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ABSTRACT

We investigate how undergraduates' financial aid packages affect their subsequent donative behavior as alumni. The empirical work is based upon micro data on alumni giving at an anonymous research university. We focus on three types of financial aid, scholarships, loans, and campus jobs. A novel aspect of our modeling strategy is that, consistent with the view of some professional fundraisers, we allow the receipt of a given form of aid per se to affect alumni giving. At the same time, our model allows the amount of the support to affect giving behavior nonlinearly.

Our main findings are: 1) Individuals who took out student loans are less likely to make a gift, other things being the same. We conjecture that this phenomenon is caused by an "annoyance effect" — alumni resent the fact that they are burdened with loans. 2) Scholarship aid reduces the size of a gift, but has little effect on the probability of donating. The negative effect of receiving a scholarship on donations decreases in absolute value with the size of the scholarship. We do not find any evidence that scholarship recipients give less because they have relatively low incomes post graduation. 3) Aid in the form of campus jobs does not have a strong effect on donative behavior.

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1. Introduction

Financial aid to undergraduates from their schools has been growing over time; according to the College Board [2010, p.3], institutional grant dollars per full-time-equivalent undergraduate increased at an average annual rate of about 2.8 percent over the 1999-2000 to 2009-10 decade. At the same time, institutions of higher education have become ever more reliant on support from alumni contributions, which were $7.1 billion in 2010 (Council for Aid to Education [2011]). This paper examines one potential linkage between these two trends, the possibility that the financial packages students receive when they are undergraduates affect their subsequent donative behavior as alumni. Indeed, "conventional wisdom among university fund-raisers holds that former scholarship recipients… are among the most dependable donors because they are grateful to the institution and want to lend a hand to the next generation" (Bombardieri [2007]). This intuition is consistent with the literature on gift exchange in charitable giving. For instance, Falk [2007] conducts a field experiment in which potential donors who receive a large gift with their solicitation donate more than those who receive a small gift, who in turn donate more than members of the control group, who receive no gift.[1]

The flip side of this argument is that students who leave college with large loans may feel some resentment and therefore donate less money, other things being the same. As a recent graduate from Boston University said, "I got a great deal with my financial aid, but I'm still paying tens of thousands of dollars. And now they want more money? I think it's just ludicrous" (quoted in Bombardieri [2007]). Alternatively, loan recipients might donate less simply because repaying the loans reduces their disposable income.

We investigate these and related hypotheses using a rich set of micro data on alumni giving at an anonymous private research university, which we call Anon U. We follow a group of

[1] For related papers on gift exchange in charitable giving, see Alpizar *et al.* [2008] and Landry *et al.* [2011].

about 13,000 alumni who graduated between 1993 and 2005. The panel nature of the data allows us to examine issues relating to the time pattern of giving, in particular, the frequency with which individuals make gifts. Such questions cannot be addressed by previous studies, which have tended to look at either a single year's worth of data, or have examined average giving over a number of years. In addition, our data provide a more detailed characterization of financial aid packages than has been available to previous researchers. In particular, in addition to grants and loan aid, we also have information on earnings from campus jobs.

Section 2 of the paper reviews the relevant literature. Section 3 discusses the data. We present the econometric specification and results in Section 4. Our main findings are:

1) The mere fact of taking out a student loan decreases the probability that an individual will contribute to the university as an alumnus. Further, individuals who take out large student loans make smaller contributions as alumni, conditional on making a gift. Taking advantage of correlates of income that are in our data set, we argue that this negative impact is unlikely to be because alumni who took out loans have relatively low disposable incomes. We conjecture that, rather, it is caused by an "annoyance effect" — alumni resent the fact that they have to repay loans.

2) Financial aid received in the form of scholarships reduces the size of a gift, conditional on making a gift, but has little effect on the probability of making a gift. Students who received scholarships are also less likely to be in the top 10 percent of givers in their class in a given year. Again, we find no evidence of income effects, i.e., that undergraduates who received scholarships give less because they have relatively low incomes as adults One possible explanation is that scholarship recipients prefer to give to charities other than their *alma mater.* Interestingly, among the group of scholarship recipients, subsequent donations increase with the size of the

scholarship (although the amounts are still less than for non-grant recipients). This suggests that at least some kind of gift exchange motive is present among scholarship awardees.

3) Aid in the form of campus jobs does not have a strong effect on donative behavior.

Section 5 discusses some alternative specifications of the model in order to assess the robustness of our results. In particular, we allow individuals' responses to the composition of their aid packages to depend on their demographic characteristics. We find some differences across racial groups, but the responses of men and women are about the same. Additionally, and somewhat surprisingly, the effects of having received aid do not change greatly as alumni age. We conclude in Section 6 with a summary and suggestions for future research.

2. Previous Literature

Several papers have used institutional level data to study the link between financial aid packages and subsequent alumni giving.[2] Ficano and Cunningham [2002] characterize financial aid as the percentage of the cost of attending the institution full time that is rebated in the forms of need based scholarships, non-need based scholarships, and student loans from college funds. They find that more generous need-based scholarships are associated with higher subsequent alumni donations. Baade and Sundberg [1996] include in their model the percentage of students who receive financial aid, along with scholarship and fellowship amounts per student. They find no effect of scholarship aid on alumni giving, and negative effects for the percentage receiving financial aid only for liberal arts schools. While interesting, the results of studies using institutional level data must be regarded with caution because the cultures and histories of different col-

[2] While the literature on the effect of financial aid on behavior *after* college is rather sparse, there has been a good deal of literature on the effects of financial aid *before* college, i.e., on college attendance decisions. See, for example, Dynarski [2000].

leges are highly diverse. Hence, unobserved variables such as the style of university governance could be driving both financial aid policy and alumni giving patterns.

An alternative strategy that avoids this problem is to use micro data from a single or several institutions, a tack taken by Clotfelter [2001], Monks [2003] and Holmes [2009]. The impact of financial aid is not the main focus of any of these studies, and the characterizations of individuals' undergraduate aid packages are consequently not very detailed. Clotfelter's model of alumni giving includes only a dichotomous variable indicating whether an individual received financial aid, Monks includes the size of any loans and an indicator for whether they were a "major" or "minor" source of support, and Holmes includes dichotomous variables both for whether the individual received loans or grants. Their substantive results differ across papers and sometimes within the same paper. Clotfelter finds that for some cohorts of individuals, the receipt of need-based financial aid depressed future giving, but for others, there was no statistically significant effect. Monks' results suggest that recipients of financial aid are more likely to make subsequent donations but loans depress the likelihood of making gifts, while Holmes finds that neither the receipt of grants nor loans affects donative behavior. This is similar to the result of McDearmon and Shirley [2009], whose analysis of online survey data (as opposed to administrative data) suggests that neither financial awards nor student loans affect alumni giving.

Marr *et al.* [2005] examine the amounts given by the individuals over the first eight years after graduation. Their data allow them to include a quite detailed characterization of financial aid packages. They consider amounts of need-based loans, need-based scholarships, merit-based scholarships, and athletic scholarships. They find that loans decrease both the probability and amount of giving, and need-based scholarships have the opposite effect. They enter their variables as step functions, and find some evidence that the effects of loans and scholarships are non-

linear. Their econometric model does not attempt to take advantage of the longitudinal nature of their data set because so few individuals make contributions in any given year. Rather, they focus on the likelihood that an individual makes any gift during the eight-year period after graduation. Such averages can mask substantial heterogeneity; someone who gives once during an extended period of time is treated as being exactly the same as someone who donates every year.

Our data set, described below, includes a rich set of information relating to the structure of financial aid packages, including income from on-campus jobs, which has not been studied before. In addition, unlike previous studies, we track some individuals in our sample over a sufficiently long period of time that we can examine whether the effects of financial aid packages diminish with time. Our econometric procedure takes advantage of the longitudinal nature of the data set, allowing us, for example, to compare patterns of giving rather than just a snapshot of a single year's donations.

3. Data

Our data are drawn from Anon U's administrative archives. The data are proprietary and sensitive, and individuals' names were stripped from the records before being made available to us. Our sample consists of all individuals who graduated between 1993 and 2005.[3] We have each individual's giving history from the year after graduation until 2009**.** Our unit of observation is a yearly giving opportunity. For example, if an individual has been an alumna for 5 years, she accounts for 5 giving opportunities, starting in the first fiscal year after graduation. Multiple gifts in the same year are summed together. We begin with 142,874 observations, representing 14,382 alumni. We delete 5,175 observations because of missing or unreliable data, leaving 137,699 ob-

[3] The members of these relatively young classes donated about 2.5 percent of the total amount given to the university by alumni in 2009, and smaller amounts in each previous year. Younger and older classes tend to give at fairly similar rates.

servations on 13,831 alumni. Of these observations, 84,394 (or 61.3 percent) are associated with a gift.

At Anon U, eligible students can receive aid in the form of scholarships, loans and campus jobs. About 49.6 percent of the individuals in our sample received any financial aid at all during their time at Anon U. 44.7 percent received some scholarship aid; 40.4 percent received aid in the form of a campus job, and 43.0 percent received loans; 34.8 percent received all three types of aid.[4] All scholarships are need based; the university gives no athletic or merit scholarships. The student's need is defined as the difference between the student budget and the university's estimate of what the student and his or her family can afford to pay toward these expenses. The parents' contribution, the student's summer earnings, a portion of the student's own savings, and external grants are compared with the university's costs to determine whether or not the applicant needs financial assistance. In our data, conditional on receiving any aid, the average total amount of aid received during a student's undergraduate career is $85,749 (s.d. = $51,627). Among students who receive scholarships, the average grant is $71,471 (s.d. = $45,921).

In 2001, Anon U moved to a no-loan policy; the class of 2005 was the first to have all four undergraduate years under this policy. Financial need was fully met by grants and campus jobs and aid that previously would have come in the form of loans came as grants instead. However, students were still able to take out loans to meet costs in excess of their calculated financial need. Thus, a few students in these classes still received loans, though their prevalence

[4] These figures include aid that came from sources external to the university. Our data do not allow us to distinguish between funds received from the university and external funds. However, over 93 percent of scholarship aid comes from university sources.

is much lower. Since the policy is relatively recent, it is difficult to estimate its effects on alumni giving, particularly because they are not distinguishable from cohort effects.[5]

During our sample period, the average interest rate on student loans was about 7 percent, and the repayment period was 10 years beginning at graduation. If a student went directly to graduate school, repayment of the loans was deferred, and the 10 year clock started when graduate school was completed. Conditional on obtaining a loan, the average amount received over the individual's undergraduate career is $15,633 (s.d. = $8,308). The average loan repayment during the 10-year period for a member of the class of 2001 is about $166 per month.

Campus jobs typically involve 9 or 10 hours of work per week for the 30 weeks of the academic year; the average amount of money earned from campus jobs is $9,544 (s.d. = $4,429).[6] This figure includes remuneration from both positions arranged by the financial aid office as well as other jobs such as research assistants.[7] Appendix Table A1 shows the average amounts per alumnus of scholarship, job, and loan aid during students' four years conditional on each source of aid being positive. The unit of observation for this table is a yearly giving opportunity as defined above. These statistics differ somewhat from those discussed above, for which the unit of observation is the individual student.

We also have information on the alumnus's undergraduate extracurricular activities, post graduate education, residence, whether he or she is married to another graduate of Anon U,[8] SAT scores, academic honors, ethnicity, type of high school, summary evaluations made by the Ad-

[5] A comparison of giving behavior in the first 5 years after graduation before and after the policy shows very little effect. However, given the problems with identifying the impact and the small number of affected cohorts in our sample, one cannot make too much of this finding.
[6] The median values for loan, scholarship, and job aid, respectively, are $15,961; 69,503; and $10,544.
[7] Income from campus jobs not arranged by the financial aid office is recorded only for aid recipients; a student not on financial aid who worked as, say, a research assistant would not have his or her income reported here. Information on off-campus jobs is not available.
[8] Except in unusual situations, half of each gift from married alumni couples is attributed to each spouse.

missions Office during the application process, major and minor course of study, and grade point average. Summary statistics for these other variables are included in Table A1 as well.

4. Econometric Specification and Results

4.1 Econometric Specification

Previous empirical work on the determinants of giving suggests that variables can differently affect the decision whether or not to donate — the extensive margin — than on the decision how much to donate, conditional on making a gift — the intensive margin.[9] A statistical model that allows for this possibility is therefore needed. We assume that each alumnus first chooses whether or not to make a gift and then, conditional on making a gift, decides how much to donate. Following Huck and Rasul [2007], a natural specification is a hurdle model. In our context, the first step is to estimate a linear probability model for whether or not the individual makes a gift.[10] The second step is to use ordinary least squares on the positive observations to analyze the decision about how much to give. In order to make causal inferences from the second-stage estimates, one must assume that the second stage is conditionally independent of the first. We discuss this further below. We correct for correlation among the error terms for any given individual with a clustering procedure.

An alternative two-step procedure, suggested by Heckman [1979], can also be used to estimate the amount of giving, conditional on it being positive. Heckman's model augments the OLS equation in the second stage with the inverse Mills ratio. There is some controversy with respect to which estimator is superior (Leung and Yu [1996]); hence, a sensible approach is to

[9] Thus, for example, it would not be appropriate to use a Tobit model, which constrains the marginal effect of a given variable on the probability of giving and the marginal effect on the amount given to be the same up to a constant of proportionality.

[10] It is more common to use a probit model for this first stage. However, the interpretation of the marginal effects in the presence of quadratic terms and interactions is less intuitive in non-linear models than in the linear probability model, so we prefer the latter. This issue is described in more detail below.

estimate the model both ways. We show below that our substantive results are essentially unchanged when we use Heckman's method.

As is typical, a few relatively large gifts account for a disproportionate amount of Anon U's donations. For example, in our analysis sample, the top one percent of gifts in 2009 accounted for 50.8 percent of total giving. These large donations are critical to the university, so it is important to determine whether financial aid packages affect the likelihood that an individual makes such gifts. We therefore also use a linear probability model to estimate the probability that the alumnus is a "class leader" in a given year, where a class leader is defined as someone who donated an amount greater than or equal to the 90^{th} percentile of gifts in his or her class**.** Given that, by construction, the mean of the left hand side variable in this model is about 0.10, the linear probability model might not be appropriate. In Section 5 below we show that our substantive results are very much the same when we estimate the class leader model using a probit.

Another issue relates to the fact that our data contain a few very large outliers. For example, there are 11 gifts greater than $100,000 in our sample. We therefore use the logarithm of the amount of giving on the left hand side of the equation for the intensive margin. As an additional check to make sure that outliers are not driving our results, we estimate the OLS equation with the top one percent of the observations eliminated. In Section 5 we show that the substantive results with respect to the impact of financial aid are unchanged.

A major concern is how to characterize the structure of undergraduates' financial aid packages. The conjectures about the effects of financial aid discussed above suggest that we need a specification that allows us to address the following questions: does the receipt of a particular form of aid *per se* have an effect on giving; what is the marginal effect of receiving additional aid of a particular type; and what is the overall effect of a given aid package? With that in mind,

we adopt a somewhat novel modeling strategy, and include both a dichotomous variable that takes a value of one if the individual received any aid of a given type, as well as a quadratic in the amount of that kind of aid.

The dichotomous term allows the receipt of a particular form of aid *per se* to affect subsequent giving. Fundraising professionals are keenly aware of this mechanism. The Vice-President for Development at Boston University, discussing it in the context of the impact of college loans on giving behavior, expressed concern about a "psychological debt burden. Whether your debt is $200 or $200,000, you don't tend to write checks as long as you have it" (Bombardieri [2007]). It is also possible that students who take out loans have lower family incomes than their peers, or perhaps develop less of an affinity for the university when they are undergraduates. We discuss the interpretation of the coefficient on the indicator variable in more detail below.

The quadratic terms permits nonlinearity in the impact of the amount of the form of aid. We choose a quadratic over a logarithmic function because, for many individuals, the amount of aid is zero. In order to assess the robustness of the quadratic specification, we experimented with a cubic, and found that it did not significantly affect the explanatory power of the equation.[11]

In addition, we include on the right hand side a series of alumni characteristics that have been shown in previous studies to influence giving.[12] These include years since graduation, gender, ethnicity, SAT scores, ranking of the candidate by the admissions office when they applied to Anon U, course of study, and post-baccalaureate education. The literature also shows that

[11] We also experimented with a step function. The relationship between the financial aid variables and giving behavior was qualitatively similar to those for the quadratic. However, there was some instability to the coefficients. If one uses a substantial number of categories, there are relatively few observations in any given category, but as one decreases the number of categories, significant differences in effects within the categories are ignored.

[12] See, for example, Cunningham and Cochi-Ficano [2002], Shulman and Bowen [2001], Lara and Johnson [2008], and Holmes [2009]).

alumni giving is heavily influenced by the affinity they develop for their schools as undergraduates. Participation in varsity sports and membership in fraternities are two ways in which affinities develop (Clotfelter [2003], Monks [2003], Meer and Rosen [2009]); we include variables relating to these activities. Summary statistics for these variables are recorded in Table A1. The model also includes year, class, , and location effects. The year effects reflect the impacts of the business cycle, the stock market, and so on.[13] The year effects also account for yearly differences in the size of Anon U's fundraising staff and its fundraising expenditures. The class effects control for common influences on alumni in the same class, such as the political milieu when they were undergraduates, the presence of certain professors or administrators, and so on.

Unfortunately, our data include no direct information on income, an important determinant of alumni giving (Shulman and Bowen [2001, p. 404]). To address this issue, we begin by noting that a number of the variables in our basic specification are correlated with the individual's income, including gender, ethnicity, college major and grade point average, advanced degrees, years since graduation, and location. In addition, as noted below, we augment the basic model with a number of variables that are closely related to permanent income, including the sector in which the individual works, *inter alia,* and find that our substantive results are not sensitive to their inclusion.

4.2 Results

4.2.1 Probability of Giving

Table 1 shows the effects of the financial aid variables on the probability of making a gift. For each type of aid, we exhibit the estimated coefficients and standard errors for both the linear and quadratic terms, and for the dichotomous variable indicating whether the individual

[13] Bristol [1991] emphasizes the role of the stock market and Ehrenberg and Smith [2001] document the importance of macroeconomic conditions.

received that form of aid at all. In addition to the financial aid variables in the table, the models include the other right hand side variables mentioned in the previous section**,** which are suppressed for brevity.

To begin, consider the results for loans in the first panel. The coefficient of -0.0357 on the dichotomous variable *Any Loan Aid* in the first column means that receiving a loan in itself lowers the probability that an alumnus makes a gift by about 3.6 percentage points. Given that the mean rate of giving is about 62 percent, it seems fair to characterize this as a meaningful although not huge effect.

The positive linear term and negative quadratic term imply that, in absolute value, the negative effect on the probability of giving first decreases and then increases with the amount of the loan. Indeed, when the function reaches its maximal value (when loans are around $13,000), the overall effect is a much weaker, -0.88 percentage points (s.e. = 1.12 percentage points). The negative quadratic term then begins to dominate and by the time the loan amount is about $23,000, the effect is once more significantly different from zero at the 5 percent level. Essentially, receiving small or large loans reduces the probability of giving, while moderate-sized loans have little effect. While we cannot definitively say what is driving these results, a possible explanation is that the annoyance effect of small loans is diminished by gratitude for moderate amounts of aid, while large loans feel like a burden.

One potential reason that student loans reduce the likelihood of donating is that students who take out loans subsequently have lower incomes than other alumni, perhaps because they come from relatively low-income families, and have less wealth as well as fewer family connections to help them professionally. It follows that to the extent donations to Anon U are a normal good, alumni who took out loans will be less likely to make donations. In other words, if loan aid

as an undergraduate is correlated with income as an alumnus, then the omission of income from the right hand side might bias the coefficients on loan aid (and other kinds of aid as well).[14] While we do not have income in our data, we do have several variables that are correlated with income. Specifically, for a subset of our alumni (114,108 observations, representing 11,124 alumni), we have information that is closely related to permanent income, the fields in which they work. The fields of education, finance, health care, and law are highly represented. The complete distribution of fields across the sample is available upon request.[15] If income effects are behind the estimated effects of the financial aid variables, then including these correlates of income in the model should change the coefficients on the financial aid variables.

The results when the model is estimated with the field variables are shown in the second column of Table 1.[16] The coefficients on the field variables, which are not reported in the table, are jointly significant in all specifications[17] and their signs and magnitudes are as expected if they are correlates of income (although they could certainly be picking up other effects as well). For example, the coefficient for working in finance on the conditional amount given is 0.407 (s.e. = 0.027), while the coefficient for working at a nongovernmental organization is -0.090 (s.e. = 0.042). A comparison with the estimates for our basic model in the first column indicates that they are essentially unchanged. This is consistent with the notion that income effects are not driving our results on the impact of loan aid.

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[14] A related possibility is that repayment of loans diminishes disposable income, which also could reduce donations. We present evidence below that this phenomenon is unlikely to explain our findings.

[15] Due to lack of reliable data regarding the start- and stop-dates of occupation and field, these variables indicate whether the alumnus *ever* worked in that field or occupation, rather than whether he or she worked in it during the particular year of observation. An alumnus can be listed as having worked in multiple fields, so these categories are not mutually exclusive.

[16] In order to benchmark this exercise, we estimated the basic model (i.e., the model without the occupation and field variables) using the smaller sample comprised only of the observations with the occupation and field variables. These results, too, were substantively the same as those in Column (1).

[17] In both the models for the probability of making a gift and for the conditional amount given, the null hypothesis that the coefficients on the field of work variables have no effect is rejected at p = 0.0000.

To investigate this issue further, we utilize information in the dataset on ZIP code, another correlate of income. We re-estimate the basic model including a dichotomous variable for each three-digit ZIP code.[18] The zip code variables are jointly statistically significant in all specifications.[19] The results on the coefficients of interest, which are in the third column, are not substantively different from those in column (1) either. A related approach is to include ZIP-code-level measures of income as regressors instead of three-digit ZIP code dichotomous variables. To the extent that an alumnus's income varies with the income in her zip code area, this provides a way, albeit a rough one, to account for income effects. Implementing this strategy is difficult because income data are unavailable for some areas and we lack consistent income data on a yearly basis. Nevertheless, we obtain median income data from the 2000 Census and the 2008 IRS Statistics of Income (SOI) and, separately, map them into each alumnus's ZIP code in each year. We then re-estimate our basic models, first augmented with a quadratic in the Census measure, and then with the SOI measure. For both measures, the income variables are statistically significant and imply that giving is a normal good, a result consistent with intuition as well as the empirical literature on donative behavior (Andreoni [2006]). The implied income elasticity of giving (0.15) is lower than most previous estimates, but this is expected given that our ZIP-code measure of individual income is clearly measured with error. In any case, neither variable's inclusion has a substantial effect on the coefficients on the financial aid variables.

The starting point for our final check for the relevance of income effects is the well-known observation that the incomes of children and their parents are positively correlated. (See, for example, Behrman and Taubman [1990].) Presumably this correlation is stronger for relatively young individuals, such as the members of our sample, the oldest of whom are about 38 years

[18] For alumni living abroad, we include indicators for their country.
[19] In both the models for the probability of making a gift and for the conditional amount given,, the null hypothesis that the three-digit ZIP code effects are jointly zero is rejected at $p = 0.0000$.

old at the end of the sample period**.** Because aid recipients must submit evidence of their financial need, we know parental income for alumni who received financial aid as undergraduates. While this is clearly not a random subset of our analysis sample, it is of some interest to see whether the inclusion of parental income for members of this group affects our conclusions with respect to the impact of financial aid.[20] To construct a benchmark for this analysis, we re-estimate our basic model from column (1) for this sample, and then augment the model with parents' income. In results available upon request, we find that the coefficients on the financial aid variables are not affected substantially. Given the particular nature of this sample, and that parental income is only a proxy for the alumnus's income, we cannot argue too strongly that this exercise rules out the presence of income effects. Nevertheless, the preponderance of the evidence suggests that they are not driving our results.

We turn next to the results for scholarships in the second panel. The intercept, linear, and quadratic terms in column (1) are all very small in magnitude and imprecisely estimated. One cannot reject the hypothesis that scholarship aid has no effect on the likelihood of making a donation. Looking across the columns, we see that including our additional correlates of income does not change the substantive findings. As before, income effects do not appear to be behind the results.

The last panel has the results for campus jobs. The intercept suggests that receiving this form of aid *per se* has no discernible impact on the probability of making a gift. The amount of aid has a small negative effect (roughly 0.58 percentage points per thousand dollars) on the probability of giving until about $7,500, at which point the positive quadratic term dominates. The effect on giving at this point is a statistically significant but relatively small -0.031 (s.e. =

[20] For most of the analysis sample, we have the students' ZIP codes at the time of application to Anon U, a variable that is correlated with family income. The inclusion of indicators for family three-digit ZIP code does not materially affect the estimates of the coefficients on the financial aid variables.

0.014). Aid through campus jobs does not appear to materially affect the likelihood of making a contribution.

4.2.2 Amount of Giving

Table 2 shows the estimates for the log of the conditional amount of giving. In the first panel, none of the individual coefficients on aid from loans is significant, but the set of loan variables is jointly significant at p = 0.002. The point estimate of the intercept for loans, -0.0679, implies that the receipt of loan aid reduces donations by about 6.6 percent, but it is not statistically significant. The negative linear term dominates over the entire range of loan values, and the overall (negative) effect becomes statistically significant at around $3,000 of loans. As discussed above, one possible explanation is that alumni who took out larger loans as undergraduates have relatively low incomes. However, as was the case in Table 1, a look across the columns indicates that augmenting the model with various correlates of income has little effect on the estimates, so income effects are unlikely to be at work.

In the second panel of Table 2, the striking result is the coefficient on *Any Scholarship Aid*, which indicates that the receipt of a scholarship in itself lowers giving by about 18 percent, an effect that is precisely estimated. The negative effect of receiving a scholarship *per se* is attenuated by the positive though imprecisely estimated linear term. Indeed, at the conditional mean of $71,000, the estimated decrease is only half as large, -0.092 (s.e. = 0.043). It becomes insignificantly different from zero (though still relatively large in magnitude) at around $90,000 of scholarship aid, and at the conditional 99th percentile of scholarship aid, $170,000, the effect is -0.045 (s.e. = 0.071). Thus, the absolute value of the negative effect of scholarships on the conditional amount of giving tends to fall with the size of the scholarship.

The third panel shows that aid from campus jobs does not have a statistically discernible effect on the amount of giving.

Note that we can combine the results for the probability of giving in Table 1 with the results for conditional amounts of giving in Table 2 to estimate the effects of the various forms of financial aid on the average amount of giving.[21] These results are presented in Appendix Table A2, which shows the marginal effect of additional aid of a given type, evaluated at the mean, along with the effect of going from no aid of that type to a positive amount. For instance, Column (1) shows that an additional thousand dollars of loan aid, evaluated at the mean, has a statistically insignificant effect of about half a percent on the average gift, while receiving any loan aid reduces it by about seventeen percent, a statistically significant effect.

4.2.3. Class Leadership

Table 3 shows the estimates for class leadership. To put these figures in perspective, recall that by construction, the mean value of the probability of being a class leader is about 0.10. Hence, the point estimate of the loan intercept in column (1) of the first panel, 0.9 percentage points, is substantial, although imprecisely estimated. The quadratic term is minuscule, and the linear term suggests that each thousand dollar increase in loans reduces the probability of being a class leader by about 0.07 percentage points. While this effect is small for a marginal thousand dollar increase, the overall effect of loans taking into account all three coefficients becomes statistically significantly different from zero at around $6,000 of loan aid.

The impacts of scholarship aid on the likelihood of being a class leader are in the second panel. From Column (1), the effect of receiving a scholarship is large, about negative 3.3

[21] Denote the amount of giving as Y, and the vector of right hand side variables as X. Then the first stage of the estimation gives results for Pr[Y>0|X] and the second stage gives E[Y|X,Y>0]. The unconditional value of giving, E[Y|X], is Pr[Y>0|X]*E[Y|X,Y>0]. The marginal effects, $\partial E[Y|X]/\partial X$, are straightforward to compute, and standard errors are obtained using the delta method.

percentage points, and precisely estimated. But at the conditional mean of scholarship aid, one cannot reject the hypothesis that the effect on being a class leader is zero; the overall effect is -0.014 with a standard error of 0.009. In the third panel, we see that aid from campus jobs has no discernible effect on the probability of being a class leader. As was the case in Tables 1 and 2, a glance across columns indicates that the results are not sensitive to the addition of correlates of income.

4.3 Interpreting the Results

We begin with the results for loans. Taking out a student loan per se reduces both the probability an alumnus makes a gift and its size, conditional on making a gift. This finding is consistent with the belief of development professionals, mentioned above, that taking on debt creates a kind of psychological burden that is independent of the amount..

We have argued that this finding is probably not because undergraduates who take out loans subsequently have lower incomes than their classmates. Another observation consistent with this notion is that the intercept term in the model for the probability of making a gift is negative, and dominates the positive linear term for relatively small loans. In short, smaller loans have a more pronounced negative effect on giving than medium-sized loans, though large loans depress giving on both the intensive and extensive margins. This nonlinear relationship is difficult to reconcile with a predominant role for income effects.

Another possible explanation for the negative effect of loan aid on the probability of donating is that loan recipients felt excluded from the majority campus culture when they were undergraduates, hence reducing their affinity for Anon U. Such unobserved heterogeneity might bias our parameter estimates, and the standard method for dealing with it, including fixed effects, is not open to us because alumni's financial aid histories are time invariant. To explore this issue,

we begin by noting a robust finding in the literature, that individuals who participate in fraternities/sororities and varsity sports develop relatively strong affinities to their colleges, *ceteris paribus.*(Clotfelter [2003] and Monks [2003]). If so, the negative effect of loans on giving should be less in absolute value for individuals who were involved in these activities, other things being the same. We augmented our basic models from the first columns of Tables 1, 2, and 3, respectively, with interactions between the financial aid variables and both participation in fraternities/sororities and in varsity athletics. The interaction terms were neither individually nor jointly significant. Hence, the negative effect of loans on the probability of making a gift does not appear to be due to alienation of loan recipients from the campus culture, at least to the extent the majority culture can be characterized by these variables.

A final possibility is that, as suggested above, paying back loans creates an "annoyance effect." Given that the results do not seem to be driven by income or ties to the majority social culture, it is difficult to put forward an explanation other than that loan recipients resent the fact that their aid came in the form of loans rather than grants, and consequently, give less to Anon U.

Turning next to the scholarship results, we have already argued that the negative effects in Tables 2 and 3 are probably not because scholarship recipients have lower incomes than their classmates. Another problem with an income-effect interpretation is that the negative effect of receiving a scholarship on the amount given falls (in absolute value) with the size of the scholarship. Indeed, at approximately $85,000 in scholarships (about the 86th percentile of the unconditional distribution in our data), the combined effect of the amount of scholarships and the indicator for any grant aid is not even statistically different from zero at the 5 percent level.[22] Given that scholarships at Anon U are entirely need-based, this means that scholarship students

[22] At about $105,000 in scholarships (the 91st percentile of the unconditional distribution), it no longer significant at the 10 percent level.

from lower-income families give more than those from higher-income families, *ceteris paribus.* To the extent that children's incomes are related to their parents' incomes, then if income effects were driving the results, we would expect just the opposite.

Another conjecture is that scholarship recipients might feel alienated from the majority culture at Anon U, and hence develop less of an affinity for the institution. However, just as was the case for loan recipients, we find no evidence that alumni who likely developed relatively strong affinities to the institution react differently to receiving scholarships than other scholarship recipients. Moreover, one would expect lower affinity to be reflected in a lower probability of giving, not just a smaller amount conditional on giving. Hence, we are inclined to discount this explanation.

How, then, can we account for the negative effects of scholarships on subsequent giving? Perhaps scholarship recipients target their donations to other institutions that extend grant aid to students who want to attend college, such as Scholarship America or the United Negro College Fund. However, given that we have no information on alumni's other charitable donations, this notion remains conjectural.

Does the observation that scholarship recipients give less than others mean that one should reject the notion that they want to "give back?" Not necessarily. As noted above, the negative impact on conditional giving to Anon U falls as the amount of the scholarship increases; that is, those who receive more generous aid as undergraduates give more as alumni, conditional on making a gift. In this limited sense, then, our data are consistent with the gift exchange hypothesis.

5. Alternative Specifications

In this section we estimate several alternative specifications of the model in order to assess the robustness of our results.

5.1 Outliers

As is the case at most universities, a few large gifts account for a disproportionate share of total donations to Anon U. As noted earlier, the top one percent of positive gifts in our sample accounted for about half of the total in 2009**.** This raises the possibility that our results for amounts given in Table 2 are driven by just a few observations. Our use of the log rather than the level of giving on the left hand side attenuates the impact of outliers, but as another check, we re-estimate the models deleting the top one percent of donations in each column from the sample. These results, available on request, have similar signs and magnitudes to their counterparts in Table 2. Hence, outliers do not appear to be affecting our results for giving on the intensive margin.

5.2 Demographic Differences

Previous empirical research indicates that various aspects of altruistic behavior can differ substantially by demographic group. (See, for example, Andreoni and Vesterlund [2001], Andreoni [2006], and Meer [2011].) This raises the possibility that the impact of financial aid might as well. We therefore investigated whether our parameter estimates vary by race, gender, and age. To do so, we augmented our basic models from the first columns of Tables 1 through 3, respectively, with a series of terms interacting the financial aid variables first with indicator variables for race, then gender, and finally age.

The detailed results are presented in the Appendix. The main substantive findings can be summarized as follows:

5.2.1 Race

One cannot reject the joint hypothesis that the interactions between the race and financial aid variables are zero. However, some of the interaction terms are individually significant. For instance, the effect of loans on the probability of giving is different for black alumni than other ethnic groups; the linear term is negative while the intercept is positive (the latter is significant at $p = 0.08$). Receiving a scholarship does not have any substantial effect on the size of a gift for Asian alumni. With a few other exceptions, there is little difference across races in the effect of financial aid on alumni giving.

5.2.2 Gender

The interaction terms between gender and the financial aid variables are jointly significant for the case of scholarship aid in the model for giving on the extensive margin; otherwise, they are not. The most striking difference is that the negative effect of receiving a scholarship is especially pronounced for alumnae, particularly on the probability of being a class leader. One possible interpretation is that relatively low-income women selectively mate with relatively low-income men and are therefore less likely to donate for household income-related reasons. To investigate this possibility, we augmented our basic specification with interactions between the gender and financial aid variables with marital status. We found that these interaction terms were not statistically significant.[23] This finding is consistent with the notion that income effects are not driving our results.

5.2.3 Age

For purposes of examining whether age affects the response to financial age packages, we create a dichotomous variable that equals one if an alumnus graduated 10 or more years ago and

[23] The interactions of marital status, gender and the loan variables are jointly significant only at $p = 0.311$, with scholarships at $p = 0.978$, and with campus jobs at $p = 0.131$. Note that in our data we know only if the individual was ever married, not the date on which he or she married. Hence, the marital status variable is measured with error.

zero otherwise, and interact it with the financial aid variables. Our sample for this specification consists only of individuals who graduated in 1999 or earlier, whose giving behavior we observe both before and after the 10-year mark. One cannot reject the joint hypothesis that the interactions between the financial aid and age variables are zero. This result may be a bit surprising. One can imagine, for example, that any gift exchange motive associated with being a scholarship student either increases (because of nostalgia) or decreases (because of forgetfulness) with age. Similarly, any negative feelings associated with loan obligations might be less after the loans are paid off. However, the "annoyance effect" associated with receiving loans appears to persist beyond the repayment period.

This finding also relates to our previous discussion of whether our results on the impact of loans are due to income effects. We focused on the possibility that students who receive loan aid have lower incomes as alumni. But note that making loan payments reduces an individual's disposable income, *ceteris paribus.* Hence, if income effects were dominant, we would expect the negative effect of loans to disappear or at least be attenuated after they are paid off. However, we find no statistically significant difference in the impact of loan aid on the donative behavior of individuals who have been out of school for more than ten years (and have generally paid off their loans) and those who are younger.

There is clearly some arbitrariness in our selection of 10 years as the cutoff between "young" and "old" alumni. We therefore estimated a series of specifications varying the cutoff for "young" from seven to twelve years.[24] While of course the coefficients differ somewhat, there are no dramatic differences. To explore this issue further, we interacted the aid variables with years since graduation. None of the sets of interaction terms is jointly significant, except for

[24] Thus, for example, for an eight-year cutoff, we estimate whether the impact of financial aid on giving by alumni who are out eight or more years in 2009 depends on whether, in a given year, they have been out at least eight or fewer than eight years.

the campus aid variable in the equation for the log of the amount of giving, but even here, the interaction terms are extremely small relative to the main effects. Our finding with respect to the impact of age on the financial aid effects appears to be fairly robust.

5.3 Alternative Econometric Specifications

We have used the convenient linear probability model to estimate the equations for the dichotomous left hand side variables, *DidGive* and *ClassLeader*. As is well-known, a possible problem with the linear probability model is that the predicted values may be outside the range zero to one, which is especially likely to be an issue when the mean of the variable is close to zero or one. For *DidGive,* whose mean is about 0.61, this is unlikely to be an issue.[25] In fact, when we estimated the basic model of column (1) in Table 1 using a probit model, we found essentially identical average marginal effects.

Given that, by construction, the mean of *ClassLeader* is about 0.10, the problem is potentially a greater concern for those estimates. When we estimated the *ClassLeader* model of Column (1) in Table 3 using a probit, we found the following average marginal effects: -0.00092 (s.e. = 0.00084) for loans, 0.00042 (s.e. = 0.00022) for scholarships, and -0.00115 (s.e. = 0.00151) for campus jobs. These are not dissimilar to the average marginal effects calculated from the model in Column (1) of Table 3: -0.00072 (s.e. = 0.00064) for loans, 0.00028 (s.e. = 0.00013) for scholarships, and -0.00039 (s.e. = 0.00106) for campus jobs.

Another econometric issue relates to the use of the hurdle model. An alternative estimator augments the OLS equation for the amount given with the inverse Mills ratio generated by the first stage probit (Heckman [1979]). This model explicitly allows for correlation between the errors in the first and second stage equations. The econometric literature indicates that the desirability of this estimator relative to the hurdle model is unclear. In particular, Leung and Yu [1996]

[25] Fewer than one percent of the predicted values are outside the range zero to one.

observe that even if the errors in the true model are correlated, the hurdle model may, under certain circumstances, yield better estimates. Also, in the absence of variables that can be excluded from the second stage but still affect the probability of giving, which is our situation, identification comes entirely off of functional form assumptions.

In any case, it seems sensible to re-estimate the model using Heckman's approach to see if the substantive results are affected. They are not. For instance, using the selection model, the effect of receiving a loan on the likelihood of making a gift is -3.7 percentage points, and the effect on the conditional size of the gift is -6.58 percent. The comparable results from our basic specification are -3.6 percentage points and -6.56 percent, respectively. The other variables are similarly close in magnitude. Hence, our results are robust with respect to this change in econometric specification.

6. Conclusion

College and university fundraisers are justifiably concerned about the impact of undergraduate financial aid packages on future gift-giving by alumni. Do students who receive loans or who need to take campus jobs give less in the future because they are resentful? Do scholarship recipients donate more because they want to "give back?" We have analyzed micro data from a selective research university to address these questions. We find that the mere act of taking out a student loan decreases the probability that an alumnus contributes to the university,, and that large student loans reduce future donations, conditional on making a gift. Scholarship aid reduces the amount of alumni giving, conditional on making a gift, but has little effect on the probability of making a gift. Scholarship recipeints are also less likely to be in the top 10 percent of donors in their class in a given year. We find no evidence that the negative effects of loans and scholarships on subsequent giving arise because aid recipients have lower post-graduation in-

comes than their peers. Nor is there any evidence that scholarship recipients give less because they felt alienated from the majority culture on campus when they were undergraduates. We conjecture that their charitable giving might be focused on organizations other than their relatively wealthy *alma mater*.

Our results provide mixed evidence for the gift exchange model. As just noted, it does not appear that gratitude induces alumni who received financial aid give back to the university more generously than alumni who received no aid. Indeed, scholarship recipients give less than their classmates, *ceteris paribus.* However, within the set of scholarship awardees, those who received larger grants make larger donations as alumni, providing some evidence for a gift exchange motive. In any case, to the extent our findings generalize, universities should not expect that generous financial aid will pay for itself through larger donations in the future. Of course, there remain myriad reasons to maintain these policies apart from the financial status of the university.

Another caveat is that our results are based on data from a single selective research university. Consequently, one must be cautious about assuming that the results would apply to other institutions as well. Still, it seems safe to say that university fundraisers' belief that financial aid packages affect future alumni giving is well founded.

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Appendix

Appendix Table A1 presents the summary statistics for the variables used in our econometric model. Table A2 combines the results for the probability of giving in Table 1 with the results for conditional amounts of giving in Table 2 in order to estimate the effects of the various forms of financial aid on the average amount of giving.

The remaining tables show the results when we augment our basic models with interactions of the financial aid variables with indicators for race, gender, and age, respectively. Table A3 shows the outcomes when we interact the financial aid variables with the indicators for race.[26] Consider the first panel, which shows the results for loans. We do not report the regression coefficients themselves. Rather, for each racial category, we show the sum of the main effect of a given loan variable and the coefficient on the interaction between the loan variable and the race dichotomous variable. In short, the figures show the total effects of each loan variable for the respective ethnic categories. The coefficient for an ethnic group is italicized if it is statistically different at the 5 percent level from the corresponding figure for whites. The bottom portion of the first panel shows the p-value of a test of the hypothesis that the interaction terms are jointly significant (for example, 0.110 for the probability of making a gift) and the p-value of a test of the hypothesis that the average marginal effects for each ethnic group are equal (0.001). The figures suggest, then, that these interactions do not jointly improve the explanatory power of the equation, but one can reject the hypothesis that the average marginal effects of loans are the same across ethnic groups. It is important to note that the figures in the table measure the total impact of each financial aid variable on giving, including the estimate of the associated intercept. However, the average marginal effects recorded toward the bottom of the panel do not include the effect of the intercept, because they measure the impact of an incremental increase of a given

[26] Because there are so few Native Americans in our sample, they are not included in this analysis.

type of aid rather than the leap from no aid to some aid. The next two panels report the same information for scholarships and campus jobs.

Table A4 reports the results for interactions by gender. Coefficients for men and older alumni that are significantly different from the corresponding coefficients for women and younger alumni, respectively, are italicized. Table A5 has the interactions with age. The indicator for age takes a value of one if, in a given year, the individual graduated 10 or more years ago, and zero otherwise, and is estimated for the sample of those who were out of college for at least 10 years. As noted in the text, there are generally (but not always) no statistically discernible differences by demographic group.

Table 1*
Probability of Making a Gift

	(1) Main Specification	(2) Including Field Variables	(3) Including 3-Digit ZIP Effects
Loans	0.00407**	0.00493**	0.00457**
	(0.00168)	(0.00210)	(0.00164)
$Loans^2$	-0.000155**	-0.000184**	-0.000167**
	($4.35x10^{-5}$)	($4.35x10^{-5}$)	($4.21x10^{-5}$)
Any Loan Aid	-0.0357**	-0.0436**	-0.0390**
	(0.0175)	(0.0201)	(0.0172)
p-Value of Joint Significance of Loan Variables	0.000	0.001	0.000
Scholarships	0.000551	0.000177	0.000515
	(0.000388)	(0.000423)	(0.000383)
$Scholarships^2$	$-3.23x10^{-6}$	$-1.21x10^{-6}$	$-3.18x10^{-6}$
	($2.42x10^{-6}$)	($2.69x10^{-6}$)	($2.38x10^{-6}$)
Any Scholarship Aid	-0.00704	0.00260	-0.0123
	(0.0181)	(0.0191)	(0.0180)
p-Value of Joint Significance of Scholarship Variables	0.528	0.950	0.609
Jobs	-0.00581**	-0.00460*	-0.00540**
	(0.00244)	(0.00254)	(0.00241)
$Jobs^2$	0.000386**	0.000335**	0.000383**
	($8.85x10^{-5}$)	($8.82x10^{-5}$)	($8.73x10^{-5}$)
Any Job Aid	-0.00907	-0.0107	-0.00282
	(0.0191)	(0.0200)	(0.0189)
p-Value of Joint Significance of Job Variables	0.000	0.000	0.000
N	137,699	114,108	137,699

*****Each column shows the incremental effect of the respective variables on the probability of making a gift in a given year, based on a linear probability model. Aid amounts are in thousands of dollars. Column (2) includes indicator variables for the field in which the individual works, and column (3) includes indicator variables for the individual's ZIP code. Each regression includes on the right hand side the variables listed in Table A1 as well as class effects, location effects and time effects. Standard errors are in parentheses. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.

Table 2*
Log Amount Conditional on Giving

	(1) Main Specification	(2) Including Field Variables	(3) Including 3-Digit ZIP Effects
Loans	-0.00344 (0.00520)	-0.00575 (0.00609)	-0.00294 (0.00505)
$Loans^2$	$2.50x10^{-5}$ (0.000145)	$8.43x10^{-5}$ (0.000171)	$1.27x10^{-5}$ (0.000139)
Any Loan Aid	-0.0679 (0.0512)	-0.0475 (0.0568)	-0.0742 (0.0502)
p-Value of Joint Significance of Loan Variables	0.002	0.004	0.001
Scholarships	0.00162 (0.00108)	0.00180 (0.00117)	0.00179* (0.00107)
$Scholarships^2$	$-4.90x10^{-6}$ ($6.92x10^{-6}$)	$-6.46x10^{-6}$ ($7.69x10^{-6}$)	$-5.44x10^{-6}$ ($6.82x10^{-6}$)
Any Scholarship Aid	-0.188** (0.0492)	-0.184** (0.0512)	-0.186** (0.0483)
p-Value of Joint Significance of Scholarship Variables	0.000	0.001	0.000
Jobs	-0.000383 (0.00651)	-0.00231 (0.00681)	-0.00123 (0.00641)
$Jobs^2$	-0.000147 (0.000216)	$-8.51x10^{-5}$ (0.000226)	$-7.69x10^{-5}$ (0.000216)
Any Job Aid	0.0149 (0.0522)	0.0451 (0.0541)	0.0196 (0.0514)
p-Value of Joint Significance of Job Variables	0.041	0.505	0.743
N	84,394	74,920	84,394

*Each column shows the incremental effects of the respective variables on the log amount of the gift, conditional on making a gift, estimated by ordinary least squares and using observations with a positive gift. Aid amounts are in thousands of dollars. Column (2) includes indicator variables for the field in which the individual works, and column (3) includes indicator variables for the individual's ZIP code. Each regression includes on the right hand side the variables listed in Table A1 as well as class effects, location effects and time effects. Standard errors are in parentheses. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.

Table 3*
Probability of Being a Class Leader

	(1) Main Specification	(2) Including Field Variables	(3) Including 3-Digit ZIP Effects
Loans	-0.000754**	-0.00113	-0.000608**
	(0.000997)	(0.00134)	(0.000971)
$Loans^2$	$2.03x10^{-6}$	$8.00x10^{-6}$	$-1.40x10^{-6}$
	$(2.77x10^{-5})$	$(3.84x10^{-5})$	$(2.67x10^{-5})$
Any Loan Aid	-0.00920	-0.00736	-0.0102
	(0.00994)	(0.0124)	(0.00980)
p-Value of Joint Significance of Loan Variables	0.005	0.005	0.005
Scholarships	0.000369*	0.000345	0.000407**
	(0.000200)	(0.000235)	(0.000195)
$Scholarships^2$	$-1.45x10^{-6}$	$-1.38x10^{-6}$	$-1.61x10^{-6}$
	$(1.23x10^{-6})$	$(1.49x10^{-6})$	$(1.21x10^{-6})$
Any Scholarship Aid	-0.0326**	-0.0337**	-0.0325**
	(0.00967)	(0.0111)	(0.00961)
p-Value of Joint Significance of Scholarship Variables	0.004	0.016	0.003
Jobs	-0.000579	$4.76x10^{-5}$	-0.000765
	(0.00145)	(0.00158)	(0.00143)
$Jobs^2$	$2.38x10^{-5}$	$-5.94x10^{-7}$	$3.42x10^{-5}$
	$(5.72x10^{-5})$	$(5.96x10^{-5})$	$(5.71x10^{-5})$
Any Job Aid	-0.00610	-0.00313	-0.00415
	(0.0107)	(0.0123)	(0.0107)
p-Value of Joint Significance of Job Variables	0.708	0.992	0.745
N	137,699	114,108	137,699

*Each column shows the incremental effects of the respective financial aid variables on being a "class leader" in a given year, where a class leader is defined as an individual who donated an amount greater than or equal to the 90^{th} percentile of gifts in his or her class. Estimation is based on a linear probability model. Aid amounts are in thousands of dollars. Column (2) includes indicator variables for the field in which the individual works, and column (3) includes indicator variables for the individual's ZIP code. Each regression includes on the right hand side the variables listed in Table A1 as well as class effects, location effects and time effects. Standard errors are in parentheses. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.

Table A1*
Variable Definitions and Summary Statistics

Variable	Description	Mean	Standard Deviation
TotalYear	Total giving for year (2009 dollars) conditional on making a gift	173.26	2753.20
Didgive	1 if any donation given in year	0.613	0.487
Loans	Total loan aid (2009 dollars) conditional on receiving loan aid	16,315	8,082
Any Loan Aid	Received any loan aid	0.444	0.497
Scholarships	Total scholarship aid (2009 dollars) conditional on receiving scholarship aid	66,405	43,130
Any Scholarship Aid	Received any scholarship aid	0.442	0.497
Campus Jobs	Total job aid (2009 dollars) conditional on receiving job aid	9,751	4,467
Any Job Aid	Received any job aid	0.404	0.491
Yearssince	Number of years since graduation	6.18	3.83
Yearssince2	Number of years since graduation, squared	52.87	57.21
Spouseisalum	1 if the spouse is an alumnus	0.151	0.358
Male	1 if the alumnus is male	0.543	0.498
Race/Ethnicity			
White	Omitted Category: 1 if the alumnus is White	0.743	0.437
Amerind	1 if the alumnus is a Native American	0.0045	0.0671
Black	1 if the alumnus is Black	0.0666	0.249
Hispanic	1 if the alumnus is Hispanic	0.0582	0.234
Asian	1 if the alumnus is Asian	0.127	0.333
Secondary Schooling			
Public	Omitted Category: 1 if the alumnus attended public school	0.557	0.497
Boarding	1 if the alumnus attended boarding school	0.128	0.334
Private	1 if the alumnus attended private school	0.314	0.464
School - Other	1 if the alumnus attended another type of school	0.0017	0.0415
SATmath	SAT math score. Scores prior to 1996 are adjusted to reflect recentering of the scoring scale.	714	67.4

SATverbal	SAT verbal score. Scores prior to 1996 are adjusted to reflect re-centering of the scoring scale.	712	66.4
Admissions Office "Non-Academic" Ranking			
A	Omitted Category: 1 if the alumnus received the highest non-academic ranking from the admissions office	0.0224	0.148
B	1 if the alumnus received the second highest non-academic ranking from the admissions office	0.193	0.395
C	1 if the alumnus received the third highest non-academic ranking from the admissions office	0.467	0.499
D	1 if the alumnus received the fourth highest non-academic ranking from the admissions office	0.299	0.458
E	1 if the alumnus received the fifth highest non-academic ranking from the admissions office	0.0192	0.137
Admissions Office "Academic" Ranking			
A	Omitted Category: 1 if the alumnus received the highest academic ranking from the admissions office	0.228	0.419
B	1 if the alumnus received the second highest academic ranking from the admissions office	0.407	0.491
C	1 if the alumnus received the third highest academic ranking from the admissions office	0.217	0.412
D	1 if the alumnus received the fourth highest academic ranking from the admissions office	0.121	0.326
E	1 if the alumnus received the fifth highest academic ranking from the admissions office	0.0268	0.161
Clubsport	1 if the alumnus played on a club team	0.130	0.337
Honors	1 if the alumnus graduated *magna*, *summa*, or *cum laude*	0.463	0.499
Greek	1 if the alumnus was a member of a fraternity or sorority	0.730	0.444
Athlete	1 if the alumnus played a varsity sport	0.377	0.485
Major			
Molbio	Omitted Category: 1 if the alumnus majored in molecular biology	0.0591	0.236
Small Social Science	1 if the alumnus majored in Anthropology, Urban Studies, or Sociology.	0.0375	0.190
English	1 if the alumnus majored in English	0.101	0.301
Economics	1 if the alumnus majored in Economics	0.0889	0.285
Public Policy	1 if the alumnus majored in Public Policy	0.0634	0.244

Political Science	1 if the alumnus majored in Political Science	0.0998	0.300
Psychology	1 if the alumnus majored in Psychology	0.0470	0.212
History	1 if the alumnus majored in History	0.110	0.313
MAE	1 if the alumnus majored in Mechanical/Aerospace Engineering	0.0348	0.183
EE/CS	1 if the alumnus majored in Electrical Engineering or Computer Science	0.0589	0.235
Arch & Civ	1 if the alumnus majored in Architecture or Civil Engineering	0.0565	0.231
Small Humanities	1 if the alumnus majored in Art, Art History, Classics, East Asian Studies, Linguistics, Music, Near Eastern Studies, Philosophy, Religion, or Languages and Literature departments	0.109	0.312
Small Engineering	1 if the alumnus majored in "Engineering", Operations Research and Financial Engineering, or Chemical Engineering	0.0321	0.176
Small Sciences	1 if the alumnus majored in Applied Mathematics, Astrophysics, Biochemistry, Biology, Chemistry, Ecology and Evolutionary Biology, Geology, Mathematics, Physics, or Statistics	0.102	0.302
Minor			
No Minor	Omitted Category: 1 if the alumnus received no minor	0.682	0.466
African/African-American Studies	1 if the alumnus received a minor in African or African-American Studies	0.0221	0.147
American Studies	1 if the alumnus received a minor in American Studies	0.03004	0.171
Latin	1 if the alumnus received a minor in Latin	0.0078	0.0880
Finance	1 if the alumnus received a minor in Finance	0.0231	0.150
Theater	1 if the alumnus received a minor in Theater	0.0184	0.134
Public Policy	1 if the alumnus received a minor in Public Policy	0.0562	0.230
Other Engineering	1 if the alumnus received a minor in Architecture, Basic Engineering, Bioengineering, Electrical Engineering, Geological Engineering, Management, Materials Sciences, or Robotics.	0.0199	0.140
Other Sciences	1 if the alumnus received a minor in Applied and Computational Mathematics, Biophysics, Cognitive Studies, Environmental Studies, Science in Human Affairs, or Neuroscience.	0.0559	0.230
Other Humanities	1 if the alumnus received a minor in a humanities field	0.0966	0.295
Teaching	1 if the alumnus received a teaching certificate	0.0172	0.130
Reunion	1 if the year after graduation is a multiple of 5	0.162	0.368

Post Baccalaureate Education			
No Advanced	Omitted Category: 1 if the alumnus has no advanced degree	0.794	0.404
PhD	1 if the alumnus has a Ph.D. or equivalent degree	0.0387	0.183
Masters	1 if the alumnus has a masters	0.0619	0.241
JD	1 if the alumnus has a JD	0.0428	0.202
MD/DDS	1 if the alumnus has a medical degree	0.0411	0.198
MBA	1 if the alumnus has an MBA	0.0415	0.199

***** These summary statistics are based on 137,699 observations between 1994 and 2009 of 13,831 alumni who graduated from 1993 to 2005. The unit of observation is the alumnus-year giving opportunity.

Table A2*
Effects on the Average Gift

	(1) Main Specification	(2) Including Field Variables	(3) Including 3-Digit ZIP Effects
Marginal Effect of Additional Loans	0.00515	0.00590	0.00654
	(0.00491)	(0.00606)	(0.00473)
Effect of Any Loan Aid	-0.179**	-0.202**	-0.195**
	(0.0766)	(0.0903)	(0.0745)
Marginal Effect of Additional Scholarships	0.00214**	0.00135	0.00210**
	(0.00107)	(0.00118)	(0.00104)
Effect of Any Scholarship Aid	-0.141*	-0.110	-0.160**
	(0.0761)	(0.0819)	(0.0749)
Marginal Effect of Additional Job Aid	-0.0116	-0.00963	-0.0103
	(0.00812)	(0.00878)	(0.00794)
Effect of Any Job Aid	-0.0258	-0.0123	-0.00117
	(0.0837)	(0.0900)	(0.0823)
N	137,699	114,108	137,699

*****Each column shows the marginal effect of additional aid of that type evaluated at the mean, as well as the effect of going from no aid of that type to a positive amount. These are unconditional effects; i.e., they take into account changes in both the probability of making a gift and the size of the gift, conditional on giving. The aid amounts are in thousands of dollars. Column (2) includes indicator variables for the field in which the individual works, and column (3) includes indicator variables for the individual's ZIP code. Each regression includes on the right hand side the variables listed in Table A1 as well as class effects, location effects and time effects. Standard errors are in parentheses. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.

Table A3*
Race and the Effects of Financial Aid

		(1) Probability of Making a Gift	(2) Log Amount Conditional on Giving	(3) Probability of Being a Class Leader
Loans				
White	Linear	0.00514**	-0.00840	-0.00151
		(0.00199)	(0.00630)	(0.00127)
	Quadratic	-0.000179**	0.000197	2.27×10^{-5}
		(5.15×10^{-5})	(0.000171)	(3.55×10^{-5})
	Indicator	-0.0465**	-0.0369	-0.00501
		(0.0212)	(0.0641)	(0.0128)
Black	Linear	*-0.0109**	0.00648	-0.00245
		(0.00579)	(0.0149)	(0.00243)
	Quadratic	*0.000122*	-0.000254	2.98×10^{-5}
		(0.000138)	(0.000376)	(5.58×10^{-5})
	Indicator	0.0692	-0.202	0.00868
		(0.0634)	(0.145)	(0.0266)
Hispanic	Linear	0.00910	-0.0123	0.00131
		(0.00597)	(0.0154)	(0.00303)
	Quadratic	-0.000209	9.92×10^{-5}	-3.27×10^{-5}
		(0.000156)	(0.000430)	(9.10×10^{-5})
	Indicator	-0.0793	0.243	0.0219
		(0.0654)	(0.156)	(0.0331)
Asian	Linear	0.00331	0.0168	0.00402
		(0.00549)	(0.0189)	(0.00312)
	Quadratic	-8.98×10^{-5}	-0.000627	-0.000143
		(0.000166)	(0.000640)	(0.000105)
	Indicator	-0.0214	-0.210	-0.0408*
		(0.0451)	(0.132)	(0.0228)
p-Value for Joint Significance of All Interaction Coefficients		0.110	0.433	0.365
p-Value for Equality of Average Marginal Effects		0.001	0.431	0.181

Scholarships				
White	Linear	0.000958* (0.000503)	0.00266* (0.00146)	0.000262 (0.000272)
	Quadratic	-6.99×10^{-6}** (3.31×10^{-6})	-1.84×10^{-5}* (9.96×10^{-6})	-2.00×10^{-6} (1.76×10^{-6})
	Indicator	-0.00531 (0.0219)	-0.227** (0.0618)	-0.0325** (0.0127)
Black	Linear	0.00232* (0.00127)	0.00176 (0.00305)	0.000763 (0.000438)
	Quadratic	-1.46×10^{-5}** (7.09×10^{-6})	2.43×10^{-6} (1.71×10^{-5})	-3.96×10^{-6} (2.57×10^{-6})
	Indicator	-0.0524 (0.0711)	-0.156 (0.169)	-0.000456 (0.0247)
Hispanic	Linear	*-0.00271*** *(0.00129)*	0.00378 (0.00342)	0.000508 (0.000614)
	Quadratic	*1.61×10^{-5}** *(7.37×10^{-6})*	-1.97×10^{-5} (1.97×10^{-5})	-1.08×10^{-6} (3.36×10^{-6})
	Indicator	0.0998 (0.0672)	-0.204 (0.165)	-0.0806** (0.0316)
Asian	Linear	0.000287 (0.00100)	0.00116 (0.00262)	0.000844 (0.000462)
	Quadratic	-3.76×10^{-7} (6.13×10^{-6})	8.85×10^{-6} (1.61×10^{-5})	-2.51×10^{-6} (2.96×10^{-6})
	Indicator	-0.0158 (0.0433)	*-0.00777* *(0.0955)*	-0.0194 (0.0158)
p-Value for Joint Significance of All Interaction Coefficients		0.162	0.005	0.010
p-Value for Equality of Average Marginal Effects		0.143	0.987	0.423

Campus Jobs				
White	Linear	-0.00738** (0.00288)	-0.000784 (0.00784)	-0.000411 (0.00184)
	Quadratic	0.000447** (0.000100)	-0.000133 (0.000251)	0.0000278 (0.0000734)
	Indicator	-0.0219 (0.0228)	0.0186 (0.0643)	-0.00953 (0.0140)
Black	Linear	-0.00154 (0.00707)	0.0102 (0.0166)	-0.000141 (0.00276)
	Quadratic	0.000262 (0.000243)	-0.000374 (0.000558)	3.21×10^{-5} (0.000107)
	Indicator	0.0593 (0.0657)	-0.0471 (0.149)	-0.00445 (0.0235)
Hispanic	Linear	-0.00255 (0.0122)	-0.0312 (0.0226)	-0.00110 (0.00522)
	Quadratic	0.000273 (0.000501)	0.000786 (0.000752)	-1.89×10^{-5} (0.000183)
	Indicator	-0.00839 (0.0794)	0.0731 (0.182)	-0.00834 (0.0370)
Asian	Linear	-0.00152 (0.00823)	-0.00351 (0.0270)	-0.00219 (0.00515)
	Quadratic	3.73×10^{-5} (0.000363)	-8.00×10^{-5} (0.00132)	6.58×10^{-5} (0.000281)
	Indicator	0.0213 (0.0527)	0.00443 (0.139)	0.0112 (0.0241)
p-Value for Joint Significance of All Interaction Coefficients		0.430	0.972	0.979
p-Value for Equality of Average Marginal Effects		0.421	0.520	0.906

*This table shows, for each racial category, the sum of the main effect of a given financial aid variable and the coefficient on the interaction between the financial aid variable and the race dichotomous variable. Aid amounts are in thousands of dollars. Coefficients for each race that are significantly different from the corresponding coefficient for whites are italicized. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.

Table A4*
Gender and the Effects of Financial Aid

		(1) Probability of Making a Gift	(2) Log Amount Conditional on Giving	(3) Probability of Being a Class Leader
Loans				
Female	Linear	0.00211 (0.00264)	-0.00623 (0.00777)	-0.000624 (0.00151)
	Quadratic	-0.000117 (7.14×10^{-5})	0.000107 (0.000219)	7.41×10^{-6} (4.44×10^{-5})
	Indicator	-0.0277** (0.0260)	0.0209 (0.0692)	-3.15×10^{-5} (0.0136)
Male	Linear	0.00552** (0.00217)	-0.000542 (0.00691)	-0.000849 (0.00131)
	Quadratic	-0.000180** (5.48×10^{-5})	-5.06×10^{-5} (0.0001871)	-8.20×10^{-7} (3.47×10^{-5})
	Indicator	-0.0430* (0.0235)	-0.148* (0.0741)	-0.0167 (0.0142)
p-Value for Joint Significance of All Interaction Coefficients		0.579	0.168	0.254
p-Value for Equality of Average Marginal Effects		0.284	0.602	0.786
Scholarships				
Female	Linear	0.00156** (0.000548)	3.20×10^{-5} (0.00137)	0.000367 (0.000237)
	Quadratic	-8.59×10^{-6}** (3.42×10^{-6})	5.93×10^{-6} (8.89×10^{-6})	-9.82×10^{-7} (1.45×10^{-6})
	Indicator	-0.0229 (0.0262)	-0.228** (0.0635)	-0.0493** (0.0117)
Male	Linear	*-0.000413* *(0.000544)*	0.00297 (0.00163)	0.000362 (0.000313)
	Quadratic	*1.95×10^{-6}* *(3.38×10^{-6})*	-1.41×10^{-5} (1.03×10^{-5})	-1.83×10^{-6} (1.94×10^{-6})
	Indicator	0.00890 (0.0248)	-0.150** (0.0728)	-0.0184 (0.0147)
p-Value for Joint Significance of All Interaction Coefficients		0.042	0.145	0.223
p-Value for Equality of Average Marginal Effects		0.007	0.200	0.837

Campus Jobs				
Female	Linear	-0.00919** (0.00343)	-0.00735 (0.00794)	-0.00169 (0.00172)
	Quadratic	0.000504** (0.000124)	-0.000104 (0.000198)	3.79×10^{-5} (5.68×10^{-5})
	Indicator	-0.00938 (0.0275)	-0.00939 (0.0275)	0.00519 (0.0140)
Male	Linear	-0.00174 (0.00375)	0.00381 (0.0114)	0.000251 (0.00242)
	Quadratic	0.000229 (0.000146)	-0.000130 (0.000455)	1.27×10^{-5} (0.000105)
	Indicator	-0.0114 (0.0270)	-0.0378 (0.0792)	-0.0155 (0.0162)
p-Value for Joint Significance of All Interaction Coefficients		0.297	0.385	0.677
p-Value for Equality of Average Marginal Effects		0.159	0.309	0.414

*This table shows, for each gender, the sum of the main effect of a given financial aid variable and the coefficient on the interaction between the financial aid variable and the gender dichotomous variable. Aid amounts are in thousands of dollars. Coefficients for men that are significantly different from the corresponding coefficient for women are italicized. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.

Table A5*
Age and the Effects of Financial Aid

		(1) Probability of Making a Gift	(2) Log Amount Conditional on Giving	(3) Probability of Being a Class Leader
Loans				
Younger	Linear	0.00456* (0.00234)	-0.00545 (0.00694)	-0.00205 (0.00150)
	Quadratic	-0.000155** (5.58×10^{-5})	2.69x10^{-5} (0.000178)	2.23x10^{-5} (4.03×10^{-5})
	Indicator	-0.0495* (0.0256)	-0.0675 (0.0737)	-0.00218 (0.0149)
Older	Linear	0.00303 (0.00308)	-0.00457 (0.0120)	-0.000394 (0.00163)
	Quadratic	-0.000135* (7.52×10^{-5})	0.000136 (0.000314)	1.28x10^{-6} (4.03×10^{-5})
	Indicator	-0.0137 (0.0336)	-0.0318 (0.125)	-0.00865 (0.0196)
p-Value for Joint Significance of Interaction Coefficients		0.505	0.341	0.270
p-Value for Equality of Average Marginal Effects		0.537	0.730	0.203
Scholarships				
Younger	Linear	0.000562 (0.000584)	0.00117 (0.00155)	0.000458 (0.000296)
	Quadratic	-4.15x10^{-6} (4.08×10^{-6})	-3.21x10^{-6} (1.14×10^{-5})	-2.38x10^{-6} (2.08×10^{-6})
	Indicator	-0.00577 (0.0237)	-0.108* (0.0595)	-0.0296** (0.0125)
Older	Linear	0.000535 (0.000761)	0.00130 (0.00285)	0.000319 (0.000426)
	Quadratic	-6.42x10^{-6} (5.34×10^{-6})	2.13x10^{-6} (2.10×10^{-5})	-1.08x10^{-6} (3.00×10^{-6})
	Indicator	0.0147 (0.0312)	-0.248** (0.105)	-0.0278 (0.0179)
p-Value for Joint Significance of Interaction Coefficients		0.210	0.254	0.947
p-Value for Equality of Average Marginal Effects		0.770	0.820	0.802

Campus Jobs				
Younger	Linear	-0.00326 (0.00325)	-5.49x10^{-5} (0.00848)	-0.000391 (0.00188)
	Quadratic	0.000295** (0.000107)	-1.88x10^{-5} (0.000272)	3.79x10^{-5} (7.09x10^{-5})
	Indicator	-0.0211 (0.0250)	0.000377 (0.0642)	-0.00163 (0.0138)
Older	Linear	-0.00689 (0.00422)	-0.00685 (0.0137)	-0.000715 (0.00244)
	Quadratic	0.000516** (0.000139)	-0.000231 (0.000361)	-1.41x10^{-5} (7.65x10^{-5})
	Indicator	0.0153 (0.0323)	0.0619 (0.115)	-0.00207 (0.0200)
p-Value for Joint Significance of Interaction Coefficients		0.177	0.081	0.167
p-Value for Equality of Average Marginal Effects		0.491	0.387	0.648

*This table shows, for each age category (graduated more than ten years ago and graduated less than ten years ago), the sum of the main effect of a given financial aid variable and the coefficient on the interaction between the financial aid variable and the age dichotomous variable. Aid amounts are in thousands of dollars. Coefficients for older alumni that are significantly different from the corresponding coefficient for younger alumni are italicized. Coefficients significant at the 5 percent level are marked with **, while those significant at the 10 percent level are marked with *.