Career Outcomes of STEM and Non-STEM College Graduates:

Persistence in Majored-Field and Influential Factors in Career Choices

Abstract

Using the data from a nationally representative, longitudinal survey of college graduates, this study examines student transition from college to their chosen career paths and identifies factors influencing college graduates choosing an occupation related to ones' undergraduate major. Within the context of expanded econometric framework, a wide range of variables are considered, including monetary and nonmonetary costs and benefits as well as cultural and social capital measures. Using multinomial logit regression analyses, the results suggest positive career outcomes associated with individuals having an occupation closely related to one's college major, including a better income profile and greater job satisfaction. Major-based differences are also examined between STEM and non-STEM graduates, and patterns of changes are documented for ten years after graduation. An important perspective offered by this study is to consider career outcome as an extended definition of institutional effectiveness and student success. Based on the empirical findings, policy implications are discussed with the hope to bring attention and improvement to the relationship between the higher educational system and the labor market.

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College education is a costly investment at both personal and institutional levels. One of the primary reasons for individuals choosing to invest in a college education is the improved career and occupational outcomes (Roksa & Levey, 2010). Scholarly endeavors to understand the occupational choices and career outcomes can be found in educational, sociological, and economic research. However, one of the aspects of occupational progress that has largely been unattended is the consistency between the academic training and occupational choice of college graduates. For individuals who maintain a career congruent with their academic training, the benefits include systematic and in-depth knowledge about the occupation and greater chances to maximize the return on educational investment (Melguizo & Wolniak, 2011; Wolniak & Pascarella, 2005). In comparison, those who work in occupations not related to their undergraduate study may suffer material and nonmaterial disadvantages, and both the individuals and the system may sustain losses as a result of this disconnection between college education and career choices.

As such, the primary interest of this study is to examine the labor supply in science, technology, engineering, and mathematics (STEM) and non-STEM fields from the perspective of college graduates choosing an occupation that is consistent with their academic training. To be specific, career outcome is defined as how closely a college graduate's job was related to the undergraduate field of study. Based on a national longitudinal survey of college graduates, two research questions are addressed: 1) What factors influence the career choices and progress of college graduates? and 2) How do their influences differ for individuals in STEM and non-

STEM fields? The objectives are to identify factors that underline the career choices of college students and to improve their persistence and career outcome during their post-college stage.

Literature Review

During the last few decades, economists, sociologists, organizational, and educational researchers have examined the occupational choices and career outcomes of college graduates from different theoretical perspectives, as well as by considering a variety of variables (Behrman et al., 1998; Griffith, 2010; Seibert et al., 2001; Stoecker & Pascarella, 1991; Whalen & Shelley, 2010). As observed by Goyette and Mullne (2006), career-related inquiries branch out into three directions: 1) gender and race imbalance in the selection of fields of study; 2) factors influencing entry into STEM fields; and 3) occupational outcomes for college students.

Studies taking either of the first two directions focus on high school and postsecondary education and students' choices of academic majors. The major findings support that the underrepresentation of women and racial minorities in STEM has remained a troublesome reality in college and graduate school enrollment (Hurtado et al., 2008; Jackson, 1990; Perna, 2000 & 2004). In this body of research, considerable attention has been focused on the gendered patterns of choosing college majors. Although national statistics show that women account for over 55% of bachelor's degree recipients, they are still the minority in STEM fields (Joy, 2000; Staniec, 2004). Not only is the underrepresentation of women apparent at the time college students declare a major, but attrition of women from STEM majors is significantly higher than that of men (Griffith, 2010; Whalen & Shelley, 2010). Besides gender and race/ethnicity, other factors found to bear a significant relationship with the choice of college majors include academic ability/performance, socio-psychological variables, labor market returns, and family background (Goyette & Mullne, 2006; Jacobs, 1986 & 1995; Melguizo & Wolniak, 2011; Simpson, 2001).

The third branch encompasses studies on the occupational outcome of college graduates presented in educational, organizational, economical, and sociological literature. Unfortunately, inconsistent terminology and classifications have been used to define occupational choices and/or career outcomes. For example, "occupational outcome" was classified into five categories by Keane and Wolpin (1997): white-collar occupation, blue-collar occupation, joining the military, staying at home, and returning to school. Ehrenberg (1991) took a different approach and had four options: enroll in graduate school, enroll in a first-professional degree program, pursue foreign study, or work fulltime. Among different occupational outcomes, stronger attention has been focused on graduate school enrollment by higher education researchers (e.g., Ethington & Smart, 1986; Perna, 2004; Sax, 2001; Zhang, 2005). For example, some studies indicated that there is a significant difference between the graduate education enrollment of men and women, with more women at the master's level and more men at the doctoral level (Joy, 2000; Perna, 2004; Zhang, 2005). Gender-based differences were also found in the first post-college job, with an implication that the "leaky pipe" in STEM labor supply continues at the post-college stage (Joy, 2000).

Variables regularly considered in studies of post-college choices include gender, age, race, academic performance, undergraduate majors, parents and family background, financial resources, and institutional characteristics (Ethington & Smart, 1986; Mullen et al., 2003; Perna, 2004; Zhang, 2005). For instance, financial factors, family background, and social and academic integration at the undergraduate institutions are found to have direct and/or indirect influence on graduate school enrollment (Ethington & Smart, 1986; Perna, 2004; Zhang, 2005). In some studies of career outcome, career aspirations and career attainment are also examined (Sax, 2001; Smart, 1988; Stoecker & Pascarella, 1991). Their findings suggest that when making a career

decision, individuals take into consideration many factors, including "financial reward, autonomy, recognition, intellectual stimulation, flexibility, creative expression, and sense of social purpose" (Mullen et al., 2003, p. 146; see also Stolzenberg, 1994).

It is worth mentioning that, although career outcomes can be measured from various perspectives, economic theory places wage as the central role in allocating human resources in the labor market (Flyer, 1997). Individual earning power has been the most frequently used indicator of labor market returns and has been the focus of numerous studies of career outcomes in economics and education (Flyer, 1997; Melguizo & Wolniak, 2011; Smart, 1988; Staniec, 2004; Goyette & Mullen, 2006). Gender differences in labor market return are observed at both the entry level and the trajectories over time (Roksa & Levey, 2010). In general, college major has been documented as one of the few prominent dimensions related to divergent labor market returns (e.g., Roska, 2005; Roksa & Levey, 2010; Thomas & Zhang, 2005). In terms of career trajectories, studies have found that certain college majors that emphasize general skills may enhance individuals' likelihood of promotion (Ishida, Spilerman, & Su, 1997), and that graduates of different majors may experience different rates of wage growth (Melguizo & Wolniak, 2011; Roksa & Levey, 2010; Thomas & Zhang, 2005).

Theoretical Frameworks

Not only is there a wide spectrum of variables, including demographic characteristics, family background, human capital, academic attainment, institutional variables, and career aspirations, to be considered for inquires into the career choices of college graduates, but also several competing theoretical views are available, including, but not limited to meritocratic, social reproduction, and human capital theories. The meritocratic theory and the social reproduction theory are the two theoretical premises permeating the sociological and educational

studies of career attainment (Mullen et al. 2003; Smart, 1988). Meritocratic theorists claim that academic ability and educational performance are the principal determinants of individual success, whereas the social reproduction theorists view social origin as the primary determinant of individual success and the educational system as a site of class reproduction that perpetuates social inequity. In economics, though, human capital theory is the dominant framework that posits a positive relationship between individual investments and employment returns in order to understand the career patterns of college graduates, gender-based labor-market segregation, and salary differences (Keane & Wolpin, 1997; Melguizo & Wolniak, 2011). Extant research suggests merits to each perspective, but none can "provide an accurate portrayal of the attainment process" (Smart, 1988, p. 55).

Acknowledging the existence of a variety of conceptual approaches, Perna (2004) introduced an expanded econometric theoretical framework in her study of gender/racial imbalance in graduate education. This framework "assumes that individuals make decisions by weighing the monetary and nonmonetary costs against the monetary and nonmonetary benefits for all possible alternatives and then selecting the alternative that maximizes utility with respect to individual preferences, tastes, and expectations" (Perna, 2004, p. 489). Relying on the argument that individuals most likely have to make decisions based on imperfect information (Ehrenberg, 1991), Perna used social and cultural capital as appropriate proxies for "individual preferences, tastes, and expectations" in order to quantify the nonmonetary variables.

This study adopts Perna's theoretical framework based on the following considerations. First, by modeling career outcomes in connection with social and cultural capitals, it allows simultaneous manifestation of meritocratic theory and social reproduction theory. Second, by including both "monetary and nonmonetary" factors, it integrates sociological variables with an

economic view. Also, this framework can be slightly modified to have the costs and benefits arranged in a longitudinal and sequential fashion, showing the occupational outcome as the a result of the chosen career path of an individual along which one moves over time, as suggested by microeconomic models of career choices (Behrman et al., 1998).

The last but not least reason that this expanded econometric theoretical framework is appropriate for the current study is because it makes the consideration of a variety of variables in a theoretically suitable fashion. In particular, monetary costs can be interpreted as measures of financial resourses, such as parent's support, financial aids, and debts related to undergraduate education (Weiler, 1991; Fox, 1992). Following examples in some previous studies, nonmonetary costs for college education may be indicated by age when received bachelor's degree with the argument that those who received their degree at an older age may have a shorter time horizon to realize an increase in lifetime earnings (Perna, 2004; Roksa & Levey, 2010). Monetary and nonmonetary benefits are in alignment with the extrinsic and intrinsic outcomes of career success as defined in the organizational theory (Seibert et al., 2010). Monetary/extrinsic outcomes may be measured by salary and mobility, and nonmonetary/intrinsic outcomes may refer to individuals' subjective evaluation of professional growth and satisfaction.

Individual preferences, tastes, and expectations may be indicated by variables including gender, race, family background, characteristics of the undergraduate institutions attended, academic performance, and career aspirations. For example, women may plan their career in accordance with their plans for bearing and raising children, in which the time out of the labor force means interruptions and delays to the realization of career benefits (Perna, 2004). Race, family background, and other parent-related factors can serve as proxy measures of cultural capital to define one's class status (Perna, 2004). Cultural capital factors have been empirically

connected with students' academic mastery (Goyette & Mullne, 2006), social experience and career attainment (Stoecker & Pascarella, 1991), students' pursuit of graduate education (Ethington & Smart, 1986), accumulation of social capital (Bourdieu & Passeron, 1977 & 1979), facilitating upward mobility (Lamont & Lareau, 1988), and making choices on college major (Goyette & Mullne, 2006).

Characteristics of the institution from which the undergraduate degree was obtained may serve as the proxy measure of social capital. Social capital refers to one's social networks and connections that an individual builds upon her/his relationships with others through social interactions or social structures (Morrow, 1999). Social capital contributes to career success in terms of greater access to resources, information, and network supports (Coleman, 1988; Seibert et al., 2001; Wells, 2008). Empirical evidence supports that students' social environment and connection to the institution are factors contributing to personal gains, persistence in STEM majors, continuation to graduate education, and career attainment (Griffith, 2010; Pascarella & Terenzini, 2005; Stoecker & Pascarella, 1991). Institution characteristics have also been identified as important factors influencing the persistence of women in STEM disciplines.

Even though in the human capital theory, academic performance/attainment is used as a measure of initial stock of human capital, within the current framework, academic performance can be viewed as the personal preparation for future career, along with career aspiration, to indicate individuals' preference and expectation. It is also worth noting that empirical evidence in economic studies of college students suggest self-selection bias – individuals are prone to major in fields that lead to occupations of greater earnings (Melguizo & Wolniak, 2011; Montmarquette et al., 2002; Wolniak & Pascarella, 2005). Although the current study does not address the self-selection bias directly, following examples in previous studies, students are

separated into STEM vs. non-STEM majors to isolate the potential bias given the knowledge that there are earning advantages for majors that are scientifically and quantitatively oriented (i.e., STEM majors; Melguizo & Wolniak, 2011). The separation of STEM vs. non-STEM majors is also supported by the expanded econometric theoretical framework, because education decisions based on the expectation of earnings are likely to be influenced by imperfect and incomplete information, and expected earning is only one of many factors reflecting individual preferences and expectations. As such, the two research questions will be answered: 1) What factors influence the career choices and progress of college graduates? and 2) How do their influences differ for individuals in STEM and non-STEM fields? Based on the research questions, two hypotheses are to be tested:

Hypothesis 1: A variety of monetary and nonmonetary costs and benefits are considered by an individual when making career-related decisions, but these factors are weighted differently in order to maximize the return with respect to individual preferences, tastes, and expectations; and

Hypothesis 2: Given the self-selection bias assumption, monetary benefits dominate other individual preferences and expectations when STEM graduates make career choices. In comparison, non-STEM students' career choice is an outcome of more comprehensive evaluation of both monetary and non-monetary factors.

Data Sources

This study uses the restricted-use data of Baccalaureate and Beyond Longitudinal Study (B&B: 93/97/03), a survey sponsored by the National Center for Education Statistics (NCES) that tracks students' education and work experiences after they received a bachelor's degree during the 1992-93 academic year. The 1993 B&B cohorts consisted of 11,192 students from

the National Postsecondary Student Aid Survey (NPSAS:93), and are a representative sample of graduating seniors in all majors. Follow-up surveys were completed in 1994, 1997, and 2003.

Variables

In this study, the dependent variable is how closely related an individual's current job is with her/his undergraduate major. The relatedness, or congruence, between one's major and job had four categories: job closely related to college major; job somewhat related to college major; job not related to college major; and unemployed. However, due to the extremely small percentage of unemployed individuals, only individuals with part-time or full-time employments were included in the analysis. Please note that congruence between primary job and undergraduate degree (1-closely related, 2-somewhat related, and 3-not at all) was reported in 1994 and 1997 surveys, but this item was removed from the 2003 follow-up and had been derived based on individuals' undergraduate major, occupational categories and other related information of 2003[1].

The independent variables are selected in accordance with the research objective to evaluate individual career outcomes using the theoretical framework that considers the monetary and nonmonetary costs and benefits, and social and cultural capitals. Gender and race/ethnicity are the two demographic characteristics considered in this study. Racial categories are separated into two groups, underrepresented racial minorities (URM) vs. the reference group (White and Asian) based on literature that found URM "students are not graduating at the same rate as White and Asian American students, particularly in the sciences" (Hurtado et al., 2008, p. 126; see also Campbell et al., 2000; Frehill et al., 2008). As a matter fact, the gap between URM and White and Asian Americans has been found at freshman year in college (Hurtado et al., 2007), at college attendance and in science and engineer majors (Frehill et al., 2008), at the graduate and

professional school levels (Chang et al., 2011), and in engineer occupations at employment stage (Frehill et al., 2008).

Monetary and nonmonetary costs and benefits. The monetary costs are considered as the costs of completing the college education. Limited by the information in the data set, they are quantified by two measures: direct monetary contribution from parents in the academic year of 1992–93, and the adjusted total cost less total aid during the same period. Monetary benefit is quantified as an individual's pay rate, which is the ratio of one's annual income and the reported average number of hours worked per week. Age when received bachelor's degree is used as an indicator of nonmonetary cost for college education, because those who received their degree at an older age may have a shorter time span to realize an increase in lifetime earnings (Perna, 2004; Roksa & Levey, 2010). Job status (full-time vs. part-time) and satisfactions with job challenge, with job security, and with promotion are used to indicate the nonmonetary benefits.

Cultural and social capitals. Family backgrounds are used as proxy of cultural capital measures. Parents' education attainment is the highest education completed by either parent, which has six categories that range from having no high school (HS) diploma or equivalent, having HS graduate or equivalent, some postsecondary education (PSE; less than 2 years), 2 years or more PSE (less than BA), bachelor's degree, to having one or more advanced degrees. Family income, as an indicator of financial resources of an individual student, has to be converted into a categorical measure with three group values, lower than $30,000, between $30,000 and $60,000, and higher than $60,000 (reference group) due to its skewed distribution. Both measures convey the overall socioeconomic status and the family background of a student.

Another measure of cultural capital is the career aspiration reported by college graduates by evaluating a number of factors, such as job security, income potential, independence, and

intellectual challenge, through 14 items on future job choices. The 14 items had a reliability of .82, as measured with Cronbach's alpha. An exploratory factor analysis was conducted on the 14 items and only one outstanding factor is produced with an eigenvalue of 5.22. The extract factor counts for 37.3% of the total variance and loads heavily on self-establishment, independence, interaction with others, and job freedom (please see Appendix for statistical details). For easier interpretation, this extractor factor is converted into a quartile measure, including low, below average, above average, and high career aspiration for establishment.

Since social capital is composed of the social relationships and connections that an individual builds with others through social interactions or social structures (Coleman, 1988; Morrow, 1999), the two proxy measures of social capital in this study are Carnegie classification of undergraduate institution and cohort graduation rate. The Carnegie classification is a composite indicator of the similarities or differences in undergraduate degree-granting institutions from the perspectives of instructional and research activities, resources, and student profiles (Perna, 2004). The cohort graduation rate partially reflects the focus of the bachelor's degree-granting institution. The two institutional characteristics are therefore used as indirect measures of the initial level of social connections of college graduates.

Finally, graduates' academic performance is quantified as SAT/ACT quartiles and GPA in undergraduate major. As reported in the B&B data, five possible outcomes for a student's SAT/ACT quartile include 1) did not take SAT or ACT; 2) bottom quartile SAT/ACT score; 3) 2nd quartile SAT/ACT score; 4) 3rd quartile SAT/ACT score, and 5) top quartile SAT/ACT (the reference group). To avoid skewed distribution, the GPA in undergraduate major is divided into quartiles of lower than 2.50, 2.50-2.99, 3.00-3.49, and 3.50 and higher (reference group).

Methods

Descriptive analysis of the data is used to show the distribution of bachelor degree recipients in jobs closely related, somewhat related, and not related to their college major with respect to demographic factors and the major independent variables in the study. Also, summary information is made available separately for 1994, 1997, and 2003 job data. For inferential analysis, multinomial logit models are used to answer the research questions. The multinomial logit model is a special case of the general log-linear model and chosen for the statistical analysis because the dependent variable is categorical in nature (Peng et al., 2002). The overall model fit can be evaluated with pseudo-R^2 values, the ratio of the scaled deviance to its degrees of freedom, and the percentage of cases that are correctly classified.

With models of good fit indices, evaluation of individual independent variables can be performed. With one category of the dependent variable as the reference group, multinomial logit models estimate the log-odds of other single outcome categories occurring relative to the reference group. For a single independent variable, the logistic coefficient shows the change in the log-odds when the independent variable changes by one unit. The interpretation of the coefficients is made easier with the exponentiation of the coefficient, the odds ratios. For example, with female being the reference group, holding other variables constant, a one-unit change in gender is associated with the dependent variable by a coefficient of -0.50 and the corresponding odd ratio of .607. It indicates that male graduates had almost 40% lower likelihood to hold a job that was closely related to their undergraduate majors relative to the odds of having a job not related to their major (the reference group of the dependent variable) in comparison to their female counterparts. Multinomial logit models have been used frequently in sociological, educational, and economic studies (e.g., Flyer, 1997; Perna, 2004; Staniec, 2004),

thus, further discussion of this statistical approach is omitted. If readers need more information, please see Cabrera (1994), Hosmer and Lemeshow (2000), Pampel (2000), and Peng et al. (2002).

The analysis is conducted separately for STEM and non-STEM graduates. In addition, identical model structure is used for the 1994, 1997, and 2003 data times since career-related variables were measured repeatedly in those years. The models of identical structure over time permit a longitudinal view of career progress, and separate models for STEM and non-STEM graduates help to reveal differences in career choices across major fields and the sources of the differences.

Given the stratified sampling procedures and the longitudinal design of the B&B surveys, data are weighted in the analyses to ensure the validity and generalizability of the findings (Thomas & Heck, 2001). A relative weight was obtained in order to generate unbiased descriptive statistics. Further, the relative weight was adjusted for the average design effect from the multistage cluster sampling procedure in order to produce correct standard errors for hypothesis testing (Thomas and Heck, 2001). As a result, slightly different weights were used for the 1994, 1997, and 2003 model construction.

Multinomial logit regression is a large sample technique and estimates of the model parameters would be more reliable with sufficiently large samples (Hosmer & Lemeshow, 2000). To avoid significant reduction in sample size caused by listwise deletion, missing data were imputed using regression of closely related measures; when such measures were not available, mean imputation was used if appropriate. Finally, the maximum likelihood estimation of multinomial logit regression requires normal distribution of continuous variables. A number of continuous variables had to be converted into ordinal scales due to severe departure from normality (see Perna, 2004).

Results

The distributions of college graduates by the subgroups defined by the dependent variable and independent variables are provided in Table 1. The weighted sample sizes of STEM and non-STEM students are 2,374 versus 6,428, 2,604 versus 7,070, 2,755 versus 7,154 in years of 1994, 1997, and 2003, respectively. The percentages of STEM college graduates who reported to have a job "closely related" to undergraduate major are 53.5%, 58.8%, and 61.5% in 1994, 1997, and 2003, respectively. The three percentages are 50.5%, 54.2%, and 53.4% for non-STEM students. Across the three surveys over a ten-year span, some consistent patterns emerge from the descriptive information, such as 1) Female students who obtained the bachelor's degree at an older age, and students with a higher GPA in undergraduate major, appeared more likely to choose a major-related career; 2) URM, including African Americans, Native Americans, and Hispanics, had a higher percentage than their White and Asian (together in the reference group) counterparts with regard to choosing non-major related jobs, and this pattern is consistent with the findings by Melguizo and Wolniak (2011); 3) College graduates holding part-time jobs were more likely to be in non-major related occupations; 4) Graduates with a lower pay rate had a higher likelihood to be working in non-major related occupations; and 5) A higher percentage of graduates reported being dissatisfied with their job challenge when self-identified into non-major related occupations, although their dissatisfaction may alleviate through years.

STEM and non-STEM students were separated in the multinomial logit analyses. With graduates whose job was not related to undergraduate major being the reference group, model summary and estimated parameters are presented for non-STEM graduates with jobs closely related to major (Table 2), non-STEM graduates with jobs somewhat related to major (Table 3), STEM graduates with jobs closely related to major (Table 4), and STEM graduates with jobs

somewhat related to major (Table 5). All models have good fit indices as shown at the end of each Table. With the model χ^2 being significant at $p<.001$ level, each model explains the data significantly better than its corresponding baseline model. The pseudo R^2 is .265 for non-STEM graduates and .301 for STEM graduates in 1994; however, for both groups, the pseudo R^2 grows increasingly smaller for 1997 and 2003 models. The overall classification rates are above 60% for the three models of STEM graduates and are slightly lower for the non-STEM models. The fit indices suggest that all models fit the data well, with somewhat better fit for STEM students than for their non-STEM counterparts.

Monetary and Nonmonetary Costs

Examination of the individual predictor variables suggests that degree age as an indicator of nonmonetary cost may predict graduates' major/job congruence. Overall, younger groups, in comparison to those who received their bachelor's degree at 30 years or older age, have a roughly 40-50% decrease in their likelihood to have a major-related job (the majority of odds ratios range from .484 to .580, with one at .663), and this pattern lasts from 1994 to 2003 for non-STEM graduates. For STEM graduates, younger age is associated with at least 55% lower likelihood of choosing a career closely related to major (odds ratio between 0.43 to 0.45) at the beginning of their career (in 1994) and the relationship soon disappears; in all times, degree age shows no significant association with the likelihood of choosing between a non-major-related job and a somewhat major-related job for STEM graduates.

Monetary costs of a college degree seem to be given little consideration in college graduates' career choices. Parents' support in the 1992-93 academic year has no significant relation to non-STEM graduate's likelihood of choosing major-related jobs; for STEM graduates, limited monetary support during college years may have a correlation with their having a major-

related job, but the relationship does not become apparent until years after graduation. That is, in comparison to students who received $20,000 or more from their parents during the last year in college, graduates with $1,000 to $4,999 (odds ratio = 0.141 for somewhat related group; odds ratio = 0.209 for closely related group) and $5,000 to $9,999 (odds ratio = 0.159 for closely related group) have 80% or even lower likelihood to maintain a career in major related field in 2003. Expenses during 1992-93 academic years, as measured by total cost less total aids of a student, only show limited and inconsistent relationships with career preference in 1997 for non-STEM graduates and in 2003 for STEM graduates.

Monetary and Nonmonetary Benefits

Individuals' pay rate, the ratio between annual income and average hours worked per week, is the measure of monetary benefit. Pay rate seems to make a strong difference in the choices between having a job closely related to major and having a job not related to major, but not so much between those who have a job somewhat related to major and not related to major. The likelihood of non-STEM graduates in the low pay rate group having a job closely related to major reduces by 63% in 1994 (odds ratio = 0.37) and by about 45% in 2003 (odds ratio = 0.55), in comparison to the high-earning group; similar patterns are observed for the likelihood of non-STEM graduates in the low pay rate group having a job somewhat related to major in 1994 (odds ratio = 0.47) and in 2003 (odds ratio = 0.55). For STEM graduates, those in low and relatively low pay groups are less likely to have a major-related job relative to the high pay group, and this pattern grows stronger from 1994 to 2003 (see Tables 4 and 5 for details).

Nonmonetary benefits, as indicated by job status (part-time vs. full-time) and satisfactions with job challenge, job security, and promotion, also show relationships with the major/job congruence of college graduates. For both STEM and non-STEM graduates, those

with part-time jobs are more likely than their counterparts holding full-time positions to have a non-major-related job in both 1994 and 1997, but this pattern disappears in 2003. Graduates who are somewhat satisfied with job challenge, in comparison to those who are very satisfied, have approximately 70% (in 1994; about 50% in 1997) lower likelihood of having a job closely related to major; similarly, those who are dissatisfied with job challenge have at least 90% (in 1994; between 80-90% in 1997) lower likelihood of having a job closely related to major than those who are very satisfied; both cases indicate that graduates having a job closely related to major are much more likely to have high satisfaction with job challenge. Satisfaction with job security and promotion appear to be different for non-STEM and STEM graduates. Non-STEM graduates with major-related jobs reported lower satisfaction with job security in 1994 and with promotion in 1997. STEM graduates with job not related are more likely to be satisfied with promotion in 1997 than those with jobs closely-related to major and with job security than those with jobs closely-related to major in 2003.

Cultural and Social Capitals

Social capital shows strong association with the career preference of non-STEM graduates. A 1% increase in the cohort graduation rate is linked to at least 1.2% reduction in the likelihood of a non-STEM graduate choosing a major-related job (the odds ratio is about .987) holding other variables constant. Carnegie classification is another significant factor. In particular, the 1997 and 2003 models show that, for non-STEM graduates from baccalaureate, master's and doctoral institutions, the likelihood to choose a job that is closely related to degree major reduces by at least 55% (odds ratio range from .450 to .337) relative to those who graduated from Associates and other institutions; nonetheless, this difference is not observed between those whose job somewhat related to major and whose job not related to major. Social

capital measures do not show as strong an influence on STEM graduates' job outcomes as they had on non-STEM students. Still, having a degree from doctoral (odds ratio = 0.180 in 1997) and baccalaureate universities (odds ratio = 0.204 in 1997 and odds ratio = 0.214 in 2003) is likely to lower their chance to have a job closely related to major than those from Associates and other institutions as shown by the 1997 and 2003 job data.

Cultural capital measures, including parents' highest education attainment, family income and career aspiration, do not bear any relationship with the job preference of non-STEM college graduates. In comparison, family income, when higher than $60,000 annually, increases the likelihood (odds ratio = 1.824) of STEM graduates choosing a job closely related to major than their counterpart whose family had an annual income between $30,000 and $60,000 (Table 4). In 2003 (Table 5), parents with advanced degrees increases STEM graduates' likelihood of having a job somewhat related to undergraduate major, in comparison to parents with less than 2 years of postsecondary education (odds ratio = 2.016) and parents with bachelor's degree (odds ratio = 1.704).

Demographics and Others

A consistent gender difference is only observed for non-STEM graduates. Male students are at least 25% lower in their likelihood of holding a job closely related to college major with odds ratios of 0.607, 0.594, and 0.742 in 1994, 1997, and 2003, respectively. The only gender-based difference in STEM graduates takes place in 2003, ten years after graduation, with males having about 56% higher likelihood of having a job that is somewhat related to college major than not related at all (odds ratio = 1.564). In terms of academic performance measures, the general pattern appears to be that lower academic performance in college, indicated by GPA in

undergraduate major, reduces the likelihood of an individual holding a job closely related to major, with the strongest effect in 1997 for non-STEM and in 2003 for STEM graduates.

Discussion

With the expanded econometric framework, the assumption is that individuals make career-related decisions by weighting the monetary and nonmonetary costs against the monetary and nonmonetary benefits, and then selecting the alternative from three possible outcomes, including job not-related to major, job somewhat related to major, and job closely related to major, in order to maximize the return with respect to individual preferences, tastes, and expectations as characterized by their social and cultural capitals (Perna, 2004). The findings suggest certain measures of monetary and nonmonetary costs and benefits, along with social capital factors, are related to the career choices of college graduates and such relationships with individuals' career progress evolve over time. In addition, factors associated with having a major-related job differ for college graduates who were in STEM and non-STEM fields.

To be specific, regardless of undergraduate majors, factors having a general bearing with the choice between a job closely related to major and one not related to major include age when received bachelor's degree, academic performance, Carnegie classification of undergraduate institution, pay rate, satisfactions with job challenge and with promotion, and job status (part-time vs. full-time). Factors in general not making a difference in the likelihood choosing one or the other include race, parents' educational attainment, family income, monetary costs of undergraduate education, satisfaction with job security, and career aspiration. When the comparison is between a job somewhat related to major and not related to major, cohort graduation rate and satisfaction with job security show a relatively stronger impact, but satisfaction with promotion fails to make a remarkable difference.

It appears the monetary and nonmonetary benefits, as measured by individuals' pay rate, job status, and satisfactions with job challenge and promotion, dominate the career choices of college graduates. Individuals in major-related occupations usually earned more, are more likely to maintain a full-time employment and more satisfied with job challenge. Interestingly, the only prominent monetary factor is the pay rate; monetary costs of undergraduate education, as well as parents' financial support, have little connection with choosing a job related to major. Additionally, the statistical findings indicate that the association between high pay rate and increased likelihood of having a job closely related to major is much more visible for STEM than it appears for non-STEM graduates. This pattern supports the critical role of monetary benefits when STEM graduates make career choices, and in part confirms the existence of self-selection bias: earning advantages in STEM occupations is likely to be a major consideration when individuals choose a college major and continue on a congruent career path (Melguizo & Wolniak, 2011; Montmarquette et al., 2002; Wolniak & Pascarella, 2005).

Cultural capital, with proxy measures of parents' education, family income, and career aspiration, rarely have noticeable relationships with the odds of a student choosing a major-related job, indicating a lack of support to the social reproduction theory in career outcomes. It may not be a surprise given that a mismatch has already been observed between the empirical findings of studies on graduate school enrollment and the predictions based of social reproduction theory (Mullen et al., 2003). However, evidence is also available that parents' education attainment affects enrollment in graduate education (Mullen et al., 2003; Perna, 2004). Further research is required to comprehend the lack of relationship between parents' education and college graduates' major/job congruence as identified in this study.

Carnegie classification and cohort graduation rate of the undergraduate institutions are certainly not the best indicators of social capital. Still, institutional factors have been found to have impact on the career attainment of college students (Stoecker & Pascarella, 1991). In one study of graduate school enrollment, Carnegie classification was used as an indicator of social capital and found to work differently for men and women in their odds of enrolling in different programs (Perna, 2004). Findings of this study may serve as further evidence to support the social capital theory from the aspect that social structure and the relationships therein may be different for students in doctoral, master's, baccalaureate, and associate institutions (Coleman, 1988). Such difference does not make any observable mark in college graduates' career choices instantly, but begins to emerge as individuals progress further into their career path.

Comparisons between STEM and Non-STEM Graduates

When the sample was separated by undergraduate major into STEM group versus non-STEM group, the findings suggest that factors influential in students' career preference differ between the two groups. For the non-STEM graduates, gender, non-monetary cost (degree age), academic performance, and social capital proxies all show statistical significance in the odds of graduates' choosing a major-related job, although the effects varied in years 1994, 1997, and 2003. In particular, women consistently have significantly better odds to have a job closely related to major than their men counterparts. Age at bachelor's degree increases the likelihood of having a job related to undergraduate major. Better academic performance, which may be interpreted as better career preparation or as the higher initial stock of human capital, helps to increase the likelihood of choosing a major-related job as well.

In contrast, gender difference in career outcome was not significant for STEM-major graduates until 2003. This result may suggest delayed attrition of women from STEM careers

that calls for further examination. For STEM graduates, individuals having received the undergraduate degree at an older age were more likely to join major-related occupations, but the effect was only significant in 1994. Academic performance and institutional characteristics show significance as they do for the non-STEM group. However, the findings are not sufficient to explain why, unlikely the complete lack of association between monetary costs of college education and career choices for non-STEM graduate, parents' financial support for undergraduate study and the adjusted total cost less aid in 1992-93, have some significant but inconsistent influence on STEM graduates' having a major-related job, as observed in 2003.

Finally, when the percentages of college graduates choosing a job closely related to major are compared between STEM and non-STEM students over time, the consistently higher percentages of STEM students may be interpreted as a positive sign of lowered attrition. However, the real meanings of numbers need to be considered with two things in mind. First, college majors have different specificity (Roksa & Levey, 2010). In other words, some college majors, such as health-related majors, offer vocationally specific training and lead to clear occupational choices in the labor market, while other fields (e.g., social sciences) lack discernable occupational trajectories. When reporting how major/job congruence, graduates from majors of low specificity may be more reluctant to identify their job as closely related to undergraduate major. That is, different specificity of STEM and non-STEM majors may partly be responsible for their gap in the percentages of students choosing a job closely related major. Also, as shown in the descriptive analysis, with more than double the size of STEM graduates, non-STEM individuals may have to face stronger competitions when searching for major-related employment opportunities.

Theoretical Implications

With the expanded econometric framework that integrates econometric and sociological perspectives, a variety of monetary and nonmonetary measures were included in the study. The findings confirm the importance of econometric variables as well as cultural and social capital proxies. This integrated theoretical framework makes it possible to gain a comprehensive and in-depth understanding of the career choices of college graduates. In light of reviewed literature, three theoretical implications emerge. First, social capital may assume a more important role than cultural capital in preparing college students for future careers. It is found that proxy measures of cultural capital have little association with change in the odds of graduates choosing jobs closely related to undergraduate major, whereas the social capital measures demonstrate significant influence. The difference may be interpreted as that, cultural capital, the factors inherited from family to sustain societal stratification, may affect students' pre-college preparations, such as academic mastery and making choices on college major (Goyette & Mullne, 2006; Wells, 2008). Once enrolled in higher education institutions, students start at a new social environment with relatively equal opportunities and increased autonomy to access resources and information and to build network supports (Coleman, 1988; Seibert et al., 2001; Wells, 2008). Institutions that allow greater chances for individuals to initiate and grow social networks and to connect with peers and faculty members may level out pre-existing differences in cultural capital and provide a competitive beginning for students to prepare for a successful career.

Second, both econometric and sociological factors are required in order to better understand the dynamics of college students' career choices. This study examines the career outcome from the perspective of congruence between one's college major and post-college occupation, and finds monetary benefits to be one of the few dominant factors in determining the odds of having a job closely related to major (Melguizo & Wolniak, 2011). In the meantime,

major/job congruence is also positively related to nonmonetary advantages, including higher likelihood of maintaining a full-time employment and having greater job satisfactions. The inclusion of a variety of other factors, such as gender, degree age, academic performance, STEM and non-STEM major, and job status, makes it possible to identify additional sources of major/job congruence differences and verify related theories. For example, with GPA in undergraduate major being one of the critical factors positively associated with having a major-related job, the results add credits to the meritocratic perspective that individual effort in academic integration during the college years is one of the principal determinant of long term success (Mullen et al., 2003; Smart, 1986). Overall, the implication is that an integrated theoretical approach is extremely important for future research on the career attainment and occupational outcomes of college students.

Last but not least, longitudinal effects of variables on career outcomes need to be examined. As argued in the review of literature, using this expanded econometric framework, the costs and benefits can be arranged in a longitudinal and sequential fashion with career outcome as the a result of the chosen path (Behrman et al., 1998). The importance of a longitudinal view is illustrated in this study by the varied and/or delayed significance of a few independent variables, such as parents' support for STEM students having a major-related job in 2003. Other researchers (e.g., Keane & Wolpin, 1997; Roska & Levey, 2010) have also confirmed differences in occupational trajectories over time for college graduates. If data are available, longitudinal studies allow researchers to not only trace the progressive effects of cultural and social capital on career outcomes, but also examine gender and racial differences in occupational outcome and professional growth (Perna, 2004).

Policy Implications

The foremost question brought to the attention of administrators, researchers, and practitioners by this study is whether it is sufficient to focus on graduation rates as the traditional measure of institutional effectiveness and student success. On the one hand, findings of this study suggest that college graduates with strong major/job congruence have higher earning powers, are more likely to have a full-time employment, and report higher satisfaction with job challenge than their counterparts whose jobs are not related to college major. On the other hand, higher cohort graduation rates of the undergraduate institutions are associated with reduced likelihood of students finding a major-related job. Evidence in this study is not enough to explain this undesirable relationship. Nonetheless, the findings may serve as a reminder that policy makers are encouraged to view completing an undergraduate degree as the initial step to a successful career. Institutional effectiveness, in a more complete sense, may be better evaluated from the perspective of how effectively higher education institutions prepare students for a congruent and rewarding career. From a different perspective, the responsibility of the higher education system is not to hand out more diplomas, but to produce a quality workforce that meets the need of the national labor market. As Roska and Levey (2010) argued that "finding a job in one's fields of study is not only an individual dilemma, it is a process that reflects the relationship (or the lack thereof) between the educational system and the labor market" (p. 391).

The next question would be what administrators and practitioners can do to prepare students for a congruent and rewarding career. It is puzzling that findings of this study suggest that graduates of four-year institutions, in particular Baccalaureate and doctoral universities, have significantly lower likelihood of finding major-related jobs than those of Associates and other two-year institutions, and the difference seems to grow stronger over time. One possibility is that Associates and other two-year institutions offer training and degrees in areas of high

specificity (Roksa & Levey, 2010) with a clear objective to get students ready for the labor market. If so, what lessons need to be learned by administrators in four-year institutions and researchers of higher education? Apparently, changes are needed beyond the offices of job placement and career services. First, researchers are charged to conduct more studies to better understand why students of four-year institutions have a lower likelihood of landing a job of high major congruence than their peers in Associates and two-year institutions. Second, academic programs in four-year colleges and universities may need to restructure their curricula in order to improve occupational specificity and sharpen students' job skills (Keane & Wolpin, 1997; Roksa & Levey, 2010).

Third, with more time and opportunities for students to become academically and socially integrated with peers and faculty members, institutional policies need to place stronger attention on career-oriented programs and to promote campus culture valuing strong ties with professional and alumni communities. Establishing social and professional connections may help students with a better outlook of their future occupation and motivate them to stay focused on an academic path that leads to a rewarding career. Finally, it is important to keep students within full perspective of the advantages and disadvantages of various career options. This study and other published research (Melguizo & Wolniak, 2011; Montmarquette et al., 2002; Wolniak & Pascarella, 2005) have evidence to support the benefits of having a career that is closely related to one's major. Ongoing communication is needed to keep students informed about these monetary and nonmonetary advantages. Also, this study identifies academic performance as one of the critical factors positively associated with having a major-related job, indicating that it is important for students to have academic and social involvements on campus in order to prepare for a successful career.

The last note is an emphasis on differences among academic majors (Melguizo & Wolniak, 2011; Roksa & Levey, 2010; Thomas & Zhang, 2005). Efforts to improve the career outcomes of college students are expected to be executed differently for STEM and non-STEM majors. Particularly, for non-STEM graduates, women are more likely to be employed in major-related occupations, whereas for their STEM counterparts, a significant difference is found ten years after graduation, with women being less likely to have major-related jobs. This finding confirms that the lack of persistence of women in STEM majors is not only a problem during college (e.g., Austin & Austin, 1993; Griffith, 2010), but attrition takes place after they graduate from college and choose a career path inconsistent with their college major (Joy, 2010). Further scholarly attention is needed in order to understand the gendered patterns in STEM and non-STEM career choices in order to provide effective interventions in this regard.

Limitations

Quality of this study is limited by the information available in the B&B data source. For instance, the proxy measures of cultural and social capitals may not capture the two theoretical constructs to an ideal extent, and thus limits the validity of the findings. In addition, many of the continuous variables have to be converted into categorical measures in order to better meet the statistical requirements of the multinomial logit regression. The downgrade in measurement accuracy may reduce the model sensitivity to the true effect of some of the independent variables. Finally, the number of independent variables considered, along with the multiple models constructed for comparisons across the ten-year time span, makes it infeasible to test possible interaction effects between independent variables in the current study. It is hoped that variable interactions can be examined in future research in this area.

Conclusions

Using the data from a nationally representative, longitudinal survey of college graduates, this study examines student transition from college to their chosen career paths and breaches the knowledge gap regarding career outcomes measured as the congruence between ones' academic training and occupational choices. Within the context of expanded econometric framework, a wide range of variables are considered, including monetary and nonmonetary costs and benefits, as well as cultural and social capital factors.

The results identified positive career outcomes associated with individuals having an occupation closely related to one's college major, including a better income profile and greater job satisfaction. Major-based differences are also examined and patterns of changes are documented for ten years after graduation. An important perspective offered by this study is to consider career outcome as an important indicator of college student success. Potential implications for policy makers are discussed in terms of promoting future career success of college students. By looking at the career outcome as extended definition of institutional effectiveness and student success, it is hopeful that this study can contribute to improvement of the relationship between the higher educational system and the labor market during a time the nation is in need of a work force with advanced training and occupational skills.

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[1] In order to generate the major/job congruency measure for 2003, a 3-step approach was taken: 1) student's response was copied from 1997 to 2003 if the individual answered "no" to the question on the 2003 survey whether s/he had "more than one career in the last 10 years;" 2) Similarly, student's response was copied from 1997 to 2003 if an individual's answer was greater than "5" to the question on the 2003 survey how many "years pursuing career in the industry." At this point, an unweighted sample size of 5995 out of 8969 (weighted percentage was approximately 67.5%) had a valid value for the major/job congruency. 3) In the last step, a Bayesian network (BN) was constructed to model the relationship between major/job congruence and a list of related measures (e.g., gender, cumulative GPA in undergraduate major, STEM vs. non-STEM undergraduate major, undergraduate major in 12 categories, and occupation in 2003) for the 5995 individuals, and the final BN model had a prediction accuracy of 80%. The BN model was then applied to the remaining 2974 individuals to predict their major/job congruency.

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Appendix

Exploratory Factor Analysis of the Fourteen Items on Career Aspiration

		Initial extraction	Factor loading
CHOICE01	Job choice depends on previous work experience	0.418	**0.646**
CHOICE02	Job choice depends on good starting income	0.471	0.482
CHOICE03	Job choice depends on good income potential	0.378	0.487
CHOICE04	Job choice depends on job security	0.444	0.606
CHOICE05	Job choice depends on prestige and status	0.334	0.575
CHOICE06	Job choice depends on interesting work	0.433	0.606
CHOICE07	Job choice depends on intellectual work	0.386	0.551
CHOICE08	Job choice depends on freedom at work	0.657	**0.809**
CHOICE09	Job choice depends on interaction with people	0.445	**0.645**
CHOICE10	Job choice depends on working independently	0.580	**0.761**
CHOICE11	Job choice depends on travel	0.273	0.459
CHOICE12	Job choice depends on ability to be established	0.466	**0.654**
CHOICE13	Job choice depends on time for other activities	0.567	**0.753**
CHOICE14	Job choice depends on other	0.368	-0.326

Note: The extraction method used is principal component analysis.

Table 1.

Descriptive Statistics

	Relationship between primary job and degree 1 (closely related) 2 (somewhat related) 3 (not at all)											
	1994				1997				2003			
		1	2	3		1	2	3		1	2	3
	Total	5056	1915	2807		5888	2321	2533		6399	2228	2357
		Row percentage (%)				Row percentage (%)				Row percentage (%)		
Gender												
1 Male	4408	47.8	22.1	30.1	4833	50.3	25.1	24.6	5014	54.5	23.9	21.6
2 Female	5368	54.9	17.5	27.6	5905	58.5	18.7	22.8	5965	61.4	17.2	21.4
Racial minority in two categories												
0 Minority (exc. Asian)	1154	48.6	19.9	31.5	1293	51.4	19.9	28.8	1341	56.7	20.7	22.7
1 White & Asian	8624	52.1	19.5	28.3	9447	55.3	21.8	22.9	9643	58.5	20.2	21.3
Age when received BA degree												
1 21 and younger	1369	45.6	17.8	36.7	1520	50.6	23.0	26.4	1570	55.8	21.7	22.5
2 22 or 23 years old	4913	47.8	21.2	31.1	5364	54.1	21.4	24.5	5496	56.1	21.0	22.9
3 24 to 29 years old	1991	52.9	18.8	28.3	2161	53.2	22.0	24.8	2167	58.2	19.5	22.3
4 30 years and older	1505	68.5	17.1	14.4	1696	63.0	20.4	16.6	1751	67.3	17.8	15.0
Parent's highest education												
1 Not HS graduate or equivalent	816	51.1	21.7	27.2	900	56.1	18.9	25.0	926	60.0	16.0	24.0
2 HS graduate or equivalent	2492	55.0	18.1	26.8	2778	56.8	21.5	21.7	2818	60.3	19.9	19.8
3 Some PSE, less than 2 years	929	52.1	20.7	27.2	1023	55.7	23.0	21.3	1045	59.7	21.9	18.4
4 2 years or more PSE (lt BA)	827	51.0	19.1	29.9	907	55.3	22.9	21.7	926	56.7	21.7	21.6
5 Bachelor's degree	2301	51.1	21.4	27.5	2497	53.7	23.2	23.1	2563	56.4	21.5	22.1
6 Advanced degree	2416	49.1	18.4	32.5	2636	52.8	20.2	27.0	2706	57.3	19.8	22.9
GPA in undergraduate major												
1 Lower than 2.50	705	48.5	21.4	30.1	817	50.7	19.3	30.0	838	56.0	19.7	24.3
2 2.50 to 2.99	1185	44.9	21.4	33.8	1283	47.2	23.7	29.1	1290	49.4	22.4	28.2
3 3.00 to 3.49	4148	49.6	20.4	30.1	4518	52.2	22.5	25.3	4628	56.1	21.2	22.7
4 3.50 and higher	3741	56.8	17.8	25.4	4123	60.9	20.4	18.7	4227	63.8	18.8	17.5

	Relationship between primary job and degree 1 (closely related) 2 (somewhat related) 3 (not at all)											
	1994				1997				2003			
		1	2	3		1	2	3		1	2	3
	Total	5056	1915	2807	Total	5888	2321	2533	Total	6399	2228	2357
	Row percentage (%)				Row percentage (%)				Row percentage (%)			
Carnegie classification recoded												
1 Doctoral/Research universities	4558	49.6	20.2	30.2	5009	53.4	22.4	24.2	5144	56.4	21.6	21.9
2 Master's colleges and univ.	3607	54.3	19.9	25.8	3957	57.1	20.8	22.1	4032	61.2	19.4	19.4
3 Baccalaureate colleges	1150	46.7	17.4	35.9	1276	48.0	23.4	28.7	1308	53.5	19.4	27.1
4 Associate & specialized inst.	465	64.1	16.8	19.1	499	68.1	16.2	15.6	500	65.4	16.2	18.4
Job status												
1 Part time	2488	43.2	17.7	39.1	966	44.9	19.3	35.8	1463	56.9	18.3	24.9
2 Full time	7287	54.6	20.2	25.2	9773	55.8	21.8	22.4	9505	58.6	20.6	20.9
Pay rate: ratio between annual salary and average hrs worked/week												
1 Low	585	31.5	16.9	51.6	1801	43.6	20.5	35.8	1744	50.8	19.1	30.1
2 Relatively low	4296	41.9	20.1	38.0	3344	55.6	22.1	22.3	2181	51.4	23.1	25.5
3 Medium	2755	60.6	20.4	19.0	2139	61.9	21.9	16.2	1721	55.3	22.2	22.5
4 Relatively high	912	72.1	17.7	10.2	1055	60.6	22.5	17.0	1227	59.8	20.6	19.6
5 High	509	70.5	18.5	11.0	759	57.8	21.2	20.9	2591	59.6	22.8	17.7
Satisfaction with job challenge												
1 Dissatisfied	2003	22.0	19.2	58.8	948	28.5	23.6	47.9	1288	48.4	22.4	29.1
2 Somewhat satisfied	3390	44.5	25.3	30.2	3714	47.0	26.5	26.5	8386	60.5	19.7	19.8
3 Very satisfied	4385	70.8	15.4	13.8	6069	63.7	18.3	18.0				
Satisfaction with job security												
1 Dissatisfied	1570	44.0	19.4	36.6	935	45.6	21.9	32.5	1913	54.3	23.6	22.1
2 Somewhat satisfied	2984	49.8	21.8	28.3	3038	53.1	22.1	24.8	7745	60.0	19.2	20.8
3 Very satisfied	5226	55.1	18.4	26.6	6733	56.9	21.3	21.8				

Notes. 1). Statistics presented in the table are weighted. 2). Carnegie classification of the institutions has to be collapsed to fewer categories in order to avoid empty cells in multinomial logit regression. 3). Pay rate has been be coded differently for 1994, 1997, and 2003 to accommodate inflation and wage increases. For 1994, 1 (low~ 249.99), 2 ($250 ~ 499.99), 3 ($500 ~ 749.99), 4 ($750 ~ 999.99), and 5 (1000 ~ hi). For 1997, 1 (low~ 499.99), 2 ($500 ~ 749.99), 3 ($750 ~ 999.99), 4 ($1000 ~ 1249.99), and 5 (1250 ~ hi). For 2003, 1 (low~ 499.99), 2 ($500 ~ 999.99), 3 ($1000 ~ 1249.99), 4 ($1250 ~ 1499.99), and 5 (1500 ~ hi). 4) Job satisfaction was only rated as dissatisfied and satisfied in 2003.

Table 2.

Factors Related to College Graduates' Career Choices: Non-STEM Students with Primary Job Closely Related to BA Degree

		1994			1997			2003		
Variables	Characteristics	B	SE	Exp(B)	B	SE	Exp(B)	B	SE	Exp(B)
Covariate	Cohort graduation rate	-0.014	0.004	0.986***	-0.013	0.003	0.987***	-0.013	0.003	0.988***
Gender	Male	-0.500	0.109	0.607***	-0.522	0.098	0.594***	-0.299	0.102	0.742**
	Female (ref.)									
Race	Minority	-0.214	0.165	0.808	-0.353	0.143	0.702*	-0.120	0.152	0.887
	White & Asian (ref.)									
Degree age	21 and younger	-0.725	0.247	0.484**	-0.655	0.216	0.519**	-0.582	0.220	0.559**
	22 or 23 years old	-0.623	0.212	0.537**	-0.549	0.180	0.577**	-0.659	0.187	0.518***
	24 to 29 years old	-0.621	0.209	0.537**	-0.563	0.180	0.569**	-0.546	0.187	0.580**
	30 years and older (ref.)									
Parents' education	Not HS graduate or equivalent	-0.155	0.210	0.856	0.113	0.197	1.120	-0.119	0.201	0.888
	HS graduate or equivalent	0.062	0.157	1.064	0.157	0.140	1.170	0.058	0.142	1.060
	Some PSE, less than 2 years	0.175	0.205	1.191	0.232	0.181	1.261	0.241	0.185	1.272
	2 years or more PSE (lt BA)	-0.180	0.203	0.835	-0.026	0.187	0.974	-0.010	0.192	0.990
	Bachelor's degree	0.098	0.152	1.103	0.105	0.134	1.110	0.021	0.136	1.021
	Advanced degree (ref.)									
Family income	Lower than $30,000	-0.116	0.155	0.890	0.063	0.140	1.065	-0.060	0.142	0.942
	Between $30,000 and $60,000	0.028	0.143	1.029	0.013	0.126	1.013	-0.013	0.127	0.987
	Higher than $60,000 (ref.)									
SAT/ACT quartiles	Did not take SAT or ACT	0.250	0.208	1.284	0.173	0.192	1.189	0.047	0.191	1.049
	Bottom quartile SAT/ACT	0.459	0.188	1.583*	0.331	0.172	1.392	0.213	0.170	1.238
	Second quartile SAT/ACT	0.379	0.173	1.461*	0.213	0.162	1.237	0.000	0.158	1.000
	Third quartile SAT/ACT	0.254	0.172	1.289	0.257	0.161	1.293	0.174	0.158	1.191
	Top quartile SAT/ACT (ref.)									
GPA in undergrad major	Lower than 2.50	-0.356	0.206	0.701	-0.587	0.180	0.556***	-0.195	0.192	0.823
	2.50 to 2.99	-0.192	0.178	0.825	-0.505	0.157	0.603***	-0.467	0.156	0.627**
	3.00 to 3.49	-0.203	0.120	0.816	-0.417	0.109	0.659***	-0.215	0.111	0.807
	3.50 and higher (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Carnegie classification	Doctoral/Research universities	-0.575	0.341	0.563	-0.794	0.320	0.452*	-0.772	0.316	0.462*
	Master's colleges and univ.	-0.427	0.340	0.653	-0.799	0.318	0.450*	-0.706	0.315	0.494*
	Baccalaureate colleges	-0.741	0.359	0.477*	-1.087	0.335	0.337***	-1.055	0.332	0.348***
	Associate & other inst. (ref.)									
Parents' support (1992-93)	$0	-0.307	0.327	0.736	0.196	0.308	1.216	0.180	0.283	1.197
	$1-$999	-0.416	0.375	0.660	0.420	0.357	1.521	0.354	0.337	1.425
	$1,000-$4,999	-0.607	0.368	0.545	0.311	0.344	1.365	0.287	0.322	1.333
	$5,000-$9,999	-0.423	0.366	0.655	0.307	0.342	1.359	0.143	0.323	1.154
	$10,000-$19,999	-0.505	0.362	0.604	0.155	0.341	1.168	0.247	0.321	1.280
	$20,000 or more (ref.)									
Adjusted total cost less aid	$0	0.286	0.318	1.331	-0.484	0.275	0.617	0.157	0.282	1.170
	Less than 5,000	0.228	0.237	1.256	-0.248	0.219	0.780	-0.006	0.216	0.994
	Between $5,000 and $9,999	-0.017	0.230	0.983	-0.275	0.213	0.760	-0.170	0.210	0.844
	Between $10,000 and $14,999	0.002	0.239	1.002	-0.268	0.223	0.765	-0.149	0.217	0.862
	Between $15,000 and $19,999	-0.065	0.271	0.937	-0.490	0.247	0.613*	-0.063	0.245	0.939
	$20,000 or more (ref.)									
Pay rate	Low	-0.995	0.338	0.370**	-0.189	0.200	0.828	-0.596	0.155	0.551***
	Relatively low	-0.503	0.286	0.605	0.312	0.189	1.366	-0.374	0.138	0.688**
	Medium	0.198	0.291	1.219	0.622	0.201	1.862**	-0.030	0.145	0.971
	Relatively high	0.423	0.343	1.527	0.172	0.222	1.188	0.002	0.162	1.002
	High (ref.)									
Satisfaction with job challenge	Dissatisfied	-2.712	0.161	0.066***	-1.646	0.177	0.193***	-0.467	0.133	0.627***
	Somewhat satisfied	-1.218	0.126	0.296***	-0.753	0.107	0.471***			
	Very satisfied (ref.)									
Satisfaction with job security	Dissatisfied	0.281	0.155	1.324	-0.102	0.176	0.903	-0.210	0.119	0.811
	Somewhat satisfied	0.291	0.120	1.338*	-0.164	0.107	0.849			
	Very satisfied (ref.)									
Satisfaction with promotion	Dissatisfied	-0.084	0.151	0.919	0.144	0.146	1.155	0.130	0.106	1.139
	Somewhat satisfied	-0.050	0.140	0.952	0.385	0.113	1.470***			
	Very satisfied (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Job status	Part-time	-0.460	0.118	0.632***	-0.488	0.154	0.614**	-0.120	0.151	0.887
	Full time (ref.)									
Career inspiration	Low inspiration	0.224	0.220	1.251	0.233	0.202	1.262	-0.259	0.207	0.772
	Below average	0.192	0.135	1.212	-0.031	0.123	0.970	-0.242	0.129	0.785
	Above average	0.171	0.197	1.187	0.075	0.181	1.077	-0.167	0.187	0.846
	High inspiration (ref.)									
Number of cases		6428			7070			7154		
-2 log likelihood & *df*		4859	94***		5966	94***		5601	88***	
% correctly classified	Overall	62.2%			57.6%			54.1%		
	Closely related	85.2%			89.5%			94.1%		
Pseudo R2 (Cox & Snell)		.265			.151			.075		

Note. The baseline group is non-STEM college graduates whose primary job is not related to undergraduate major.

Table 3.

Factors Related to College Graduates' Career Choices: Non-STEM Majored Students with Job Somewhat Related to BA Degree

		1994			1997			2003		
Variables	Characteristics	B	SE	Exp(B)	B	SE	Exp(B)	B	SE	Exp(B)
Covariate	Cohort graduation rate	-0.003	0.004	0.997	-0.015	0.004	0.985***	-0.011	0.004	0.989**
Gender	Male	-0.052	0.122	0.950	0.086	0.113	1.090	0.189	0.121	1.207
	Female (ref.)									
Race	Minority	-0.213	0.188	0.808	-0.303	0.172	0.739	0.052	0.177	1.054
	White & Asian (ref.)									
Degree age	21 and younger	-0.569	0.287	0.566*	-0.229	0.249	0.795	-0.568	0.259	0.567*
	22 or 23 years old	-0.238	0.243	0.788	-0.387	0.211	0.679	-0.571	0.219	0.565**
	24 to 29 years old	-0.239	0.240	0.787	-0.411	0.210	0.663*	-0.767	0.223	0.464
	30 years and older (ref.)									
Parents' education	Not HS graduate or equivalent	0.010	0.235	1.010	-0.224	0.249	0.800	-0.183	0.247	0.833
	HS graduate or equivalent	-0.039	0.181	0.962	0.311	0.165	1.365	0.242	0.169	1.274
	Some PSE, less than 2 years	0.208	0.230	1.231	0.410	0.211	1.507	0.258	0.221	1.295
	2 years or more PSE (lt BA)	-0.003	0.228	0.997	0.242	0.216	1.274	0.170	0.226	1.185
	Bachelor's degree	0.216	0.171	1.241	0.246	0.157	1.279	0.042	0.164	1.043
	Advanced degree (ref.)									
Family income	Lower than $30,000	-0.062	0.177	0.940	0.199	0.163	1.221	0.168	0.169	1.183
	Between $30,000 and $60,000	0.132	0.161	1.141	-0.012	0.148	0.988	0.051	0.152	1.053
	Higher than $60,000 (ref.)									
SAT/ACT quartiles	Did not take SAT or ACT	0.122	0.234	1.130	-0.389	0.218	0.678	-0.247	0.230	0.781
	Bottom quartile SAT/ACT	0.280	0.209	1.323	-0.503	0.197	0.605*	-0.065	0.205	0.937
	Second quartile SAT/ACT	0.035	0.196	1.036	-0.474	0.184	0.623**	-0.134	0.190	0.875
	Third quartile SAT/ACT	-0.025	0.193	0.975	-0.150	0.177	0.861	0.213	0.185	1.238
	Top quartile SAT/ACT (ref.)									
GPA in undergrad major	Lower than 2.50	0.086	0.228	1.089	-0.427	0.221	0.653	-0.172	0.238	0.842
	2.50 to 2.99	-0.002	0.201	0.998	-0.222	0.182	0.801	-0.191	0.186	0.826
	3.00 to 3.49	0.096	0.137	1.101	-0.128	0.127	0.880	0.101	0.133	1.106
	3.50 and higher (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Carnegie classification	Doctoral/Research universities	-0.844	0.368	0.430*	-0.079	0.410	0.924	-0.225	0.396	0.798
	Master's colleges and univ.	-0.611	0.366	0.543	-0.022	0.408	0.978	-0.175	0.394	0.839
	Baccalaureate colleges	-0.780	0.388	0.458*	-0.019	0.423	0.982	-0.336	0.412	0.715
	Associate & other inst. (ref.)									
Parents' support (1992-93)	$0	-0.024	0.387	0.977	-0.071	0.336	0.931	-0.086	0.321	0.918
	$1-$999	-0.265	0.444	0.767	0.065	0.395	1.067	0.031	0.385	1.031
	$1,000-$4,999	-0.210	0.430	0.811	-0.124	0.383	0.883	-0.548	0.384	0.578
	$5,000-$9,999	0.153	0.422	1.165	0.117	0.373	1.124	0.204	0.363	1.226
	$10,000-$19,999	-0.191	0.426	0.826	-0.565	0.392	0.568	-0.126	0.371	0.882
	$20,000 or more (ref.)									
Adjusted total cost less aid	$0	0.476	0.367	1.610	-0.902	0.331	0.406**	-0.264	0.340	0.768
	Less than 5,000	0.306	0.281	1.358	-0.474	0.251	0.622	-0.215	0.252	0.806
	Between $5,000 and $9,999	0.440	0.271	1.553	-0.233	0.242	0.792	-0.164	0.243	0.848
	Between $10,000 and $14,999	0.233	0.282	1.263	-0.177	0.253	0.838	-0.229	0.254	0.795
	Between $15,000 and $19,999	0.230	0.318	1.258	-0.505	0.287	0.604	-0.342	0.293	0.710
	$20,000 or more (ref.)									
Pay rate	Low	-0.764	0.376	0.466*	-0.273	0.227	0.761	-0.590	0.188	0.554**
	Relatively low	-0.498	0.320	0.608	0.087	0.214	1.091	-0.090	0.160	0.914
	Medium	-0.029	0.326	0.972	0.189	0.229	1.208	-0.068	0.171	0.935
	Relatively high	0.147	0.385	1.158	-0.289	0.263	0.749	-0.249	0.198	0.779
	High (ref.)									
Satisfaction with job challenge	Dissatisfied	-1.352	0.178	0.259***	-0.648	0.197	0.523***	-0.128	0.154	0.879
	Somewhat satisfied	-0.333	0.147	0.717*	0.021	0.124	1.021			
	Very satisfied (ref.)									
Satisfaction with job security	Dissatisfied	0.357	0.174	1.429*	-0.184	0.205	0.832	0.039	0.137	1.040
	Somewhat satisfied	0.496	0.134	1.643***	-0.214	0.125	0.807			
	Very satisfied (ref.)									
Satisfaction with promotion	Dissatisfied	-0.132	0.173	0.876	0.168	0.170	1.183	0.079	0.126	1.083
	Somewhat satisfied	-0.110	0.163	0.896	0.327	0.134	1.387*			
	Very satisfied (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Job status	Part-time	-0.342	0.134	0.711*	-0.467	0.188	0.627*	0.042	0.183	1.043
	Full time (ref.)									
Career inspiration	Low inspiration	-0.223	0.260	0.800	0.233	0.231	1.263	-0.196	0.250	0.822
	Below average	0.001	0.149	1.001	-0.144	0.143	0.865	-0.119	0.156	0.888
	Above average	0.182	0.215	1.200	0.061	0.207	1.063	0.138	0.217	1.148
	High inspiration (ref.)									
Number of cases		6428			7070			7154		
-2 log likelihood & *df*		4856	94***		5966	94***		5601	88***	
% correctly classified	Overall	62.2%			57.6%			54.1%		
	Somewhat related	6.4%			8.0%			4.5%		
Pseudo R2 (Cox & Snell)		.265			.151			.075		

Note. The baseline group is non-STEM college graduates whose primary job is not related to undergraduate major.

Table 4.

Factors Related to College Graduates' Career Choices: STEM Majored Students with Primary Job Closely Related to BA Degree

		1994			1997			2003		
Variables	Characteristics	B	SE	Exp(B)	B	SE	Exp(B)	B	SE	Exp(B)
Covariate	Cohort graduation rate	-0.005	0.007	0.995	0.001	0.006	1.001	0.001	0.006	1.001
Gender	Male	0.098	0.194	1.103	-0.063	0.191	0.939	0.187	0.180	1.205
	Female (ref.)									
Race	Minority	-0.057	0.310	0.944	-0.099	0.278	0.906	-0.108	0.258	0.898
	White & Asian (ref.)									
Degree age	21 and younger	-0.573	0.483	0.564	-0.398	0.438	0.672	-0.173	0.396	0.841
	22 or 23 years old	-0.851	0.420	0.427*	-0.107	0.373	0.898	-0.235	0.335	0.790
	24 to 29 years old	-0.804	0.409	0.447*	-0.185	0.362	0.831	-0.349	0.326	0.705
	30 years and older (ref.)									
Parents' education	Not HS graduate or equivalent	-0.410	0.359	0.664	-0.698	0.385	0.498	0.321	0.364	1.379
	HS graduate or equivalent	-0.191	0.279	0.826	-0.287	0.264	0.751	0.311	0.237	1.365
	Some PSE, less than 2 years	-0.266	0.347	0.767	-0.349	0.325	0.706	0.046	0.303	1.047
	2 years or more PSE (lt BA)	-0.062	0.379	0.940	-0.196	0.364	0.822	0.377	0.351	1.458
	Bachelor's degree	-0.232	0.253	0.793	-0.316	0.255	0.729	0.332	0.224	1.394
	Advanced degree (ref.)									
Family income	Lower than $30,000	0.212	0.274	1.236	-0.161	0.285	0.851	-0.285	0.256	0.752
	Between $30,000 and $60,000	0.601	0.258	1.824*	-0.283	0.253	0.754	-0.120	0.233	0.887
	Higher than $60,000 (ref.)									
SAT/ACT quartiles	Did not take SAT or ACT	-0.528	0.358	0.590	-0.568	0.338	0.566	-0.484	0.312	0.616
	Bottom quartile SAT/ACT	0.213	0.335	1.237	-0.442	0.329	0.643	-0.571	0.307	0.565
	Second quartile SAT/ACT	0.486	0.276	1.625	-0.212	0.276	0.809	-0.294	0.249	0.745
	Third quartile SAT/ACT	-0.022	0.254	0.979	-0.099	0.258	0.906	-0.217	0.238	0.805
	Top quartile SAT/ACT (ref.)									
GPA in undergrad major	Lower than 2.50	-0.501	0.340	0.606	-0.596	0.317	0.551	-0.392	0.306	0.676
	2.50 to 2.99	-0.776	0.297	0.460**	-0.658	0.278	0.518*	-0.796	0.255	0.451**
	3.00 to 3.49	-0.054	0.217	0.947	-0.140	0.215	0.869	-0.453	0.202	0.636*
	3.50 and higher (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Carnegie classification	Doctoral/Research universities	-1.230	0.789	0.292	-1.713	0.732	0.180*	-1.266	0.684	0.282
	Master's colleges and univ.	-1.238	0.793	0.290	-1.121	0.737	0.326	-0.910	0.691	0.403
	Baccalaureate colleges	-1.401	0.823	0.246	-1.588	0.766	0.204*	-1.540	0.715	0.214*
	Associate & other inst. (ref.)									
Parents' support (1992-93)	$0	0.325	0.616	1.384	-0.560	0.697	0.571	-1.340	0.719	0.262
	$1-$999	0.806	0.707	2.238	-0.686	0.748	0.503	-1.435	0.767	0.238
	$1,000-$4,999	0.461	0.681	1.586	-0.415	0.738	0.660	-1.566	0.749	0.209*
	$5,000-$9,999	0.495	0.667	1.641	-0.928	0.732	0.395	-0.991	0.767	0.371
	$10,000-$19,999	0.763	0.665	2.144	-0.646	0.730	0.524	-1.292	0.757	0.275
	$20,000 or more (ref.)									
Adjusted total cost less aid	$0	0.374	0.620	1.453	0.745	0.606	2.106	1.064	0.513	2.899*
	Less than 5,000	0.112	0.467	1.119	0.006	0.444	1.006	0.606	0.354	1.833
	Between $5,000 and $9,999	-0.132	0.461	0.876	0.040	0.438	1.040	0.507	0.347	1.660
	Between $10,000 and $14,999	-0.021	0.467	0.979	-0.460	0.441	0.631	0.437	0.351	1.549
	Between $15,000 and $19,999	-0.307	0.507	0.736	-0.262	0.492	0.769	0.289	0.401	1.335
	$20,000 or more (ref.)									
Pay rate	Low	-2.348	0.602	0.096***	-1.820	0.399	0.162***	-0.952	0.259	0.386***
	Relatively low	-1.716	0.516	0.180***	-1.060	0.378	0.347**	-1.160	0.240	0.313***
	Medium	-0.267	0.523	0.766	-0.305	0.390	0.737	-0.902	0.242	0.406***
	Relatively high	0.261	0.582	1.298	0.178	0.446	1.194	-0.211	0.274	0.810
	High (ref.)									
Satisfaction with job challenge	Dissatisfied	-2.397	0.269	0.091***	-2.227	0.355	0.108***	-0.486	0.240	0.615*
	Somewhat satisfied	-1.276	0.225	0.279***	-0.664	0.202	0.515**			
	Very satisfied (ref.)									
Satisfaction with job security	Dissatisfied	-0.162	0.277	0.850	-0.670	0.353	0.512	0.347	0.219	1.415
	Somewhat satisfied	-0.150	0.213	0.861	0.052	0.206	1.054			
	Very satisfied (ref.)									
Satisfaction with promotion	Dissatisfied	-0.050	0.272	0.952	0.644	0.279	1.903*	0.115	0.189	1.122
	Somewhat satisfied	0.181	0.250	1.198	0.548	0.212	1.729**			
	Very satisfied (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Job status	Part-time	-0.452	0.207	0.636*	-1.270	0.334	0.281***	0.033	0.322	1.034
	Full time (ref.)									
Career inspiration	Low inspiration	0.110	0.400	1.116	0.523	0.408	1.687	-0.062	0.351	0.940
	Below average	-0.281	0.252	0.755	-0.070	0.248	0.933	-0.278	0.237	0.757
	Above average	0.057	0.369	1.059	-0.086	0.350	0.918	-0.405	0.324	0.667
	High inspiration (ref.)									
Number of cases		2374			2604			2755		
-2 log likelihood & *df*		1710	94***		1975	94***		2207	88***	
% correctly classified	Overall	62.4%			63.6%			61.3%		
	Closely related	86.1%			92.3%			96.8%		
Pseudo R2 (Cox & Snell)		.301			.205			.117		

Note. The baseline group is STEM college graduates whose primary job is not related to undergraduate major.

Table 5.

Factors Related to College Graduates' Career Choices: STEM Majored Students with Primary Job Somewhat Related to BA Degree

		1994			1997			2003		
Variables	Characteristics	B	SE	Exp(B)	B	SE	Exp(B)	B	SE	Exp(B)
Covariate	Cohort graduation rate	-0.018	0.007	0.982*	-0.004	0.007	0.996	-0.006	0.007	0.994
Gender	Male	0.160	0.216	1.173	0.183	0.221	1.201	0.447	0.219	1.564*
	Female (ref.)									
Race	Minority	0.222	0.336	1.248	0.034	0.314	1.035	0.137	0.307	1.147
	White & Asian (ref.)									
Degree age	21 and younger	0.112	0.541	1.119	0.163	0.519	1.176	0.655	0.488	1.925
	22 or 23 years old	-0.219	0.474	0.803	0.510	0.447	1.666	0.547	0.422	1.729
	24 to 29 years old	-0.507	0.469	0.602	0.076	0.443	1.078	0.255	0.417	1.290
	30 years and older (ref.)									
Parents' education	Not HS graduate or equivalent	-0.630	0.430	0.532	-0.224	0.429	0.799	0.227	0.451	1.254
	HS graduate or equivalent	0.177	0.308	1.193	-0.289	0.306	0.749	0.364	0.290	1.439
	Some PSE, less than 2 years	-0.203	0.390	0.816	-0.058	0.366	0.943	0.701	0.346	2.016*
	2 years or more PSE (lt BA)	0.036	0.421	1.036	-0.213	0.417	0.808	0.771	0.398	2.162
	Bachelor's degree	0.074	0.279	1.077	-0.072	0.287	0.931	0.533	0.266	1.704*
	Advanced degree (ref.)									
Family income	Lower than $30,000	-0.142	0.301	0.868	-0.245	0.323	0.782	-0.311	0.301	0.733
	Between $30,000 and $60,000	0.097	0.284	1.102	-0.204	0.284	0.815	-0.160	0.270	0.852
	Higher than $60,000 (ref.)									
SAT/ACT quartiles	Did not take SAT or ACT	-0.151	0.398	0.860	-1.015	0.402	0.363*	-0.480	0.374	0.619
	Bottom quartile SAT/ACT	-0.010	0.374	0.990	-0.680	0.378	0.507	-0.762	0.366	0.467*
	Second quartile SAT/ACT	0.191	0.308	1.210	-0.348	0.308	0.706	-0.759	0.296	0.468*
	Third quartile SAT/ACT	0.060	0.278	1.062	-0.322	0.289	0.725	-0.371	0.273	0.690
	Top quartile SAT/ACT (ref.)									
GPA in undergrad major	Lower than 2.50	-0.071	0.371	0.931	-0.238	0.362	0.788	-0.075	0.356	0.927
	2.50 to 2.99	-0.313	0.327	0.731	-0.272	0.316	0.762	-0.816	0.310	0.442**
	3.00 to 3.49	0.065	0.243	1.067	-0.017	0.248	0.983	-0.309	0.236	0.734
	3.50 and higher (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Carnegie classification	Doctoral/Research universities	-1.179	0.810	0.307	-0.567	0.843	0.567	-1.432	0.730	0.239*
	Master's colleges and univ.	-1.511	0.817	0.221	-0.142	0.850	0.868	-1.310	0.739	0.270
	Baccalaureate colleges	-1.533	0.852	0.216	-0.700	0.889	0.497	-2.255	0.788	0.105**
	Associate & other inst. (ref.)									
Parents' support (1992-93)	$0	0.028	0.648	1.028	-0.034	0.791	0.966	-1.510	0.777	0.221
	$1-$999	0.249	0.753	1.283	-0.558	0.857	0.573	-1.958	0.846	0.141*
	$1,000-$4,999	0.402	0.713	1.494	-0.068	0.836	0.934	-1.841	0.815	0.159*
	$5,000-$9,999	-0.330	0.721	0.719	-0.810	0.839	0.445	-1.499	0.840	0.223
	$10,000-$19,999	-0.042	0.711	0.959	-0.278	0.835	0.757	-1.454	0.823	0.234
	$20,000 or more (ref.)									
Adjusted total cost less aid	$0	-0.007	0.668	0.993	0.582	0.701	1.789	0.921	0.597	2.513
	Less than 5,000	-0.328	0.497	0.720	0.150	0.515	1.162	0.312	0.429	1.366
	Between $5,000 and $9,999	-0.370	0.487	0.691	0.448	0.505	1.565	0.481	0.417	1.618
	Between $10,000 and $14,999	-0.569	0.501	0.566	-0.280	0.516	0.756	0.330	0.422	1.391
	Between $15,000 and $19,999	-0.442	0.540	0.643	-0.286	0.581	0.751	-0.186	0.501	0.831
	$20,000 or more (ref.)									
Pay rate	Low	-1.534	0.712	0.216*	-1.875	0.461	0.153***	-0.790	0.313	0.454*
	Relatively low	-0.837	0.594	0.433	-1.011	0.424	0.364*	-0.718	0.283	0.488*
	Medium	0.138	0.600	1.148	-0.263	0.433	0.769	-0.683	0.287	0.505*
	Relatively high	0.217	0.667	1.243	0.585	0.484	1.794	-0.133	0.315	0.875
	High (ref.)									
Satisfaction with job challenge	Dissatisfied	-1.264	0.297	0.283***	-0.681	0.372	0.506	-0.271	0.291	0.762
	Somewhat satisfied	-0.487	0.254	0.615	0.088	0.231	1.092			
	Very satisfied (ref.)									
Satisfaction with job security	Dissatisfied	-0.479	0.313	0.619	-0.239	0.384	0.787	0.694	0.250	2.002**
	Somewhat satisfied	-0.153	0.234	0.858	0.107	0.233	1.113			
	Very satisfied (ref.)									
Satisfaction with promotion	Dissatisfied	0.104	0.303	1.110	0.367	0.320	1.443	-0.273	0.228	0.761
	Somewhat satisfied	0.174	0.282	1.190	0.273	0.243	1.314			
	Very satisfied (ref.)									

Variables	Characteristics	1994 B	1994 SE	1994 Exp(B)	1997 B	1997 SE	1997 Exp(B)	2003 B	2003 SE	2003 Exp(B)
Job status	Part-time	-0.840	0.245	0.432**	-0.514	0.369	0.598	0.233	0.378	1.263
	Full time (ref.)									
Career inspiration	Low inspiration	-0.196	0.450	0.822	0.551	0.465	1.735	-0.634	0.469	0.531
	Below average	-0.318	0.275	0.728	0.154	0.288	1.166	-0.009	0.279	0.991
	Above average	-0.222	0.411	0.801	-0.027	0.415	0.974	-0.195	0.381	0.823
	High inspiration (ref.)									
Number of cases		2374			2604			2755		
-2 log likelihood & *df*		1710	94***		1975	94***		2207	88***	
% correctly classified	Overall	62.4%			63.6%			61.3%		
	Somewhat related	10.7%			12.8%			4.8%		
Pseudo R2 (Cox & Snell)		.301			.205			.117		

Note. The baseline group is STEM college graduates whose primary job is not related to undergraduate major.