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Major Choices: Undergraduate Concentrations and the Probability of Graduation*

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Résumé / Abstract

We develop a model of the decision-making process in which the perceived probability of success in a major is the central determinant of the choice of a major. Using 1979-1987 data from the National Longitudinal Survey of Youth, we employ a two-step procedure that first evaluates, for all the individuals in the sample, the chances of success in all majors. Second, with a multinominal logit model of discrete choice, we explain the individuals choice of a major with his or her estimated probability of success and characteristics.

This paper shows that the choice of college concentration depends on the perceived probability of success in a particular concentration. There are, however significant differences across groups and for students who have a high probability of success in all majors.

Nous développons un modèle de décision où la probabilité attendue du succès dans un champ d'éducation devient l'élément central du choix de cette filière. Utilisant des données longitudinales américaines de 1979 à 1987, nous employons une procédure à deux étapes pour évaluer dans un premier temps, pour chacun des individus, leurs chances de réussite dans chacune des filières d'éducation considérées. Par la suite, à l'aide d'un modèle logit multinominal de choix discrets, nous expliquons les choix individuels relativement à ces probabilités anticipées de succès, de même que diverses caractéristiques individuelles et socio-économiques des étudiants.

L'étude montre que le choix d'une filière d'éducation dépend de la probabilité perçue du succès dans cette filière particulière. Il y a, par ailleurs, des différences significatives selon les groupes sociaux et selon le talent des étudiants.

Key words: choice of college concentration, probality of success, multinominal logit model.

Mots-clés : choix de filières éducationnelles, probabilité de succès, modèle multinominal logit.

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1. INTRODUCTION

At some point during the early stages of an undergraduate education, every college student must choose an area of concentration such as science, business, liberal arts or education. A certain proportion of these undergraduates will not finish college, and an ill-advised choice of concentration may be a contributing factor. It is generally thought, for example, that majoring in science is more difficult, and hence riskier, than majoring in education. It may be, however, that people who differ in their socioeconomic and ascriptive characteristics as well as cognitive capabilities also differ in their willingness to choose riskier areas of concentration. If it is true, for example, that students from more affluent socioeconomic backgrounds are more willing to take risks in the pursuit of their education, then, in effect, more privileged socioeconomic backgrounds enhance the educational choices of those who possess them. Similarly, insofar as men are willing to take more risks than women in the choice of concentration, there is an element of gender inequality in educational choice.

This paper analyzes the extent to which the choice of college major depends on the perceived probability of success in that major relative to other areas of concentration that could have been chosen. We also use these results to determine whether distinct social groups exhibit significant differences in their choices of college major. In the next section of this paper, we review the theoretical and econometric literature on the determinants of the choice of college major. Then we develop a model of the decision-making process in which the perceived probability of success in a major is the central determinant of the choice of major. In the following section, we describe the data that we use to estimate the model. In the final two sections of the body of the paper, we present the statistical results on the students' perceived probabilities of success in different majors and how these perceived probabilities affect their choices of concentrations.

2. THEORETICAL FRAMEWORK AND ECONOMETRIC ISSUES

In focusing on the choice of concentration, our approach differs from other studies that have analyzed the socioeconomic determinants of the demand for education and the choice of occupations. For example, Oosterbeek (1990) found that in the Netherlands the education and profession of parents and siblings had no significant impact on the demand for education. In another study, Kodde (1986) found that increases in uncertainty concerning future incomes increased the demand for higher education [see also Kodde and Ritzen (1988) for the influence of family background on the demand for higher education]. Orazem and Mattila (1986), using annual data on the entry-level occupational choices of Maryland High School graduates from 1951 through 1969, show that the probability that an occupation is chosen varies directly with the mean return to human capital such that occupation is inversely related to the variance of returns within the occupation. In addition, a number of studies have shown that gender influences both the demand for education and occupational choice, given the differences between men and women in their perceptions of the employment opportunities open to them and their planned patterns of labour force participation [Polachek (1981); Blakemore and Low (1984); Zalokar (1988); Blau and Ferber (1991)].

While these studies have explored the impacts of socioeconomic background and ascriptive characteristics such as gender on the demand for education and the choice of occupation, they have not addressed the more specific question of the impacts of these variables on the choice of undergraduate concentration. Three studies, however, are important exceptions. Berger (1988) shows that, in their choice of concentrations, individuals are less influenced by initial earnings levels in occupations related to different concentrations and more influenced by the stream of earnings that these occupations are expected to yield. In analyzing the relation between the choice of college major and earnings, Berger makes the implicit assumption that different occupations with different earnings streams are tightly linked to different college concentrations. This assumption can, of course, be overdrawn in a liberal arts educational environment such as exists in the United States where professional specialization in the educational system typically takes place in advanced degree programs. Nevertheless, even in such an educational setting, it can be argued that students perceive certain college majors as leading to subsequent training that provides access to occupations that offer higher pay and more employment security. For example, if one wants to enter medicine - an occupation that tends to offer higher pay and more employment security - one must successfully complete a science major.

Yet, if the choice of a science major presents a greater probability of noncompletion, then an individual who is motivated by future earnings prospects may choose a major that offers a greater probability of successful completion combined with a smaller subsequent income stream. If, in fact, the choice of college major significantly determines subsequent career progress, then, for the sake of both the efficient allocation of human resources and the elimination of discriminatory barriers, it is important to know why certain types of individuals choose certain types of college majors. Assuming that 1) the choice of college major is a significant determinant of subsequent career success, 2) riskier majors are associated with higher subsequent income streams, and 3) students are motivated in their choice of major by the possibilities of accessing higher income streams, an analysis of the impact of the perceived probability of success in a college major on the choice of college major can have important policy implications. Duru and Mingat (1979) were the first to present a model that takes into account the probability of success in selecting a major. They suggest a trade-off between the economic return to education and the risk of failure. Paglin and Rufolo (1990, p. 125) have also made a major contribution in this direction by showing that "comparative advantage influences the observed choice of college major and that quantitative ability is one of the most important factors in this choice". In similar fashion, we test the basic hypothesis that the perceived probability of success in a major is a significant determinant of the choice of major.[1]

Our paper can be considered as a complement to the contributions of Berger, Duru-Mingat and Paglin-Rufolo. More specifically, the role of expected income is conditional upon successful completion of the major, and our paper basically sets the conditions where expected income is crucial in this decision of a major choice. Consider, for example, p_j as the probability of success in major j and e_j as the earnings associated with major j.

For simplicity, assume that the expected utility of individual i choosing major j depends on expected earnings :

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1 Paglin and Rufolo (1990) had no data on students who actually failed in any field and could not therefore consider this specific question.

$$E(u_{ij}) = p_{ij}(x)\ e_{ij}(z) + (1 - p_{ij}(x))\ e_{io}(z), \quad i = 1, \ldots, n, \quad j = 1, \ldots, m, \tag{1}$$

where x and z are factors that influence the probability of success and earnings respectively. e_o is the earning alternative with no success in any majors. Then individual i will choose j over the alternative k if

$$E(u_{ij}) \geq E(u_{ik}),$$

that is,

$$p_{ij}(x)(e_{ij}(z) - e_{ik}(z)) + (p_{ij}(x) - p_{ik}(x))\ (e_{ik}(z) - e_{io}(z)) \geq 0. \tag{2}$$

If p_{ij} substantially differs from p_{ik}, it could play a major role in choosing major j with respect to smaller differences in $(e_{ij} - e_{ik})$. With $p_{ij} = p_{ik}$, the main determinant of choosing a major is the earnings difference in occupations expected from the two majors.

Preceding the choice of college major is the decision to go to college, so for at least one major,

$$p_{ij}(x)\ e_{ij}(z) + (1 - p_{ij})(x)\ e_{io}(z) \geq e_{io}(z) + sc_{ij}, \tag{3}$$

where sc_{ij} is schooling cost, which includes college tuitions and information costs. Equation (3) implies that

$$p_{ij}(x) \geq \frac{sc_{ij}}{e_{ij}(z) - e_{io}(z)} = \tilde{p}_{ij}. \tag{4}$$

For some talented students, $p_{ij}(x) \geq \tilde{p}_{ij}$ for all majors. For these students, preferences should matter more than probabilities of success. Furthermore, we can even observe a negative effect of the probability of success in the choice of a major for the talented students if riskier majors are associated with higher subsequent income streams.

Let y^*_{ij}, the expected level of indirect utility for person i in major j of equation (1), be expressed as a linear function of the individual's prediction of success p*(x) in major j, the characteristics of the individual (z), and an unobserved random component (ε) that reflects the idiosyncracies of this individual's preferences for major j :

$$y^*_{ij} = \beta' \, p^*(x_{ij}) + \alpha'_j \, z_i + \varepsilon_{ij}. \tag{5}$$

y^*_{ij} is unobserved. However, the choice made by the individual is observed :

$$y_{ij} = 1, \text{ if } y^*_{ij} \geq y^*_{ik} \text{ for all } k \neq j$$

$$y_{ij} = 0, \text{ otherwise.}$$

From McFadden's (1973) random utility models and if the residuals ε_{ij} are independently and identically distributed with the Type 1 extreme-value (or Gumbell) distribution, we can derive a mixed model of the discrete choice [see Maddala (1983), and Hoffman and Duncan (1988)] of the probability p_{ij}, with individual i choosing major j :

$$P_{ij} = \text{Prob}(y_{ij} = 1) = \frac{\exp(\beta' \, p^*(x_{ij}) + \alpha'_j \, z_i)}{\sum_{k=1}^{m} \exp(\beta' \, p^*(x_{ik}) + \alpha'_k \, z_i)}, \tag{6}$$

where z_i is the vector of individual characteristics for individual i (age, gender, socioeconomic background, etc.). The coefficients α differ for each concentration. We assume a different constant term for each concentration. These constants can, in part, reflect the different expected permanent incomes that one can derive from each concentration.[2] Given a new individual with specified characteristics, we can predict the probability that the individual will choose one of the m possible concentrations. $p^*(x_{ij})$ is the anticipated or predicted probability of success in the concentration for the individual i. The impact of the explanatory variables $p^*(x_{ij})$ is assumed to be constant across alternatives. Therefore, the coefficient β is the

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2 The linearity of equation (5) suggests that the assumption of neutrality with respect to risk should be retained. Extensions on this question along the lines proposed by Orazem and Mattila (1986) would be worth considering in future work.

same for each concentration with an expected positive sign, for example, for an individual who chooses the concentration that, given his or her socioeconomic background and gender, has the highest probability of success. The theoretical model suggests, however, different signs and values for β according to the general ability and/or the socioeconomic status of the individuals. Stratified samples will be considered in the empirical estimation of the model. If a new discipline is added to the choice of concentration, the perceived probability of success in the new concentration of a sample of individuals can be used to predict the probability that any one individual will choose the concentration.

However, we cannot directly estimate equation (6), since the probability of success for each concentration is not observable. We must derive measures for the probabilities of success in the different college majors that students perceive in making their choices. The decision-making process considers that the individuals evaluate their chances of success in all majors based on their differential probabilities of success.

Assume that the underlying anticipated probability of success is defined by the regression :

$$p^*_{ij} = \gamma'_j x_{ij} + \mu_{ij} \qquad \text{for all i and j.} \qquad (7)$$

p^*_{ij} is unobservable, but we observe a dummy variable d defined by

$d_{ij} = 1,$ if the individual i has completed the degree,

$d_{ij} = 0,$ otherwise.

The independent variables, x, are the ability and informational background variables.

The full maximum likelihood estimation of equations (5) and (7) will be an efficient but very complicated procedure. Considering the recursivity of the system and assuming weak exogeneity for p*, a two-step procedure is less efficient but will provide consistent estimates.[3]

First, assuming the normality of the errors μ_{ij}, we use a simple probit model with mostly ability variables to estimate the individuals' probabilities of success in each major. From the parameter estimates of equation (7), we then predict the probability of success in each major for all individuals in the sample.[4] Second, assuming that residuals ε_{ij} are independently and identically distributed with the Type 1 extreme-value distribution (or Gumbell), equation (6) is estimated with the estimated probability of success and the individual characteristics.

3. THE DATA

To estimate the model, we use a subsample drawn from the NLSY cross-sectional sample of 6,111 people, ranging from the ages of 14 and 22 in 1979.[5] This subsample includes 851 people whose enrollment status on the first of May 1979 was "enrolled in college" studying in either business, liberal arts, science or education (see Table 1 for the construction of these concentrations). With the elimination of the missing data, the basic sample size for this study is 527. Of these 527 individuals, 146 were in business, with 61 (42 percent) completing their degree within four years; 162 were in liberal arts, with 64 (40 percent) completing their degree; 152 were in science, with 69 (45 percent) completing their degree; and 67 were in education,

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3 Weak exogeneity assumes the independence of the error terms ε_{ij} and μ_{ij}. See Engle, Hendry and Richard (1983).

4 There is no sample selection problem here. An individual evaluates his/her probability of success in each major, assuming he/she will choose that major.

5 In fact, there were three independent probability samples, designed to represent the entire population of youth born in the United States between 1957 and 1964, that were drawn for the NLSY :

(1) a cross-sectional sample of 6,111 people designed to represent the noninstitutionalized civilian American youngsters aged 14-22 in 1979;

(2) a supplemental sample of 5,295 people designed to oversample civilian Hispanic, black and economically disadvantaged non-Hispanic, nonblack youth;

(3) a military sample of 1,280 people designed to be representative of the population aged 17-22 in 1979 and serving in the military in 1978.

with 38 (57 percent) completing their degree.[6] The NLSY data base is supplemented by data on various measures of knowledge and skill gathered by means of the Armed Services Vocational Aptitude Battery (ASVAB) that was administered to NLSY respondents in 1980 to generate the Profile of American Youth study mentioned earlier.[7]

[Insert Table 1 about here]

In Table 2, we have divided the variables measuring individual characteristics into four categories : personal, socioeconomic, educational and regional. The personal variables measure gender, race and the ASVAB test scores. The gender variable, for example, seeks to determine whether women are (as is generally believed) less likely than men to choose science. The ASVAB variables seek to determine whether different types of cognitive capabilities affect the probability of success in the different concentrations. The socioeconomic variables measure family income, the education and occupational levels of parents, as well as elements of family structure such as the education of siblings. By including these variables, we want to see whether there is any systematic relation between a family background that is more privileged in terms of parental income, education, role models, and stability as independent variables and the type of college concentration chosen. As already mentioned, it may be argued that a more privileged background would lead a student to be willing to risk entering a more demanding concentration in science. The parental education variables measure potential educational advantages due to family background that a student has that may influence him or her to choose a concentration with a higher risk of failure. The regional variables measure college education received in urban areas or outside the South. Depending on where an individual acquires his or her education might affect his or her ability or willingness to choose a riskier concentration. It also represents different opportunity costs.

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6 For the students who started to attend the college in 1979, the year of graduation was settled to be in 1982 (i.e., four years later). For the others, the graduation years considered were 1981, 1980 and 1979, respectively.

7 For a description of the NLSY data base and the Profile of American Youth Study, see the NLS Handbook published by the Center for Human Resource Research, 1988, and NLSY documentation Attachment 4 : Fields of Study in College, and NLSY Attachment 106 : Profiles.

[Insert Table 2 about here]

Table 3 provides descriptive statistics on the 527 individuals in the sample, 56 percent of whom are male and 85 percent of whom are white. As one might expect, women are overrepresented in liberal arts and education, and underrepresented in science. In every category of ASVAB scores, those of men are higher than those of women. Women come from families with somewhat higher incomes than those of men, while a larger proportion of men than women have fathers who are professionals. Most of the remaining socioeconomic characteristics are the same for men and women.

[Insert Table 3 about here]

4. THE EMPIRICAL RESULTS ON THE STUDENTS' PERCEIVED PROBABILITY OF SUCCESS

In the first step of the estimation procedure, under the assumption of the normality of the errors, we use the binary probit model for each major to estimate the determinants of the probability of success in each of the four concentrations. The independent variables are those mainly affecting the probability of success, notably the ability and informational background variables.[8] The variables with the most significant impacts on the probability of success in the business major are the ASVAB mathematics knowledge and vocabulary (word knowledge) scores. In liberal arts, the mathematics knowledge affects positively and significantly the probability of success in this major. The SMSA variable is negative and significant. Living in the South is a significant determinant of the probability of success in education. In addition, as might be expected, the ASVAB vocabulary scores are significant in this major. Also, being a woman positively affects the probability of success in education. In science, no variable appears statistically significant, except for the constant term. A plausible explanation is the collinearity between the ability variables more important in science, where we also observe higher mean ASVAB scores with less dispersion in science than for any other majors. When tested blockwise, the ability variables are always significant for each major.

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8 The complete statistical results are not reported, but are available upon request.

From the coefficients of the probit models, we then compute the probability of success (SUCCESS) in each major for each of the 527 individuals in the sample. In Table 4, we present descriptive statistics on the observed and perceived probabilities of success by major choices. As already pointed out, the observed probabilities are the actual proportions of those who enter a college major and successfully complete that major. The highest observed probability of success is in education (0.57) and the lowest is in liberal arts (0.40). The perceived (or predicted) probabilities of success are based on the probabilities of success of students with particular abilities, personal and socioeconomic characteristics. We call these probabilities "perceived", because we assume that students with particular characteristics (e.g., women) and abilities recognize that, as a group or individuals, they have a different probability of success in a given major than students with other characteristics and abilities.

[Insert Table 4 about here]

Table 4 shows that our model predicts that 41 percent (the observed probability of success is 0.42) of those who entered the business major should have succeeded in it. If those same students who entered the business major had instead gone into liberal arts, 42 percent of them would have succeeded.

Note that this percentage is greater than the observed success rate in liberal arts (40 percent). In contrast, if the business majors had gone into science, only 32 percent would have succeeded, a figure that is less than the 45 percent who actually succeeded. Indeed, our model predicts that for those who entered in liberal arts and education, the perceived probability of success in science is well below the observed probability of success. As for those who entered science, they would do quite well in business and education, but marginally less well in liberal arts. The data in Table 4 also show that the students who actually enter education are especially suited to that major and very poorly suited to science.

5. THE EMPIRICAL RESULTS ON THE CHOICE OF CONCENTRATIONS

Table 5 reports the results of the mixed model estimated for all 527 individuals in the sample. The significance of the mixed model estimates in Table 5 must be interpreted with respect to major number 4, education. For example, GENDER is highly significant and positive when major number 3, science, is compared with major number 4, education. Therefore, a man is significantly more likely to choose science rather than education. A number of other variables is also statistically significant. The INTERCEPT (constant) variables capture the differences in expected income that may systematically vary across majors. They are not, however, statistically significant, suggesting that differences in earnings are partly measured by some of our quality variables.[9] SIBLOEDU is positive and significant in business indicating that prior information might play a role in that sector. FAMINC and SMSA are positive and significant in liberal arts, suggesting that students from wealthy families living in SMSAs are more likely to choose liberal arts than education. There are a small number of statistically significant variables, however, blockwise, the group of personal characteristics, socioeconomic and regional factors are all statistically significant. SUCCESS is positive and statistically significant. This result supports the hypothesis that students choose the major with the highest probability of success.

[Insert Table 5 about here]

In section 2, we suggest a weaker influence of the probability of success on the choice of a major for talented students with comparable perceived probabilities of success across majors. Stratified subsamples that yield a sufficient number of observations for all categories involved could not be obtained. As an alternative, we present the direct weighted aggregate elasticities of the aggregate probabilities of choosing the different major with respect to the perceived probabilities of success[10] reported in Table 6. For each student enrolled in a

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9 Hartog et al. (1989, p. 1 392) concluded that earnings differences do not have a significant effect on decisions regarding the schooling content of one's education. The self-selection based on personal comparative advantage regarding schooling also applies to occupational choice, as demonstrated by Paglin and Rufolo (1990).

10 Computations are based on the work of Hensher and Johnson (1981).

specific major, we calculated the mean, the standard deviation, the coefficient of variation and the range of the four probabilities of success. The mean values of these four statistics are also reported in Table 6.

[Insert Table 6 about here]

For students in science, the weighted aggregate elasticity is 0.363 compared to an elasticity of 0.788 for students in education. The descriptive statistics clearly indicate that students in science form a stronger more homogeneous group than those in education. These results support our conjecture concerning talented students.

Finally, Table 7 reports the results of the mixed model estimated for some selected stratified subsamples. We present only the estimates for the SUCCESS variable.

[Insert Table 7 about here]

The results of the estimation of the mixed model when the sample is stratified by gender shows that, for men, the relation between the probability of success and the choice of the major is positive and statistically significant. In contrast, SUCCESS for women is negative but insignificant. This result may reflect the impact of the women's movement on the willingness of women to go into nontraditional careers. An alternative explanation is that women drop out for reasons related to nonacademic problems. Therefore, the probability of success is less important to them in selecting a major (see Siegfried, 1992). When the sample is stratified by race, the relation between the probability of success and the choice of major is positive and significant for whites. For nonwhites, the coefficient is insignificant, but may reflect the small number of observations available for this group. Stratification of the sample by socioeconomic background yields a significant and positive estimate of the probability of success only when the individual has a less affluent socioeconomic background. This result implies that those from less affluent social backgrounds do not take risks in their choices of concentration.

6. CONCLUSION

There are many elements entering the choice of concentration of college students. Preferences, information and the family socioeconomic background can all play an important role in that matter. In some cases, there can be elements of inequality in educational choice based on gender, race or wealth status of the students. Choosing a concentration is a decision under uncertainty. One major element of that uncertainty concerns the perceived ability needed to complete with success the concentration chosen. This paper has analyzed the extent to which the choice of concentration depends on and the perceived probability of success in that concentration relative to other areas of concentration that could have been chosen.

The results show that the choice of college concentration depends on the perceived probability of success in a particular concentration. There are, however, differences across social groups and for students who have a high probability of success in all majors. Those from less affluent social backgrounds appear to take less risks in their choices of concentration. Talented students seem less influenced by the probability of success than the other students. Elements of inequality, therefore enter into educational choice. When uncertainty combines with social background, the concept of equal opportunity to all reveals its limitations.

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TABLE 1

**The Determinants of College Major Choice :
Major Fields of Study in College**

Constructed Title	Description
Business (BUSINESS)	Business and Management, Business Technology
Liberal Arts (LIBARTS)	Area Studies, Communications, Fine and Applied Arts, Foreign Languages, Letters, Home Economics, Public Affairs and Services, Social Sciences, Theology, Interdisciplinary Studies
Science (SCIENCE)	Agricultural and Natural Resources, Architecture and Environmental Design, Biological Sciences, Computer and Information Sciences, Library Science, Mathematics, Military Science, Physical Sciences, Engineering
Education (EDUC)	Education

TABLE 2

The Determinants of College Major Choice : Symbol and Variable Definition

Symbol		Variable Definition
Personal Characteristics		
GENDER	:	1 if male, 0 if female
RACE	:	1 if white, 0 if black or hispanic
ASVABSC1	:	ASVAB vocational test scale score - general science
ASVABSC2	:	ASVAB vocational test scale score - arithmetic reasoning
ASVABSC3	:	ASVAB vocational test scale score - word knowledge
ASVABSC4	:	ASVAB vocational test scale score - paragraph comprehension
ASVABSC8	:	ASVAB vocational test scale score - mathematics knowledge
ASVABS10	:	ASVAB vocational test scale score - electronics information
Socioeconomic Factors		
FAMINC	:	total net family income in past calendar year (in dollars)
MOMEDU	:	highest grade completed by mother (in years)
DADEDU	:	highest grade completed by father (in years)
MOMOCC	:	1 if mother worked as a professional in past calendar year, 0 otherwise
DADOCC	:	1 if father worked as a professional in past calendar year, 0 otherwise
NUMSIBLS	:	number of siblings currently attending or enrolled in school
SIBLOEDU	:	1 if oldest sibling completed college grade, 0 otherwise
FAMILY14	:	1 if mother and father were both present in household at age 14, 0 otherwise
Regional Characteristics		
SMSA	:	1 if current residence in SMSA, 0 otherwise
REGRES	:	1 if region of current residence is South, 0 otherwise
URBAN	:	1 if current residence urban, 0 rural
School Factors		
FIELD	:	major field of study at current college
EDULOAN	:	1 if supported by an educational loan, 0 otherwise
PUBLIC12	:	1 if attended grades 1-12 in a public school, 0 otherwise
SUCCESS	:	estimated probability of success

TABLE 3

The Determinants of College Major Choice : Mean and Standard Deviation

VARIABLE	TOTAL	MALE	FEMALE
Independent :			
GENDER	0.5560	-	-
RACE	0.8539	0.8737	0.8291
ASVABSC1*	790.2315	1067.6280	442.8932
	(889.1797)	(832.8249)	(835.2991)
ASVABSC2	870.2751	1078.2082	609.9145
	(855.8235)	(787.4289)	(868.3189)
ASVABSC3	830.7476	918.6962	720.6239
	(726.3648)	(666.9826)	(782.0841)
ASVABSC4	678.0645	702.2628	647.7650
	(620.1010)	(592.2007)	(653.3800)
ASVABSC8	927.9772	1067.0068	753.8932
	(788.7978)	(777.9665)	(769.0238)
ASVABSC10	632.9355	1032.8805	132.1496
	(871.3065)	(744.7737)	(752.1243)
FAMINC	26951.5427	26008.2457	28103.2949
	(16889.0584)	(17423.0083)	(16155.0102)
MOMEDU	12.9583	12.9898	12.9188
	(2.6012)	(2.6773)	(2.5079)
DADEDU	13.6546	13.6416	13.6709
	(3.6572)	(3.7423)	(3.5556)
MOMOCC	0.2125	0.2082	0.2179
DADOCC	0.4934	0.5222	0.4573
NUMSIBLS	1.6414	1.5051	1.8120
	(1.4456)	(1.4060)	(1.4791)
SIBLOEDU	0.4839	0.4744	0.4957
FAMILY14	0.8634	0.8635	0.8632
SMSA	0.7306	0.7304	0.7308
REGRES	0.3074	0.2901	0.3291
EDULOAN	0.2334	0.2355	0.2308
PUBLIC12	0.8615	0.8601	0.8632

TABLE 3 (continued)

VARIABLE	TOTAL	MALE	FEMALE
Major choice :			
BUSINESS	0.2770	0.2730	0.2821
LIBARTS	0.3074	0.2799	0.3419
SCIENCE	0.2884	0.3720	0.1838
EDUC	0.1271	0.0751	0.1923
Sample size :	527	293	234

* ASVAB scores have three implied decimals.

TABLE 4

Statistics on the Observed and the Perceived Probability of Success (means and standard deviations)

	Observed	Perceived			
		Business	Liberal Arts	Science	Education
Business	0.42	0.414 (0.236)	0.418 (0.220)	0.316 (0.196)	0.551 (0.307)
Liberal Arts	0.40	0.398 (0.260)	0.398 (0.201)	0.308 (0.197)	0.601 (0.292)
Science	0.45	0.530 (0.221)	0.443 (0.187)	0.452 (0.208)	0.552 (0.293)
Education	0.57	0.295 (0.210)	0.365 (0.208)	0.196 (0.137)	0.572 (0.283)

TABLE 5

The Determinants of College Major Choice : Mixed Model Analysis of the Full Sample

Variable	Comparison	Coefficient Estimate	Standard Error
GENDER	1/4	0.48062	0.39659
	2/4	0.52835	0.34537
	3/4	1.08516[a]	0.43721
RACE	1/4	0.29295	0.49752
	2/4	-0.01566	0.47462
	3/4	0.13962	0.49416
FAMINC	1/4	0.0000137	0.0000113
	2/4	0.0000183[c]	0.0000111
	3/4	0.0000089	0.0000113
MOMEDU	1/4	-0.01699	0.08284
	2/4	-0.00550	0.08375
	3/4	0.01902	0.08451
DADEDU	1/4	0.01211	0.06356
	2/4	0.08622	0.06395
	3/4	0.04768	0.06452
MOMOCC	1/4	-0.02020	0.44473
	2/4	0.20831	0.42616
	3/4	0.21809	0.43856
DADOCC	1/4	-0.10315	0.37953
	2/4	-0.07831	0.37277
	3/4	-0.21057	0.38143
NUMSIBLS	1/4	0.16541	0.11824
	2/4	0.06185	0.11920
	3/4	0.23164[c]	0.11928
SIBLOEDU	1/4	0.66237[b]	0.32624
	2/4	0.07245	0.32665
	3/4	0.28809	0.33575
FAMILY14	1/4	-0.32949	0.50115
	2/4	-0.86395[c]	0.48284
	3/4	-0.32573	0.50553

TABLE 5 (continued)

Variable	Comparison	Coefficient Estimate	Standard Error
SMSA	1/4	0.27697	0.35496
	2/4	0.69987[c]	0.38412
	3/4	0.07876	0.35223
REGRES	1/4	0.53171	0.38250
	2/4	-0.23035	0.35322
	3/4	0.01196	0.36704
EDULOAN	1/4	-0.50885	0.37034
	2/4	-0.41232	0.36043
	3/4	-0.49053	0.36866
PUBLIC12	1/4	-0.20722	0.46850
	2/4	-0.08994	0.45803
	3/4	0.01277	0.48831
SUCCESS		1.49670[a]	0.59271
INTERCEPT	1/4	0.05999	1.14713
	2/4	-0.22259	1.15664
	3/4	-0.65075	1.21960

Other statistics

Sample size :	527
Log of the likelihood function :	-663.8171
Chi-square test of the model :	83.7124
(degrees of freedom)	(43)

1 - BUSINESS
2 - LIBARTS
3 - SCIENCE
4 - EDUC

[a] Significantly different from zero at the 1 percent level.

[b] Significantly different from zero at the 5 percent level.

[c] Significantly different from zero at the 10 percent level.

TABLE 6

Direct Weighted Aggregate Elasticities and Measures of Location and Dispersion of the Perceived Probabilities of Success

	Business	Liberal Arts	Science	Education
Direct elasticity	0.456	0.403	0.363	0.788
Mean	0.425	0.426	0.494	0.357
Standard deviation	0.182	0.197	0.166	0.199
Coefficient of variation	0.494	0.527	0.378	0.618
Range	0.401	0.437	0.369	0.437

TABLE 7

The Determinants of College Major Choice :
Mixed Model Analysis of Stratified Subsamples

Sample	SUCCESS Estimate	Number of Observations
Stratified		
By gender		
Male :	3.32687[a] (0.92783)	293
Female :	−0.25085 (0.84445)	234
By race		
White :	1.73414[a] (0.65670)	450
Nonwhite :	−0.33214 (1.97590)	77
By socioeconomic background		
Low[1] :	2.58652[b] (1.26693)	131
Middle[2] :	0.98770 (0.86237)	264
High[3] :	2.01290 (1.40202)	132

( ) : Standard error.

1 Based on family income ≤ $ 14,990 (the first quartile).

2 Based on family income between $ 14,990 and $ 35,280.

3 Based on family income ≥ $ 35,280 (the last quartile).

a Significantly different from zero at the 1 percent level.

b Significantly different from zero at the 5 percent level.

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