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**Progression to Graduate School from the “Elite”
Colleges and Universities**

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PROGRESSION TO GRADUATE SCHOOL FROM THE "ELITE"
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ABSTRACT

This paper addresses the concern that too few students will pursue doctoral degrees and academic careers by examining surveys of graduating seniors made in 1982, 1984, and 1989 at the selective, private institutions that comprise the Consortium on Financing Higher Education. In addition to simple descriptive statistics about these students' self-reported intentions to pursue graduate degrees, regression analyses are presented that identify the effects of sex, race, and income differences among undergraduates as well as institutional characteristics that encourage progression to graduate school. Results indicate that debt does not inhibit graduate school attendance but that certain individual and institutional attributes have statistically significant effects on rates of progression.

Progression to Graduate Schools from the "Elite" Colleges and Universities

I

A great deal of attention has centered recently on the belief that the number of Ph.D.s seeking academic employment will soon be substantially below the corresponding number of openings and that this imbalance will persist for a decade or more. In the most thorough recent analysis of the supply and demand for faculty in the United States, William Bowen and Julie Ann Sosa (1989) project "some significant increase in demand [for faculty] relative to supply as early as 1992-97 -- and then far more dramatic changes beginning in 1997-2002" (pp. 13-14). All of their models projected "demand to exceed supply by substantial amounts" following 1997. The projected supply deficit ranges from 6,000 to 8,000 Ph.D. holders per year during that period, depending on the assumptions of the model: this estimate represents about 20 percent of the total level of demand (pg. 134). Howard Bowen and Jack Schuster (1986) conclude their earlier study of the American professorate with the observation that "... fewer and fewer persons, especially highly talented young students, are opting for academic careers. Indeed, there is serious risk that academic careers will become less attractive for highly able young people over the next ten years and more" (pg. 7). Most recently, the Association of American Universities (1990) has issued a call to action regarding "the Ph.D. Shortage," noting that "supply and demand are moving in different directions in doctoral education" (1990).

This paper examines data from the thirty-two highly-selective, private institutions that comprise the Consortium on Financing Higher Education (COFHE); appendix 1 is a list of these schools. This collection of schools traditionally has been a disproportionate source of the doctoral degree recipients who are likely to become faculty members. During the period 1977 to 1986, 378,935 doctoral degrees were granted in the United States. Two recent studies of the baccalaureate origins of doctorate recipients reported that 28 percent of these degrees were obtained by graduates of 956 private four-year institutions (Franklin and Marshall, 1988 and Clark, 1989). Graduates of the COFHE institutions accounted for 27 percent of the degrees obtained by the alumni of private institutions, and 8 percent of the total number of doctoral degrees granted. This represents an average doctoral degree productivity for this period of 919 degrees per COFHE institution versus 183 per institution for the entire set of over 2,000 four-year institutions. In addition, along with other public and private colleges, these schools would be affected by a shortage of faculty that would heighten the already stiff competition for the most desirable Ph.D.s, which would in turn affect salary scales, workloads, and the like. Hence, not only would the educational functions of COFHE schools be affected by an erosion of the attractiveness of graduate school and of academic careers, these institutions clearly have a distinctive role to play in any plan to avert the predicted shortage of faculty.

This paper examines data on student intentions to pursue a graduate degree in the arts and sciences with the aim of understanding the determinants of student behavior. Section II contains a brief review of previous work on the subject, while section III contains a description of surveys of undergraduates at COFHE institutions that provide both cross-sectional and time-series information on plans to attend graduate school in the arts and sciences. Progression intentions are examined in detail in section IV. In section V we specify and estimate a model of progression to graduate programs that evaluates the effects of undergraduate debt, the influence of sex/race/income differences among undergraduates, and the role of the educational process. Finally, a summary and some policy recommendations comprise section VI.

II

Surprisingly, few studies have examined the determinants of progression to graduate programs. Two distinct, albeit related, approaches exist for investigating these phenomena -- (1) study of the undergraduate institutions, and their characteristics, that produce high levels of enrollment in doctoral programs: (2) study of the characteristics of individuals, their experiences, and their circumstances that are related to progression to Ph.D. programs. The studies that have been conducted to date have focused primarily on the first approach.

One of these, Dolan, Jung and Schmidt (1985), examined variation in the number of alumni from private, undergraduate colleges who went on to receive Ph.D. degrees. Various measures of student and faculty quality as well as expenditures per student were included as explanatory variables in regression analyses. Academic and administrative expenditures, faculty salaries, class size and library facilities had statistically significant effects on progression to graduate studies, while, curiously, scores on standardized tests were shown to be insignificant. In a series of similar studies, Perl (1970 and 1976) found that increases in university expenditures per undergraduate student raised the proportion of graduates who eventually enrolled in graduate and professional schools.

Reports produced by COFHE from the data sets used in this article have provided considerable insight on the subject of progression to graduate school. Surveys of graduating seniors conducted in 1982 and in 1984 asked about their plans for graduate education in the arts and sciences and what influenced those plans, although the analytic techniques used and the data on progression to graduate school that are reported differ in the two surveys. A third survey of COFHE seniors in 1989 asked questions similar to those in the preceding surveys.

While the COFHE reports have been extensive, they have not provided consistent trend analysis of these data, nor have they exploited the analytical advantages of regression analysis that examines net effects of the independent variables and interactions

among them. In this article we seek to provide such analysis on all three classes.

III

The data for the analyses presented here are derived from responses to surveys administered to graduating seniors at COFHE schools in 1982, 1984, and 1989.¹ The surveys were administered on campus during the weeks prior to graduation, with institutional response rates ranging from the low teens to close to 100 percent. Most of the institutions with very high response rates made commencement tickets available only to students who turned in completed questionnaires. In 1982 10,923 students completed the survey, while 6,876 and 9,553 returned surveys in 1984 and 1989 respectively; appendix 1 lists the institutions that participated in the survey each year, along with the response rates of those that had high rates which were judged to be representative by race and gender. Five schools produced representative samples in all three survey years.

Although the three survey instruments were not identical, they are similar in intention and scope and with appropriate coding, they easily allowed comparable analyses across the years. Besides providing demographic information, students gave detailed information about their undergraduate experience and their plans for the

¹ The surveys were designed and directed by the following people: 1982 -- Larry Litten; 1984 -- Elizabeth Johnson; 1989 -- Kim Honetschlager.

future. Using these data, we developed dichotomous variables to indicate a respondent's race, sex, father's education level, family income, amount of debt, and intentions to enter graduate school in the fall following receipt of their bachelor's degrees. Appendix 2 is a glossary of our variables.

The intention to enter a program in the arts and sciences was coded to include those who planned to enroll in master's programs as well as doctoral programs during the fall immediately following graduation. Due to differences in the survey instruments, coding for the above intention was slightly different for the three years to ensure consistency across the three samples. For 1982, the survey instrument asked only about the intention to enter graduate school in the arts and sciences in the fall, without indicating final degree intentions. For 1984, the survey asked whether the respondent intended to engage in advanced study in the fall of 1984 and whether such study was likely to be in a graduate or a professional school. For 1989, we code for graduate school intentions from reported plans to attend school in the fall of 1989 and that enrollment would be in an arts and sciences master's or doctoral **program.**²

²We also address the issue of students who planned to progress to graduate school anytime following graduation. Again, the different survey instruments necessitate different coding to ensure consistent treatment of these people. For 1982 seniors, we are able to know if the respondent had intentions to enter arts and sciences graduate school in the future but cannot know final degree intentions. For 1984 and 1989 seniors, we only know which final degree was desired. To be consistent with the 1982 coding, 1984 and 1989 seniors who planned on final master's or doctorate degrees in the arts and sciences were presumed to have intentions to enter graduate school.

In 1982, respondents with family income between \$30,000 and \$50,000 are placed in a "middle-income" group, while those with family incomes above \$50,000 are considered "high-income". With only modest inflation between 1982 and 1984 (7.6%), roughly the same classifications could be used for the 1984 data to achieve consistency across survey years. Unfortunately, different income bands on the 1984 questionnaire preclude similar, inflation-adjusted classifications. The 1984 survey specifies income groups of \$20,000 to \$40,000 and from \$40,000 to \$60,000, thus splitting the desired interval in half. We were therefore forced to use the \$40,000 to \$60,000 interval as our middle-income classification and our high-income students came from families with incomes above \$60,000. (The actual inflation-adjusted band for a consistent middle-income group would be \$32,300 to \$53,800.) Inflation over the rest of the period allowed us to use the 1989 survey's \$40,000 to \$60,000 family income grouping as a middle-income category that would be largely consistent in real terms with our 1982 middle-income category. (Inflation between 1982 and 1989 was 29%, making the comparable middle-income grouping \$38,700 to \$64,500.)

Fortunately, these discrepancies across the surveys between inflation rates and questionnaire response categories were not the case with the debt variable. Outstanding loans of greater than \$10,000 are considered "high debt" in 1982. The comparable inflation adjusted value was \$10,800 in 1984. The survey for that year also included a debt range beginning at \$10,000, so we chose to continue calling outstanding loans of greater than \$10,000 "high

debt". Inflation made this value equal to \$12,900 in 1989, and with a debt range beginning at \$12,500 in that year's questionnaire, we coded debts greater than \$12,500 as "high debt".

The survey questions describing undergraduate grades provided a discrete set of numbers corresponding to letter-grade ranges. We ascribed values that relate to the familiar four-point scale to these ranges. Our variables indicating gender, race, and the educational level of the student's father are dichotomous variables that identify respondents who are male, white or Asian, and whose fathers have a college degree (or more).

To ensure that our variables are not affected by missing or multiple values, we deleted observations with these **problems**.³ Because we sought to show the effects of specific demographic characteristics, we also dropped the few observations for which the non-specific "other" race was specified. In the 1989 sample we dropped the few observations where the respondent gave inconsistent answers regarding financial aid.

IV

Table 1 presents data on plans to begin a graduate program in the arts and sciences during the fall following graduation. While the percentage of students intending to progress immediately on to graduate school changed little over the period (going from 11% in

³The one exception to this rule: when computing our variable indicating pre-college interest in an academic career, we retained observations that had a missing or multiple response to the pertinent survey question and assumed undecided career interests.

1982, to 13% in 1984, to 10% in 1989), these aggregate data obscure some interesting compositional information. Whites, blacks and hispanics exhibited some encouraging gains from 1982 to 1984 but fell back to around 1982 levels by 1989. Asians, on the other hand, exhibited a major decline in progression intentions over the period, falling from 18% in 1982 to 11% in 1989.

A closer look reveals that decline in Asians is explained mainly by the behavior of Asian men, whose progression intention rate fell from 23% to 9%; intentions of Asian females declined only slightly during the **period**.⁴ The relative decline of males versus females is not limited to Asians. In fact, the male advantage in 1982 was lost by 1989 for whites as well, giving rise to a relative decline by males for the entire sample at each survey year, with parity reached at 10% in 1989. Among blacks and hispanics, however, the progression advantage of males over females has remained through the three surveys.

The bottom line from these simple descriptive statistics is that the substantial variation in progression intentions that existed at the first survey date has dissipated over time. In 1989, females behave in the same way as males, Asians behave in approximately the same way as whites, and, in the realization of racial equality, blacks and hispanics now respond similarly to Asians and whites, although at the cost of a lower overall rate of progression.

⁴Of course, the relatively small cell sizes suggest that these numbers should be interpreted with caution.

These conclusions prompt a number of questions. First, what is the relationship between intentions to go on immediately to graduate study and what actually happens? A 1987 follow-up of the Class of '82 found that among the students who indicated in late spring of 1982 that they would enroll in a graduate degree program in the upcoming fall, 90% reported that they were enrolled in an educational program as their principal activity in February 1983 (COFHE, p. 73).

Another worry is that a question concerning plans for the next fall excludes a large number of students who plan to enroll in graduate school at a later date. While the number of students with plans to go to graduate school in the future is substantially larger than the number planning to go immediately, these data indicate trends that mirror those among students who intend to progress immediately.

While differences between immediate intentions and long-term plans are of interest, we will concentrate on immediate intentions, assuming that the likelihood that immediate plans will be realized is surely greater than is the case for more tenuous plans for a distant future. Indeed, the 1987 follow-up survey showed that among the members of the Class of '82 who planned a delayed entry into graduate school, only 25% had enrolled in such a program by the date of the second study, while 13% had abandoned plans for any

advanced degree work and 25% had altered their further education plans to include only a professional **degree**.⁵

Finally, we have the interesting question of the extent to which progression intentions are function of pre-college attitudes rather than being affected by the collegiate educational experience. The 1989 survey asked if the student had any pre-college interest in a career in higher education. Table 2 addresses this question by reexamining the 1989 survey, using respondents with and without pre-college interest, respectively. These figures show that 5% of the sample (302/6251) had pre-college plans to pursue a career in higher education and that a bit more than one-third of these students (36%) had immediate graduate school progression intentions upon graduation. More interesting, students with pre-college interest constituted only 17% (108/623) of all students with progression intentions for fall of 1989. Hence, roughly 5 out of 6 people with immediate intentions to enter a graduate program in the arts and sciences were students without pre-college interests in a career in higher education. It is not

⁵The remainder of these students who were postponing enrollment in graduate school had either been enrolled in only a professional degree program (and were not asked about their plans for graduate degree work) or had not enrolled in any advanced degree program but still harbored unrealized plans for an arts and sciences graduate degree. We also wondered if the results concerning immediate intentions were sensitive to the differing response rates of the schools for the three survey years. We reconstructed table 1 with data limited to respondents from the 5 institutions that had representative responses for the 1982, 1984, and 1989 surveys (response rates above different thresholds were checked by COFHE each year for representativeness on race and sex - - in 1982 it was 66%; 1984 it was 75%; in 1989 it was 55%). An examination of these numbers fails to show any important differences from the trends and patterns noted earlier.

correct, however, to infer that the college experience influenced all of these people to go to graduate school, for we cannot know how many respondents actually had pre-college interest in getting a graduate degree without a corresponding interest in a higher education career.

We do, however, have survey responses to a question about career intentions for graduating seniors. As noted above, 83% of students with immediate progression intentions did not have pre-college interest in an academic career. According to the career question, only 41% of these students intended to pursue an academic career. On the other hand, 85% of the students with progression intentions who also had pre-college interest in academic careers retained this career goal by graduation.

What about the quality of the students who go on to graduate school from these colleges? Does the slight decline in progression rates from 1982 to 1989 conceal a larger decline in quality? Table 3 shows that among the 5% or so who constitute the cream of the crop -- the students who reported an average grade of A in their undergraduate course work -- the 1982 and 1989 intended progression rates are roughly equal to one-quarter. The 1984 rate was somewhat higher within this select group. Again, however, the overall pattern fails to reveal some interesting compositional effects. The progression rate among these high-performing women rises over the three samples, while the men's rate ends lower than it starts after peaking in 1984; this essentially produces parity in our most recent class. The numbers of students in all the racial/ethnic

groups other than whites are too small and the patterns are too variable to draw any conclusions. Among a less select group -- students with grades of B+ or higher -- the percentage with progression intentions has fallen slightly over the period, reflecting the decline among men.

The preceding discussion suggests the need for more rigorous regression analyses of factors that may contribute to or impede progression to graduate school following graduation from college. This statistical methodology shows the effect of a given variable on a dependent variable while controlling for the effects of other variables. In so doing, it allows us to determine how much progression probabilities change in response to changes in a particular independent variable *ceteris paribus*. It also permits an assessment of the effects of interactions between variables.

V

The regression analyses presented here test how gender, race, and income differences as well as the effects of debt accumulated during the undergraduate years, collegiate grades, family income, and parental education affect progression **rates**.⁶ From an economist's perspective, differences across the sexes and racial/ethnic

⁶In 1989 we also test for the significance of a variable indicating whether there was any pre-college interest in a career in higher education. The data set used in our statistical analysis includes all students regardless of whether they majored in the arts and sciences. When the sample was restricted to arts and science majors, the regression results were highly similar to those presented below.

groups may indicate disparate opportunity costs of continuing in higher education, differential access to capital markets, and returns to advanced degrees that vary by demographic group. Differing income backgrounds may also generate different expectations about lifestyles that affect career decisions. From a sociologist's perspective, differences across the various groups may be due to variations in the social rewards or social costs related to graduate school attendance and associated careers, access to role models for academic careers, levels of encouragement from undergraduate faculty, or degrees of self-confidence. While determining the underlying reason or reasons why a variable such as race affects progression is beyond the scope of this paper, estimating the magnitude of this link independent of other variables can expand our understanding of this critical point in the process of producing future faculty. Similarly, it is possible to detect whether the presence of a sizable debt burden inhibits progression, encourages progression, or has no effect. While we could speculate that the negative effect of debt on progression means that a Ph.D. is understood to be a poor investment in terms of pecuniary returns or that a positive effect of debt on progression results from the desire to delay repayment by remaining in school, a definitive interpretation demands further analysis.

Table 4 presents descriptive statistics for the data used in our regression analyses. Table 5 presents the results of these analyses with demographic information **limited to** a gender variable, while table 6 presents the results replacing the sex variable with

racial **variables**.⁷ These specifications allow us to test whether the effect of debt on progression intentions differs by gender or by race and permit relatively easy interpretation of the regression **coefficients**.⁸

A close look at table 5 is helpful. For 1982, the coefficient of GRADES has a value of .10 (and is significant at the 1% level), indicating that, all else (debt, father's education, sex, and family income) equal, a one point increase in an individual's grade point average raises the probability of progression by ten percentage points. The coefficient of the HIGH-DEBT variable fails to differ significantly from zero as is the case with those signifying FATHER'S EDUCATION and MIDDLE- and HIGH-INCOME. The coefficient of the MALE variable, however, is statistically

⁷The dependent variable in each regression takes a value of one if the respondent has progression intentions and zero otherwise. The limited nature of this variable may cause problems with an estimation technique that fails to restrict predicted values to the unit interval; that is, there is nothing in the estimation technique to ensure that the predicted probability that an individual will plan to continue to graduate school will not be less than zero or greater than one. Nonetheless, given the similarity between the ordinary least squares (OLS) results presented here and estimation results using a maximum-likelihood logistic regression technique that corrects this problem and the fact that the former method produces a set of regression results that is much easier for the reader to interpret, the results presented here are based on an OLS technique and hence assume the characteristics of a linear probability model.

⁸On the other hand, they do not test the effect of debt for specific sex-race groups. That is, the equations presented below examine, for example, the effect of high debt for all Asians and for all whites, but not the effect of debt for Asian men, Asian women, white men, and white women. However, separate regressions (not reported) for males and females on the equations containing race dummies show that this restriction can be supported empirically - the debt effect for a particular racial group is largely unaffected by a further gender breakdown.

different from zero and leads, us to believe that, all else equal, a male is about six percentage points more likely than a female to have progression aspirations.

Our HIGH-DEBT-MALE variable is a product of HIGH-DEBT and MALE that permits the effects of high debt to vary by sex. An example may clarify the interpretation of this interaction effect. The coefficient on HIGH-DEBT (call it d) measures the effect of having a large amount of debt on the progression intentions of females. The coefficient on the HIGH-DEBT-MALE variable (call it m) enables us to measure the difference between the effect of high debt for females and the effect of high debt for males, while the standard error on the HIGH-DEBT-MALE variable indicates the precision with which this difference may be measured. The net effect of having a large amount of debt for males is the algebraic sum of d and m . The statistical significance of this net effect cannot be read directly from the t -tests on the individual variables: instead, it is determined by testing the hypothesis that the sum of d and m is equal to zero. As seen in Table 5, the F value is only .47, which is too small to reject the hypothesis that the sum of d and m equals zero. Hence, the effect of high debt on progression for males, while negative in sign (.024 - .036), is not statistically significant.

While some of the results for 1982 hold up well for 1984 and 1989, others change quite a bit. The coefficient for GRADES remains positive and statistically significant in the two subsequent years and has a value of about .12 for both years. On the

other hand, the coefficient of MALE, while positive and significant in 1984, is half as large as in the earlier period. In 1989, the coefficient for this variable is not statistically different from zero. Thus, as indicated by the simple cross-tab results discussed earlier, the advantage of males over females in progression intentions is eliminated over time.⁹ As for the effect of high debt, both females and males remain unaffected in 1984 and 1989. The coefficients of FATHER'S EDUCATION in 1984 and 1989 are positive and significant and indicate that having a father with (at least) an undergraduate degree increases the probability of progression by 4 and 2 percentage points, respectively. A particularly intriguing difference from the 1982 results is the strong evidence in both 1984 and 1989 that students from high-income families are 4 to 5 percentage points less likely to intend to enter graduate school than their counterparts from families with lower incomes. The MIDDLE-INCOME variable also has a negative coefficient, but it is statistically insignificant. The final column in table 5 repeats the 1989 analysis but includes the variable indicating pre-college interest (PCI). The coefficient of PCI is statistically significant and relatively large, indicating that a pre-college interest in a higher education career increases progression probabilities by 25 percentage points -- equivalent to a change of about 2 points in GRADES, the variable with the next

⁹The contribution of regression analysis is that, unlike in the earlier discussion, we are able to control for the effects of income, debt, and other variables that may confound the progression-male link.

largest coefficient. Not surprisingly, the presence of PCI has a sizable effect on the adjusted R-SQ. (It should be noted that the relatively small values of adjusted R-SQ are not unusual given the size and nature of the samples.)

Table 6 presents analogous results after replacing the sex breakdown with one for race. There are three racial groups - white, Asian, and "other" (the "other" category consists of black, hispanic, and native American respondents). The omitted category in the regression analysis is the "other" group, so the coefficient on HIGH-DEBT measures the effect of high debt on progression intentions for members of this group. The test statements at the bottom of each table measure the effect of high debt for whites (where the coefficient is the sum of HIGH-DEBT and HIGH-DEBT-WHITE) and Asians (where the coefficient is the sum of HIGH-DEBT AND HIGH-DEBT-ASIAN).

These results are very similar to those reported above. GRADES has a positive and significant coefficient in all three periods, while the coefficients of FATHER'S EDUCATION and HIGH-INCOME are significant in the two latter periods, with positive and negative signs, respectively. The coefficient of PCI is positive and significant when it is included in the 1989 regressions. The coefficient of WHITE fails to be significantly different from zero at any date, while the coefficient of ASIAN is positive and significant in 1982 and 1984.¹⁰ Finally, the effect of high debt exhibits a statistically significant effect for the "other" group

10 Again, these findings mirror the simple cross-tab results.

only in the 1984 results where the presence of high debt increases progression intentions for these students by about 9 percentage points. Neither whites nor Asians are affected by high debt at any of the survey dates.

In summary, the regression results indicate no consistent effect of high debt on progression intentions. The lack of evidence that the behavior of particular groups is systematically influenced by the presence of high debt implies that the fear that high debt inhibits progression to graduate schools is unfounded, at least for the specific levels and incidence of "high debt" that exist among the graduates of these elite schools. On the other hand, an unsettling phenomenon appeared in 1984 and persisted at a stronger level in 1989--students from high-income backgrounds were, all else equal, less likely than other students to plan to attend graduate school immediately upon graduation.¹¹ Finally, we should not underestimate the importance of pre-college interests of undergraduates. While the college experience appears to mold educational aspirations for many students, a predisposition to pursue a career in higher education has an important effect on graduate school **plans**.¹²

¹¹ The scope of our data do not permit us to determine whether this recent development represents a new condition or a return to a more enduring pattern among graduates of these elite institutions (with 1982 being an aberration).

¹²We were concerned that these regression results might be sensitive to changes in the composition of the sample. The results when the sample for each year is limited to students from the five schools that produced representative samples in all three years varied little from those already discussed, providing reassuring evidence of robust results.

For insight into what features of undergraduate life influence educational goals, we supplement the earlier list of independent variables, which described the respondent, with variables that identify school-specific determinants of **progression**.¹³ We add four variables that group schools by broad characteristics: COLLEGE, a dummy variable taking a value of 1 if the institution is a college rather than a university; WOMEN'S COLLEGE, a dummy variable with a value of 1 if the institution is a women's school and 0 if the school is coed; NON-NORTHEAST, a dummy variable with a value of 1 if the institution is not in the northeastern section of the U.S., and SAT, a continuous variable indicating the average verbal SAT score for matriculants during the respondents' freshman year.¹⁴

The findings, reported in tables 7 and 8, provide insight into which school characteristics encourage graduate school attendance. At the 1982 and 1989 survey dates, the coefficient of WOMEN'S COLLEGE is positive and significant; all else equal, attendance at

¹³We also added a set of dummy variables identifying the respondent's school (this analysis was limited to respondents whose schools produced a representative sample of its student body). For each year, the same school was omitted from the analysis so the effect of graduation from an individual institution was consistently compared to the same institutional referent. The results indicate that a number of individual schools have significant effects on progression intentions even after controlling for student characteristics (including, in 1989, pre-college interest in a career in higher education). It is reassuring to note that the institutional effects (positive or negative) for a particular school are highly consistent across the different surveys.

¹⁴We also tried a variable measuring instructional expenditures per student, but it proved to be statistically insignificant. This result may reflect the homogeneity of COFHE institutions or, more simply, measurement problems.

a women's school raises progression intentions by about 10 percentage points in 1982 and 4 percentage points in 1989. This coefficient is not significantly different from zero in 1984. Students at colleges are 6 percentage points, 3 percentage points, and 2 percentage points less likely to progress immediately to graduate school in 1982, 1984, and 1989, respectively. Attending a school outside of the Northeast raises progression intentions about 7 to 11 percentage points at each date. In 1982, an increase of 100 points in the average verbal SAT score increases progression intentions by almost 20 percentage points, while the effect fell to around 5 percentage points in 1984 and 1989.

These findings strongly suggest that attendance at certain types of schools (women's/university/non-Northeast/high SAT) leads to greater interest in graduate school. While it is beyond the limits of the data set to do more than speculate about underlying explanations, it isn't difficult to suggest some possibilities. A university (instead of a college) provides greater exposure to graduate classes and students as well as a greater research emphasis. These factors may imply an educational experience that is more conducive to the development of graduate school aspirations and may also make a university education a natural choice for students already interested in pursuing graduate study. Women attending a single sex institution may have a more favorable academic experience than elsewhere, and/or attendance at such an institution may indicate a particular orientation toward intellectual achievement. Indeed, the introduction of our measure of pre-

college interest in a higher education career into the regression equation moderately reduces some of the institutional coefficients and slightly reduces the institutional-type coefficients in our 1989 data. An institution with superior students (as measured by higher SAT scores) is likely to have a more academic environment that encourages graduate school attendance as well as having students with greater academic abilities. Students who attend an institution outside of the Northeast may face lower opportunity costs when electing to pursue graduate study due to the relatively smaller and less-well compensated professional communities and executive cadres outside of the Northeast corridor and, realizing this, students choosing in these schools may be predisposed to attending graduate school. Obviously, a study that seeks to identify the reasons underlying the success of the various institutional variables would be extremely valuable. Identifying a list of institutional characteristics that affect progression intentions, as has been done here, is a first step in such an analysis.

VI

The data from the COFHE surveys of graduating seniors indicate that in these major institutional suppliers of future faculty, the progression rates to graduate school appear to have slipped only slightly during the past seven years. The quality of the students who are moving along the path that leads to academic careers has

been fairly steady over this period. However, while the proportions of students who are going on to graduate school have held over the period, they have not increased, as will be necessary if the predicted shortage of faculty is to be averted. Greater gender and racial/ethnic parity in progression rate has been achieved, but at the cost of substantial reductions in the progression rates of men and of Asians (and especially of Asian men). If the trends in the graduate school attendance rates of men that are observed in these data exist in the broader universe of institutions and are extrapolated into the future, it is indeed an increasingly bleak prognosis for academia.

We have found some clues in these data regarding what impels students toward graduate school. As would be expected, high academic achievement at the undergraduate level is associated with a propensity to enter graduate school. Other findings suggest that women's colleges, and to a lesser extent, universities, either produce or reenforce an orientation toward graduate school, or both. One possible line of inquiry into these issues would be carried out via case studies of the curricula, student/faculty relations, personal values of students, and economic circumstances that face the matriculants in and the graduates from these particular highly productive institutions.

On the other hand, we have encountered evidence to discount one of the presumed impediments to graduate school attendance suggested in the current folklore relating to these phenomena. The levels of student debt that are being incurred by undergraduates in

these high-priced institutions do not appear to influence the immediate progression to graduate school, either negatively or positively. To the extent that undergraduate student loans permit undergraduates to attend these incubators of future faculty, it is important to keep the present programs in place and functioning **effectively.**

Table 1

Percentage Intending to Proceed Directly To Graduate School*

	1982		1984		1989	
	<u>Pct.</u>	<u>N.</u>	<u>Pct.</u>	<u>N.</u>	<u>Pct.</u>	<u>N.</u>
<u>Total</u>	11%	715/6298	13%	710/5401	10%	623/6251
<u>By Gender</u>						
Women	9	295/3351	12	339/2881	10	351/3561
Men	14	420/2947	15	371/2520	10	272/2690
<u>By Race/Ethnic Group</u>						
Asian	18	54/298	19	53/284	11	56/529
Black	8	17/212	14	34/250	8	25/309
Hispanic	9	14/148	14	23/166	7	14/209
White	11	630/5592	13	597/4666	10	523/5185
<u>By Gender and Race</u>						
<u>Women</u>						
Asian	14	21/152	17	29/166	12	38/328
Black	7	10/141	13	19/151	6	11/190
Hispanic	8	5/61	10	8/83	5	6/121
White	9	259/2968	11	282/2461	10	293/2909
<u>Men</u>						
Asian	23	33/146	20	24/118	9	18/201
Black	10	7/71	15	15/99	12	14/119
Hispanic	10	9/87	18	15/83	9	8/88
White	14	371/2624	14	315/2205	10	230/2276

* With plans to enroll in the fall following graduation.

Table 2

Percentage Intending To Proceed Directly To Graduate School*
(1989)

	With Pre-College Interest		Without Pre-College Interest	
	<u>Pct.</u>	<u>N.</u>	<u>Pct.</u>	N
<u>Total</u>	36%	108/302	9%	515/5949
<u>By Gender</u>				
Women	31	44/141	9	307/3420
Men	40	64/161	8	208/2529
<u>By Race/Ethnic Group</u>				
Asian	37	10/27	9	46/502
Black	0	0	8	25/306
Hispanic	20	1/5	6	13/204
White	36	97/266	9	426/4919
<u>By Gender and Race</u>				
Women				
Asian	44	7/16	10	31/312
Black	0	0	6	11/190
Hispanic	0	0	5	6/119
White	30	37/123	9	256/2786
Men				
Asian	27	3/11	8	15/190
Black	0	0	12	14/116
Hispanic	33	1/3	8	7/85
White	42	60/143	8	170/2133

* With plans to enroll in the fall following graduation.

Table 3

Percentage Intending to Proceed Directly to Graduate School
Among High-Performing Students*

A. Students With Overall Grades of A

	1982		1984		1989	
	<u>Pct.</u>	N	<u>Pct.</u>	N	<u>Pct.</u>	N
<u>Total</u>	25%	116/457	29%	75/262	24%	74/314
<u>By Gender</u>						
Women	20	36/176	22	23/106	23	35/150
Men	28	80/281	33	52/156	24	39/164
<u>By Race</u>						
Asian	36	9/25	13	2/16	28	5/18
Black		0/1	-	-	33	1/3
Hispanic	43	3/7	20	1/5	-	0/14
Native American	-	0/1	-	0/2	-	0/0
White	25	104/423	30	72/238		68/289

B. Students With Overall Grades of B+ or Higher

	1982		1984		1989	
	<u>Pct.</u>	N	<u>Pct.</u>	N	<u>Pct.</u>	N
<u>Total</u>	15%	507/3445	16%	530/3284	13%	493/3907
<u>By Gender</u>						
Women	11	201/1752	14	245/1782	12	278/2312
Men	18	306/1693	19	285/1502	13	215/1595
<u>By Race</u>						
Asian	25	40/158	20	34/169	13	44/346
Black	14	6/43	20	10/50	15	12/79
Hispanic	22	11/50	18	11/61	9	8/89
Native American	-	0/18	18	3/17	29	2/7
White	14	450/3176	16	472/2987	13	427/3386

TABLE 4

Descriptive Statistics on the Three Data Sets

<u>1982 (N = 6,298)</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
Grad. School Intentions	0.114	0.317	0	1
Grades	3.241	0.415	1.5	4
High-Debt	0.106	0.308	0	1
Male	0.468	0.499	0	1
White	0.888	0.316	0	1
Asian	0.047	0.212	0	1
Father's Education	0.778	0.416	0	1
Middle-Income	0.278	0.448	0	1
High-Income	0.478	0.500	0	1
High-Debt White	0.094	0.292	0	1
High-Debt Male	0.054	0.226	0	1
High-Debt Asian	0.005	0.069	0	1
<u>1984 (N = 5,401)</u>				
Grad. School Intentions	0.131	0.338	0	1
Grades	3.239	0.412	1.5	4
High-Debt	0.238	0.426	0	1
Male	0.467	0.499	0	1
White	0.864	0.343	0	1
Asian	0.053	0.223	0	1
Father's Education	0.776	0.417	0	1
Middle-Income	0.238	0.426	0	1
High-Income	0.440	0.496	0	1
High-Debt White	0.201	0.401	0	1
High-Debt Male	0.119	0.324	0	1
High-Debt Asian	0.013	0.113	0	1
<u>1989 (N = 6,251)</u>				
Grad. School Intentions	0.100	0.300	0	1
Grades	3.260	0.399	1.75	4
High-Debt	0.135	0.342	0	1
Male	0.430	0.495	0	1
White	0.829	0.376	0	1
Asian	0.085	0.278	0	1
Father's Education	0.799	0.400	0	1
Middle-Income	0.187	0.390	0	1
High-Income	0.601	0.490	0	1
High-Debt White	0.111	0.314	0	1
High-Debt Male	0.568	0.232	0	1
High-Debt Asian	0.009	0.093	0	1
Pre-College Interest	0.048	0.214	0	1

TABLE 5
 Regression Results With Gender Variables
 (Dependent variable--Progression Intentions)
 (T-statistics are in parentheses)

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PCI</u>	<u>1989</u> <u>w/PCI</u>
Intercept	-0.234097 ^a (-7.331)	-0.254166 ^a (-6.787)	-0.301263 ^a (-9.474)	-0.263501 ^a (-8.392)
Grades	0.10022138 ^a (10.475)	0.11519645 ^a (10.364)	0.12432287 ^a (13.165)	0.10969579 ^a (11.735)
Father's Education	-0.00479142 (-0.461)	0.03826834 ^a (3.212)	0.01803743 ^c (1.757)	0.01672287 ^a (1.656)
Middle-Income	0.01584341 (1.399)	-0.0200026 (-1.576)	-0.0125672 (-1.036)	-0.0129313 (-1.083)
High-Income	-0.00889741 (-0.828)	-0.0528781 ^a (-4.545)	-0.0351733 ^a (-3.403)	-0.0323852 ^a (-3.183)
Male	0.0550724 ^a (6.571)	0.02717858 ^a (2.600)	0.009713445 (1.195)	0.003410554 (0.426)
High-Debt	0.0239697 (1.312)	-0.0192514 (-1.274)	0.00638901 (0.443)	0.005286546 (0.373)
High-Debt Male	-0.0364421 (-1.419)	0.02253355 (1.055)	-0.00623331 (-0.282)	-0.00190649 (-0.088)
Pre-College Interest				0.24800624 ^a (14.357)
N	6298	5401	6251	6251
F value	23.8 ^a	21.0 ^a	26.5 ^a	49.7 ^a
Adj. R ²	0.0247	0.0253	0.0278	0.0587
TEST (F value): High-Debt + High-Debt Male=0	0.4747	0.0455	0.0001	0.0412

^a significant at the 0 .01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

TABLE 6

Regression Results With Racial/Ethnic Variables
 (Dependent variable--Progression Intentions)
 (T-statistics in parentheses)

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PCI</u>	<u>1989</u> <u>w/PCI</u>
Intercept	-0.228725 ^a (-6.827)	-0.257601 ^a (-6.638)	-0.294273 ^a (-9.151)	-0.258681 ^a (-8.152)
Grades	0.10135571 ^a (10.411)	0.12076427 ^a (10.654)	0.12629801 ^a (13.106)	0.11263573 ^a (11.822)
Father's Education	-0.00619271 (-0.591)	0.03984604 ^a (3.329)	0.02001153 ^c (1.934)	0.019041 ^c (1.871)
Middle-Income	0.01942701 ^c (1.708)	-0.0155169 (-1.218)	-0.0103189 (-0.847)	-0.0106825 (-0.891)
High-Income	-0.00618361 (-0.571)	-0.0479792 ^a (-4.086)	-0.0328769 ^a (-3.148)	-0.0300865 ^a (-2.928)
White	0.01284277 (0.731)	-0.0111313 (-0.554)	-0.0149103 (-0.957)	-0.0192521 (-1.256)
Asian	0.0806031 ^a (3.159)	0.05235339 ^c (1.764)	-0.00277445 (-0.139)	-0.00755888 (-0.384)
High-Debt	0.04352853 (0.885)	0.09132695 ^a (2.639)	0.02313285 (0.708)	0.02514141 (0.782)
High-Debt White	-0.0387125 (-0.758)	-0.10681 ^a (-2.924)	-0.0178756 (-0.512)	-0.0196318 (-0.572)
High-Debt Asian	-0.0221786 (-0.285)	-0.130716 ^b (-2.273)	-0.0774564 (-1.446)	-0.0755811 (-1.435)
Pre-College Interest				0.24897838 ^a (14.435)

^a significant at the 0.01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

TABLE 6 continued.

Regression Results With Racial/Ethnic Variables

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PCI</u>	<u>1989</u> <u>w/PCI</u>
N	6298	5401	6251	6251
F value	15.2 ^a	17.2 ^a	20.9 ^a	40.3 ^a
Adj. R ²	0.0199	0.0264	0.0279	0.0591
TEST (F value): High-Debt + High-Debt White=0	0.1235	1.7236	0.1863	0.2115
TEST (F value): High-Debt + High-Debt Asian=0	0.1245	0.7342	1.6351	1.4564

^a significant at the 0.01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

TABLE 7

Regression Results With Gender
and Institutional Characteristics
(Dependent variable--Progression Intentions)
(T-statistics in parentheses)

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PCI</u>	<u>1989</u> <u>w/PCI</u>
Intercept	-1.2554 ^a (-5.203)	-0.561595 ^a (-3.432)	-0.611192 ^a (-6.383)	-0.445093 ^a (-4.683)
Grades	0.08168923 ^a (6.024)	0.12268988 ^a (8.766)	0.12211857 ^a (12.953)	0.10828228 ^a (11.598)
Father's Education	0.007180546 (0.506)	0.0217658 (1.445)	0.01547596 (1.510)	0.01491164 (1.477)
Middle-Income	0.0295597 ^c (1.902)	-0.0212099 (-1.305)	-0.0108797 (-0.899)	-0.0115408 (-0.968)
High-Income	0.01185657 (0.818)	-0.0581674 ^a (-3.963)	-0.029858 ^a (-2.884)	-0.0273521 ^a (-2.682)
Male	0.05725182 ^a (4.390)	0.03871159 ^a (2.759)	0.009404628 (1.063)	0.005535884 (0.635)
High-Debt	0.006142941 (0.263)	-0.03704 ^c (-1.909)	0.004906726 (0.341)	0.004118869 (0.291)
High-Debt Male	-0.0491559 (-1.394)	0.04349626 (1.590)	-0.00595433 (-0.270)	-0.00179658 (-0.083)
Womens' College	0.10898731 ^a (5.756)	0.03069836 (1.362)	0.04861182 ^a (3.507)	0.0429825 ^a (3.148)

^a significant at the 0.01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

Table 7 continued.

Regression Results With Gender
and Institutional Characteristics

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PC1</u>	<u>1989</u> <u>w/PC1</u>
College	-0.0567253^a (-4.493)	-0.0329903^b (-1.980)	-0.0237747^b (-2.427)	-0.0208088^b (-2.157)
Non-Northeast	0.11168475^a (7.217)	0.07575435^a (2.959)	0.08365182^a (6.503)	0.07310742^a (5.761)
SATs	0.001715257^a (4.339)	0.0004733997^c (1.817)	0.0004922461^a (3.377)	0.0002812646^c (1.949)
Pre-College Interest				0.24274118^a (13.998)
N	2913	3110	6251	6251
F value	14.9^a	12.5^a	21.0^a	36.2^a
Adj. R ²	0.0499	0.0390	0.0340	0.0633
Test (F value) High-Debt + High-Debt Male=0	2.6363	0.1074	0.0039	0.0195

^a significant at the 0.01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

TABLE 8

Regression Results With Racial/Ethnic
and Institutional Characteristics
(Dependent variable--Progression Intentions)
(T-statistics in parentheses)

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PCI</u>	<u>1989</u> <u>w/PCI</u>
Intercept	-1.34679 ^a (-5.594)	-0.601985 ^a (-3.657)	-0.604526 ^a (-6.260)	-0.43222 ^a (-4.509)
Grades	0.08180474 ^a (5.928)	0.13391639 ^a (9.299)	0.12431936 ^a (12.914)	0.11143078 ^a (11.702)
Father's Education	0.006253185 (0.436)	0.02378502 (1.571)	0.01751775 ^c (1.695)	0.01748991 ^c (1.719)
Middle-Income	0.03114758 ^b (1.993)	-0.0145782 (-0.893)	-0.00887355 (-0.730)	-0.00915606 (-0.765)
High-Income	0.01266754 (0.864)	-0.0525397 ^a (-3.533)	-0.0278899 ^a (-2.662)	-0.0248495 ^b (-2.408)
White	0.007553767 (0.321)	-0.0175716 (-0.749)	-0.0151175 (-0.969)	-0.0213029 (-1.386)
Asian	0.01442231 (0.401)	0.05222986 (1.401)	-0.0067282 (-0.337)	-0.0115418 (-0.587)
High-Debt	-0.00249542 (-0.042)	0.0938438 ^b (2.332)	0.02138243 (0.656)	0.02337977 (0.729)
High-Debt White	-0.0218126 (-0.353)	-0.124339 ^a (-2.894)	-0.0167961 (-0.483)	-0.0184229 (-0.538)

^a significant at the 0.01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

TABLE 8 continued.

Regression Results With Racial/Ethnic
and Institutional Characteristics

	<u>1982</u>	<u>1984</u>	<u>1989</u> <u>w/o PCI</u>	<u>1989</u> <u>w/PCI</u>
High-Debt Asian	0.12166604 (1.165)	-0.08318 (-1.141)	-0.0841926 (-1.577)	-0.0814934 (-1.550)
Womens' College	0.08709371 ^a (4.711)	-0.00272287 (-0.127)	0.0445964 ^a (3.360)	0.04044242 ^a (3.094)
College	-0.0588284 ^a (-4.649)	-0.0277905 ^c (-1.667)	-0.0234156 ^b (-2.388)	-0.0202417 ^b (-2.096)
Non-Northeast	0.11617870 ^a (7.451)	0.06412878 ^b (2.488)	0.08468422 ^a (6.575)	0.074053791 ^a (5.830)
SATs	0.001901754 ^a (4.842)	0.0005259377 ^b (2.026)	0.0004933067 ^a (3.375)	0.0002715991 ^c (1.876)
Pre-College Interest				0.24396395 ^a (14.071)
N	2913	3110	6251	6251
F value	11.3 ^a	10.9 ^a	18.0 ^a	31.4 ^a
Adj. R ²	0.0440	0.0399	0.0342	0.0638
Test (F value) High-Debt + High-Debt White=0	1.6587	3.9758 ^b	0.1425	0.1717
Test (F value) High-Debt + High-Debt Asian=0	1.9046	0.0307	2.1969	1.9399

^a significant at the 0.01 level, ^b significant at the 0.05 level, ^c significant at the 0.10 level

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APPENDIX 1

Institutions in the Data Sets

SCHOOL	1982 sample size	1984 sample size	1989 sample size
Amherst College	186	190	320 * - 70%
Barnard College	405 * - 67%	454 * - 90%	307 * - 69%
Bryn Mawr College	122	131	199 * - 76%
Carleton College	261	220	271 * - 63%
Columbia University	79	61	
Cornell University	203		
Dartmouth College	140		-
Duke University	660	456	-
Georgetown University	1067 * - 97%	1135 * - 98%	1120 * - 78%
Harvard University/Radcliffe	780	261	1680 * - 97%
Johns Hopkins University	81	71	-
MIT	348	182 * - 87%	-
Mount Holyoke College	206	251	492 * - 95%
Northwestern University	495		
Pomona College	295 * - 99%	297 * - 96%	321 * - 95%
Princeton University	791 * - 75%	1091 * - 99%	1118 * - 102
Smith College	566 * - 83%	124 * - 83%	672 * - 90%
Stanford University	356		
Trinity College	286	314 * - 76%	428 * - 100
University of Chicago	462 * - 96%	277	
University of Pennsylvania	-	107	1005 * - 67%
University of Rochester	256	144	
Washington University		-	555 * - 55%
Wellesley College	126	129	475 * - 93%
Wesleyan University	570 * - 96%	471	590 * - 83%
Williams College	477 * - 97%	389 * - 76%	
Yale University	146	121 * - 81%	

*Schools that achieved high-response rates that produced representative samples are shown with their response rates.

Institutions in boldface type are included in the set with high response rates in all three samples.

APPENDIX 2

GLOSSARY OF VARIABLES

GRADUATE SCHOOL INTENTIONS (also G.S. INTENTIONS): a dichotomous variable indicating intentions to enroll in graduate school in the arts and sciences in the fall after receipt of a bachelor's degree; 1 = such intentions, 0 otherwise.

GRADES: a variable indicating the respondent's grade point average, using the familiar four-point scale.

HIGH-DEBT: a dichotomous variable that takes the value 1 if the student amassed large educational debts during college and 0 otherwise.¹

MALE: a dichotomous variable that takes the value 1 if the respondent is male and 0 otherwise.

WHITE: a dichotomous variable that takes the value 1 if the respondent is White and 0 otherwise.

ASIAN: a dichotomous variable that takes the value 1 if the respondent is Asian and 0 otherwise.

FATHER'S EDUCATION: a dichotomous variable that takes the value 1 if the respondent's father has at least an undergraduate degree and 0 otherwise.

HIGH-INCOME: a dichotomous variable that takes the value 1 if the respondent comes from a high-income family and 0 otherwise.²

MIDDLE-INCOME: a dichotomous variable that takes the value 1 if the respondent comes from a high-income family and 0 otherwise.³

¹Debts above \$10,000 are considered "high debt" in both 1982 and 1984, while debts above \$12,500 are considered "high debt" in 1989.

²Families with incomes above \$50,000 are considered "high-income" families in 1982, while families with income above \$60,000 are considered "high-income" in 1984 and 1989.

³Families with income greater than \$30,000 but less than \$50,000 are considered "middle-income" families in 1982, while families with income between \$40,000 and \$60,000 are considered middle-income families in 1984 and 1989.