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RETURNS TO FIELD OF STUDY AND INSTITUTIONAL TYPE AMONG ELITE COLLEGE GRADUATES

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Abstract

This article examines the earnings of graduates of selective U.S. colleges and universities, with a focus on (a) returns to female humanities majors and (b) returns to attendance at a university or college. The results indicate that humanities graduates of elite institutions do earn significantly less than graduates of business-related fields. However, the expected higher returns to science and mathematics fields are not observed consistently. Returns to institutional type suggest an advantage to study at research universities and women's colleges, but these results are inconclusive.

Returns to Field of Study and Institutional Type Among Elite College Graduates

Introduction

The gender pay gap in the United States persists, despite decreases in the size of that gap since the 1970s. Factors affecting the size of the gender pay gap include a) traditional divisions of labor within the family that lead women to invest less than men in career-oriented education and training, b) labor market discrimination and the structure of wages in different industries and occupations, and c) differences between men and women in the type of human capital acquired (Blau, 1996). Since the late 1970s, college-educated women have increasingly entered technical and business-related fields of study that were once almost exclusively male, and this trend has contributed significantly to the observed decline in the gender gap among college-educated workers (Eide, 1994; Loury, 1997).

However, college women continue to be overrepresented in traditional female fields of study, such as the humanities and education, and underrepresented in traditional male fields of study, such as the physical sciences, computer science, and engineering (National Center for Education Statistics, 1997). Women at elite colleges and universities, in particular, have continued to choose humanities and other liberal arts majors, even as women in the general population of college students have turned away from the liberal arts towards technical fields (Bowen & Sosa, 1989). In this article, I estimate economic returns to different college majors among graduates of prestigious

colleges and universities in the United States, focusing on the returns to women who have studied the humanities.

The disparity in liberal arts enrollments at institutions of varying quality and prestige suggests that humanities graduates of the most-selective institutions did not face the same labor market disincentives to the study of the liberal arts as did their peers who attended less-prestigious institutions. Women at prestigious colleges and universities may expect to play non-traditional child-rearing roles (e.g. by juggling career and family responsibilities), or they may, as students whose abilities are strongly signaled by their academic credentials, have a wider range of occupational opportunities open to them.

Numerous studies have shown that humanities and other liberal arts majors earn low salaries relative to their peers. However, these analyses of returns to the college major have been conducted in samples of college graduates from institutions of widely varying quality and prestige. Constructing variables that adequately control for the relevant aspects of college quality is quite difficult, as Solmon (1973, pp. 77-79) and James and Alsalam (1993, pp. 115-120) have observed. Controlling for institutional quality is particularly important when evaluating returns to liberal arts fields, because they are arguably among the most prestigious majors at elite institutions (Kingston & Smart, 1990), though they may be considered low prestige fields at other institutions. Liberal arts study may very well lead to comparatively high paying occupations, particularly in law and business, for graduates of elite institutions.

Graduates of elite institutions are more likely than other bachelor's degree holders to attend graduate school (Brewer & Ehrenberg, 1996, p. 258; Eide & Waehrer, 1998, p.77; Fox, 1993, p. 147). Using data from the National Longitudinal Study of the

Class of 1972 (NLS-72), Eide and Waehrer have shown that the financial "option value" of potential graduate or professional study has a significant influence on the choice of the liberal arts major among men and women. With a greater proportion of elite undergraduates continuing on to graduate and professional programs, the option value is particularly relevant to understanding choice of major among elite liberal arts students. The option value further differentiates their choice process from that of average college students.

The economic returns to study in a liberal arts field may also be influenced by institutional type, whether the institution is a liberal arts college or a university. Liberal arts colleges and research universities may have different institutional cultures, which would influence women's choice of major and electives, as well as their career plans. Studies of the returns to degrees earned at women's colleges have focused on characteristics such as types of learning environments and faculty mentoring (Riordan, 1994; Smith, 1990; Smith, Wolf, & Morrison, 1995; Solnick, 1995; Stoecker & Pascarella, 1991). This body of research points to advantages that accrue to women who attend women's colleges in the development of leadership roles and self-esteem and in entry to non-traditional occupational fields (Smith et al., 1995, pp. 245-249).

Earnings are understood as just one component of the psychic and monetary returns to investments in education. Therefore, the analysis of the findings takes into account the influence of pecuniary and nonpecuniary costs and benefits on the investment decision.

Prior Research

The earnings disadvantage associated with liberal arts fields is often sizeable. Recent studies indicate earnings advantages over comparison groups of humanities and education majors of 23% to 61% for engineers, up to 25% for business majors, 13% to 35% for students of mathematics and the physical sciences, and 8% to 24% for social scientists (Angle & Wissmann, 1981; Berger, 1992; Bishop, 1994; Daymont & Andrisani, 1984; Eide, 1994; Griffin & Alexander, 1978; James & Alsalam, 1993; Rumberger & Thomas, 1993; Sharp & Weidman, 1989).

Pascarella and Terenzini (1991, p. 511-513) reviewed early research on economic returns to study at different types of institutions and concluded that graduates of major research universities received an earnings premium. They qualified this finding by observing that the use of better controls for institutional quality likely would have reduced those differentials significantly. They also reported that a small body of research has indicated that, all else equal, increases in institutional size have a modest, positive effect on earnings.

Analyzing NLS-72 data, James and Alsalam (1993, p. 125) found that college characteristics explained a very small proportion of variance in the earnings of graduates and tentatively identified institutional size, type of control (public or private), and student body characteristics as the institutional characteristics that mattered. However, the examined links were quite weak. They hypothesized that larger institutions enjoyed economies of scale in providing students with program variety and access to labor market information and connections. Using a causal model, Smart (1986, p.89) found direct and indirect effects of institutional size on occupational status among college graduates who

entered nonprofessional occupations. Monks (1998, p.11-13) analyzed returns to institutional type and found an advantage associated with study at a research university over study at a liberal arts college.

Data

To focus on returns to humanities study at elite institutions, I evaluate a data set that includes only highly prestigious institutions, which are of relatively homogeneous quality in comparison to the broad representation of colleges and universities in previous studies. This approach provides a control for college quality and also yields a larger number of liberal arts majors than is typically observed in nationally representative samples of college graduates, which allows for analysis by smaller groupings of field of study. The data used are the results of a 1993 survey known as the "Class of '82 Follow-Up Study,"[1] which was mailed to graduates of twenty colleges and universities.

Survey respondents had been out of college for ten years, a length of time that gave those who had entered the labor force a chance to establish themselves in occupations. This is particularly important to an evaluation of the employment experiences of humanities and other non-occupationally oriented majors, who may well need time after college to identify an occupational niche (Katchadourian & Boli, 1985). Many graduates also completed post-baccalaureate degrees within that time. Much of the previous research analyzing earnings by college major has been conducted on college graduates who were in the labor market only a short time (less than three years), or who had just graduated from college (Berger, 1992; Daymont &

[1] The survey was conducted of member institutions by the Consortium on Financing Higher Education (COFHE).

Andrisani, 1984; Eide, 1992; Rumberger & Thomas, 1993; Sharp & Weidman, 1989). Some researchers (Berger, 1992, Rumberger and Thomas, 1993) also limited their sample to graduates whose highest degree was the bachelor's, omitting those in graduate study or with graduate degrees. This approach may bias the sample by omitting high ability students from each major who were qualified to continue their studies.

Limitations

The primary limitation of the data from the Class of '82 Follow-Up Study for an analysis of this type is that wage information is not available. Instead, respondents reported "own income" and "family income." As described further below, I used the "own income" data as a proxy for earnings and limited the analysis to employed respondents. The absence of any measures of ability, such as standardized test scores, grades, or class rank, is a second significant limitation. The analysis does not control for college preparation or performance.

Sample Size

The survey had a 42% response rate, yielding a total of 7,491 responses. The responses are non-random, but there is no theoretical basis to expect that any response bias would be systematically associated with the relationship between respondents' major fields of study and their earnings. One of the twenty institutions in the original data base was omitted from the data for this research, because, on the basis of its admissions practices, it could not appropriately be categorized as one of the four institutional types (described below) defined for this analysis. A total of 7,223 cases remained.

Distribution by Major Field

A relatively large proportion of respondents to the Class of ’82 Follow-Up Study majored in the humanities. Of those reporting their primary field of study, 10% of the men and 20% of the women, or 16% of the combined sample, were humanities majors. Table 1 shows the sample distribution by undergraduate field of study. Traditional gender differences related to field of study prevail among these graduates of highly selective institutions. Men far outnumber women in engineering and applied science fields, the physical sciences, and economics, and a greater number of men majored in business. Women outnumber men in English, the fine arts, the social sciences, and the humanities (which includes philosophy and foreign languages and literature). Education and nursing are both nearly all-female fields among these respondents, but the numbers enrolled are low. The field of education generally accounts for a relatively large numbers of female cases in other studies, but it is likely that an education major was not an option for many of these respondents once they made their choice of college. A review of the Barron’s Profiles of American Colleges, published in 1978, the year when the majority of the members of the Class of ’82 started college, shows that only six of the institutions in this study listed education as a major field. Other fields, such as the biological sciences, history, and political science, have nearly equal numbers of men and women.

Graduate and Professional Degrees

A large number of the respondents had been enrolled in graduate study at some point since graduating in 1982: 3,361 held professional degrees or doctorates and 1,397 held masters’ degrees. (This count is duplicative, because some held multiple graduate degrees.) Sixty-six percent had earned some type of higher degree. In addition, at the time

of the survey, 720 of these alumni were enrolled in graduate study, with 288 of them indicating that being a student was their principal activity. Employment was the principal activity of 82% of the respondents.

In almost all fields, a larger proportion of men than women had obtained a post-baccalaureate degree (see Table 1). The differences are largest in psychology, foreign languages and philosophy, business, and the biological and physical sciences. The proportions are closest in English, communication, history, economics, the fine arts, and in the "other" category (which includes architecture), and, somewhat surprisingly given the traditional underrepresentation of women in quantitative fields, in applied science fields such as engineering and computer science.

Table 2 shows the proportions of students in selected major field groups who went on to earn professional degrees in law and business. A relatively low proportion of female humanities majors obtained these degrees, which lead to occupational fields associated with relatively high earnings. Male humanists pursued these degrees at nearly double the rates at which female humanists did.

Occupational Fields

Consistent with these findings on patterns of continuing education, female humanists entered four potentially lucrative fields in relatively low proportions. While 19% of the sample was employed in four business-related fields indicated on the survey—banking and finance, business consulting, business administration, and marketing—only 13% of female English majors had entered these occupational areas. In comparison, 53% of female business majors and 47% of female economics majors were employed in these fields. Female graduates of engineering and of other liberal arts fields

such as history and political science were employed in these business-related occupations at proportions around 20% to 23%.

Mean Income by Major

Survey respondents reported their individual annual income by choosing from income brackets indicated on the survey. I coded individual incomes as the midpoint of the respondent's selected income bracket. Table 3 provides a summary by fields of study and by highest degree obtained of the means of the incomes reported by male and female respondents who indicated that employment was their principal activity. The maximum income value is $300,000; therefore the means may be underestimated due to a censored distribution. The means reflect a gender wage gap. The mean income of women is less than the mean income of men in nearly every field of study and at both the bachelor's and advanced degree levels. The exceptions are education, which should be discounted because it includes only one male case, and the physical sciences at the undergraduate level. As would be expected based on the results of previous studies, male and female humanities majors (in both the English and the other humanities groups) whose highest degree is the bachelor's have lower incomes on average than graduates from business, economics, and engineering whose highest degree is the bachelor's.

At the advanced degree level, the mean incomes associated with the study of the liberal arts and humanities in both the male and female samples are among the lowest values of the incomes of graduates both with and without advanced degrees. These findings indicate the opportunity costs of lengthy study in non-vocational fields. Advanced degree holders in biology have similarly low incomes.

Methods

The relationship between earnings and undergraduate major was evaluated through ordinary least squares regression (OLS) analysis in subsamples of men and women. The dependent variable is the log value of the survey variable "own income," which respondents reported by selecting from fourteen unequal income brackets. (The implications of using income rather than earnings as the dependent variable is discussed below.) The dollar value of each bracket was set as the midpoint of the bracket. The midpoint of the open-ended uppermost and lowermost income levels, "$200,000 or more" and "Less than $6,000," were assigned midpoints of $4,000 and $300,000, respectively.

The regression equation can be expressed as $Y_i=X_iB+u_i$, where Y_i equals the log of annual income, B is the vector of parameters to be estimated, and u_i is an unobserved mean zero disturbance term. The independent variables in X_i are all indicator variables, taking the value one if true and zero otherwise. The classes of grouped variables represent undergraduate field of study; type of college or university attended; level of financial-aid received in college; ethnicity; geographic region of current residence; and marital, parental and student status. Table 4 provides a description and means for all variables in the model. The variables of primary interest are described in detail below and discussed in the findings section.

The regression analysis was limited to employed respondents who reported income. ("Own income" was not reported by 498 respondents, 7% of the sample.) In the male subsample of 3,421 respondents, there were 2,927 employed respondents reporting income; the comparable number in the female subsample of 3,802 was 2,718. Graphs of the distribution of incomes in both the male and female samples demonstrate that the

incomes are distributed normally. The distribution is censored, however, due to the use of income intervals rather than actual incomes. This may lead to underestimated predictions of the differences in incomes between graduates from various fields, because, undoubtedly, some respondents earned more than $300,000 annually. The regression model was run with alternative values for the highest and lowest income brackets, and this did result in larger coefficients on variables associated with differences in income, but besides these changes in magnitude, the relationship between the variables remained the same.

The model may be subject to self-selection bias due to the fact that the earnings of those who had chosen not to enter the labor market cannot be observed. An alternative model was run using Heckman's (1979) two-stage correction model in order to minimize the effect of this bias. However, the coefficient associated with the correction variable was not statistically significant in this particular model, and the standard errors resulting from this procedure are less precise than those resulting from OLS regression. Therefore, the results of the initial model are discussed here. The results of the selectivity corrected model are available from the author.

Income as a Proxy for Earnings

Since earnings data were not available in these data, the available variable "Own income" was used as a proxy for earnings. How well does this proxy function? Data collected by the U.S. Census Bureau from June to September, 1993, as part of the Survey of Income and Program Participation (SIPP), provides information about the ratio between earnings and income among the general population of 25 to 34 year olds, the age group into which most of the COFHE respondents fall. In this age group, mean monthly

earnings constitute 97% of mean monthly income among individuals who had a bachelor's or master's degree and 99% of income among those with professional degrees (Bruno, 1995, Table 4). (Data was not available for those with doctorates.) In the SIPP sampling of this age group, then, income and earnings are nearly equivalent measures. Therefore, income appears to be a fair proxy for earnings in this study, particularly given its focus on relative economic returns to field of study.

Undergraduate Major

Survey respondents indicated their major by choosing from thirty-five coded categories. Table 4 shows the manner in which the undergraduate major fields were grouped to obtain the indicator variables used in the analysis. It also indicates the total number of employed respondents in each group and the proportion of the male and female samples represented by each group.

Graduate degrees are not included as a variable in the regression model, although postbaccalaureate degree information is available in the data set. While a number of earlier studies included graduate degree variables in regression analyses (Daymont and Andrisani, 1984; James and Alsalam, 1993), such an approach may produce biased parameters. Students who major in different subjects and who were enrolled in different types of institutions have different probabilities of completing graduate or professional study. Therefore, in a model including undergraduate and graduate degrees, the effect of undergraduate major on income is both direct and indirect (through its influence on the graduate-study variable), and the resulting coefficient associated with the undergraduate major variable does not then reflect the total effect of the choice of major. (See Brewer and Ehrenberg, 1996, pp. 242-247, for a discussion of these specification errors). In the

model presented here, which does not include graduate and professional degrees, the influence of postbaccalaureate study on income is captured entirely by the undergraduate major variable. For example, the coefficients associated with history and political science majors will reflect the high proportion of graduates from these fields who earned law degrees (as shown above in Table 2).

Institutional Groupings

The institutions in the sample were grouped based on measures of selectivity indicated in the Barron's directory published in 1978, the year the survey cohort entered college. They were categorized as "Most Competitive" or "Highly Competitive." The "Most Competitive" group was further divided between institutions reporting median SAT scores totaling greater or less than 1300, and between research universities and liberal arts colleges.[2] Five groupings of the institutions participating in the survey resulted: (1) Most Competitive Universities, with SAT>1300 (four universities); (2) Most Competitive Colleges, with SAT>1300 (three colleges); (3) Most Competitive Universities, with SAT<1300 (three universities); (4) Most Competitive Colleges, with SAT<1300 (four colleges); and the omitted group (5) Highly Competitive Universities (five universities). Four institutions enrolled women only. Three of the women's colleges were in the Most Competitive Colleges, SAT<1300 category, which included only one institution that enrolled men.

The institutional categories are based on the reputation of the institution and the competitive character of admission to that institution at the time the cohort represented in this study entered college. As mentioned previously, in comparison with the full range of

[2]Two institutions did not report SAT scores in this guidebook; therefore, they were entered into categories based on their reported rate of admissions in comparison to other institutions represented in the study.

colleges and universities in the United States, the quality of these institutions is quite homogenous. The creation of these five institutional-type variables allows for a test of differences based on size, breadth of offerings, and differences in the institutional cultures of liberal arts colleges and universities. However, given the small number of institutions in each institutional type category, the results must be interpreted cautiously. The estimates may reflect the effects of one or two institutions in the group rather than institutional type effects.

Financial Aid

The financial-aid indicator variable is included in the model as a proxy for socioeconomic status (SES). Three groups were constructed for this variable: those receiving aid for 4 or 5 years, those receiving aid for 1, 2, or 3 years, and those receiving no aid at all. As is still true today, in 1978 financial aid was awarded to students by institutions primarily on the basis of financial need. Therefore, the majority of those who received aid may be considered more financially needy than those who received no aid at all or those who received only some aid.

Results

Undergraduate Major

The results of the regression analysis, which are presented in Table 5, do indicate significant earnings disadvantages associated with the study of the humanities. Women who majored in fields in the omitted category (English, foreign languages and literature, philosophy, and other humanities) are predicted at statistically significant levels to earn less than women who majored in history, political science, economics, business,

engineering, mathematics, and the physical sciences.[3] At statistically significant levels, women in the omitted group are predicted to earn more than fine arts majors. The greatest returns to field of study are associated with business and economics, which highlights the value of skills that are prized in the corporate sector.

Consistent with the findings of previous research, female graduates who studied business and engineering are predicted to earn 34% and 25% more, respectively, than humanists. Economics graduates have the largest positive earnings differential, at 47%, which demonstrates the importance of treating economics separately from the other social sciences when evaluating earnings by major. Higher positive returns to the study of mathematics (20%) and the physical sciences (19%) are also indicated, reflecting the market value of quantitative skills. However, the study of the biological sciences is not associated with higher incomes.

Female graduates from history and political science departments are also predicted to earn more than humanists, with earnings advantages of 16% and 23%, respectively. This finding can be interpreted in the context of the high proportion of graduates from these fields (one-third of the sample) who went on to earn law degrees. Graduates of other social science fields are not predicted to earn more than humanists.

Similar findings on the returns to field of study were obtained in the sample of male respondents, with several exceptions. Men who studied the physical sciences and mathematics are not predicted to earn more than those in the omitted group, while those who studied the biological sciences and psychology are expected to earn more. This pattern of findings indicates that it is not accurate when referring to graduates of elite

[3] Significance levels of $p < .10$ are reported, because the assumption that humanities majors will earn less than their peers creates a one-sided test.

colleges to speak generally about earnings advantages related to the study of mathematics and science and disadvantages related to the liberal arts.

Type of Institution

The findings relating to the predicted returns to study at the most selective universities or at the most selective colleges are striking. In the female sample, the differences in predicted income between graduates of institutions in the Most Competitive Universities, SAT>1300 category and the Most Competitive Colleges, SAT>1300 category is quite large. Women who graduated from universities are predicted to have a 12% income advantage over those in the omitted group, while graduates of the liberal arts colleges are predicted to be at a 13% income disadvantage relative to the omitted group, which included universities with less selective admissions policies than the colleges. Similar results obtain in the male sample, where the returns to study at the top universities is 8% and the disadvantage to study at a top college is –14%. In the male and female sample, there were no significant differences between the omitted group and the universities in the Most Competitive Universities, SAT <1300 category. In the female sample, there was no difference between the omitted group and the liberal arts colleges in the Most Competitive Colleges, SAT<1300 category. (The results for this latter category are not reported for men because the results refer only to the single institution in this category that admitted men.)

Discussion

Field of Study

The study sought to explain differences among women at elite and non-elite institutions in the rate of enrollment in humanistic fields by focusing on economic returns

to field of study among elite graduates. The results show that, like their counterparts at less selective institutions, elite humanities graduates face earnings disincentives to their choice of major. Economic returns do not explain the continued strong enrollment of women in humanities fields at elite institutions.[4] Human capital theory takes account of both the monetary and psychic costs and benefits associated with educational investment decisions (Becker, 1976). If economic returns do not provide an explanation of the differential humanities enrollment trends, then differences in the psychic costs and benefits of choosing the humanities in selective or non-selective institutions are indicated.[5] The following discussion presents four hypotheses worthy of further investigation to explain the continued strong enrollment of elite students in humanities fields, even as women in the general population of college students have migrated from traditional female fields to business fields. Each focuses on potential psychic costs and benefits that may be perceived or experienced by elite female college students to a degree not experienced by other college women. (The formation of these hypotheses draw on the results of a case study of female English majors at an elite institution, which is reported in the author's doctoral dissertation (Dowd, 1998).

Option Value First, elite female humanists may perceive a greater "option value" for graduate or professional study than is actually associated with a humanities degree. As noted above, elite college graduates receive advanced degrees at a high rate relative to other college graduates. The comparison of rates of completion of MBA and JD degrees presented in Table 2 showed that English majors had the lowest rate of completion in

[4] This holds barring any significant differences in other types of compensation, such as pensions, health care benefits, or work environment.

comparison to their peers in political science and history and in comparison to male humanists and men in these other majors.

A lower option value for humanities majors may result from fewer opportunities to enter law and business schools, as the curricular choices of undergraduate humanists may have limited their eligibility for entry into these programs. A second explanation points to the influence of occupational tastes and preferences. The same values that led to the study of the humanities at the undergraduate level may preclude interest in or motivation to attend professional programs. As noted above, female humanists were also less likely than their peers to be employed in business-related occupations. The variation in the returns to different subjects within the liberal arts creates higher costs for women to obtain accurate information about future economic returns.

Winner Take All Markets Second, "winner take all" markets (Frank & Cook, 1995) may have an unusually strong attraction for the most academically talented students, who may reasonably expect to have a higher probability of success in them than do average students. The winner-take-all model stresses that the prospect of extremely high earnings for a few (those who become famous authors, for example) is adequate incentive for large numbers of students to invest inefficiently in academic and career fields with expectedly low financial returns for all but the top performers.

Threshold Earnings Third, on average elite students come from more-affluent backgrounds than the general population of college students (Brewer & Ehrenberg, 1996; Cook & Frank, 1993). Those from wealthier backgrounds may perceive that opportunities for financial security will be available to them through family wealth or connections,

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[5] While there are certainly differences in costs between institutions of varying quality, tuition costs do not typically vary by choice of major within an institution. Therefore, monetary costs are not likely to differ

which Coleman [, 1988 #307] has described as "social capital." For this reason, they may be more willing to pursue an undergraduate degree that does not provide occupational specialization.

A comparison of the mean incomes by field of study of the elite college graduates in this sample with the mean incomes of a more-representative sample of college graduates indicates that elite English/journalism majors (both men and women combined) earn more than graduates of non-elite institutions who have graduated from any other field. Elite liberal arts/humanities majors earn more than graduates of all other fields except economics and engineering. Elite college graduates who had majored in English or journalism had a mean income of $46,879, while the mean income of their counterparts in the SIPP sample was $28,752. The comparable values in a category of liberal art/humanities majors were $39,189 among elite graduates and $25,236 in the SIPP sample.

The comparison was made with data from the U.S. Census Bureau's 1993 Survey of Income and Program Participation (SIPP). It was conducted by degree level (bachelor's or advanced degree) and by field of study. However it did not control for any background characteristics, such as gender, race/ethnicity, and socioeconomic status, or for measures of academic ability. In addition, the SIPP data included all age groups, while the elite graduates in the data examined in this study would typically be in their early thirties. For this reason, the mean earnings of the elite graduates are likely to be underestimated in relation to the comparison group. (See Dowd (1998) for the details of this comparison.) This rough comparison does suggest that--whether due to greater motivation, ability, or social capital--college students enrolled at elite institutions have

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based on choice of major for students at elite or non-elite institutions.

greater reason to expect they will pass a threshold level of earnings at which they can assign a lesser role to economic returns as they choose their major and careers. Those who anticipate earnings above this threshold may be able to give greater weight to the psychic costs and benefits associated with their choices.

Relative Costs of Grading Differential grading practices in quantitative and verbal fields raise the psychic costs of earning a degree in quantitative fields (Sabot & Wakeman-Linn, 1991). If assessment practices are more competitive in mathematics and the sciences and average grades are lower than in liberal arts fields, college students of equal ability in either type of field receive a disincentive to study in the quantitative field. To the extent that classes at elite institutions are more highly competitive than at less selective institutions and elite students are in a position to give weight to these psychic costs, women at elite colleges would be driven from quantitative fields at a greater rate than women at less selective colleges. (See Dowd (forthcoming) for a discussion of why differential grading would play a greater role in influencing the major and career choices of women than of men.)

Type of Institution

The positive returns associated with study at the most prestigious research universities and the negative returns associated with study at the most prestigious liberal arts colleges suggests a positive influence of institutional size, which would be consistent with the findings of the institutional type literature cited earlier. However, this interpretation is confounded by the finding of no difference between the second, less prestigious, category of liberal arts colleges and the omitted group of universities.

Similarly, the greater returns to the less prestigious category of liberal arts colleges confound an interpretation based on student ability, especially given the difficulties of distinguishing differences in ability at the extreme right tail of the distribution (Klitgaard, 1985), which is represented in the sample under study.

A focus on the differences in institutional culture and mission provides the best interpretation of the earnings differentials associated with institutional type in these data. Liberal arts colleges and universities offer different institutional environments to prospective students and may well nurture career aspirations in different ways. In addition, they are likely to attract students with different values and goals. The study does not control for the self-selection bias created by the student's choice of institution, as measures of educational and career aspirations at college entry were not available. However, one clear finding regarding returns to field of study in these data is that those graduates who have studied subjects valued in business settings (business, economics, engineering, and law) can expect higher earnings than their peers. With their greater breadth of offerings, universities may provide greater access to business-related courses and careers.

Similarly, women's colleges may counterbalance their liberal arts mission with a commitment to nurturing female leaders and enabling them to take leadership roles in organizations across occupational sectors. Three of the four colleges in the less prestigious liberal arts category admitted women only, which suggests earnings advantages for women who attend women's colleges instead of coeducational colleges. This interpretation must be advanced tentatively, however, as the categories were not established to test differences between coeducational and women's colleges and the

single coeducational college in the category may be exerting a significant influence on findings. However, the results do contribute to the relatively small body of research on returns to institutional type, particularly given the unusually good control provided for college quality by these data.

Conclusion

This analysis revealed that, like their counterparts at less-selective institutions, humanities graduates of elite colleges and universities are predicted to be at an earnings disadvantage in the labor market. Consistent with prior research, there were large and significant returns to the study of business and engineering. However, the study of mathematics and the physical sciences was associated with earnings advantages only in the sample of women. Graduates of several liberal arts fields (political science, history, and economics) were predicted to have significant earnings advantages relative to humanities majors, which highlights the importance of analyzing returns to undergraduate major at the least aggregated levels made possible by available data.

The analysis of economic returns to institutional type (research universities versus liberal arts colleges) showed that graduates of the most prestigious liberal arts colleges in the sample (and in the country) were at an earnings disadvantage relative to graduates of universities, including those in equally or less selective categories. However, liberal arts colleges in a less prestigious institutional-type category were not associated with an earnings disadvantage relative to the universities in the omitted group, which confounds an interpretation of institutional size and breadth of offerings as the primary factor bearing on these differences. Therefore, the discussion of the results highlighted differences in institutional cultures and student career aspirations, rather than returns to

institutional size, as the most likely explanation for these findings. This interpretation was presented tentatively, given the small number of institutions included in each institutional type category in this study. Further research is needed to explore the relative earnings advantages related to study in liberal arts colleges or research universities.

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Table 1 Survey Respondents: Frequencies by Major

Major Fields	Total	Men	%Grad[a]	Women	%Grad[a]
engineering, computer science, other applied science	821	622	63%	199	59%
biology, biochemistry, other biological science	966	476	88%	490	75%
visual, theatre, or other fine arts and music	292	91	55%	201	49%
history	514	263	74%	251	68%
English	519	146	62%	373	61%
foreign languages and literature, philosophy, other humanities	608	184	78%	424	58%
chemistry, geology, physics, other physical sciences	365	235	83%	130	67%
sociology, anthropology, other social sciences	381	134	76%	247	64%
economics	776	454	70%	322	65%
political science	576	287	75%	289	66%
psychology	397	121	79%	276	20%
business	311	180	54%	131	33%
communication	116	33	37%	83	33%
education	27	4	50%	23	65%
mathematics, statistics	135	70	76%	65	66%
nursing	125	2	100%	123	41%
other	215	76	61%	139	60%
Total	7144	3378	71%	3766	62%

[a]The percentages show the proportion of men or women in that field or field grouping who have earned post-baccalaureate degrees.

Source: Class of ’82 Follow-Up Survey

Table 2 Proportion of Selected Majors with JD and MBA Degrees

Major field groups	JD (law)		MBA (business)	
	Men	Women	Men	Women
Political science and history	44%	33%	13%	12%
Humanities	25%	15%	13%	7%
Economics, business, and communication	19%	13%	33%	25%

Source: Class of ’82 Follow-Up Survey

Table 3 Mean Income by Field of Study

	Bachelor's Degrees Only[a]		Advanced Degrees[b]	
	Men	Women	Men	Women
Biology	56870	42726	38402	35283
	(8686)	(3726)	(1723)	(2692)
Business/ Management	87777	63745	113880	88105
	(6581)	(6796)	(3747)	(4053)
Economics	114008	79542	—	—
	(8748)	(8715)		
Education	–	51100*	—	—
		(2275)		
Engineering[c]	83156	57125	61679	54216
	(4463)	(2842)	(2136)	(2311)
English	69042	48417	—	—
	(9131)	(2899)		
Law	–	—	88571	65913
			(2135)	(1768)
Other humanities[d]	58221	44885	39665	31541
	(614)	(2892)	(2925)	(1272)
Math/Statistics	84219*	51737	—	—
	(18240)	(6032)		
Medicine/ Dentistry	–	—	87728	64520
			(3370)	(2748)
Nursing/ Pharmacy	–	37897	—	—
		(2628)		
Physical Sciences	54194	54583	49897	40648
	(3567)	(9065)	(2073)	(2763)
Psychology	81091*	45383	—	—
	(16630)	(3248)		
Social Science[e]	78393	50805	56715	39665
	(6158)	(3036)	(3012)	(1896)
Other	69958*	42157	53953	42117
	(11627)	(4650)	(4598)	(1630)

Source: Class of '82 Follow-Up Survey

Notes: The data were collected in January, 1993. The means may be underestimated due to a censored distribution of income ($300,000 is the maximum income value). Incomes reported for employed respondents only.

[a]Respondent's highest degree is the bachelor's, in the indicated field.

[b]Respondent's highest degree is a master's or doctorate, in the indicated field.

[c]Engineering includes computer science.

[d]Other humanities includes fine arts.

[e]Social science includes history at the undergraduate level, but at the graduate level respondents would have decided themselves whether to place history in the humanities or social science categories. At the graduate level, the social science category includes economics.

— Data not available.

*Based on fewer than 25 cases.

Table 4 Variable Descriptions, Counts, and Means for Employed Respondents Who Reported Income

	Men		Women	
Total in sample	2927		2718	
Dependent Variable The natural logarithm of the midpoint of the respondent's reported income level. Midpoints are defined as $4,000; $8,000; $12,500; $17,500; $22,500; $27,500; $35,000; $45,000; $55,000; $67,500; $82,500; $125,000; $175,000; $300,000.	Mean $82085	Std. error $1212	Mean $55512	Std. error $842
Independent Variables All indicator variables, taking the value 1 if true and 0 otherwise.				
	N	Mean (% of male sample)	N	Mean (% of female sample)
Undergraduate Major				
Omitted group: English, foreign languages and literature, philosophy, and other humanities	335	.11	548	.20
Sociology, anthropology, other social sciences	110	.04	176	.07
History	225	.08	179	.07
Political Science	255	.08	217	.08
Economics	411	.14	232	.09
Business	163	.06	87	.03
Communication	29	.01	60	.02
Engineering, computer science, and other applied sciences	535	.18	152	.06
Mathematics and statistics	60	.02	52	.02
Chemistry, geology, physics, other physical sciences	198	.07	96	.04
Biology, biochemistry, other biological sciences	408	.14	364	.13
Psychology	102	.03	193	.07
Nursing	2	.0007	81	.03
Visual, theatre, or other fine arts and music	67	.02	145	.05
Education	1	.0003	14	.005
Other fields not listed elsewhere	64	.02	99	.04
Major: missing data	20	.007	23	.008

Table 4 (Continued)

	N	Mean	N	Mean
Type of College or University: *based on Barron's directory rankings (1978)*				
Omitted: Highly Competitive Universities	953	.33	803	.30
Most Competitive Universities, SAT>1300	1009	.35	570	.21
Most Competitive Colleges, SAT>1300	156	.05	194	.07
Most Competitive Universities, SAT<1300	744	.25	509	.19
Most Competitive Colleges, SAT<1300	65	.02	642	.24
Financial Aid in College				
Omitted: 4 or 5 years	980	.34	899	.33
No aid	1513	.52	1419	.52
1, 2 or 3 years	348	.12	332	.12
Aid: data missing	86	.03	68	.03
Ethnicity				
Omitted: White	2586	.88	2387	.88
Asian	137	.05	115	.04
Black	63	.02	126	.04
Hispanic	90	.03	56	.02
Native American	16	.005	16	.006
Ethnicity: data missing	35	.01	18	.007
Geographic Region: Based on U.S. Census Bureau Divisions				
Omitted: Mid-Atlantic: NY, NJ, PA	223	.08	229	.08
New England: ME, NH, VT, MA, RI, CT	357	.12	434	.16
South Atlantic: DE, MD, DC, VA, WV, NC, SC, GA, FL, PR	770	.26	721	.27
East South Central: KY, TN, AL, MS	42	.01	38	.01
East North Central: OH, IN, MI, WI, IL	389	.13	319	.12
West North Central: IA, MN, SD, ND, MO, KS, NE	163	.06	157	.06
West South Central: AR, LA, OK, TX	420	.14	296	.11
Mountain: MT, ID, WY, CO, NM, AZ, UT, NV	136	.05	113	.04
Pacific: WA, OR, CA, AK, HI	427	.15	411	.15
Single: No spouse or partner	721	.25	852	.31
Single: data missing	13	.004	11	.004
Children: Any number of children	1310	.45	952	.35
Children: data missing	58	.02	61	.02
Student: Currently enrolled	165	.06	183	.07

Source: Class of '82 Follow-Up Study

Table 5 Logged 1992 Income Regressions for Employed Respondents

	Women	Men
N	2718	2927
Undergraduate Major omitted=humanities		
Social Sciences	.013	.085
	(.059)	(.075)
History	.146****	.177****
	(.057)	(.060)
Political Science	.205****	.221****
	(.053)	(.058)
Economics	.387****	.409****
	(.052)	(.052)
Business	.294****	.340****
	(.079)	(.067)
Communications	.118	.120
	(.093)	(.130)
Engineering	.226****	.200****
	(.063)	(.050)
Mathematics	.180*	.141
	(.097)	(.095)
Physical Sciences	.172**	.036
	(.073)	(.062)
Biological Sciences	.045	.105**
	(.046)	(.052)
Psychology	.066	.126*
	(.056)	(.077)
Nursing	-.062	.002[b]
	(.082)	(.470)
Fine Arts	-.341	-.311****
	(.062)[a]	(.090)
Education	-.219	-.240[b]
	(.180)	(.663)
Other	.006	-.094
	(.073)	(.093)
Major: data missing	.007[a]	-.030[a]
	(.143)	(.154)

Table 5 continued

	Women	Men
Type of College or Univ. omitted=competitive univs.		
Univ w/ SAT>1300	.114****	.081***
	(.039)	(.031)
College w/ SAT>1300	-.136****	-.153****
	(.055)	(.058)
Univ w/ SAT<1300	-.022	.003
	(.040)	(.034)
College w/SAT<1300	-.054	NR
	(.038)	
Financial Aid in College omitted=4 or 5 years		
No aid	.046	.121****
	(.029)	(.028)
1, 2 , or 3 years	-.007	.017
	(.043)	(.042)
Missing data	-.032	.052
	(.084)	(.075)
Ethnicity omitted=white		
Asian	.077	-.037
	(.065)	(.059)
Black	.059	.084
	(.063)	(.086)
Hispanic	.121	.074
	(.092)	(.072)
Native American[a]	-.062*	-.347**
	(.179)	(.173)
Ethnicity: data missing	-.047 [a]	-.037
	(.171)	(.118)

Table 5 continued

	Women	Men
Geographic Region omitted=middle Atlantic		
New England	-.138****	.019
	(.039)	(.041)
South Atlantic	-.077***	-.110****
	(.036)	(.035)
East South Central	-.118	-.349****
	(.111)	(.105)
East North Central	-.061	-.039
	(.045)	(.041)
West North Central	.013	-.077
	(.061)	(.059)
West South Central	.017	.027
	(.053)	(.046)
Mountain	-.196****	-.131**
	(.077)	(.067)
Pacific	-.065	-.014
	(.041)	(.041)
Lifestyle variables omitted=married, no children		
Single	.045	-.081
	(.031)	(.033)**
Single: data missing	-.118 [a]	.067[a]
	(.203)	(.188)
Children	-.132****	.155****
	(.030)	(.029)
Children: data missing	-.139	.108
	(.088)	(.089)
Student	-.091	-.306
	(.051)*	(.053)****
Constant	10.7****	10.8****
	(.049)	(.057)[a]
R-squared adjusted	.08	.10

Notes: Each regression is estimated for a sample of respondents to the Class of '82 Follow-Up Survey conducted in January, 1993. Respondents are alumni of 19 prestigious U.S. colleges and universities, who reported their own income by choosing among 13 income levels. The dependent variable is the natural logarithm of the midpoint of the income levels; the maximum and minimum levels were open-ended and were assigned midpoints of $4,000 and $300,000, respectively (based on reported intervals of <$6,000 and >$200,000).

Standard errors are in parentheses.

Significance levels of p <.10 are reported, because the assumption that humanities majors will earn less than their peers creates a one-sided test.

****= significant at the .1% level

***= significant at the 1% level

**= significant at the 5% level

*= significant at the 10% level

[a]based on fewer than 25 observations

[b]based on fewer than 5 observations

NR=not reported, category includes only one institution