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ABSTRACT

This study used a logistic probability model to investigate the effects of variables relating student characteristics and institutional factors on the decision to apply to a large land-grant research university. The study used the entire data set from American College Testing (ACT) program test-takers in the fall of 1995 and institutional data on students who applied to a study institution that fall which were matched to the ACT data. The empirical model used was based on human capital theory which states that a student's college choice decision is based on the expected net benefits (utility) of attending a particular institution. The results indicated that students' test scores and high school rank percentile, age, proximity of the institution, whether the student postponed initial college enrollment date, congruence between the student's preferred institution type and size and that of the study institution, and family income were all important variables in students' application decisions. The study also found that highly reputed programs had a positive effect on students' decisions as did the presence of honors programs, study abroad options, and advanced courses in mathematics. No significant effects were found for marital status, gender, underrepresented groups, and number of siblings at home. Results have implications for institutions' recruitment efforts. (Contains 16 references.) (JLS)

MODELING THE COLLEGE APPLICATION DECISION PROCESS IN A LAND-GRANT INSTITUTION

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Abstract

Over the past two decades as student recruitment has become increasingly important, numerous studies have examined the college choice process in an attempt to identify factors influencing students' decision making. The findings from these studies are particularly helpful for college administrators in identifying a potential pool of desirable students and in implementing new recruitment techniques. In this study we used a logistic probability model to investigate the effects of variables relating student characteristics and institutional factors on the decision to apply to a large land-grant research university. The results suggest that socioeconomic background, geographic location, college cost, and personal attitudes are likely to impact a student's decision to apply. The findings also suggest that the rank order of the institution in the student's college choice set, distance to the school, and reputation of the student's intended field of study affect application decisions.

Introduction*

Each year millions of high school graduates make decisions whether to continue their education, and if so, where to apply and enroll. For some students the choice process is relatively simple because of the existence of a particular academic program in a specific institution, the close proximity of an institution of higher education, or a host of other factors. For others the choice process is very difficult as they attempt to find an institution which will match their educational goals and interests and financial constraints.

College choice decision making is important for the student and also has implications for institutional policy. A student's college choice influences his or her professional career, and there is ample evidence to indicate that the type of postsecondary education a student completes yields differential outcomes (Hossler, Braxton, & Coopersmith).

An institution also has a vested interest in understanding the factors that influence students' application and enrollment decisions in order to attempt to increase the "fit" between students and the institution. If individuals' goals and institutional factors are not congruent, recruitment is ineffective and retention problems may emerge. Institutions can use the results of student college choice modeling (a) to develop better marketing strategies designed to attract sufficient numbers of students with desired academic and nonacademic characteristics and (b) to more effectively target limited financial aid resources. For these reasons, colleges and universities frequently rely on sophisticated marketing and recruitment techniques to better understand and influence students' college choice.

Despite substantial investment in marketing and recruitment activities, these activities are often not based on empirical research of the college choice process. Many institutions are still unsure which marketing and recruitment activities really work. If institutions want to plan their enrollments more effectively, they must pay special attention to the college choice behavior of prospective students by considering the effects of student and institutional characteristics, by being more responsive to market demands, and by being more aware of the increasing importance of student recruitment (Paulsen, 1990). If used effectively, studies of college choice can provide valuable information in developing marketing, recruitment, and retention strategies (Hossler, 1984).

Despite the importance of such information, the literature on college choice is incomplete, particularly with respect to the examination of the factors affecting students' choices at different types of institutions. Many institutions have little information about the factors influencing potential students' college choice processes. The purpose of this study is to extend the previous studies of college choice by examining the factors affecting students' decisions to apply to a land-grant institution. Some of the questions this research addresses are: What are the characteristics of students choosing to apply to a land-grant research university? How can factors under an institution's control be used to affect a student's decision to apply? How can institutions more effectively use available data to inform the enrollment management process?

This study differs from previous studies of student choice in several ways. First, the study estimates a model of student application probability and examines the factors affecting students'

* The authors would like to thank the generous assistance of ACT for supplying the data used in this study.

propensities to apply to a land-grant university. Using the student as the unit of analysis, the decision to apply is analyzed using logistic regression techniques. Second, the study uses unit record data from ACT test-takers and institutional data on students who applied for admission for a recent fall quarter. The findings of this study provide information about modeling the college application decision process to guide recruitment and marketing efforts at similar institutions and at institutions in general. Third, we also examine the effects of several variables not typically included in previous college choice studies. These variables include information about a student's probable major, his or her interest in nationally recognized programs at the institution, special educational needs of potential students, out-of-class accomplishments of these students, and a student's work plans while in college.

The paper is divided into four sections. First, a brief review of the literature is provided. Second, the model and data are described. Third, the results are detailed. In the final section we discuss the results and their implications for institutional policy in higher education.

Literature Review

Several authors (e.g., Hossler, et al., 1989; Paulsen, 1990) have examined the literature on student college choice. There are two distinct approaches to studying student college-going behavior. Student demand models which explain enrollments as a function of measures characterizing the population of potential enrollees and the characteristics of a relevant set of existing schools. Student college choice models predict student behavior in choosing a particular school as a function of students' individual characteristics and preferences about the school (Fuller, Manski, and Wise, 1982).

Many institutions engage in various forms of marketing and recruitment activities and seek ways to make themselves more attractive than other institutions in the eyes of targeted students. An understanding of student enrollment decision making has become a primary part of effective student enrollment forecasting and recruitment. Effective enrollment planning and recruitment depends on a better understanding of the timing and nature of the search process, and which student and institutional characteristics are most important in the student college choice process. For example, Paulsen (1990) noted that student college choice studies can provide guidelines which permit institutions to better understand the effects of student characteristics and institutional factors and how they relate to student college decision making. The enrollment effects of student attributes can be used to identify groups of students possessing characteristics similar to those who are likely to enroll at a particular college. Paulsen also noted that understanding the effects of institutional characteristics on enrollment can provide helpful information to develop the most appropriate marketing mix of attractive programs, delivered at appropriate times and places, and at acceptable prices. Better information about how students and institutions interact can be helpful in designing effective marketing strategies, especially in high yield markets (Paulsen, 1990). As a consequence, college choice studies have become an increasingly important part of enrollment planning and recruitment activities.

The literature also details that the college choice decision process involves three broad stages. The first stage is the formation of college aspiration which includes the factors and processes influencing and shaping a student's educational aspirations. The formation of college aspirations can take place over a long period of time, from early childhood through high school and

sometimes beyond. The second stage of college choice involves identification, selection of, and application to a select number of colleges. During this stage potential students acquire information from various sources about colleges they are considering. The identification and selection process ends when a student applies to one or more institutions. The final phase is admission, college enrollment and attendance. In this phase of the college choice process students choose to enroll in one of the institutions included in their "choice set" (Weiler, 1994; Paulsen, 1990). The choice set refers to the institution(s) a student plans to apply to. This information is typically obtained from the survey conducted at the time that college entrance tests are administered.

Over the past two decades numerous studies have examined the college choice behavior of undergraduate students at each stage of the college choice process (see, Kohn, Manski, & Mundel, 1976; Weiler, 1994). Several studies have reviewed the literature on student college choice (see, Manski & Wise, 1983; Hossler, 1984; Paulsen, 1990; Hossler, Braxton, & Coppersmith, 1989). Studies on college choice vary greatly with respect to the data sources, models, and findings. Typical data sources of college choice studies include various types of information collected while completing the ACT or SAT tests used for admissions purposes. These tests provide profiles and "preferences of high school graduates who took these exams" (Weiler, 1994). To date most of these studies have focused on the undergraduate choice process but several recent studies have also examined the college choice decisions of graduate students (Hearn, 1987; Kallio, 1995). Logit, probit, ordinary least squares (OLS) regression models and/or discriminant statistical analyses are generally utilized to model student college choice behavior.

Studies on college choice behavior have suggested that the characteristics of students (e.g., race, gender, marital status, family income, parents' educational attainment and occupational status, academic ability and achievement), institutional characteristics (e.g., tuition, financial aid, home location, reputation, selectivity, special programs, and curriculum); and contextual factors (e.g., parental encouragement, teacher encouragement, and peers' plans) appear to influence students' application decisions. Generally, these studies have found that as students' family income, educational aspirations, academic ability and achievement, and parental education increase, students are more likely to choose high-cost, highly selective, distant, private, and four-year institutions (Hossler, Braxton, & Coopersmith, 1989; Paulsen, 1990).

Another important finding is that the college selection decision is interactional, depending on both the attributes of the student and the characteristics of the institution. Some interaction effects between student and institutional characteristics are especially important in order to develop effective enrollment management policies. For example, Weiler (1994) found that the match between a student's preferences and an institution's characteristics is the most critical factor influencing the decision to apply. Weiler also noted that geographic location and congruence between SAT scores of applicants and enrollees are of particular importance in predicting college choice. College choice is also influenced by the net cost of attendance, family income, and academic ability. For example, Manski and Wise (1983) found that student responsiveness to college cost is negatively related to income and academic ability. However, this negative relationship is significantly greater for students from lower income families and for students with lower academic ability. At higher income and ability levels, these effects are (relatively) less important (Paulsen, 1990).

Despite an increase in the number of studies examining student college choice, there is still a dearth of information about the factors that influence students' decision to attend a particular postsecondary educational institution (Weiler, 1994). Each institution has its own unique characteristics which influence students' college choice processes. Also, there are few studies based on large samples of students representing a diverse set of groups. Thus, the existing literature is still very limited in its ability to provide a broad and comprehensive understanding of the college choice decisions of students desiring to attend large, public institutions.

Methodology

Data Sources

We examine the factors affecting students' college application behavior for a specific institution. The model is applied in a public, land-grant university located in a major metropolitan area.

The data used in this study came from two sources. First, we obtained the entire data set for over one million ACT test takers intending to enroll in higher education in the fall of 1995. These data were compiled from the Student Profile Questionnaire which is administered when the ACT test is taken. This questionnaire provides information about (a) educational plans, interests, and needs; (b) special educational needs, interests, and goals; (c) college majors and occupational choices; (d) college extracurricular plans; (e) financial aid needs and work plans; (f) demographic and background information; (g) factors influencing college choice; (h) high school information; (i) high school extracurricular activities; (j) out-of-class accomplishments; and (k) an evaluation of the high school experience. Since this data set is much more comprehensive than data sets used in most other studies, we expected to obtain a better understanding of the factors that affect the student application process.

The second data set consisted of application and enrollment information for the fall of 1995 at the study institution, but only the results pertaining to application are presented here. This data set was extracted from an institutional data base and, when matched (using social security number) with the ACT data, resulted in the data set used in the analysis.

Initially, we attempted to analyze the full data set (all ACT test takers in the United States intending to enroll in 1995). However, we faced two problems in using the entire data set. First, statistical analysis of over a million cases was difficult (even on an IBM mainframe) because of the substantial computer memory and time requirements of the statistical model. Second, an analysis of a number of subsets of the entire data set convinced us that relatively little information was gained by analyzing the full data set. Since 85 percent of applicants to the study institution come from within the state or from its neighboring states, we focused only on the students who took the ACT in the state in which the study institution is located and four of its neighboring states, which included a population of approximately 112,000 potential applicants.

The definitions of the variables used in the study are summarized in Table 1. The dependent variable in this study is a discrete variable (i.e., one if a student applied to the study institution and 0 otherwise). All the independent variables included are binary variables indicating students' personal and background characteristics (marital status, gender, ethnicity, number of siblings, family income, home location, home town size); educational characteristics (degree aspirations, high school rank, college preparatory courses, high school size, ACT scores); preferences about the college (maximum yearly tuition preferred, intended place of residence, size and control of

preferred institution); and college intentions (work plans, educational needs and interests, intention to apply for financial aid, and prospective major).

[INSERT TABLE 1 HERE]

The Empirical Model

The model and variables included in this study are based on human capital theory (see Weiler, 1994). The human capital model states that a student's college choice decision is based on the expected net benefits (utility) of attending a particular institution. In such a model, the students who take the ACT assessment test are assumed to face a set of educational and non-schooling options. That is, the first choice is between college attendance and the pursuit of non-college alternatives such as labor force participation, the military, or homemaking. If the student decides to pursue postsecondary education, the next decision involves making a discrete choice between applying or not to a particular institution from a set of available colleges and universities.

Individuals are assumed to be utility maximizers in that they will choose to apply to a particular institution when the perceived net benefits (the difference between the benefits and costs of application to a specific institution) resulting from applying to this institution is greater than not applying. In other words, student *i* will decide to apply to institution *k* when the utility of applying to *k* is greater that the utility of not applying. This decision process can be summarized with the *application decision model* (see, Weiler, 1994).

General Model

A logistic probability model is used to study the college application decisions of the 1995 ACT test takers in five midwestern states. The model is specified as

$$log \frac{P_i}{1 - P_i} = \alpha + \beta_i X_i + \delta_i Y_i + \varepsilon_i \qquad (1)$$

where P_i is the probability that student i will choose to apply to the study institution; X_i is a vector of individual characteristics such as socioeconomic background and academic ability; Y_i is a vector of the institutional characteristics in the consideration set of student i; α, β_i, and δ_i are estimated coefficients; and ε_i represents a random error term which is logistically distributed. The dependent variable in this regression equation is simply the logarithm of the odds that a particular choice (i.e., whether to apply to the study institution or not) will be made. The model is estimated using a maximum-likelihood estimation (MLE) procedure (PROC LOGIT, an option included in the SAS statistical package).

Limitations

As is true of all empirical studies, this study is limited in a number of ways. First, the factors affecting student college choice are limited in number, yet the choice process is difficult to study because it is complex, longitudunal, interactional, and cumulative (see, Hossler, Braxton, and Coopersmith, 1989). Although the data being used are rich and help us better understand how students' characteristics and institutional preferences relate to the application decision, the model does not allow us to capture the longitudinal and cumulative influences on the decision making process.

Second, the ACT data set does not include all the variables affecting a student's application decision to a particular institution, nor does it include some of the variables which have been found significant in other studies (e.g., the education level of the students' parents and variables related to the influences of peers and family on their application decision). Studies found that parental education and the level of parental encouragement for students were positively associated with student college choice. As levels of parental education increase, students are likely to choose more selective institutions, ceteris paribus (Hossler, et al., 1989). Hossler and colleagues also noted that as the level of parental encouragement increased, the likelihood increased that students would attend four year and more selective postsecondary education institutions. In a single-institution study, Welki and Navratil (1987) also found that parental preference played an important role in the decision to attend college. Unfortunately, no data were available for these variables so we were unable to examine their effects on students' application decisions.

Third, there may be a statistical problem related to selectivity bias that limits the generalizability of the results. Students who prefer to study at institutions located on the Eastern or Western coasts of the United States are likely to take the SAT rather than the ACT. However, students taking only the SAT are not included in our sample. Since students taking the ACT are more likely to apply to colleges and universities in the Midwest (where the ACT scores are generally used), students who are likely to choose institutions in the Midwest are overrepresented in the sample.

Results

Before presenting the results, a brief description of the data is in order. An examination of the students who applied to the study institution confirmed that about 85 percent of applicants came from within the state and its four neighboring states. Since these states represent the (current) applicant pool for the institution under study, we focused only on the students in these states. The effective sample included about 112,000 students or roughly 10 percent of all national ACT takers.

The results of the logistic regression model are also reported in Table 2. The model includes three sets of variables: personal and demographic, high school experiences, and college preference. Note that all discussion of statistical significance of individual variables is conditional on controlling for other factors included in the model, and any reference to statistical significance is at the $p < .01$ level; this stringent level was chosen because of the large sample size.

[INSERT TABLE 2 HERE]

Personal and Demographic Characteristics

The effects of the following personal and demographic characteristics are examined: marital status, gender, age, family composition, family income, home location, and home town size.

Marital status: Less than one percent of the potential applicant population were married and the results indicate that marital status does not differentially affect a student's propensity to apply.

Gender: Weiler's (1994) study of applications to a private university found that women were significantly more likely to apply than men. Our results show no gender differences.

Race and Ethnicity: In their review of the literature, Hossler and colleagues (1989) noted that few existing studies indicate that there are differences in student college choice with respect to a student's ethnicity. Based on these studies, the authors concluded that African American students were less likely to apply to more selective institutions, but also noted that very little is known about the college choice of the other minority groups. Weiler (1994) also noted that minority students are more likely to apply to private and selective research universities.

We included six indicator variables designed to test whether there are differences in application behavior by ethnicity: African American, American Indian, Chicano/Hispanic, Asian American, white, and other ethnic groups (white students were used as the reference group). The results indicate that African Americans are 1.2 times more likely to apply than white students. Asian American students are nearly twice as likely to apply as white students. The other ethnic groups did not apply at significantly different rates than white students.

Age at Enrollment: We examined the effect of age on student college application behavior. Four age groups were included in the model: seventeen years old, eighteen years old, nineteen years old, twenty years old, and twenty years and older. The reference group was eighteen years old. We found that seventeen year old students were less likely to apply than their eighteen year old counterparts, whereas prospective students who were over twenty were six times more likely to apply than eighteen year olds.

Delay in Enrollment: Students who delayed their enrollment by a year or more (after graduating high school) were less likely to apply to the study institution than students who had not delayed their college careers. Although this finding may seem inconsistent with the results for age at intended time of enrollment, controlling for differences related to other variables in the model may be driving this result. Students who delayed starting college for less than a year were not significantly different than students who had no delay.

Number of Siblings: Because of the potential financial burden, we were also interested in the effects of the number of siblings under 21 years of age. Three variables were included that indicate whether the students had no, one, or two siblings under 21 years of age living at home (the reference group is if the student had more than two siblings under 21 living at home). The results indicate that all three variables were positively related to application, but none were significant at the $p < .01$ level.

Family Income: Previous research on student college choice has found that family income affects student college choice. High socio-economic status students are more likely to apply to and attend out-of-state and selective postsecondary institutions (see, Hossler, Braxton, & Coopersmith, 1989; Weiler, 1994). Weiler (1994), for example, found that students who are from high income families are more likely to apply to a private, selective institution, and that the probability of application increased as the level of family income increased. Several other studies found that the final stage of enrollment decision is not influenced by family income, and that choice decision is largely determined by academic factors (Hearn, 1988; Leppel, 1993).

We included nine family income categories to estimate the effects of a student's financial situation on the college application decision, with students with family incomes greater than sixty thousand dollars used as the reference group. We found that students from families with incomes less than twelve thousand dollars and students with family incomes in the forty-two to fifty thousand dollar ranges were both over three times more likely to apply than students from the reference category.

Distance: The empirical evidence suggests that distance from a student's home residence strongly influences college choice behavior (Hossler, et al., 1989; Leppel, 1993). In most studies, distance from home appears to be negatively associated with the likelihood of student application or enrollment. Leppel (1993) identified several reasons for this finding. First, students are less likely to have information about a college as distance increases. Students are likely to get more information from nearby institutions through their high school counselors or college recruitment representatives. Second, the cost of attending college increases with distance from home. Third, if students consider attending a distant school, their college choice set tends to include more schools, thereby reducing the probability that a particular institution will be chosen. Fourth, many students feel less comfortable in unfamiliar, distant places making them more likely to choose a school near their home. Fifth, students are likely to go to colleges where their friends or parents attend(ed), since they will be more familiar with those institutions (Leppel, 1993).

It should be noted, however, that there are studies indicating distance from home has no effect on student application decisions. For example, Chapman (1979) found that distance was not related to the decision to apply to a private university.

In this study two distance related variables are combined to form the indicator variables used. The first is home state of the student and the second is the answer on the "distance" question on the ACT survey. Students who live within twenty miles of the institution are the reference group, prospective students living more than twenty miles away but still in the state the institution is located in are dubbed "Outstate." The other four categories are indicators of the student's residence in one of the four neighboring states.

The effect of distance was as expected: Students who are state residents but live more than twenty miles from the institution are about half as likely to apply (odds ratio of .541) as students who live within twenty miles. Least likely to apply are students from a neighboring state which does not have a tuition reciprocity agreement with the state in which the study institution is located. Proximity, availability of information, competition with other institutions and financial costs all obviously have an influence on students' college application decisions.

Home Town Size: Do students from small towns prefer to study at a large campus in a major metropolitan area? This question was tested by including students' home town size as a regressor. Home town size was divided into the following variables: farms, towns with less than ten thousand inhabitants, towns with between ten and fifty thousand people, cities with fifty to 250 thousand people, and cities with more than 250 thousand people (the reference group). There is a negative relationship between application probability and home town size. Students from farms are less than half as likely to apply to the study institution as students from cities with more than 250 thousand people. Students from cities of fifty to 250 thousand are not statistically different than the reference group. Generally, students from home towns of less than fifty thousand are less likely to apply to the study institution than students from the reference group.

Effects of Educational Characteristics

Existing research on ability suggests that student ability affects the college choice process. High ability students are more likely to select out-of-state and more selective institutions (Hossler, Braxton, & Coopersmith, 1989). We used two measures of ability (i.e., high school rank and ACT Composite score) in the model to test the effect of student ability on student choice.

High School Rank: The positive and statistically significant coefficient on the HIGHABIL variable implies a positive relationship between a student's application decision and this measure. If the student is ranked in the top quartile of his or her high school class, they are more likely to apply to this institution. The odds of a student from the top quartile applying are nearly 12 percent higher than for their lower high school rank counterparts.

ACT Scores: Because we were not able to obtain individual scores of students not sending their ACT test scores to the study institution, ACT scores for all students were aggregated into groupings approximating quartiles (the reference group is the top quartile). The coefficient estimates for the second, third, and fourth quartiles are all negative and decline by quartile even after controlling for high school rank (and other regressors). Students who score in the fourth quartile on the ACT test are over fifty percent less likely to apply than top quartile ACT students.

College Preparatory Courses: The effect of taking different types of high school programs was tested by including a dummy variable which tests whether students who took college preparatory courses are more likely to apply. The reference group was students who took business or commercial, vocational-occupational or other courses. As expected, the results indicate that students who took college preparatory courses in high school are more likely (1.24 times) to apply to the study institution.

High School Extracurricular Activities: The effect of student involvement in a number of high school extracurricular activities was also tested. Included were whether the student indicated involvement in music (vocal or instrumental), a high school political campaign, a religious organization or varsity athletics, or a school or community service organization. Students involved in political campaigning or community service were slightly more likely (1.11 times) to apply than the general population. Students who indicated involvement in music or religion were less likely to apply than other students. Students who participated in varsity athletics in high school had application probabilities no different from the general population.

High School Graduating Class Size: Does high school graduating class size have any effect on student college choice? Do students from small high schools prefer to go to a large college or university? These questions were examined by including high school class size variables in the model. The results indicate that students from large classes are much more likely to apply to the study institution than students from smaller graduating classes. For instance, students who graduated in classes of 100 or fewer students are roughly half as likely to apply than students who graduated from classes with more than 600 students.

High School Control: We tested the effect of type of high school control (public versus private) on the students' application decision to the study institution. The estimated coefficient is negative (students from public high schools are *less* likely to apply). Initially this result seems

counterintuitive but may arise because we are controlling for other factors that affect application decisions. Even so, further examination of this result is certainly warranted.

High School Preparation Requirements: The ACT questionnaire provides a question about the number of years students have (or will have) studied various subjects by the time they graduate. By including these variables, we were able to test whether studying these subjects affects a student's propensity to apply to this institution. The rationale for including these variables was that the institution implemented high school preparation requirements for enrollment a few years ago, and we wanted to examine how these requirements affect application propensity. All applicants are expected to have completed four years of English, three years of mathematics, three years of science, two years of a (single) second language, and two years of social studies.

We found that students who did not meet the English and mathematics requirements were as likely to apply as students who complied, whereas students who did not fulfill the natural science requirement were less likely to apply than students who had. Students who had two years of a foreign language were more likely to apply. Students who did not meet social science requirements were more likely to apply than students who met the requirement.

Degree Aspirations: Are students who have indicated postbaccaleurate degree aspirations more likely to apply? We found that students who intend to continue their education beyond the baccalaureate level are about 1.5 times more likely to apply than students who did not indicate a desire to pursue an advanced degree.

Effects of Preferences About the College

Institutional attributes may have an impact on the student college choice process. In a review of the literature on the effects of institutional attributes on college choice, Hossler, Braxton, and Coopersmith (1989) identified the following attributes as having an impact on students' decisions to apply to or attend a college or university: tuition, financial aid availability, special academic programs, academic reputation (or institutional quality or institutional selectivity), location (distance from home), size of institution, institutional control (public versus private) and social atmosphere.

Maximum Yearly Tuition Preferred: Although there is sufficient evidence in the literature that students consider costs when selecting a college, we were interested in examining whether the preferred yearly tuition levels have an impact on the probability that students apply to the study institution. We included four preferred maximum yearly tuition variables and found that tuition preference does have an effect on a student's application decision. Students who prefer to pay more than five thousand dollars in tuition are more likely to apply than students who prefer tuition rates below two thousand dollars. Specifically, students who preferred tuition levels above five thousand dollars per year were about 1.3 times more likely to apply as students preferring tuition rates less than two thousand dollars per year. We also found that students who prefer to pay two to three thousand dollars per year were less likely to apply than the reference group.

Intended Place of Residence: Where a student intends to reside during college may be a factor in college choice. The four variables entered into the equation were: whether the student intended to live in a residence hall, in off-campus housing, married housing, in a fraternity or sorority, or at their parents' home or with a relative (the reference group). Students who intended to live in a

residence hall or fraternity/sorority house were more likely to apply than students who intended to live with their parents. Students who indicated a desire to live in a fraternity or sorority house were nearly 1.6 times as likely to apply as students from the reference group.

Preferred College Size: Students who prefer to attend a college or university with more than 20,000 students are *over three times* as likely to apply to the study institution than students who want to attend a smaller institution.

Main Competition: An institution in a neighboring state is viewed as a popular choice for students considering the study institution. Thus, we developed an indicator variable that would allow us to test whether students who had the other institution first in their choice set were more or less likely to apply to the study institution. We found that students who had the other institution as their first choice, ceteribus paribus, were about half as likely to apply to the study institution as students who had another institution as their first choice.

Control: The institution under study is a public, land-grant institution. Student preferences regarding type of institutional control (public versus private) may have an effect on their college choice calculus. Indeed, our findings indicate that students who prefer to attend a public college or university are nearly 1.8 times as likely to apply to the institution than students who prefer a private institution.

Expected Course Taking Behavior: We also tested whether an affinity to take advanced placement, independent study, or honors courses in college or to do study abroad had any impact on an individual's application probability. Students who indicated a desire to enroll in honors or advanced math courses and students who would like to study abroad were slightly more likely to apply to the study institution than students who did not indicate an interest in these programs

Effects of College Intentions

Work Plans: We examined the effects of whether students intended to work during their first year of college. Four variables were included in the regression model: will work between one and ten hours per week, between ten and twenty hours per week, between twenty and thirty hours per week, and greater than thirty hours per week (the reference group is students who do not plan to work). Generally, the results indicate that students who plan to work are less likely to apply than students who have no intention of working while in college. Also, the chances of applying to the study institution decline as the number of hours intended to work increase. For instance, students who intend to work up to ten hours per week are about ten percent less likely to apply, whereas students who expect to work more than 30 hours per week are about fifty percent as likely to apply.

Intentions to Apply for Financial Aid: As already noted, financial aid is a significant variable that influences students' decisions to apply to and enroll in a college or university. The estimated coefficient was negative, implying that after controlling for the other factors, students who intend to apply for financial aid are less likely than students who *do not* intend to apply for financial assistance.

Reputational Rank of Intended Majors: It has been hypothesized that students select a program (and an institution) based on its reputation (or institutional quality). The ability to estimate the behavioral impact of the reputational rank of a program on students' college application decision

making is important given the growing use of such rankings by students. There is also a debate in higher education regarding the effect of reputation of a program on a student's choice of a college or program. To test the effect of the study institution's ranked programs, we entered dummy variables for a variety of programs. Some of these programs are highly ranked by the National Research Council (1982 and 1995 reports) doctoral programs ratings. Although we do realize that these studies evaluated doctoral programs, it is likely that students' making college application decisions are less likely to distinguish between the reputation of a doctoral program and that of the undergraduate program.

Our results indicate that students who intend to study the highest ranked program in the institution are about 2.2 times more likely to apply to the study institution than the general population. Another highly ranked program that was positively related to application behavior was ranked eight. Given that the study institution has a law, medical, and dental school, we also tested the application effects of these programs. Students who indicated a preference to study dentistry and business were more likely to apply than other students (though the p-values were only .02). We did not, however, find similar findings for the other ranked and unranked programs at this institution. An interesting finding was that students interested in studying the arts were about 1.2 times more likely to apply than the general prospective student population.

Discussion and Conclusion

A logistic regression model was estimated to determine the factors that influence a students' application to a land grant institution. This model included several important variables which need to be considered by institutional decision makers. First, students' test scores and high school rank percentile, age, proximity to the institution, whether the student postponed their initial college enrollment date, congruence between the student's preferred institution type and size and that of the study institution, and family income are all important variables in determining students' application decisions. Second, we found that highly reputed programs have a positive effect on students' college application decisions. Honors programs, study abroad options, and advanced courses in mathematics also positively influence applications to this institution. Third, we did not find any statistically significant effects of marital status, gender, underrepresented groups (American Indian, African American, or Chicano/Hispanic students), and number of siblings at home under 21 years of age. The finding with regard to underrepresented groups is welcome news given the institution's commitment to diversity.

This analysis has several important implications. First, the estimated effects of the personal and demographic, high school and college preference characteristics are generally consistent with the findings of previous college choice studies. However, there are some institution-specific results of interest. We found that students from a state without a tuition reciprocity agreement with the state in which the study institution is located are much less likely to apply, there are specific academic programs that seem to draw applications, and students who have the main competition as their first choice school are not very likely to apply. The ability to determine and more closely examine general and institution-specific relationships should better enable us to inform recruitment and retention policies at the study institution.

Second, using data on a substantial proportion of the potential pool of applicants to an institution is an improvement on studies that use only a subsample of students who sent their test scores to the institution. Using a subsample of students who send their scores to an institution may limit

our ability to explain the factors that influence college choice decisions since students who did not report their scores are excluded (see, Weiler, 1994).

Third, if they are not already doing so, institutions should begin to use the information collected by ACT and SAT more effectively. These surveys provide researchers and administrators with a rich source of information about student characteristics and institutional-specific factors which can improve their understanding of the college choice process. Once institutions better understand who their potential applicants are and how they can differentially affect their decision making, scare resources can be more efficiently and effectively utilized.

Fourth, it should be noted that this study only examines the application decision process. A more thorough approach would be to link the application and enrollment process in a single model. Statistical procedures exist that allow researchers to estimate nested or conditional logistic models, where enrollment behavior could be modeled conditional on having applied (see Greene, 1993). Also, since the college choice process takes place over time, researchers should look for ways to apply longitudinal models to the study of college choice.

Finally, in the broader institutional policy arena, results of this study provide empirical evidence of progress towards institutional goals, especially goals established relative to recruitment of students who are best able to benefit from the institution's academic programs. In particular, results indicate that the institution is more likely to attract high ability students and students from within student of color populations, both of which are elements of the institution's strategic planning initiative. In a period in which some institutional functions (like admissions) are evaluated based on specific numeric targets, more broadly based research strategies can provide evidence of the linkages between prospective student activities and the furtherance of an institution's strategic planning goals. Our observation is that there is a paucity of research that serves to link institutional policies and students' behavior in the college application and enrollment arenas.

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Table 1 - Definitions of the Variables Included in the Model

Variable Name	Definition
Personal and Demographic Characteristics	
Gender	A dummy equal to one if the student is male.
Marital status	A dummy equal to one if the student is married.
Ethnicity	
AFR-AMER	A dummy equal to one if the student is an African-American.
AM-INDIAN	A dummy equal to one if the student is an American-Indian.
ASIAN	A dummy equal to one if the student is an Asian-American.
HISPANIC	A dummy equal to one if the student is a Hispanic.
WHITE	A dummy equal to one if the student is a Caucasian.
OTHETH	A dummy equal to one if the student did not respond to this item or indicated that his or her ethnicity was other than above groups.
Age	
AGE17	A dummy equal to one if the student is seventeen years old.
AGE18	A dummy equal to one if the student is eighteen years old.
AGE19	A dummy equal to one if the student is nineteen years old..
AGE20	A dummy equal to one if the student is twenty years old.
AGEGT20	A dummy equal to one if the student is older than 20 years.
Delay in Enrollment	
DELAY1YR	A dummy equal to one if the student delayed his/her enrollment by one year (after graduating high school).
DELAYLT1	A dummy equal to one if the student delayed entering for less than one year (after graduating high school).
NODELAY	A dummy equal to one if the student did not delayed entering college (after graduating high school).
Siblings	
NOSIBS	A dummy equal to one if the student has no siblings under 21 years of age.
ONESIB	A dummy equal to one if the student one siblings under 21 years of age.
TWOSIBS	A dummy equal to one if the student has two siblings under 21 years of age.
SIBGR2	A dummy equal to one if the student has more than two siblings under 21 years of age.
Family income	
FAMINCTO18	A dummy equal to one if the student family's income is less than 18 thousand dollars.
FAMINC12TO18	A dummy equal to one if the student family's income is between 12 and 18 thousand dollars.
FAMINC18TO24	A dummy equal to one if the student family's income is between 18 and 24 thousand dollars.
FAMINC24TO30	A dummy equal to one if the student family's income is between 24 and 30 thousand dollars.
FAMINC30TO36	A dummy equal to one if the student family's income is between 30 and 36 thousand dollars.
FAMINC36TO42	A dummy equal to one if the student family's income is between 36 and 42 thousand dollars.
FAMINC42TO50	A dummy equal to one if the student family's income is between 42 and 50 thousand dollars.
FAMINC50TO60	A dummy equal to one if the student family's income is between 50 and 60 thousand dollars.
FAMINCGR60	A dummy equal to one if the student family's income is greater than 60 thousand dollars.
Home location	
WISC	A dummy equal to one if the student's home is in Wisconsin.
IOWA	A dummy equal to one if the student's home is in Iowa.
NDAK	A dummy equal to one if the student's home is in North Dakota.
SDAK	A dummy equal to one if the student's home is in South Dakota.
OUTSTATE	A dummy equal to one if the student's home is farther than 20 miles from the state institution in the state.
METRO	A dummy equal to one if the student's home is within 20 miles of the institution.
COMPETITION	A dummy equal to one if the student indicated the competitor institution as his/her first choice.
Educational Characteristics	
PUBLICHS	A dummy equal to one if the student attended a public high school.
High school size	
HSLT100	A dummy equal to one if the student's high school size is less than 100 students.
HSLT200	A dummy equal to one if the student's high school size is between 100 and 199 students.
HSLT400	A dummy equal to one if the student's high school size is between 200 and 399 students.
HSLT600	A dummy equal to one if the student's high school size is between 400 and 599 students.
HSLGR600	A dummy equal to one if the student's high school size is greater than 600 students.
High School Courses	
ENGLT4	A dummy equal to one if the student studied English four years or more.
MATHLT3	A dummy equal to one if the student studied mathematics less than three years.
NATSLT3	A dummy equal to one if the student studied natural sciences less than three years.
SOCSLT2	A dummy equal to one if the student studied social sciences less than two years.
LANGREQ	A dummy equal to one if the student completed language requirements.

Special College Programs	
INDSTUD	A dummy equal to one if the student is interested in independent study.
HONORS	A dummy equal to one if the student is interested in freshmen honors courses.
FOREIGN	A dummy equal to one if the student is interested in studying in a foreign country during undergraduate years i college.
ADVENG	A dummy equal to one if the student is interested in advanced placement in English.
ADVMATH	A dummy equal to one if the student is interested in advanced placement in mathematics.
ADVSS	A dummy equal to one if the student is interested in advanced placement in social studies.
ADVNS	A dummy equal to one if the student is interested in advanced placement in natural sciences.
ADVFR	A dummy equal to one if the student is interested in advanced placement in French.
ADVGER	A dummy equal to one if the student is interested in advanced placement in German.
ADVSPAN	A dummy equal to one if the student is interested in advanced placement in Spanish.
ADVOTH	A dummy equal to one if the student is interested in advanced placement in other language.
High School Extracurricular Activities	
HSPOLCAM	A dummy equal to one if the student participated in political campaigns.
HSMUSIC	A dummy equal to one if the student participated in musical activities.
HSRELIG	A dummy equal to one if the student participated in religious organizations.
HSCOMSER	A dummy equal to one if the student participated in community services.
COLPREP	A dummy equal to one if the student received any college preparatory courses.
HIGHABILITY	A dummy equal to one if the student is ranked in the top quartile in his/her high school class rank.
ACT scores	
QUAR1ACT	A dummy equal to one if the student is ranked in the top quartile in ACT scores.
QUAR2ACT	A dummy equal to one if the student is ranked in the second quartile in ACT scores.
QUAR3ACT	A dummy equal to one if the student is ranked in the third quartile in ACT scores.
QUAR4ACT	A dummy equal to one if the student is ranked in the fourth quartile in ACT scores.
Preferences About the College	
Tuition Preference	
TUITTO 2K	A dummy equal to one if the student prefers tuition up to one thousand dollars.
TUIT2TO3K	A dummy equal to one if the student prefers tuition between 2 and 3 thousand dollars.
TUIT4TO5K	A dummy equal to one if the student prefers tuition between 4 and 5 thousand dollars.
GT5K	A dummy equal to one if the student prefers tuition greater than 5 thousand dollars.
TUITNOPREF	A dummy equal to one if the student indicates no preference about tuition.
PUBCOL	A dummy equal to one if the student prefers a public college or university.
Preferred residence	
RESHALL	A dummy equal to one if the student prefers to live in a residence hall.
OFFCAMP	A dummy equal to one if the student prefers to live in an off-campus room, apartment or own home.
MARHOUSE	A dummy equal to one if the student prefers to live in a married student housing.
FRAT/SOR	A dummy equal to one if the student prefers to live in a fraternity or sorority house.
PARHOUS	A dummy equal to one if the student prefers to live at his/her parent's house.
SIZEGT20	A dummy equal to one if the student prefers to attend a college where the student body is more than 20,000.
College Intentions	
Work Plans	
NOTWORK	A dummy equal to one if the student plans not to work.
WORKTO10	A dummy equal to one if the student plans to work between 1 and 10 hours per week.
WORKTO20	A dummy equal to one if the student plans to work between 11 and 20 hours per week.
WORKTO30	A dummy equal to one if the student plans to work between 21 and 30 hours per week.
WORKGR30	A dummy equal to one if the student plans to work more than 30 hours per week.
APPFINAID	A dummy equal to one if the student intends to apply for financial aid.
College majors and occupational choices	
CHEMENG	A dummy equal to one if the student intends to study chemical engineering.
ECON	A dummy equal to one if the student intends to study economics.
PSYCH	A dummy equal to one if the student intends to study psychology.
GEOG	A dummy equal to one if the student intends to study geography.
ME	A dummy equal to one if the student intends to study mechanical engineering.
MATH	A dummy equal to one if the student intends to study mathematics.
CHEM	A dummy equal to one if the student intends to study chemistry.
ECOLOGY	A dummy equal to one if the student intends to study ecology.
GEOG	A dummy equal to one if the student intends to study geology.
POLISCI	A dummy equal to one if the student intends to study political science.
EE	A dummy equal to one if the student intends to study electrical engineering.

PRELAW	A dummy equal to one if the student intends to study pre-law.
PREMED	A dummy equal to one if the student intends to study pre-medicine.
PREDENT	A dummy equal to one if the student intends to study pre-dental.
BUSINESS	A dummy equal to one if the student intends to study business.
LETTERS	A dummy equal to one if the student intends to study letters.
ARTS	A dummy equal to one if the student intends to study arts.
POSTBAC	A dummy equal to one if the student intends to get a postbaccalaureate degree.

Table 2 - Descriptive Statistics and Regression Results

	Descriptive Statistics	Logistic Regression Results			
Variable	Sample Proportion	Parameter Estimate	Standard Error	Pr > Chi-Square	Odds Ratio
INTERCPT		-2.0708	0.1054	0.0001	0.126
MARRIED	0.86%	-0.0728	0.1265	0.5653	0.93
MALE	45.20%	0.0386	0.0255	0.1294	1.039
BLACK	1.99%	0.1849	0.076	0.015	1.203
AMIND	0.85%	0.129	0.1343	0.3368	1.138
LATINO	1.26%	0.0647	0.0968	0.5037	1.067
ASIAN	2.37%	0.6268	0.0572	0.0001	1.872
OTHETH	8.29%	0.1456	0.0537	0.0067	1.157
(WHITE)	85.23%				
AGE17	0.58%	-0.5436	0.1643	0.0009	0.581
AGE19	37.84%	0.0256	0.0241	0.2888	1.026
AGE20	1.06%	-0.2636	0.1205	0.0287	0.768
AGEGT20	1.71%	1.8851	0.0939	0.0001	6.587
(AGE18)	58.81%				
DELAY1YR	41.25%	-0.1163	0.0249	0.0001	0.89
DELAYLT1	2.38%	-0.1623	0.0875	0.0637	0.85
(NODELAY)	56.37%				
NOSIBS	18.90%	0.028	0.0403	0.4878	1.028
ONESIB	37.58%	0.0834	0.0356	0.0193	1.087
TWOSIB	23.87%	0.0741	0.0385	0.0542	1.077
(GT2SIB)	19.66%				
FARM	14.64%	-0.7573	0.0583	0.0001	0.469
TOWNLT10	32.43%	-0.414	0.0442	0.0001	0.661
TOWN1050	23.34%	-0.1988	0.0387	0.0001	0.82
UPTO250K	16.21%	-0.0736	0.0412	0.0743	0.929
(OVER250K)	13.37%				
PUBLICHS	86.13%	-0.2389	0.0434	0.0001	0.787
HSLT100	28.94%	-0.8155	0.0541	0.0001	0.442
HSLT200	19.62%	-0.5273	0.0501	0.0001	0.59
HSLT400	29.38%	-0.2924	0.0435	0.0001	0.746
HSLT600	12.29%	-0.2084	0.0467	0.0001	0.812
(HSGT600)	9.77%				
ENGLT4	14.02%	0.018	0.0517	0.7278	1.018
MATHLT3	12.26%	-0.0402	0.0632	0.5254	0.961
NATSLT3	19.27%	-0.2378	0.0468	0.0001	0.788
SOCSLT2	6.53%	0.5061	0.0854	0.0001	1.659
LANGREQ	75.79%	0.4842	0.0434	0.0001	1.623
INDSTUD	38.28%	0.0112	0.0272	0.6806	1.011
HONORS	24.40%	0.1339	0.0336	0.0001	1.143
FOREIGN	28.08%	0.1793	0.0269	0.0001	1.196
ADVENG	24.06%	0.0295	0.0312	0.3439	1.03
ADVMATH	22.94%	0.0888	0.0311	0.0043	1.093
ADVSS	22.02%	-0.0646	0.0314	0.0395	0.937
ADVNS	21.48%	-0.00212	0.032	0.9472	0.998
ADVFR	4.44%	0.000421	0.0482	0.993	1
ADVGER	4.06%	-0.0606	0.0508	0.2329	0.941
ADVSPAN	11.52%	-0.0155	0.0347	0.6547	0.985
ADVOTH	2.39%	-0.0696	0.0655	0.2881	0.933
HIGHABIL	43.80%	0.112	0.0292	0.0001	1.119
(HSR%LT75)	56.20%				
QUAR2ACT	21.41%	-0.1676	0.0321	0.0001	0.846
QUAR3ACT	26.05%	-0.3978	0.0355	0.0001	0.672
QUAR4ACT	31.51%	-0.7884	0.0415	0.0001	0.455
(QUAR1ACT)	21.03%				

Table 2 - Descriptive Statistics and Regression Results (cont'd)

Variable	Sample Proportion	Parameter Estimate	Standard Error	Pr > Chi-Square	Odds Ratio
HSPOLCAM	7.55%	0.1071	0.0406	0.0083	1.113
HSMUSIC	49.61%	-0.0677	0.0252	0.0072	0.935
HSRELIG	26.21%	-0.1195	0.0285	0.0001	0.887
HSVARATH	62.41%	0.0583	0.026	0.0253	1.06
HSCOMSER	43.75%	0.0981	0.0256	0.0001	1.103
COLPREP	61.61%	0.2135	0.0298	0.0001	1.238
SIZGT20K	9.32%	1.2055	0.0374	0.0001	3.338
COMPET	2.79%	-0.6131	0.0615	0.0001	0.542
OUTSTATE	27.51%	-0.6151	0.0428	0.0001	0.541
WISC	36.13%	-1.4174	0.0444	0.0001	0.242
IOWA	21.04%	-4.3477	0.1017	0.0001	0.013
NDAK	6.09%	-1.8785	0.0773	0.0001	0.153
SDAK	4.14%	-1.7251	0.0824	0.0001	0.178
(TC METRO)	5.09%				
RESHALL	65.17%	0.219	0.0384	0.0001	1.245
OFFCAMP	14.24%	0.0241	0.0474	0.6108	1.024
MARHOUSE	0.46%	-0.0887	0.1961	0.6509	0.915
FRAT	1.75%	0.4541	0.0882	0.0001	1.575
(HOME)	18.39%				
POSTBACH	46.23%	0.419	0.0272	0.0001	1.52
PUBCOL	63.04%	0.5785	0.0288	0.0001	1.783
CHEME	0.43%	0.7757	0.1177	0.0001	2.172
ME	0.57%	0.2479	0.1264	0.05	1.281
EE	0.54%	-0.0155	0.1461	0.9153	0.985
MATH	0.62%	-0.1584	0.137	0.2475	0.853
CHEM	0.43%	0.0124	0.1429	0.931	1.012
ECOLOGY	0.10%	-0.1386	0.3272	0.6717	0.871
ECON	0.05%	-0.2994	0.4525	0.5082	0.741
GEOG	0.03%	0.2014	0.5337	0.7058	1.223
POLISCI	0.47%	0.233	0.1335	0.0809	1.262
PSYCH	2.82%	0.0238	0.0652	0.7152	1.024
PRELAW	1.44%	-0.014	0.087	0.8718	0.986
PREMED	2.87%	0.1094	0.0561	0.051	1.116
PREDENT	0.23%	0.4234	0.1866	0.0232	1.527
BUSINESS	12.21%	-0.0896	0.0387	0.0207	0.914
LETTERS	0.77%	0.0815	0.1156	0.4808	1.085
ARTS	4.30%	0.1739	0.0565	0.0021	1.19
INCTO12K	16.54%	1.2382	0.0423	0.0001	3.449
INC12T18	5.09%	1.0982	0.0615	0.0001	2.999
INC18T24	7.41%	1.016	0.0543	0.0001	2.762
INC24T30	8.83%	0.8312	0.0522	0.0001	2.296
INC30T36	11.37%	1.0263	0.0446	0.0001	2.791
INC36T42	9.78%	0.6624	0.0491	0.0001	1.939
INC42T50	11.24%	1.1396	0.041	0.0001	3.126
INC50T60	10.13%	0.1323	0.0508	0.0091	1.141
(INCGT60K)	19.62%				
APPFAID	83.11%	-0.3032	0.0351	0.0001	0.738
WORKTO10	25.50%	-0.1038	0.0343	0.0025	0.901
WORKTO20	39.18%	-0.1874	0.0331	0.0001	0.829
WORKTO30	11.77%	-0.284	0.0468	0.0001	0.753
WORKGT31	1.82%	-0.8196	0.1197	0.0001	0.441
(NOTWORK)	21.73%				
TUIT2T3K	16.74%	-0.1994	0.0691	0.0039	0.819
TUIT4T5K	19.79%	0.0716	0.0656	0.2754	1.074
TUITGT5K	14.08%	0.2465	0.0664	0.0002	1.28
TUITNOPR	40.37%	0.1091	0.0622	0.0797	1.115
(TUITLT2K)	9.02%				
		Intercept Only	Intercept & Covariates		
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