Maximizing Enrollment Yield through Financial Aid Packaging Policies

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Using institutional data, this paper presents a model to enable researchers and enrollment managers to assess the effectiveness of financial aid packaging policies in light of student characteristics and institutional market position. The model uses discriminant analysis and a series of hypothetical financial aid award scenarios to predict the enrollment decisions of students who applied to an urban, comprehensive research institution with selective admissions criteria in autumn 2001. The findings suggest that changes in the need-based award policy would result in relatively small changes in enrollment yield.

Students today are faced with rising college costs and a relative decline in need-based student aid. At the same time, colleges are experiencing increased enrollment demand and declining state support. These factors may discourage enrollment of low-income and minority students despite the increasing importance of a college degree to social and economic mobility. Although many colleges are actively pursuing strategies to attract and retain a diverse student body, waning support in a number of states for affirmative action and targeted scholarships for minority students make this goal difficult to achieve. Understanding how students make enrollment decisions is a critical part of designing an enrollment strategy that enhances diversity on campus.

According to Hossler and Gallagher (1987), the factors important in the college choice process change as the student gets closer to the selection of an institution. This study focuses on issues connected to cost of attendance, which is a factor that is important throughout the college choice process but changes substantially in the final stage of the model.

The Role of Costs in College Choice

In the predisposition and search phase of the college choice process, students have a somewhat abstract notion of cost. Family income is an important influence on whether a student chooses to attend college and what types of colleges a student considers. Students in these two phases are working on a set of assumptions about college costs that may or may not reflect reality, due to the way students gather information about colleges and the complexity in the college pricing and financing schemes in American higher education.

As students get closer to choosing which postsecondary education institution they want to attend, they receive more concrete information about the cost of attendance, and cost moves from an indirect influence on the process to a direct

concern about affordability. If students are unable to afford their first-choice institution, they are likely to select a less expensive alternative or delay entry. Understanding the decision-making process of young people is complicated by the fact that differences in enrollment choices are associated with a complex array of background characteristics.

Family income is an important factor in whether a student will develop a predisposition to attend college. Further, if the student chooses to go to college, income will affect the type of schools to which the student applies and ultimately attends (Cabrera & La Nasa, 2000; Hossler, Braxton & Coopersmith, 1996; Hossler & Gallagher, 1987; Hossler, Schmit, & Vesper, 1999). Although a number of studies have estimated the marginal effect in enrollment associated with a change in net price (Hossler, 1984; Kane, 1999; Leslie and Brinkman, 1987; Manski & Wise, 1983; McPherson and Schapiro 1991; St. John, 1990), the role of financial aid in the enrollment decision is often difficult to isolate from other factors.

Although a number of studies have estimated the marginal effect in enrollment associated with a change in net price, the role of financial aid in the enrollment decision is often difficult to isolate from other factors.

Previous research indicates a need for a better understanding of the role financial aid plays in the college choice process. The literature illustrates that financial aid does influence college enrollment in general, especially for low- and middle-income students. However, it is important to note that this influence varies by type of aid, income group, and race/ethnicity. Generally these studies indicate that a decrease in net price is associated with an increased chance a student will enroll in college (Kane, 1999; McPherson & Schapiro 1991; St. John, 1990; Leslie & Brinkman, 1987). The impact of changes in award policy at individual institutions is less understood, and is likely to vary considerably depending upon institutional characteristics and the population served.

Somers and St. John (1997) argue that analysis of institutional data is essential to understanding the factors that influence enrollment at a particular institution. St. John (1992) provides a model for using existing institutional data to understand better the effectiveness of financial aid and improve enrollment management practice and theory.

Drawing on St. John's framework, this study presents a new model that enables institutions to assess the efficiency of their financial aid packaging strategies. The model examines the effect of financial aid on enrollment yield in light of student background characteristics by simulating effects on an individual student level. In addition, this model adds variables that indicate the relative position of the target institution in students' choice set (Braxton, 1990).

The study examines how financial aid packaging policies can be modified to more effectively address financial constraints of the neediest students. An ideal packaging policy would ensure that low-income financial aid applicants are not deterred by cost of attendance. While the data under investigation and

the subsequent analysis only applies to one institution, the approach may be replicated with data from other institutions. Most of the data used is readily available from institutional sources; however this study does draw upon some resources that may require the purchase of outside data or additional data collection by any institutions interested in following this approach.

The Case Study Population

A case study is used to examine the effects of financial aid on undergraduate enrollment. This study investigates enrollment yield at a major public research university in the Northwest (referred to as Research U to preserve the confidentiality of the institution involved) for the freshmen class of autumn 2001. Research U is an urban, comprehensive research institution with selective admissions standards. Research U offered admission to 10,937 freshmen for autumn 2001; of these, 5,583 (51%) returned their enrollment confirmation indicating their acceptance of the offer of admission. For the purposes of this study we included students who were offered freshman admission, applied for financial aid, and were considered financially dependent for the purposes of financial aid. Additionally, the study is restricted to those students who were considered in-state residents for tuition purposes, and awarded aid using the "traditional" student budget. These limitations yielded a sample of 2,971 undergraduate financial aid applicants and who were offered freshman admission to the Research U in autumn 2001.

Data Sources and Variables

Data were obtained through institutional sources. For students offered admission, the admissions office provided academic and background information, and the student aid office provided detailed award and budget information. The award data reflected the aid shown in the initial aid award letters sent to the students following their offer of admission. To construct some of the choice set variables described below, the Federal Interagency Committee on Education (FICE) codes of the schools listed on the FAFSA were matched with institutional information, including school sector and school control, using a "crosswalk table" developed by The Institutional Codes Bridge project in 1995.

The variables used in this analysis were categorized in the following groups:

1. Socio-demographic characteristics—race/ethnicity, gender, and expected family contribution (EFC). EFC is used as a composite measure of economic resources that takes into consideration student and parent income and assets, including college savings, family size, and age of older parent. Parent education and parent alumni status are also considered.
2. Academic predictors—high school grade point average (GPA) and admissions test scores (SAT or ACT).

3. Choice set—data from the FAFSA used to create measures to indicate the relative position of Research U in the aid applicants' choice of institutions to attend. These variables include the total number of institutions listed by the applicant on the FAFSA; the relative ranking of Research U on the FAFSA (first, second, third, etc.); the type of institution for the first institution listed by the applicant (i.e., two year, four year); and the control of the first institution (public or private).
4. Financial aid award—the percentage of total budget met with gift aid.
5. Accept—the dependent variable. This is a dichotomous outcome of whether or not the student accepted the initial offer of admission.

Packaging Policy

Research U packages student aid using an "equity packaging" formula. Need-based funds are awarded to students based on EFC ranking and other factors, such as loan debt for some funds. Student awards based on the "traditional" budget receive a maximum of 55% of the total budget in gift aid. Scholarship funds, including non-need based institutional gift funds and other "outside" aid, are not counted against equity, therefore some students receive gift awards greater than 55% of their budget.

Choice Set Variables

The choice set variables used in this study are an attempt to glean information about student preferences from the available data. While the listing of schools on the FAFSA is not intended to be a ranking, the data suggest that students may list schools in order of preference. For example, students who rank Research U higher on the FAFSA are more likely to accept their offer of admission and ultimately enroll. Of students who listed Research U as the first school on the FAFSA, 80.2% accepted their offer of admission. Students who listed Research U in the second, third, fourth, fifth, and sixth positions accepted their offer of admission at the following rates, respectively: 41.3%, 35.4%, 29.2%, 28.7%, and 21.3%. The relationship of Research U rank and acceptance is correlated at $r = .404$. In addition, students who listed fewer schools were more likely to accept the offer of admission, and only about one-third (32.9%) of the students who listed a private school first accepted the offer of admission from Research U, compared with more that two-thirds (71.7%) of students who listed a public school first.

Analytic Approach

Discriminant analysis was used to develop a model that allows for the prediction of enrollment decisions of applicants under a range of award policy variants, and estimates the effect on enrollment associated with a change in the financial aid award policy. Discriminant analysis is used to classify cases into two or more mutually exclusive categories, which is useful in both

interpretation of data and in classification of new data (Klecka, 1980).

The final model developed in this analysis is applied to estimate the effect on enrollment that would result from a change in financial aid award policy. Specifically, the model is used to estimate the change in enrollment yield for a subgroup of applicants who were awarded aid based on the traditional budget if the percentage of their need met by grants is changed. The analyses were run using "the percentage of total budget met by gift aid" as the financial aid variable and "accept" as the outcome variable. For the purposes of this analysis, the total amount of need-based gift aid available to freshmen applicants is assumed to be fixed. This means that as gift-aid awards increase for the neediest students, less gift aid remains available to students with more moderate needs. Thus more students will receive some type of need-based funding when 40% of need is awarded, and fewer will receive need-based funding when 70% of need is awarded.

Results

Discriminant analysis was used to create a function that could be used to predict admissions yield for a set hypothetical award scenarios. The analysis generated a function that correctly classified 70.3% of the cases and was significant at $p < .001$:

$$D = -.478E + .140G - .015P - .058A + .056H - .024T + .333N - .327U + .379Y + .731C - 1.104F - 2.629$$

Where E = Ethnicity, G = Gender, P = Parent Education, A = Parent Alumni Status, H= High School GPA, T = Test Scores, N = Number of Schools listed on the FAFSA, U = Research U rank on the FAFSA, Y = Type of First School Listed on the FAFSA, C = Control of First School Listed on the FAFSA, F = Percentage of Budget Met by Gift Aid.

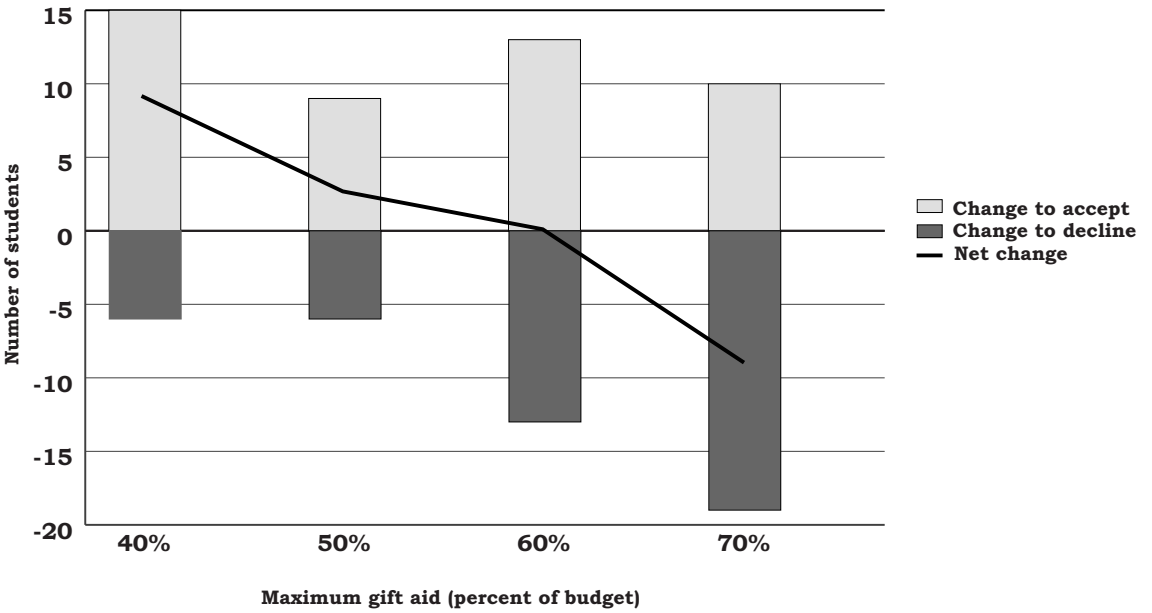
A set of hypothetical awards were then calculated using maximum gift awards of 40%, 50%, 60%, and 70%. These awards were calculated with the assumption that no new aid was available, so existing funds were reallocated based on EFC ranking. Discriminant scores were calculated using the estimates of the percentage of the budget met by need-based gift aid for each of the test award scenarios. These scores were compared to the group centroids for each state of the outcome variable, and cases were thus classified into the group with a centroid score closest to the calculated discriminant score for that case.

Limiting the analysis to those cases correctly classified using the observed data, net changes in the dependent variable are small, and by themselves they mask slightly greater changes in response to changes in the award. Reducing the maximum gift aid has the effect of providing gift aid to a slightly greater number of students, and resulted in small net gains in admission yield. Because this is a reallocation of funds rather than an

addition of new funds, both positive and negative effects on yield were expected. For this reason, in addition to the net change in yield, the number of cases that change from accept to decline, and from decline to accept, are reported.

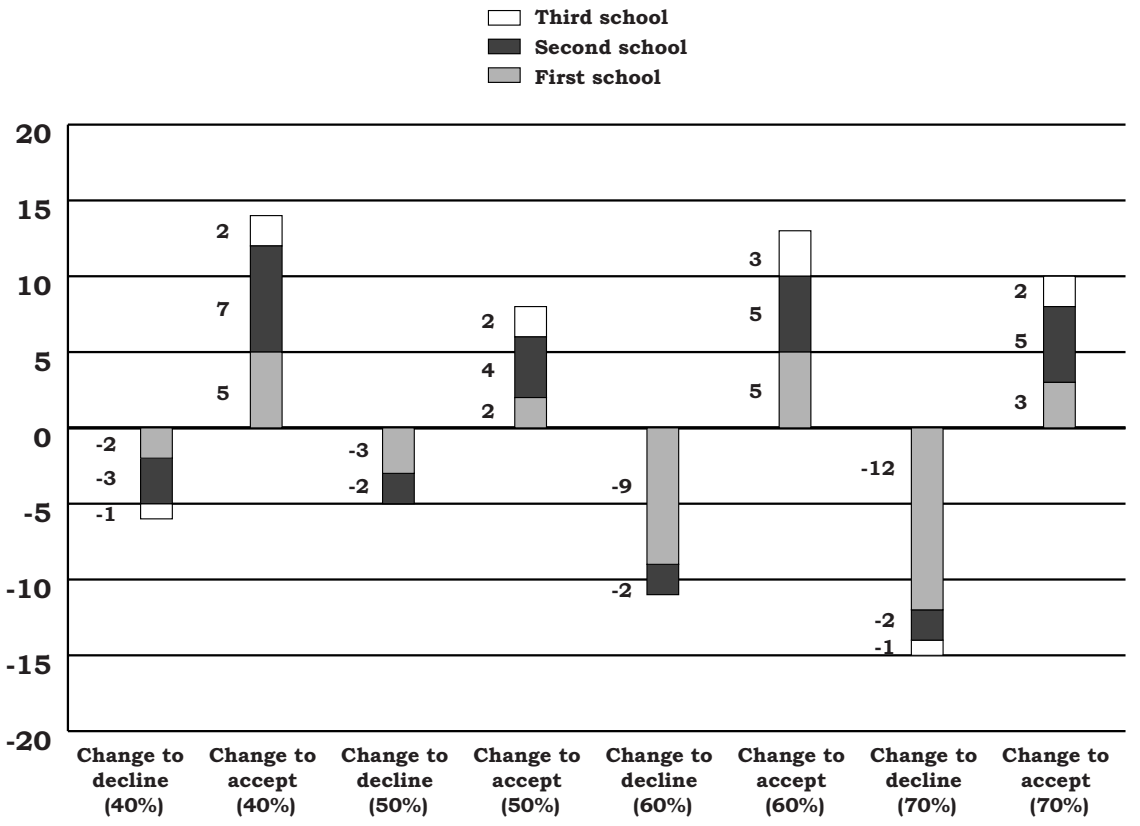
With a hypothetical gift aid maximum of 50%, there is a net gain in enrollment of three students out of 2,124 in this sub-group. Six students changed to decline and nine students changed to accept. At 40% gift aid, the net gain is nine students. Again, six students changed to decline, and this time 15 students changed to accept. An increase of the maximum gift award to 60% yields no net gain or loss with 13 students changing in each direction. With an increase in gift award to 70% of the cost of attendance, there is a net loss in the admission yield with 19 students changing to decline and 10 changing to accept (see Figure 1).

FIGURE 1
Enrollment Response to Change in Gift Award Maximum



A cross-tabulation of the direction of the change and Research U rank in the choice set reveals that students who changed their enrollment decision (in either direction) ranked Research U as one of their top three schools. At the 40% and 50% gift aid levels, more of the students who changed to accept had ranked Research U second. At the 60% and 70% gift levels, most of the students who changed to decline had ranked Research U first, while the majority of students who changed to accept had ranked Research U lower (see Figure 2).

FIGURE 2
School's Placement on FAFSA and Change in Enrollment

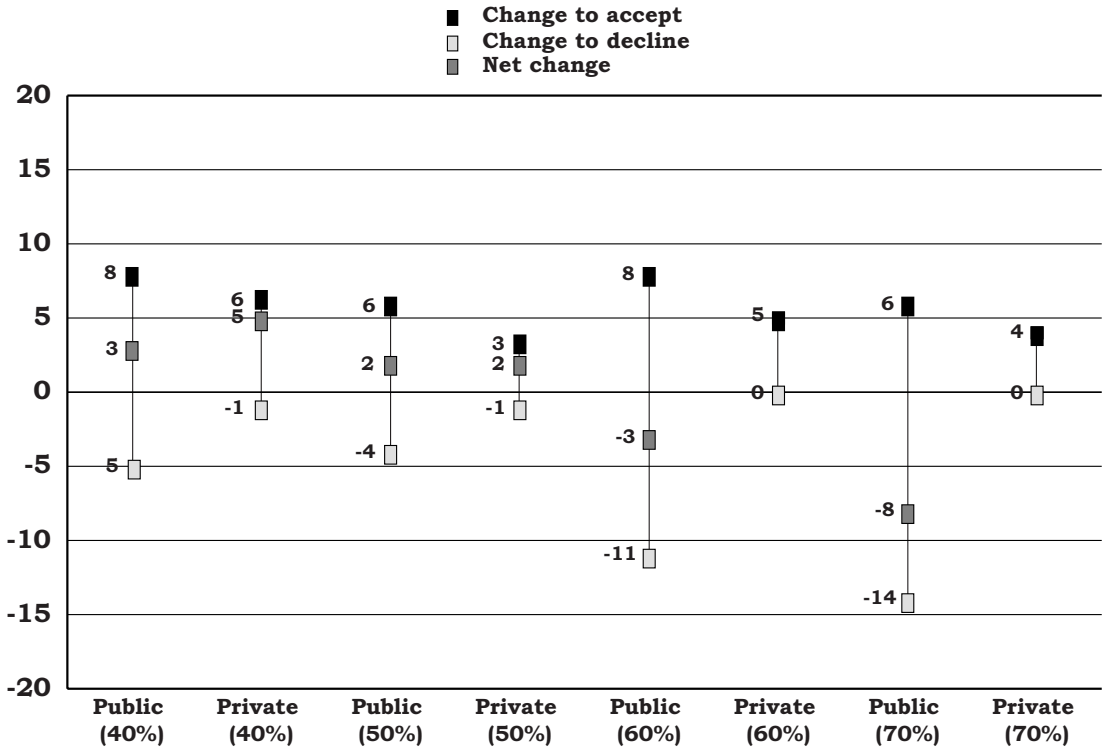


Whether a student listed a public or private school first on the FAFSA revealed an interesting pattern in enrollment changes. At the 40% and 50% equity levels, the net change was positive whether a student listed a public or a private school first. However, with simulated awards at 60% and 70% equity, the net effect was negative for students who listed a public school first, but positive for those who listed a private school first (see Figure 3).

Nearly all of the award changes affect only those students in the first EFC quartile, although one-third of the changes to accept in the 40% gift simulation occur in the second EFC quartile (see Figure 4).

No clear pattern is evident when looking at changes in enrollment by ethnicity, as the majority of changes in both directions are for Caucasian students. However, changes in enrollment are predicted for all ethnic groupings examined in this study (see Figure 5).

FIGURE 3
Control of First School Listed on FAFSA and Change in Enrollment

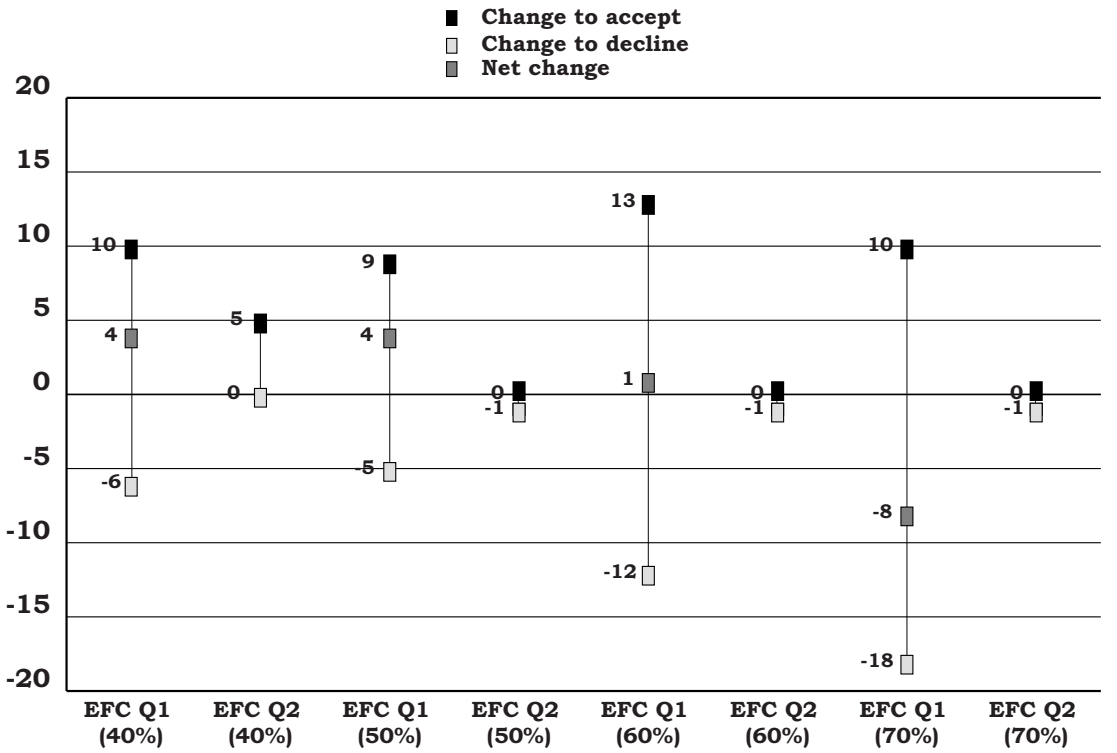


Findings and Discussion

Simulations based on the discriminant analysis indicate that using existing funds, changes in packaging strategy can be used to optimize admission yield. The model presented in this study demonstrates that the following variables may be used to predict enrollment yield: ethnicity, gender, parents' highest education attainment level, parents' alumni status, high school GPA, test scores, number of schools listed on the FAFSA, Research U's rank on the FAFSA, type of first school listed on the FAFSA, control of first school listed on the FAFSA, and financial aid award variables. The results of this analysis for Research U indicate that modifications of the award strategy may potentially improve yield at the margin, although the demonstrated effects are small. For Research U, spreading out the need-based aid to a greater number of students appears to positively impact admission yield.

This analysis lends support to the notion that insufficient aid may cause students to choose other alternatives. The negative effects of the reallocation of aid demonstrated by the simulations in the higher gift models tended to affect students who ranked Research U first, and those who listed a public school

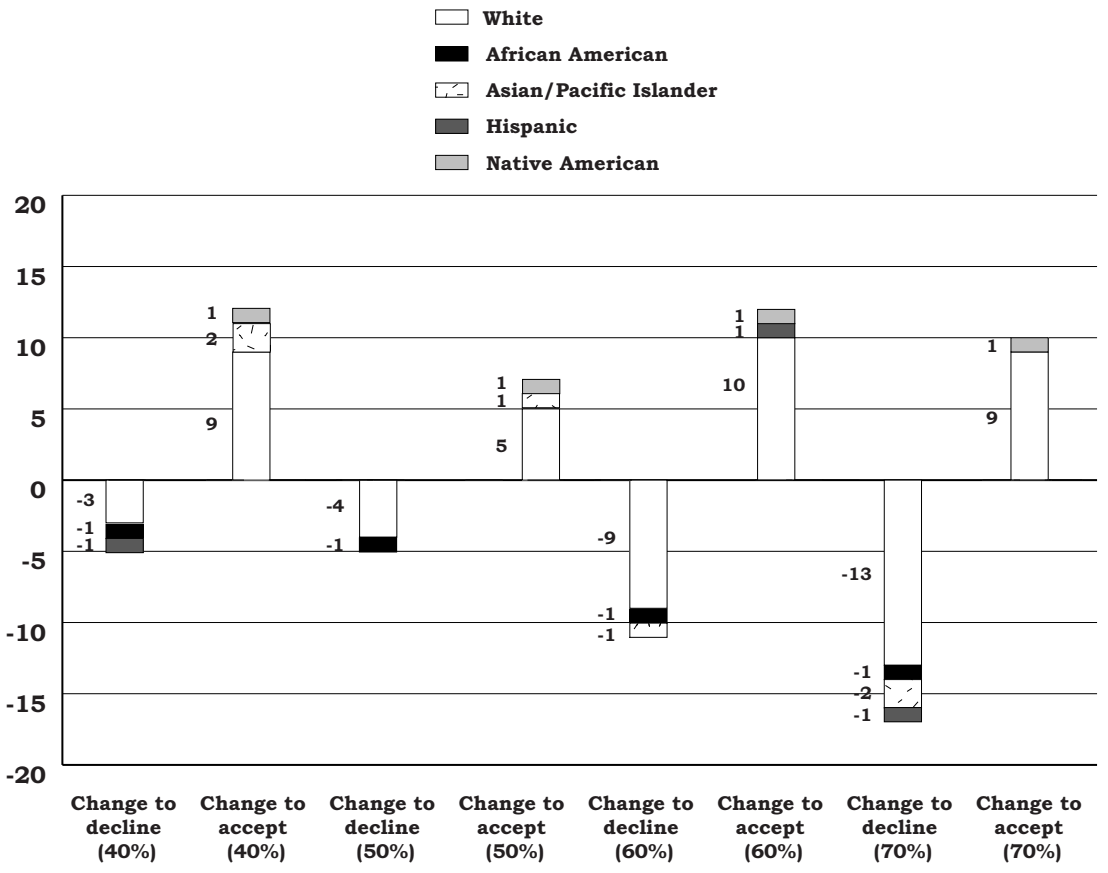
FIGURE 4
EFC Quartile (Q) and Change in Enrollment



first. The benefits in these models appeared to favor more heavily students who ranked Research U second or third, and those who listed a private school first. For this population the analysis demonstrates that spreading need-based gift aid to a larger number of students may help some students afford this institution, but it is not without cost. While there is a net gain in enrollment when aid is distributed more broadly, there are a few students who are priced out of the institution with this change in award policy, which indicates a need for additional resources to serve students with financial need better.

Overall, the simulations demonstrate that award modifications can positively affect student enrollment decisions and help enrollment managers ration limited funds. The approach presented here may be modified to address institution-specific concerns. The simulations for this model included only one financial aid variable: the percentage of the budget met by gift aid. The approach might also be used to assess the effect of replacing loan with grant, or other financial aid policy options an institution is considering. While the effects were small for this particular institution, using the selected set of

FIGURE 5
Ethnicity and Change in Enrollment



assumptions, a change in assumptions about availability of aid, or different institutional and student characteristics may yield very different results and merit further examination.

Conclusion

Over the years, enrollment managers have developed a number of methods to forecast enrollment and maximize yield. However, even with these new methods, enrollment managers face an almost impossible task. The model presented here is intended to add to the enrollment manager's toolbox by providing a means to compare alternative award strategies for institutional funds and thus arrive at the award policy that best supports the school's enrollment goals.

This new model is early in its development and needs further refinement to improve the accuracy of its predications. It should be coupled with more sophisticated award simulations that will allow the use of more detailed financial aid packages to more accurately reflect institutional award policy. The

model will also need to consider changes in student retention and program completion in addition to initial enrollment.

The simulations presented were based on a reallocation of existing aid funds. The model could also allow for simulations based on new funding, which might mitigate the negative enrollment effects associated with reallocation of funds.

Finally, it is important to consider the expense of changing strategy, especially if reallocation of funds is being considered. For example, if gains in yield are among higher-income students at the expense of the lowest-income applicants, the strategy may not achieve the desired goals.

Institutional studies on the effects of aid demonstrate that there is a great deal of variation in the impact of aid on enrollment from one school to the next (Somers & St. John, 1997). As this model is further refined, it will seek to help enrollment managers and researchers better understand the unique characteristics of their student population and the role of financial aid in attracting and retaining students to their institution.

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