

# CAN POSITIVE FEEDBACK ENCOURAGE FEMALE AND MINORITY UNDERGRADUATES INTO ECONOMICS?

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Economics is a popular major in U.S. colleges and universities, but the field has historically been relatively unsuccessful in attracting women and minority students. Men outnumber women as undergraduate economics majors by three to one nationwide, and men outnumber women two to one or more at the best research universities and liberal arts colleges (Avilova and Goldin, 2018). The numbers are even lower for underrepresented racial and ethnic minorities, who earn slightly more than 20% of all bachelor's degrees, but less than 12% of economics degrees (Bayer and Wilcox, 2019)<sup>1</sup>. These disparities in the early stages of the professional pipeline for economists contribute to an underrepresentation of women and minorities in graduate school, the academy, and the

economics profession more generally (Lundberg and Stearns, 2019). This lack of diversity constrains the range of issues addressed in the economics profession and limits our collective ability to understand issues from new and innovative perspectives. The fact that there is more diversity in the populations earning STEM degrees than in economics suggests that there is still more that can be done to attract women and minority students to the field (Bayer and Rouse, 2016).

This paper reports the results of a simple field experiment in which students earning a C or better in the introductory "Principles of Microeconomics" course (Econ 1) at the University of California, Santa Barbara (UCSB) were sent a letter describing the two majors offered by the department—Economics and Economics and Accounting—and inviting the student to an informational meeting about the majors and career prospects. A random sample of students earning a B or better were instead sent a treatment letter that augmented

<sup>1</sup> These data are for four-year, not-for-profit colleges and universities in the U.S. for the period 2011-2015.

the baseline (control) letter by adding positive feedback about their performance in Econ 1, stating that they are on track to be a successful economics major, and encouraging them to consider majoring in Economics or Economics and Accounting. We evaluate whether this simple positive feedback intervention increases attendance at the informational meeting and the probability of enrolling in one of the two economics majors. We are also interested in whether women and underrepresented minority students, who are less likely to continue on to more advanced economics courses, are more responsive to encouragement about their likely success in the major.

The “nudge” increased meeting attendance by both men and women. Treatment had no significant impact on the probability of entering an economics major, though it increased the number of women in Economics and Accounting and increased the number of men in the Economics Major. The biggest treatment effects are observed among Hispanic students, though the absolute number of students in this subgroup is small.

## **I. Background and Experimental Design**

We contribute to a recent literature on interventions designed to increase interest in majoring in economics among women and other underrepresented groups. Many of the

studies were part of, or inspired by, the Undergraduate Women in Economics Challenge (Avilova and Goldin, 2018). These include experiments that assess the impact of classroom visits by female role models (Porter and Serra, 2019) and the provision of peer mentoring (Li, 2018). More similar to our experiment are those that provide information about economics and related career prospects, or provide a behavioral nudge that encourages high-performing students to continue their studies in economics. Li (2018) finds that a full treatment of information about careers, salaries, and the class grade distribution combined with a message that mentions the student’s good grade in an introductory class and encourages them to continue in the major increases the probability of majoring in economics for high-performing female students. Bayer, Bhanot, and Lozano (2019) find that welcoming messages and information about the breadth of the economics field sent to incoming college students do not have significant effects on the probability that female and minority students take an economics course, though it does affect first-generation students. In another study similar to ours, Pugatch and Schroeder (2020) send a message with basic information about the economics major to students in an introductory course and find that it increases the probability

that male, but not female students, major in Economics. They conclude that such light-touch interventions, as opposed to programs involving personal interactions with students, may be of limited value in increasing diversity in economics.

Our experiment focuses on students taking their first economics course at UCSB, and investigates whether providing information about majoring in economics combined with a message that explicitly encourages students who perform well in the class to pursue an economics degree increases the likelihood that they pursue the major. The fraction of women taking undergraduate economics courses tends to decrease from freshman to senior year, and there is evidence that some of this attrition may be due to a greater responsiveness to grades (Owen, 2010). We conjectured that persistence in the field among female economics students, and perhaps other underrepresented groups, might be more responsive to targeted encouragement than are white male students.

The organization of economics majors at UCSB includes an unusual element that may offer some insights into the choices of students on the margin between majoring in economics or other fields. The Economics Major is a conventional one, but Economics and

Accounting includes an extensive curriculum in accounting and financial management that satisfies many of the requirements of, and helps students prepare for, credentialing as a Certified Public Accountant. Extensive career counselling and the involvement of major accounting firms gives this major a more explicit vocational emphasis and clearer career trajectory than the Economics Major, possibly making it a more attractive choice for marginal students.<sup>2</sup>

The experiment included 2,338 students taking Econ 1 at UCSB during the fall 2015, winter 2016, fall 2016 and winter 2017 quarters. We began by surveying all students during sections/tutorials approximately half way through each quarter. The survey asked for basic demographic information and major intentions. Students were incentivized to participate with a \$25 lottery for each section. Participation was essentially 100% for eligible students age 18 and over.

Survey participants were then randomly assigned to the treatment or control group conditional on their Econ 1 final grade. Half the students earning a B or better were randomly assigned to the treatment and control group, and all student earning between a C and a B- were allocated to the control group. Low

<sup>2</sup> Anecdotal evidence suggests that Economics and Accounting is considered to be an easier major by pre-major undergraduates.

scoring students were excluded from the treatment randomization because the information nudge involved commenting on their strong performance in Econ 1.

Treatment and control subjects received their personalized letter via email approximately one week after the final exam. The control letter described the fields in which Economics and Economics and Accounting Majors can take courses as well as the types of occupations the majors might lead to. The letter then invites the student to a short informational meeting early the next quarter. The only difference between the control and treatment letters is the opening paragraph. The control letter begins as follows:

*Congratulations on successfully completing Economics 1. The Department of Economics would like to take this opportunity to share some information with you about our major offerings and their associated career and advanced degree opportunities.*

The treatment letter begins with:

*Congratulations on your strong performance in Economics 1. We believe that you are on track to be a successful Economics Major, and would like to encourage you to consider entering the Economics or Economics and Accounting programs. The Department of Economics has a new initiative to reach out to some high scoring students and provide them with more information about our*

*undergraduate majors and what they can lead to.*

The informational meetings were led by a panel of faculty and focused on the major curriculums and recommended course progressions, post-graduate education options, and the wide range of career opportunities available to economics majors. These meetings were informal and included a question-and-answer period. In order to collect attendance information, students were asked to sign in to the meeting and were offered a chance to win \$100 in a lottery for each meeting. All students signed in, so the data is complete and representative of all attendees.

It is worth noting two limitations inherent to this experiment. First, the difference between the treatment and control letters is a very light touch treatment relative to the effort of completing future economics courses and entering the major, and therefore we might expect the impact to be small. Second, there may have been spillovers if students shared the information in their letters with other students. It is likely (but not certain) that this would bias the estimates downward.

## **II. Data and Subjects**

All data come from three sources: entry survey data, meeting attendance data, and UCSB administrative data on socioeconomic

background, courses, and major status. There were four experimental rounds from fall 2015 to winter 2017. The sample includes all UCSB students enrolled in Econ 1 in these quarters who completed the survey and earned a C or better in the course. Summary statistics are reported in Table 1. Column 1 reports summary measures for all C or better students, column 2 restricts the sample to treatment-eligible B or better students, and column 3 is restricted to untreated B or better students. Column 4 reports the difference between treated and untreated B or better students using a linear regression. While there are a couple of statistically significant differences between treated and untreated B or better students, these differences are small and the samples appear to be reasonably balanced.

[ Insert Table 1 Here]

### III. Empirical Specification

We use the following linear probability model on the sample of all students who were sent either the basic or the treatment message:

$$Y_i = \beta_1 T_i + \beta_2 F_i + \beta_3 T_i * F_i + X_i \beta_4 + \varepsilon_i$$

$Y_i$  is an indicator variable for whether students attended the information meeting, entered the Economics Major, or entered the Economics and Accounting Major.  $T_i$  is a treatment indicator,  $F_i$  is a female indicator,  $X_i$

includes indicators for race, grade in Econ 1, quarter enrolled in Econ 1, whether the student studied economics and calculus in high school, and whether a parent took economics in college, as well as a continuous SAT score. The results are not sensitive to the specific controls included.

### IV. Results

The first panel in Table 2 shows that treatment increases the probability that a student attends the information meeting by 6.1 percentage points for men and 5.8 percentage points for women, relative to those who receive the invitation to the meeting without personal encouragement (column 1). Treatment increases the probability that men major in Economics by 5.8 percentage points (column 2) and that women major in Economics and Accounting by 5.4 percentage points (column 3). The observed pattern of results is consistent with the notion that there is a hierarchy in majors with Economics perceived as more difficult than Economics and Accounting. As such, the experimental nudge encouraged some women to enter Economics and Accounting and some men to shift from Economics and Accounting to Economics. For neither gender, however, is the effect of treatment on the probability of choosing either major significant.

[ Insert Table 2 Here]

The other panels of Table 2 split the sample into subgroups. All models are estimated separately for white, Asian, international (almost exclusively Chinese), Hispanic, and first-generation students. Not surprisingly, many of these results are quite imprecise given the small sample sizes. The most striking results are for Hispanic students. For both Hispanic men and women, treatment leads to a large increase in the fraction of students majoring in Economics and Accounting. The impact for Hispanic women is particularly large (48.2 percentage points), and for this group treatment results in a significant increase the probability of majoring in either program. Many of the Hispanic students are first-generation college students, who might find a major with a clear occupational link attractive, but it is clear from the final panel reporting treatment effects for all first-generation students that this does not appear to be what is driving the Hispanic results.

## V. Conclusions

Many economics departments are experimenting with changes in curriculum, communication, and mentoring to address the underrepresentation of women and minority students. Our experiment is a light touch

intervention providing information and encouragement to high-performing students in an introductory course. In a pattern of results consistent with earlier work, we find little evidence that this kind of inexpensive intervention, attractive as it is to an under-resourced department, will be effective in diversifying our economics undergraduate program. Female and Hispanic students respond to treatment, but the only significant effects are for entry to a career-oriented program that prepares students for certification as a professional accountant. White male students also respond to treatment, becoming more likely to enter the more academic Economics Major rather than Economics and Accounting.

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TABLE 1— SUMMARY STATISTICS AND TREATMENT BALANCE

	C or Better (1)	B or Better (2)	Not Treated B or Better (3)	Treatment Difference (4)
Female	0.45	0.40	0.37	0.05
White	0.28	0.33	0.37	-0.07**
Asian (domestic)	0.23	0.24	0.22	0.04
International	0.18	0.25	0.25	0.00
Hispanic	0.19	0.09	0.08	0.01
Other	0.11	0.10	0.09	0.01
First Generation College	0.39	0.28	0.28	0.00
Pell Grant	0.34	0.24	0.23	0.03
SAT	1910	2004	2012	-15.67
Economics in High School	0.71	0.71	0.70	0.03
Calculus in High School	0.76	0.84	0.81	0.05*
Parent College Economics	0.27	0.30	0.29	0.02
Economics Pre-Major in Econ 1	0.23	0.26	0.28	-0.02
Accounting Pre-Major in Econ 1	0.24	0.30	0.30	0.01
Other Pre-Major in Econ 1	0.53	0.44	0.43	0.02
Sample Size	2338	793	400	

Notes: Entries in column (4) are from a linear regression on the treatment indicator for the column (2) sample. \*\* (\*) Indicates statistically significant difference at the 5 (10) percent level.

TABLE 2— TREATMENT EFFECTS FOR WOMEN AND MEN: TOTAL AND BY SUBGROUPS

	Means: B or Better Untreated Students					
	Attend Meeting (1)	Economics Major (2)	Econ. & Accounting Major (3)	Attend Meeting (4)	Economics Major (5)	Econ. & Accounting Major (6)
<u>All (n=2338)</u>						
Men	0.061** (0.023)	0.058* (0.025)	-0.037 (0.025)	0.104	0.291	0.259
Women	0.048* (0.026)	-0.029 (0.028)	0.054* (0.028)	0.134	0.195	0.228
<u>White (n=660)</u>						
Men	0.000 (0.038)	0.100** (0.047)	-0.073* (0.038)	0.097	0.379	0.184
Women	0.091* (0.051)	-0.028 (0.064)	0.016 (0.052)	0.205	0.227	0.227
<u>Asian (domestic) (n=538)</u>						
Men	0.111** (0.048)	-0.023 (0.046)	-0.075 (0.059)	0.113	0.194	0.468
Women	0.007 (0.055)	-0.010 (0.054)	-0.093 (0.068)	0.083	0.208	0.500
<u>International (n=429)</u>						
Men	0.025 (0.050)	0.049 (0.058)	-0.030 (0.056)	0.098	0.195	0.146
Women	0.036 (0.043)	0.025 (0.050)	0.064 (0.048)	0.069	0.138	0.138
<u>Hispanic (n=443)</u>						
Men	0.127 (0.078)	-0.039 (0.064)	0.169** (0.067)	0.143	0.190	0.238
Women	0.156* (0.095)	-0.092 (0.077)	0.482** (0.081)	0.273	0.364	0.000
<u>First Generation Students (n=922)</u>						
Men	0.083* (0.045)	0.047 (0.041)	-0.003 (0.047)	0.103	0.218	0.333
Women	0.032 (0.047)	0.046 (0.043)	0.047 (0.047)	0.121	0.152	0.242

Notes: All estimates are from linear probability models. All models also include indicators for treatment, female and an interaction, as well as indicators for race, Econ 1 grade, Econ 1 quarter, SAT score, and indicators for taking economic and calculus in high school and having a parent who took economics in college. \*\* (\*) Indicates statistically significant difference at the 5 (10) percent level.