Does Advisor Gender Affect Women's Persistence in Economics?

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The share of women in the economics profession remains low and has grown slowly over the past decades (Lundberg and Stearns, 2019). The underrepresentation of women in economics is visible from the early stages of postsecondary education, as female undergraduate students major in economics at a substantially lower rate than men (Avilova and Goldin, 2018). This issue gave rise to a variety of mentoring interventions that were successful at increasing women's interest and persistence in the field of economics (Buckles, 2019). A common feature of these interventions is the use of female mentors who may act as role models to other women.[1] However, there is still no conclusive evidence on whether the gender of a close mentor affects the gender gap in economics.[2]

In this paper, we provide some of the first causal evidence on whether the gender of an advisor affects undergraduate women's persistence in the field of economics. We use data from a private 4-year college, where first year undergraduate economics majors are randomly assigned to academic advisors. Advisors are also faculty members in the economics department whose job is to help students select courses, resolve academic problems and monitor their academic progress. Students are required to meet one-on-one with their advisors once at the beginning of each semester and can attend their advisors' weekly office hours.

We find that an economics advisor's gender substantially impacts women's persistence in the major. Specifically, we show that having a female rather than a male advisor (i) decreases female students' first-year major dropout rate by 4.1 percentage points and, (ii) increases the share of women graduating with a degree in economics by 7 percentage points. However, advisor gender has no significant effect on female students' GPA. This suggests that elements other than academic performance, such as socio-psychological factors related to the lack of female role models in economics, may explain why women drop out of the field. Our findings indicate that increasing the share of female economists among academic advisors may be an effective way to improve women's persistence and graduation in the major.

I. Institutional Background

Our study leverages unique aspects of the academic advising system at the American University of Beirut (AUB)—a private college located in Lebanon. AUB is most similar to the average private non-profit 4-year college in the United States. Approximately 83% of its full-time faculty have doctoral degrees, its student to faculty ratio is 11 to 1 and its average class size is less than 25. Furthermore, 40% of AUB's full-time faculty and 50% of its students are women.

Students in Lebanon typically enroll in their first year of college with a declared major. At the beginning of their first year, AUB students are randomly assigned to academic advisors who are also fac-

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[1] For example, the American Economic Association's Committee on the Status of Women in the Economics Profession (CSWEP) organizes a yearly workshop to provide junior female economists with mentoring by senior female economists. The workshop was effective at improving participants' publication record and tenure rates (Blau et al., 2010; Ginther et al., 2020). Porter and Serra (2020) show that having two female economists discuss their careers with students during Principles of Economics classes, increases the likelihood that women choose economics as their major.

[2] Previous studies document that the gender of a role model matters for women in science fields. Carrell, Page and West (2010) show that teacher gender has a strong impact on women's enrollment and graduation from science majors. Canaan and Mouganie (forthcoming) find that having a female science college advisor increases female students' access and persistence in STEM fields.

Table 1—Summary statistics

	All Students	Male Students	Female Students
	(1)	(2)	(3)
Female Advisor	0.239	0.253	0.225
	(0.427)	(0.435)	(0.418)
Number of Students per Advisor-Year	59.91	60.81	59.01
	(28.10)	(28.31)	(27.88)
Total SAT Score	1149.7	1151.6	1147.7
	(118.8)	(120.5)	(117.1)
Legacy Status	0.233	0.244	0.222
	(0.423)	(0.430)	(0.416)
First Year GPA	77.02	75.53	78.49
	(9.525)	(10.11)	(8.667)
First Year Dropout Rate	0.121	0.117	0.126
	(0.327)	(0.322)	(0.332)
On-Time Graduation Rate	0.792	0.777	0.806
	(0.406)	(0.416)	(0.395)
Graduation Rate	0.817	0.816	0.818
	(0.387)	(0.388)	(0.386)
Number of Students	1,317	656	661
Distinct Number of Female Advisors	4	4	4
Distinct Number of Male Advisors	8	8	8

Note: Means and standard deviations (in parentheses) reported. Sample includes first time enrolling Economics majors at the American University of Beirut from the academic years 2002-2003 to 2014- 2015. Graduating on time is defined as obtaining an Economics BA within 3 years of initial enrollment. Graduating is defined as obtaining an Economics BA within 5 years of initial enrollment.

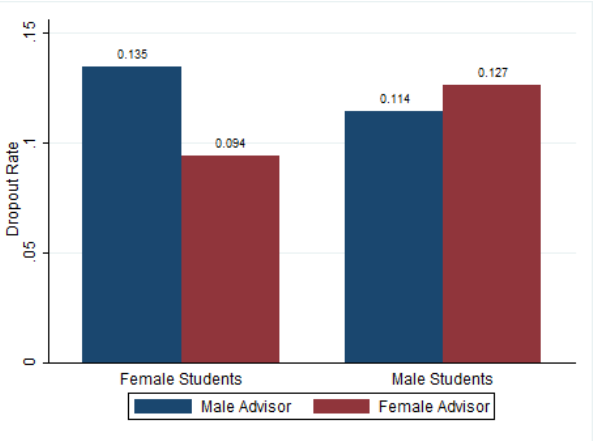
ulty members in their major's department.[3] Advisors help students select courses and develop a plan of study which would allow them to meet graduation requirements. Students can discuss their academic difficulties and ask their advisors for academic and career advice. Advisors also monitor students' academic progress, are notified when they are placed on academic probation and have access to their academic records. Students are required to meet one-on-one with their advisors once at the beginning of each semester and prior to enrolling in courses, and have the option of attending advisors' weekly office hours. This advising model is comparable to advising conducted at private liberal arts colleges in the U.S. such as Amherst College, Middlebury College and Williams College.

[3]The process of assigning students to advisors is conducted by university administrators who first sort students by either their ID numbers or last names. The first student is assigned to the first advisor from the advisors' list (where advisors' names are listed in a random order), the second student is assigned to the second advisor and this process continues until all students are assigned to an advisor.

II. Data

We use administrative data on advisors and students who first enrolled at AUB in the academic years 2002-2003 to 2014-2015. Data are taken from AUB's registrar and admissions offices. We restrict our main sample to students enrolled in their first year at AUB and who have economics as their declared major. Summary statistics for all first-year economics students in our sample are reported in column (1) of Table 1. In columns (2) and (3), we present statistics for male and female students separately. Approximately 24% of economics majors are matched to a female advisor in the department and advisors have an average yearly caseload of about 60 students. Male students have a slightly higher—but not statistically different—average total SAT score than women (1,151 versus 1,147), and 23% of students in our sample have a close relative who graduated from AUB (i.e., legacy students). Additionally, twelve distinct faculty members served as first-year advisors over the study period; four of whom were women and eight men.

Figure 1. Likelihood of dropping out after first year as an Economics major



Note: Sample includes first time enrolling Economics majors at the American University of Beirut from the academic years 2002-2003 to 2014- 2015. Means of first-year dropout rates are reported in bars for varying student-advisor gender matches.

Turning to our main outcomes, female economics students significantly outperform men during their first year in the major, with an average GPA of 78.49 out of a 100 possible points (versus 75.73 for men). Strikingly, and despite having a higher first-year GPA, female students are more likely than men to drop out of the major after their first year, with a dropout rate of 12.6% compared to 11.7% for men.

In our main analysis, we also look at the impact of advisor gender on economics students' likelihood of graduating from the major. Students in Lebanon need three years to complete an economics degree on time.[4] We therefore define on-time graduation as graduating with an economics degree within 3 years from initial enrollment, while overall graduation is defined as graduating with an economics degree within 5 years of initial enrollment. Table 1 reveals that 80.6% (77.7%) of female (male) students graduate on time from the major and around 82% of both male and female students eventually graduate from the major. The fact that students of different genders graduate from economics at the same rate but have different first-year dropout rates, indicates that men persist longer than women—despite performing worse in the first-year—before dropping out of the major.

III. Empirical Strategy

Our identification strategy leverages the random assignment of students to advisors at the beginning of their first year as economics majors. In online appendix Table A1, we demonstrate that our data are consistent with what we would expect from the random allocation of students to advisors by showing that predetermined student baseline characteristics such as SAT scores and high school GPA are unrelated to student-advisor gender match.[5] This enables us to identify the causal effect of student-advisor gender match on students' persistence and graduation in economics. Formally, we estimate the following regression model:

$$Y_{iat} = \beta_0 + \beta_1 Femadv_a + \beta_2 Femst_i + \beta_3 Femst_i * Femadv_a + X_i'\gamma + A_a'\delta + \sigma_t + \epsilon_{iat}$$

[4]This is because the majority of students in Lebanon enroll in their first year of college as sophomores with a declared major, as the last year of high school is considered equivalent to the U.S. freshman year of college.

[5]We also run additional tests of randomization, using re-sampling techniques, to show that our data are consistent with what would be observed from a random process. These results are reported in online appendix A2.

TABLE 2—THE EFFECT OF ADVISOR-STUDENT GENDER MATCH FOR STUDENTS MAJORING IN ECONOMICS

	Year 1 dropout	Year 1 GPA	Graduate on time	Graduate
	(1)	(2)	(3)	(4)
Effect on male students (β_1)	0.012	-0.040	0.048	0.037
	(0.037)	(0.069)	(0.044)	(0.045)
	[0.557]	[0.395]	[0.061]	[0.125]
Effect on female students ($\beta_1 + \beta_3$)	-0.041**	-0.005	0.077**	0.070**
	(0.019)	(0.067)	(0.035)	(0.034)
	[0.057]	[0.922]	[0.002]	[0.006]
Effect on gender gap (β_3)	-0.053	0.035	0.029	0.032
	(0.045)	(0.095)	(0.049)	(0.046)
	[0.057]	[0.588]	[0.447]	[0.347]
Observations	1,317	1,317	1,317	1,317

Note: Sample includes first time enrolling Economics majors at the American University of Beirut from the academic years 2002-2003 to 2014- 2015. Each column represents estimates from separate regressions. Graduating on time defined as obtaining an Economics BA within 3 years of enrollment. Graduating defined as obtaining an Economics BA within 5 years of enrollment. Standard errors clustered at the advisor-year level and reported in parentheses. Randomization inference based p-values reported in brackets. *** p <0.01 ** p <0.05 * p <0.1

where Y_{iat} is the outcome of interest for student i matched to economics advisor a in academic year t. $Femadv_a$ is a dummy variable that is equal to 1 if an advisor a is female and 0 otherwise. $Femst_i$ is another indicator variable for whether student i is female. We further interact both of these indicators. Our main specification includes only these variables.

Random assignment guarantees that our estimates of the β coefficients are unbiased. Throughout, we report estimates for three main parameters of interest: β_1 captures the effect of having a female versus male economics advisor on male students' outcomes. $(\beta_1 + \beta_3)$ estimates the same effect for female students. β_3 reports the relative difference between female and male students' outcomes when matched to a female rather than a male economics advisor.

Additionally, we report estimates from an alternate specification in which we include a vector of student controls X_i', advisor's academic rank A_a' and academic year fixed effects σ_t. Student controls include total SAT score, high school GPA, and legacy student status. Finally, ϵ_{iat} is the error term. We cluster our standard errors at the advisor-year level but also report randomization inference based p-values with our main results. This method of inference has the benefit of not relying on asymptotic properties of estimators.

IV. Results

Figure 1 provides visual evidence on how advisor gender impacts students' first-year dropout rate in economics. Specifically, we plot the unconditional first-year dropout means of different student-advisor gender match combinations. The figure shows that female students matched to a male economics advisor are 13.5% likely to drop out from the major by the end of their first year. However, their dropout rate substantially decreases to 9.4% when they are instead assigned a female economics advisor. On the other hand, male students' dropout rate increases slightly from 11.4% to 12.7% when they are matched with a female rather than a male economics faculty advisor.

Regression estimates taken from our main equation in section III are reported in column (1) of Table 2. In line with the visual evidence, we find that having a female rather than a male economics advisor significantly reduces female students' first-year dropout rate by 4.1 percentage points (i.e. 32.5 percent compared to the mean female dropout rate). We detect no statistically significant gender match effects on dropout for male students. In column (2), we show that advisor-student gender match has no significant impact on either female or male

students' GPA during their first year in the major. This indicates that female economics advisors do not decrease female students' dropout rates through helping them improve their academic performance. Instead, the dropout effects could be due to female advisors acting as role models to female students, inspiring them to persist in the major.

Columns (3) and (4) of Table 2 report gender match effects on graduation outcomes. We find that the documented dropout effects persist in the long run. Specifically, women matched with a female rather than male economics advisor are 7.7 percentage points (9.5 percent) more likely to graduate on time from the major. They are also 7 percentage points (8.5 percent) more likely to ever graduate with an economics degree after being exposed to a female rather than a male advisor. On the other hand, student-advisor gender match has no statistically significant impact on male students' graduation outcomes. Finally, consistent with the random assignment of students to advisors, we show that all our main estimates are robust to the inclusion of student controls, advisor academic rank as well as year fixed effects. These results are reported in online Appendix Table A3.

V. Conclusion

We examine how the gender match between first-year economics students and their academic advisors affects persistence in the major. We exploit the random assignment of students to advisors who are also faculty members in the economics department. We find that female students matched to a female rather than a male economics advisor are less likely to drop out of the major and more likely to graduate with a degree in economics.

Our findings highlight that the gender of an economics mentor has a strong impact on female students' persistence in the field. Moreover, given that most colleges provide some form of academic advising, our results suggest that increasing the share of female economists among advisors or mentors may be a scalable way to promote women's participation in the field of economics.

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