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Historically, colleges and universities have lacked models for systematically assessing the impact of their financial aid strategies on the enrollment decisions of admitted applicants. This study tests a model for assessing the impact of aid offers on enrollment decisions. The analysis demonstrates that: 1) financial aid strategies have a substantial influence on enrollment; and 2) the systematic analysis of student enrollment decisions can help institutional administrators refine their financing decisions.

The linkage of financial aid to admission strategies is integral to the concept of enrollment management (Hossler, 1984, 1987). However, the concept of pricing strategy has been deemphasized in the recent enrollment management literature (e.g. Hossler, Bean, and Associates, 1990), in part because institutions have lacked practical ways of assessing the effects of student aid offers on enrollment decisions.

There are two recently proposed methods for assessing the impact of financial aid strategies on enrollment decisions. One is to systematically track the relationship between the amount and type of aid offers on the yield of admitted applicants (Scannell, 1992). This method provides ratios of yields per dollar invested, but does not control for other factors that can influence enrollment. The alternative is to use data derived from admissions, financial aid, and student record systems to generate data to assess the impact of actual aid offers on enrollment decisions by applicants (St. John, 1992). This strategy not only has the potential of controlling for some of the other factors that influence student enrollment decisions in a particular institution, but also enables an institution to assess the responsiveness of accepted applicants to the amount and type of aid offered.

This study tests the viability of developing institutional assessment models using institutional data sources. First, a brief background section describes the origins of the assessment model, then the methodology, findings, and implications are discussed.

Background

In the late 1960s and early 1970s, there were a series of studies of the impact of prices and price subsidies on student enrollment decisions, the so-called "demand studies" (reviewed in Jackson and Weathersby, 1975). However, these studies were criticized because they lacked necessary econometric controls (Dresch, 1975). Nevertheless, over time there were a series of meta analyses that developed standardized price-response coefficients (SPRCs) from the early demand studies (Jackson and Weathersby, 1975; Leslie and Brinkman, 1988; McPherson, 1978). The concept of student price response was integral to the early concep-

tions of enrollment management (Hossler, 1984). Recent national studies indicate there is a linkage between prices and first-time attendance (e.g. Jackson, 1978, 1988; Manski and Wise, 1983; St. John, 1991; St. John and Noell, 1989). However, institutional research on the linkage between financial aid strategies and student enrollment decisions has been very limited.

Recently, St. John (1992) proposed a model that institutions can use to assess the impact of their financing strategies on student first-time enrollment decisions using extant data sources. Based on theories of human capital and educational attainment, he argued that: 1) student enrollment decisions could be viewed as a function of social and economic background, academic preparation, and financial aid; and 2) sufficient data could be derived from extant data sources—the institution's admissions, financial aid, and student record systems—to assess the impact of student aid. This study tests the viability of the proposed model.

Method

The population consisted of the 2,558 accepted applicants for first-time enrollment at an urban, public, primarily commuter university for the fall semester of 1989. The typical accepted applicant was young, and dependent financially on his or her parents. The accepted applicant group was about evenly divided by gender; about one in five was either African-American or Hispanic. About 45% of the accepted applicants received offers of financial aid, and for those applicants, the average award was $3,636.

The analysis used logistical regression, an appropriate method for examining qualitative choices (Aldrich and Nelson, 1984), such as whether accepted applicants actually enroll. This method has been used in other recent studies of access and persistence (e.g. St. John, 1989, 1990a, 1990b, 1991; St. John and Noell, 1989).

The coefficients from the logistic analyses are converted to change-in-probability measures (delta-P statistics) using a method recommended by Petersen (1984). The delta P can be used as a student price response coefficient (SPRC) (Leslie & Brinkman, 1988).

Delta P statistics are used in two ways in this study. First, for dichotomous variables, the delta P provides a measure of the extent to which the outcome is likely to change if an applicant or student has that characteristic. For example, a delta P of 0.061 for African-Americans can be interpreted as increasing the probability of persistence or attendance by 6.1 percentage points for this group.

The second use for the delta P statistic in this study is for continuous variables. In these cases, the delta P can be interpreted as meaning that a change in a unit measure will change the probability of the outcome by a certain percentage. For example, a delta P statistic of 0.061 per $1,000 of grant aid indicates that the probability of attendance or persistence increases by 6.1 percentage points per $1,000 in grant aid awarded.

The model for first-time attendance assessed the influence of variables related to three factors: background, achievement, and student financial aid. Several *financial aid* variables were created to compare

different approaches to assessing the effects of aid. The first analysis simply examined whether the receipt of any financial aid influenced first-time attendance. The second version analyzed *amount of aid.* This variable represented the total financial aid offered, divided by 1,000 to allow for comparisons to student price-response coefficients (e.g. Leslie & Brinkman, 1988), which use one-hundred-dollar increments. The third version considered the amount of the different types of aid. This encompassed all aid received, including grant, work/study, loan, and scholarship moneys. These numeric variables were divided by 1,000 to allow for conversion to SPRCs.

Findings

The first analysis examined the influence of the receipt of any aid on first-time enrollment. African-American applicants were 22.6 percentage points less likely to attend when the mere receipt of aid was considered. This suggests that the institution is not competing effectively for this group, especially when aid is considered. However, when receipt of any aid was considered, middle-income aid applicants were 19.4 percentage points less likely to attend.

Additionally, this analysis demonstrated the power of aid in attracting applicants. The National Merit Scholars, who all received scholarships, were 26 percentage points more likely to attend. However, applicants who were high scorers on the ACT, who probably received only need-based aid awards (if they received aid offers), were about 22 percentage points less likely to attend. Moreover, these applicants may have been recruited by schools that could offer them non-need-based aid.

Finally, the analysis indicates that aid offers were effective at this institution. The receipt of an aid offer was significant and positively associated with attendance. The receipt of aid increased the probability that the average accepted applicant would enroll by about 23 percentage points.

Assessing the Influence of Aid Amounts

Three approaches to assessing the impact of student financial aid are compared in Table 1. The second version considered the influence of the total amount of aid (the sum of all types of aid awarded). The third model examined the influence of the amount of each type of aid awarded.

The second version, which contained the variable total aid, showed the impact of the amount of aid on first-time attendance, with the total amount of aid significantly associated with an increase in first-time attendance. In this analysis, aid applicants from low- and high-income groups were more likely to attend; however, independence was significant and negatively associated with first-time attendance. This model provided a price-response measure: the average accepted applicant was 6.2 percentage points more likely to attend per $1,000 in aid awarded. This measure is approximately equal to the most recently developed standardized student price-response coefficient (Leslie and Brinkman, 1988).

TABLE 1
Comparison of Aid Analysis—First-time Attendance Logistical Model

Factor/Variable	Version 1 Any Aid Delta P	Version 2 Aid Amount Delta P	Version 3 Aid Types Delta P
Background			
Female	0.0077	0.0009	0.0065
African-American	−0.2261*	−0.2229*	−0.2086*
Hispanic	0.0672	0.0665	0.0672
Independent	−0.0922	−0.1243**	−0.0954
Low-income aid applicant	−0.0945	0.1031**	0.2119*
Middle-income aid applicant	−0.1944*	0.0656	0.1866*
High-income aid applicant	0.0101	0.1906*	0.2268*
Age	0.0033	0.0046**	0.0029
Achievement			
ACT—low	−0.0012	0.0020	−0.0013
ACT—high	−0.2177*	−0.1953*	−0.2289*
National Merit	0.2600*	0.2600	***
Financial aid			
Any aid?	0.2271*		
Total aid		0.0619*	
Aid types			
Grant $			−0.0761
Loan $			−0.0340
Work study $			0.2599
Scholarship $			0.2355*

*Significance level = .01 **Significance level = .05
*** Variable omitted because of the high correlation coefficient (.9) with scholarship $.

In the third version, the impact of each type of aid was examined. Only scholarships were significantly associated with first-time attendance. However, the power of scholarship money in attracting well-qualified applicants was demonstrated by the large price response: applicants awarded scholarships were 23.5 percentage points more likely to attend for each $1,000 of aid awarded. However, high scorers on the ACT who did not qualify for the special National Merit Scholarships were much less likely to attend. This suggested that these students might be responsive to scholarship awards and that partial scholarships may influence these students to attend. The model statistics indicate that the discretionary aid awarded by the university explains why this institution's aid strategy was effective.

Conclusions and Implications

This study has two conclusions that merit consideration by financial aid administrators. First, this study demonstrates that it is possible to develop workable models for assessing the effects of student aid using extant data sources. This approach is a viable way for students affairs professionals to assess the impact of their financial aid strategies using existing data and a simple statistical procedure.

Second, this study suggests that the institutional investment of discretionary resources in student aid increases the effectiveness of aid

offers. Typically, public colleges and universities do not invest their own resources in student aid. However, this particular public university made a substantial investment of its discretionary resources in scholarships, which seems to be the reason why aid was viable.

This second finding reinforces the conclusions drawn from a recent national study of price response in persistence (St. John, Oescher, and Andrieu, 1992), which found that combined grant and scholarship awards were positively associated with persistence by traditional college-age students in private four-year institutions but not public four-year institutions. This difference was attributed to the facts that: 1) private institutions invested more of their own discretionary resources in student aid than public institutions; and 2) federal grants did not keep pace with tuition increases in the 1980s.

These findings suggest that institutional research on the impact of student aid on first-time enrollment represents a viable way of linking financial aid packaging decisions into other enrollment management strategies. An institutional research program can help colleges and universities make better informed choices about whether to invest in student financial aid, where to invest these funds, and how much to invest. For example, the aid strategy used by the public urban university attracted National Merit Scholars, but apparently lost African Americans and middle-income applicants who might have attended if these discretionary funds would have been redistributed.

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