

# Improve academic performance and social support by facilitating adaptation in the university

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## ABSTRACT

In Colombia and Latin America, barely one half of students who are admitted to higher education actually completes their studies and obtains a college degree within a six-year period. Such incommensurable attrition poses huge social and economic costs, given the inverse relationship between education and factors like poverty, inequality, violence, health issues, and mortality. Therefore, understanding this phenomenon and its determinants, and effectively reducing attrition rates should be a priority in government and universities' agendas. Both for socially re-

sponsible and for strategic reasons, higher education institutions should strive to improve retention rates and increase students' likelihood of successfully graduating from their programs. Based on our first-hand experience in a private business school in Colombia, we estimate the effect of the Student Follow-up and Retention Program using a regression discontinuity and difference-in-differences empirical strategies, that will help improve retention and increase students' likelihood of successfully graduating.

## INTRODUCTION

Achieving a compromise between conflicting goals is often a grueling task for higher education institutions. For many universities, for instance, it is a mission mandate to balance sustainabil-

ity with selectivity. That is, institutions must enroll enough new students to break even, and hopefully make a profit to reinvest, but they also have to attract and select qualified prospects, apt for demanding academic programs. Also, after admission, great efforts must be made to ensure that students make it through the program and graduate, without reducing or affecting the academic standards. Such balance is not only a particularly compelling challenge, but also one that requires priority attention.

Education is one of the most significant factors in reducing poverty, inequality, violence, health issues, and mortality (Janvry & Sadoulet, 2000; Krueger, Male, & Ková, 2003; Lleras-Muney, 2005), so every conceivable effort should be made to ensure that as many people as possible complete their education, without lessening quality.

Whereas the previous rationale is true for any country and educational system, it is particularly urgent in emerging economies, where student attrition reaches alarming levels (Fox, 1986; Gershberg, González, & Meade, 2012). In Colombia, college dropout rates average about 50%, nationwide and across different disciplines (J. H. Escobar, 2007), as shown in Table . That is, barely one half of students who are admitted to higher education actually completes their studies and obtains a college degree, within a six-year period.

As shown in Table 1, this sad reality is also common to most other Latin American countries, which poses foreseeable—albeit immeasurable—consequences (De Vries, León, Romero, & Hernández, 2011). Quite evidently, understanding higher education attrition and its determinants—and, more important, effectively reducing attrition rates— should be a priority in government and universities’ agendas (Bennett, 2003). The Colombian Ministry of Education, for instance, has advanced several initiatives aimed at reducing college attrition, including incentives for higher education institutions that consistently and significantly improve their retention rates (MEN, 2008, 2010). Quite evidently, both for socially responsible and for strategic reasons, higher education institutions should strive to improve retention rates and increase students’ likelihood of successfully graduating from their programs.

**Table 1. Cumulative attrition rates by areas of knowledge in Colombia.**

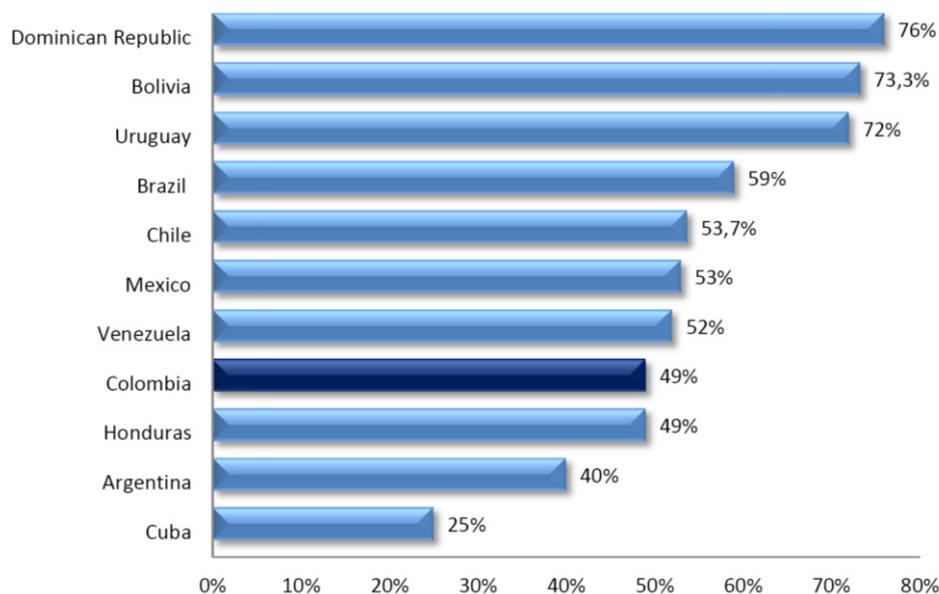
Academic areas	1st Semester	5th Semester	10th Semester
Engineering, Architecture, Urbanism	23,16%	46,13%	55,58%
Arts	19,95%	40,87%	52,50%
Economics, Management and Business	21,37%	41,26%	50,98%
Agronomic Science and Veterinary Medicine	20%	41,37%	50,67%
Education Sciences	19,15%	38,23%	47,65%
Basic Sciences	19,45%	40,22%	46,92%
Social Sciences	18,13%	35,33%	45,41%
Health Sciences	13,92%	29,99%	38,61%

Source: (MEN, 2008).

In response to the Ministry of Education initiatives, universities set up retention programs but an adequate evaluation of those programs has not been developed. This paper attempts to estimate the causal effects of the Student Follow-up and Retention Program (SFRP) with a regression discontinuity (RD) design based on our first-hand experience in a private business

school in Colombia. First, we use the criteria established by the University to dismiss students based on the student's semester-GPA which depending on their score can allow them to just make or miss the cut-off. Second, although students are aware of the criteria, they are not able to manipulate their grades to avoid being dismissed from their undergraduate programs.

Figure 1. Attrition rate in Latin American Universities. Source: (A. B. Escobar & Dueñas, 2014).



RD design results do not evidence a statistically different effect in the students GPA. Alternatively we estimate a Difference in Differences model in order to have a broader measure of the program's impact and we find that the effect on GPA is positive and statistically significant.

## THE PROGRAM

After overcoming the high-entry barrier of selective schools, students are faced with a new challenge of obtaining satisfactory grades, preferably those that allow them to swim comfortably without having academic problems. Even if they manage to attain the minimum entrance scores in standardized tests, many of them fail to maintain the grade point average (GPA) required to stay in college and are hence dismissed from the programs, or simply bail out because of the multiple pressures of a radically alien environment.

We argue that much of this dropout phenomenon relates to an inappropriate fit between the student entrance skills and the university's requirements. Moreover, because many highly competitive colleges and universities assertively attract and enroll students from diverse backgrounds, student population is increasingly heterogeneous in terms of socio-economic strata, ethnicity, culture, and schooling. Inevitably, such heterogeneity fosters large gaps in academic, social, and cultural skills, between students coming from low-income households or under-represented minorities and those raised under more privileged conditions. Despite such disad-

vantages, many students transcend their background and handicaps, manage to attain the minimum standards, and eventually graduate from college.

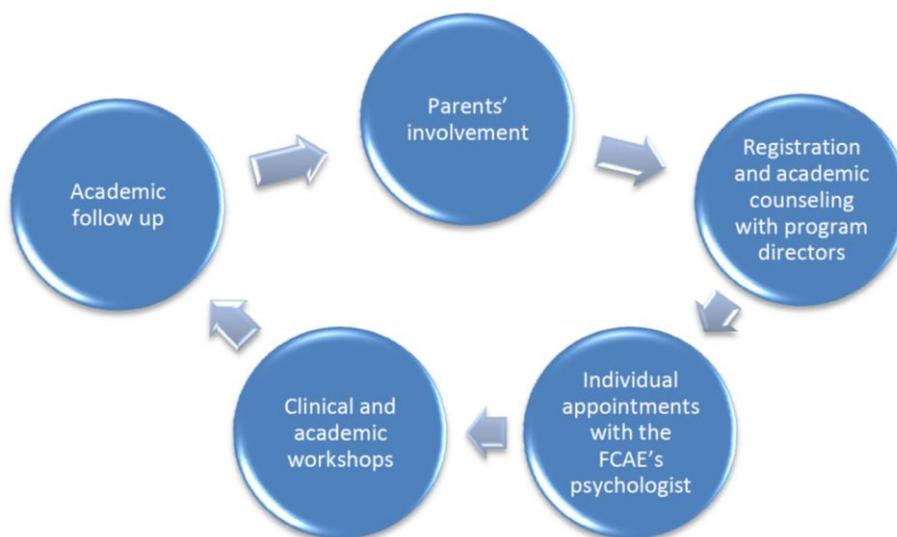
Other students are not as lucky and because of their academic performance, are dismissed from the university after being in academic probation for two consecutive semesters. Evidence shows that even after being in academic probation for one semester students are not able to develop strategies that allow them to rise their semester GPA and return to good academic standing. This fact is enough to prove that giving students a chance to recover their good academic standing without any other intervention is as good as doing nothing.

### THE STUDENT FOLLOW-UP AND RETENTION PROGRAM APPROACH

As shown by extant evidence, merely giving students another chance is not helping them. Schools should implement academic and psychological support systems that effectively increase academically vulnerable students' chances of survival. That, precisely, was the intention upon implementing our school's SFRP) for readmitted students. At our business school, readmitted students are students who, having been dismissed for low academic performance, are granted readmission for one term, under an academic probation status. If they succeed in attaining a minimum GPA of 3.4 at the end of their academic probation term, they regain their regular academic status.

The main objective of the SFRP is to increase the enrolled students' retention through a clinical intervention aimed at providing both academic, in order to improve their academic performance, and social support, to facilitate their adaptation to university life. Figure 2 illustrates the general process involved in the SFRP program.

Figure 2. SFRP program's general process.



Source: (A. B. Escobar & Dueñas, 2014).

The university gives students the opportunity to continue their studies if they are willing to participate in the SFRP. This program reassures both parents' and students' self-esteem by making them feel part of the University and caring for their special conditions. SFRP began in

January 2010 and most dismissed students at the time were readmitted to give them an opportunity to make part of the program.

The main objective of the SFRP is to increase the enrolled students' retention in the five undergraduate programs of the School. Students are exposed to both a clinical intervention and academic support in order to improve their academic performances and social support to facilitate their adaptation to university life.

These interventions are implemented through several actions:

#### 1. Parents involvement

The program begins with a general meeting where parents and students are invited, in order to present them the program and explain the conditions for their participation, so they can decide if they are willing to participate in the program. Parents receive academic information of their children, so they can identify their academic hindrances.

Additionally, parents have the opportunity to clarify doubts about the academic process with the undergraduate program director and the School psychologist. Also, students' parents or guardians are asked to complete a custom questionnaire that provides additional insights on the students' study habits.

#### 2. Registration and academic counseling with program directors

Given that students have to overcome their academic or personal challenges, the School allows them to register a maximum of three courses under the advice of their program directors in order to balance their course load.

#### 3. Individual appointments with the School's psychologist

As a norm, students participating in the SFRP are asked to complete the Learning and Study Strategies Inventory (LASSI), a metacognitive test that assesses their learning abilities and study strategies (Nist, Mealey, Simpson, & Kroc, 1990). Based on the LASSI results the FCAE psychologist prepares an individual profile of the students which allows her to identify critical aspects that should be addressed during the individual sessions. Depending on each case some students are scheduled for several appointments while others have to attend at least one appointment. For specific cases, students are advised to receive additional psychological treatment outside of school.

#### 4. Clinical workshops

Based on the LASSI results the School's psychologist groups students and schedule workshops that are aimed at providing them tools to overcome their hindrances.

Workshops are given on a weekly basis for ten weeks during the semester and they undertake time management, anxiety or study practices.

#### 5. Academic workshops

Some students need reinforcement on math courses which we have identified as the more challenging each term. These workshops have an intensity of 2 hours a week and are offered

by math and statistics department teachers with a slightly different methodological approach in order to meet the students’ needs.

6. Professional career orientation

During individual appointments with the FCAE’s psychologist students may express that they are not so sure about their undergraduate program choice. In order to guide these students, the psychologist helps them to identify their vocational interests and preferences.

7. Academic follow up

Program directors gather students’ grades up to the eighth week in order to identify critical cases. With this information program directors and the School’ psychologist meet with students in critical situations in order to discuss their academic results and design a plan to successfully finish the semester.

An important departure point for the SFRP, relative to more conventional retention initiatives common in Colombia, involved reframing the problem and revising the definition of attrition. Early research vaguely defined attrition as the act of withdrawing from college before attaining a degree (Tinto, 1975). More recent definitions approach the concept in terms of the student’s attitude, defining it as a “lack of commitment to academic goals from and individual” (Bean, 1982). For our studies, we subscribe to contemporary views that synthesize attrition as the combined result of individual, academic, institutional, and socioeconomic determinants (Castaño, Gallón, & Vásquez, 2008). Consequently, we analyze the SFRP’s effects in terms of four determinants, supported on previous research on the theory of attrition, namely individual, academic, socioeconomic and institutional (see Table 2). Each of the four determinants can be associated with at least one variable in our data that allow us to validate the findings of previous research on attrition.

Table 2. SFRP’s approach to determinants of attrition.

		SFRP
Attrition Determinants	Individual	Individual appointments
		Clinical workshops
	Academic	Registration and academic guidance
		Academic workshops
		Academic follow up
		Professional orientation
	Socioeconomic	Parents involvement
		Counseling
	Institutional	Registration and academic guidance
		Individual appointments

Source: (A. B. Escobar & Dueñas, 2014).

An important motivation for this paper, and for a more thorough understanding of the effects underlying the entire attrition-retention situation, relates to our concern for students who barely pass the cut-off threshold for dismissal. That is, students who get a less than 3.4 grade

point average (GPA) on any given semester are considered on academic probation throughout the following semester, and are required to improve their grades (i.e., get a GPA of 3.4 or more) in order to return to a good academic standing. If they fail to do so, and attain a less than 3.4 GPA for a second consecutive term, they are dismissed on the grounds of low academic performance. Many of these students are readmitted on an academic probation status, on the condition that they raise their GPA back. Given the current rules, a student who gets a 3.39 GPA on her academic probation term is dismissed because of low academic performance, whereas a readmitted student who gets a 3.40 returns to a good academic standing. While the latter can resume her studies with a regular class load, the former student, if readmitted, would enter the SFRP, get the corresponding academic and psychological support, and sign up for a limited number of classes. That is, a 0.01 difference in a semester's GPA makes all the difference in determining whether a student gets the support and follow-up treatment or not. Due to this specificity we are interested in estimating the effect of the SFRP using a RD design. Quite evidently, a 3.40 GPA student is likely to have the same academic risk as a 3.39 GPA student, thus the latter is a counterfactual for the student who is readmitted and, as a condition for readmission, has to participate in the proposed activities of the SFRP. However, because of the current standards, the former students might go on below the radar, and maybe incur in more serious, and possibly harder to deal with, academic problems further ahead on their academic program. Furthermore, as explained above, the objective of the SFRP is to recover their good academic standing and successfully graduate but not to attain a specific GPA, we anticipate that the effect estimated through the RD design could not evidence the SFRP impact.

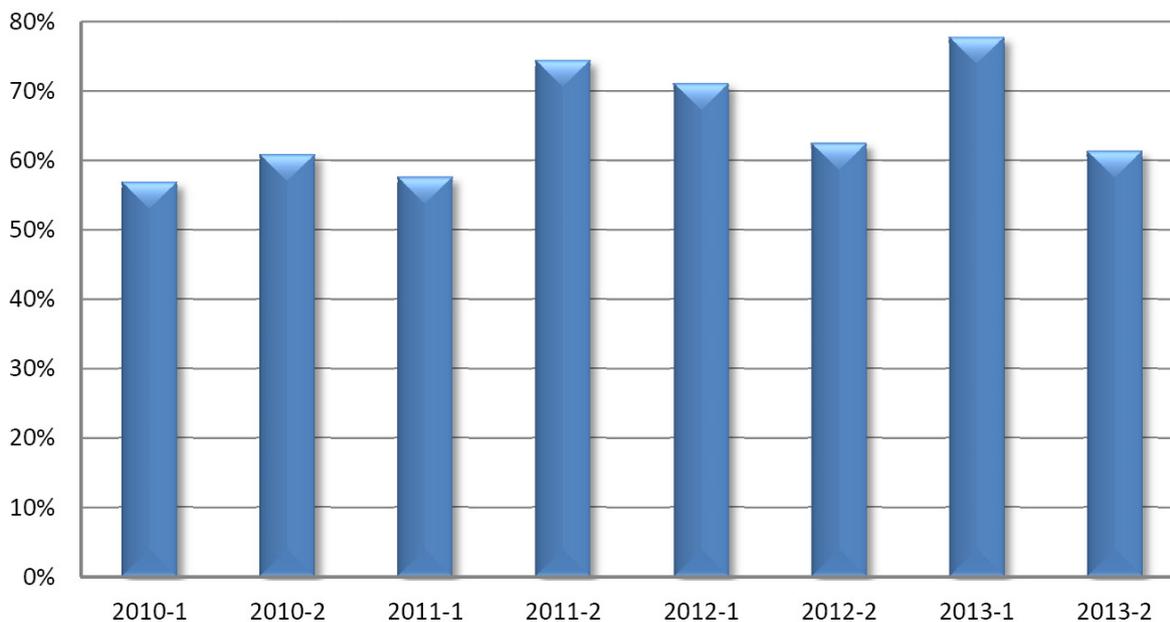
While aware that the SFRP is an intervention that takes place once students are dismissed from school there are no other mechanisms in place that help school staff identify the at-risk students for which, for some students, at the time of the SFRP it is already too late. This is corroborated by the descriptive statistics that show the effectiveness of the program at increasing retention rates but the number of students being dismissed has increased.

This issue leads to our interest in assessing the effect of the program. Not only we are aiming at improving our retention rates via more effective interventions, i.e. those that prevent students from being dismissed from the university, but we also hope to be able to advance useful and practical strategies to identify students who are at risk, beyond simply waiting for them to fall below the 3.40 GPA for two consecutive semesters.

## DATA

The SFRP's raw data show remarkable results significantly increasing readmitted students' retention rates. Based on a holistic approach that actively involves teachers, psychologists, staff and parents, this follow-up and coaching program has significantly improved readmitted students' retention. From an average readmitted retention rate of 56%, before implementing the SFRP, current readmitted retention rates have improved to about 72% (See Figure 3).

Figure 3. Students' retention after participating in the SFRP program.



Source: (A. B. Escobar & Dueñas, 2014)

Aligned with the attrition theory developed seminally by Tinto, we will analyze data obtained from students' records that includes information on socio-economic strata (SES), national standardized tests results, high-school transcripts, parents' education level, GPA, scholarships, and courses taken in order to identify the main determinants of being considered on academic probation and dismissed from the university. We estimate the probability of being in academic probation (i.e. obtaining a semester GPA below 3.40) on any given semester.

Tables 3 and 4 show the estimation of two probit models that allow us to determine the characteristics that may have an effect on the probability of being on academic probation and/or dismissed. Results suggest that there are three main factors that affect the probability of being on probation. First, good academic standing measured through the level of English –when admitted – and a good performance on the standardized national test, reduces the probability of having a semester GPA below 3.40 as well as coming from a high quality high school. Second, the academic program in which the student is enrolled is not especially important but being a student that changes major (from other school in the university), has a higher probability of being on academic probation and this is also true for the case of a student who has a job while studying at the university. Finally, in terms of socioeconomic conditions, students with lower levels of income who receive a scholarship based on financial needs are more exposed to being on probation than those holding other scholarships (i.e. merit based) or any at all.

**Table 3. Determinants of the probability of being on academic probation (marginal effects-evaluated at means)**

	(1) Marginal
Man (d)	0.027
Age at entrance	0.003
Live with parents (d)	-0.030
Socioeconomicst1 (d)	-0.074
Socioeconomicst2 (d)	-0.040
Socioeconomicst3 (d)	0.018
Socioeconomicst4 (d)	0.079*
Socioeconomicst5 (d)	0.083*
Lives in Cali (d)	0.005
Private school (d)	0.056
High quality School (d)	-0.110**
Medium quality School (d)	-0.068
Low quality School (d)	-0.100
Business Administration (d)	0.007
Public Accounting (d)	-0.072*
Economics (public policy) (d)	0.009
International Marketing (d)	-0.065**
Other undergraduate program (d)	0.200***
Icfes ranking	0.0005**
Icfes score	-0.001**
Icesos-scholarship (d)	0.160**
Acces-Financial aid (d)	0.056
Other scholarship (d)	-0.019
Icaro (d)	-0.029
English level	-0.010*
Works (d)	0.190***
Academic instructor (d)	-0.130***
Father with university degree (d)	-0.010
Mother with university degree (d)	-0.026
Observations	2701

Marginal effects

(d) for discrete change of dummy variable from 0 to 1

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 4. Determinants of the probability of being dismissed from the university (marginal effects-evaluated at means)

	(1) Marginal
Man (d)	0.086***
Age at entrance	0.014
Live with Parents (d)	-0.024
Socioeconomicst1 (d)	-0.088
Socioeconomicst2 (d)	-0.047
Socioeconomicst3 (d)	0.021
Socioeconomicst4 (d)	0.028
Socioeconomicst1 (d)	0.036
Lives in Cali (d)	0.033
Private school (d)	0.043
High quality School (d)	-0.001
Medium quality school (d)	0.099
Low quality school (d)	0.027
Business Administration (d)	-0.100***
Public Accounting (d)	-0.110**
Economics (Public Policiy) (d)	0.210**
International Marketing (d)	-0.068**
Other undergraduate program (d)	-0.008
Icfes ranking	0.0001
Icfes score	-0.0014***
Icesos-Scholarship (d)	-0.1000
Acces-Financial aid (d)	-0.0610
Other Scholarship (d)	-0.0360
Icaro (d)	0.0520
English level	-0.0290***
Works (d)	-0.0040
Academic instructor (d)	-0.2300***
Father with university degree (d)	-0.0200
Mother with university degree (d)	-0.0360
Observations	2701

Marginal effects

(d) for discrete change of dummy variable from 0 to 1

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

As described before, we are also interested in studying the probability of being dismissed because of a below-the-required-GPA academic performance or any other reason. Like in the previous exercise, English level (at entry) and national standardized test results reduce the risk of being dismissed. Moreover, there are important differences among the undergraduate programs offered within the business school, for example Business Administration, International Marketing and Public Accounting students are less likely of being dismissed respect to their fellows from Economics and International Business undergraduate program. Finally, men have

a higher probability of being dismissed from the university than women. It is important to highlight that some variables like parents' level of education and high school's quality (as measured by their historical results on the national standardized exams) are not statistically significant but its effects may be captured by other variables like national standardized test results.

## EMPIRICAL STRATEGY

### Regression Discontinuity Design

We attempt to estimate the effect of the SFRP and test our causal hypotheses using a regression discontinuity (RD) design (Hahn, Todd, & Van der Klaauw, 2001), given that we have a cut-off point that allows us to identify those students that have to participate in the program because of their GPA. We are using a pooled sample of all students who have participated in the SFRP and those who, because they attained a GPA equal or greater than 3.4 while on academic probation, do not participate in the program.

As mentioned earlier, we use a RD design in order to identify the potential impact of the SFRP program. More specifically, we want to exploit the fact that there is a discontinuity in the probability of being part of the program and because of this it is feasible to assume that students that benefit from the SFRP are not different to those located just at the right of the cut-off point who recover their normal status and do not receive the treatment.

In general terms we want to determine if being part of the program has any impact on the students' GPA. However, it is important to highlight once more than the main purpose of the SFRP is not to improve the students' GPA after their participation in the program but to prevent students from leaving the university because of their academic performance. Accordingly if  $y_i$  is the GPA for the semester next to the treatment, we want to explore if it has a relation with the treatment captured by a dummy, SFRP, while we control for a smooth function of the score, which is given by the student's GPA from the semester previous to the treatment. Formally, we have:

$$\psi_i = \alpha + \beta \Sigma \Phi P \Pi_i + \phi(\Sigma_i) + \varepsilon_i$$

Figure 4 shows how the probability of being treated is related to the GPA from the previous semester, our assignment variable, and that there is a clear discontinuity at the cutoff point, represented by a GPA of 3.40. As seen, this leaves us in a fuzzy RD scenario where receiving treatment is determined partially by whether the assignment variable crosses the cutoff point. In our case we have students that are part of the SFRP for reasons different to their GPA such as failing half or more the courses taken on any given semester or failing a course for a third time. On the other side we do not expect students to manipulate their GPA in order to get into or out of the program.

Figure 4. Probability of being a SFRP beneficiary and eligibility threshold.

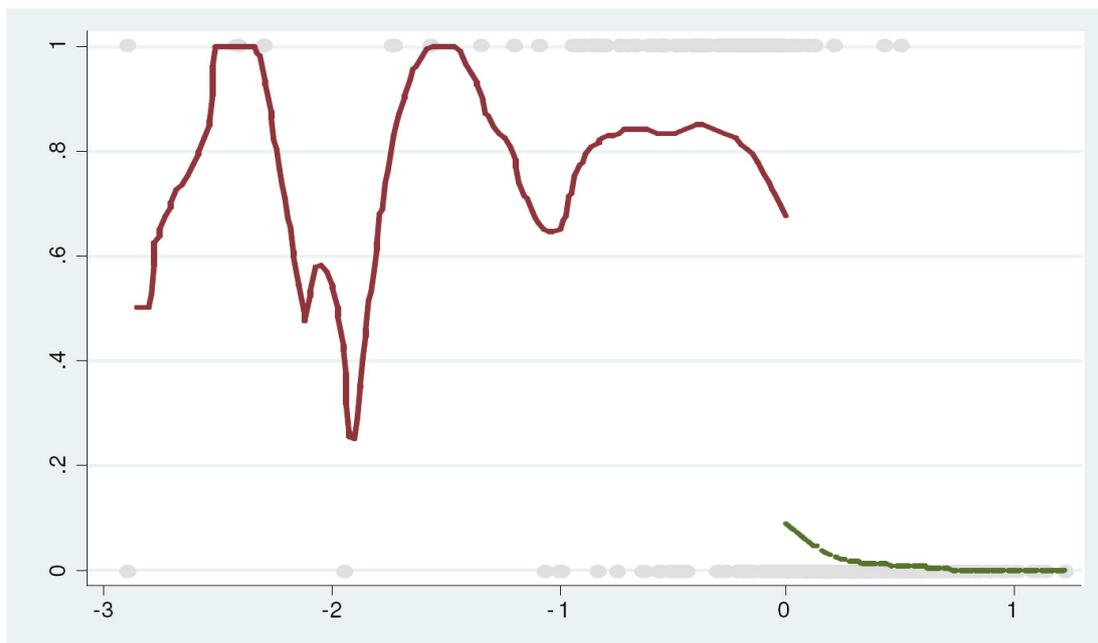
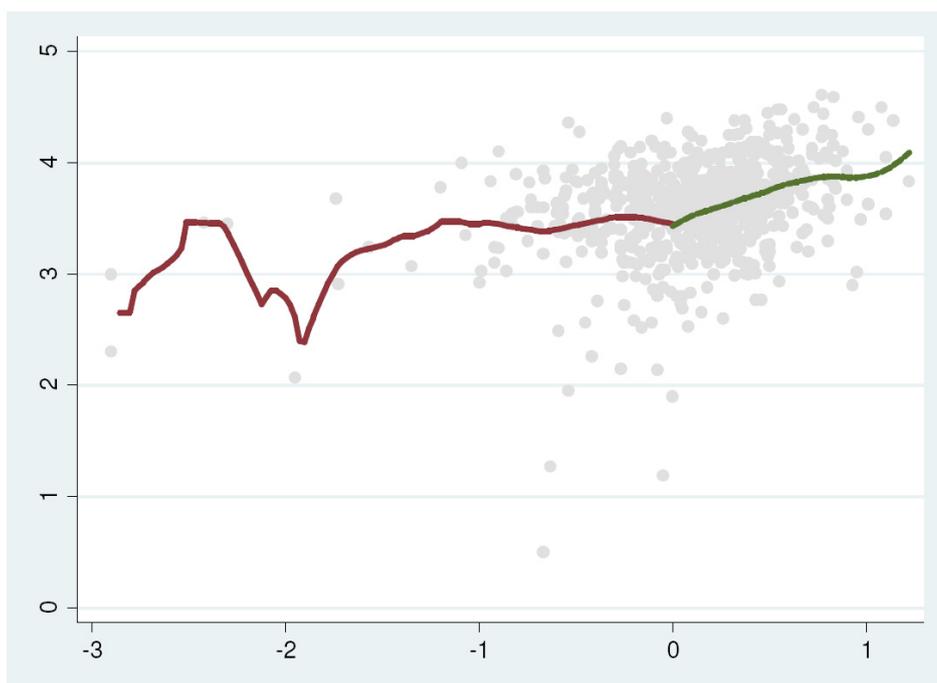


Figure 5 presents a graphical representation of the RD regression and shows that there is no discontinuity in the GPA at the eligibility cutoff point. In fact, estimation results suggest that the SFRP does not have a statistically significant effect in terms of the treated students' GPA. The latter is not especially surprising for two main reasons: first, as we noted earlier, the program is not aimed at improving the students' academic performance but to support students academically and socially to successfully graduate from their undergraduate programs. On the other hand, even if the program has a significant impact on the GPA, it is not going to be seen in the semester just after their participation in the program but instead it will take some time to see the SFRP impact on the students' study habits and GPA. This can be explained by the fact that while students are participating in the program, they can only take three courses (of the six they can usually take) and once they overcome their academic probation they feel pressed to take a full course-load even under their program directors' advice to be strategic in order to prevent being in academic probation again. This situation is aggravated for students who are government soft-loan beneficiaries because they receive them for five years thus becoming a pressing issue for students and parents. As the probit estimation shows, need-based scholarship holders have a higher probability of being dismissed after being on academic probation.

Figure 5. Student's GPA on the semester next to the treatment and eligibility threshold.



Although RD estimation results show that there is no discontinuity in the semester GPA after treatment, this helps us identify and evaluate if this should be a program's objective and if such, the program's span should be considered. We expect that the academic and social support offered to students through the program is strong enough to help them overcome the academic impasse not just for the next semester but through their academic life.

## DIFFERENCE IN DIFFERENCES

We have mentioned before that we wanted to exploit the fact that a 3.40 GPA student is likely to have the same academic risk as a 3.39 GPA student and so a RD design was quite suitable. In particular, that RD strategy allows us to estimate effects for students around the threshold but in order to have a broader measure of its impact, we estimate also a difference in differences (DID) model. Table 5 shows the GPA for both treatment and control groups before and after the former receives the treatment.

Data suggest that GPA increases for the treatment group while slightly reduces for the control group. In terms of the DID technique, the first step is to prove that there is indeed a difference in means between both groups before the treatment is implemented. A two-sample  $t$  test with equal variances shows that there is evidence to reject the null hypotheses of no difference at a 1% significance level, indicating that the previous differences between both groups can be considered for the DID estimation.

Table 5. GPA pre and post-treatment.

	Observations	GPA Pre-treatment	GPA Post-treatment
Treatment	205	3,02	3,49
Control	525	3,68	3,64

Formally we estimated the following equation by OLS:

and

$$\Delta y_i = \beta_0 + \beta_1 \text{SFRP}_i + \beta_2 X_{ki} + \dots + \beta_{k+1} X_{ki} + u_i$$

where  $\Delta y_i$  represents the difference in the GPA before and after the intervention

$X_{ki}$  denotes observable variables from the individual. Results from the estimation are presented in Table 6 where the coefficient associated to the SFRP variable reflects the impact of the treatment. For our case, we can conclude that there is a positive and statistically significant impact of the program on the students' GPA: a student that receives the treatment presents an increase of 0.6 points in their semester-GPA one semester after participating in the program.

Table 6. Differences-in-Differences estimation of the GPA for treatment and control groups.

	(1) Coefficients
SFRP	0.631***
Academic semester	0.037 *
Socioeconomicst1	0.048
Socioeconomicst2	0.153
Socioeconomicst3	0.005
Socioeconomicst4	0.041
Socioeconomicst5	0.110
High quality school	0.101
Medium quality school	0.226
Low quality school	-0.114
Business Administration	-0.045
Public Accounting	0.021
Economics (Public Policy)	-0.043
International Marketing	-0.103
Other undergraduate program	-0.080
Icfes ranking	0.0004
Icfes score	0.0012
Icesos scholarship	-0.226
English level	0.021
Works	0.011
Constant	-1.019**
Observations	425

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

## CONCLUSIONS

The effectiveness achieved by the program so far is undeniable. These results, however, have been more a consequence of an essentially empirical approach of trial-and-error, rather than a rigorous scientific process. Furthermore, as our school's academic standards become progressively more stringent, the number of students dismissed every semester because of low academic performance increases consistently.

Therefore, the SFRP program, the school's academic quality and the entire Colombian higher education system could benefit from a more profound comprehension of the attrition issues. To keep improving the program's effectiveness, and to develop preventive—rather than corrective—retention strategies, we need to probe deeper into the psychological processes underlying the SFRP program, student attrition, and the learning processes, as a whole.

Further decreasing the number of students with a high risk of attrition, by means of a closer understanding of the determinants of attrition and retention, is a challenge with enormous value, both for the school and for the individuals, not to mention the significant contribution to society at large that reducing student attrition implies.

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