information on educational attainment, and the capacity of interventions to improve outcomes, a majority find a significant effect both on choices and on subsequent performance of providing additional information to students and their families. With respect to this literature, our paper's contribution is twofold: Firstly, the information transmitted to the students in our study concerns their competence relative to the requirements of the degree course they consider applying to. Such information is highly relevant in the French context where drop-out rates after the first year of undergraduate studies are extremely high. Secondly, the target population of the specific intervention we analyze are low-performing high-school students whose risk of failing their first year is very large. This constitutes a large inefficiency, both in terms of time lost for the students and in terms of public finances, as university attendance is practically free of charge in France and financed by the taxpayer. Thus the urgency of finding effective policy interventions improving the match between these students and their chosen degree courses is particularly high for this target population.

The data on which our study is based are already explored in a companion paper : Pistolesi (2017) studies the consequences of the same policy, on the same data set that we employ, but with a different identification strategy. He takes advantage of the fact that there exists a threshold grade in mathematics below which university staff sending the feedback are expected to indicate their reservations regarding the students' desired choice. This allows to apply a regression discontinuity design (Hahn *et alii*, 2001), comparing the decisions of students whose grades are situated just below the threshold to those with grades just above it.

He finds that negative feedback significantly decreases the propensity to enroll for the students at the margin of receiving negative feedback from the university. By the nature of a regression discontinuity design, the population of students whose behavior is be examined in his study is limited to those whose grades in mathematics situate them in

close proximity to the threshold below which the university tends to provide students with unfavorable feedback regarding their enrollment.

However, to provide a more complete evaluation of the AO policy, ideally the behavior of all low performing students should be taken into account, including those individuals whose grades situate them further away from this threshold. In the present study, we thus extend the work of Pistolesi (2017) using a different identification strategy, which allows us to examine the reaction to the installment of the policy of a much larger part of the treated population. We include all students whose grades situate them below the threshold, as opposed to only including those students at the margin of being treated as in the paper previously cited. Measuring the discouraging effect an unfavorable feedback has on the enrollment rates of all the population of academically weaker students is particularly salient for informing policies seeking to reduce drop-out rates. We also add to the previous study by including as an additional control group students from departments within the university which did not put in place the AO policy. This control group is thus constituted of students who are equally weak academically, but who are not provided with feedback on their choices prior to enrollment. Our study thus extends the work of Pistolesi (2017) to allow for a more complete evaluation of the AO policy and better inform policy makers. The following section describes the functioning of the feedback policy.

The Active Orientation policy and university enrollment decisions

Context

The AO policy was voted by the French Parliament on August 10th 2007 as part of the law n°2007-1199 on the « Independence and Responsability of Universities », commonly called LRU law. The article L123-3 of this law describes the AO policy as an important task of the public service of education. Higher education institutions, notably universities, are called upon to inform applicants about how well their desired course of study matches their educational background. The objective of this procedure is to prevent students embarking on degree courses they are not suited for, paving the way for future difficulties and contributing to the high drop-out rate after the first year of higher education.

Universities convey their feedback to students through a web-based platform called Post-Bac. Since 2009, each January, high-school students in their final year register on the Post-Bac site to compile a list of degree courses and higher education institutions they intend to apply to for entry in the fall term. They are allowed to list up to 24 combinations of degree courses and institutions, ranked by order of their preference. Higher education institutions then receive lists of all candidates having expressed an intention to enter one of their degree courses. This list equally contains detailed information on the students' previous education, such as the type of high-school they went to, the grades they received during their last two years of high-school, or the optional courses they chose.

Each department within a university is free to decide upon the criteria it deems most relevant in order to judge whether a student's skills correspond to the requirements of the degree course he intends to enroll in. The feedback students receive consists in one of three types of messages, which we will designate as « positive », « neutral », or « negative » regarding the student's intended choices[(4)]. From mid-April onwards, candidates have access to these messages when logging in to the Post-Bac website. They can then elect to maintain or modify their choices, taking into account the feedback they received. In July, after passing their final set of high-school examinations, students are either assigned to the non-selective degree course that tops their list of choices, or else, to the first selective one that accepts them.

In this study, we focus on a single French university that consists of three main departments, Law, Economics, and Business Administration and Communication. These departments differ in the way they provide students with feedback of the kind described above. One of them, we will call it experimental department, provides feedback to all applicants, sending an evaluation to all students expressing an interest to register in one of its degree courses. The other two departments, which we will call control departments, send feedback only to those candidates who ask for it. Under this latter system, only very few students ask for feedback; in total, around 4% do so in both control departments taken together over the period from 2008-2013. This represents 1736 of prospective students in those departments. Moreover, candidates in the treatment department receive feedback based on their grades in mathematics during their last year of high-school, whereas the control departments tend to evaluate students based on the major they chose in high-school. Although in the treament department no strict cut-off exists for evaluating students regarding their grade in mathematics, we observe that the probability of receiving a negative feedback increases sharply as students' grade in mathematics in high-school falls below 10 points out of 20. Similarly, we observe a sharp increase in the probability of receiving a positive feedback for students whose grades in mathematics are above 12 points. For students with grades between 10 and 12 the probability of receiving a neutral feedback is thus

very high. The faculty staff deciding on the recommendations are indeed advised to use as a principal criterion students' grades in mathematics, but it is at their discretion to also base their decision on additional information they obtain through the Post-Bac website, such as the average grade in the student's class, the motivation letter addressed to the university, or the reputation of the high-school the student attended[5]. For the present study, we use an identification strategy based on comparing the proportion of students enrolling, both among those whose grades situate them above *versus* below this threshold, as well as among different departments. The AO policy started in 2009, which leaves us with one year of data before the reform, covering the applicants of the 2008 cohort. These applicants did not receive any feedback no matter their chosen degree courses or their grades in mathematics.

Does negative feedback lead students to change their field of study?

The treatment we focus on consists in reception of a negative feedback, as opposed to a neutral one. We examine the impact this has on students' choice of the degree course they register for in their first year at university. We use the students applying to degree courses proposed by departments who do not issue such feedback as control groups. To reinforce the validity of our study, additional control groups are constituted by students applying to each of these departments and having obtained a grade in mathematics between 10 and 12 points. We thus measure the effect of receiving a negative feedback for treated candidates (*i.e.* those applying to the experimental department and with grades in mathematics below 10), compared to the non-treated candidates (*i.e.* those applying to the control department, or disposing of a grade between 10 and 12), and this during the period when the feedback policy was in place, compared to the year before that. This triple difference method is explained in more detail in the following section.

Identification Strategy

The aim of this study is to assess the causal effect of receiving negative feedback on students' decision to register in a given degree course at entry into university. This feedback is given to a specific group among them, those having obtained less than 10 points in mathematics in high-school; we call these the treatment group. To measure this effect we need to control for any systematic shock affecting the entry to the experimental degree courses correlated with the implementation of the AO policy. To neutralize any shock affecting enrollment to any degree course at a given point in time, we include time dummies for each period. We also include dummies for each type of degree course to account for permanent differences between the mean characteristics of the applicants between the degree courses. Finally, we include degree-by-year dummies to control for any shock specific to each course that is correlated with the start of the AO policy. To sum up, we compare candidates receiving negative feedback in the experimental degree courses to individuals in the same degree courses but who receive different feedback and we measure the relative change in the decision to register with respect to candidates in degree courses that did not implement this feedback policy.

This identification strategy mirrors closely, and extends, the difference-in-differences approach[6]. The latter method consists in comparing the evolution over time of a treated group, affected by the reform, to that of a control group not touched by it. However, our method has the advantage of requiring weaker assumptions, which suits our objective. In particular, it does not necessitate, contrary to the double-difference strategy, that the time trend of the explained variable be parallel for the treatment group and for the control group, since we use an additional degree of comparison: we not only compare students situated above and below the threshold grade in mathematics, but also between departments which did or did not implement the AO policy. Our difference-in-difference-in-differences (DDD) estimator only requires that there be no shock affecting simultaneously the relative choices of the treatment group in the same degree course and the same year as the start of the AO policy. This is often referred to as the Independence of Irrelevant Alternatives assumption (IIA) in the program evaluation literature.

To justify our use of the triple differences estimator we have to restrict our sample, for reasons detailed in the following. Among the degree courses French students register as their preferred choices, they are allowed to list several courses dispensed by the same university. Thus, in our case, students listing degree courses proposed by the experimental department may also list courses proposed by the non-experimental departments among their desired options, and *vice versa*. It therefore would not be credible to regard all students scoring below 10 points in mathematics and listing a non-experimental department as a control group not affected by the reform. Indeed, as students are allowed to list multiple options within the same university among the degree courses they consider desirable options for themselves, it is natural that the non-experimental departements will also be affected by this reform: Students having received a negative feedback when requesting entry into a degree course dispensed by the experimental departement and who are deterred by this information, are likely to turn not only to other universities, but as well to different degree courses within the same university. This is all

the more likely as the information they receive through the feedback pertains to their lack of mathematical skills, which would endanger their success in any degree course requiring such skills, be it at this university or another. Thus, it is natural that these students should rather turn towards degrees requiring less mathematical knowledge and abstract thinking, within the same university.

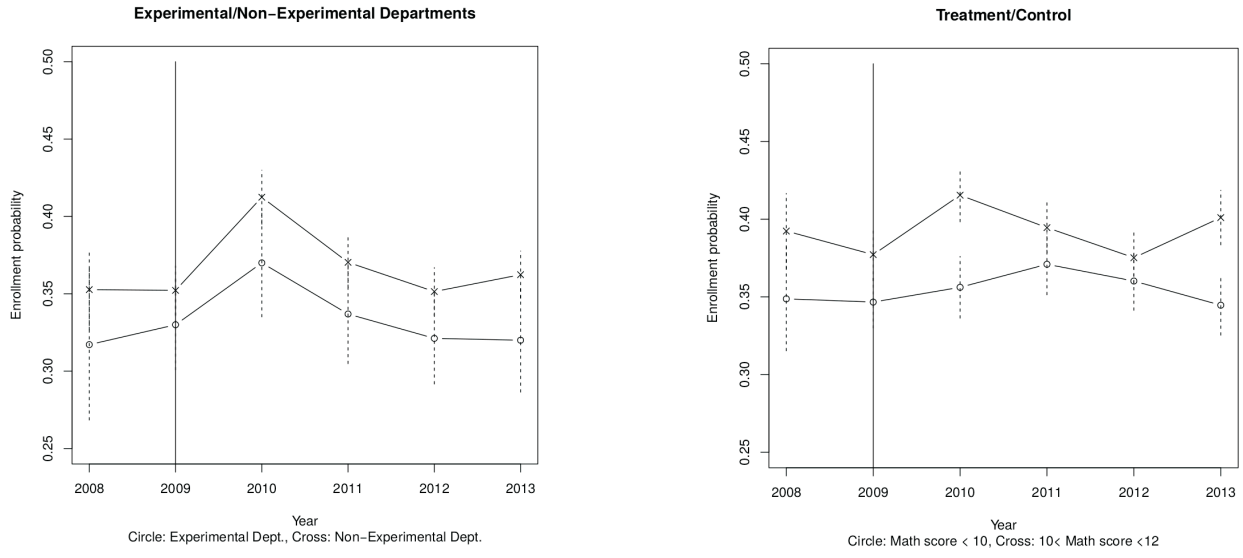
As a consequence, by including all students, what our estimator would capture is the relative change in enrollment rates between low- and higher-achieving students (the former likely to receive negative feedback, the latter not) within the department providing such feedback (the experimental one), compared to the relative change in enrollment between these two groups of students in departments not providing feedback (the non-experimental ones). This overall change in the relative propensity to enroll constitutes an interesting parameter in itself, but could not be regarded as a triple differences estimator due to the direct effect of the reform on enrollment in the non-exerimental degree courses. In order for the assumptions required by our estimator to hold, we therefore decide to eliminate from our sample those students listing as their desired options both degrees proposed by the experimental and the non-experimental departments of the university.

Data

We use administrative data of a French university, covering the years 2008-2013. To do so, we merge two databases: the first is based on information retrieved through the Post-Bac website. It collects details for students whose list of desired degree courses included one of those proposed by the university. These data include socio-demographics, such as age, gender, place of birth or nationality, but also a detailed account of the grades obtained in high-school, the name and location of the school, as well as a national student identification number. The Post-Bac data also contain information on the degree courses each student considers applying to, and on the kind of feedback they received as part of the AO policy whose impact we seek to evaluate. The second source of data we use stems from the administrative services of the university itself. It records the name and national identification number of all students enrolled at the university, as well as the degree course they are actually enrolled in. Unfortunately, we do not have access to the grades the students obtained once enrolled at university. Each year, around 10.000 senior high-school students list at least one of the degree courses the university proposes as a desired option. Around 3.000 of them then decide to enroll at the university each fall.

Figure 1 presents the change over time in the enrollment rate between 2008 and 2013 for several groups of students. The left hand side panel displays the proportion of applicants that register in the experimental department which provide feedback to all first year applicants, compared to those in the non-experimental departments which do not provide feedback. The right hand side panel displays the probability to register in the experimental department for those with mathematics grades below 10, compared to those with grades between 10 and 12. In both panels we do not observe any different change over time. If the time trend was different in any of the panels, it would not invalidate the hypothesis of our approach. As we use a triple difference approach, the parrallel trend assumption is not necessary.

Figure 1: Enrollment Rates by Year and Treatment Status



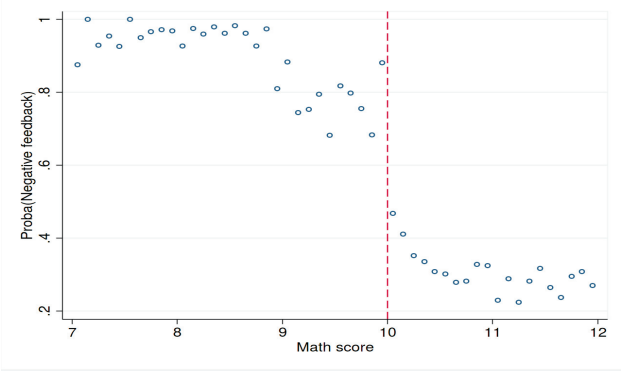
Notes : The graph on the left hand side shows the yearly enrollment rates separately for the experimental and non-experimental departments. The graph on the right hand side displays yearly enrollment rates separately for treated and control groups (Mathematics grade lower than 10/20 or between 10 and 12/20, respectively), the vertical gray line represents the year of the reform, dashed lines are standard errors.

A drawback of these data which needs to be kept in mind is that they do not provide information on the enrollment decisions of students who do not end up enrolling in one of the degree courses proposed by the university. We thus cannot tell whether students who decide not to enroll at this university go on to enroll at a selective course of study outside the university system (such as a « classe prépa », or « IUT »), whether they enroll for a non-selective degree course at another university, or else decide not to pursue post-secondary studies at all. This is an important drawback, but it seems likely that its implications are limited if we recall the type of students on whose decisions we study the impact of receiving negative feedback: this almost exclusively concerns those who obtain less than 10 out of 20 points in mathematics at high-school. These students are highly unlikely to be accepted for entry to selective degree courses. The option of renouncing from further studies altogether does not seem to be of major relevance either: national aggregate statistics show that almost all students having obtained high-school diploma pursue post-secondary studies during the time period covered by our data (MSER, 2015). Based on these facts, we can safely assume that most students reconsidering their choice due to unfavorable feedback will likely end up enrolling for a non-selective degree within the university system which poses weaker requirements on their skills in mathematics.

Figure 2 displays the probability to receive negative feedback according to students' high-school grade in mathematics. Over 90 % of students with a score below 10 out of 20 receive negative feedback. For those with a score above 10 and below 12 out of 20 this share drops sharply to around 30 %.

Our database initially contains information on 61.086 senior high-school students over the period from 2008 to 2013. We firstly eliminate from these data individuals who do not pass their final year of high-school in mainland France. Secondly, we only keep students having a grade of no more than 12 out of 20 points in mathematics in the first semester of their final year of high-school. Of those remaining, we keep those for whom none of the relevant variables is missing. Finally, we dropped the observations listing at the same time experimental and non-experimental departements from our sample, for the reasons discussed above. This reduces our sample by 8.414 observations based on the first criterion, by 20.062 observations based on the second one, by 442 observations due to missing variables and by 8.819 observations based on the fourth criterion. Our remaining sample thus yields information on the desired options listed, the type of feedback received (if any), and the enrollment choices of 23.349 senior high-school students between 2008 and 2013. Table 1 contains descriptive statistics based on our final sample.

Figure 2: Probability to Receive Negative Feedback by Mathematics Grade in High-School



Notes: The graph displays the probability to get a negative feedback relative to the score in mathematics in high-school in the experimental department from 2009 to 2013. The dash vertical line represents the math score of 10.

The left hand side panel displays figures for the students whose high-school grades in mathematics fall below 10 points, the right hand side panel covers those whose grades fall between 10 and 12 points. Within each panel, the different columns distinguish between the experimental department, that is the one giving feedback to all students, and the control departments, that do not give such systematic feedback. Furthermore, within each of these groups, we distinguish between the period before and those after implementation of the AO policy.

Table 1 shows that the proportion of students receiving unfavorable feedback is much higher among those whose grades fall below 10/20 in mathematics than for their peers scoring between 10 and 12 points: 86% relative to 31%, respectively. Students listing the experimental department among their options are somewhat more likely to be male than those listing the non-experimental ones (66% as opposed to 41%). The first group is less likely to receive a need-based scholarship than the second one (18 % as opposed to 27%)[(7)]. Otherwise, candidates in the two types of departments are comparable in all major characteristics: in terms of age, likelihood to enroll, nationality, whether they attend a general or a vocational high-school, whether it is a public or private school, and in terms of the distance of this school to the university. We observe some evolution over time in the composition of the different groups: Among those listing options from the experimental department, the proportion of students having attended a general high-school diminishes from 95% to 90%; the proportion of male students increases from 66% to 72% among the group scoring below 10 points in mathematics. In the regressions we use in the analysis, we control for these variables in order to obtain an effect that does not depend on these changes.

Table 1: Descriptive Statistics

	Grade in Mathematics <10/20						Grade in Mathematics >10 and <12/20					
	Non-Experimental Dept			Experimental Dept			Non-Experimental Dept			Experimental Dept		
	Before AO	After AO		Before AO	After AO		Before AO	After AO		Before AO	After AO	
Enrollment	0.31 0.46	0.35 0.48	0.11	0.37 0.48	0.32 0.47	0.31	0.37 0.48	0.39 0.49	0.51	0.29 0.46	0.33 0.47	0.29
Negative Feedback	0.00 0.00	0.00 0.00		0.00 0.00	0.86 0.35	0.00	0.00 0.00	0.00 0.00		0.00 0.00	0.31 0.46	0.00
Age	19.07 1.02	19.03 1.09	0.49	18.87 1.04	19.02 1.09	0.13	18.95 0.99	18.79 1.05	0.00	18.85 1.14	18.72 1.05	0.11
Male	0.41 0.49	0.42 0.49	0.75	0.66 0.48	0.72 0.45	0.18	0.35 0.48	0.35 0.48	0.85	0.67 0.47	0.64 0.48	0.28
French Nationality	0.93 0.26	0.93 0.26	0.93	0.92 0.27	0.90 0.30	0.48	0.93 0.25	0.94 0.24	0.47	0.89 0.31	0.93 0.26	0.10
Needs-based scholarship	0.27 0.45	0.25 0.43	0.33	0.18 0.39	0.20 0.40	0.71	0.23 0.42	0.23 0.42	0.65	0.22 0.42	0.15 0.36	0.01
General high-school	0.94 0.24	0.90 0.29	0.00	0.95 0.09	0.90 0.30	0.00	0.92 0.28	0.89 0.31	0.01	0.94 0.24	0.89 0.31	0.01
Public high-school	0.82 0.39	0.78 0.42	0.03	0.91 0.28	0.74 0.44	0.00	0.77 0.42	0.74 0.44	0.06	0.76 0.43	0.73 0.45	0.21
Distance to University	0.12 0.18	0.17 0.24	0.00	0.16 0.24	0.21 0.26	0.03	0.13 0.21	0.16 0.23	0.00	0.14 0.24	0.19 0.25	0.01
Observations	456	7970		114	1735		851	9453		236	2534	

Notes: The table indicates the average characteristics of the sample, along with standard deviations. Columns 1, 2, 7 and 8 describe candidates in non-experimental departments, columns 4, 5, 10 and 11 candidates in the experimental one. Columns 3, 6, 9 and 12 display p-values testing equality of the means before and after the reform for each group.

The effect of negative feedback on enrollment

Our analysis combines two diffence-in-differences strategies, one comparing experimental and non-experimental departments, and one comparing within these departments students receiving negative feedback and students that do not receive it. Table 2 illustrates the results using each of these identification strategy independently.

In this table, columns 1 and 2 display the result of the regression comparing the experimental department and the non-experimental one, before and after the reform. In column 1 the estimation is done without adding control variables, column 2 displays the results when all control variables are added. On average, students are 8 percentage points less likely to register when they receive negative feedback; the effect is significant at the 10% level. In columns 3 and 4, we perform the same analysis but using as a treatment group those students with grades in mathematics below 10 points and as a control group those with grades between 10 and 12 points. The estimated effect is very similar at around 8 percentage points. This effect is large, considering that the mean probability to register is 35 %. However, these two analysis rely on the assumption that the enrollment rates of the treatment and control groups follow similar trends. The difference-in-difference-in-differences approach is more flexible in this respect.

Table 3 illustrates the method of estimation in triple differences of the impact of negative feedback on students' enrollment decisions. Panel A compares the change in the enrollment rate for candidates in the experimental department who have a grade of less than 10 points in mathematics to the enrollment rate for those who equally have a grade of less than 10 points, but are candidates the non-experimental department. Each cell indicates the proportion of

Table 2: Difference-in-Differences Estimates of the Effect of Negative Feedback on Enrollment

	Dif-in-dif 1 Experimental/ Non-Experimental dept		Dif-in-dif 2 Maths grade<10 / Maths grade >10	
	1	2	3	4
Negative Feedback	-0.084 (0.051)	-0.085 (0.049)	-0.081 (0.055)	-0.071 (0.053)
Control Variables	N	Y	N	Y
Observations	10275	10275	4619	4619
R-squared	0.001	0.084	0.001	0.093

Notes: The table shows the effect of the negative feedback on the choice to enroll with two different dif-in-dif strategies. In columns (1) and (2) we compare students in experimental and in non-experimental departments before and after the reform. In columns (3) and (4) we compare students with a maths grade lower that 10/20 with students with a math grade between 10 and 12/20. In columns 1 and 2 we keep only observations with a math score below 10. In columns 3 and 4 we keep only observations in the experimental department.

students who enrolled, as well as the standard error of this proportion. After implementation of the AO policy, we observe a drop of 4.7 percentage points in the enrollment rate in the experimental department for this group of students. For non-experimental departments, those not providing systematic feedback to all students, we on the contrary observe an increase of 3.5 percentage points between the pre-implementation period in 2008, and the post-implementation period of 2009-2013. Overall, for students with grades in mathematics below 10 points, we thus observe a relative change of -8.3 percentage points in enrollment in the experimental relative to the non-experimental departments from 2009 onwards. To put this effect into perspective, 35% of students enroll in non-experimental degree courses, as shown in Table 1; the effect is thus sizeable. However, if there were shocks affecting only enrollment in the experimental department, or *vice versa*, at the same time period as the date of implementation of the AO policy, this difference-in-differences estimate would not be a correct measure of the causal effect of the policy. In panel B of Table 3, we therefore carry out the same exercise, again on candidates for both types of departments, but this time on those whose grades in mathematics fall between 10 and 12 points. They are suitable to serve as control groups as they are highly unlikely to receive a negative feedback. For this group, we find that under AO, the enrollment rate in degrees proposed by the experimental department increases by 2.1 percentage points relative to enrollment in degrees in the non-experimental departements. This increase is not significant at the standard thresholds though. We obtain our triple-difference estimate if we now take the difference between the values obtained in each of the two panels. The result is displayed at the bottom of the table. We find that with respect to the time period before the AO policy, the enrollment rate afterwards is 10.5 percentage points lower for students whose high-school grade in mathematics is below 10 points, and who are candidates for a degree in the experimental department applying the feedback policy, compared to students in the same department whose grade in mathematics lies between 10 and 12 points, and to students in the other departments. However, this effect is only significant at the 10% level.

The above triple differences estimator amounts to a mere comparison of mean enrollment rates between different groups. To obtain more precise estimates of this effect, we use a linear regression analysis. This allows to control for observed heterogeneity and thus to reduce the standard error of the coefficients. The estimating equation we use is the following one:

$$(1)\ y_{ijt} = \alpha + \beta_1 X_{ij} + \beta_2 \tau_t + \beta_3 \delta_j + \beta_4 F_i + \beta_5(\delta_j \times \tau_t) + \beta_6(\tau_t \times F_i) + \beta_7(\delta_j \times F_i) + \beta_8(\delta_j \times \tau_t \times F_i) + \varepsilon_{ijt}$$

where i indicates individuals, j indicates degree courses (with 1 denoting degrees dispensed by the experimental department, and 0 all others) and t denotes time periods (taking the value 1 for periods after implementation of the policy, and 0 otherwise). y_{ijt} represents the decision to enroll at university (taking the value 1 if the student enrolls, 0 otherwise), X_{ij} is a vector of observed individual characteristics and of those of the high-school attended, δ_j is a department fixed effect, τ_t a fixed effect for each time period, and F a dummy variable for students whose high-school grade in mathematics is below 10 points. The coefficient of interest is β_8. Just as the overall effect obtained in

Table 3: Triple difference estimates of the negative feedback on enrollment decisions

	Before start of AO	After start of AO	Difference between periods
A. Treatment group: Candidates with grades of less than 10 points out of 20 in mathematics			
Experimental Department	0.368	0.320	-0.047 0.046
Non-Experimental Departments	0.311	0.347	0.035 0.021
Difference between departments	0.057	-0.027	
Difference in Differences	-0.083 0.051		
B. Control group: Candidates with grades between 10 and 12 points in mathematics			
Experimental Department	0.292	0.325	0.032 0.031
Non-Experimental Departments	0.374	0.386	0.011 0.017
Difference between departments	-0.082	-0.061	
Difference in Differences	0.021 0.035		
Difference in Differences in Difference	**-0.105** **0.062**		

Notes: The table shows the enrollment probabilities for first year of studies for different groups of students, along with the corresponding standard deviations. The first column describes these probabilities in 2008, the second column between 2009 and 2013.

Table 3, described above, it measures the change in the enrollment rate of the treated individuals from the date of implementation of the AO policy in the department applying the policy, compared to students with higher grades in mathematics, or who are enrolled in other departments. The control variables X_{ij} include age, gender, nationality, (1 indicating French individuals, 0 all others), socio-economic status as measured by having received financial aid in high-school, and indicators for taking additonnal optional courses during high-school. The characteristics describing the high-school attended include: an indicator for public *versus* private status, if it is a general or vocational high-school, the distance between the high-school and the university, as well as the squared distance. Finally, the quality of the high-schools students attented is assessed by the pass rate of the final high-school examinations (the French A-level equivalent, called *baccalauréat*).

Results from estimations of equation (1) are displayed in Table 4; each column corresponds to a different specification. In these regressions, to compute standard errors we follow Bertrand *et alii* (2004) and we cluster the standard errors at the group level (experimental *versus* non-experimental and math grade lower than 10 *versus* larger than 10). In the first column, no explanatory variables are added to the regression, so that we reproduce the result shown in Table 3: a treatment effect of 10.5 percentage points, significant at the 9.8% level only. In column 2, we see that introducing the time invariant control variables X_{ij} improves precision as we are able to explain a larger share of the variance: the estimated treatment effect is slightly larger in absolute value at 12.7 percentage points and is now significant at the 5% level. The third column shows the coefficients resulting from a specification replacing the indicator variable for the post-implementation period by five indicators, one for each of the five post-implementation years included in our data, 2009 up to 2013. This captures yearly fluctuations in enrollment rates across all degree courses, and thus reduces the share of unexplained variance, such that the estimated coefficient of -12.1 percentage points is significant at the 5% level. Finally, the fourth column displays results from an inclusion of period-by-department dummies, that is, interaction terms between the indicators for the experimental *versus* non-experimental departments and a linear time effect (see Angrist et Pischke, 2008). With this regression, we obtain a coefficient of -12.8 percentage points. It is almost identical in size to the previous specification. This indicates that our results are robust to time varying shocks affecting experimental and non-experimental departments differently. These findings thus lead us to confirm the conclusion that those candidates receiving negative feedback are about 12 percentage points less likely to enroll than their peers receiving neutral feedback, a coefficient significant at a 5% level in our regression specification.

Table 4: Regression Analysis: Effect of Negative Feeback on Enrollment

	Dependent Variable: Share of Candidates Enrolled			
	1	2	3	4
Negative Feedback	-0.105 (0.063)	-0.127 (0.061)	-0.121 (0.061)	-0.128 (0.061)
Control Variables	N	Y	Y	Y
Year dummies	N	N	Y	Y
Departmental trends	N	N	N	Y
Observations	23349	23349	23349	23349
R-squared	0.003	0.081	0.075	0.097

Notes: Column 1: DDD regression without controls; Column 2: DDD regression with controls; Column 3: DDD regression with controls and dummies for each treatment year; Column 4: DDD regression with controls and year-departments dummies. In parentheses are clusterd standard errors at the group level.

Table 5 shows the regressions corresponding to the specification used in column 3 of Table 4 (inclusion of time dummies for each period), but distinguishes between different treatment groups, all composed of candidates for entry into degree courses proposed by the experimental department. They but differ either in either their mathematics grades at high-school, or else in the degree course they enroll in among those offered by the experimental department. The first column reproduces the results from Table 4 to allow for easy comparison. The second column of Table 5 restricts the sample of treated students to those whose grade in mathematics at high-school falls between 7 and 10 points out of 20; arguably a more homogeneous group that is also more similar to their peers in the control group[8]. The estimated treatment

Table 5: Effect of Negative Feedback on Enrollment for Different Treatment Groups

	Dependent variable: Share of Candidates Enrolled				
	1	2	3	4	5
Mathematics grade <10/20	0.127 (0.061)				
Mathematics grade >7 and <10/20		-0.107 (0.062)			
Candidates for Z1			-0.163 (0.118)		
Candidates for Z2				-0.116 (0.079)	
Candidates for Z3					-0.166 (0.118)
Control Variables	Y	Y	Y	Y	Y
Observations	23349	23093	19616	21329	19864
R-squared	0.081	0.080	0.082	0.082	0.079

Notes: The table shows the effect of negative feedback on the choice to enroll for different sub-groups of treated students. (1) Main specification. (2) Restricts group of treated students to those with grades in mathematics between 7 and 10/20, (3) restricts the sample to candidates for Z1 (4) restricts the sample to candidates for Z2 (5) restricts to candidates for Z3. Z1, Z2 and Z3 refer to different degree courses within the experimental department, as outlined in the main text.

effect decreases slighlty in absolute value, but is still close to the one we obtained before, at -10.7 percentage points.

Columns 3 to 5 of Table 5 divide the sample of individuals composing the treatment group according to the degree course dispensed by the experimental department that they listed. In the experimental department there are three degree courses that we will call Z1, Z2 and Z3. Z1 integrates elements of the humanities and therefore necessitates good French langage skills, both written and oral, Z3 is more technical with a heavy weight given to mathematics, and Z2 is in between the two previous degree courses in terms of skill requirements. These three different degree courses use the same feedback system and apply the same criteria according to which feedback is given. The third column of Table 5 restricts the treatment group to candidates for degree course Z1, the fourth column to candidates for Z3, and the fifth to those who are candidates for Z2. The estimated treatment effect of receiving negative feedback is close for candidates for Z1 and Z3, and a little higher in absolute value than the one obtained from estimation on the whole sample: -16 percentage points. For candidates to Z2, we obtain an effect that is smaller in absolute terms, -11.6 percentage points, and not significant.

Table 6 displays results from further robustness checks. They are obtained, firstly, by varying the time periods taken into account for the treatment period, so as to evaluate possible differences between short and longer-term effects of the policy. Secondly, we also differenciate treatment groups by the region of residency of the students' parents, and by the type of high-school they attend. By comparing results for these different sub-groups of the treated students, we assess whether the effect is homogeneous across the treated population of students.

The first column compares enrollment rates between the period before implementation of the AO policy, 2008, and the first year it was in place, 2009. The second column restricts the treatment period to the second year the policy was in place, 2010. Comparing the coefficients obtained for the different years allows to assess whether the medium term effect of the policy, as measured 3 to 5 years after implementation, differs from that observed during the first years. We observe only the slightest difference between the coefficients: the effect size ranges from -9.1 to -13.2 percentage points whitout any clear time pattern. The precision of the estimates is lower as we divide the sample, and thus reduce its size: the estimated coefficients are only marginally significant.

The estimates displayed in the sixth column of Table 6 result from restricting our sample to students living in the same region as the university. They represent the majority of candidates. We find that the estimated coefficient is indeed larger in absolute value for students originating from the same region as the university: receiving a negative feedback as opposed to a neutral one reduces the probability of enrollment by 13.2 percentage points. This is likely due to the fact that students from other regions tend to list this university as one of their less desired options ; they first try to gain entry to a university closer to their home. Thus, they often decide not to register at this university in any case, independently of the feedback they receive. The effect of feedback for this group is thus weaker, and excluding them therefore increases the estimated coefficient's absolute value. Finally, column 7 lists the results of a regression where the

Table 6: Effect of Negative Feedback on Enrollment: Robustness Checks

	Dependent Variable: Share of Candidates Enrolled						
	1	2	3	4	5	6	7
AO in 2009	-0.091						
	(0.067)						
AO in 2010		-0.126					
		(0.069)					
AO in 2011			-0.132				
			(0.069)				
AO in 2012				-0.112			
				(0.068)			
AO in 2013					-0.101		
					(0.071)		
Same Region as University						-0.132	
						(0.069)	
General High School							-0.064
							(0.053)
Control Variables	Y	Y	Y	Y	Y	Y	Y
Observations	6152	5446	5896	6284	6199	15590	18147
R-squared	0.087	0.154	0.072	0.070	0.066	0.039	0.090

Notes: The table shows the effect of negative feedback on enrollment for different sub-samples of the treated students. Column 1 restricts the treatment period to 2009. Column 2 restricts to 2010. Column 6 focuses on students living in the same region as the university. Column 7 includes only students attending a general high school.

sample is constituted of students attending a general high-school, as opposed to a vocational one. These students are on average more likely to go on to study for higher education degrees which take longer to complete, such as the ones we examine here. We do not find any marked difference in effect size for these students however; the estimated drop in the likelihood to enroll is 6.4 percentage points.

In Table 7 we propose different placebo tests of the previous results. In Panel A, we use different « mock » treatment and control groups, none of which are affected by the reform. In the first column, we define as treated the students applying to the non-experimental departments and whose mathematics grade lies below 10 points. They have never received any feedback and should not be affected by the reform. As a control group we use students applying to the same non-experimental departments but with a grade above 10 points. In our difference-in-differences analysis, the estimated effect should not be statistically different from 0. In columns 2 the control group consists in students applying to the experimental department and those math grades are higher than 10, in column 3 we keep the latter group as control but change the treatment group to students applying to the non-experimental department and those math grades are larger than 10. We do not find a significant effect in any of the three regressions. Finally, in panel B, we change the definition of the dummy variable measuring the treatment year, posing a « mock » treatment date later than the actual date of implementation of the policy. The estimated effect of the negative feedback remains not statistically different from 0 for all of the four regressions. We conclude that the placebo tests do not yield significant estimates in any of the seven estimations described above.

An important aim of our study is to compare our results to the companion study of Pistolesi (2017) whose results we extend. He uses a regression discontinuity design to study the effect that receiving feedback has on the decisions of individuals whose math grades are close to the cutoff values at which the propensity of receiving one kind of feedback or another changes sharply. From his study, we thus obtain information on the reaction of these individuals only. For example, he observes that for individuals whose maths grades are close to 10/20, receiving negative feedback by the university results in a drop in their propensity to enroll of 10 to 12 percentage points. The design of our study enables us to extend the assessment of this treatment effect to students situated further from this threshold, for example to those whose maths grades are far below 10. To obtain a differential effect of receiving negative feedback according to the students' grade in maths, we add an additional term to our previous regression, which captures the interaction between the maths grade and the treatment dummy. Our new estimating equation is thus as follows:

$$(2)\ y_{ijt} = \alpha + \beta_1 X_{ij} + \beta_2 \tau_t + \beta_3 \delta_j + \beta_4 F_i + \beta_5(\delta_j \times \tau_t) + \beta_6(\tau_t \times F_i) + \beta_7(\delta_j \times F_i) + \beta_8(\delta_j \times \tau_t \times F_i) + \beta_9(\delta_j \times \tau_t \times F_i \times Math) + \varepsilon_{ijt}$$

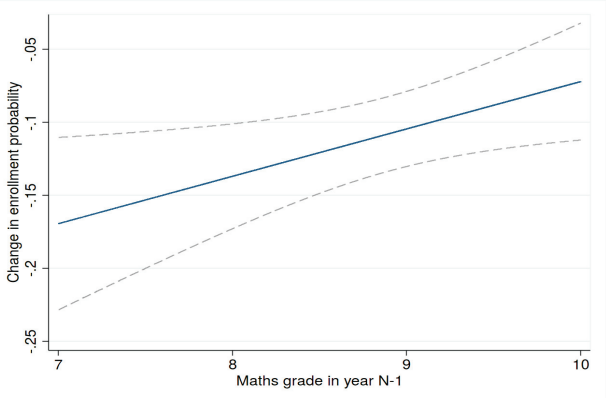
Table 7: Placebo tests

	Dependent Variable: Share of Candidates Enrolled			
Panel A: Alternative Treatment and Control groups	1	2	3	
T: Non-Exp Grade<10 C:Non-Exp Grade>10	0.048			
	(0.038)			
T: Non-Exp Grade<10 C: Exp Grade>10		0.010		
		(0.038)		
T: Non-Exp Grade>10 C: Exp Grade>10			-0.034	
			(0.036)	
Controls	Y	Y	Y	
Observations	18730	11196	13074	
R-squared	0.075	0.073	0.073	
Panel B: Alternative Treatment and Control groups	1	2	3	4
Treatment in 2010	-0.074			
	(0.047)			
Treatment in 2011		-0.035		
		(0.046)		
Treatment in 2012			-0.030	
			(0.045)	
Treatment in 2013				-0.027
				(0.045)
Controls	Y	Y	Y	Y
Observations	23349	23349	23349	23349
R-squared	0.076	0.076	0.076	0.075

Notes: The table shows the effect of negative feedback on enrollment for different placebo tests. In Panel A won consider alternative treatment and control groups. In panel B in change the treatment year.

The results we obtain when estimating this equation are displayed in table A.1 in appendix 2. The coefficient on the interaction term is positive and significant at the five percent level. Thus, the propensity to enroll diminishes more for those students having the lowest math grades among the treated students. The deterrence effect of receiving negative feedback is therefore strongest for the weakest students. This result highlights the importance of the present study with respect to Pistolesi (2017) : our approach allows to show that the treatment effect is very different for those students whose grade in mathematics is close to 10, compared to their peers whose grade is around 7 or 8 in mathematics in their final year of high school. We graphically represent the variation in the treatment effect according to the treated students' maths grade in figure 3. This graph shows the difference in the propensity to enroll predicted by regression (2) between two hypothetical individuals, one from the non-treated group and one from the treatment group, whose observable characteristics are fixed at their sample means. We observe the change in this difference when we let the math grade of the treated individual vary from 7 to 10. For students whose grades are close to the threshold of 10 points out of 20, receiving a negative feedback results in a drop of eight percentage points in the propensity to enroll. For those students whose grade in mathematics is around 7 points we observe a drop in the propensity to enroll of nearly 16 percentage points. The effect of receiving negative feedback on enrollment is thus very heterogeneous in this dimension. Our finding that the Active Orientation policy induces in particular the weakest students, who are least suited for the degree course they applied for, to reconsider their choices is crucial to evaluate its importance as a policy tool that seeks to lower dropout rates and improve the match between students' ability and their chosen degree courses at university.

Figure 3: Change in enrollment probability relative to the math score for receiving a negative feedback



Discussion and Conclusion

In this study, we examine whether the "Active Orientation" policy has an impact on the kind of degree course students decide to enroll in for their first year at university. Students whose skills in mathematics the university deems to be too low to successfully complete the degree course they intend to enroll for will more often modify their choice if informed of their low chances of success in their preferred subject. Among students having listed a degree course as a desired option, the enrollment probability diminishes by about 12 percentage points after implementation of the AO policy, under which feedback is provided to all students expressing the desire to enroll. This drop is a sizeable effect when compared to an average enrollment probability of 35 percent before implementation of the policy. We find this result to be robust across different specifications, notably regarding different definitions of who constitutes the treated group of students. The deterrence effect of receiving negative feedback is greater for students living in the same region as the university, and for those whose chosen specialization in high-school is less relevant to the subject of the degree course they intend to enroll in.

However, it is important to qualify these findings, due to several factors. Firstly, the estimated coefficient is only marginally significant at the five percent level. This is notably due to the fact that the data available only cover a single year of observations before implementation of the feedback policy, namely those students entering higher education institutions in the fall of 2008. To our knowledge, no data have been collected before 2008, since the Post-Bac website did not yet exist. As a consequence, the sample size regarding the pre-implementation period is small. The comparison of the periods before and after implementation of the policy is thus less precise than it would be were additional cohorts of students observed before 2008.

Extensions that should be explored in future work include a closer examination of the destination of students changing their mind following the negative feedback received. The data we have obtained so far do unfortunately not allow us to pursue this question further. Another important dimension to take into account for an evaluation of the effectiveness of the feedback policy is of course the possible changes that occured in drop-out rates after the first year at university, as well as in mean grades in first year examinations, or indeed in the proportion of students graduating with a three year undergraduate degree. As the policy was implemented with the aim of lowering the failure rates during the first years of university studies, it is crucial to find out whether on average students achieve better results at the end of their first year, and if those students who against the

advice given to them decide to go ahead with their original plan and enroll, do indeed worse during their subsequent studies. We aim to pursue our study of the AO policy in the directions outlined above in work to be carried out in the near future.

Notes

(1) The «Plan Réussite en Licence» (2008-2012) is the most famous example.

(2) This represents the least favorable feedback out of three types of recommendations emitted: the other two indicating a «neutral» or a «positive» message.

(3) Avery and Kane (2004) and Hastings *et alii* (2015) also document the lack of information of high school students on higher education.

(4) The exact phrasing of the messages is given in the Appendix.

(5) In a companion paper, Pistolesi (2017) uses the discontinuity between the numerical score in mathematics in high school and the probability to enroll to assess the causal impact of the feedback.

(6) Gruber (1994) is the first study introducing the DDD estimator in a very different context.

(7) Combining matching and difference-in-differences would be a solution to control for the differences in mean characteristics between treatment and control groups. Using a triple difference strategy with covariates controlling for departement dummy variables is an alternative solution.

(8) We tested the effect of imposing different restrictions on the lower bound for the mathematics grade, with similar results.

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Appendix 1: Content of the Feedback Sent to Candidates for Entry Into the First Year of an Undergraduate Degree

The feedback given to students who express their desire to register for a degree course is sent *via* the Post-Bac website. There are three options: positive, neutral and negative feedback. The text these messages contain is standardised and exactly the same for any student receiving the same kind of feedback. The three messages are:

Positive feedback: "*You expressed the wish to enroll in the first year of an undergraduate degree in X at Z University. After examination of your application form we approve of your choice. We would nonetheless like to remind you that to study for this degree requires a sound knowledge of mathematics, the capacity to handle a large workload and a taste for abstract reasoning*".

Neutral feedback: "*You expressed the wish to enroll in the first year of an undergraduate degree in X at Z University. After examination of your application form, we would like to express some reservations regarding your choice. From the grades you obtained, and from the options you chose in your last two years of high-school, it seems to us that your mastery of the skills required for this degree course is insufficient as yet. However, if you are highly motivated and ready to work extremely hard, enrollment in this degree may still be a viable option. We would like to remind you however that studying for this degree requires a sound knowledge of mathematics, the capacity to handle a large workload and a taste for abstract reasoning*".

Negative feedback: "Y*ou expressed the wish to enroll in the first year of an undergraduate degree in X at Z University. After examination of your application form, we have to advise you against this choice. Successfully studying for this degree requires a sound knowledge of mathematics and a taste for abstract reasoning, and your profile does not seem to correspond to these requirements. We invite you to contact your school's career counselor".*

Appendix 2

Table A.1: Estimated Effect of the Negative Feedback by Math score

Dependent variable: Share of candidates enrolled	
Negative Feedback	-0.396 (0.142)
Negative Feedback*Math score	0.032 (0.014)
Constant	0.375 (0.016)
Observations	23349
R-squared	0.005