



College Relations and Fund-Raising Expenditures: Influencing the Probability of Alumni Giving to Higher Education

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Abstract — Costs of fund raising and college relations data for each of three years from 17 colleges and universities have been combined with the schools' institutional characteristics to predict ratios of alumni donors to total alumni for each school. With factor analysis, expenditure and institutional variables were classified into three descriptor influences on giving: fund-raising effort, donor wealth, and school resources. The expected ratio of donors to number of available alumni for each school was then projected with the use of logit coefficients derived from the limited factor model. [*JEL* I21]

INTRODUCTION

MY RESEARCH ADDRESSES empirically a question about which there is little information. Are larger expenditures upon college and university development justified, and in particular do alumni activities pay off?

This study concerns a subset source of giving to higher education, the alumni, and specifically, the proportion of alumni on record who may be expected to give in any school year. The resources available for the promotion of alumni giving are professional and clerical personnel, office equipment and supplies, university space, and outside consultants or other services. These are employed in fundraising, alumni relations and similar activities conducted with the business and general community, faculty and students, and not-for-profit organizations. Such resources are constrained by each school's type, size, endowment, ability to use resources effectively, donor wealth, and educational and general (E & G) budget.

For more than 30 years, The New York-based Council for Aid to Education (CAE) has published its annual report *Voluntary Support of Education*.¹

This has greatly facilitated motivational studies of college philanthropy. While most research has focused on donor characteristics and behavior, *Voluntary Support* data has supplemented studies of colleges' influence on philanthropy with extensive institutional information. Sources of support, restrictions on gifts, and vital statistics about the receiving institutions are provided for most American colleges and universities, which are grouped into ten "Carnegie" peer classifications.²

Statistics reported by CAE, however, do not yet include information about collegiate expenditures for the purpose of promoting gifts. Generally, these fall into three cost categories. Fundraising costs include those designed to obtain private gifts from all sources, for all purposes, and for immediate or deferred purposes (such as bequests). Alumni relations costs cover informational activities for the benefit of alumni(ae) and especially encourage participation in and support for college activities and plans. Other relations costs arise from informational activities concerned with attracting support for the institution from non-alumni, including parents, faculty, staff, students, government officials, and the business community.

Costs associated with the three activities just mentioned are not usually available to researchers. For one reason, schools may not be willing to share details about successes or shortcomings in their efforts to secure funds and other support.³ They may be uncertain as to how public release of their data on fund-raising costs or methods would affect their own support or share of support relative to others.

In 1990, The Council for Advancement and Support of Education (CASE) published *Expenditures in Fund Raising, Alumni Relations, and other Constituent (Public) Relations*. This study which was funded by a grant from Lilly Endowment, Inc., included central tendency data for 51 participating colleges and universities for each of three years. Instructions to participating schools provided definitions for each of the three classes of costs to be reported and thoroughly described specific types of expenditure. The result was a uniform and consistent report on cost allocations.

By obtaining the CASE "Expenditures" data directly from 18 of the 51 reporting schools, most of them reporting for each of the academic years 1985–86, 1986–87 and 1987–88, I was able to perform statistical analysis of relationships between various kinds of giving associated with combinations of fund-raising costs and institutional variables. My specific concern in this research was with the decision of alumni to give or not to give.

The goal of this study is to estimate, insofar as possible, the proportion of alumni of record who actually donate to any given school (a dependent variable). Explanatory (independent) variables include fundraising and constituent relations costs, along with a number of institutional variables.

STATE OF THE LITERATURE ON GIVING TO HIGHER EDUCATION

Because giving for educational purposes is a philanthropic activity, it is useful to review studies that deal with altruism. Many investigators, especially economists, search for motives — whether altruistic or not — that explain giving as an act of consumer behavior. They assume that the act of giving creates positive utility for the giver.

Much literature in recent years has focused on an *interdependence thesis* (Andreoni and Scholz, 1990; Becker, 1974; Boulding, 1962; Hochman and

Rodgers, 1973; Reece, 1979; Schwartz, 1970; Scott, 1972). The economic person gives as a response to others whose income or wealth is less than his or hers. Such acts are Pareto-optimal as long as the income or wealth of the recipient remains below that of the donor. Some have even classified giving as a luxury good to the donor, citing recipient income elasticity greater than one with respect to giving (Becker, 1974; Reece, 1979).

Many who have included a price variable in their studies have used a taxation rate for this purpose, because giving is believed to be directly related to the marginal tax rate on donor income (Boskin and Feldstein, 1977; Clotfelder and Feldstein, 1986; Feldstein, 1975; Hood *et al.*, 1977; Reece, 1979; Schwartz, 1970).

While most studies of philanthropy are concerned with donor behavior as exemplified by those just cited, giving to educational institutions has been examined also for influences on giving that are generated by recipients. This orientation is not surprising given the schools' abilities to shape the perceptions people have about them and the reactions of donors to different fund-raising approaches by school development offices.

Studies of educational philanthropy that deal with donor characteristics have stimulated efforts by college development officers to know more about their pools of alumni(ae) and other potential donors. Colleges then have sought to appeal to their principal characteristics. Some have found, for example, that *emotional attachment* to the school is important (Beeler, 1982). Also, donor *attitudes toward their own educational experiences* are significant (Beeler, 1982). The latter is the basis for findings of connections between giving and *involvement in student activities* (Haddad, 1986; Hall, 1967; Keller, 1982), *residence on campus* (Widick, 1985), *scholarship or grant awards* (Beeler, 1982), *major subject* (Deel, 1971; Haddad, 1986), and *year of graduation* (Beeler, 1982; Haddad, 1986; Keller, 1982; Yankelovich, 1987).

Studies on the receiving end are less numerous. These incorporate institutional features of colleges, such as endowment, E & G expenditures, enrollment, and "prestige", a more nebulous factor that may be proxied by the institution's age or research funds available.

Additionally, a number of variable costs are associated with fundraising, alumni relations, and community relations, which are assumed to be

justified by their direct relationship to giving. Some of the most revealing work in this area has been produced in recent years by doctoral dissertations dealing with the economics of education. For example, recent theses have emphasized that maintaining close contact with alumni and producing high-quality alumni publications with information about college plans, philosophy, and objectives encourage giving (Aug, 1987; Carlson, 1978).

One dissertation — winner of a CASE Grenzebach award — examines a comprehensive range of college-determined variables that are associated with gifts received by public, research/doctoral universities (Woods, 1987). This work, covering 77 schools, combines dozens of variables into six categories *a priori*:

Financial resources — number of alumni, federally-sponsored research grants, legislative appropriations, and student aid funds.

Inherent institutional characteristics — age, endowment, in-state and total enrollment, cost of attendance, E & G expenditures, number of advancement professional staff.

Organizational components — fund-raising and constituent relations goals, planning, staffing, budget, experience, and structure.

Method components — solicitation techniques such as direct mail, telephone, written proposal, capital campaign, and use of trustees, faculty, president, students, volunteers.

Gift emphasis components — Annual, deferred, corporate, foundation, and major giving emphasis.

U.S. regional locations.

Wood's research finds that, in general, two factors are especially crucial to success in fund-raising: financial resources and inherent institutional characteristics. Some aspects of the organizational structure of the college development office also were significant.

Proposing a model in which donations to colleges are the outcome of the simultaneous solution of supply and demand functions, Yoo and Harrison (1989) tested the model with cross-section data from 13 private colleges. Donors were said to demand the attention and prestige supplied by colleges. The donors try to maximize recipient services while colleges maximize donations. Equations were estimated with two and three-stage least squares techniques. Yoo and Harrison found that their price variable, donations per donor, explained significantly the value of recipient services rendered by

colleges to donors, in both supply and demand equations.

Despite the increase in research into giving to higher education, more is required. Notably lacking are findings on developmental activity influences on (1) proportions of alumni who give to their *alma mater*, as well as (2) amounts given per alumnus or alumna. The identification by Woods of "components", which are groups of variables to account for giving, suggests a more formal procedure, factor analysis, as a basis for formulating the groups. Her findings that financial resource variables and inherent institutional research variables, along with the Yoo-Harrison conclusions also suggest some of the influences to be examined in this study.

EMPIRICAL APPROACH

Colleges wish to maximize an objective function consisting of some measure of success in attracting money and property gifts from corporations (matching or otherwise), from alumni and other individuals (current and bequests), and from other organizations. These schools must allocate scarce resources to fundraising, alumni relations, and other relations activities. These costs, along with selected institutional variables, are arguments for determining colleges' alumni participation rates.

A preliminary correlation matrix exhibited a strong linear relationship among a number of our variables. When a large number of explanatory variables present such a multicollinearity problem, the relative contributions of some variables are clouded. In these circumstances, a solution is to omit some variables that are collinear. However, dropping variables may result in information loss, and the model may in consequence be misspecified. Factor analysis goes a long way toward solving the problem.

Factor analysis is employed here as a means to identify a few broad influences (factors) underlying the large number of institutional variables contained in my constraints. By clustering a larger number of variables into a few homogeneous sets, each set is identified as a *factor*. This accomplishes two objectives. First, I reduced the number of variables used in the study, because any one variable may be substituted for a number of other homogeneous ones. Also, I established a few broad, interpretable characteristics to identify my objective function.⁴

Once the set of "super variables" representing factors are produced, they are used to extend my analysis of the *proportion of alumni on record that give to their alma mater*. The next task is to predict this proportion for any school (i), given its fundraising and relations expenses and institutional factors.

The logit procedure provides a response probability to be modeled (Rubinfeld and Pindyck, 1981). In this case, it is the proportion (P_i) of alumni that will donate to a school, given information (X_i) about the costs of fundraising, costs of constituent relations, and certain institutional characteristics of the school. The logistic probability function is defined as:

$$P_i = 1/(1 + e^{-z}),$$

where z is a linear function of X_i , namely,

$$z = a + B X_i.$$

Solving for e^z ,

$$e^z = P_i/(1 - P_i).$$

By taking the natural log of e^z ,

$$z_i = \log (P_i/(1 - P_i)) = a + B X_i.$$

The regression parameters provide an estimate of the logarithm of the odds that a particular choice to give will be made. From that I have a predicted proportion of alumni making a donation to a specific school, given the school's characteristics.

The final and most important task is performed with logit regressions which produce the ratio predictions just described, based on my sample of colleges and universities. These predictions may be compared with the actual ratios of alumni giving to alumni of record for each school.

DATA SOURCES

Eighteen schools gave me copies of data that they had submitted to CASE for its 1990 report. One school could supply only the 1987–88 data, and one supplied only the 1985–86 and 1986–87 data. The other 16 colleges and universities furnished data on costs of fundraising and college relations for each of the three years as summarized in the CASE report.

For statistical analysis, I treated data from each school for one year as a separate observation. In consequence, there are 51 observations in the analysis: 48 for 16 schools, 2 for one school and one for another.

The data set consists of figures for the three years from both CAE and CASE reports. Collectively, these sources supplied information about various sources and amounts given to higher education, institutional characteristics of the schools including endowment, enrollment, and educational and general expenditures (E & G). Each school is identified by a dummy variable with its Carnegie class. Table 1 provides the data used, variable designations, and sources, and major characteristics of the data.

The college development costs for fundraising, alumni relations and other constituent relations were obtained for 1986, 1987 and 1988 from the 1990 CASE report. The remaining data (gift amounts from different sources and institutional characteristics) came from CAE reports for 1985–86, 1986–87 and 1987–88 as indicated above.

EMPIRICAL RESULTS

The enrollment of full-time equivalent (F.T.E.) students is the conventional way of denoting size of schools and, indeed, is the primary basis for funds allocation to public schools. In order to abstract from the dominant influence of size, each of the independent variables, except Carnegie classification dummies, are expressed in total dollars, and all were denominated in terms of the schools' full-time enrollment.

Classical factor analysis was employed to classify these variables into several broad categories that influence the proportion of alumni who gave.⁵ The dominant influence of size in association with number of donors relative to total number of alumni, led to a search for a way to abstract from size altogether. Three factors were finally specified — after experimenting with the size-denominated variables — as most representative of broad, non-size characteristics that would describe schools' influence on giving.

Table 2 includes most of the variables found in Table 1 taken from CASE and CAE reports for our 51 observations from 1985–86 through 1987–88. Setting the number of factors equal to three, thirteen variables — plus the Carnegie classifi-

Table 1. Data used, variable names and data sources

CASE 1990 Report for 1985–86, 1986–87 and 1987–88
 TOTGIV — Total giving in \$(000)
 FRCOST — Fund raising costs \$(000)
 ALCOST — Alumni (as) relations costs \$(000)
 OTHCOST — Other constituent costs \$(000)
 CAE Annual Reports for 1985–86, 1986–87, 1987–88
 ENDOW — Endowment market value \$(000)
 EG — Educational and general expenses \$(000)
 ENROLL — College enrollment in full — time equivalent students
 ALUMREC — Number of alumni(ae) of record
 ALUMDON — Number of alumni(ae) donors
 ALUMGIV — Aulmni(ae) gifts \$(000)
 OTHIND — Other individual gifts \$(000)
 ORGGIV — Gifts from organizations \$(000)
 CURROPNS — Current operations support \$(000)
 CAPSUPP — Capital purposes support \$(000)
 CORPMAT — Corporate matching gifts \$(000)
 PLANGIV — Planned gifts \$(000)
 PROPGIV — Property gifts \$(000)
 ALRELTOT — Revenues from alumni(ae) activities
Carnegie Classifications
 RSDOCPUB — Public research/doctoral institutions
 COMPPUB — Public comprehensive institutions
 LBARTPUB — Public liberal arts institutions
 PROFPUB — Public professional and specialized institutions
 RSDOCPRV — Private research/doctoral institutions
 COMPPRV — Private comprehensive institutions
 LBARTPRV — Private liberal arts institutions
 PROFPRV — Private professional and specialized institutions

Table 2. Rotated factor matrix

Variables (*)	F1: Fund raising effort	F2: Donor wealth	F3: Resource availability
FRCOST/ENROLL	0.86*	0.28	0.14
ALCOST/ENROLL	0.82*	0.31	0.13
ENDOW/ENROLL	0.70*	0.29	0.01
ALUMGIV/ENROLL	0.79*	0.35	-0.01
CAPSUPP/ENROLL	0.66*	0.46	0.37
CORPMAT/ENROLL	0.94*	0.04	0.09
OTHIND/ENROLL	0.37	0.88*	0.20
CURROPNS/ENROLL	0.41	0.77*	0.35
PLANGIV/ENROLL	0.43	0.85*	0.09
PROPGIV/ENROLL	0.31	-0.57*	0.40
EG/ENROLL	-0.08	0.02	0.94*
OTHCOST/ENROLL	-0.07	0.26	0.90*
ORGGIV/ENROLL	0.31	0.02	0.86*

* Primary factor loadings.

cations — are shown as they loaded into the three factors. Observe the loadings: these are the correlations between the factors and the variables. Note also the proportion of the variability explained by the factors.

Table 2 is the rotated factor matrix obtained from intercorrelation among the variables. Factor one

contains six variables, most of which are clearly connected with school fund-raising efforts: fund-raising costs; endowment; alumni giving and cost of alumni relations; and corporate matching gifts.

Factor two includes four variables, three of which are linked to donor wealth characteristics: bequests, property gifts and gifts of other individuals besides

the alumni pool. The latter group is not targeted as extensively as alumni, and, because of diversity of interests, is thought to be motivated to contribute more as a result of being wealthy than because of anything the school does.

The third factor includes educational and general expenditures and other relations expenditures over and above alumni relations and fund-raising activities. Including organizational giving in this category is consistent with the appropriations character of these gifts. This category provides information about the availability and use of funds on a more or less regular basis and the efficiency with which the school uses its resources.

As a comparison with the factor-analytic method, I prepared a stepwise regression with the maximum R^2 improvement procedure. Because this model looks for the "best" one-variable model, the "best" two-variable model, etc., I wished to see if representative variables from each of the three factor classes would enter the "best" explanatory equations at an early stage. The stepwise regression results confirmed the use of these variables.

By using only one selected variable per factor, my experiments with several regression equations indicate the results are almost as good with three variables — one for each factor — as with all thirteen variables shown in Table 1. These are: ALCOST/ENROLL, representing factor one and fund-raising effort; PLANGIV/ENROLL, representing factor two and donor wealth; and OTHCOST/ENROLL, representing resource availability. In addition, the dummy variables representing Carnegie classifications are included.

Using the parameter estimates, *Logistic Procedure* calculates the estimated logit of the proportion of alumni of record — for any given school — that will donate to that school. Recall that each of our 51 school observations exhibits its own number of response observations in terms of donors per 100 alumni.

Using a base of 100% of the alumni per school for 51 schools, the dependent variable predicted by the model parameters is the ratio of donors per 100 alumni of record, 26.67%. By summing the number of donors per 100 alumni for each of our 51 schools there are 1360 donors (26.67% of 5100) and 3740 nondonor observations.

The logit procedure computes an index of rank correlation for assessing the predictive ability of the model as follows:

$$c = (nc + 0.5 (6 - nc - nd))/t,$$

where t is the total number of pairs with different responses. With 5100 alumni responses as our basis, we have 1360 donor events times 3760 no-donor events, or

$$t = 5,086,400.$$

nc is the number of "concordant" pairs and nd is the number of "discordant" pairs (explained below).

In our use of an "events/trials" model — the ratio of donors to total alumni — P_i is the *observed* response ratio of donors to alumni for school i , and P'_i is the ratio *predicted* by the model for that school. In any pair of trials — e.g., comparing ratios for School A with School B's ratios — if the *predicted* ratio for School A (P'_A) is larger than the *Predicted* ratio for School B (P'_B), then the pair comparison is said to be *concordant* if the *observed* ratio for School A (P_A) is also larger than the *observed* ratio for School B (P_B).

Symbolically, the following three terms are indicated by these conditions:

Concordant if

$$P'_A > P'_B \text{ and } P_A > P_B,$$

or if

$$P'_A < P'_B \text{ and } P_A < P_B;$$

Discordant if

$$P'_A > P'_B \text{ and } P_A < P_B,$$

or if

$$P'_A < P'_B \text{ and } P_A > P_B;$$

Tied if

$$P'_A = P'_B \text{ and } P_A = P_B.$$

In this case, the index value ($c = 0.69$) and percentage of concordant pairs (68%) show a high degree of predictive probability for the model.

Table 3 provides the logit regression results, including the parameter estimates and test of the estimates for all thirteen variables along with data

for the three preferred variables. Observe first that all of the coefficients on the variables except two of the Carnegie classification dummies are significant at the 1% level.⁶

FINDINGS OF INTEREST TO COLLEGE DEVELOPMENT OFFICERS

Table 3 shows that each of the three variables chosen to represent principal factors are significantly different from zero at the 1% level. These variables are: (1) (ALCOST/ENROLL) representing fund-raising effort, (2) (OTHCOST/ENROLL) for resource availability, and (3) (PLANGIV/ENROLL) for donor wealth. Moreover, the same three variables, along with the Carnegie classifications, are the only ones with significant coefficients when all 13 variables are included.

Recall that the dependent variable is a response probability to be modeled. In this study, it is the expected ratio of alumni donors to alumni of record for each school. The results show that the reduced factor analytic model is as successful in predicting which schools are likely to have above average alumni participation as the full variable model.

Our earlier discriminant analysis revealed that the factor, fund-raising effort discriminates between low- and high-donation schools with the greatest magnitude. This is consistent with the large, significant, and positive relationship between alumni costs per full-time student enrolled and the ratio of donors to alumni of record shown in Table 3. This is the most striking result of our study: that expenditures on alumni activities have greatest significance in explaining success for this sample of schools.

What are the activities for which these *alumni costs* are incurred? They are informational activities for alumni such as plans and activities of the school, promotion of contacts among alumni, and encouragement of alumni to participate in school affairs. We learn from CASE's guidelines that such activities include alumni records maintenance; alumni newsletters; promoting membership in clubs; participation in events such as reunions and committee meetings; organizing alumni travel, job placement, non-credit instructional programs; and recognition of alumni.

Our second major finding is that expenditures on "other" development activities is negatively related to success in securing a higher participation rate among alumni. *Other relations costs* relate to non-

alumni. According to CASE, these include, "... the general public, parents, faculty, staff, students, elected and appointed officials, church groups (in the case of church-affiliated institutions), and the business community." The objective of these activities is to cultivate support among all of these groups.

This finding that other activities have a significant negative impact on alumni participation suggests that alumni expenditures are more likely to be substitutes for rather than complements to costs of other constituent relations. Our personal contacts with some of the schools in our sample found very low staffing levels with tendencies to specialize and concentrate limited resources on particular constituencies.

Fund-raising costs are associated with activities to secure private gifts of all types and for all purposes occurring in the development office, athletic associations, academic units, fund-raising consortia, and other affiliates of the school. These include contracts for external services; fund-raising events such as dinners, auctions, phonathons, and concerts; and research and cultivation of donor prospects. Also included are production and distribution of fund-raising literature, expenses for volunteer groups, and tangible recognition of donors.

Surprisingly, our schools exhibit no significant relationship between fund-raising activities and percentage of alumni of record contributing. Although our study shows a significant net dollar return to fund-raising activities, alumni contacts providing information and recognition on a continuing basis are seen as far more important to participation than intermittent festivals and special fund raisers.

Planned giving (bequests) is negatively and significantly related to the alumni participation rate, both in the full equation model and the factor analytic model. This is not surprising, given the formal nature of many contracts between donor and school. Though bequests reveal wealth and are often an indicator of sizable annual gifts from some alumni, bequests act to reduce the number of annual gifts. Planned giving can provide the donor with income for life, a charitable income tax deduction and a way to avoid capital gains taxes. In the circumstances, many alumni making bequests are likely to forego annual giving.

Table 3. Logit regression results for full-variable and factor analytic models
A response probability model: ratio of donors to alumni of record

Variable	Full-variable model*	Factor-analyte model*
Intercept	-4.617	-3.834
EG/ENROLL	1.689	1.258
FRCOST/ENROLL	-0.004	
	0.006	
ALCOST/ENROLL	-0.254	
	0.615	
OTHCOST/ENROLL	5.410	7.158
	1.161	0.616
ENDOW/ENROLL	-0.732	-1.685
	0.736	0.435
ALUGIV/ENROLL	-0.003	
	0.002	
OTHIND/ENROLL	-1.210	
	6.503	
ORGGIV/ENROLL	-1.172	
	6.494	
CURROPNS/ENROLL	-1.529	
	6.488	
CAPSUPP/ENROLL	1.382	
	6.481	
CORPMAT/ENROLL	1.484	
	6.488	
PLANGIV/ENROLL	3.659	
	2.040	
PROPGIV/ENROLL	-0.265	-0.039
	0.079	0.012
RSDOCPUB	0.187	
	0.280	
COMPPUB	0.785	0.580
	0.285	0.207
RSDOCPRV	0.061	-0.153
	0.336	0.268
COMPPRV	0.430	0.229
	0.296	0.206
LBARTPRV	0.583	0.440
	0.302	0.222
Model chi-square ratio test**	0.630	0.850
Association of predicted probabilities and observed responses (percentage concordant pairs among 1360 × 3740)	0.247	0.190
Number of donors relative to a base of 5100 alumni of record (51 schools and a base of 100 per school)	460.838	412.382
Number of non-donors per 100 × 51	0.675	0.667
	1360.000	1360.000
	3740.000	3740.000

*Standard errors are listed below each coefficient.

** Chi-square statistic significant at 0.01 level.

In general, *private schools* in our sample revealed a significantly better participation rate than did *public schools*. However, being identified as a *research/doctoral public school* raised the probabil-

ity that alumni of record would donate. Our sample is small, however; only three schools with eight data observations were identified as *research/doctoral public*.

CALCULATING A CHANGE IN PARTICIPATION RATE FOR A PARTICULAR SCHOOL

Logistic Procedure, as explained above, provides predicted proportions of alumni at each school in our sample who would donate to their school. Table 3 provides a logit regression model developed from the "preferred" variables of the factor analytic model for each school and a dependent variable which is the ratio of that school's donors to alumni of record. With the regression coefficients derived from all of the schools, logistic procedure calculates a predicted alumni participation ratio for each school which can then be compared with its actual rate.

How might a development office influence participation? Consider a change in one of the variables, *Alumni Costs*, for example. Let's use from Table 3 the coefficient on *Alumni Costs per F.T.E.* to calculate the effect on the alumni participation rate at one of our research/doctoral public universities from an increase of, say, \$10.00 in alumni expenditures per student.⁷

Recall that the natural log (Y) of a school's (i) alumni participation rate (P) is a linear function of the change in the log of the participation rate (X) when alumni cost per student changes:

In symbolic terms:

$$\text{Log}_e (P_{i1}/(1 - P_{i1})) = Y_1 \pm X_i = Y_2,$$

and

$$\text{Anti Log}_e Y_2/(1 + \text{Anti Log}_e Y_2) = P_{i2},$$

and

$$\Delta P_i = P_{i2} - P_{i1}$$

In numerical terms:

$$\begin{aligned} \text{Log}_e (0.25067/0.74933) &= -1.09504 + 0.071575 \\ &= -1.02347, \end{aligned}$$

and

$$\text{Anti Log}_e (-1.02347) = 0.35935/1.35935 = 0.26436,$$

and

$$0.26436 - 0.25067 = 0.014.$$

Consequently, a ten dollar change in this university's alumni relations expenditures per full time equivalent student could increase the alumni participation ratio from about 25% to about 26.4%.

IMPLICATIONS FOR DEVELOPMENT OFFICERS

Use of these parameters, such as the logit change of 0.071575 used above, is based on our particular sample and historical time period of observations. It would not be so useful, therefore, to use these coefficients to predict a particular school's outcome from future alumni relations expenditures. A better procedure for the school development officer assisted by a statistician would involve building their own model along lines of ours but with their own historical time series data or with current cross-section data from a consortium of peer schools.

Development officers, though they may recognize special factors in their own schools that lead to donation results quite different from our schools' experience, can nonetheless apply our methodology to their own data.

Table 4 lists the predicted proportions of alumni at each school for a given year who would contribute to that school. These predictions are based on the logit regression model of Table 3.

An index of "efficiency" is constructed as the actual ratio of the donor alumni percentage for each school to the predicted response rate of donors for that school. Any index above 100% implies that the school is performing well or at least better than the limited factor-logit model would predict.

SUMMARY AND CONCLUSION

The inclusion of fund-raising and college relations costs in studies of how schools influence alumni gift decisions is of paramount importance. A preponderance of education philanthropy research has focused on the characteristics of donors. Investigating the recipients' roles in giving to higher education has been limited generally to institutional characteristics.

In collecting and merging both institutional characteristics and college expenditure data, this study makes possible a more comprehensive explanation of how colleges influence giving. In terms of the statistical analysis performed here, the most influential variables on the school side were

Table 4. Logit probabilities that alumni will give and efficiency indexes of schools

School and Carnegie class	1986 %			1987 %			1988 %			Index
	Full model	Limited model	Actual ratio	Full model	Limited model	Actual ratio	Full model	Limited model	Actual ratio	
106	30	31	51	33	35	31	29	30	25	0.83
201	22	23	26	23	24	26	23	24	26	1.08
308	7	8	9	5	7	5	6	7	7	1.00
407	53	45	60	72	58	67	56	55	63	1.15
506	19	21	15	20	21	17	19	21	14	0.67
602	12	12	2	12	12	5	12	12	10	0.83
705	16	15	18	16	16	18	16	16	22	1.38
805	33	36	30	34	35	30	31	36	32	0.89
906	28	28	27	24	23	27	37	32	31	0.97
1006	27	27	29	27	27	27	30	27	29	1.07
1102	12	12	16	12	12	22	12	12	16	1.33
1207	18	20	10	18	19	16	21	18	18	1.00
1307	41	44	43	23	31	23	23	30	23	0.77
1401	37	36	31	39	36	37	40	35	39	1.11
1507	44	41	45	50	55	50	42	46	43	0.93
1605	25	18	25	24	18	25	24	18	24	1.33
1705							35	46	31	0.67
1801	23	25	24	24	25	20				0.80

identified, and cross-section models were developed from 18 schools' data for three years. These models go a long way toward explaining why smaller or larger proportions of alumni donate to their schools.

Facilitated by factor analysis, thirteen variables — each one uniquely related to each school — were reduced to a set of three groups of variables. Within groups, homogeneity is indicated by the high degree of intercorrelation among cross-section variables. This procedure allowed selection of one variable from each group and, in consequence, the reduction of variables from thirteen to three. The analysis suggested that a generalized identity could be ascribed to each of the three groups and that each group could be proxied by a selected variable. Based on the variables contained, the three groups were identified as: Fund-Raising Effort, Resource Use, and Donor Wealth.

A logistic model was then used to predict the proportion of any school's alumni of record that would make a donation to the school. The observed response — a school's actual percentage of alumni who were donors in any one of the three years under study — was compared to the predicted percentage of donors giving to that school for that particular year as computed by the model. Consistent with the factor analysis procedure, logit analysis performed equally as well with a single-variable-per-factor model as with use of all thirteen variables.

The three-factor analytic variables used to predict the number of donors per 100 alumni of record were alumni costs per full-time equivalent student, other college relations costs per student, and planned giving per student. Each of these variables' coefficients were significant at the 0.01 level of statistical significance.

The effectiveness of the model's predicting ability was only slightly enhanced by adding the school Carnegie classifications. These were added to the logit model as dummy variables on which the coefficients were significant at the 1% level for research, doctoral-granting public schools and liberal arts private schools and significant at the 5% level for comprehensive private schools.

This study has provided useful knowledge about particular results of college and university spending on alumni relations and fund-raising activities. The findings fail to support any null hypothesis that such expenditures have little influence on the number of giving alumni relative to total number of alumni.

Besides analysis of participation, similar analysis is needed to discover the distinguishing characteristics of high-dollar gift schools and low-dollar gift schools. As more information is developed relative to college and university characteristics and behavior, development units on campuses may discover more effective ways to generate philanthropic responses.

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NOTES

1. The Council for Aid to Education, Inc. is a non-profit organization which promotes financial and advisory aid from business enterprise in support of education at all levels.
2. The Carnegie Foundation for the Advancement of Teaching classifies four-year colleges into eight classifications, public and private: Research/Doctoral, Comprehensive, Liberal Arts, and Specialized.
3. In our earlier study (Yoo and Harrison, 1989), we found that schools for which we had data were reluctant to have these statistics identified with them. In consequence, I have assured schools participating in this study that individual school data would not be revealed.
4. I assume that (1) there is a causal relationship linking the limited number of factors to each of the numerous observed institutional variables, and that (2) these variables are expressed as linear functions of at least one factor that is common to all variables and one factor that is uniquely associated with each variable. The SAS computational package produces factors based on correlations between variables. The highly correlated variables tend to be associated with the same factor.
5. The Statistical Analysis System (SAS), version 66, PROC FACTOR procedure was used to classify these variables. The model used is principal axis factor analysis with an equamax rotation technique and the number of factors equal to four.

6. In this version of the SAS *Logistic Procedure*, I use a model in which the dependent variable is a ratio of the number of events (Donors) to a number of trials (Alumni of Record). The score statistic gives a test for the joint significance of all of the explanatory variables in the model. The combined effect here of the independent variables is significant with a *P* value of 0.01. The -2LOG L statistic provides a Chi-Square test for the effects of the variables based on -2LOG Likelihood . Again, the combined effects of the variables are significant with $P = 0.01$.
7. Our coefficient of 7.158 on Alumni Costs per F.T.E., for example, represents the change in the log of the participation rate per \$1,000 change in Alumni Cost per F.T.E. A \$10.00 change converts the coefficient to 0.071575. This school's actual participation rate for the year was 0.25067.

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