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ABSTRACT

It is frequently asserted that a college's female undergraduate enrollment in the sciences and engineering can be increased by raising female representation on the faculties in these areas. Despite the widespread acceptance of this proposition, it does not appear to have been subjected to any kind of serious statistical analysis. In this paper, we assemble panel data from three rather different educational institutions, and use them to examine the relationship between the gender composition of the students in an academic department and the gender composition of its faculty at the time the students were choosing their majors. We find no evidence for the conventional view that an increase in the share of females on a department's faculty leads to an increase in its share of female majors.

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1. Introduction

In recent years, considerable concern has been expressed over the dearth of female scientists and engineers in the United States. This concern has focused attention on the fact that female college undergraduates are much less likely to major in science, mathematics, and engineering than their male counterparts. One common belief is that increasing the number of female faculty in these fields would increase the number of females majoring in them. This belief appears to have influenced public policy. For example, the National Science Foundation has instituted a "Visiting Professorships for Women" program that provides grants to enable women scientists and engineers to serve as visiting professors at U.S. academic institutions. One objective of the program is "To encourage female students to pursue careers in science and engineering by providing greater visibility for women scientists and engineers in industry, government, and academic institutions."

This notion has also taken hold in a number of educational institutions. For example, a recent report at Princeton University entitled A Program for the Recruitment and Retention of Women Faculty in Science and Engineering asserted that Princeton's "ability to attract and retain women students" would be "profoundly affected" by an increase in the number of female faculty in science and engineering (Girgus [1992, p.5]). Dartmouth College has established a Women in Science Project whose purpose is to increase the percentage of women pursuing science majors by hiring more women faculty in the sciences. Similarly, the Provost of Yale

University recently indicated that, in order to attract more women to math and science, universities should think about changing their hiring practices in ways that would lead to increases in the number of female faculty members (New York Times, January 24, 1993, p. 23).

Given the academic community's widespread acceptance of this view, we were surprised when we were unable to find any serious empirical support whatsoever for the assertion that the gender composition of an academic department affects the gender composition of its majors. The purpose of this paper is to investigate this hypothesis econometrically. To do so, we obtained from three different academic institutions data that track the numbers of female faculty and students across departments and over time. In general, we find no evidence for the conventional view that an increase in the share of females on a department's faculty leads to an increase in its share of female undergraduate majors. Hence, university administrators who seek to increase female enrollments in particular departments by inducing an increase in female faculty may find their efforts to be of no avail.

2. Background

The notion that an undergraduate woman's choice of major is affected by the faculty's gender composition appears to be based on the concept of a role model, defined as an individual who has "skills or qualities that [another] lacks and yet admires and wishes to emulate" (Anderson and Ramsey [1990, p. 183]). Young women are argued to need female role models because a person is most likely to emulate someone who appears similar to himself or herself in external characteristics.[1]

Another argument for the need for female role models relates to the traditional role of women in American society. According to this view, the character attributes necessary for professional achievement are incompatible with traditional feminine qualities, so that a young woman with serious career ambitions needs female role models to demonstrate that success is possible. Thus, Tilghman [1993] argues that "all but the most determined women will tend to gravitate to the environment which is most positive and rewarding, and that tends to be where other women have already led the way." According to Fox [1974, p.19], "The deviations from normative female marital and familial patterns that are typical of women Ph.D.s may loom as more significant where female faculty is small." Similarly, Lafortune [1990, p.273] asserts that, "Only an increase in the number of women in scientific careers, and/or the teaching of math and science at advanced levels, will change the masculine social image associated with these fields, and encourage more girls to enter them."[2]

What evidence is there for the importance of role models? Most of it comes from surveys that ask young women what factors determine the careers for which they are preparing. For example, Basow and Howe [1980, p.571] surveyed a group of college students, and on the basis of the responses concluded that "female models are particularly important for female college students in their career decisions, especially mothers and female teachers." Similarly, after interviewing a group of college-bound female high-school seniors, McLure and Piehl [1978, p.181] concluded that "one of the major barriers" to women's success in science is that girls "perceive that preparation for science careers is too difficult because they lack awareness of successful women scientists." On the basis of the

McLure-Piehl survey, Betz and Fitzgerald [1987, pp.70-71] argue that "there is evidence that the relative lack of female faculty is a deterrent to women's educational an (sic) career pursuits, particularly in science." However, the fact that individuals in a survey assert that some factor is the cause of their behavior does not mean that it necessarily is. In any case, other surveys come to the opposite conclusion. Hackett, Esposito and O'Halloran [1989, p.177] surveyed a group of college women and concluded that "perceived role model influences...are not promising explanatory variables for nontraditional and science-related college-major choices."

A more serious attempt to establish a link between female faculty role models and female student enrollment was made by Fox [1974]. For several universities, he computed the correlation between the number of women faculty and number of women undergraduates in major academic divisions.[3] He found a positive correlation, and interpreted this as support for the notion that same-gender role models affect undergraduate choice of major. However, Fox's finding really tells us nothing about whether increasing the female faculty representation in a department would increase female undergraduate enrollment. To examine the validity of such a claim, one would have to analyze the relation across time between the gender composition of faculty and the gender composition of students. In contrast, Fox examines the relationship at a given point in time. The finding of a positive correlation in a cross section might be due simply to the fact that women gravitate to certain occupations and the associated courses of study because of cultural influences: "[C]hildren may internalize traditional notions of sex roles, accept these cultural sex stereotypes as fact, and eventually choose occupations that conform to these stereotypes" (Corcoran and Courant [1985, p.275]).

While our focus is on the decisions of college students, there has been some closely related work on the choice of courses by pre-college girls. Here as well female role models have been assigned a key role. However, we have not been able to find any more compelling evidence in the high school than in the college context. Smith and Erb [1986, p.673] claim that "the use of women science career models may positively affect both enrollment in science courses by girls entering high school and their personal consideration of a science career." This conclusion was drawn on the basis of an experiment in which one group of students was exposed to some women scientists over a period of time and a control group was not. The students were surveyed before and after the test. In the pre-test stage, the groups were similar in their responses to questions about women in science. In the post-test stage, the experimental group had a more positive attitude toward women in science. There was, however, no evidence on whether the girls in the experimental group subsequently were actually more likely to enroll in science courses.[4]

In summary, the effects of same-gender role models have been studied in the psychological and sociological literatures on education and career development.[5] While the verdict is not unanimous, the general view is that role models affect women's educational and career choices. However, most of the evidence is based either on case studies or surveys. We have found no attempts explicitly to relate changes in the number of female role models to changes in young women's participation in various endeavors.

3. Data

The data for this study were collected from three schools, Princeton University, the University of Michigan at Ann Arbor, and Whittier College. One reason these institutions were selected is simply that they were willing to give us the information we requested--a number of other schools we approached were unwilling or unable to provide the necessary information.[6] Their selection was also influenced by our desire to obtain some diversity with respect to type of institution, and hence to determine whether the role model theory applies in some settings and not in others. Princeton is a highly selective[7] private research university whose undergraduate enrollment (about 4,500 students) is relatively small for a research university. Michigan is a selective public research university with a much larger undergraduate student body, about 22,000 students. Whittier is a small (2,000 student), private, liberal arts college that puts much less emphasis on research than Princeton and Michigan, and which has less stringent admissions requirements than those institutions. While Michigan and Whittier have been coeducational for many years, Princeton began admitting female undergraduates only in 1969. In 1986 about a third of Princeton's seniors were women, about 40 percent of Michigan's, and about half of Whittier's.

The methods for collecting the data differed among the schools. Both Princeton and Whittier were unable to provide official documents with the number of faculty by gender, department, and year. Hence, we tabulated the data by hand using past editions of the relevant undergraduate announcements. When first names were androgynous, we consulted with various administrative officials to determine gender. The Michigan faculty data were compiled for us by the school's administration.

With respect to data on students, the Princeton and Michigan Registrar's Offices provided us tabulations from various public and internal records. The Princeton data consist of figures from the graduating class of 1973 through 1991. At Michigan, the continuous set of student data begins with the graduating class of 1979 and extends through 1992. The Whittier student data were more complicated to assemble. For the period 1980-88, the Registrar's Office tabulated the data. For years prior to 1980, no tabulated statistics were available, and the Registrar provided us with lists of the names and majors of the students who received their degrees each year from 1954 through 1979.[8] Unfortunately, in the mid-1970s, Whittier instituted some new programs that encouraged students to take independent and interdisciplinary majors. These changes made it impossible to compare meaningfully the numbers of majors in various departments in the pre and post-1973 periods. We therefore focus on the 1974-88 period, which has the greatest overlap with the Princeton and Michigan data.[9]

Summary statistics for the Princeton, Michigan, and Whittier data are presented in Tables 1a, 1b and 1c, respectively. For each school, the left-hand side of the table shows the mean over the relevant sample period of the proportion of female faculty in each department, the standard deviation and the minimum and maximum values of the proportion.[10] The right-hand side of the table exhibits the same information for graduating students.

Casual inspection of the tables suggests several observations. First, female faculty are distributed across departments more or less along the expected lines. At Princeton, for example, the mean proportion of females in the Chemistry department is only 0.009, while in Romance Languages and Literature it is 0.240. Second, in many departments there appears to be a substantial amount of variation over time in the proportion of female faculty. In Michigan's Chemical Engineering Department, for instance, the mean proportion is 0.015, but it ranges from 0.0 to 0.12. This is important, because some intertemporal variation in the proportion of female faculty is needed if one is to identify the impact of changing that proportion on the gender composition of the students.

Finally, within institutions there appears to be a positive correlation between the proportion of female students in a department and the proportion of female faculty. To examine this phenomenon more carefully, we used 1986 data to estimate for each institution a regression of the proportion of female majors in the graduating class on the proportion of female faculty. In each case, the coefficient on the proportion of female faculty was positive and exceeded its standard error by more than a factor of four.[11] These findings confirm the results in the sociology literature that female faculty and undergraduates tend to end up in the same departments. However, as stressed above, this correlation tells us nothing about whether undergraduates' choices of majors are influenced by the gender composition of the faculty. We now turn to the specification and estimation of a more appropriate statistical model.

4. Statistical Model and Results

In this section we specify and estimate our basic model. We then estimate several variations of the model to assess the robustness of the results.

4.1 Statistical Model

Consider a group of students who graduate from a school in year t. We define $STUFEM_{it}$ as the proportion of the graduates in department i at a given school who are female. (For the sake of simplicity, we suppress the school subscripts.) Next we define $FACFEM_{it}$ as the female proportion of the faculty in department i at the time that students who graduated in year t were choosing their majors.[12] For our basic model, $FACFEM_{it}$ is computed as the average of the proportions of female faculty that graduating members encountered during their first and second years.[13] For example, to determine $FACFEM_{it}$ for department i in 1989, we would take the average of the female faculty proportions in 1986 and 1987.[14]

For each school we assume that

$$STUFEM_{it} = \beta_0 + \beta_1 \, FACFEM_{it} + \beta_2 t + \beta_3 t^2 + f_i + \epsilon_{it} \,, \quad (1)$$

where t is a time trend, f_i is a departmental fixed effect, ϵ_{it} is a random error, and the β's are parameters to be estimated.[15] The fixed effect refers to all unchanging attributes of a department that might affect the proportion of the students who are female, such as cultural norms which indicate that certain fields are "masculine" or "feminine." In practice, accounting for the fixed effect amounts to including a series of dichotomous variables MAJ_{it}, where $MAJ_{it} = 1$ if the observation is for department i and zero otherwise. The quadratic time trend takes into account any possible overall trends that might affect female enrollments.[16] For example, during our sample period the proportion of female undergraduates at Princeton grew substantially. The presence of the time trend assures that we do not falsely attribute to the gender composition of the faculty any increases in female enrollments that were really due to the increased representation of women in the student body as a whole. A final estimation issue arises because the variances of the error terms may vary systematically across departments. Therefore, we computed robust (Huber) standard errors for all the regression coefficients.

4.2 Basic Results

The parameter estimates for equation (1) using the Princeton, Michigan, and Whittier data sets are reported in Tables 2a, 2b, and 2c, respectively. Consider first the Princeton results. When interpreting the coefficients of the department variables, note that English is omitted from the regression, so the coefficient on each department shows its proportion of female majors relative to English, ceteris paribus. The coefficients on the department variables are generally statistically significant on a one-by-one basis; indeed, an F-test easily rejects the null hypothesis that the coefficients on the major variables are jointly zero.[17] The time trend is also significant at conventional significance levels. Our main focus, however, is the coefficient on $FACFEM_{it}$. The point estimate, 0.054, is minute--it suggests that raising the percentage of female faculty in a department by 10 percentage points, ceteris paribus, would increase the percentage of female undergraduates by only 0.54 percentage points. In fact, given that the associated standard error is 0.106, one cannot reject the hypothesis that the coefficient is zero. Thus, the Princeton data do not support the view that the gender composition of a department affects the gender composition of its undergraduate majors.

The stories for Michigan (Table 2b) and Whittier (Table 2c) are essentially the same. The coefficients on $FACFEM_{it}$ are small in magnitude and statistically insignificant. As was true for Princeton, the major fixed effects are statistically significant.[18] Unlike the Princeton case, the time trends are not statistically significant for Michigan and Whittier. However, when we estimated the equations without the trend, the results were substantially unchanged. That is, the coefficient on $FACFEM_{it}$ remained statistically insignificant, providing no support for the notion that the gender composition of a department's faculty affects the gender composition of its undergraduate majors.[19]

4.3 Alternative Specifications

Our inability to reject the hypothesis that role model effects are absent might be due to some misspecification in equation (1). To assess the robustness of our results, in this section we examine several alternative specifications.

Functional Form. Equation (1) assumes that the proportion of female undergraduates increases linearly with the proportion of female faculty, *ceteris paribus*. Another possibility is that the presence of *any* female faculty in a department destroys the preconception that only men can succeed in the field, and once any female faculty are present, adding additional women has no effect on female undergraduate enrollments. To examine this possibility, we created the dichotomous variable DF_{it}, which equals one if there were any females in department i at the time that graduates of year t were choosing their majors and zero otherwise. Following the convention used in defining $FACFEM_{it}$, this amounts to determining whether there were any women in the department during the student's first or second years. For each school we then estimated

$$STUFEM_{it} = \beta_0' + \beta_1' DF_{it} + \beta_2' t + \beta_3' t^2 + f_i + \epsilon_{it}. \qquad (2)$$

Panel A of Table 3 reports the estimated coefficients on DF_{it} and their standard errors; the other coefficients are not reported in order to conserve space. For no school can one reject the hypothesis that the coefficient on DF_{it} is zero.

Another exercise in the same spirit is to determine whether the proportion of female undergraduate majors increases when the proportion of female faculty exceeds some critical value. This is the notion that a "critical mass" of female faculty in a department is needed to induce undergraduate women to enroll. To investigate this issue, we created the variable $DF15\%_{it}$, which equals one if the proportion of female faculty in department i exceeded 15 percent in the relevant year, and zero otherwise. We then replaced DF_{it} in equation (2) with $DF15\%_{it}$, and re-estimated the equation. The results are reported in Panel A of Table 3. The coefficients for Princeton and Whittier continue to be statistically insignificant. The coefficient for Michigan is statistically significant, but its sign suggests that when a critical mass of female faculty is reached, the proportion of female majors decreases.[20] We are not inclined to make much of this result—The coefficient is small in magnitude, and if one runs enough regressions, sooner or later a significant coefficient is bound to emerge. Still, this finding certainly does not provide any support for the conventional view.

The models reported in Panel A embody a very extreme assumption on how additions to the number of female faculty might affect female enrollments--after some number of female faculty members is reached, the incremental impact of any others is zero. A less extreme type of diminishing marginal returns can be modelled by including a quadratic in $FACFEM_{it}$:

$$STUFEM_{it} = \beta_0' + \beta_1' \, FACFEM_{it} + \beta_4 FACFEM_{it}^2 + \beta_2' t + \beta_3' t^2 + f_i + \epsilon_{it} \quad . \qquad (3)$$

The coefficients on the linear and quadratic terms are reported in Panel B of Table 3; again, the other coefficients are suppressed. For each school the linear and quadratic terms are individually and jointly insignificant.[21] Hence, allowing for nonlinear effects does not change the basic result.

Department size. Male and female undergraduates may differ in their tastes with respect to department size. While it is hard to predict just what these differences might be (do women prefer the anonymity of a large department or the cozy atmosphere of a small department?), it seems worthwhile to determine whether department size exercises an independent effect on women's choice of majors, and whether its omission from equation (1) biases the coefficient on $FACFEM_{it}$. Hence, we augmented equation (1) with the variable $SIZE_{it}$, the number of students (female plus male) in department i when the graduates of year t were selecting their majors.[22] Panel C of Table 3 exhibits the resulting coefficients on $FACFEM_{it}$ and $SIZE_{it}$. They suggest that department size does not exert an independent effect on the propensity of females to major in a department, and this variable's inclusion does not substantially affect the coefficient on $FACFEM_{it}$.

Lag structure. We have assumed that a woman's selection of her major is based equally on the gender composition of the faculty in her first and second years as a student. However, changes in the proportion of female faculty might affect students' decisions with some other lag. To investigate the possibility that our results are sensitive to the lag structure, we defined $FACFEM1_{it}$ as the proportion of female faculty in department i when the graduating seniors of year t were first-year students and $FACFEM2_{it}$ analogously. We then re-estimated equation (1) replacing $FACFEM_{it}$ with: a) $FACFEM1_{it}$, b) $FACFEM2_{it}$ and c) both $FACFEM1_{it}$ and $FACFEM2_{it}$. Specification a) assumes that the first year is formative; b) assumes it is the second year; and c) permits both years to matter, but does not constrain the effects to be the same. The results are reported in Panel D of Table 3. The coefficients remain statistically insignificant. Hence, the absence of gender effects does not appear to be due to a misspecification of the lag structure.

Tenure Status. Our model treats all faculty members the same, regardless of their rank. However, to the extent that tenured faculty have more prestige and visibility than their non-tenured counterparts, then it might be more appropriate to focus on the proportion of female faculty in the tenured ranks only. We therefore created the variable $TENFEM_{it}$, the analogue to $FACFEM_{it}$ for the tenured faculty. We were able to construct $TENFEM_{it}$ for Princeton and Michigan only; the results are in Panel E of Table 3. They are not very different from their $FACFEM_{it}$

counterparts in Tables 2a and 2b. Of course, one could just as well argue that non-tenured faculty are more relevant role models, because they are relatively young and may be more heavily involved in undergraduate instructional programs. However, when the female proportion of non-tenured faculty members is used as a right-hand-side variable, its coefficient is also statistically insignificant. We conclude that taking into account differences in faculty rank does not change our results.

Sciences vs. humanities and social sciences. The policy discussion that surrounds our issue has focused on the desire to increase female representation in the sciences. However, our basic specification pools the sciences and non-sciences together, operating on what we take to be the reasonable view that to the extent the notion of gender role models is relevant, it applies symmetrically to the sciences and non-sciences. Nevertheless, it is possible that the processes governing entry into different types of departments differ, and that by pooling them together, we are obscuring the impact of faculty gender composition. Hence, we re-estimated equation (1) using just the science departments, and then repeated the process just for the humanities and social sciences.[23] Panel F of Table 3 shows the coefficients on $FACFEM_{it}$ for the science and non-science departments. The coefficients from both regressions are statistically insignificant. The gender composition of the faculty has no more importance in science departments than in the others.

Pooling the institutions. So far, we have estimated each model separately by institution. Perhaps if all three data sets were used together it would be possible to obtain more precise estimates. We therefore created a model suitable for analyzing all three data sets simultaneously. The model is a variant of equation (1) in which β_0, β_2, β_3 and the department fixed effects are allowed to vary by institution, but the coefficients on $FACFEM_{it}$ are constrained to be the same. Mechanically, this involved creating a dichotomous variable for each institution, and interacting it with each of the right-hand side variables except $FACFEM_{it}$.[24] Estimation of this model with the pooled data set yielded a coefficient on $FACFEM_{it}$ of 0.0714 with a standard error of 0.0888. Thus, pooling the data does not change our by now, familiar finding--the gender composition of a department's faculty exerts no statistically discernible effect on the gender composition of its undergraduate majors.

5. Conclusion

It is frequently asserted that female undergraduate enrollments in the sciences and engineering could be increased by raising female representation on the faculties in these areas. We have assembled panel data from three rather different educational institutions and used them to examine this proposition. The econometric analysis indicates that one cannot reject the hypothesis that the gender composition of the students in an academic department is unaffected by the gender composition of the faculty at the time the students select their majors. This finding holds for each institution, and is robust with respect to a number of reasonable alternative specifications of the statistical model.

Of course, this analysis hardly exhausts the possibilities for empirical work on this topic. The most obvious avenue for future research would be the collection and analysis of data from additional schools. An even more ambitious research agenda would involve the collection of micro data on individual students and the genders of their instructors. This would allow researchers to investigate whether role model effects are present for some types of students and not others. Such effects are difficult to discern in a study like ours, which relies on data at the department level. Things are further complicated by the fact that increasing female faculty in certain disciplines might have long-term and indirect effects by influencing social definitions of appropriate majors for men and women. Having made these points, however, we believe that our research shifts the burden of proof to those who assert that hiring female faculty in a department is an efficacious way to increase its undergraduate female enrollments.

Do our results say anything more general about the validity of the notion that females need role models to encourage them to enter certain majors? The answer is clearly no. It could be, for example, that young women's decisions are driven by the presence or absence of female role models, but these role models appear in their lives before entering college. High school teachers, family members, and public figures come to mind here. Further, even if female role models don't affect choice of major, they may affect post-college outcomes, such as the propensity of women in the department to go on to graduate school. (See Rothstein [1994].) Of course, we must also contemplate the possibility that a person can be inspired by someone of another gender. One may want to follow the lead of a person who is similar in race, ethnicity, religion, social background, etc. Or perhaps role models don't matter very much at all—individuals choose careers solely on the basis of their capabilities and the constraints they face, the traditional view in economics, as reflected in Ehrenberg's [1992] survey. Our research says nothing about these more general issues. It does, however, suggest that many hypotheses in this area can and should be subjected to empirical testing.

Table 1a
Summary Statistics*
Princeton University

1973-1989

Major	PROPORTION OF FEMALE FACULTY Mean	Standard Deviation	Minimum	Maximum	PROPORTION OF FEMALE STUDENTS Mean	Standard Deviation	Minimum	Maximum
Aerospace and Mechanical Engineering	0.007	0.016	0.000	0.042	0.099	0.069	0.000	0.216
Anthropology	0.278	0.182	0.125	0.667	0.499	0.229	0.000	1.000
Architecture & Urban Planning	0.013	0.040	0.000	0.154	0.344	0.140	0.152	0.647
Art & Archaeology	0.159	0.052	0.067	0.235	0.648	0.108	0.467	0.833
Astrophysical Sciences	0.020	0.038	0.000	0.091	0.175	0.278	0.000	1.000
Biology	0.097	0.068	0.000	0.242	0.363	0.109	0.145	0.507
Chemical Engineering	0.033	0.036	0.000	0.077	0.187	0.101	0.000	0.343
Chemistry	0.009	0.021	0.000	0.053	0.249	0.123	0.000	0.450
Civil Engineering	0.012	0.033	0.000	0.100	0.182	0.118	0.000	0.415
Classics	0.238	0.115	0.000	0.385	0.411	0.130	0.143	0.714
Comparative Literature	0.107	0.097	0.000	0.250	0.659	0.214	0.000	0.875
Computer Science & Electrical Engineering	0.019	0.026	0.000	0.056	0.099	0.068	0.000	0.250
East Asian Studies	0.018	0.033	0.000	0.091	0.526	0.200	0.000	0.800
Economics	0.039	0.023	0.000	0.081	0.173	0.074	0.000	0.263
English	0.193	0.073	0.028	0.296	0.500	0.092	0.305	0.633

Table 1a (continued)

Major	PROPORTION OF FEMALE FACULTY Mean	Standard Deviation	Minimum	Maximum	PROPORTION OF FEMALE STUDENTS Mean	Standard Deviation	Minimum	Maximum
Geology	0.056	0.068	0.000	0.200	0.406	0.237	0.000	1.000
Germanic Languages and Literature	0.176	0.084	0.000	0.300	0.484	0.288	0.000	1.000
History	0.121	0.046	0.047	0.226	0.335	0.078	0.175	0.462
Mathematics	0.007	0.016	0.000	0.047	0.121	0.094	0.000	0.286
Music	0.073	0.089	0.000	0.200	0.277	0.164	0.000	0.500
Near Eastern Studies	0.033	0.043	0.000	0.133	0.424	0.181	0.000	0.786
Philosophy	0.073	0.041	0.048	0.111	0.209	0.121	0.000	0.450
Physics	0.011	0.012	0.000	0.026	0.093	0.062	0.000	0.200
Politics	0.086	0.030	0.033	0.136	0.291	0.100	0.123	0.441
Psychology	0.143	0.073	0.000	0.261	0.431	0.103	0.222	0.643
Religion	0.141	0.161	0.000	0.364	0.430	0.178	0.000	0.690
Romance Languages & Literature	0.240	0.101	0.105	0.433	0.725	0.156	0.333	0.941
Slavic Languages and Literature	0.291	0.131	0.000	0.400	0.719	0.194	0.400	1.000
Sociology	0.144	0.046	0.056	0.214	0.567	0.180	0.136	0.769
Statistics	0.000	0.000	0.000	0.000	0.415	0.321	0.000	1.000

*Source: Faculty data are from various editions of The Princeton University Undergraduate Announcement. Student data for the years 1973-1981 and 1982-1985 are from: Department of Health, Education and Welfare, Educational Division, Higher Education General Information Survey (Washington, D.C.: Government Printing Office). For 1981-82 they are from: Princeton University Office of the Registrar, Bachelor's, Master's and Doctor's Degrees Conferred (Working Paper). For 1985-1991 they are from U.S. Department of Commerce, Bureau of the Census Acting as Collection Agent for U.S. Department of Education, National Center for Education Statistics Integrated Post-secondary Education Data System: Completions Survey (Washington, D.C.: Government Printing Office).

Table 1b
Summary Statistics*
University of Michigan
1979-1990

Major	PROPORTION OF FEMALE FACULTY				PROPORTION OF FEMALE STUDENTS			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Aerospace Engineering	0.028	0.021	0.000	0.046	0.112	0.034	0.067	0.166
Anthropology	0.212	0.065	0.067	0.316	0.587	0.080	0.450	0.679
Art & Archaeology	0.304	0.067	0.214	0.455	0.805	0.063	0.667	0.889
Astronomy	0.000	0.000	0.000	0.000	0.047	0.088	0.000	0.250
Atmospheric and Oceanic Science	0.000	0.000	0.000	0.000	0.280	0.139	0.067	0.563
Biology	0.098	0.011	0.085	0.116	0.402	0.046	0.315	0.484
Chemical Engineering	0.015	0.037	0.000	0.118	0.250	0.057	0.196	0.349
Chemistry	0.038	0.014	0.026	0.059	0.267	0.070	0.161	0.395
Civil & Environmental Engineering	0.062	0.028	0.038	0.120	0.278	0.132	0.132	0.640
Classics	0.193	0.062	0.067	0.308	0.569	0.201	0.250	1.000
Communication	0.192	0.098	0.063	0.364	0.673	0.054	0.596	0.769
East Asian Studies	0.198	0.078	0.111	0.400	0.490	0.108	0.273	0.660
Economics	0.055	0.020	0.029	0.086	0.335	0.042	0.267	0.397
Electrical Engineering & Computer Science	0.042	0.016	0.017	0.068	0.155	0.026	0.111	0.192
English	0.143	0.285	0.097	0.211	0.601	0.042	0.527	0.652
Geology	0.008	0.020	0.000	0.053	0.428	0.177	0.125	0.611
Germanic Languages & Literature	0.215	0.042	0.133	0.294	0.614	0.087	0.444	0.737
History	0.111	0.045	0.061	0.196	0.385	0.052	0.261	0.447
Industrial & Operations Engineering	0.041	0.040	0.000	0.105	0.348	0.068	0.189	0.412
Linguistics	0.309	0.101	0.154	0.500	0.706	0.139	0.444	0.909

Table 1b (Continued)

Major	PROPORTION OF FEMALE FACULTY				PROPORTION OF FEMALE STUDENTS			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Materials Science & Engineering	0.000	0.000	0.000	0.000	0.268	0.094	0.167	0.409
Mathematics	0.031	0.013	0.016	0.054	0.416	0.105	0.268	0.622
Mechanical Engineering	0.029	0.026	0.000	0.065	0.141	0.028	0.075	0.178
Naval & Marine Engineering	0.000	0.000	0.000	0.000	0.044	0.051	0.000	0.154
Near Eastern Studies	0.068	0.020	0.056	0.111	0.449	0.252	0.000	1.000
Nuclear Engineering	0.038	0.040	0.000	0.083	0.108	0.076	0.000	0.250
Philosophy	0.066	0.038	0.000	0.133	0.321	0.115	0.100	0.529
Physics	0.002	0.005	0.000	0.019	0.101	0.041	0.047	0.184
Political Science	0.130	0.047	0.067	0.206	0.421	0.036	0.346	0.469
Psychology	0.204	0.055	0.152	0.321	0.689	0.025	0.642	0.727
Romance Languages & Literature	0.214	0.029	0.160	0.269	0.791	0.079	0.613	0.920
Slavic Languages & Literature	0.148	0.043	0.091	0.200	0.476	0.087	0.286	0.571
Sociology	0.155	0.069	0.053	0.286	0.705	0.054	0.627	0.800
Statistics	0.014	0.048	0.000	0.167	0.372	0.188	0.000	0.600

*Source: Faculty data were tabulated by the Staff and Faculty Records division of the University of Michigan. Student data for years prior to 1985 are from University of Michigan at Ann Arbor Office of the Registrar, Field of Study 1 Count by Student Level. For 1985-1992, they are from University of Michigan at Ann Arbor Office of the Registrar, Undergraduate Students by Unit, Field of Specialization, Upper Division Class Level, and Sex.

Table 1c
Summary Statistics
Whittier College
1974-1986

Major	PROPORTION OF FEMALE FACULTY				PROPORTION OF FEMALE STUDENTS			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Art	0.128	0.247	0.000	0.667	0.655	0.358	0.000	1.000
Biology	0.246	0.166	0.000	0.400	0.400	0.112	0.211	0.565
Business Administration	0.032	0.062	0.000	0.167	0.312	0.073	0.161	0.407
Chemistry	0.062	0.096	0.000	0.200	0.337	0.202	0.000	0.750
English	0.435	0.094	0.250	0.600	0.697	0.174	0.286	1.000
Foreign Languages & Literature	0.449	0.284	0.000	1.000	0.916	0.118	0.667	1.000
Geology	0.167	0.226	0.000	0.500	0.280	0.395	0.000	1.000
History	0.000	0.000	0.000	0.000	0.475	0.218	0.167	1.000
Home Economics	1.000	0.000	1.000	1.000	0.950	0.126	0.600	1.000
Mathematics	0.071	0.135	0.000	0.333	0.458	0.258	0.000	1.000
Music	0.386	0.156	0.250	0.075	0.660	0.318	0.000	1.000
Philosophy	0.000	0.000	0.000	0.000	0.667	0.471	0.000	1.000
Physical Education	0.237	0.183	0.000	0.500	0.323	0.095	0.167	0.500
Physics	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Political Science	0.097	0.099	0.000	0.286	0.310	0.085	0.158	0.500
Psychology	0.353	0.159	0.000	0.750	0.660	0.155	0.385	0.909
Religion	0.000	0.000	0.000	0.000	0.300	0.447	0.000	1.000
Sociology	0.397	0.177	0.250	0.667	0.663	0.189	0.333	1.000
Speech	0.046	0.088	0.000	0.200	0.772	0.074	0.625	0.867

*Faculty data are from various editions of The Whittier College Undergraduate Announcement. Student data for years prior to 1980 were from lists provided by the Whittier College administration. After 1980, they are from the Department of Health, Education and Welfare, Educational Division, Higher Education General Information Survey (Washington, D.C.: Government Printing Office).

Table 2a

Estimates of Equation (1) for Princeton*

Variable			
$FACFEM_{it}$	0.0542 (0.109)	Economics	−0.333 (0.0216)
t	0.0280 (0.00505)	Geology	−0.0945 (0.0509)
t^2	−0.000998 (0.000227)	German	−0.0215 (0.0644)
Aerospace Engineering	−0.390 (0.0248)	History	−0.168 (0.0154)
Anthropology	−0.00684 (0.0501)	Mathematics	−0.373 (0.0307)
Architecture	−0.144 (0.0315)	Music	−0.223 (0.0467)
Art & Archaeology	0.155 (0.0290)	Near Eastern Studies	−0.0819 (0.0428)
Astrophysics	−0.327 (0.0699)	Philosophy	−0.285 (0.0295)
Biology	−0.129 (0.0201)	Physics	−0.393 (0.0251)
Chemical Engineering	−0.302 (0.0253)	Politics	−0.210 (0.0214)
Chemistry	−0.237 (0.0280)	Psychology	−0.0656 (0.0204)
Civil Engineering	−0.307 (0.0265)	Religion	−0.0755 (0.0309)
Classics	−0.102 (0.0299)	Romance Languages & Literature	0.217 (0.0307)
Comparative Literature	0.142 (0.0468)	Slavic Languages & Literature	0.189 (0.0481)
Computer Science & Electrical Engineering	−0.400 (0.0217)	Sociology	0.0699 (0.0325)

Table 2a (continued)

Variable			
East Asian Studies	0.0368 (0.0468)	Statistics	-0.0615 (0.0952)
		Constant	0.349 (0.0253)
N	555		
R^2	0.61		

* The dependent variable is the proportion of female majors in department i in year t and $FACFEM_{it}$ is the proportion of female faculty in department i that graduates of year t confronted when they were selecting their majors. Figures in parentheses are standard errors, which are corrected for heteroskedasticity using Huber's method. The omitted department major is English.

Table 2b

Estimates of Equation (1) for Michigan*

Variable			
$FACFEM_{it}$	-0.248 (0.138)	History	-0.225 (0.0176)
t	0.0104 (0.00494)	Industrial & Operations Engineering	-0.274 (0.0220)
t^2	-0.000428 (0.000306)	Linguistics	0.163 (0.0447)
Aerospace Engineering	-0.505 (0.0185)	Materials Science & Engineering	-0.373 (0.0309)
Anthropology	0.00514 (0.0214)	Mathematics	-0.213 (0.0311)
Art & Archaeology	0.254 (0.0272)	Mechanical Engineering	-0.477 (0.0184)
Astronomy	-0.574 (0.0316)	Naval and Marine Engineering	-0.583 (0.0251)
Atmospheric & Oceanic Science	-0.342 (0.0408)	Near Eastern Studies	-0.183 (0.0624)
Biology	-0.196 (0.0138)	Nuclear Engineering	-0.532 (0.0259)
Chemical Engineering	-0.370 (0.0235)	Philosophy	-0.295 (0.0315)
Chemistry	-0.331 (0.0233)	Physics	-0.518 (0.0242)
Civil & Environmental Engineering	-0.344 (0.0356)	Political Science	-0.182 (0.0127)
Classics	-0.0454 (0.0564)	Psychology	0.105 (0.0132)
Communication	0.0713 (0.0163)	Romance Languages & Literature	0.202 (0.0246)
East Asian Studies	-0.0757 (0.0311)	Slavic Languages and Literature	-0.109 (0.0231)

Table 2b (continued)

Variable			
Economics	-0.291 (0.0185)	Sociology	0.107 (0.0165)
Electrical Engineering & Computer Science	-0.472 (0.0184)	Speech	-0.226 (0.0523)
Geology	-0.209 (0.0491)	Constant	0.585 (0.0229)
German	0.0316 (0.0255)		
N	472		
R^2	0.84		

* See note to Table 2a.

Table 2c

Estimates of Equation (1) for Whittier*

Variable			
$FACFEM_{it}$	0.123 (0.133)	Physical Education	−0.339 (0.0549)
t	0.0147 (0.0464)	Physics	−0.638 (0.0693)
t^2	−0.000156 (0.000843)	Political Science	−0.320 (0.0648)
Art	0.00508 (0.101)	Psychology	−0.00790 (0.0568)
Biology	−0.292 (0.0538)	Religion	−0.223 (0.191)
Business	−0.325 (0.0685)	Sociology	0.0230 (0.0658)
Chemistry	−0.307 (0.0805)	Speech	0.143 (0.0680)
Foreign Language	0.197 (0.0673)	Constant	0.352 (0.626)
Geology	−0.379 (0.113)		
History	−0.193 (0.0889)		
Home Economics	0.194 (0.0972)	N	251
Mathematics	−0.192 (0.0876)	R^2	0.54
Music	−0.0497 (0.104)		
Philosophy	0.0862 (0.168)		

* See note to Table 2a.

Table 3

Alternative Specifications*

A. Dichotomous Variables for Female Faculty

	Princeton	Michigan	Whittier
DF_{it}	-0.0103	0.00147	0.0322
	(0.0167)	(0.0231)	(0.0465)
$DF15\%_{it}$	0.0349	-0.0483	0.0505
	(0.0222)	(0.0183)	(0.0451)

B. Quadratic in the Proportion of Female Faculty

	Princeton	Michigan	Whittier
$FACFEM_{it}$	0.258	-0.609	0.217
	(0.199)	(0.336)	(0.298)
$FACFEM^2_{it}$	0.0349	-0.0483	0.0505
	(0.0222)	(0.0183)	(0.0451)

C. Inclusion of Size of Undergraduate Enrollment

	Princeton	Michigan	Whittier
$FACFEM_{it}$	0.0554	-0.252	0.215
	(0.109)	(0.139)	(0.134)
$SIZE_{it} \times 100$	0.0316	0.00621	-0.0708
	(0.0427)	(0.00807)	(0.150)

D. Alternative Lags of Proportion of Female Faculty

	Princeton	Michigan	Whittier
$FACFEM1_{it}$	0.0273	-0.154	0.172
	(0.0971)	(0.117)	(0.124)
$FACFEM2_{it}$	0.0634	-0.205	-0.00166
	(0.126)	(0.111)	(0.104)
$FACFEM1_{it}$	-0.0309	-0.0778	-0.117
	(0.196)	(0.120)	(0.0933)
$FACFEM2_{it}$	0.0847	-0.170	0.242
	(0.227)	(0.115)	(0.130)

Table 3 (continued)

E. Tenured Faculty

	Princeton	Michigan	Whittier
$TENFEM_{it}$	0.0691	−0.168	-
	(0.200)	(0.186)	-

F. Sciences vs. Humanities and Social Sciences

	Princeton	Michigan	Whittier
a. <u>Sciences</u>			
$FACFEM_{it}$	0.0636	−0.674	0.120
	(0.286)	(0.549)	(0.223)
b. Social Sciences <u>and Humanities</u>			
$FACFEM_{it}$	0.0773	−0.0812	0.105
	(0.120)	(0.137)	(0.169)

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* Each coefficient is from a regression in which the dependent variable is the proportion of female majors in department i in year t, and that on the right-hand side also includes a constant, major fixed effects, and a quadratic time trend. Figures in parentheses are standard errors, corrected for heteroskedasticity using White's method. DF_{it} = 1 if there were any female faculty in department i at the time that graduates of year t were choosing their majors, and zero otherwise. $DF15\%_{it}$ = 1 if the proportion of female faculty in department i at the time that graduates in year t were choosing their majors exceeded 15 percent, and zero otherwise. $FACFEM_{it}$ is the proportion of female faculty in department i at the time that graduates of year t were selecting their majors. $SIZE_{it}$ is the number of students in department i in year t. $FACFEM1_{it}$ is the proportion of female faculty in department i when graduates of year t were first-year students, and $FACFEM2_{it}$ is defined analogously for the year when they were second-year students. $TENFEM_{it}$ is the analogue to $FACFEM_{it}$ for tenured faculty only.

Appendix Table A
Summary Levels Data*
Princeton University

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Aerospace and Mechanical Engineering	0.176 (0.392)	23.9 (3.33)	3.94 (3.25)	35.5 (11.2)
Anthropology	1.88 (1.22)	6.76 (0.970)	3.76 (2.54)	7.47 (3.86)
Architecture & Urban Planning	0.176 (0.529)	11.1 (1.78)	9.53 (3.74)	28.4 (5.49)
Art & Archaeology	2.65 (0.996)	16.3 (1.99)	15.5 (4.14)	23.7 (4.70)
Astrophysical Sciences	0.235 (0.437)	11.0 (0.707)	0.412 (0.618)	2.18 (1.81)
Biology	3.06 (2.28)	30.9 (4.15)	31.7 (10.9)	86.8 (13.0)
Chemical Engineering	0.471 (0.514)	14.4 (0.939)	6.0 (4.76)	29.8 (13.6)
Chemistry	1.176 (0.393)	18.6 (2.21)	5.65 (3.26)	22.1 (7.52)
Civil Engineering	0.235 (0.664)	21.1 (3.12)	10.3 (6.94)	52.7 (16.3)
Classics	3.12 (1.62)	12.7 (1.53)	4.47 (1.66)	10.9 (3.29)
Comparative Literature	1.76 (1.86)	13.5 (5.46)	13.9 (5.31)	20.0 (7.01)
Computer Science & Electrical Engineering	0.529 (0.799)	22.4 (5.87)	6.24 (4.97)	55.5 (20.9)
East Asian Studies	0.235 (0.437)	12.4 (2.23)	5.06 (2.86)	9.12 (4.24)
Economics	1.53 (0.874)	39.4 (3.33)	14.9 (7.09)	82.3 (13.9)
English	6.65 (2.34)	34.9 (2.29)	48.4 (11.0)	96.9 (13.1)

Appendix Table A (continued)

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Geology	0.882 (1.05)	16.1 (1.11)	4.59 (3.02)	12.1 (6.23)
Germanic Languages and Literature	1.82 (0.883)	10.5 (1.33)	1.59 (1.54)	3.47 (2.96)
History	4.23 (1.44)	35.6 (3.49)	41.9 (12.8)	124.0 (19.6)
Mathematics	0.294 (0.686)	35.9 (4.23)	2.18 (1.67)	17.1 (6.72)
Music	0.765 (0.970)	10.6 (2.94)	2.13 (1.54)	7.13 (3.74)
Near Eastern Studies	0.471 (0.624)	12.8 (2.51)	2.47 (2.58)	5.29 (3.33)
Philosophy	1.41 (1.00)	18.9 (1.96)	4.88 (3.62)	21.8 (7.34)
Physics	0.471 (0.514)	43.5 (3.69)	2.24 (1.64)	22.6 (4.61)
Politics	2.94 (1.39)	33.0 (4.60)	26.7 (13.4)	86.5 (21.3)
Psychology	3.18 (1.63)	20.2 (1.60)	22.8 (5.74)	54.1 (12.9)
Religion	1.53 (1.77)	10 (1.27)	7.65 (5.07)	18.4 (7.74)
Romance Languages and Literature	5.88 (3.04)	23.0 (4.14)	10.6 (3.14)	15.0 (4.24)
Slavic Languages and Literature	1.35 (0.702)	4.47 (0.624)	4.53 (2.21)	6.23 (2.49)
Sociology	2.29 (0.686)	16.1 (1.56)	10.9 (4.66)	19.8 (6.33)
Statistics	0 (0)	5.94 (2.73)	1.71 (2.11)	4.88 (4.51)

*Source: See Table 1a. The first column shows the average number of female faculty in the department over the period 1973-1989; the second column is the average number of total faculty; the third column is the average number of female majors; and the fourth column is the average number of total majors. Figures in parentheses are standard deviations.

Appendix Table B
Summary Levels Data*
University of Michigan

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Aerospace Engineering	0.667 (0.492)	23.5 (1.17)	13.4 (6.83)	114 (37.7)
Anthropology	4.08 (1.24)	19.3 (3.31)	33.8 (11.4)	57.0 (16.1)
Art and Archaeology	4.5 (1.0)	14.9 (2.15)	28.0 (11.2)	34.5 (12.8)
Astronomy	0 (0.)	9.42 (0.515)	0.250 (0.452)	4.58 (1.83)
Atmospheric and Oceanic Science	0 (0)	16.3 (1.07)	4.0 (2.45)	13.8 (4.22)
Biology	4.33 (0.492)	44.3 (4.71)	129.0 (16.9)	322.0 (24.6)
Chemical Engineering	0.250 (0.622)	16.9 (1.08)	27.9 (7.49)	115.0 (35.1)
Chemistry	1.33 (0.492)	35.0 (2.45)	19.3 (4.29)	72.8 (17.9)
Civil and Environmental Engineering	1.50 (0.674)	24.5 (1.09)	17.8 (12.6)	65.8 (29.9)
Classics	2.67 (0.888)	13.8 (1.03)	4.58 (2.64)	8.0 (3.93)
Communication	2.25 (1.06)	12.3 (2.64)	118.0 (36.7)	175.4 (51.1)
East Asian Studies	2.08 (0.900)	10.4 (2.07)	10.8 (8.54)	20.6 (12.6)
Economics	1.92 (0.793)	34.3 (3.36)	100.0 (23.6)	297 (43.0)
Electrical Engineering and Computer Science	2.92 (1.56)	65.6 (13.4)	66.0 (23.0)	415.0 (84.6)
English	8.75 (2.22)	61.0 (3.49)	169.0 (62.0)	277.0 (91.0)

Appendix Table B (continued)

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Geology	0.167 (0.389)	17.0 (1.95)	5.40 (3.37)	11.9 (5.11)
Germanic Languages and Literature	3.75 (0.965)	17.3 (2.10)	11.9 (5.32)	19.4 (8.53)
History	4.91 (2.02)	44.5 (3.12)	50.2 (13.3)	133.0 (43.4)
Industrial and Operations Engineering	0.750 (0.754)	16.5 (3.37)	40.7 (12.5)	115.0 (22.0)
Linguistics	3.42 (0.793)	11.8 (3.25)	7.16 (4.24)	9.92 (5.25)
Materials Science and Engineering	0 (0)	11.6 (2.02)	8.83 (4.76)	31.6 (7.61)
Mathematics	1.83 (0.718)	59.6 (3.06)	27.8 (13.2)	65.2 (20.3)
Mechanical Engineering	1.33 (1.23)	45.2 (4.06)	34.9 (12.4)	240.0 (50.9)
Naval and Marine Engineering	0 (0)	11.6 (1.08)	1.58 (1.51)	40.5 (18.6)
Near Eastern Studies	1.17 (0.389)	17.0 (0.739)	2.25 (1.48)	4.92 (2.23)
Nuclear Engineering	0.50 (0.522)	13.2 (1.19)	2.08 (1.51)	19.0 (5.26)
Philosophy	1.00 (0.603)	14.8 (1.75)	12.2 (5.80)	37.1 (14.2)
Physics	0.0833 (0.289)	50.2 (2.59)	3.75 (1.54)	37.5 (5.93)
Political Science	4.33 (1.67)	32.9 (2.50)	101.0 (22.1)	240.0 (54.9)
Psychology	10.6 (3.52)	51.5 (6.88)	247.0 (52.0)	358.0 (71.0)

Appendix Table B (continued)

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Romance Languages and Literature	5.92 (0.793)	27.8 (2.93)	32.3 (12.7)	40.7 (15.1)
Slavic Languages and and Literature	1.58 (0.515)	10.6 (0.793)	10.3 (6.08)	20.8 (10.7)
Sociology	3.92 (2.02)	24.4 (3.20)	29.0 (13.1)	41.6 (19.0)
Statistics	0.167 (0.577)	9.42 (1.24)	4.17 (3.40)	10.2 6.16

* Source: See Table 1b. Computations are the same as in Appendix Table A, except the time period is 1979-1990.

Appendix Table C
Summary Levels Data*
Whittier College

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Art	0.308 (0.630)	1.31 (0.630)	1.85 (2.15)	2.84 (2.82)
Biology	1.23 (0.832)	4.77 (0.439)	9.85 (3.43)	26.0 (11.0)
Business Administration	0.231 (0.439)	4.92 (1.80)	14.7 (5.04)	47.1 (11.9)
Chemistry	0.308 (0.480)	4.77 (0.439)	2.0 (1.53)	6.38 (4.35)
English	2.23 (0.599)	5.08 (0.494)	5.85 (4.02)	8.38 (4.89)
Foreign Languages and Literature	1.23 (0.725)	2.69 (0.480)	3.23 (2.05)	3.69 (2.53)
Geology	0.384 (0.506)	2.23 (0.439)	0.538 (0.776)	1.85 (1.34)
History	0 (0)	4.61 (0.660)	2.69 (1.93)	6.69 (5.12)
Home Economics	2.38 (0.650)	2.38 (0.650)	8.31 (3.50)	8.54 (3.15)
Mathematics	0.231 (0.439)	4.23 (0.832)	2.08 (1.61)	4.62 (2.06)
Music	1.46 (0.776)	3.69 (0.630)	2.46 (1.90)	4.0 (2.89)
Philosophy	0 (0)	2.23 (0.599)	0.308 (0.480)	0.769 (1.30)
Physical Education	1.0 (0.913)	4.08 (0.954)	5.0 (2.27)	15.5 (4.79)
Physics	0 (0)	1.0 (0)	0 (0)	0.923 (1.11)
Political Science	0.615 (0.650)	5.62 (0.961)	6.85 (1.77)	23.2 (7.43)

Appendix Table C (continued)

Major	Female Faculty	Total Faculty	Female Majors	Total Majors
Psychology	1.92 (0.641)	5.54 (0.967)	10.7 (6.18)	16.4 (9.99)
Religion	0 (0)	1.85 (0.689)	0.231 (0.599)	0.692 (1.18)
Sociology	1.38 (0.506)	3.62 (0.506)	9.0 (7.0)	13.1 (9.73)
Speech	0.231 (0.439)	4.54 (0.519)	10.2 (5.18)	13.1 (6.01)

* Source: See Table 1c. Computations are the same as in Appendix Table A, except the time period is 1974-1986.

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Endnotes

1. This argument is also made in the context of race. Thus, a sociologist argued that the dearth of black males receiving doctoral degrees is because "young blacks have no real role models" (Manegold [1994, p.A14]).

2. For further assertions along these lines, see Furlong [1986] and Douvan [1976].

3. Academic divisions are groupings of departments. There are five in Fox's study: social sciences, natural sciences, humanities, education, and applied sciences.

4. More generally, Gross [1988, p.24] argues that there is no empirical evidence that pre-college students emulate <u>any</u> aspects of their teachers' conduct.

5. Economists appear not to have dealt with this issue very much. For example, Ehrenberg's [1992] excellent survey on the flows of individuals into
academic specialties reports no research on this topic.

6. These included the University of Virginia, The University of North Carolina at Chapel Hill, the University of Washington in Seattle, Loyola College in Los Angeles, Duke University, and Syracuse University.

7. See Barron's Educational Series, Inc. [1992] for information on admissions standards.

8. The lists included the students' middle names. Hence, even in cases where students had androgynous first names, it was possible to determine their gender.

9. However, when we analyzed the data for the earlier period, we found that the substantive conclusions were essentially the same as those reported below.

10. The Princeton and Michigan data include every department in those institutions. The Whittier data include every department except anthropology, which ceased being a department there during our sample period. Corresponding data on the levels (as opposed to proportions) of female students and faculty are exhibited in the Appendix Tables.

11. For Princeton, the coefficient was 1.527(s.e. = 0.340); for Michigan 2.182 (s.e. = 0.344); and for Whittier 0.665 (s.e. = 0.164).

12. In computing $FACFEM_{it}$, the following conventions were used to deal with joint appointments. For Princeton and Whittier, we assumed that a member of two departments could serve as a role model in each of those departments. Hence, faculty with joint appointments were in effect double-counted. For Michigan, however, we were provided no information on joint appointments. The office that compiled the data assigned faculty members to the department in which they spent most of their time.

13. Other definitions are examined in Section 4.3 below.

14. Each of our institutions allowed modest numbers of transfer students. In principle it would have been desirable to remove them from the sample, because there is little reason to believe that their decisions could be affected by faculty gender composition at a time when they weren't even on campus. However, our data did not allow us to identify them. We doubt if this phenomenon seriously affects our results, although it would clearly be worthwhile to investigate it if suitable data become available.

15. This specification assumes that, within a school, the β_1's are constant across departments, a hypothesis that could not be rejected in our data. Also, the specification assumes that an increase in the proportion of female faculty is independent of the size of the department's faculty. However, when we interacted $FACFEM_{it}$ with department size, the results reported below did not change. Finally, note that the number of graduating majors in a department is the product of the number of students who initially choose the major and the retention rate. Our data do not allow us to separate the two.

16. We also estimated the equation with time effects (a different intercept for each year) rather than a quadratic time trend. The substantive results were substantially the same. Note that including total female undergraduates as an explanatory variable would be equivalent to the use of year dummy variables.

17. The $F(29,522)$ statistic for the joint hypothesis that all the coefficients are zero is 28.17; the critical value at the 0.05 significance level is 1.46.

18. For Michigan, a test of the hypothesis that the coefficients are jointly insignificant generates an F(33,435) statistic of 56.3. For Whittier, the F (18,229) statistic is 87.59. In both cases, the statistic far exceeds the critical value at the 0.05 significance level.

19. The fact that our left-hand side variable is a proportion creates two concerns. First, econometric problems may arise when a left-hand side variable cannot be greater than one or less than zero. We therefore re-estimated the model using a variant of the logit transformation suggested by Maddala [1983, p.30]. (The conventional logit transformation is not appropriate because $STUFEM_{it}$ sometimes equals one or zero. In the variant, a factor depending on the number of observations in the cell is added to each sample proportion, so that it is never necessary to take the log of zero.) The results were qualitatively the same as those discussed above. Second, perhaps the results might change if the equation were estimated in levels rather than proportions. We therefore estimated equation (1) replacing $STUFEM_{it}$ and $FACFEM_{it}$ with the corresponding levels, and augmenting the equation with the total number of students to control for scale effects. The results are qualitatively the same as those reported above, except the coefficient on female faculty at Princeton goes from insignificant positive to insignificant negative.

20. When a 20 percent threshold is used, the Michigan coefficient remains negative and significant and the Princeton and Whittier coefficients remain insignificant. With a threshold of 10 percent, the Michigan coefficient remains negative and significant, but Princeton's positive coefficient becomes significant, with a t-statistic of 2.1. Like the negative Michigan coefficient, however, it is small in absolute value (0.0475).

21. For Princeton, β_1' and β_4 are jointly significant only at a 0.38 significance level, for Michigan at a 0.12 significance level, and Whittier at a 0.58 significance level.

22. For this specification, $SIZE_{it}$ is computed as the average of sizes when the graduates of year t were first- and second-year students.

23. We classified the following departments as being in the humanities and social sciences: Anthropology, Architecture, Art and Archaeology, Business Administration, Classics, Communication, Comparative Literature, East Asian Studies, Economics, English, Foreign Languages and Literature, Germanic Languages and Literature, Home Economics, History, Linguistics, Music, Near Eastern Studies, Philosophy, Physical Education, Politics, Psychology, Religion, Romance Languages and Literature, Slavic Languages and Literature, Sociology, Speech. The sciences are: Aerospace and Mechanical Engineering, Astronomy, Astrophysical Sciences, Atmospheric and Oceanic Science, Biology, Chemical Engineering, Chemistry, Civil and Environmental Engineering, Computer Science and Electrical Engineering, Industrial and Operations Engineering, Mathematics, Naval and Marine Engineering, Nuclear Engineering, and Statistics.

24. An F-test of the hypothesis that the three schools have the same coefficient on $FACFEM_{it}$ (conditional on the other coefficients varying by school) yields an F(2,1086) test statistic of 2.15, which is significant at the 0.12 level. Hence, this type of pooling is consistent with the data.