

UNIVERSIDAD EAFIT

ECONOMICS UNDERGRADUATE PROGRAM

DISSERTATION

Characterizing the population of the economics undergraduate program at EAFIT University and identifying key aspects that infer in their academic achievement

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Abstract

With the purpose of identifying key aspects that can affect academic success and help the institution develop strategies to improve the quality of education, this study conducts a characterization analysis of the population of the economics undergraduate program at EAFIT University using data from 1995 to 2017, identifying students socioeconomic characteristics and analyzing how these variables and other academic aspects can influence students academic achievement throughout their undergrad program. To do so, the study conducted OLS regression using as a dependent variable the total average or the total score of the economics undergrad program in a standardized way. Based on the results, the data indicates that female gender and an increasing number of siblings can positively affect GPA scores in the economics undergrad program, while being born in a department different from Antioquia and canceling courses has a negative effect over GPA scores. Variables like age of enrollment, socioeconomic strata and type of secondary school do not have a statistically significant effect. The variations of the variables taken into the model explain for 39.9% of the variations in academic achievement. This study shows empirical evidence that can be of use for future decision making to improve the undergraduate program.

KEYWORDS: (Undergraduate, Analysis of Education, Analysis of Education, Higher Education)

JEL CLASIFICACION: A22, I21, I23

1 Introduction

Bearing in mind that rising the quality of a society's human capital can increase economic return and generate economic growth, one can infer that forming a more efficient and productive labor force can help close economic gaps and in that way, contribute to social prosperity. One way of doing this is by guaranteeing quality education. For this, educational institutions strive to form competent individuals, by preparing students in an interdisciplinary manner and stimulating a diversely qualified labor force.

Nevertheless, institutions almost always suppose students as homogeneous individuals, even though they have very different personalities and socioeconomic backgrounds that can differentially affect the way individuals perceive the same situation and how they subsequently perform. Logically then, as higher education faces the challenge of providing mass quality education to people with very different backgrounds, institutions must also accept the challenge of extracting a detailed characterization analysis and have in-depth knowledge of students to accurately develop policies that affect this population's personal and professional development.

Taking this into account, this study presents a characterization analysis of the students in the economics undergraduate program at EAFIT University between 1995 and 2017. This was possible thanks to the data which was kindly provided by the Admissions and Registration Office and the Student Development Department of EAFIT.

With the purpose of facilitating future policy and project decision-making, this study aims to identify how these socioeconomic characteristics and other academic factors may be determining aspects in students' achievement (measured as the overall grade point average obtained throughout the undergrad program) and how these can influence their decision to drop out of a program.

Considering that the studied population is made up of the individuals that have enrolled in the economics undergrad program in EAFIT University, it is worth sharing a couple of facts to have a general idea of the students of all the undergraduate programs of this institution. For this, Acevedo and Jaramillo (2007) conducted a study to identify the socioeconomic profile of undergraduate students and found that in 2007 the university's student population was primarily made up of male individuals (53,8%), the average age was 22 years, 96,8% of the population had a single marital status. Furthermore, the percentage of the population enrolled in the university that had private

secondary education had dropped since 2000, but remained at a high level of 79,2% for the year of the study. The good economic solvency presented by students' families allowed 66.6% of to fund their own studies, while the remaining population used credits like ICETEX or scholarships to fund their education. Generally, conditions indicate homogeneity amongst the students in the demographic, economic, academic, and social components studied.

This paper is organized as follows. Section 2 briefly presents previous findings made on the topic of population characterization and the variables that are essential for this study. Section 3 will focus on a statistical analysis that broadly describes the selected data. Subsequently, section 4 presents some econometric estimations, using a Standard Deviation Regression analysis by total values and then by quantiles with the purpose of calculating the possible effects those socio-economic and academic variables have over students' academic achievement in the economics undergraduate program. Section 5 summarizes the main findings.

2 Literature and theoretical framework

Several studies have already been conducted around the topic of population characterization. In general, as determined by Acevedo and Jaramillo (2007) the key elements that can determine a student's social profile are grouped in: demographic conditions, economic features and the group's customs. All the attributes, precollege experiences, and backgrounds come along with the students as they enter institutions of higher education and have been found to directly and indirectly impact performance in college. (Tinto, 1975)

Specifically, among the demographic elements, the same authors indicate that the main aspects to examine are age, gender, marital status, race, type of school, socioeconomic stratum, academic attainments, expectations and family composition. However, the effect some of the demographic variables can have over academic achievement is not intuitive, and in some cases researchers haven't had a general consent over the results. For example, age can affect attainment as younger students have less responsibilities and may be able to maintain the academic pace as they have just come out of secondary school, which can make them more focused and motivated to perform well. Yet, older students probably have a better understating of their goals and what their aptitudes are and may have more responsibilities that require them to manage their time effi-

ciently, and in this way, obtain better results. Another aspect that has the same problem is family background or place of birth given that individuals with a different cultural background or those born in a different place can have trouble adapting to the new environment, yet this depends on each student's personal characteristics and cannot be generalized (Ferreyra, 2007).

Other demographic variables do seem to have known effect among the literature. Most commonly, women are more likely to obtain better grades, private school increases achievement, and previous academic success can affect students performance represented by the abilities developed and the observed potential to learn. It may also be important to analyze how the student performs in the first semesters of the program, as their results can be affected by their ability to adapt to the new environment by adjusting to a new and challenging setting (Ferreyra, 2007, Richardson and Woodley, 2003).

The economic aspects that should be considered are income levels, consumption patterns and work activities. Some international studies like Caldas and Bankston (1997) find that not only does an individual's family social status have a direct effect on academic achievement, but also that schoolmates' social status tends to positively raise one's own academic achievement. Furthermore, knowing that economic conditions affect possible social opportunities, it is worth analyzing how students' background can influence educational expectations, one of these aspects is the level of education reached by the parents of the students as this facilitate access to better job opportunities, thus having the possibility of offering their children a better quality of life (Acevedo and Jaramillo, 2007).

Finally, sociocultural indicators can reveal the group's preferences in how they use their free time and give insights about their role in society. Around this topic it is crucial to recognize how students perceive the teachers and the university, how they use their free time, what motivates them and what their specific personalities are. It is also known that students' involvement in college has a positive effect on their learning and personal development. This can be measured as the energy devoted to academic work, participation in extracurricular activities, and interaction with the institution's staff. Consequently, educational policy effectiveness depends on the ability educational institutions have of finding ways to increase student involvement. (Álvarez and García, 1996 and Astin, 1984)

Moreover, Tinto (1975), affirms that all these background characteristics and individual at-

tributes can also influence a student's decision to continue their higher education or to drop out. In this topic, researchers have found that students that frequently interact with teachers and their peers are less likely to abandon their studies. They also notice that dropping out is more common in the first semesters of the program, and that the probability an individual has of leaving his or her undergraduate program increases as the person ages. Comparing students who drop out versus those who remain in the educational institution, the first tend to have worse academic grades and parents with less education and lower income. (Porto and Di Gresia, 2001 and Aleans Otero et al., 2012).

3 Data and statistical findings

The population of this study is made up of individuals enrolled in the economics undergraduate program in EAFIT University. A first database consists of historical individual information of every student that has ever enrolled in the program. This makes up 2,006 students from the generational cohort groups of 1995-1 to 2017-2 (this analysis of this information is done by comparing students by the semester in which they began the program, in this way for example, cohort 1995-1 is made up of the students that began their economics undergraduate program in the first semester of 1995). A second database is put together by students who voluntarily filled out the university's Annual Integral Profile Survey, 255 students in 2015, 244 students in 2016 and 236 students in 2017.

It is worth mentioning that in 2007 the economics undergraduate program in EAFIT experienced a change in its academic plan, which shortened the program from 10 to 9 semesters, changed some of the courses and added others. In effect, some of the variables in this database must be examined separately.

Additionally, as this research is conducted in May 2018, there is a need to separate the population in two: those who should have completed their studies by the time this research is conducted (cohorts from 1995 to 2012) and those who are yet to graduate (cohorts from 2013 to 2017). Those of the first group have already completed their studies by approving all their credits, and therefore the observations related to these individuals will not change in the future. However, most of the students of the second group continue to be active, and these cohorts differ in terms of the number of credits that have been approved, so variables related to these students' GPA are not comparable.

This is represented in the graphs by a gap between cohorts 2012-2 and 2013-1.

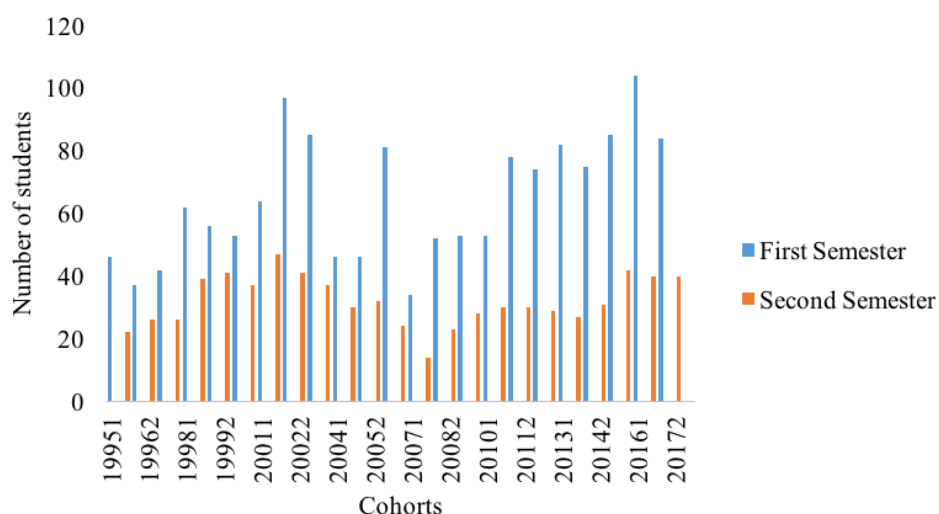
The university's Admissions and Registrations office provided the first database containing information collected in the registration forms, which students must fill out when accepted into EAFIT. The form includes a series of socioeconomic aspects like age, gender, economic stratum and place of birth, amongst others. This database was later merged with two other databases, containing the student's academic information like the courses taken, along with the average grades obtained in each one and how many courses have been canceled. There was no access to names, identification numbers, telephone numbers or addresses for security reasons.

3.1 Demographic and economic findings

The following are the main results found in terms of the demographic information given. As mentioned, a total of 2,006 students have enrolled in the economics undergrad program, out of which 776 have graduated. Individuals begin the program with an average age of 19 and finish when they are approximately 23 years old, yet before the 2007 academic plan reform students graduated with an average age of 24. Additionally, data shows that students that enrolled between 1995 and 2007 took approximately 5.1 years to graduate from the program while students enrolled between 2007 and 2012 took approximately 4.4 years.

Out of all the students that have enrolled in the program between 1995 and 2017, 59.3% have been men and the remaining 40.7% have been women. The study finds that every year approximately 64 students enroll in the undergrad program during the first semester and 32 students in second semester. The fact that twice as much students enroll in the first semester of the year is easily explained as the academic calendar in most Colombian secondary schools begins in January and ends in November, hence most students continue with their higher education starting the beginning of the following year.

Figure 1: Number of students that enroll per semester



A distinctive feature of students from Colombia and even Latin America is the strong preference they have for remaining close to home when studying an undergraduate program. Understandably then, students that have enrolled in the economics program at EAFIT University are mostly born in Antioquia (75.6%), followed by the capital city Bogota (4.1%), Valle del Cauca (2.6%), Cordoba (2.3%), Caldas (1.8%) and Atlantico (1.6%).

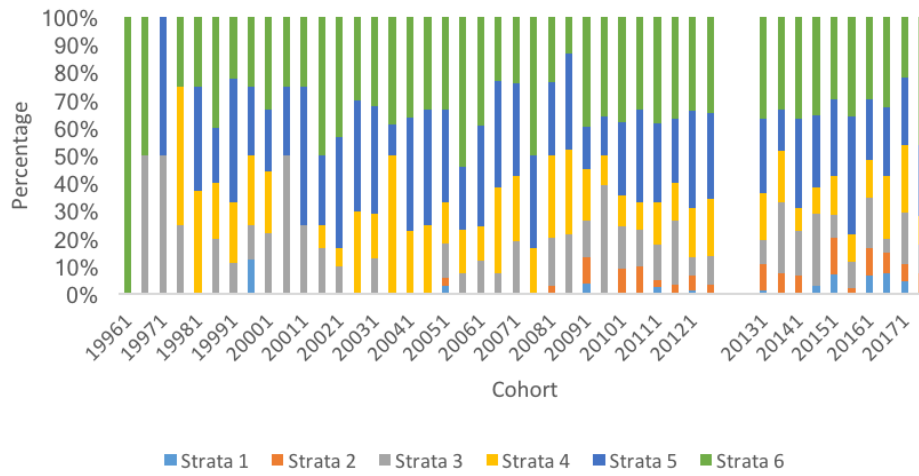
Most students completed their secondary education in a private school (85.8%), and the remaining 14.2% studied either in a national, departmental, municipal, or cooperative institution. Additionally, 47.8% of the students finished their studies at a mixed gender secondary school, while 28.7% studied at institutions with only female students and 23.4% at institutions with only male students.

To examine the economic composition the study took into account the students' socioeconomic stratum¹ In general terms, 62% of the students that have enrolled in this program have been classified as strata 5 or 6 (high income), 30% as strata 3 or 4 (middle income) and only 8% of the population has been classified as strata 1 or 2 (low income). As figure 2 illustrates, this variable has evolved over the years showing a more equal distribution in the last years. This is partly due to the efforts made by the government to facilitate access to higher education. The latest and proba-

¹Colombia's official socioeconomic strata clasifies urban populations into different strata with similar economic characteristics. The system classifies areas on a scale from 1 to 6 with 1 as the lowest income area and 6 as the highest.

bly the most known program has been “Ser Pilo Paga”, carried out since 2014 by the government with the objective of granting quality higher education access to the best students of low socioeconomic strata, awarding scholarships to students who have achieved a high score on the national standardized tests. This program has benefited 52 students, who have enrolled into the economics undergrad program at EAFIT University.

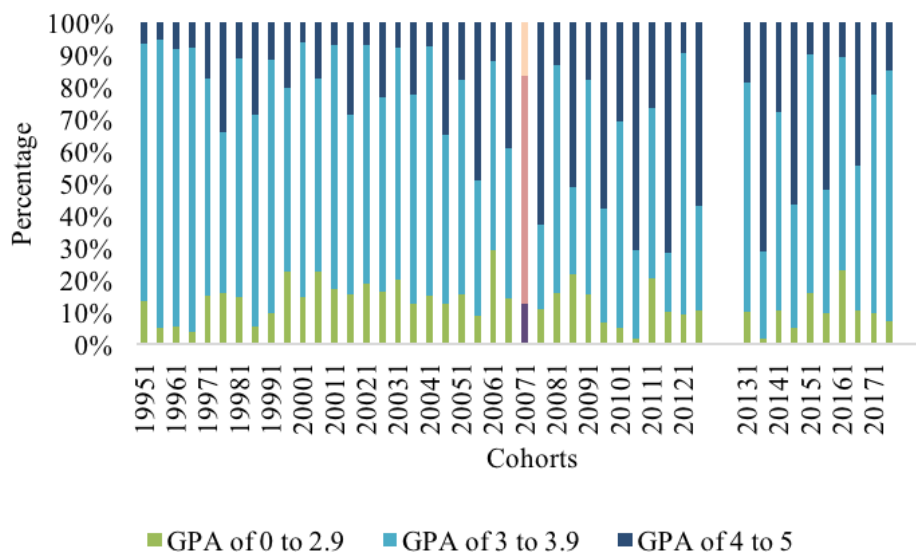
Figure 2: Student’s socioeconomic Stratum



3.2 Academic findings

Moving on to the statistical analysis of the achievement level in the economics undergrad program itself, students that enrolled between 1995 and 2012 had an overall grade point average (GPA) of 3.54 (within a possible range of 0 to 5 with a passing grade of 3). Following enrollment periods are not analyzed as most of the remaining population is yet to graduate from the program when this study is conducted and therefore their current GPA is incomparable with the rest of the population. Men tend to perform slightly better than women, the first, have an average GPA of 3.60 while the second of 3.49. The following figure shows the evolution of GPA levels grouped into three categories, (group 1: GPA between 0 and 2.9, group 2: GPA between 3 and 3.9, group 3: GPA between 4 and 5). What seems interesting here is that over time, the percentage of students that have obtained a GPA between 4 and 5 has increased significantly, especially after the 2007 academic plan reform.

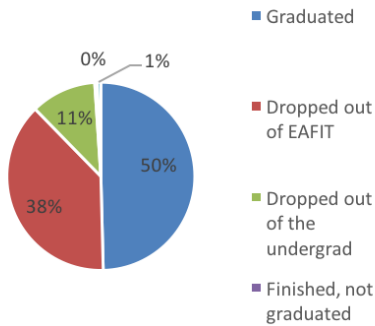
Figure 3: Student's GPA



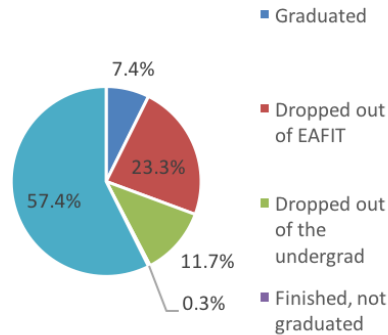
The analyzed data also indicates that 50% of the students that enrolled between 1995 and 2012 successfully graduated from the same program, while the remaining half dropped out of EAFIT (38.1%), dropped out of the mentioned program but stayed in a different program in the same institution (11.3%), finished the program but have not graduated (0.4%) or are still active students (0.6%). Out of the remaining population, those enrolled between 2013 and 2017, 57.4% still classify as active students, 23.3% have dropped out from the university, 11.7% have dropped out from the program yet have stayed in a different program within EAFIT, 7.4% have graduated from the economics undergrad program, and 0.3% have finished the program but have not graduated.

Figure 4: Current situation

(a) (Cohorts 1995-1 to 2012-2)



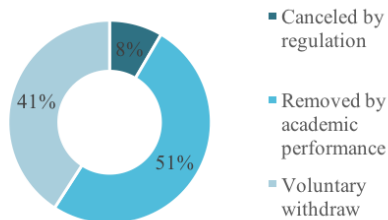
(b) Cohorts 2013-1 to 2017-2



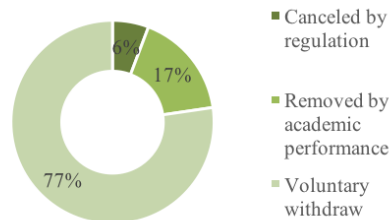
Taking a better look at the reasons why students drop out of EAFIT, figure 5 (a) shows that half of those who dropped out of the university had to cancel by regulation, 41% decided to withdraw voluntarily and 8% were removed from the institution because of poor academic achievement. Moreover, figure 5 (b) illustrates that out of the individuals that dropped out of the economics undergrad program but continued their studies in EAFIT, 77% decided to withdraw voluntarily, 17% were removed given their poor academic achievement and the remaining 6% canceled by regulation.

Figure 5: Drop outs

(a) Dropped out of EAFIT



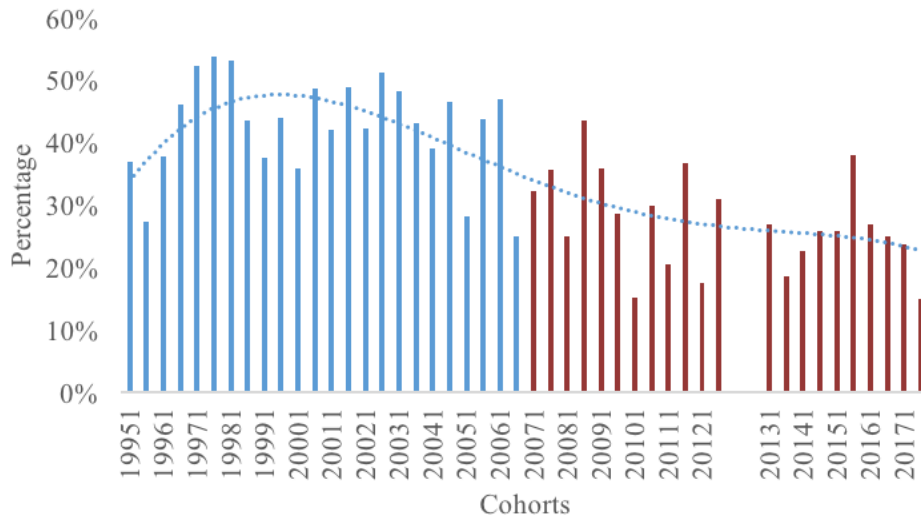
(b) Dropped out of the program



Another interesting finding is that the percentage of students that drop out has decreased significantly, as indicated by the tendency line in figure 6. A possible reason that can explain this decline

is that the institution and, particularly the School of Economics has improved its student-teacher relations and as has been explained by the literature, having a greater connection to the professors helps to decrease desertion of individuals. In this figure there is a change of color from blue to red to represent the before and after of the academic plan reform.

Figure 6: Percentage of students that drop out



To explain these results, it is worth pointing out that Tinto (1975) considers that “voluntary withdrawals are most frequently found to be both social isolates and/or deviants regarding the intellectual norms of the institution [...] academic dismissals, on the other hand, are often lacking in both intellectual and social development or are socially integrated to an extreme”.

Particularly, in the economic undergrad program, the study confirmed that male students abandon the program more than female students (45% and 38% respectively) and individuals who enter at age 20 or higher tend to leave the program more than the others (59.3%). Additionally, 45% of the dropouts were born outside of Antioquia, the stratum that has the higher dropout levels is stratum 1 with 42% followed by stratum 2 and 3 with 36%, stratum 5 with 31% and the stratum with less dropout levels is stratum 6. Finally, individuals who graduated from a private secondary school tend to abandon the program less than the other type of secondary schools graduates (36.05% and 56%).

Analyzing more thoroughly each course, the study found that the GPA of the main courses of the economics undergrad program has increased since the academic plan reform in 2007. In the

current plan, the courses with the highest GPAs are Economic Seminar, General Macroeconomics, Economic History of Colombia, and Game Theory, and the courses with the lowest GPAs are Mathematics 1, Mathematics 2 and Linear Algebra. Also, nearly all courses have relatively low standard deviations, showing that students grades are grouped closely around the mean.

On another note, canceling courses is used as a mechanism that students have to avoid failing a course, since it is preferable to cancel it and repeat it again, instead of risking failing and negatively disturbing the semester's GPA. The most canceled courses have been Mathematics 1, Linear Algebra, Statistics 2 and Mathematics 2.

Table 1: Academic grades

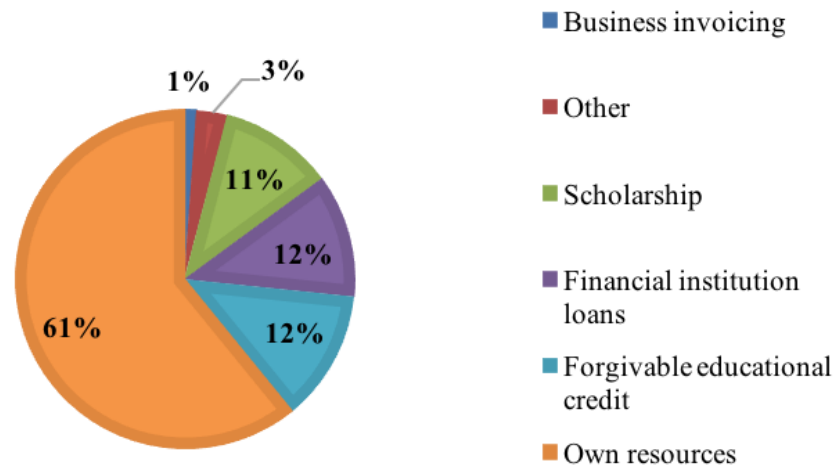
	Before 2007 academic plan reform				After 2007 academic plan reform					
	GPA	Min	Max	SD	Canceled	GPA	Min	Max	SD	Canceled
Mathematics I	2.8	2.4	3.4	0.2	19.70%	3.4	3.1	3.9	0.2	30.20%
Mathematics II	3.1	2.6	3.6	0.3	16.90%	3.4	3	3.7	0.2	13.70%
Mathematics III	3.6	3.1	4.1	0.2	9.10%	3.7	3.1	4.1	0.3	9.40%
Statistics 1	3.3	2.7	4.3	0.3	1.20%	3.6	3.2	4.1	0.2	9.00%
Statistics 2	3.3	2.9	3.7	0.2	2.50%	3.7	3.1	4	0.3	13.80%
Linear algebra						3.4	3	4.1	0.3	15.20%
Fundamentals of Accounting	3.1	2.5	3.5	0.2	11.70%	3.5	2.9	3.9	0.2	11.30%
Financial mathematics	3.6	3	3.8	0.2	11.30%	3.6	3	4	0.2	9.40%
General Microeconomics	3.3	3.1	4.4	0.2	11.80%	3.7	3.1	4	0.3	5.90%
Intermediate Microeconomics I	3.5	2.8	4.3	0.3	7.00%	3.7	3.3	4.1	0.2	8.20%
Intermediate Microeconomics II	3.7	3.1	4.3	0.3	4.10%	3.6	3	4.2	0.3	9.50%
General Macroeconomics	3.4	3	4	0.2	11.60%	3.8	2.4	4.3	0.5	3.90%
Intermediate Macroeconomics I	3.2	2.6	3.5	0.2	12.30%	3.5	3	3.7	0.2	16.10%
Intermediate Macroeconomics II	-	-	-	-	-	3.6	3.3	4.1	0.2	3.00%
Econometrics I	3.5	2.6	4.3	0.4	5.40%	3.6	3.1	3.9	0.2	9.60%
Econometrics II	3.6	2.9	4.3	0.3	4.00%	3.6	3	3.9	0.2	8.40%
Economic thought 1	3.5	2.9	4.1	0.3	2.20%	3.7	3.2	3.9	0.2	2.00%
Economic thought 2	3.4	2.4	3.8	0.3	3.80%	3.7	3.4	4.1	0.2	3.80%
Economic measurement techniques	3.3	2.2	3.6	0.3	8.20%	3.4	2.6	3.8	0.3	8.70%
Introduction to the Colombian economy	3.5	3.1	4.1	0.2	2.30%	3.6	3.3	4.7	0.3	3.70%
Economics seminar	-	-	-	-	-	4.1	3.5	4.4	0.3	1.60%
International economics	3.5	3	4.1	0.3	3.80%	3.6	3	3.9	0.2	1.10%
Development and economic growth	3.5	3.2	3.8	0.2	3.30%	3.7	3.3	4.2	0.3	1.40%
Game theory	4.3	4.2	4.5	0.1	9.10%	3.8	3.5	4.4	0.2	4.10%

3.3 Family background and social findings

As mentioned, academic achievement can be subjective to each student's motivations and perceptions. To grasp a better understanding of the characteristics of the students in EAFIT university, the Student Development Department has developed a yearly integral profile survey since 2015, which students voluntarily fill out through the institutional web page once a year. The survey questions students on topics like their current status in the university, socioeconomics information like family and economic data, habits and social customs, academic information, academic habits and university well-being.

As figure 7 shows, most students pay for their registration fee with their own resources (61%), followed by loans from financial institutions (12%) and forgivable educational credits (12%), scholarships (11%), business invoicing (1%) and other resources (3%).

Figure 7: Tuition payment method



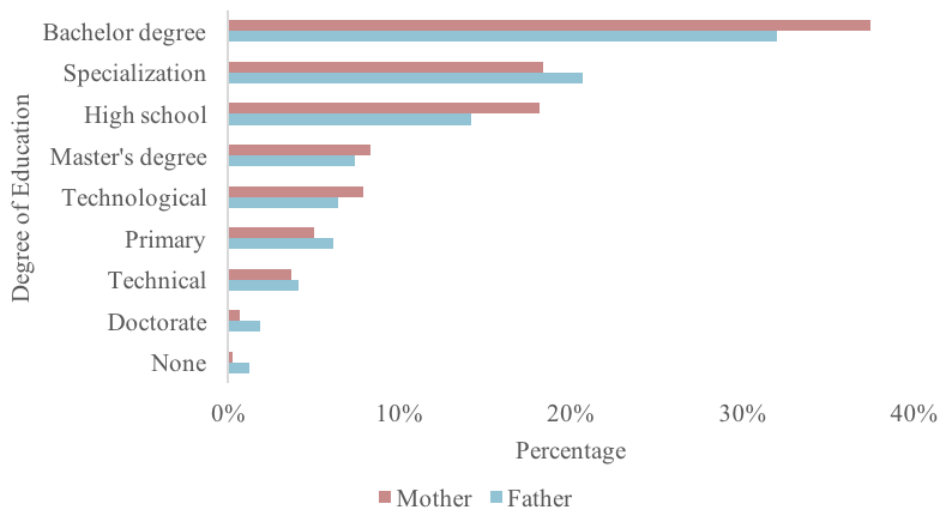
Subsequently, most of the students in the economics undergrad program are solely dedicated to studying (78.3%), as only 21.8% dedicate their time to working. Additionally, 6.4% of the people surveyed assure that they financially contribute in their home.

When comparing the level of education, it is observed that, fathers, reach in their majority (34.5%) university studies, being this percentage is higher than the mother's (30.6%). The survey shows that both parents receive in their majority bachelor degrees, followed by specialization

degrees and high school degrees.

Comparing mother's and father's level of schooling, figure 8 shows that there is a higher percentage of fathers with a level of education of a doctorate degree (father: 1.9% - mother: 0.7%) as well as specialization degree (fathers: 20.6% - mothers: 18.4%) technical degree (father: 4.1% mother: 3.7%) and primary education (fathers: 6.1% - mothers: 5.0%). Although, there is a lower percentage of fathers who's level of education is masters degree (fathers: 7.4% - mothers: 8.3%) bachelors degree (fathers: 32.0% - mothers: 37.4%), technological degree (fathers: 6.4% - mothers: 7.9%) and a high school degree (fathers: 14.2% - mothers: 18.1%).

Figure 8: Parents level of education

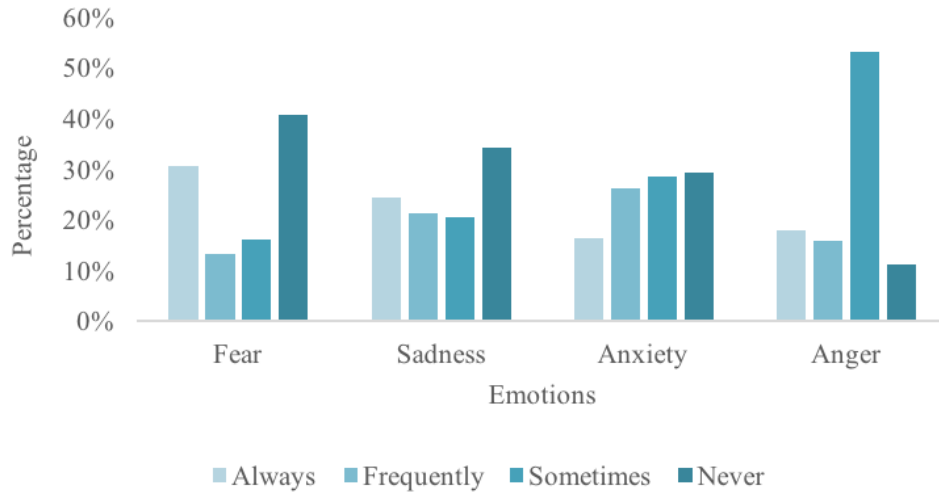


When questioned about what activities the student may take a part of in the university besides attending class, 77.7% answered that they stay in the university studying, 61.8% spending time with their friends, 47.1% attending tutoring sessions, some students also attend seminars (25.9%), are involved in research groups (21.9%), participate in sport activities (19.8%) form part of a student societies (15.9%) and are complementing their academic studies by being research assistants (14.7%). Furthermore, student's involvement in these types of activities is greatly dependent on the student's motivation. In this case, the students in the economics undergraduate program perceive that they are greatly invested in their academic formation, as they highly value the motivation and the time weekly spent in their studies.

Analyzing student's emotional stability is also of use for this study, as emotional health can

have a negative effect on academic achievement and can even influence a student’s intention to drop out. Out of the information gathered, it is worth highlighting that 30.4% of the students surveyed always feel fear, 24.4% always feel sadness, 16.3% always feel anxiety and 17.8% always feel anger.

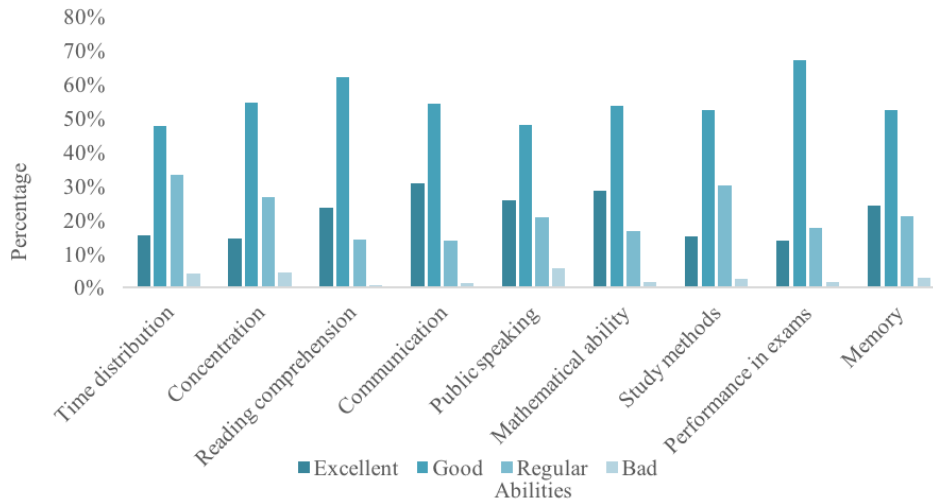
Figure 9: Emotional stability



Choosing to study at EAFIT University is mainly influenced by the academic prestige that the institution has. Pleasure, prestige in the work place and geographic proximity are considered secondary factors that influence people in choosing this university.

Most students consider that they have an overall good or excellent ability in distributing their time (62.8%), concentrating (69%), reading comprehension (85.5%), interpersonal communication (85.2%), public speaking (73.8%), mathematics (82.0%), study method (67.4%), performing in exams (80.8%) and memorizing (76.4%).

Figure 10: Ability perception



4 Empirical specification and empirical findings

Given the previous information, the study continues by calculating the effect that socioeconomic and academic variables have over student's GPA level. First, an Ordinary Least Squares (OLS) regression is conducted and to further examine the results, the study estimates an OLS regression by quantiles of the GPA scores. The dependent variable of both models is great point average (GPA) scores which is rescaled to have a mean equal to zero and a standard deviation of one.

Using the "zscore" command on STATA the values are modified as follows: first, the mean of each GPA score by cohort is subtracted from the original value and then the difference between the score and the mean is divided by the standard deviation, resulting in a value of one. When the variable is standardized this indicates that the difference from the mean of the original variable is measured by standard deviations, in other words for a value of -3 the variable for individual i is considered to be three standard deviations lower than the mean. The mean for this study refers to the average GPA scores by individual's year of enrollment to the undergrad. It is worth mentioning that the coefficients estimated by STATA are not the decimal changes in GPA scores but rather the multiplication of the coefficient by the standard deviation, which is represented in the regressions as the number below the coefficient in parenthesis.

$$\begin{aligned}
Z_{pca} = & \beta_0 + \beta_1 Gender + \beta_2 EnrollmentAge18 + \beta_3 EnrollmentAge19 \\
& + \beta_4 EnrollmentAge20 + \beta_5 AmountofSiblings + \beta_6 BirthDepartment + \\
& \beta_7 Strata1\&2 + \beta_8 Strata3 + \beta_9 Strata4 + \\
& \beta_{10} Strata5 + \beta_{11} Strata6 + \beta_{12} SchoolGender + \beta_{14} CooperativeSchool + \beta_{15} PublicSchool + \\
& \beta_{16} OthertypeSchool + \beta_{17} Re - enteredStudies + \beta_{18} Re - enrolledStudies + \\
& \beta_{19} ExternalTransference + \beta_{20} OthertypeStudent + \beta_{21} GraduateYears(less5) + \\
& \beta_{22} GraduateYears(5more) + \beta_{23} Canceled(1or2) + \\
& \beta_{24} Canceled(more2) + \varepsilon
\end{aligned}
\tag{1}$$

The independent variables are listed in the following table. For the econometric models presented in this study the demographic factors considered are gender (committing male), enrollment age (omitting age 17), amount of siblings and department of birth (omitting Antioquia). To analyze the economic factors, the study takes into account the socioeconomic stratum each student is classified in (omitting stratum 6). Additional factors are included about the school from which the student graduated secondary education (omitting schools that are single sex, all girl schools and also private schools). The university factors include type of student (omitting individuals that are classified in first time studies), years it takes a student to graduate (omitting graduation in zero years) and the number of courses a student canceled (omitting if the individual did not cancel any course).

Table 2: Variable description

Demographic factors	Type	Description
Gender	Dummy	1= Female; 0 = Male
Enrollment Age (17)	Dummy	1= Yes; 0=No
Enrollment Age (19)	Dummy	1= Yes; 0=No
Enrollment Age (18)	Dummy	1= Yes; 0=No
Enrollment Age (19)	Dummy	1= Yes; 0=No
Enrollment Age (20 or more)	Dummy	1= Yes; 0=No
Amount of siblings	Continiuous	Number of siblings
Department of Birth	Dummy	1= Antioquia; 0= otherwise
Economic factors	Type	Description
Stratum 1&2	Dummy	1= Yes; 0=No
Stratum 3	Dummy	1= Yes; 0=No
Stratum 4	Dummy	1= Yes; 0=No
Stratum 5	Dummy	1= Yes; 0=No
Stratum 6	Dummy	1= Yes; 0=No
School factors	Type	Description
All girls school	Dummy	1= Yes; 0=No
All boys school	Dummy	1= Yes; 0=No
Mixed gender school	Dummy	1= Yes; 0=No
Private school	Dummy	1= Yes; 0=No
Public school	Dummy	1= Yes; 0=No
Cooperative school	Dummy	1= Yes; 0=No
Other type of school	Dummy	1= Yes; 0=No
University Factors	Type	Description
Type of student (Re-entered studies)	Dummy	1= Yes; 0=No
Type of student (Re-enrollment)	Dummy	1= Yes; 0=No
Other type of student	Dummy	1= Yes; 0=otherwise
Graduating years (5 or less)	Dummy	1= Yes; 0=No
Graduating years (more than 5)	Dummy	1= Yes; 0=No
Canceled 1 or 2 courses	Dummy	1= Yes; 0=No
Canceled more than 2 courses	Dummy	1= Yes; 0=No

4.1 OLS regression

This first method was carried out by estimating the OLS regression seven times for seven different specifications, adding different sets of variables with each new regression to examine how the effects over the GPA score change. To make sure the individuals GPA scores were comparable, the study only took into account the part of the population that had already graduated, this makes up 770 students. The first regression was carried out with only gender as the independent variable, resulting in a statistically significant outcome that shows that female students have a higher

GPA score by 0.00153 decimals (0.051 percentage points (pp)) over male students. The second regression included demographic variables such as enrollment age, gender, number of siblings and department of birth. In this case, out of the new variables, the study found a statistically significant negative effect for the individuals who were born in a department different from Antioquia representing which expresses a -0.003724 decimals over GPA scores, this effect means that this individual has a lower GPA score of -0.098 pp beneath the mean score compared with an individual who was born in Antioquia.

In the next regression, the study included the economic variable, represented by the stratum levels of the individual. Again, being born in a department different from Antioquia has a negative effect over GPA by 0.003876 decimal points (-0.102 pp), additionally, enrolling in the undergraduate program with 20 years or more has a negative impact over GPA scores by 0.004717 points under the mean (-0.089 pp), and finally, the number of siblings a student has shows a statistically significant positive effect over GPA scores by 0.000703 deviations or 0.037 pp.

Taking into account secondary school variables, like whether the school was of coed or single-sex (all boys school or all-girls school) and the type of school (public, private, cooperative or another), the estimation now indicates that being a female student has a positive impact over GPA scores by 0.003276 deviations (0.078 pp), being born in another department from Antioquia has an effect of -0.003914 deviations underneath the mean on GPA scores (-0.103 pp) and the number of sibling the individual has a positive impact of 0.000703 deviations over GPA mean scores (0.037 pp).

Next, the model is calculated with additional university variables such as what type of student the individual is classified as, the amount of years it took for him or her to graduate and if the student canceled one, two or more courses throughout the program. This time, having paused studies and re-entering the program has a negative effect of 0.00324 deviations over GPA scores (-0.081 pp) while being classified as other type of student positively affects GPA scores by 0.004346 standard deviations (0.106 pp) comparatively with students classified as first time students. Also, canceling one or two courses negatively affected student's GPA scores in -0.008778 deviations from the mean (-0.266 pp) and canceling more than two has a negative effect of -0.01591 decimals over GPA scores (-0.430 pp) compared with an individual who has not canceled any courses.

The sixth specification analysis takes into account all the previous variables except the amount

of years it took for the individual to graduate. Now, pausing studies in the economics undergrad program and later returning has a negative effect (0.003738 deviation points or -0.089 pp), being classified as other type of student has a positive effect of 0.003913 deviations over GPA mean (0.091 pp), canceling one or two courses decreases GPA scores (0.008194 deviations or -0.241 pp) and canceling more than two courses throughout the undergrad program has an effect of -0.0147 deviation points over the GPA mean scores of students (-0.420 pp).

Apart from the variables included in the former regression, the final estimation introduces missing variables of the semester in which the individual entered the program to analyze how these modify the effects, resulting in the following: being a female student raises GPA scores over the mean by 0.002405 deviation points (0.065 pp). An increasing number of siblings has a positive effect over the GPA scores by 0.000936 standard deviations (0.052 pp). Pausing studies in the economics undergrad program and later returning makes GPA in -0.004368 deviations bellow the mean (-0.104 pp) and being removed from the program because of poor academic performance and enrolling again in the same undergrad has a negative effect over GPA scores by 0.016647 (-0.179 pp). Having canceled one or two courses impacts GPA scores negatively in 0.00901 deviation points under the mean (-0.265 pp) and canceling more than two increases GPA scores by 0.018084 standard deviations from the mean (-0.476 pp).

Table 3: OLS regression

Variable	(1) zpcá	(2) zpcá	(3) zpcá	(4) zpcá	(5) zpcá	(6) zpcá	(7) zpcá
Gender	0.051* (0.030)	0.050 (0.030)	0.038 (0.030)	0.078* (0.042)	0.043 (0.036)	0.052 (0.038)	0.065* (0.037)
Enrollment age (18)		-0.008 (0.048)	-0.012 (0.049)	-0.008 (0.049)	-0.026 (0.042)	-0.011 (0.044)	0.010 (0.045)
Enrollment age (19)		-0.012 (0.051)	-0.025 (0.052)	-0.024 (0.052)	-0.067 (0.045)	-0.050 (0.047)	-0.041 (0.047)
Enrollment age (20 or more)		-0.074 (0.053)	-0.089* (0.053)	-0.088 (0.054)	-0.072 (0.051)	-0.084 (0.053)	-0.055 (0.054)
Amount of siblings		0.029 (0.019)	0.037* (0.019)	0.037* (0.019)	0.007 (0.017)	0.021 (0.017)	0.052*** (0.018)
Birth department (other)		-0.098** (0.038)	-0.102*** (0.038)	-0.103*** (0.038)	-0.044 (0.033)	-0.055 (0.035)	-0.054 (0.035)
Stratum 1 and 2			0.067 (0.102)	0.088 (0.114)	0.042 (0.098)	0.051 (0.103)	0.092 (0.101)
Stratum 3			-0.101 (0.065)	-0.102 (0.067)	0.011 (0.058)	-0.011 (0.061)	-0.001 (0.060)

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... table 3 continued

Variable	(1) zpc	(2) zpc	(3) zpc	(4) zpc	(5) zpc	(6) zpc	(7) zpc
Stratum 4			-0.066 (0.056)	-0.059 (0.056)	-0.040 (0.048)	-0.027 (0.051)	-0.019 (0.050)
Stratum 5			-0.032 (0.045)	-0.028 (0.046)	-0.015 (0.039)	-0.002 (0.041)	0.003 (0.041)
All-boys school				0.048 (0.057)	-0.018 (0.049)	-0.016 (0.052)	-0.015 (0.051)
Coed school				0.073 (0.045)	0.028 (0.039)	0.032 (0.041)	0.027 (0.041)
Cooperative school				0.090 (0.083)	0.106 (0.071)	0.089 (0.075)	0.045 (0.075)
Public School				0.375 (0.418)	0.119 (0.359)	0.173 (0.377)	0.317 (0.375)
Other type of school				-0.040 (0.076)	0.008 (0.066)	-0.010 (0.069)	0.007 (0.068)
Re-entered studies					-0.081** (0.040)	-0.089** (0.042)	-0.104** (0.042)
Re-enrollment studies					-0.009 (0.089)	-0.119 (0.093)	-0.179* (0.093)
External transference					0.003 (0.057)	0.029 (0.060)	0.004 (0.060)
Other type of student					0.106*** (0.041)	0.091** (0.043)	0.049 (0.045)
Graduating years (5 or less)					0.180 (0.151)		
Graduating years (more than 5)					0.107 (0.152)		
Canceled 1 or 2 courses					-0.266*** (0.033)	-0.241*** (0.034)	-0.265*** (0.034)
Canceled more than 2 courses					-0.430*** (0.037)	-0.420*** (0.035)	-0.476*** (0.035)
Constant	0.505*** (0.020)	0.531*** (0.047)	0.537*** (0.056)	0.468*** (0.070)	0.507*** (0.166)	0.638*** (0.066)	0.603*** (0.105)
Observations	770	770	770	770	770	770	770
Cohort	NO	NO	NO	NO	NO	NO	YES
R-squared	0.004	0.025	0.041	0.047	0.308	0.231	0.319
Standard errors in parentheses							
=** p<0.10			** p<0.05				*** p<0.01

4.2 OLS regression by quantiles

Additionally, the study estimated a regression by quantiles (0.25, 0.50, 0.75 and 0.90) Given this kind of regression, we can observe that for the demographic variables, age at which the individual enters the undergraduate program affects GPA scores when the individual enrolls at 19 years old, this variable has a negative effect for the lowest quantile 0.50 of 0.005712 deviation points over

GPA mean (-0.102 pp) and when the individual enters at 20 years or more, the GPA score is affected for quantile 0.50 in -0.007552 deviations (-0.118 pp) at the same quantile.

The number of siblings increases GPA scores in the highest distribution quantiles 0.75 and 0.90 with values of 0.00141 and 0.003003 deviations over the mean, (0.059 pp and 0.077 pp), respectively. Neither gender or place of birth have effects over the dependent variable at any of the quantiles calculated. For the economic variables, the study found that individuals are not affected in their academic scores by the stratum they belong except for a positive effect of 0.022345 deviations over the mean of GPA scores (0.205 pp) for individuals in stratum 1 or 2 and that are part of the lowest (0.25) quantile compared with stratum 6 students. Secondary school gender variables indicate to have no effects over the dependent variable over any of the analyzed quantiles, while cooperative and private schools have positive effects of 0.011178 and 0.296536 standard deviations over GPA scores (0.138 pp and 0.734 pp respectively) for the lowest quantile (0.25) compared with private schools.

Regarding the academic variables, students classified as re-entering students (for example, those that do an exchange program to another university, or leave learn another language), if the individual is in the median quantile 0.50 the effect is equal to -0.0044 deviation points (-0.088 pp) and for the 0.75 quantile the diminish in the GPA is of -0.006552 deviations (-0.117 pp), students who are removed from the program and decide to re-enroll have a diminishing effect of -0.0216 deviations under the mean (-0.216 pp) compared to students classified as first time students.

Also, the students who cancel between one and two courses have a diminishing and significant effect of -0.007252 deviations, -0.01064 deviations, -0.013455 deviations and -0.025678 deviations for quantiles 0.25, 0.50, 0.75 and 0.90 respectively (-0.196 pp, -0.266 pp, -0.299 pp and -0.347 pp). Finally, when students cancel more than two courses, this has an even higher effect of -0.015504 deviations for the lowest distributional quantile 0.25, of -0.020202 deviations for quantile 0.50, of -0.026128 deviations and of -0.048792 deviations for the highest quantile over their GPA scores (-0.408 pp, -0.481 pp, -0.568 pp and -0.642 pp).

Table 4: OLS regression by quantiles

Variable	(Q25)	(Q50)	(Q75)	(Q90)
Enrollment age (18)	-0.001 (0.048)	-0.048 (0.053)	-0.023 (0.059)	0.019 (0.097)
Enrollment age (19)	-0.006 (0.051)	-0.102* (0.056)	-0.095 (0.063)	-0.035 (0.103)
Enrollment age (20 or more)	-0.067 (0.058)	-0.118* (0.064)	-0.039 (0.071)	-0.012 (0.116)
Gender	0.048 (0.040)	0.023 (0.045)	-0.014 (0.049)	0.006 (0.081)
Amount of siblings	0.012 (0.020)	0.028 (0.022)	0.059** (0.024)	0.077* (0.039)
Birth department (other)	-0.043 (0.038)	-0.021 (0.042)	-0.028 (0.047)	0.006 (0.077)
Stratum 1 and 2	0.205* (0.109)	0.111 (0.120)	0.044 (0.134)	0.126 (0.220)
Stratum 3	0.023 (0.064)	0.013 (0.071)	-0.005 (0.079)	-0.028 (0.129)
Stratum 4	-0.011 (0.054)	-0.043 (0.060)	0.020 (0.066)	0.001 (0.109)
Stratum 5	-0.011 (0.044)	-0.029 (0.048)	0.025 (0.054)	0.017 (0.088)
All-boys school	-0.050 (0.055)	-0.052 (0.061)	-0.035 (0.067)	0.052 (0.111)
Coed school	0.008 (0.044)	0.013 (0.048)	0.017 (0.054)	0.036 (0.088)
Cooperative school	0.138* (0.081)	0.076 (0.089)	-0.040 (0.099)	-0.080 (0.163)
Public school	0.734* (0.404)	0.256 (0.446)	-0.189 (0.495)	-0.307 (0.813)
Othery type of school	-0.014 (0.074)	-0.026 (0.081)	-0.023 (0.090)	-0.037 (0.148)
Re-entered studies	-0.066 (0.045)	-0.088* (0.050)	-0.117** (0.056)	-0.087 (0.091)
Re-enrollment studies	-0.216** (0.100)	-0.083 (0.111)	-0.020 (0.123)	-0.017 (0.202)
External transference	0.070 (0.065)	0.003 (0.071)	-0.101 (0.079)	-0.001 (0.130)
Other type of student	0.061 (0.048)	0.034 (0.053)	0.047 (0.059)	0.093 (0.097)
Canceled 1 or 2 courses	-0.196*** (0.037)	-0.266*** (0.040)	-0.299*** (0.045)	-0.347*** (0.074)
Canceled more than 2 courses	-0.408*** (0.038)	-0.481*** (0.042)	-0.568*** (0.046)	-0.642*** (0.076)
Constant	0.475*** (0.113)	0.704*** (0.124)	0.891*** (0.138)	1.046*** (0.227)
Observations	770	770	770	770
Cohort	YES	YES	YES	YES
Standard errors in parentheses				
=** p<0.10 ** p<0.05 *** p<0.01"				

5 Interpretation of findings and concluding remarks

The purpose of this study was to identify certain socioeconomic aspects proper to the population that makes up the economics undergraduate program at EAFIT University and analyze, in a quantitative and qualitative matter, how these aspects and other the academic factors can affect an individual's academic achievement throughout the program.

Out of the 2,006 students that have enrolled in the program since 1995, 38.7% have successfully graduated from the program, the rest have either dropped out or are still considered active students. Individuals take approximately 4.4 years to graduate and gender equality in enrollment seems evident in the program (59.3% male and 40.7% female). Most of the students that enroll were born in the same department that the university is located in (75.6%). Most of the population completed their secondary school in a private school (85.8%) and half of the students finished their studies in a mixed gender institution.

Moreover, 62% of the students come from high income families (strata 5 or 6), yet more students from lower income families have been able to access the program in the last years thanks to new financing programs. Academic findings show that the overall general grade point average has been of 3.54, men have a slightly higher achievement level of 3.6 while women have a average score of 3.49.

Over time, student's grades have gone up, yet the courses with the lowest GPAs and highest canceling rate continue to be those that have high mathematical content. On another note, the study found that students compared to those who remain and graduate from the economics undergrad in EAFIT it is more common for men to drop out of the program or the university. Likewise, students that enroll when they are 20 years old or more and are born outside of Antioquia tend to drop out more often.

By estimating a standard deviation regression and a regression by quantiles the study found that GPA scores in the economics undergraduate program at EAFIT University are positively affected by female gender, number of siblings and being classified as other type of student, compared to students classified as first time students. On the contrary the variables that have a negative effect over the student's GPA scores are: being born in a department different from Antioquia, being classified as a student re-entering studies (pausing academic studies and later rejoining the

program) compared to students classified as first time students and being classified as a student who was removed from the undergrad program for poor academic achievement and returned.

Additionally, canceling courses has a negative effect over GPA scores, yet it is worth noticing that the effect is larger over students who cancel more than two courses than over students who cancel just one or two, compared to those who do not cancel any courses. Furthermore, variables like age of enrollment, socioeconomic strata and type of secondary school do not have a statistically significant effect. This is considered as a greatly desirable result as it indicates and that the neither, age, nor the school from which students come from nor the socioeconomic status, limit the student's potential and their academic performance in the undergrad.

It is important to point that there were a series of limitations to this study. In particular, as the databases from the Admissions and Registrations Office could not be merged with the database provided by the Student Development Department, the study could not analyze how further emotional and cultural variables and how they affect academic achievement. There was also a limitation when trying to examine the effect that previous academic success has over the academic achievement in the undergrad program as the university has not yet digitalized previous academic grade.

Future research should include these variables, as the literature takes them as crucial aspects that determine academic achievement. In conclusion, the results derived from this study assert the need for academic institutions to recognize that their student population is heterogeneous to the rest. Therefore, to provide mass quality education they must perform a detailed characteristics analysis to have sufficient knowledge of the demographic, economic, cultural and academic backgrounds that can affect students personal and professional development. In this way, institutions will have sufficient information to adequately train internationally competent professionals in their areas of knowledge, and achieve an integral formation of its students.

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