

Comparing standard with high-ability groups at university: differences in GPA for equally able students and gender- differentials

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Abstract

In this paper we compare the academic performance of students who enter a high-ability program at university with those who stay in a standard program for the same major. We also study whether the effects differ by gender. We find that, on average, students in the high-ability groups outperform those in the standard groups. However, once we control for the student's university entrance score - that is, the student's ability - we find that those in the high-ability groups obtain lower grades than their counterparts in the standard groups. Hence, students entering a high-ability program face a cost in terms of foregone academic grades. Finally, the gender analysis shows that such a negative effect is greater for females. Our results suggest that the post-graduate assessment of academic performance should not only look at the grades obtained, but also at the program taken. The implications might be larger for women.

Keywords: *High-ability; gender; grades; university.*

1. Introduction

High-ability tracking in educational systems are common in many countries. One of the main reasons used to justify the creation of such programs is that, given that students instruct each other and academic attitude is contagious, joining high-ability peers will benefit all of them. This positive effect has been labelled as the ‘*peer effect*’ (Zimmerman, 2003). Other channels through which positive effects could come are a better predisposition on the part of teachers, a more dynamic environment for group interactions, or a more homogenous group, which would benefit all students because teachers would not have to explain the same thing several times to suit the different levels of students.

However, the evidence available to date on the effects of ability-grouping shows contradictory results (Sacerdote, 2011). A possible explanation for this mixed evidence is that, besides joining better peers, students in high-ability groups have also to cope with two disadvantages as compared to standard groups. The first of such drawbacks is that in high-ability groups instructors tend to set higher academic standards, which entails greater difficulty to obtain high grades. The second is that the environment in the classes become more competitive, resulting in higher pressure, that is, in higher stress and anxiety to meet own’s and others’ expectations. Joint with this, the *relative ranking effect* (Elsner et al., 2021) predicts that students perform worse/better when ranking low/high in a group’s ability distribution. Since students enrolling in high-ability groups used to be top students at high-school or even earlier, upon entry in a high-ability group they suffer a sharp downgrading in the relative position that they occupy in the ability distribution, what may impact their anxiety and self-confidence negatively (the *small-fish-in-a-big-pond effect*, Marsh 1987).

The adaptation of students to the new environment at university, particularly in high-ability groups due to their special characteristics, is likely to be subjective to a large extent. Given the by now abundant literature documenting substantial gender differences in preferences for and reaction to competition (e.g., Gneezy et al., 2003), gender-based differences are likely to appear in such responses.

Given that high-ability grouping can have both positive and negative effects on academic performance, the natural question that arises is which of the possible countervailing effects overruns the other, and whether or not the net effect of those pros and cons might be heterogeneous by gender. To evaluate this trade-off, the first question that we want to answer in this study is: *Do students, with the same university entrance score, who decide to enter academically selective programs get better grades than those who stay in a standard program?* And the second question we want to answer is: *Are the effects on academic performance of joining a high ability group different between male and female students?* Therefore, the rationale behind exploring these questions is whether it is worthy (in GPA terms) entering HA-groups, and whether the answer may be different depending on gender.

Enrolment in high-ability educational programs determines, in many instances, subsequent access to selective educational and professional settings. If joining a high-ability group imposes students with a penalty in terms of grades, this would put them in disadvantage with respect to students in standard groups. In the academic context, particularly so at the higher educational stages, this could imply lower chances of successful post-graduate applications to masters programs, scholarships, or job offers if the recruitment processes do not value the specific program that the graduate comes from. Female underperformance in such high-ability groups, if it exists, might be among the many obstacles that women encounter on their path towards top professional positions, where the higher gaps are observed (the *glass-ceiling* phenomenon). Identifying such differences and their determinants therefore represents a significant contribution to redressing existing gender imbalances.

Methodologically, we base our analysis on four-cohorts of academic records for students at a large public university in Spain (*Universitat de València*, UV henceforth) in standard groups of Business Administration and in two high-ability programs of Business that coexist with the former. The two kind of programs share the same subjects but differ considerably in the admission cutoff. Based on regression analysis, we isolate the effect of the baseline ability of the student, approximated by their entrance score, and analyse gender differences as we further detail below.

To anticipate our results, we find that, on average, students in high-ability groups outperform (in terms of GPA at the end of first year at university) students in standard groups. However, once we control by the university entrance grade, students in high-ability groups obtain lower grades than their counterparts in the standard groups. This result points in the direction that joining a high-ability group has a cost in terms of foregone opportunities to get a higher grades-transcript in the degree. Finally, when we do the gender analysis, we find that although females get better grades than males on average on standard groups, when they enter a high-ability group the negative effect is greater than for males.

2. Institutional setting and data

To carry out our analysis we use administrative data on four cohorts of students enrolling in the business degrees offered at UV. This comprises both students in a standard program of Business Administration and in the high-ability programs of Business Administration & Law and International Business (HA-groups, henceforth). The HA-programs were set up in the academic year 2010-2011. The data used here refers to first-year students from then to academic year 2013-2014.

The UV, with near 45,000 students in 2020, is one of the largest public universities in Spain, and offers a wide range of around 70 four-year major degrees in all areas of study. College

admissions in public universities in Spain are based on students' entrance scores and the specific admission cutoffs established by each university for each degree and year. The admission cutoff is determined by the number of slots on offer, the demand of slots and the incoming cohort's average score. The entrance score ranges between 0 and a maximum of 14 points. The cutoff established by the UV for admission to the HA-programs differ quite from the entrance grades in standard groups. The cutoff started at around 10.5 points (out of 14) in 2010 and has increased to above 11.3 in 2013. By contrast, in the regular groups the cutoff ranged from 7.45 in 2010 to 7.65 in 2013. Thus, on average between 2010 and 2013, the differences between the mean entrance scores of students in the regular groups and those in high-ability groups are above 3 points on the 1-14 scale of the entrance grade, which constitutes a considerable difference.

Following a formal request of data, we received from UV administrative records of all students enrolled in the above mentioned major degrees from year 2010 to year 2013. These administrative records contain information on each student's entrance score, which we will take in this article as our measure of student's baseline ability. The data also contain the academic grades obtained in all subjects of the first academic year (all of them compulsory subjects), as well as certain demographic characteristics such as gender. In our empirical set up below, the outcome variable of interest is the student's final average point grade (GPA) obtained in compulsory subjects of the first year. This GPA is measured on a 0-10 scale.

We exclude from the estimation sample all those students whose admissions were based on different entrance requirements. This includes special students, such as disabled and elite sports students, those who transferred across colleges or degrees, those aged above 25 and international students. In total, we count on the administrative records for 1,691 students, out of which 934 are students in the standard groups and 757 are students in HA-groups. In our estimation sample, each student enters as many times as subjects evaluated for this student, that is, we pool the GPA of all students across all subjects. As a result, the estimation sample comprises 17,440 observations, 9,322 corresponding to regular students and 8,118 to high-ability students.

3. Empirical procedure and results

Our first question of interest is whether equally able students obtain higher/lower GPA in either standard groups or in HA-groups. Our second question of interest is whether or not such differences, if any, differ by gender. To shed light on these issues, we provide two pieces of evidence. First, we estimate that part of a student's actual GPA at the end of the first year at university that is above or below the value predicted by her entrance grade. More specifically, we regress by OLS the student's GPA on her entrance grade and its squared

value (to allow for non-linearities in the relationship between the GPA and the entrance grade). We compute a ‘residual’ as the difference between the actual (observed) GPA and the predicted GPA. A positive residual indicates that the student performs better than predicted by his/her entrance grade; a negative value indicates the opposite. The results are shown in Figure 1 for students who have surpassed the admission threshold but decide to enrol into the standard program and for those deciding instead entering the high-ability groups. The results are displayed by entrance grade (below or above the average) and by gender. A considerable positive difference is observed in favour of female students in standard groups. However, such a difference is close to zero, and if any negative, in HA-groups. In the case of male students, they underperform with respect to their predicted GPA in both types of groups. Such underperformance of male students seems to be larger in HA-groups than in standard groups for students below the average of entrance grades, but the opposite is found among above-the-average students. These results would be suggesting that female students feel ‘more comfortable’ in standard groups than in HA-groups, or, in other words, that the more competitive environment of the HA-groups do not favor them in terms of performance.

Figure 1 does not allow us to observe if equally able students obtain higher or lower GPA on either standard or HA-groups. To proceed with this we next estimate by OLS a linear model whose results are shown in Table 1. Subsequently from column (1) to column (5) we proceed estimating each student’ GPA as a function of an increasingly augmented set of variables as follows: i) Column (1), only with a constant. In this case, the estimated coefficient displayed in the table represents the sample average of the dependent variable, that is, the sample average of GPA regardless of the type of group, the student’s entrance grade, and gender. ii) In column (2), we add a binary indicator variable taking the value 1 for students in HA-groups and 0 otherwise. The estimated coefficient of this variable indicates the GPA differential for HA-groups as compared to standard groups (measured by the constant), regardless of the entrance grade and gender. iii) In column (3), we further add the entrance grade of the student. By doing so, we discount the effect of the student’s entrance grade. That is, the estimated coefficient of the variable ‘High-ability group’ now indicates the GPA differential for HA-groups as compared to standard groups if we were to compare students with the same ability - as measured by a same entrance grade-, and still regardless of gender. iv) In column (4), we further we add a binary indicator variable (Female) taking the value 1 for female students, in all groups, and 0 for males. The estimated coefficient of this variable indicates the GPA differential for female students, regardless of the type of group, as compared to their male counterparts.v) Finally, in column (5), we interact the binary indicator variable ‘Female’ with the binary indicator variable ‘High-ability group’. This variable will then take the value 1 for female students in HA-groups, and the estimated coefficient of this variable indicates

the GPA differential for female students in such type of groups as compared to female students in standard groups.

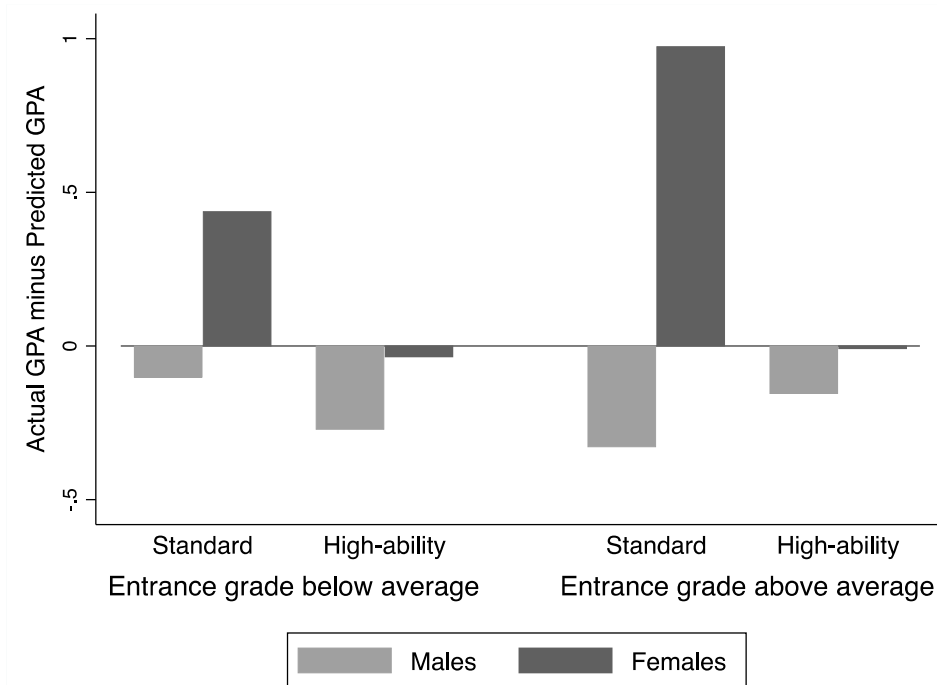


Figure 1. The figure shows the difference between the GPA at the end of the first academic year at university and the GPA that the entrance grade of the student would predict. A positive difference indicates that the student performs better than predicted by his/her entrance grade; a negative value indicates the opposite. The results are shown for students entering either the standard groups of business or the high-ability groups, by entrance grade (below or above the average) and by gender. A considerable positive difference is observed in favour of female students, particularly for those with above-the-average entrance grades on standard groups. Such an advantage is lost in the high-ability groups.

Our estimation procedure in Table 1 yields two main findings. Initially, column (2) indicates that the GPA differential in HA-groups as compared to standard groups is positive and statistically significant. This would be the average difference that we would observe in the raw data. However this is of course due to a large extent to the fact that students in HA-groups are on average more able students, that is, they have higher entrance grades. In column (3), once we isolate the effect of the entrance grade (ability), the coefficient on the 'High-ability group' indicator becomes negative. This result is the first of our main findings: for a same ability, in HA-groups it becomes harder to obtain higher GPA. In other words, students in these groups would be 'giving up' to the opportunity of getting higher grades in standard groups. In the economists' jargon, students in HA-groups will be incurring in an 'opportunity

cost' since the alternative – the standard program- would result in higher grades transcript. The result is around half a point lower on average on the 0-10 scale of the GPA (estimated coefficient around -0.5), which constitutes a huge difference, for instance, for students aspiring to get a scholarship or to get admitted in some master program after college graduation.

The second of our main findings refers to the gender differences. On column (4) the positive coefficient of the 'Female' indicator variable is indicating that female students, on average, obtain near half a point higher GPA than their males counterparts, when we do not attend to the type of group. However, in column (5) the estimated interaction effect between female gender and HA-group tells us that the difference is considerably lower in HA-groups. This finding would be suggesting that the more competitive environment of HA-groups lead female students to underperform with respect to their performance in the standard groups.

Table 1. Dependent variable: Students' GPA at the end of first year at university. Standard vs. High-ability groups of Business Administration (BA) and gender differences. (OLS estimation)

	(1)	(2)	(3)	(4)	(5)
High-ability group ^a		1.437*** (0.038)	-0.532*** (0.058)	-0.503*** (0.058)	-0.142* (0.074)
Entrance grade			0.861*** (0.020)	0.827*** (0.021)	0.825*** (0.021)
Female				0.533*** (0.037)	0.836*** (0.053)
Female in High-A.					-0.659*** (0.073)
Constant	5.873*** (0.020)	5.204*** (0.028)	-2.884*** (0.197)	-2.824*** (0.196)	-2.947*** (0.196)
Observations	17,440	17,440	17,440	17,440	17,440
R-squared	0.000	0.073	0.153	0.163	0.167

High-ability: refers to a binary indicator variable equal to 1 for students in high-ability groups and 0 for students in standard groups of Business Administration. The estimated coefficients show the difference in the dependent variable of students in HA-groups as compared to students in standard groups. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4. Final comments

The evidence provided in this paper suggests that ability-based selective grouping may have several implications. For individuals deciding on whether or not to join a selective group, an opportunity cost comes in the form of giving up the academic premium associated with holding a top position in less demanding environments. In the academic context, particularly so at the higher educational stages, this could imply lower chances of successful post-graduate applications to masters programs, scholarships, or job offers when competing with candidates from standard programs. For evaluators of the academic merits achieved by students, our results suggest that in order to improve the recruitment of the best candidates, grades should not be the unique indicator of the candidate's ability, but rather a mix of grades and program studied. In the case of women, given that the grade penalty for belonging to a high-ability group is even greater, this mix of grades and program studied has even more pronounced consequences. In this sense, interventions are needed to provide female students with more tools to increase self-confidence, reduce risk aversion and feelings of anxiety when facing competitive environments.

References

- Elsner, B., Isphording, I. E., and Zölitz, U. (2021). Achievement rank affects performance and major choices in college. *The Economic Journal*, 131(640), 3182-3206. <https://doi.org/10.1093/ej/ueab034>
- Gneezy, U., Niederle, M., and Rustichini, A. (2003). Performance in competitive environments: Gender differences. *The quarterly journal of economics*, 118(3):1049–1074. <https://doi.org/10.1162/00335530360698496>
- Marsh, H. W. (1987). The big-fish-little-pond effect on academic self-concept. *Journal of educational psychology*, 79(3), 280. <https://doi.org/10.1037/0022-0663.79.3.280>
- Sacerdote, B. (2011). Peer effects in education: How might they work, how big are they and how much do we know thus far? *Handbook of the Economics of Education*, Vol. 3, 249-277.
- Zimmerman, D. J. (2003). Peer effects in academic outcomes: Evidence from a natural experiment. *Review of Economics and statistics*, 85(1), 9-23. <https://doi.org/10.1162/003465303762687677>