Sex Differences in the Utilization of Educational Capital Among College-Educated Workers

Kimberlee A. Shauman
Department of Sociology, University of California, Davis

Introduction

This paper examines sex differences in the utilization of college education at the transition to the labor force in an attempt to understand the persistence of occupational segregation among college-educated workers. Despite increasing postsecondary participation rates of women (Bae, Choy, Geddes, Sable, and Snyder 2000; Jacobs 1996; Spain and Bianchi 1996; NCES 2005; Xie and Shauman 2003) and the increasing integration of college majors (Xie and Shauman 2003), occupational segregation by persists in the U.S. labor force. The gap between educational and occupational integration indicates that a significant amount of sex-based variation in occupational sorting occurs even among individuals who have earned degrees in the same field. Identifying the extent, character and causes of population variation in the utilization of educational capital is therefore essential to our understanding of the processes by which occupational segregation is perpetuated and to the development of policies that will speed progress toward gender equity in the labor market.

This analysis addresses the following research questions: Does the utilization of educational capital vary by sex? What individual and field-specific characteristics account for the differences? I use individual-level data for a representative sample of U.S. college graduates from the 1993 *National Survey of College Graduates* (NSCG-93) to model the determinants of sex differences in the utilization of educational capital. The focal concept of the analysis, the successful utilization of the educational capital, is operationalized in two ways: (1) by each survey respondent's self-report of how related their job is to their degree field; and (2) by the proportion of respondents identifying a close relationship between each major-occupation dyad. The multivariate analysis assesses the extent to which within-field differences in the utilization of educational capital are accounted for by differences in (1) individual-level labor force attachment and experience, (2) family-level characteristics such as family status and spousal employment characteristics, and (3) the characteristics of majors such as the representation of women in the major field and the earnings potential associated with degrees in the field.

Background

The close correlation between the sex segregation of college majors and the sex segregation of occupations is well known (Davis 1965; Jacobs 1989; Jacobs 1995; Peng and Jaffe 1979; Polachek 1978), as is the power of controlling for college major to explain sex differences in occupational attainment and earnings (Brown and Corcoran 1997; Daymont and Andrisani 1984; Gerhart 1990; Shauman Forthcoming). Given the linkages between educational fields and occupational placement (Shauman Forthcoming), sex differences in educational specialization impose upper bounds on the extent of occupational integration that can be expected. But controlling for college major falls far short of explaining occupational segregation as labor force integration lags behind the integration of college majors to a significant degree. For example, although women earned 57.3 percent of all bachelor's degrees in the biological sciences in 2000, they accounted for only 40.7 percent of employees in biological science occupations. An integration gap of similar magnitude exists for the physical sciences, where 41.7 percent of 2000

bachelor's degrees went to women but 31.3 percent of employees were women, and in engineering, where the contrast was 20.1 percent versus 10.8 percent. Although the slow pace of social change through the cohort replacement process may explain some of this inertia, the gap between the diversity of degree-holders and labor force representation in related field is significant even among the newest entrants to the labor force.

The lag between the integration of educational fields and the integration of occupations indicates that there may be significant sex differences in how educational capital is utilized in the labor force and translated into occupational attainment. There are few studies, however, that investigated the sex differences in individual education-to-work transitions. One a recent analysis showed that there are significant within-major differences in occupational attainment, and more specifically, that women are less likely than men to follow normative major-occupation paths (Shauman Forthcoming) upon completion of their bachelor's degree. That analysis, however, focused on the relative size of the major-occupation flows to identify normative pathways and neglected the qualitative characteristics of education-occupation linkages (Shauman Forthcoming). For the present analysis, I focus on the content consistency of major-occupation transitions. By examining variation in extent to which individuals are able to attain employment in occupations in the field in which they are educated, this analysis will help to identify important mechanisms in the processes by which occupational segregation is generated.

Majoring in a particular field represents an affinity for the content of that field, aspirations for employment in that field, and a distinct type of human capital investment. It may be assumed, therefore, that the individuals attaining a degree in a given field are likely to have similar interests, occupational aspirations, and specific human capital. Variation by sex in the employment outcomes of those sharing a common degree field may by caused by (1) individual characteristics, (2) family characteristics, and (3) characteristics of the degree fields and the occupations with which they are linked. In this analysis I test the power of correlates operating in each of these domains to explain sex differences in the utilization of educational investments.

Research Hypotheses

This analysis of individual-level determinants of educational utilization focuses on the influence of labor force attachment on occupational attainment. The unwillingness or inability to work full-time may influence occupational placement since the availability of part-time work varies across occupations. Working part time therefore may largely preclude working in one's degree field. Given the significance of sex difference in the desire for and experience of part-time work, I hypothesize that differences in the utilization of educational training will be partially explained by variation in labor force attachment.

The analysis examines the influence of three types of family-level factors that may generate sex differences in the utilization of educational capital: marital status, family structure, and spousal educational and employment characteristics. Since the gendered division of labor within the family tends to have opposite effects on the amount of time women and men devote to work and career development, I expect that controlling for these factors will explain some sex differences in the utilization of educational capital.

Finally, the analysis tests three mechanisms by which the characteristics of majors and their related occupations may generate sex differences in the utilization of educational investments. The first is the availability of flexible work schedules. That is, variation by field in the availability of part-time work may differentially impact whether an individual attains employment in an occupation that is related to their education. For example, a dearth of part-time work in engineering fields may help explain sex differences in the utilization of engineering degrees.

A second mechanism is the influence of the economic value of a degree field. Since the potential earnings associated with a major field is likely to have a positive influence on the utilization of the educational credential, sex differences in the valuation of economic rewards (Beutel and Marini 1995; Bridges 1989; Herzog 1982; Johnson 2002; Konrad, Ritchie, Leib, and Corrigall 2000; Lueptow 1980) may generate differences in occupational outcomes and the attainment of educationally-related employment. Furthermore, the potential earnings associated with a major may also intensify the competition for economically related employment, and this competition may depress the employment prospects of women.

Third, the diversity of the population in a field may generate inequality in the utilization of educational capital. If women are underrepresented in a major, as is the case with the sciences and engineering, they may also experience a depressed likelihood of mainstream employment due to discrimination in hiring or to their marginalization in employment networks.

Data and methods

I use data from the 1993 National Survey of College Graduates (NSCG-93) to model the utilization of educational capita. The NSCG-93 is a survey of a representative sample of individuals identified in the 1990 Census as having earned a bachelor's degree. The 1993 sample included 215,000 individuals under age 75 working in all occupational fields and holding bachelor's degrees in all fields of study, although those working in scientific and technical fields were oversampled (NSF 1997). I use the NSCG-93 for this analysis because it provides the largest nationally representative sample available that includes detailed information about college graduates' employment characteristics, degree attainment, and field of postsecondary study. The sample extracted for this analysis includes individuals aged 25 to 40 who had attained a bachelor's, master's or doctoral degree between 1985 and 1993 and who reported being employed at the time of the survey in 1993. Given the sample restrictions and the exclusion of respondents with missing information on the dependent variable, the analytic sample includes 23,207 respondents. All analyses are weighted to represent the population of college-educated workers in the U.S.

The dependent variable of this analysis is the utilization of the educational capital. I operationalize this concept in two ways and conduct parallel analyses for each variable. The first operationalization is a subjective self-report of how related the respondent's job is to their degree field. Respondents were asked, "To what extent was your work on your principal job…related to your highest degree field?" The response categories were "closely related," "somewhat related," or "not related to education." I code those reporting that their job is "closely related" to their degree field as utilizing their educational investment in their employment. Given that this measure is subject to bias due social desirability reporting and variation in the interpretation of

the relatedness of educational field and work, I use a second measure that aggregates the individual-level responses by degree and occupation. This measure is the proportion of all respondents with a given degree (bachelor's, masters, doctorate), in a given field and occupation who report that the job and degree field are closely related. Given the different levels of measurement of these operationalizations of the utilization of educational capital, I use binary logit models for individual-level self-report measure and OLS regression models for the aggregate measure.

The focal covariates of the analysis are operationalized as follows:

- FIELD of the most recent degree is coded according to a 25-category classification;
- SEX is a binary indicator;
- MARITAL STATUS is a categorical classification that distinguishes those who have never been married, those who are currently married, and those who were previously married (widowed, divorced, separated);
- FAMILY STRUCTURE is measured with a series of dummy variables indicating the presence the family of children aged 0-5, 6-11 and 12-17 in;
- SPOUSE'S EMPLOYMENT STATUS is indicated with a dummy variable that distinguishes employed from unemployed spouses for married respondents;
- SPOUSE'S EDUCATIONAL ATTAINMENT is a dummy variable that distinguishes college-educated spouses from all others among married survey respondents;
- the major-specific AVAILABILITY OF PART TIME WORK is operationalized as the proportion of respondents in an occupation who work part time weighted by the percent reporting that the occupation and major field are closely related;
- the PERCENT FEMALE in a major measures the major-specific representation of women.

In addition to these covariates, I include in the multivariate analysis controls for age, race/ethnicity, level of most recent degree (bachelor's, master's, doctoral, and professional degrees), field(s) of prior degree(s), the year in which the most recent degree was earned, and a measure of years of labor force participation.

Expected Findings

Preliminary analyses show that women are more likely than men to report that their job is related to their field of study. Table 1 presents the mean of the subjective measure of educational utilization by sex and degree field. Among the sample of college graduates earning their degrees between 1985 and 1993, 57.3 percent of all the survey respondents reported that their occupation was closely related to their degree field, but 59 percent of women compared to 56 percent of men reported the close education-occupation relation. The marginal statistics masks significant between-major variation both in average level of education utilization and in the disparities by sex. Those who earn degrees in health and medical fields, law, computer and information sciences, and education are most likely to report working in jobs that are closely related to their degree field. The lowest likelihood of educational utilization is experienced by those earning degrees in the social sciences (e.g., economics, history, political science, sociology) and humanities (English, foreign languages). The summary statistics reported in Table 1 reveal that significant sex disparities in educational utilization are found in favor both of males and of females depending of the field. Among those who earn degrees in education, liberal studies, the physical sciences and social work, public administration and protective services, women are

significantly more likely than men to utilize their educational capital. Women are less likely than men to utilize their education when they earn degrees in agriculture, natural resources, and forestry, business, computer science, and in the health and medical fields.

I expect that these within-major sex differences will be explained by controls for the individual-, family- and field-level variables, but I expect that the factors that have the most explanatory power will vary by field.

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Table 1. Mean educational utilization score by sex and degree field

Major Field	Males	Females	Total	*n*
Total	0.561 (0.318)	0.585*** (0.338)	0.573 (0.328)	23,207
Agriculture, Natural Resources and Forestry	0.494 (0.287)	0.424* (0.286)	0.469 (0.288)	414
Architecture and Environmental design	0.740 (0.331)	0.654 (0.393)	0.716 (0.350)	224
Business, Marketing/distribution	0.475 (0.224)	0.460* (0.237)	0.469 (0.230)	4855
Journalism, Communications	0.360 (0.270)	0.353 (0.265)	0.356 (0.267)	748
Computer and information sciences	0.773 (0.225)	0.746* (0.260)	0.764 (0.238)	1423
Education	0.704 (0.304)	0.771*** (0.283)	0.755 (0.289)	2160
Engineering	0.602 (0.205)	0.586 (0.234)	0.599 (0.210)	3827
Foreign Languages	0.499 (0.447)	0.376 (0.416)	0.413 (0.427)	135
Health and medical	0.916 (0.185)	0.860*** (0.193)	0.880 (0.192)	1958
Law	0.840 (0.296)	0.839 (0.294)	0.839 (0.295)	652
English	0.368 (0.375)	0.347 (0.339)	0.354 (0.352)	372
Liberal studies	0.200 (0.230)	0.417*** (0.400)	0.340 (0.364)	144
Biology	0.639 (0.332)	0.605 (0.333)	0.621 (0.333)	882
Math	0.396 (0.346)	0.435 (0.342)	0.411 (0.344)	398
Philosophy & Religious studies	0.615 (0.421)	0.579 (0.432)	0.608 (0.423)	278
Physical sciences	0.592 (0.317)	0.643* (0.302)	0.605 (0.314)	753
Psychology	0.498 (0.364)	0.495 (0.357)	0.496 (0.359)	938
Social work, Public administration, Protective services	0.556 (0.318)	0.657*** (0.316)	0.618 (0.320)	770
Economics	0.239 (0.270)	0.209 (0.254)	0.229 (0.265)	247
History	0.313 (0.368)	0.271 (0.320)	0.299 (0.352)	228
Sociology	0.374 (0.330)	0.342 (0.309)	0.352 (0.316)	225
Political science, International relations	0.213 (0.255)	0.212 (0.257)	0.213 (0.256)	382
Other social sciences	0.388 (0.363)	0.328 (0.352)	0.358 (0.358)	175
Commercial, visual and performing arts	0.452 (0.342)	0.416 (0.333)	0.432 (0.337)	639
Other fields	0.482 (0.304)	0.517 (0.340)	0.503 (0.326)	379

*p<.05; **p<.01; ***p<.001.