

# **The Effect of the Davidson Trust on Alumni Giving**

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## **Abstract**

This paper analyzes the impact of Davidson College's decision to remove student loan financial aid on alumni giving. I use the policy change and subsequent exogenous variation in debt as an instrument to solve the problem of omitted variable bias and simultaneity bias. I find that debt has a significant but small negative effect on the probability of giving and a significant modest negative effect on the amount of giving. My findings are consistent with and explained by the discussed theoretical model, though there are a few concerns that should make one cautious about interpreting these results.

## **I. Introduction**

In March of 2007, Davidson College became one of the first private liberal arts institutions to implement a no-loan aid policy while meeting 100% of their student's demonstrated need (Gruber and Ross, 2009). The no-loan aid policy, called "The Davidson Trust", would impact all returning students and the incoming class as well. Before the policy Davidson's need based-financial aid package included loans, grants, and campus jobs and the average yearly loan amount was about \$3000 (Gruber and Ross, 1).<sup>1</sup> The college determines how much aid to give by subtracting the student's "expected family contribution" (EFC) from the official yearly tuition. The EFC is calculated by Davidson College and it takes into account "parental income and assets, number of siblings in college, number of dependents and other factors" (Palfrey, 12). Financial aid is then offered as a combination of grants, loans, and campus jobs to cover the difference between the EFC and official tuition. For instance, in the academic year 2008-2009, 34% of the student body received need-based financial aid (the average package was \$20542, the average gift award was \$20036, the average self-help award was \$1743, and the average loan was \$3110).<sup>2</sup> After the policy the need-based financial aid package only comprised of grants and campus jobs with no loan aid. For instance, in the academic year 2014-2015, 46.7% of the student body received need-based financial aid (the average package was \$37,819, the average gift award was \$35,003, and the average self-help award was \$2,816)<sup>3</sup>.

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<sup>1</sup> The College also offers merit based financial aid and athletic scholarships which have no loan components.

<sup>2</sup> Davidson College Fact file 2008-2009. Page 18. Office of Planning and Institutional Research. December 2008. <https://www.davidson.edu/offices/institutional-research/fact-file>

<sup>3</sup> Davidson College Fact file 2014-2015. Page 15. Office of Planning and Institutional Research. December 2015. <https://www.davidson.edu/offices/institutional-research/fact-file>

The Davidson Trust was implemented for two major reasons. First and primarily, the Davidson Trust was adopted to make the College more affordable and attractive to middle and lower income families. So by removing the loan aid component, Davidson College hoped they could attract a more diverse student body. The other goal of the Davidson Trust was to “give students greater freedom of choice with respect to academic program at Davidson College and post-Davidson opportunities” (Gruber and Ross, 3). The Davidson Trust has successfully achieved one of its goals. The Davidson Trust has resulted in an increase in applications and yield rates by students with greater financial needs and it has also led to an increase in the number of First Generation College students (Gruber and Ross, 5). This shows that the no-loan aid policy has indeed made Davidson College more attractive to students that would otherwise not apply due to financial constraints.

The Davidson Trust has not been so clearly successful in achieving its other goal of freeing up students to pursue their true academic and career dreams. Palfrey (2013) in her analysis of the effect of The Davidson Trust on graduates major and career decisions finds no significant effects after using simulated student loan offers as an instrumental variable. She determines each student’s simulated loan offer “using his or her EFC, the total tuition in each academic year and the cap on offered loans in each year” (Palfrey, 22). The simulated loan offer is the difference between the EFC and tuition cost, and if this difference is higher than the student loan cap then simulated loan offer is the student loan cap. After using the instrument, she finds that \$10000 in debt doesn’t have a significant effect on any of her post graduate outcomes, or the student’s major choices.

The goal of this paper is to explore another potential effect of The Davidson Trust: an increase in Alumni giving and donations. Gifts and donations serve as a major source of revenue for most college and universities. In the academic year 2014-2015 Davidson College received a total of \$52,430,222 from gifts which constitutes of over 23% of the college's core revenue with the alumni fund raising over \$17 million dollars.<sup>4</sup> The alumni fund is definitely an important source of revenue so this paper explores the various ways in which alumni giving might be affected by the Davidson Trust and aims to econometrically test this effect of no-loan aid on alumni donations. My honor thesis is structured as follows: Firstly, I present relevant research on determinants of giving and discuss possible conceptual models in my literature review. Secondly, I present my theoretical and conceptual model. Thirdly, I outline my chosen econometric model. Fourthly, I discuss the data I use to conduct an econometric analysis, and then present my results. Finally, I discuss possible concerns with my results and conclude the paper.

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<sup>4</sup> Davidson College Fact file 2014-2015. Pages 16 and 17. Office of Planning and Institutional Research. December 2015. <https://www.davidson.edu/offices/institutional-research/fact-file>

## II. Literature Review

In this section I explore previous literature on related research. Though there is extensive research on the determinants of alumni giving, most of these papers explore general determinants and rarely focus on specific variables. For my paper I focus solely on research concerning financial aid, loans, and other possible determinants of alumni giving that may be affected by the Davidson Trust (such as college experience). There are two papers that directly measure and focus on the effect of financial aid on alumni giving. In 2012, Meer and Rosen (2012) explore the effect of different types of financial aid on alumni's propensity to give and the amount of donation. They estimate a hurdle model using data on 13831 alumni from an anonymous university. First, they "estimate a linear probability model for whether or not the individual makes a gift", and then they "use ordinary least squares on the positive observations to analyze the decision about how much they give" (Meer and Rosen, 893). They break up financial aid into scholarships, loans, and campus jobs, and analyze the various effects that each have on alumni donations.

Meer and Rosen find that students who take *loan* aid during college are less likely to make an alumni donation after college. Specifically, receiving any loan aid reduces the probability of making a donation by about 3.6 percentage points, which is a meaningful though not huge effect, "given that the mean rate of giving is about 62 percent" (Meer and Rosen, 895). They argue that this result is not due to an income effect; students who took out loans tend to have lower income than other alumni, since they control for income through other variables that are correlated with income. They control for variables such as field of occupation, zip codes using zip codes, median income by zip code, and parent's

income. They find that none of these variables substantially affect the impact of loan aid on the propensity to give. The impact of loan aid could possibly be attributed to what they call “the annoyance effect” which claims there is a psychological burden to having any loans and this affects an alumnus’s propensity to give. They also find that the “receipt of loan aid reduces donations by about 6.6 percent” (Meer and Rosen, 896).

Another relevant result from Meer and Rosen is *scholarship* aid has a negative impact on the size of the alumni donation but no effect on the propensity of an alumnus to donate. They find that receiving any scholarship aid reduces giving by about 18 percent, however this negative effect of scholarship aid reduces as the amount of aid increases. In their own words, “the absolute value of the negative effect of scholarships on the conditional amount of giving tends to fall with the size of the scholarship” (Meer and Rosen, 897). This again shows an income effect may not be present as one would expect the opposite, since a student who receive lower scholarship aid must have a higher income (an alumnus’s income is positively correlated with their parent’s income which is negatively correlated with the scholarship aid amount). Therefore, Meer and Rosen struggle to find an explanation for this result and suggest “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” (Meer and Rosen, 898). However even Meer and Rosen agree that this explanation is merely conjectural.

The anonymous institution used in the Meer and Rosen’s paper also had a similar an introduction of no-loan aid similar to The Davidson Trust. In 2001, the university moved to a no-loan policy where financial aid was now met by grants and campus jobs, which is

without any loans. Meer and Rosen attempt to compare alumni giving before and after the no-loan policy, and find very little effect of the no-loan policy on aid. However, they state that this is probably due to the small number of affected cohorts and the difficulty in isolating the effect of the no-loan policy.

Marr, Mullin, and Siegfried (2003) also estimate the effect of undergraduate financial aid on alumni giving. In detail, they “explore whether undergraduate college loan obligations affect alumni contributions” (Marr, Mullin, and Siegfried, 124). They estimate both the likelihood of making a contribution and the expected gift size conditional on contributing using data on 2822 students at Vanderbilt University. They use a probit model to estimate the probability of giving and find that need-based loans reduce the probability of giving in the first eight years after graduation between 8 to 16%. To control for the effect of income, they use the income of the student’s parents, and the student’s scholastic performance. They argue that the student’s future income is not a determinant of financial aid and their main concern is the parent’s income since that is correlated with the student’s future income and also a determinant of financial aid. So by controlling for parent’s income they can eliminate the correlation between a student’s future income and financial aid reducing our concern of a possible income effect. The same logic goes for controlling for the student’s scholastic performance. Unlike Meer and Rosen, the results from Marr, Mullin, and Siegfried show that any *scholarship* aid significantly raises the probability of giving though the “estimated increase in the likelihood of giving decreases with the size of the scholarship awarded” (Marr, Mullin, and Siegfried, 139).



It is generally accepted that student loans negatively impact alumni giving (Marr, Mullin, and Siegfried, 2003; Meer and Rosen, 2012; Mosser, 1993; Palfrey, 2013; Rothstein and Rouse, 2011). One paper that interestingly explores the impact of a change in financial aid policy is the one by Rothstein and Rouse (2011). They explore the impact of student debt on employment outcomes using the introduction of the no loan aid policy at Princeton University in 2001. They find that student debt does have a moderately statistically significant negative effect on alumni giving (3 percentage points per \$1000 in loans) (Rothstein and Rouse, 161).

There are also other papers that don't find any significant effect of one's financial aid status. For instance, Holmes (2009) during her exploration of the factors that influence an alumni's propensity to donate and the amount donated finds no significant effect of financial aid status on alumni giving (Holmes, 2009). Her research is clearly contradicted by the work done by Truitt (2013). He conducts a logit regression of "student demographic independent variables on the bivariate alumni donor participation rate dependent variable using data from a survey of 10 Carnegie Baccalaureate Colleges from the southeastern United States (Truitt, 2013). Truitt finds that increasing institutional financial aid increases the likelihood of high alumni donor participation rates (Truitt, 109). Therefore, I assume that financial aid does have an impact on alumni giving (Hoyt, 2004; Truitt, 2013).

One variable that may be affected by the introduction of the no-loan policy at Davidson College is the student's college experience. Previous research on the effect of college experience on alumni giving seems to be decisive; a positive college experience results in more giving (Dean, 2007; Hoyt, 2004; Mosser, 1993; Miller and Casebeer, 1990;

Sun, Hoffman, Grady, 2007). For example, Clotfelter (Duke University and NBER) in 2001 conducts an extensive analysis on students who entered in the falls of 1951 and 1976 from 14 private colleges and universities to investigate the patterns of alumni giving. He finds that the degree of satisfaction with one's undergraduate experience positively correlates with the amount of alumni donation. "Those who reported being satisfied were more active contributors than those who were not" (Clotfelter, 13). Similarly, Baade and Sundberg (Economics of Education Review) show that higher institutional quality has a positive impact on the average alumni gift (Baade and Sundberg, 1996). But there are also other results like the research done by Lertputtarak and Supitchayangkool (2014). They used survey data on alumni and students of masters and doctoral degree programs in a government university in Thailand to conduct a logit regression to estimate the determinants of alumni giving. Their results "showed that the satisfaction of alumni and current students toward process cannot influence a willingness to donate" (Lertputtarak and Supitchayangkool, 175).

Another important variable that could be affected by the Davidson Trust is the wealth of the student or their future income. Various papers have found a significant positive relationship between an alumnus's income (or predictors of alumni income such as family wealth) and their giving (Baade and Sundberg, 1996; Clotfelter, 2001; Hoyt, 2004; Spaeth and Greeley, 1970; Taylor and Martin, 1995). However, most papers use proxies for income but Bruggink and Siddiqui (1995) using survey data with a measure of income (income bins) are able to find a positive effect of alumni income on giving. Though they did not have direct data on alumni income, their results are still fairly accurate because they used income class intervals that the alumni had selected in the survey (Bruggink and

Siddiqui, 1995). It's possible that the Davidson Trust might make students feel more gratitude towards the college. This in turn will increase student satisfaction and may result in being reciprocal towards the college by giving as an alumnus.

Since I have already discussed the research on the effect of student satisfaction on alumni giving, I also explored the effect of reciprocity on alumni giving. Yang (2014) defines reciprocity as “when individuals reward others that do beneficial things to them and punish others that do harmful things to them” (Yang, 2). This is the definition I assume when I refer to reciprocity throughout the paper. She finds that though reciprocity information shows a positive impact on one's likelihood to give, it doesn't have statistical significance.

Few papers develop theoretical or conceptual models for alumni gift giving behavior. Mosser (1993) in his dissertation expands on Volkwein et al. (1989) conceptual model for predicting alumni giving behavior. He explores a theoretical model that discusses how capacity to give, motivation to give, and possibly their interaction affect alumni gift giving behavior. He also uses the Partial Least Squares computer package to conduct path analysis on these channels and finds that both capacity to give and motivation to give have a strong positive effect on the alumni gift giving behavior. He does not find any interaction effects for capacity to give and motivation to give instead he discovers a mediating (indirect) effect of capacity to give through motivation to give on alumni gift giving behavior. Hoyt (Utah Valley State College) in 2004 further tests this theoretical model of alumni giving. He adjusts the previous model by Volkwein et al. (1989; 1999) and Mosser (1996) by addressing “altruistic values and preferences, the effect of solicitation,

competing charitable organizations, and the economic environment” (Hoyt, 3). He conducts a path analysis using MPLUS on data from a survey conducted by the Office of Institutional Research of alumni donors and non-donors during the years 1986 through 2003 from Utah Valley State College. Hoyt finds that receipt of scholarship of \$1000 or more and capacity to give are positively associated with willingness to give. In the next section I develop my theoretical model based on the research done by Mosser (1993) and Volkwein et al. (1989).

### **III. Theoretical Model**

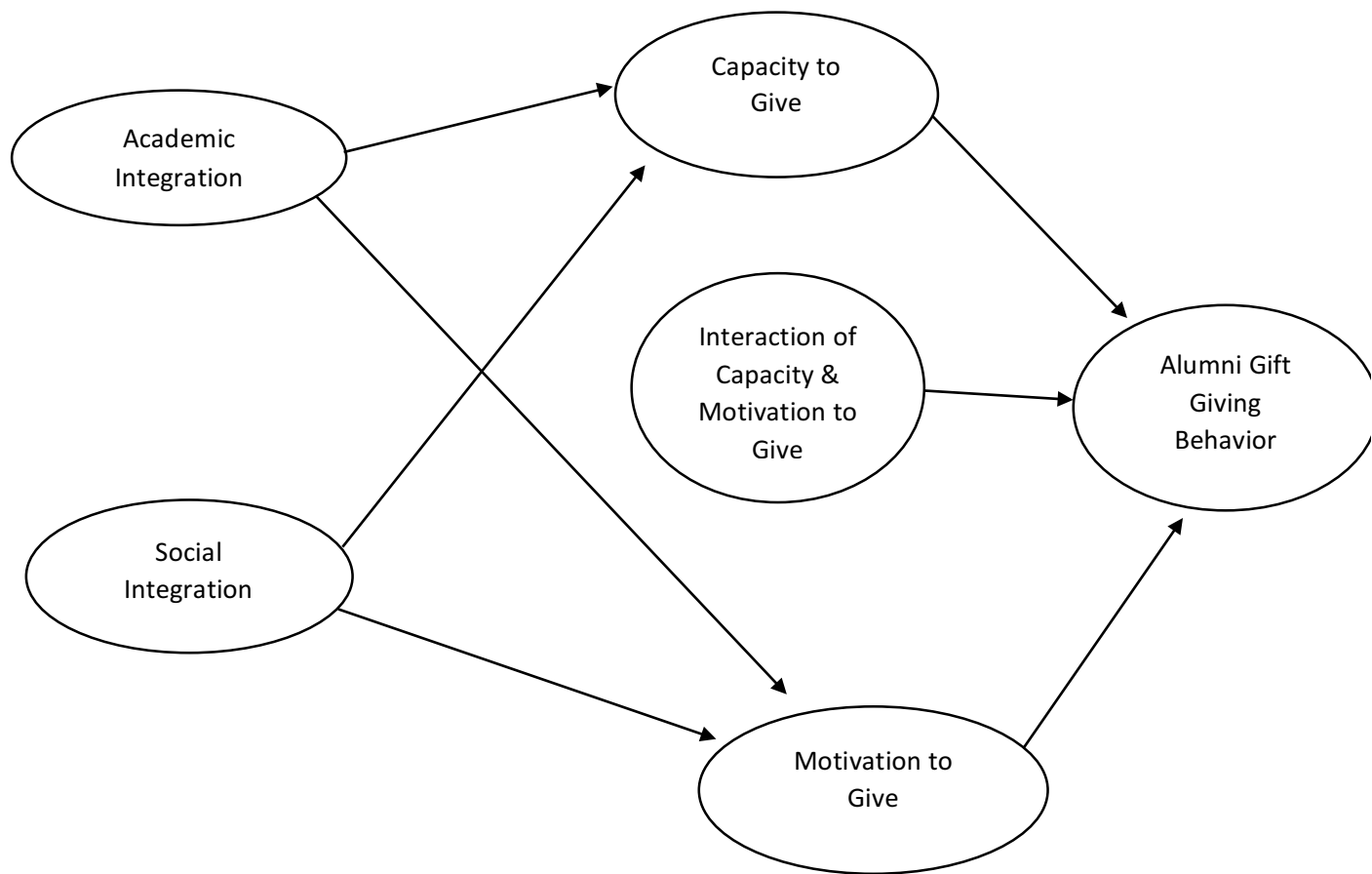
In this section I describe the theoretical economic model I use for my research. The model explores the relationship between consumption and giving by analyzing the various factors that affect an alumnus decision to give back to their Alma matter. My main goal in this section is to specify a realistic model that allows for predictions of the effect of various variables. That means I attempt to avoid making any “self-fulfilling” assumptions that constrain my effect to one direction. Therefore, my model should accurately explain my results and also clarify the interesting results seen in previous literature. This model is based on the research conducted by Mosser (1993) in his expansion of the theoretical model by Volkwein et al. (1989). I chose this model because Mosser discusses how latent variables that are determined during the student’s college career affect the decision to give as an alumnus. This specification allows me to identify the variables which would be affected by the Davidson Trust no loan initiative, and construct a model centered around these variables in order to predict the estimated effect of the Davidson Trust on alumni giving.

Mosser assumes that the main predictors of alumni giving are Capacity to Give, Motivation to Give, and an interaction of Capacity to Give and Motivation to Give. Here, Capacity to Give is defined as “an assessment of factors, both positive and negative, that impact an individual's ability to make a financial contribution” (Mosser, 59). This means any factor that influences one’s ability to give to the college affects one’s Capacity to Give. Therefore, educational attainment is a relevant factor that influences Capacity to Give. Income and wealth can be used as appropriate measures of one’s Capacity to Give

(Volkwein et al, 1989). Motivation to Give on the other hand, is defined as “a composite of current sources of satisfaction with one’s alma mater” (Mosser, 60). Mosser explains it best when he says “it is assumed that past academic and social satisfaction with one's alma mater influence the overall feeling about the institution. These past satisfactions influence current satisfaction and level of involvement with the institution to produce a readiness level or level of Motivation to Give” (Mosser, 60). While both the Capacity to Give and Motivation to Give directly affect an alumnus’s decision to give the latent variables that affect both of these factors are academic integration and social integration.

Academic integration takes into account all factors that influence how well a student fits into the academic environment of a college. The argument is that academic integration results in a level of satisfaction that affects Motivation to Give. Academic integration also influences one’s Capacity to Give since it affects educational attainment/success. Social integration takes into account factors that affect social satisfaction during a student’s college experience. Social integration also influences both Capacity to Give and Motivation to Give. A diagram exhibiting Mosser’s model can be seen in Figure 1.

**Figure 1. Mosser's Conceptual Model of Alumni Gift Giving Behavior**



As mentioned earlier in the literature review, Mosser's empirical analysis confirms the positive impact of Capacity to Give on alumni gift giving behavior and the same results for the effect of Motivation to Give on alumni gift giving behavior. However, he states that the Capacity to Give has a slightly greater effect on alumni gift giving behavior than Motivation to Give (Mosser, 1993). Unfortunately, he doesn't find a direct effect of an interaction term of Motivation to Give and Capacity to Give on alumni gift giving behavior

instead he finds that the relationship is a mediating effect. That is, Capacity to Give has another indirect effect on alumni gift giving behavior through Motivation to Give. He describes this as Capacity to Give stimulating one's Motivation to Give for example an increase in one's income drawing out a Motivation to Give (Mosser, 1993).

In adapting Mosser's model for my paper, I explore ways in which Academic Integration, and Social Integration, Capacity to Give, and Motivation to Give might be affected by the introduction of the Davidson Trust. This means exploring how financial aid in the form of aid affects these variables. From previous research we can hypothesize that student loan aid may affect a student's social and academic experience, future career decisions, gratitude towards the college, and serve as a credit constraint after college (Meer and Rosen, 2011; Mosser, 1993; Palfrey, 2013; Rothstein and Rouse, 2011). For social and academic experience, student loan aid may influence a student's stress level during college if the student is debt averse and this would in turn influence how they integrate with the academic social environment of the college (Rothstein and Rouse, 2011). So since social and academic experience determine Academic Integration and Social Integration, loan aid affects Academic and Social Integration. The loans may also be a credit constraint to the student's after college depending on how much of the debt is left to be paid (Rothstein and Rouse, 2011). It is through this channel of serving as a credit constraint that loan aid affects Capacity to Give directly. Student loan aid affects the student's future career decision since students with debt are more likely to take higher paying jobs than other lower paying jobs (Palfrey, 2013; Rothstein and Rouse, 2011). Thus student loan aid affects Capacity to Give indirectly since it may influence alumni income.



The effect of student loan aid on one's feeling of reciprocity depends on how much aid one receives from the college. On the one hand, students may feel grateful to the college for giving them any aid even if it's in the form of loans. On the other hand, it is clear that a student would definitely be more grateful to the college if the aid was in the form of a grant as opposed to loans (Meer and Rosen, 2011). Therefore, student loan aid influences Motivation to Give by affecting gratitude felt towards the college. Another possible channel through which student loan aid may affect Motivation to Give is through its effect on the social pressure to give back. DellaVigna, List, and Malmendier (The Quarterly Journal Of Economics) *in 2012* argue that for any individual that has been solicited there is a social cost associated with not giving and that people may give to avoid this social cost (DellaVigna, List, and Malmendier, 2012). Student loan aid may affect the social cost of not giving back to one's alma mater (for example a student who receives more grant aid than loan aid may feel worse about having to say no to a fund-raiser than one who had more loan aid). So the main variables that are affected by the Davidson Trust and influence alumni gift giving behavior are alumni income and wealth, gratitude towards the college, college experience, and social pressure to give.

I assume a simple utility maximization model where the alumnus chooses a giving amount  $g^*$  that maximizes her utility at the time she is considering giving back to the college. This utility function takes into account the alumni's income and wealth, reciprocity, college experience, and social pressure. The alumni's income and wealth determines their budget constraint given that they receive utility from consumption as well as giving. Reciprocity is any reciprocal feeling or gratitude an alumnus feels towards the college after receiving financial aid as a college student. A student's college experience captures the

student's willingness to give back based on how much they enjoyed college. Finally, social pressure refers to the pressure an alumnus feels from the college solicitor and any response to deter past or future solicitation. In this case giving allows the alumni to avoid this social cost and increase their utility.

In order to accurately model the role these factors play in an alumnus's decision to give back to the college, I assume a three period model. Period 0 is before the student attends college, Period 1 is during college, and Period 2 is after college. According to this model, the alumnus's decision on how much to donate in period 2 can also be influenced by factors that occur in period 0 or period 1.

At period 0 the student forms some expectations about their college experience with respects to loans. That is they choose  $\tau_E$ , their college loan expectations at period 0. The student forms these expectations based on information they get from the college (such as how much of their financial aid will be loans), and any other sources (such as friends or family).

At Period 1 the student goes through college and knows how much loans they have to pay. In particular the student now knows  $\tau_I$ , which is the total loans from college at period 1 and is a sum of  $\tau_a$  and  $\tau_o$  ( $\tau_I = \tau_a + \tau_o$ ). Where  $\tau_a$  is their loans from financial aid, and  $\tau_o$  is any other loans they have to take for college related expenses. These loans negatively affect a student's college experience as they might feel more pressure or stress as a result of having the loans or they might have to work on/off campus to pay off the loans. This means the loans are components of Academic Integration and Social Integration. This model also takes into account the possibility that as one's experience deviates from

their expectations, this difference augments their impression of the experience. So in this situation if the student's loan expectations do not match their actual loans in college ( $\tau_E \neq \tau_I$ ), then the student has a worse/better experience at college than if  $\tau_E = \tau_I$  even if they have the same amount of loans in both cases. For example, a student might feel more stressed from having to take an on campus job to pay off loans if she didn't expect to have to work in college than if she did. This means loan expectation ultimately affects one's Motivation to Give through its effect on the student's impression of their college experience. Let  $a$  represent one's willingness to give based on their college experience. From what we discussed above it follows that  $a(\tau_I, \tau_E - \tau_I)$ ,  $a'(\tau_I) < 0$ , and  $a'(\tau_I - \tau_E) < 0$ . This means  $a$  is a component of Motivation to Give.

The loans from financial aid affect how much gratitude the student feels towards the college. Though a student might be grateful for receiving any kind of financial aid, I assume that less loan aid and more grant aid makes a student more grateful to the college. Let  $r$  represent an alumni's willingness to give based on a positive reciprocal feeling. It follows that  $r(\tau_a)$ ,  $r'(\tau_a) < 0$ ,  $r \geq 0$ . Therefore,  $r$  is also a component of their Motivation to Give.

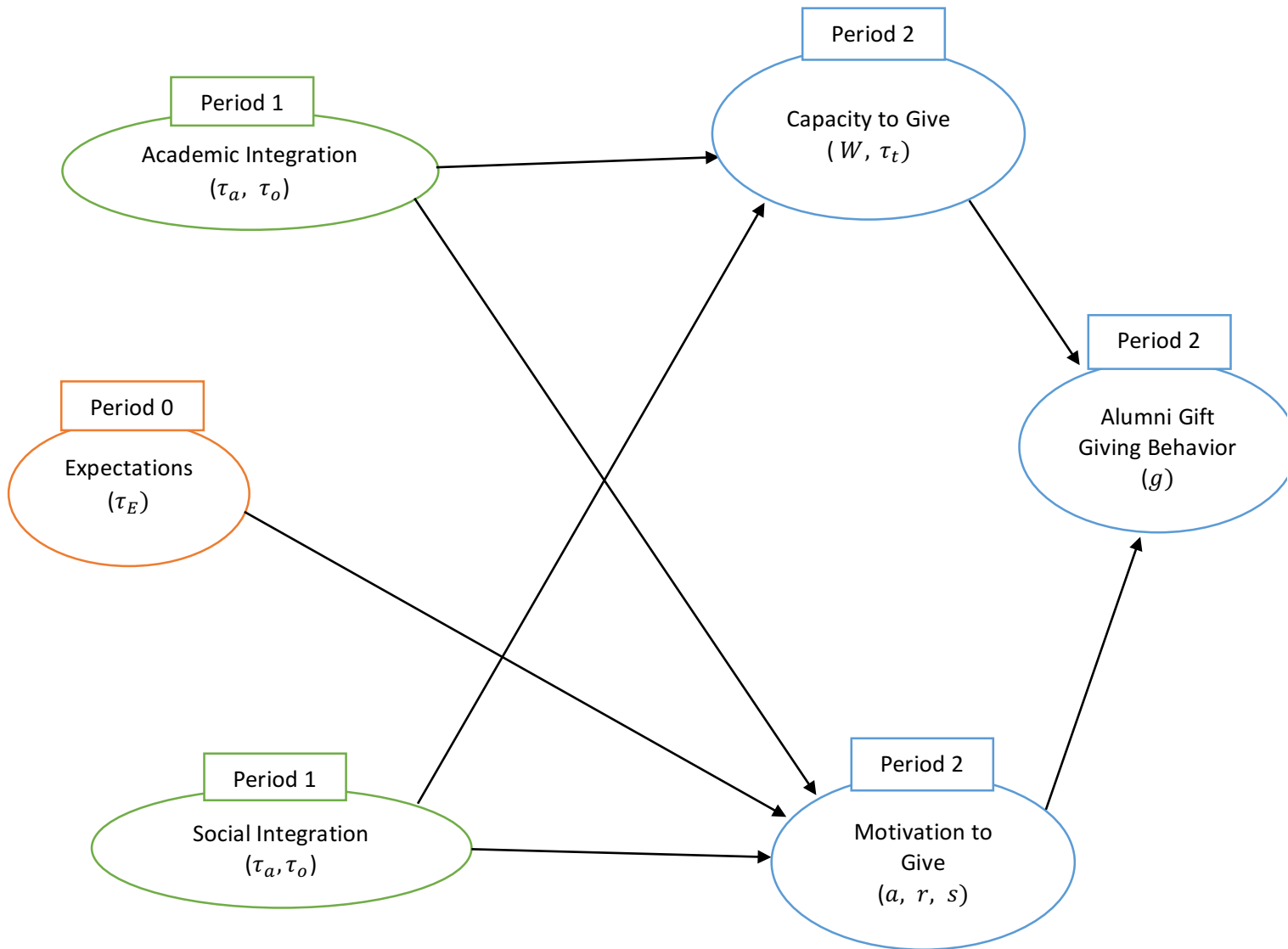
Student loans affect the social pressure cost to an alumnus when they say no after being solicited. Alumnus may feel worse when they say no if they received less loans from the college. Let  $s$  be the social pressure cost to give when solicited. It follows that  $s(\tau_a)$ ,  $s'(\tau_a) < 0$ . In this model  $s$  is the final component of Motivation to Give.

Student loans may serve as a credit constraint to an alumnus if they still have loans to pay when they are making the decision to give. Let  $\tau_t$  be the total remaining loans from

college that an alumnus is yet to pay in period 2. This means  $\tau_t = \tau_l$  if the alumnus hasn't paid off any loans by period 2. Loans also affect the student's career choices and here we assume that a student may pursue higher paying jobs due to the loans. Let  $W$  be the income of an alumnus at the point where they are deciding to give, this means  $W(\tau_l)$  and  $W'(\tau_l) > 0$ . Therefore,  $W$  and  $\tau_t$  are components of Capacity to Give. The combined effect that student loans has on Capacity to Give through  $W$  and  $\tau_t$  represent the combined effect of loans on a debt averse student with credit constraints.

Figure 2 shows a graphical depiction of my theoretical model, with the components of each variable include in parenthesis.

**Figure 2. My Conceptual Model of Alumni Gift Giving Behavior**



In Period 2 the alumnus chooses to maximize their utility by choosing  $g^*$  given  $a, r, \tau_t, W$ .

Their utility function can be expressed as:

$$U(c, g) = U(c) + (r + a + s)V(g)$$

Subject to a budget constraint of:

$$W = c + g + \tau_t$$

Where:

$U(c)$ = utility from consumption

$V(g)$  = utility from giving

$c$ = consumption

$g$  = donation amount

$r$  = reciprocity

$a$  = One's experience at Davidson

$s$  = social pressure to give

$\tau_t$  = total loans from college at period 2

Solving the general form using the Lagrangian multiplier gives us:

$$\mathcal{L} = U(c) + (r + a + s)V(g) - \lambda(W - c - g - \tau_t)$$

$$\frac{\partial \mathcal{L}}{\partial c} = U'(c) + \lambda = 0$$

$$\frac{\partial \mathcal{L}}{\partial g} = (r + a + s)V'(g) + \lambda = 0$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = c + g + \tau_t - W = 0$$

$$U'(c) = (r + a + s)V'(g)$$

To easily examine the effects of variables in my model on the optimum amount of giving let us assume the basic assumption of diminishing marginal utility for both the utility derived from giving, and the utility from consuming. That is  $U'(c) > 0$  and  $U''(c) < 0$ , and  $V'(g) > 0$  and  $V''(g) < 0$ .

Let  $U(c) = (c)^{\frac{1}{2}}$  and  $V(g) = (g)^{\frac{1}{2}}$  this means the utility function becomes:

$$U(c, g) = (c)^{\frac{1}{2}} + (r + a + s)(g)^{\frac{1}{2}}$$

Where:  $c = W - g - \tau_t$

Using the solution from the Lagrangian model:

$$U'(c) = (r + a + s)V'(g)$$

$$U'(c) = \frac{1}{2(c^{\frac{1}{2}})}, V'(g) = \frac{1}{2(g^{\frac{1}{2}})}$$

$$\frac{U'(c)}{V'(g)} = (r + a + s)$$

$$\frac{\frac{1}{2(c^{\frac{1}{2}})}}{\frac{1}{2(g^{\frac{1}{2}})}} = (r + a + s)$$

$$\frac{g^*}{(W - g^* - \tau_t)} = ((r + a) + s)^2$$

$$g^*(1 + (r + a + s)^2) = (W - \tau_t)(r + a + s)^2$$

$$g^* = \frac{(W - \tau_t)(r + a + s)^2}{(1 + (r + a + s)^2)}$$



### **Predicted Effect of Income on Alumni Giving**

$$\frac{\partial g^*}{\partial W} = \frac{(r + a + s)^2}{1 + (r + a + s)^2} > 0$$

The model shows that an increase in an alumnus income,  $W$ , ceteris paribus should result in an increase in alumni giving to the college. This shows the income effect as the alumnus will be able to maintain their level of consumption and while increasing their giving amount  $g^*$ . This result is consistent with most of the literature on the effect of alumni income on gift giving behavior. This effect shows the impact of a reduction on Capacity to Gove on alumni gift giving behavior.

### **Predicted Effect of Reciprocity on Alumni Giving**

$$\frac{\partial g^*}{\partial \tau_t} = \frac{-(r + a + s)^2}{1 + (r + a + s)^2} < 0$$

From the comparative statics we see that an increase in a positive reciprocal feeling from the alumnus,  $r$ , all other things equal should result in an increase in giving. This result is consistent with the research done by Yang (2014). This effect shows the impact of a reduction of Motivation to Give on alumni gift giving behavior.

### **Predicted Effect of Remaining Student loans in period 2 on Alumni Giving**

$$\frac{\partial g^*}{\partial \tau_t} = \frac{-(r + a + s)^2}{1 + (r + a + s)^2} < 0$$

Analyzing the model shows that an increase in the remaining student loans an alumnus has to pay at period 2,  $\tau_t$ , ceteris paribus decreases the equilibrium giving amount. This illustrates the effect of the loans acting as a credit constraint at the time where the alumnus chooses how much to give. The student loans essentially reduce the wealth of the alumnus and forces them to consume and give less. This shows the effect of an impact of a reduction of Capacity to Give on alumni gift behavior.

### **Predicted Effect of College Experience on Alumni Giving**

$$\frac{\partial g^*}{\partial a} = \frac{2\theta(W - \tau_t)(r + a + s)}{(1 + (r + a + s)^2)^2} > 0$$

The model predicts that as one's college experience,  $a$ , of a student gets more positive this increases their giving as an alumnus. This is consistent with some literature on the effect of college experience and satisfaction on willingness to give. This shows the effect of the impact of a reduction of Motivation to Gift on alumni gift giving behavior.

### Predicted Effect of Social Pressure on Alumni Giving

$$\frac{\partial g^*}{\partial s} = \frac{2(W - \tau_t)(r + a + s)}{(1 + (r + a + s)^2)^2} > 0$$

The model predicts that an increase in the social cost or pressure,  $s$ , felt by an alumnus when they are solicited results in an increase in their giving. This is consistent with the notion that as the social cost to not giving increases the alumnus is more willing to give in order to avoid this cost. This shows the effect of the impact of a reduction of Motivation to Gift on alumni gift giving behavior.

### Predicted Effect of Loans from Financial Aid on Alumni Giving

Determining the predicted effect of student loans from financial aid on alumni giving requires an analysis of the entire dynamic model. We must explore the variables that are affected by a change in student loan aid,  $\tau_a$ , and the direction of the effect of  $\tau_a$  on these variables. The different channels through which student loans from financial aid may affect alumni giving are expressed below.

I. Since  $r'(\tau_a) < 0$  and  $\frac{\partial g^*}{\partial r} = \frac{2(W - \tau_t)(r + a + s)}{(1 + (r + a + s)^2)^2} > 0$ , then reducing  $\tau_a$  has a positive effect on  $g^*$  through  $r$ .

II. If  $a'(\tau_l) < 0$  then  $a'(\tau_a) < 0$  because  $\tau_l = \tau_a + \tau_o$ . Since  $a'(\tau_a) < 0$  and  $\frac{\partial g^*}{\partial a} =$

$\frac{2(W - \tau_t)(r + a + s)}{(1 + (r + a + s)^2)^2} > 0$  then decreasing  $\tau_a$  has a positive effect on  $g^*$  through  $a$ .

III. Since  $s'(\tau_a) < 0$  and  $\frac{\partial g^*}{\partial s} = \frac{2(W-\tau_t)(r+a+s)}{(1+(r+a+s)^2)^2} > 0$ , then reducing  $\tau_a$  has a positive effect on  $g^*$  through  $s$ .

IV. If  $\tau_t'(\tau_l) > 0$  then  $\tau_t'(\tau_a) > 0$  because  $\tau_l = \tau_a + \tau_o$ . Since  $\tau_t'(\tau_a) > 0$  and  $\frac{\partial g^*}{\partial \tau_t} = \frac{-(r+a+s)^2}{1+(r+a+s)^2} < 0$  then decreasing  $\tau_a$  has a positive effect on  $g^*$  through  $\tau_t$ .

V. If  $W'(\tau_l) > 0$  then  $W'(\tau_a) > 0$  because  $\tau_l = \tau_a + \tau_o$ . Since  $W'(\tau_a) > 0$  and  $\frac{\partial g^*}{\partial W} = \frac{(r+a+s)^2}{1+(r+a+s)^2} > 0$  then decreasing  $\tau_a$  has a negative effect on  $g^*$  through  $W$ .

As we can see it is difficult to determine the direction of the effect of student loan aid on alumni giving. Though reducing student loan aid may be increasing giving through its effect on reciprocity, college experience, social pressure cost, and remaining student loans at Period 2, student loan aid also decreases giving through its effect on alumni income. Therefore, the overall effect of reducing student loan aid depends on the relative magnitudes of its effect on alumni giving through alumni income versus through reciprocity, college experience, social pressure cost, and remaining student loans at Period 2. The model does not explicitly predict the effect of student loan aid on alumni giving.

## Other Interesting Predictions

One interesting prediction from this model is the effect that students' expectations of their student loans has on the effect that reducing student loans has on alumni giving. We see that:

- VI. If  $\tau_E = 0$ ,  $\tau_a = 0$ , and  $\tau_I > 0$  (due to  $\tau_o > 0$ ), since  $a'(\tau_E - \tau_I) < 0$  and  $\frac{\partial g^*}{\partial a} = \frac{2(W - \tau_t)(r + a + S)}{(1 + (r + a + S)^2)^2} > 0$ , then this reduces the positive effect that decreasing  $\tau_a$  has on  $g^*$  through  $a$ .

What 6 tells us is if a student expects to have no student loans (perhaps she believes having no student loan aid equates to having no student loans at all), but she has to take out loans for other college expenses, then her college experience will be worse. This impact directly opposes her positive experience from having no loan aid and affects her alumni giving negatively.

#### **IV. Econometric Model**

The goal of my research is to investigate the effect of student loans on donation behavior of alumni from Davidson College aside from the income effect (students receiving loans come from families with less wealth which is correlated with their future income). The variation in loans received by students due to the Davidson Trust allows us to compare donations of students in similar financial situations who received different loan amounts. Thus, exploring any other channels through which loans may influence alumni giving such as reciprocity, college experience, or others mentioned in the theoretical model section. Therefore, my econometric model must accurately identify and isolate the effects of loan aid on amount of giving and probability of giving. One possible method is a difference-in-differences analysis. The Davidson Trust policy created an exogenous change in student debt that can be used as an abrupt policy change that only affects students who need aid. Our difference-in-differences analysis compares the average difference in outcomes between students with need and students without need before and after the trust. Here, the treatment group is student that applied for need based financial aid (assuming students who don't apply don't need aid) and these students are treated if they apply for aid after the Davidson Trust. The control group is student's that don't need aid since they will not be affected by the Davidson Trust. A possible Difference-In Differences estimation for the probability of giving can be written as follows:

$$g_{ic} = \beta_0 + \beta_1 Need_i + \beta_2 Post_c + \beta_3 (Need * Post)_{ic} + u_{ic}$$

where:

$g_{it}$  = probability of giving outcomes for a student  $i$  in cohort  $c$ .

$Need_i$  = indicates students who were eligible for need based financial aid

$Post_c$  = whether the student attended Davidson after the trust

The difference in difference regression allows us to account for any time trends or changes that occurred during the time the Davidson Trust was instituted but is independent of the policy. This difference in difference causal treatment effect is estimated by  $\beta_3$ . The coefficient  $\beta_1$  captures any difference related to being in the treatment group and  $\beta_2$  captures any time trends that might exist independent of the policy. Unfortunately, there are multiple problems with simply estimating a DID analysis for this research. The major hurdle with this estimation lies in the omitted variable bias, specifically student and family characteristics that are correlated with debt and determinants of alumni giving. For instance, excluding parent's wealth will negatively bias the coefficient (since students with high family wealth receive less loans and family wealth is positively correlated with future income which is correlated with giving) and reduce the effect that loans may have on alumni giving. Another problem with a simple DID estimation is there may be simultaneity bias since a student's belief about future earnings may influence the debt they decide to take. Though students are offered a loan amount by the college based on their expected family contribution, they can also decide to take more loans from other sources. If student's

take on more debt because they believe that they will earn a high income in the future, we may see a positive bias in the coefficient since the students with more loans will earn more income which is positively related with alumni donation behavior. The final problem with this DID analysis is it doesn't capture any differences in the magnitude of individual treatments. Since the Trust removed all loan aid, students with low expected family contributions will have a higher treatment than students with high EFCs because they will have a higher change in loans. The DID analysis simply provides the average effect of the Trust and doesn't capture the magnitudes of the individual treatments.

One possible control to prevent omitted variable bias is expected family contribution. EFC can be used as a proxy for family income, and given that it is calculated by the college we can assume that the formula used consistently predicts family and background characteristics across all students (we are not too concerned even if this prediction is inaccurate). Another assumption for EFC to be a good control is it is consistently calculated in the same format over time and the direct effect of EFC on the outcome variable must also be constant over time. These assumptions are necessary because we expect students with the same EFC in different cohorts (pre-trust and post-trust) to have similar family characteristics which affect the outcome variable in the same way. Therefore, when we control for EFC, we can find the effect of removing loans from students who would have received loans pre-trust and have very similar characteristics. Appropriate controls may account for the omitted variable bias but we must use another method to address the other problems with the DID analysis.



One technique to solve the various difficulties encountered with the DID analysis is to use the instrumental variable suggested by Rothstein and Rouse (2011). The instrument used in their paper (and eventually in this paper as well) is simulated loan offers. Simulated loan offers are determined by calculating the loan offer the student receives from the college based on their expected family contribution and tuition cost. Therefore, we use simulated loans to show the variation in debt only caused by financial aid. By removing variation in actual loans unexplained by loan offer we can account for simultaneity bias. This solves the problem of simultaneity bias since a student's belief about future earnings cannot affect the loan-aid amount awarded by the college. The instrumental variable will be in the form:

#### IV Regression

$$g_{ic} = \beta_0 + \beta_1 Need_i + \beta_2 Post_{ic} + \beta_3 d_{ic} + \beta_4 EFC_{ic} + \beta_5 X_{5ic} + \varepsilon_{ic}$$

#### First Stage

$$d_{ic} = \beta_0 + \beta_1 Need_i + \beta_2 Post_{ic} + \beta_3 (Simulated_{ic}) + \beta_4 EFC_{ic} + \beta_5 X_{5ic} + \mu_{ic}$$

Where:

$g_{it}$  = probability of giving outcomes for a student  $i$  in cohort  $c$ .

$Need_i$  = indicates students who were eligible for need based financial aid

$Post_c$  = whether the student attended Davidson after the trust

$Simulated_{ic}$  = Simulated loan offers

$d_{ic}$  = student debt

$EFC_{ic}$  = Expected Family Contribution

$X_{4ic}$  = Controls: EFC, years since graduation, gender, ethnicity, major, SAT scores, median income by zip code, Cum GPA, State, Social group, married.

In determining the effect of loans on the decision to give we must account for the fact that we have a binary variable (to give or not to give). One major disadvantage of using a simple regression model is the fitted probabilities can be less than zero or greater than one which. Also, the partial effect of any exoplanetary variable (appearing in level form) is constant. To solve this problem, we must estimate the probability of giving with a model such that the values only fall between 0 and 1.

That is:

$$Pr(y = 1|x) = G(\beta_0 + \beta_1 X_1 + \dots + \beta_k X_k) = G(\beta_0 + x\beta)$$

Where G is a function taking on values strictly between 0 and 1.  $0 < G(z) < 1$ .

This paper uses a probit model:  $G(z) = \Phi(z) = \int_{-\infty}^z \phi(v)dv$ . Which uses the normal cumulative distribution function and differentiating the CDF gives us the probability density function:

$$\phi(z) = (2\pi)^{-\frac{1}{2}} e^{-\frac{z^2}{2}}$$

Probit models can be derived from an underlying “latent variable model” where  $y^*$  is an unobserved or latent variable:

$$y^* = \beta_0 + x\beta + e, \quad y = 1[y^* > 0]$$

With probit the direction of the effect of  $x_j$  on  $E(y^*|x) = \beta_0 + x\beta$  and on  $E(y|x) = P(y = 1|x) = G(\beta_0 + x\beta)$  is the same. So probit models give us the correct direction of the effect of our independent variables, however we cannot simply read the coefficients because of non-linear aspect of  $G()$ . So, we take derivatives. The regression uses a maximum likelihood estimation which first estimates the probability of obtaining a specific set of data given the probability distribution model, then takes the log of this function. In this case the likelihood function is:

$$f(y|x_i; \beta) = [G(x_i\beta)]^y [1 - G(x_i\beta)]^{1-y}, y = 0,1$$

Then the log of this is:

$$li(\beta) = y_i \log[G(x_i\beta)] + (1 - y_i) \log[1 - G(x_i\beta)]$$

The MLE method is consistent, asymptotically normal and asymptotically efficient on the assumption that the latent error term is normally distributed and homoscedastic. So, to accurately determine and isolate the effect of loans on alumni’s decision to give, this paper uses an instrumental variable probit model of the form:

#### IV Probit Regression

$$Pr(g_{ic} = 1|X) = \Phi(\beta_0 + \beta_1 Need_i + \beta_2 Post_{ic} + \beta_3 d_{ic} + \beta_4 EFC_{ic} + \beta_5 X_{5ic})$$

Again, with the first stage regression:

### First Stage

$$d_{ic} = \beta_0 + \beta_1 Need_i + \beta_2 Post_{ic} + \beta_3 (Simulated_{ic}) + \beta_4 EFC_{ic} + \beta_5 X_{5ic} + \mu_{ic}$$

where:

$g_{it}$  = probability of giving outcomes for a student  $i$  in cohort  $c$ .

$Need_i$  = indicates students who were eligible for need based financial aid

$Post_c$  = whether the student attended Davidson after the trust

$Simulated_{ic}$  = Simulated loan offers

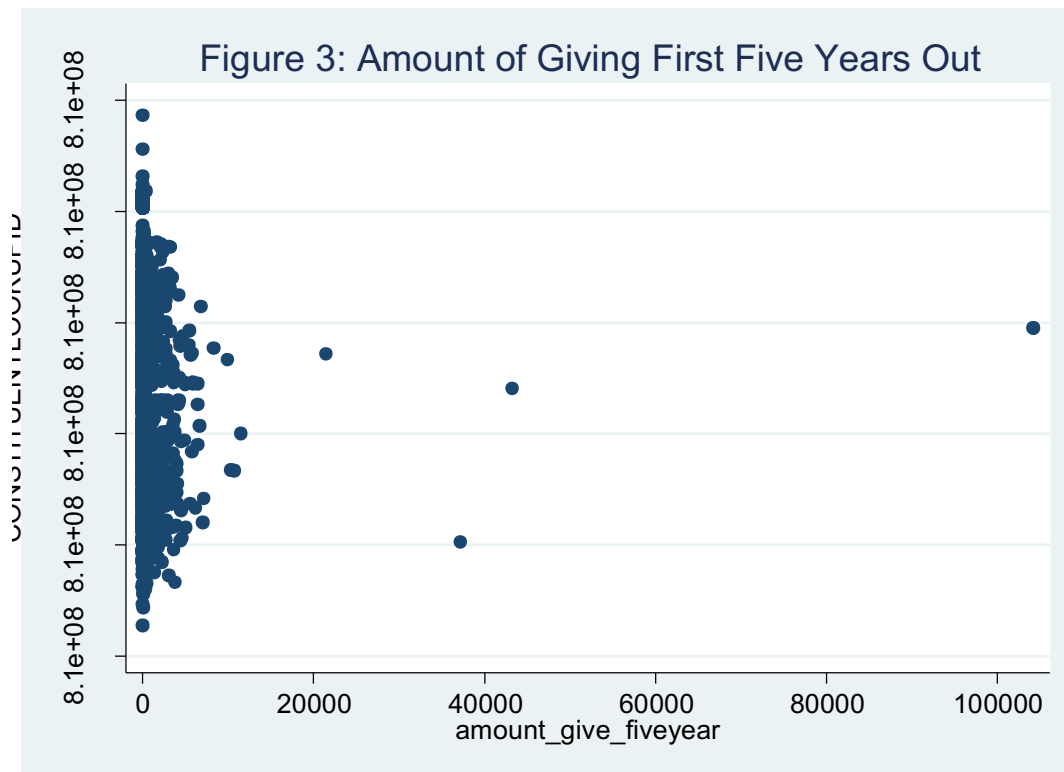
$d_{ic}$  = Student debt

$EFC_{ic}$  = Expected Family Contribution

$X_{4ic}$  = Controls: EFC, years since graduation, gender, ethnicity, major, SAT scores, median income by zip code, Cum GPA, State, Social group, married

We also run into some hurdles with estimating a simple regression when determining the effect of loans on the amount of giving. The major problem lies in the fact that we have bunches at 0 (a lot of alumni not donating at all) as shown in Figure 3, so we cannot assume that the error term has a conditional normal distribution. The OLS regression will assume that these zeros are actual values and underestimate the intercept and overestimate the slope, therefore the coefficients from this regression will not be consistent. Excluding the zeros also poses problems as this overestimates the intercept and underestimates the slope. To estimate the effect on the amount of giving we may use the

Tobit model which accounts for these bunches at 0. The Tobit model assumes that there is a latent  $y$  variable for which we can only see some values (in our case values above 0), and the latent error term is normally distributed.



That is:

$$y^* = \beta_0 + x\beta + u, u|x \sim \text{Normal}(0, \sigma^2) \text{ but } y = \max(0, y^*)$$

In the Tobit model the log likelihood function used to estimate the regression is as follows:

$$li(\beta, \sigma) = 1(y_i = 0) \log [1 - \Phi(\frac{x_i \beta}{\sigma})] + 1(y_i > 0) \log [\frac{1}{\sigma} \phi(\frac{y_i - x_i \beta}{\sigma})]$$

The first term (when  $y = 0$ ) is for the censored observations and is the cumulative distribution function (assuming the latent variable is normally distributed). The second

term (when  $y > 0$ ) is for the observed non-censored observations and uses the probability density function.

Unfortunately, the Tobit model also has some flaws that may make it inappropriate for this analysis. The assumption that the latent variable is normally distributed and that the values at 0 are not true zeros means that people would take away from the college if they could (have a giving amount of negative). That may not be the case here since most alumni choosing not to donate would not take from the college if they had the chance.

Another important limitation of the Tobit model is the expected value conditional on  $y > 0$  is directly connected to the probability that  $y > 0$  (Wooldridge, 2012). The effects of the explanatory variable on the probability that  $y$  is greater than zero conditional on all the variables ( $\Pr(y > 0|x)$ ), and on the expected value of  $y$  given that  $y$  is greater than zero conditional on all the variables ( $E(y|y > 0, x)$ ) are both proportional to the coefficient of the explanatory variable (Wooldridge, 2012). In our case the marginal effect of any variable on the probability of giving and the marginal effect of any variable on the amount given (conditional on giving) are proportional to the coefficient of that variable. This means we cannot separate any determinants of an alumnus's choice to give from determinants of how much an alumnus's donates conditional on one choosing to give. These limitations lead us to our final model: the hurdle model.<sup>5</sup> The hurdle model assumes that observed values of zeros are true zeros and also separates  $\Pr(y > 0|x)$  and  $E(y|y > 0, x)$  such that they depend on different parameters (Wooldridge, 2012). This allows the effect of any variable

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<sup>5</sup> To compare the difference between the tobit estimation and hurdle model, I run a tobit regression and the marginal effects of debt conditional on giving can be found in Table 18 shows significant results with higher magnitudes compared to those found in the hurdle model.

on the probability of giving to be different from the effect of that same variable on the amount given conditional on giving. The hurdle model breaks the process down into two steps, a binomial probability model determining if there is a zero or positive value and a truncated-at-zero count data model for positive values (Allen McDowell, 2003). The likelihood function for a hurdle model is shown below:

$$L = \prod_{i \in \Omega_0} \{1 - F_1(\beta_1)\} \prod_{i \in \Omega_0} \frac{\{f_2(y, \beta_2) F_1(\beta_1)\}}{F_2(\beta_2)}$$

The log likelihood is written as:

$$\ln(L) = \sum_{i \in \Omega_0} \ln\{1 - F_1(\beta_1)\} + \sum_{i \in \Omega_0} \ln\{F_1(\beta_1)\} + \sum_{i \in \Omega_0} [\ln\{f_2(y, \beta_2)\} - \ln\{F_2(\beta_2)\}]$$

Where:

$F_1(\beta_1)$  = the probability the hurdle is crossed

$\frac{f_2(y, \beta_2)}{F_2(\beta_2)}$  = the conditional distribution of the positives

The log likelihood function separates the binomial probability model (the first two terms) from the truncated-at-zero count model (the last term). This paper uses the hurdle model to investigate the effects of debt on the amount of giving conditional on giving.

## V. Data

To conduct my research, I use data from the Davidson College records from the Alumni Relations Office, the Financial Aid Office, and the Admissions Office.<sup>6</sup> The sample is limited to students from the Class of 2004 to the Class of 2013 to account for missing variables in EFC data and alumni giving data. Simulated loan offers as described above are calculated using the college tuition cost and expected family contribution. Davidson College also had loan caps during the years when it offered loan aid. These loan caps are shown in Table 1. Therefore, the simulated loan offers are the tuition minus the EFC but have a max value based on the loan cap. Table 3 shows the maximum total simulated loan offers any student can have over their four years at Davidson College. For students attending Davidson College after the Trust, their simulated loan offers for those years is always \$0.

<b>Table 1: Davidson College Loan Caps by Year</b>	
<b>Academic Year</b>	<b>Loan Cap</b>
<b>2000-2001</b>	<b>\$5000</b>
<b>2001-2002</b>	<b>\$4000</b>
<b>2002-2003</b>	<b>\$4000</b>
<b>2003-2004</b>	<b>\$4000</b>
<b>2004-2005</b>	<b>\$4000</b>
<b>2005-2006</b>	<b>\$4000</b>
<b>2006-2007</b>	<b>\$3000</b>
<b>2007-2008</b>	<b>\$0</b>
<b>2008-2009</b>	<b>\$0</b>
<b>2009-2010</b>	<b>\$0</b>
<b>2010-2011</b>	<b>\$0</b>
<b>2011-2012</b>	<b>\$0</b>
<b>2012-2013</b>	<b>\$0</b>

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<sup>6</sup> Over the summer and the start of the Fall semester 2016, I was fortunate to work with the Alumni Relations Office which has granted me access to a lot of the relevant data for this paper. I would also like to thank Ashley Neff, Cat Niekro, Eileen Keeley, Stephanie Glasser, and Mark Foley for granting me access to the necessary data.



<b>Table 2: Official Davidson College Tuition Cost by Academic Year</b>	
<b>Academic Year</b>	<b>Cost (Real 2017 USD)</b>
2000-2001	43786.692
2001-2002	44450.358
2002-2003	45333.6878
2003-2004	46179.536
2004-2005	46974.0484
2005-2006	47812.1056
2006-2007	48661.0384
2007-2008	49752.054
2008-2009	51184.3472
2009-2010	53063.9816
2010-2011	54566.3726
2011-2012	56333.5198
2012-2013	57934.30

<b>Table 3: Simulated Loan Offers</b>			
	<b>With Need Lower than Loan Cap</b>	<b>With Need Higher than or equal to Loan Cap</b>	<b>Without Need</b>
<b>Class Year</b>	<b>Simulated Loan Offer</b>	<b>Simulated Loan Offer</b>	<b>Simulated Loan Offer</b>
<b>2004</b>	T-EFC	\$17000	\$0
<b>2005</b>	T-EFC	\$16000	\$0
<b>2006</b>	T-EFC	\$16000	\$0
<b>2007</b>	T-EFC	\$15000	\$0
<b>2008</b>	T-EFC	\$11000	\$0
<b>2009</b>	T-EFC	\$7000	\$0
<b>2010</b>	T-EFC	\$3000	\$0
<b>2011</b>	T-EFC	\$0	\$0
<b>2012</b>	T-EFC	\$0	\$0
<b>2013</b>	T-EFC	\$0	\$0
<i>T=College Tuition, EFC=Expected Family Contribution.</i>			

Table 4 shows the summary statistics for variables in the sample. 59.7% of the sample were students after the Davidson Trust and 50.8% of the sample applied for need based financial aid (are in the treatment group). About 48% of the sample is male and 27.1% married. 25.8% of students in the sample were athletes and 64.7% were in a social organization. The average GPA for the sample is 3.226 (with about 218 missing values). The average total expected family contribution (calculated by combining EFC for all 4 years as a student) is \$48277.<sup>7</sup> Students with more than four years of EFC were dropped (possibly five year students). The average total demonstrated need, which is determined by the college as one's EFC subtracted from tuition costs, was \$58927 and the average total loan (calculated by combining loan amounts for all 4 years as a student) is \$3356. The total loan amount doesn't include

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<sup>7</sup> All dollar figures are in 2017 dollars calculated using the CPI calculator provided by <https://data.bls.gov/cgi-bin/cpicalc.pl>.

<b>Table 4: Summary Statistics for Variables in Sample</b>					
<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std.Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Is male</b>	<b>4,375</b>	<b>0.483</b>	<b>0.500</b>	<b>0</b>	<b>1</b>
<b>Is married</b>	<b>4,375</b>	<b>0.271</b>	<b>0.445</b>	<b>0</b>	<b>1</b>
<b>years out</b>	<b>4,375</b>	<b>7.482</b>	<b>2.885</b>	<b>3</b>	<b>12</b>
<b>Is an athlete</b>	<b>4,375</b>	<b>0.258</b>	<b>0.437</b>	<b>0</b>	<b>1</b>
<b>Cumulative GPA</b>	<b>4,157</b>	<b>3.226</b>	<b>0.414</b>	<b>1.541</b>	<b>4</b>
<b>Total EFC</b>	<b>4,375</b>	<b>48277</b>	<b>63836</b>	<b>0</b>	<b>451194</b>
<b>Total Demonstrated Need</b>	<b>4,375</b>	<b>58927</b>	<b>5537</b>	<b>0</b>	<b>25000</b>
<b>Total loan</b>	<b>4,375</b>	<b>3356</b>	<b>73200</b>	<b>0</b>	<b>281918</b>
<b>Total Simulated Loans</b>	<b>4,375</b>	<b>3304</b>	<b>6423</b>	<b>0</b>	<b>29535</b>
<b>Did Need Aid</b>	<b>4,375</b>	<b>0.508</b>	<b>0.500</b>	<b>0</b>	<b>1</b>
<b>Has prospect manager</b>	<b>4,375</b>	<b>0.0706</b>	<b>0.256</b>	<b>0</b>	<b>1</b>
<b>Posttrust</b>	<b>4,375</b>	<b>0.597</b>	<b>0.491</b>	<b>0</b>	<b>1</b>
<b>Sat Score</b>	<b>4735</b>	<b>0</b>	<b>1</b>	<b>-1.2816</b>	<b>1.16569</b>
<b>Is in a Social Organization</b>	<b>4,375</b>	<b>0.647</b>	<b>0.47779</b>	<b>0</b>	<b>1</b>

private loans not reported to Davidson College. As explained above, simulated loans determine the loan amount offered by the college to each student, and the average total simulated loan (calculated by combining simulated loan amounts for all 4 years as a student) is \$3304. Prospect managers are assigned to specific alumni to encourage them to give more by calling and consistently reaching out to them. About 7.06 of the sample has been assigned a prospect manager. The SAT score has been standardized to have a mean of 0 and standard deviation of 1. Table 5 contains summary stats for ethnicity, state, and major. It is important to note that 79.8% of the sample is White/Non-Hispanic/Caucasian while 5.76 percent of the sample has a missing ethnicity (not reported or available). The state variables have been broken up into the big states (Georgia, NC, SC, Virginia) and other states. The big state which the students come from the most is North Carolina with 20.7 percent of the sample and about 64.5 percent of the sample come from the other states. The majors are split into economics, math, fine arts, humanities, and natural sciences. Interestingly 68.2 % of the sample are humanities majors while 15.3% are natural science majors. Table 6 has the summary statistics for our outcome donation variables. The donation amount variables are the total amount donated to the college by the alumni during their first five years out of college, first four years out of college, and first four years after their first year out of college. I exclude the alumni's senior year in the last variable to distinguish between giving made as a student (contributing to the senior class gift) and solely as an alumnus<sup>8</sup>.

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<sup>8</sup> An interesting analysis would be to explore the effect of the senior class gift on subsequent donation behavior.

**Table 5: Summary Stats for Ethnicity, States and Major**

<b>Ethnicity</b>	<b>Obs</b>	<b>Mean</b>	<b>Std.Dev.</b>	<b>Min</b>	<b>Max</b>
<b>African American/Non-Hispanic</b>	<b>4,375</b>	<b>0.0578</b>	<b>0.233</b>	<b>0</b>	<b>1</b>
<b>American Indian/Alaskan</b>	<b>4,375</b>	<b>0.00366</b>	<b>0.0604</b>	<b>0</b>	<b>1</b>
<b>Asian/White</b>	<b>4,375</b>	<b>0.000229</b>	<b>0.0151</b>	<b>0</b>	<b>1</b>
<b>Asian</b>	<b>4,375</b>	<b>0.0290</b>	<b>0.168</b>	<b>0</b>	<b>1</b>
<b>Bi-Racial (B&amp;W or W&amp;B)</b>	<b>4,375</b>	<b>0.00160</b>	<b>0.0400</b>	<b>0</b>	<b>1</b>
<b>Bi-Racial (B and any other)</b>	<b>4,375</b>	<b>0.00206</b>	<b>0.0453</b>	<b>0</b>	<b>1</b>
<b>Hispanic American</b>	<b>4,375</b>	<b>0.0350</b>	<b>0.184</b>	<b>0</b>	<b>1</b>
<b>Hispanic and other not Black</b>	<b>4,375</b>	<b>0.00297</b>	<b>0.0544</b>	<b>0</b>	<b>1</b>
<b>Hispanic/White (H&amp;W or W&amp;H)</b>	<b>4,375</b>	<b>0.000229</b>	<b>0.0151</b>	<b>0</b>	<b>1</b>
<b>Other</b>	<b>4,375</b>	<b>0.0101</b>	<b>0.0998</b>	<b>0</b>	<b>1</b>
<b>Prior to 201001 (B&amp;H or H&amp;B)</b>	<b>4,375</b>	<b>0.00183</b>	<b>0.0427</b>	<b>0</b>	<b>1</b>
<b>White/Non-Hispanic/Caucasian</b>	<b>4,375</b>	<b>0.798</b>	<b>0.402</b>	<b>0</b>	<b>1</b>
<b>Missing</b>	<b>4,375</b>	<b>0.0576</b>	<b>0.233</b>	<b>0</b>	<b>1</b>
<b>State</b>					
<b>Georgia</b>	<b>4,375</b>	<b>0.0599</b>	<b>0.237</b>	<b>0</b>	<b>1</b>
<b>North Carolina</b>	<b>4,375</b>	<b>0.207</b>	<b>0.405</b>	<b>0</b>	<b>1</b>
<b>Other</b>	<b>4,375</b>	<b>0.645</b>	<b>0.478</b>	<b>0</b>	<b>1</b>
<b>South Carolina</b>	<b>4,375</b>	<b>0.0279</b>	<b>0.165</b>	<b>0</b>	<b>1</b>
<b>Virginia</b>	<b>4,375</b>	<b>0.0594</b>	<b>0.236</b>	<b>0</b>	<b>1</b>
<b>Major</b>					
<b>Natural Science Major</b>	<b>4,375</b>	<b>0.153</b>	<b>0.360</b>	<b>0</b>	<b>1</b>
<b>Economics Major</b>	<b>4,375</b>	<b>0.0274</b>	<b>0.163</b>	<b>0</b>	<b>1</b>
<b>Math Major</b>	<b>4,375</b>	<b>0.00731</b>	<b>0.0852</b>	<b>0</b>	<b>1</b>
<b>Fine Arts Major</b>	<b>4,375</b>	<b>0.0357</b>	<b>0.185</b>	<b>0</b>	<b>1</b>
<b>Humanities Major</b>	<b>4,375</b>	<b>0.682</b>	<b>0.466</b>	<b>0</b>	<b>1</b>

<b>Table 6: Summary Statistics for Donation Variables</b>					
<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std.Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Amount donated in first five years</b>	<b>4,375</b>	<b>298.7</b>	<b>1963</b>	<b>0</b>	<b>104131</b>
<b>Amount donated in first four years</b>	<b>4,375</b>	<b>216.0</b>	<b>1025</b>	<b>0</b>	<b>43259</b>
<b>Amount donated in four years after first year</b>	<b>4,375</b>	<b>271.3</b>	<b>1940</b>	<b>0</b>	<b>104120</b>
<b>did give in first five years</b>	<b>4,375</b>	<b>0.816</b>	<b>0.388</b>	<b>0</b>	<b>1</b>
<b>did give in first four years</b>	<b>4,375</b>	<b>0.906</b>	<b>0.292</b>	<b>0</b>	<b>1</b>
<b>did give in four years after first year</b>	<b>4,375</b>	<b>0.660</b>	<b>0.474</b>	<b>0</b>	<b>1</b>

Likewise, the donation participation variables measure if a student donated at all during their first five years out of college, first four years out of college, and first four years after their first year out of college. From Table 6 we see high participation rates in the first four years (90.6%) and first five years (81.6%) but much lower participation rates in the first four years after the first years (66.60). This shows the effect of the senior class gift as more students donated in their senior year but didn't continue their donation behavior after that. However there is a higher average amount donated in the first four years after the first year (\$271.3) compared to the first four year (216.0). So even though more students donated in their senior year, these students donated less money on average (just enough to participate in their senior class gift) than the amount donated by alumni. This is understandable because of the higher financial opportunity cost to students compared to alumni of donating more money after the decision to donate has already been made.

**Table 7: Average Characteristics of Sample by cohort and need status**

Variable	Pre-Trust		Post-Trust		Change		Difference in Differences
	Without Need	With need	Without Need	With need	Without Need	With need	
<b>N</b>	<b>840</b>	<b>922</b>	<b>1314</b>	<b>1299</b>			
<b>Is male</b>	<b>0.495</b>	<b>0.478</b>	<b>0.501</b>	<b>0.460</b>	<b>0.006</b>	<b>-0.018</b>	<b>-0.024</b>
	(0.500)	(0.500)	(0.500)	0.499)	(0.0220978)	(0.0214931)	(0.0308319)
<b>Is married</b>	<b>0.444</b>	<b>0.434</b>	<b>0.149</b>	<b>0.167</b>	<b>-0.295</b>	<b>-0.267</b>	<b>0.028</b>
	(0.497)	(0.496)	(0.356)	(0.373)	(0.0184195)	(0.184475)	(0.0276531)
<b>years out</b>	<b>10.45</b>	<b>10.51</b>	<b>5.454</b>	<b>5.463</b>	<b>-4.996</b>	<b>-5.047</b>	<b>-0.051</b>
	(1.095)	(1.140)	(1.720)	(1.696)	(0.0666041)	(0.0641829)	(0.0854563)
<b>Is an athlete</b>	<b>0.242</b>	<b>0.313</b>	<b>0.209</b>	<b>0.278</b>	<b>-0.033</b>	<b>-0.035</b>	<b>-0.002</b>
	(0.428)	(0.464)	(0.406)	(0.448)	(0.0183374)	(0.0195873)	(0.270616)
<b>Cumulative GPA</b>	<b>3.195</b>	<b>3.157</b>	<b>3.306</b>	<b>3.217</b>	<b>0.111</b>	<b>0.06</b>	<b>-0.051</b>
	(0.398)	(0.458)	(0.377)	(0.416)	(0.0175227)	(0.0190807)	(0.0262788)
<b>Total EFC</b>	<b>15739</b>	<b>69114</b>	<b>32166</b>	<b>70826</b>	<b>16427</b>	<b>1712</b>	<b>-14715</b>
	(44622)	(60363)	(68015)	(58438)	(2650)	(2551.258)	(3531.498)
<b>Total Demonstrated Need</b>	<b>0</b>	<b>118478</b>	<b>0</b>	<b>114373</b>	<b>0</b>	<b>-4105</b>	<b>-4105</b>
	(0)	(62202)	(0)	(62874)	(0)	(2695.575)	(2690.607)
<b>Total loan</b>	<b>98.87</b>	<b>6896</b>	<b>327.0</b>	<b>6013</b>	<b>228.13</b>	<b>-883</b>	<b>-1111.13</b>
	(1195)	(7652)	(2232)	(7706)	(83.77659)	(330.8724)	(338.6816)
<b>Total Simulated Loans</b>	<b>0</b>	<b>11888</b>	<b>0</b>	<b>2692</b>	<b>0</b>	<b>-9196</b>	<b>-9196</b>
	(0)	(5144)	(0)	(3702)	(0)	(187.7062)	(198.1048)
<b>Has prospect manager</b>	<b>0.12</b>	<b>0.0672</b>	<b>0.0723</b>	<b>0.0393</b>	<b>-0.0477</b>	<b>-0.0279</b>	<b>0.0198</b>
	(0.325)	(0.251)	(0.259)	(0.0393)	(0.0126688)	(0.0094486)	(0.0165617)
<b>Is in a Social Organization</b>	<b>0.729</b>	<b>0.597</b>	<b>0.702</b>	<b>0.576</b>	<b>-0.027</b>	<b>-0.021</b>	<b>0.006</b>
	(0.445)	(0.491)	(0.457)	(0.494)	(0.0199926)	(0.0212274)	(0.0290575)

Cum GPA has about 40 missing Standard deviations and standard errors are in parenthesis. Changes and difference in differences in red are significant at the 10% level.

Table 7 shows a comparison of some characteristics of the sample pre-trust and post-trust. Understandably students from after the Davidson Trust are less likely to be married (about 28 percentage points on average) and have been out for college for fewer years (about 5 years on average) compared to students before the trust. This makes sense because the sample before the trust graduated earlier than the sample after the Trust. However, the difference in differences allows us to determine that there is no significant difference on average in the fall of these two variables (`is_married` and `years_out`) between those without need and those with need before and after the Trust. That is both those without need and those with need experienced similar trends over time with the two variables. Table 7 shows that students were slightly more likely to be athletes before the trust, and again this seems to be a time trend and not due to any effect of the Trust. Another variable which simply shows a significant time trend is the likelihood of having a prospect manager which seems to be falling over time. From Table 7 the variables that show a significant effect of the trust are cumulative GPA, total expected family contribution, total loan, and total simulated loans. The difference in differences show an average decrease in GPA by 0.051 points in the treatment group (those with need) compared to the control group (those without need) because of the Trust. The time trend depicts a general increase in GPA over time however the GPA for the control group increased significantly more than the GPA for the treatment group (a change of 0.111 points for those without need, and 0.06 points for those with need).

There is a large significant decrease total expected family contribution by \$14715 on average between the treatment group and the control group and this is driven by a significant increase in total EFC in the control group and no significant change in the



treatment group. Assuming the control group depicts the time trend for total EFC, this means any potential increase in total EFC for those with need due to the time trend might have been offset by a decrease in total EFC. This decrease in total EFC in the control group is consistent with the idea that the Davidson Trust allowed students with a greater financial need to come to Davidson. Students who would usually not apply to Davidson because of the loans were more likely to apply due to the trust and this resulted in the fall in total EFC in the treatment group. The significant decrease (\$1111) in total loans received by students between those without need and those with need is expected since the Davidson Trust removed all loan aid. Though it must be noted that a student could still get loans from outside sources which is why the average loans for students with need post-trust is a positive number (\$6013) and students without need still have small loans. Total simulated loans, being the subset of total loans determined solely by the college, also falls significantly between the treatment and control group again due to the policy of the Davidson Trust.

**Table 8: Average ethnicity characteristics of Sample by cohort and need status**

Variable	Pre-Trust		Post-Trust		Change		Difference in Differences
	Without Need	With need	Without Need	With need	Without Need	With need	
N	840	922	1314	1090			
Ethnicity							
African American/Non-Hispanic	0.0107	0.0879	0.0129	0.112	0.0022	0.0241	0.0219
	(0.103)	(0.283)	(0.113)	(0.316)	(0.0048261)	(0.0130401)	(0.0136462)
American Indian/Alaskan	0.00357	0.00108	0.00381	0.00539	0.00024	0.00431	0.00407
	(0.0597)	(0.0329)	(0.0616)	(0.0732)	(0.0026884)	(0.0025794)	(0.0035262)
Asian/White	0	0	0.000761	0	0.000761	0	-0.000761
	(0)	(0)	(0.0276)	(0)	(0.0009519)	(0)	(0.0007611)
Asian	0.0107	0.0315	0.0236	0.0446	0.0129	0.0131	0.0002
	(0.103)	(0.175)	(0.152)	(0.207)	(0.0059601v	(0.0083534)	(0.0098039)
Bi-Racial (B&W or W&B)	0.00119	0	0	0.00462	-0.00119	0.00462	0.00581
	(0.0345)	(0)	(0)	(0.0678)	(0.0009517)	(0.0022341)	(0.002227)
Bi-Racial (B and any other)	0	0.00108	0	0.00616	0	0.00508	0.00508
	(0)	(0.0329)	(0)	(0.0783)	(0)	(0.0027348)	(0.0024274)
Hispanic American	0.0238	0.0380	0.0228	0.0523	-0.001	0.0143	0.0153
	(0.153)	(0.191)	(0.149)	(0.223)	(0.006655)	(0.0090549)	(0.0110706)
Hispanic and other not Black	0	0	0.000761	0.00924	0.000761	0.00924	0.008479
	(0)	(0)	(0.0276)	(0.0957)	(0.0009519)	(0.0031521)	(0.0027625)
Hispanic/White (H&W or W&H)	0	0	0	0.000770	0	0.00077	0.00077
	(0)	(0)	(0)	(0.0277)	(0)	(0.0009138)	(0.0007699)
Other	0.0155	0.00976	0.00304	0.0139	-0.01246	0.00414	0.0166
	(0.124)	(0.0984)	(0.0551)	(0.117)	(0.0039016)	(0.0047204)	(0.0064413)
Prior to 201001 (B&H or H&B)	0	0	0	0.00616	0	0.00616	0.00616
	(0)	(0)	(0)	(0.0783)	(0)	(0.0025777)	(0.0021717)
White/Non-Hispanic/Caucasian	0.895	0.803	0.842	0.687	-0.053	-0.116	-0.063
	(0.306)	(0.398)	(0.364)	(0.464)	(0.0151521)	(0.0188583)	(0.0234653)
Missing	0.0393	0.0282	0.0898	0.0577	0.0505	0.0295	-0.021
	(0.194)	(0.166)	(0.286)	(0.233)	(0.0112315)	(0.008954)	(0.133755)

*Cum GPA has about 40 missing Standard deviations and standard errors are in parenthesis. Changes and difference in differences in red are significant at the 10% level.*

**Table 9: Average population in states by cohort and need status**

Variable	Pre-Trust		Post-Trust		Change		Difference in Differences
	Without Need	With need	Without Need	With need	Without Need	With need	
<b>N</b>	<b>840</b>	<b>922</b>	<b>1314</b>	<b>1090</b>			
<b>State</b>							
<b>Georgia</b>	<b>0.0679</b>	<b>0.0542</b>	<b>0.0616</b>	<b>0.0570</b>	<b>-0.0063</b>	<b>0.0028</b>	<b>0.0091</b>
	(0.252)	(0.227)	(0.241)	(0.232)	(0.0108216)	(0.782)	(0.0147141)
<b>North Carolina</b>	<b>0.142</b>	<b>0.247</b>	<b>0.182</b>	<b>0.247</b>	<b>0.04</b>	<b>0</b>	<b>-0.04</b>
	(0.349)	(0.432)	(0.386)	(0.431)	(0.0164298)	(0.0185847)	(0.0245696)
<b>Other</b>	<b>0.700</b>	<b>0.603</b>	<b>0.667</b>	<b>0.619</b>	<b>-0.033</b>	<b>0.016</b>	<b>0.049</b>
	(0.459)	(0.490)	(0.472)	(0.486)	(0.0206098)	(0.0209878)	(0.0293446)
<b>South Carolina</b>	<b>0.0345</b>	<b>0.0336</b>	<b>0.0244</b>	<b>0.0231</b>	<b>-0.0101</b>	<b>-0.0105</b>	<b>-0.0004</b>
	(0.183)	(0.180)	(0.154)	(0.150)	(0.0101707)	(0.0070376)	(0.0105106)
<b>Virginia</b>	<b>0.0560</b>	<b>0.0618</b>	<b>0.0654</b>	<b>0.0539</b>	<b>0.0094</b>	<b>-0.0079</b>	<b>-0.0173</b>
	(0.230)	(0.241)	(0.247)	(0.226)	(0.0106358)	(0.0100018)	(0.0145527)
<b>Major</b>							
<b>Economics Major</b>	<b>0.0143</b>	<b>0.0293</b>	<b>0.0289</b>	<b>0.0331</b>	<b>0.0146</b>	<b>0.0038</b>	<b>-0.0108</b>
	(0.119)	(0.169)	(0.168)	(0.179)	(0.0066475)	(0.0075265)	(0.0096795)
<b>Fine Arts Major</b>	<b>0.0393</b>	<b>0.0369</b>	<b>0.0335</b>	<b>0.0346</b>	<b>-0.0058</b>	<b>-0.0023</b>	<b>0.0035</b>
	(0.194)	(0.189)	(0.180)	(0.183)	(0.0082045)	(0.0079793)	(0.0115737)
<b>Humanities Major</b>	<b>0.714</b>	<b>0.679</b>	<b>0.685</b>	<b>0.661</b>	<b>-0.029</b>	<b>-0.018</b>	<b>0.011</b>
	(0.452)	(0.467)	(0.465)	(0.474)	(0.0203126)	(0.0202825)	(0.0285827)
<b>Natural Science Major</b>	<b>0.129</b>	<b>0.162</b>	<b>0.154</b>	<b>0.162</b>	<b>0.025</b>	<b>0</b>	<b>-0.025</b>
	(0.335)	(0.368)	(0.361)	(0.369)	(0.0155038)	(0.0158773)	(0.0220117)
<b>Math Major</b>	<b>0.00476</b>	<b>0.0141</b>	<b>0.00609</b>	<b>0.00539</b>	<b>0.00133</b>	<b>-0.00871</b>	<b>-0.01004</b>
	(0.0689)	(0.118)	(0.0778)	(0.0732)	(0.0032895)	(0.0040656)	(0.0054293)

Table 8 and Table 9 has a comparison of ethnicity, state and major variables of the sample pre-trust and post-trust. It is interesting to note that there has been a significant decrease (6.3 percentage points) in White/Non-Hispanic/Caucasian students in the treatment group compared to the control group. This can be contrasted to the significant increases in Bi-Racial students reflecting the accomplished goal of the trust to improve access to Davidson for minority communities. For state variables the only significant variable is other states, meaning the treatment group was 4.9 percentage points more likely to come from other states after the trust compared to the control group. The treatment group is also 0.10 percentage points less likely to major in math after the trust compared to the control group. Table 10 shows the differences in the outcome donation variables before and after the Trust. From the difference in differences we see that there is no significant difference between those who needed aid and those who didn't need aid in the amount donated after the implementation of the Trust. From Table 10 we see a significant increase in donation participation rates from those with need compared with those without need. The highest change is in giving four years after the first year out of college where we see a significant increase of 7.4 percentage points in the probability of giving from the treatment group compared to the control group. However due to the problems with DID previously discussed such as omitted variable bias and simultaneity bias we cannot simply take these results as they are. Adding appropriate controls to the DID analysis removes the significance of the effect seen in Table 10.<sup>9</sup>

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<sup>9</sup> The DID analysis for donation behavior with controls can be seen in the Appendix in Table 24

**Table 10: Average Donation Characteristics of Sample by need status and cohort**

Variable	Pre-Trust		Post-Trust		Change		Difference in Differences
	Without Need	With need	Without Need	With need	Without Need	With need	
<b>N</b>	<b>840</b>	<b>922</b>	<b>1314</b>	<b>1299</b>			
<b>Amount donated in first five years</b>	<b>420.8</b>	<b>229.0</b>	<b>300.1</b>	<b>267.7</b>	<b>-120.7</b>	<b>38.7</b>	<b>159.4</b>
	(1607)	(644.4)	(1497)	(2957)	(68.06385)	(99.02139)	(109.3738)
<b>Amount donated in first four years</b>	<b>306.2</b>	<b>163.4</b>	<b>260.0</b>	<b>150.4</b>	<b>-46.2</b>	<b>-13</b>	<b>33.2</b>
	(1422)	(430.7)	(1354)	(480.2)	(61.00028)	(19.82304)	(64.65043)
<b>Amount donated in four years after first year</b>	<b>389.1</b>	<b>205.6</b>	<b>269.5</b>	<b>243.5</b>	<b>-119.6</b>	<b>37.9</b>	<b>157.5</b>
	(1596)	(633.7)	(1432)	(2943)	(66.17793)	(98.52501)	(108.1644)
<b>did give in first five years</b>	<b>0.911</b>	<b>0.894</b>	<b>0.734</b>	<b>0.782</b>	<b>-0.177</b>	<b>-0.112</b>	<b>0.065</b>
	(0.285)	(0.308)	(0.442)	(0.413)	(0.0171571)	(0.0160677)	(0.0219064)
<b>did give in first four years</b>	<b>0.910</b>	<b>0.893</b>	<b>0.899</b>	<b>0.921</b>	<b>-0.011</b>	<b>0.028</b>	<b>0.039</b>
	(0.287)	(0.310)	(0.302)	(0.270)	(0.01308)	(0.123735)	(0.0181012)
<b>did give in four years after first year</b>	<b>0.769</b>	<b>0.706</b>	<b>0.603</b>	<b>0.614</b>	<b>-0.166</b>	<b>-0.092</b>	<b>0.074</b>
	(0.422)	(0.456)	(0.490)	(0.487)	(0.0205089)	(0.0204281)	(0.02832)

## **VI. Results**

In this section I discuss my results from my analysis on the effect of debt on the probability of giving and the amount given. Total simulated loan offers was used as an instrument for debt. The first stage regression for the instrument on total loans is shown in Table 11. The significant coefficient of 0.554 (a \$1 increase in total simulated loans leads to a \$0.554 increase in total loans on average *ceteris paribus*) and high F-stat of 639.30 means that this is a strong instrument and total simulated loans is highly correlated with total loans. That satisfies the first condition of an instrument. For the second condition, it is safe to assume that simulated loans do not affect an alumni's donation behavior except through its effect on debt since simulated loans is decided by the college. First, I analyze the effects of various variables on the probability of giving, and then I explore their effects on the amount given conditional on giving.

Table 11: First State Regression	
	Model 1
VARIABLES	total_loan
total_simulatedloans	0.554***
	(0.0219)
years_out	-1,663***
	(332.0)
years_out2	73.89***
	(18.73)
female	-128.9
	(187.6)
lnmedian_income_households	-318.5
	(223.2)
total_efc	0.0244***
	(0.00192)
cum_gpa	-1,379***
	(232.8)
married	368.1*
	(204.0)
soc	256.1
	(202.7)
prospect	-230.5
	(263.0)
satstand	114.1
	(151.5)
Constant	16,229***
	(2,985)
Ethnicity Variables	Yes
State Variables	Yes
Major Variables	Yes
F-stat	639.30
Observations	3,624
R-squared	0.361
Robust standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$	

### **Effect of Income on an Alumni's Decision to Give**

Unfortunately, I could not directly measure alumni income or access confidential data on earnings therefore we must explore the any income effect through variables correlated with alumni income. We can determine the income effect through variables such as median income by zip code, cumulative GPA, total EFC, and married. From model 6 in Table 12, on average a 1 point increase in cumulative GPA (a very large increase) increases the probability of giving in the first five years out of college by 2.75 percentage points all other things equal. This effect is significant and is a modest magnitude considering the average probability of giving in the first five years is 81.6 percent. A \$1000 increase in total expected family contribution significantly increases the probability of giving in the first five years out of college by a mere 0.019 percentage points on average *ceteris paribus*. Total EFC loses its significant effect when the first year out of college is excluded from the regression.<sup>10</sup> A married alumnus on average has a 3.7 percentage point higher probability of giving in the first five years out of college than an alumnus who is not married *ceteris paribus*. This effect is significant at the 1 percent level. Median income by zip code doesn't have a significant effect on the probability of giving in the first five years out of college. These proxies for income move in the predicted direction and are consistent with the literature on the effect of alumni income on the probability of giving even though their magnitude is not large.

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<sup>10</sup> Regression Tables with the other decision to give outcomes are in the Appendix.



**Table 12: Probit Model Did Give in the First Five Years**

	Not Instrumented			Instrumented		
VARIABLES	Model 1 Did Give First Five years	Model 2 Did Give First Five years	Model 3 Did Give First Five years	Model 4 Did Give First Five years	Model 5 Did Give First Five years	Model 6 Did Give First Five years
<b>total_loan</b>	2.96e-06*** (8.76e-07)	3.96e-07 (6.09e-07)	4.03e-07 (6.01e-07)			
<b>total_loanhat</b>				-2.19e-06 (1.36e-06)	-4.24e-06** (2.02e-06)	-4.61e-06** (2.01e-06)
<b>didneed</b>	0.00125 (0.0101)	-0.0120 (0.00806)	-0.00740 (0.00801)	0.00779 (0.0114)	0.0120 (0.0128)	0.0188 (0.0129)
<b>posttrust</b>	-0.00369 (0.0186)	0.00432 (0.0144)	0.00703 (0.0143)	0.00309 (0.0142)	0.00157 (0.0146)	0.00414 (0.0145)
<b>years_out</b>	-0.00544 (0.0127)	0.0132 (0.0132)	0.0134 (0.0127)	0.00232 (0.00962)	0.0127 (0.0131)	0.0127 (0.0126)
<b>years_out2</b>	-0.000299 (0.000785)	-0.00103 (0.000713)	-0.00102 (0.000690)	-0.000521 (0.000574)	-0.000993 (0.000708)	-0.000964 (0.000686)
<b>female</b>	0.0319*** (0.00894)	0.0117* (0.00676)	0.00364 (0.00697)	0.0162** (0.00661)	0.0110 (0.00679)	0.00273 (0.00703)
<b>married</b>	0.126*** (0.0135)	0.0405*** (0.00894)	0.0356*** (0.00875)	0.0451*** (0.00910)	0.0421*** (0.00899)	0.0377*** (0.00884)
<b>Inmedian_income_households</b>		0.00102 (0.00830)	-0.00360 (0.00806)		-0.000393 (0.00831)	-0.00520 (0.00804)
<b>total_efc</b>		4.98e-08 (6.79e-08)	5.13e-08 (6.81e-08)		1.82e-07** (9.08e-08)	1.91e-07** (9.06e-08)
<b>cum_gpa</b>		0.0334*** (0.00792)	0.0349*** (0.00775)		0.0264*** (0.00819)	0.0275*** (0.00797)
<b>satstand</b>		-0.00798 (0.00656)	-0.00769 (0.00627)		-0.00777 (0.00657)	-0.00747 (0.00627)
<b>soc</b>			0.0355*** (0.00715)			0.0367*** (0.00720)
<b>prospect</b>			0.0837*** (0.0293)			0.0806*** (0.0288)
<b>Ethnicity Variables</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>State Variables</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>Major Variables</b>	No	Yes	Yes	No	Yes	Yes
<b>Observations</b>	3,921	3,603	3,603	3,603	3,603	3,603

Standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Demographic Controls and Income Controls not shown in the table are ethnicity, major, and state variables. Doesn't include Class of 2013. The coefficients reported are the average marginal effect.

### **Effect of College Experience on an Alumni's Decision to Give**

Assuming those in some form of social group during college have a better college experience than students not in a social group, we can explore the direction of the effect of college experience on amount of giving. Being in a social group on average significantly increases the probability of giving in the first five years out of college by 3.67 percentage points all other things equal. This effect is consistent and significant across all decision to give outcomes. Again compared to the average probability of giving in the first five years out of college of 81.6 percent, this effect is quite modest. The positive effect of being in a social group is consistent with the predicted effect of college experience on amount of giving.

### **Effect of Social Pressure on an Alumni's Decision to Give**

A prospect manager increases the social pressure cost of not giving because alumni must declare their decision to someone. Naturally, having a prospect manager increases the probability of giving in the first five years out of college by 8.06 percent on average all other things equal. The effect is significant and large and is consistent with the predicted direction of social pressure. However, there may be some sample selection bias if the alumni are selected to have prospect managers based on a criterion that is correlated with their donation behavior. For instance, if alumni with higher income are more likely to have prospect managers then this regression overestimates the effect of having a prospect manager on alumni's decision to give.

## **Effect of Loan Aid on an Alumni's Decision to Give**

We can analyze the impact of loans on the probability of giving through our instrument: simulated loan offers. From model 1-3 in Table 12, we see that when we do not use the instrumental variable, debt has a positive effect on the probability of giving which becomes less significant as more controls are added. This general positive effect may be due to the previously mentioned simultaneity bias. Including the instrument provides more accurate results. From model 6, on average a \$1000 increase in total loans reduces the probability of donating in the first five years out of college by 0.46 percentage points all other things equal. This effect is significant at the 5% level but quite small compared to the average of 81.6 percent. This effect is consistent and significant across all decision to give outcomes. My theoretical model discussed how loan aid could have opposing effects on an alumni's giving. The negative effect comes from the impact college debt has on college experience, reciprocity, social pressure cost, and any remaining student loans an alumnus has. College debt negatively affects a student's college experience and it reduces any positive feelings of reciprocity towards the college. Debt also reduces any social pressure cost to not donating and increases the amount of student loans left an alumnus might still have to pay all other things equal. The positive effect of loans stems from the effect of loans on alumni income if students with loans actively look for higher paying jobs. The negative effect of loans seems to be dominating in the probit regression in Table 12, where reducing loans will result in an increase in the probability of giving. The positive effect of loans on alumni giving was not strong enough to change the direction of the overall effect of loans on giving (which is negative). This is consistent with the results found by Palfrey (2013) who finds that debt doesn't have significant effect on post graduate outcomes.

Table 13: Hurdle Model			
	Model1- Demographic Controls	Model 2- Demographic and Income controls	Model 3-All Controls
VARIABLES	ln(Amount donated in first five years)	ln(Amount donated in first five years)	ln(Amount donated in first five years)
<b>total_loanhat</b>	-0.000115***	-6.35e-05***	-5.68e-05**
	(1.80e-05)	(2.39e-05)	(2.35e-05)
<b>didneed</b>	0.255*	0.0522	0.122
	(0.133)	(0.144)	(0.141)
<b>posttrust</b>	0.211	0.250	0.230
	(0.158)	(0.160)	(0.156)
<b>years_out</b>	0.188*	0.250*	0.238*
	(0.112)	(0.142)	(0.139)
<b>years_out2</b>	-0.0111	-0.0138*	-0.0139*
	(0.00679)	(0.00790)	(0.00773)
<b>female</b>	0.124	0.0771	0.0440
	(0.0771)	(0.0771)	(0.0785)
<b>married</b>	1.262***	1.178***	1.005***
	(0.0808)	(0.0811)	(0.0785)
<b>lnmedian_income_h ouseholds</b>	-0.0221	0.226**	0.112
	(0.0341)	(0.0958)	(0.0947)
<b>total_efc</b>	8.10e-07**	-6.95e-07	-4.51e-07
	(3.85e-07)	(9.84e-07)	(9.68e-07)
<b>cum_gpa</b>	0.117***	0.691***	0.688***
	(0.0339)	(0.111)	(0.109)
<b>soc</b>	0.155***	0.153***	0.495***
	(0.0308)	(0.0303)	(0.0859)
<b>prospect</b>	0.342***	0.337***	2.118***
	(0.123)	(0.121)	(0.150)
<b>satstand</b>	-0.0317	-0.0488	-0.0328
	(0.0266)	(0.0716)	(0.0696)
<b>Ethnicity Controls</b>	Yes	Yes	Yes
<b>State Controls</b>	Yes	Yes	Yes
<b>Major Controls</b>	Yes	Yes	Yes
<b>Observations</b>	3,624	3,624	3,624
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$ . The three models vary in controls for determining the amount of giving. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. Variables determining selection into the model are consistent throughout. This sample doesn't include the Class of 2013. The coefficients reported are the average marginal effects conditional on giving.			

The marginal effects of each variable conditional on giving from the hurdle regression for total giving in the first five years out of college are shown in Table 13. The three models vary in variables used to determine the amount of giving but are consistent in variables predicting one's decision to give. The first model includes only demographic variables, the second model both demographic and income variables, and the third model has all controls.

### **Effect of Income on an Alumni's Donation Amount**

Again, we can analyze the income effect from variables such as median income by zip code, cumulative GPA, total EFC, and married. The income effect seems to move in the predicted direction as median income by zip code has a strong positive relationship (22.6 percent increase) with giving amount conditional on giving, cumulative GPA has a strong positive relationship with the giving amount (69.1 percent increase) conditional on giving, and total expected family contribution though it doesn't have a significant effect in model 2 has a significant positive relationship in model 1 (0.0000810 percent increase) conditional on giving.

### **Effect of College Experience on an Alumni's Donation Amount**

Being in a social group on average significantly increases the amount of giving in the first five years out of college by 15.3 percent conditional on giving all other things equal. Again, this is consistent with the predicted effect of college experience on amount of giving.

### **Effect of Social Pressure on an Alumni's Donation Amount**

Having a prospect manager increases the amount of giving in the first five years out of college by 33.7 percent on average all other things equal conditional on giving. This is consistent with the predicted direction of social pressure.

### **Effect of Loan Aid on an Alumni's Donation Amount**

Most notably, our instrumented variable for loans shows a strong significant negative effect in all three models though the magnitude differs as more controls are added. With demographic and income controls determining amount of giving, a \$1000 increase in total loans on average leads to a 6.35 percent decrease in the amount donated in the first five years out of college conditional on giving all other things equal. This effect is significant at the 1 percent level. We focus on model 2 based on the assumption that though social pressure and college experience may strongly influence one's decision to give, these variables don't play a large role in determining the amount given. Linking this back to the theoretical model we discussed how social pressure and college experience influences one's Motivation to Give but not one's Capacity to Give. Though both channels may equally affect an alumnus's decision to give, once the alumnus has made the decision Motivation to Give plays a much lesser role than Capacity to Give in determining the amount the alumnus actually gives. The variables impacting Capacity to Give are income and debt, so these are included in model 2. The negative effect of loans on giving amount is consistent with the notion that the effect of debt on college experience, reciprocity, social pressure cost, and remaining student loans dominate the effect of debt on a student's search for higher paying jobs.

## VII. Concerns and Robustness

In this section, I discuss the robustness checks I conducted and possible concerns with my analysis. To account for the extra uncertainty that makes the standard errors in our probit models incorrect since the 2 stage regression was conducted manually, I run ivprobit regressions to check the robustness of my results. Table 23 in the Appendix shows the results from the ivprobit regression. The instrument has a similar significant average effect (0.41 percentage point decrease) of a \$1000 increase in loans on the probability of giving in the first five years out of college all other things equal. Regrettably I could not determine a quick way to conduct the same robustness check on the standard errors from the hurdle models. Excluding the first year out of college (and subsequently the senior class gift) doubles the magnitude of the effect of debt on the probability of giving.<sup>11</sup> Table 17 in the Appendix shows on average a \$1000 increase in debt leads to a 9.09 percentage point increase in the probability of giving in the first four years after the first year out of college all other things equal. The high participation rate in the senior class gift was reducing the effect of debt on the probability of giving and there is a drop in participation rates after the senior class gift. One can assume social pressure cost from not donating to the senior class gift as a senior dominates and is the reason many seniors give but once this social pressure cost subsides other determinants of giving (debt, reciprocity, college experience, etc.) start to play a larger role. This leads us to one of the major concerns of this analysis: donation campaigns by Davidson College. Unfortunately I was unable to access accurate data on

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<sup>11</sup> Senior class gift has a similar effect on the amount of giving and excluding it increases the magnitude of the effect of debt. However it must be noted that a quick difference of coefficients z test using the formula  $Z = \frac{b_1 - b_2}{\sqrt{(SE_1^2 + SE_2^2)}}$  revealed that the two coefficients are not significantly different for both the probability of giving and amount given.

different campaign start and end dates. Various campaigns may affect different groups of alumni at different times and if any of these campaigns are in any way correlated to the amount of debt a student receives from the college, then the campaigns could bias my results. For instance, if one does not account for a Davidson Trust campaign that targets recipients of the Trust to give back this will lead to an overestimation of the effect of debt on giving.

Another limitation in this paper is my analysis is solely restricted to students from Davidson College and may not apply generally to all liberal arts colleges and universities. Davidson students may have specific characteristics that Also, my sample size is reduced because of how recent the Davidson Trust was enacted and it would be interesting to analyze donation behavior of alumni with more years out of college. With more years of giving data, one could possibly analyze any lasting effects of the Davidson Trust or explore effects specifically when alumni are at the peak of their career. It would have also been helpful to have data on private loans or remaining student loans that alumni are yet to pay off to control for the wealth effect. Finally my proxies used for income may not capture the full effect of income and the analysis would be more robust with actual data on earnings.



## **VIII. Conclusion**

This paper explored the effect of the Davidson Trust no loan-aid policy enacted in 2007 on alumni giving. I analyzed the effect of debt on the probability of giving and the amount giving and found results consistent with my theoretical model. I find that debt has a significant but small negative effect on the probability of an alumnus donating to the college. I also find that debt has a negative significant effect on the amount donated to the college by the alumnus. The direction of this effect of debt is theoretically due to a domination of the reciprocity effect, social pressure cost effect, college experience effect, and wealth effect. These results suggest that aside from its two main goals, the Davidson Trust had an additional benefit to the college: an improvement in donation behavior by those impacted by the Trust. One extension of this paper could account for campaigns and explore in more detail the future donation behavior of students who participate in the senior class gift.

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## X. Appendix

**Table 14: Hurdle Model for Ethnicity Variables**

	<b>Model 1-Demographic Controls</b>	<b>Model 2- Demographic and Income controls</b>	<b>Mode 3- All Controls</b>
<b>VARIABLES</b>	<b>ln(Amount donated in first five years)</b>	<b>ln(Amount donated in first five years)</b>	<b>ln(Amount donated in first five years)</b>
<b>African American/Non-Hispanic</b>	-0.595***	-0.401*	-0.389*
	(0.203)	(0.207)	(0.202)
<b>American Indian/Alaskan</b>	-0.908	-0.667	-0.824
	(0.713)	(0.713)	(0.676)
<b>Asian/White</b>	-108.7***	-190.9***	-109.7***
	(0.375)	(0.640)	(0.209)
<b>Asian</b>	-0.497*	-0.360	-0.220
	(0.278)	(0.281)	(0.278)
<b>Bi-Racial (B&amp;W or W&amp;B)</b>	0.823	0.855	0.984
	(1.315)	(1.294)	(1.199)
<b>Bi-Racial (B and any other)</b>	0.136	0.0667	0.235
	(0.688)	(0.751)	(0.731)
<b>Hispanic American</b>	-0.290	-0.220	-0.115
	(0.194)	(0.191)	(0.190)
<b>Hispanic and other not Black</b>	1.076**	1.185**	1.359***
	(0.508)	(0.538)	(0.514)
<b>Hispanic/White (H&amp;W or W&amp;H)</b>	-113.2***	-194.5***	-112.6***
	(0.391)	(0.652)	(0.215)
<b>Other</b>	-0.456	-0.322	-0.400
	(0.498)	(0.492)	(0.473)
<b>Prior to 201001 (B&amp;H or H&amp;B)</b>	2.378***	2.153***	2.266***
	(0.499)	(0.531)	(0.526)
<b>Missing</b>	-0.128	-0.127	-0.120
	(0.183)	(0.183)	(0.181)
<b>Observations</b>	3,624	3,624	3,624
<i>Standard errors in parentheses *** p&lt;0.01, ** p&lt;0.05, * p&lt;0.1. The three models vary in controls for determining the amount of giving. The excluded variable is White/Non-Hispanic/Caucasian. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. Variables determining selection into the model are consistent throughout. This sample doesn't include the Class of 2013.</i>			

Table 15: Hurdle Model for State and Major Variables			
	Demographic Controls	Demographic and Income controls	All Controls
VARIABLES	ln(Amount donated in first five years)	ln(Amount donated in first five years)	ln(Amount donated in first five years)
Georgia	-0.379**	-0.381**	-0.347**
	(0.177)	(0.177)	(0.174)
North Carolina	-0.00186	0.0703	-0.0355
	(0.0971)	(0.0970)	(0.0946)
South Carolina	-0.0417	0.0497	0.0153
	(0.196)	(0.197)	(0.192)
Virginia	0.175	0.176	0.272*
	(0.154)	(0.154)	(0.150)
natsocsciencemjr	-0.0954**	-0.306**	-0.250**
	(0.0409)	(0.121)	(0.119)
mathmjr	0.124	-0.134	-0.0204
	(0.148)	(0.466)	(0.466)
fineartsmjr	0.00128	-0.308	-0.271
	(0.0729)	(0.239)	(0.238)
humanitiesmjr	0.0180	0.203*	0.151
	(0.0373)	(0.106)	(0.105)
Observations	3,624	3,624	3,624
<i>Standard errors in parentheses *** p&lt;0.01, ** p&lt;0.05, * p&lt;0.1. The three models vary in controls for determining the amount of giving. The excluded variable for the states are Other states, and the excluded variable for the majors is Economics. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. Variables determining selection into the model are consistent throughout. This sample doesn't include the Class of 2013.</i>			

**Table 16: Probit Model Did Give in First Four Years**

	Not Instrumented			Instrumented		
VARIABLES	Model 1 Did Give In the First Four years	Model 2 Did Give In the First Four years	Model 3 Did Give In the First Four years	Model 4 Did Give In the First Four years	Model 5 Did Give In the First Four years	Model 6 Did Give In the First Four years
total_loan	2.60e-06*** (8.28e-07)	3.58e-07 (5.86e-07)	3.38e-07 (5.76e-07)			
total_loanhat				-2.84e-06** (1.34e-06)	-4.05e-06** (1.99e-06)	-4.47e-06** (1.97e-06)
didneed	0.00162 (0.00992)	-0.00925 (0.00799)	-0.00447 (0.00791)	0.0101 (0.0106)	0.0114 (0.0117)	0.0183 (0.0117)
posttrust	-0.000107 (0.0192)	0.00749 (0.0151)	0.0106 (0.0150)	0.00635 (0.0156)	0.00361 (0.0154)	0.00640 (0.0153)
years_out	0.0119 (0.00906)	0.0319*** (0.00891)	0.0328*** (0.00880)	0.0184*** (0.00691)	0.0284*** (0.00900)	0.0289*** (0.00888)
years_out2	-0.00125** (0.000639)	- 0.00203*** (0.000535)	- 0.00205*** (0.000530)	- 0.00142*** (0.000476)	- 0.00184*** (0.000538)	-0.00184*** (0.000532)
female	0.0281*** (0.00865)	0.00469 (0.00679)	-0.00394 (0.00697)	0.0115* (0.00658)	0.00419 (0.00682)	-0.00466 (0.00701)
married	0.125*** (0.0137)	0.0400*** (0.00936)	0.0346*** (0.00917)	0.0459*** (0.00963)	0.0414*** (0.00941)	0.0364*** (0.00926)
Inmedian_income_households		0.00357 (0.00851)	-0.000992 (0.00825)		0.00248 (0.00848)	-0.00221 (0.00819)
total_efc		2.78e-08 (6.38e-08)	3.60e-08 (6.44e-08)		1.52e-07* (8.65e-08)	1.69e-07* (8.64e-08)
cum_gpa		0.0454*** (0.00819)	0.0461*** (0.00792)		0.0392*** (0.00851)	0.0394*** (0.00818)
satstand		-0.0135** (0.00656)	-0.0134** (0.00634)		-0.0125* (0.00657)	-0.0124* (0.00634)
soc			0.0411*** (0.00706)			0.0423*** (0.00711)
prospect			0.0975*** (0.0316)			0.0942*** (0.0311)
Ethnicity Variables	Yes	Yes	Yes	Yes	Yes	Yes
State Variables	Yes	Yes	Yes	Yes	Yes	Yes
Major Variables	No	Yes	Yes	No	Yes	Yes
Observations	4,373	4,022	4,022	4,022	4,022	4,022

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 17: Probit Model Did Give in First Four years after first year**

[illegible]



Table 18: Tobit model				
VARIABLES	(1)	(2)	(3)	(4)
	ln(Amount donated in first five years)	ln(Amount donated in first five years)	ln(Amount donated in first five years)	ln(Amount donated in first five years)
<b>total_loanhat</b>	-8.65e-05***	-8.72e-05***	-6.40e-05***	-5.65e-05***
	(1.34e-05)	(1.32e-05)	(1.94e-05)	(1.83e-05)
<b>didneed</b>	0.0661	0.142	0.0385	0.137
	(0.102)	(0.101)	(0.113)	(0.106)
<b>posttrust</b>	-0.0620	0.160	0.179	0.160
	(0.0646)	(0.129)	(0.131)	(0.122)
<b>years_out</b>		0.175**	0.292***	0.275***
		(0.0849)	(0.113)	(0.106)
<b>years_out2</b>		-0.0119**	-0.0174***	-0.0172***
		(0.00545)	(0.00644)	(0.00606)
<b>female</b>		0.0553	0.00178	-0.0587
		(0.0615)	(0.0622)	(0.0601)
<b>lnmedian_income_househol ds</b>			0.219***	0.0722
			(0.0749)	(0.0710)
<b>total_efc</b>			-1.32e-07	1.88e-07
			(7.50e-07)	(7.12e-07)
<b>cum_gpa</b>			0.505***	0.507***
			(0.0847)	(0.0806)
<b>married</b>		1.106***	1.027***	0.806***
		(0.0691)	(0.0689)	(0.0631)
<b>soc</b>				0.504***
				(0.0665)
<b>prospect</b>				2.279***
				(0.103)
<b>satstand</b>			-0.0653	-0.0452
			(0.0569)	(0.0523)
<b>Constant</b>	4.488***	3.475***	-1.219	0.0828
	(0.0599)	(0.362)	(1.035)	(0.986)
<b>Demographic Controls</b>	No	Yes	Yes	Yes
<b>Income Controls</b>	No	No	Yes	Yes
<b>Other Controls</b>	No	No	No	Yes
<b>Observations</b>	3,624	3,624	3,624	3,624
<i>Robust standard errors in parentheses*** p&lt;0.01, ** p&lt;0.05, * p&lt;0.1. Demographic Controls and Income Controls not included in the table are ethnicity variables, state variables, and major variables. Does not include Class of 2013 in Sample.</i>				

Table 19: Hurdle Model for first four years			
	Model1- Demographic Controls	Model 2- Demographic and Income controls	Model 3-All Controls
VARIABLES	ln(Amount donated in first four years)	ln(Amount donated in first four years)	ln(Amount donated in first four years)
<b>total_loanhat</b>	-0.000100***	-6.05e-05***	-5.12e-05***
	(1.56e-05)	(2.02e-05)	(1.99e-05)
<b>didneed</b>	0.110	0.00264	0.0525
	(0.112)	(0.119)	(0.117)
<b>posttrust</b>	0.167	0.188	0.183
	(0.150)	(0.150)	(0.146)
<b>years_out</b>	0.183**	0.198**	0.242***
	(0.0778)	(0.0939)	(0.0760)
<b>years_out2</b>	-0.0112**	-0.0119**	-0.0145***
	(0.00525)	(0.00569)	(0.00513)
<b>female</b>	0.134*	0.0513	0.0272
	(0.0699)	(0.0698)	(0.0708)
<b>married</b>	1.181***	1.118***	0.933***
	(0.0757)	(0.0758)	(0.0739)
<b>Inmedian_income_households</b>	0.0119	0.314***	0.228***
	(0.0316)	(0.0850)	(0.0843)
<b>total_efc</b>	6.62e-07*	-4.53e-07	-2.63e-07
	(3.45e-07)	(8.41e-07)	(8.30e-07)
<b>cum_gpa</b>	0.156***	0.777***	0.789***
	(0.0329)	(0.0972)	(0.0949)
<b>soc</b>	0.180***	0.176***	0.492***
	(0.0296)	(0.0291)	(0.0776)
<b>prospect</b>	0.371***	0.364***	2.058***
	(0.127)	(0.125)	(0.147)
<b>satstand</b>	-0.0523**	-0.0173	-0.0490**
	(0.0252)	(0.0619)	(0.0236)
<b>Ethnicity Controls</b>	Yes	Yes	Yes
<b>State Controls</b>	No	No	No
<b>Major Controls</b>	No	No	No
<b>Observations</b>	4,049	4,049	4,049
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The three models vary in controls for determining the amount of giving. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. This sample includes the Class of 2013. Variables determining selection into the model are consistent throughout. This sample includes the Class of 2013.			

Table 20: Hurdle Model for Ethnicity Variables for first four years			
	Model1-Demographic Controls	Model 2- Demographic and Income controls	Model 3-All Controls
VARIABLES	ln(Amount donated in first four years)	ln(Amount donated in first four years)	ln(Amount donated in first four years)
African American/Non-Hispanic	-0.0543	-0.0532	-0.0508
	(0.0485)	(0.0476)	(0.0454)
American Indian/Alaskan	-0.113	-0.110	-0.105
	(0.176)	(0.173)	(0.165)
Asian/White	-2.371***	-2.337***	-2.178***
	(0.148)	(0.146)	(0.138)
Asian	0.155*	0.152*	0.145*
	(0.0917)	(0.0900)	(0.0859)
Bi-Racial (B&W or W&B)	1.434***	1.408***	1.249***
	(0.109)	(0.107)	(0.0986)
Bi-Racial (B and any other)	-0.136	-0.134	-0.127
	(0.209)	(0.205)	(0.195)
Hispanic American	0.0991	0.0972	0.0927
	(0.0804)	(0.0789)	(0.0752)
Hispanic and other not Black	1.380***	1.355***	1.198***
	(0.100)	(0.0987)	(0.0902)
Hispanic/White (H&W or W&H)	1.358***	1.334***	1.181***
	(0.118)	(0.117)	(0.110)
Other	0.00542	0.00532	0.00507
	(0.135)	(0.133)	(0.126)
Prior to 201001 (B&H or H&B)	1.537***	1.510***	1.348***
	(0.120)	(0.118)	(0.110)
Missing	0.0131	0.0129	0.0123
	(0.0600)	(0.0589)	(0.0562)
Observations	4,049	4,049	4,049
<p>Standard errors in parentheses *** <math>p &lt; 0.01</math>, ** <math>p &lt; 0.05</math>, * <math>p &lt; 0.1</math>. The three models vary in controls for determining the amount of giving. The excluded variable is White/Non-Hispanic/Caucasian. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. This sample includes the Class of 2013. Variables determining selection into the model are consistent throughout. This sample includes the Class of 2013.</p>			

Table 21: Hurdle Model for first four years after first year			
	Model1-Demographic Controls	Model 2-Demographic and Income controls	Model 3-All Controls
VARIABLES	ln(Amount donated in first four years after first year)	ln(Amount donated in first four years after first year)	ln(Amount donated in first four years after first year)
total_loanhat	-8.76e-05***	-7.02e-05***	-5.93e-05***
	(2.12e-05)	(2.33e-05)	(2.26e-05)
didneed	0.173	0.119	0.138
	(0.142)	(0.146)	(0.142)
posttrust	0.270*	0.302*	0.263*
	(0.161)	(0.163)	(0.157)
years_out	0.225*	0.298**	0.248**
	(0.130)	(0.149)	(0.126)
years_out2	-0.0122	-0.0157*	-0.0141*
	(0.00759)	(0.00835)	(0.00741)
female	-0.105	-0.123	-0.109
	(0.0819)	(0.0810)	(0.0801)
married	1.247***	1.232***	1.054***
	(0.0903)	(0.0898)	(0.0876)
lnmedian_income_households	-0.0366	0.197**	0.120
	(0.0714)	(0.0933)	(0.0923)
total_efc	7.32e-07	4.16e-08	2.28e-07
	(7.27e-07)	(9.38e-07)	(9.17e-07)
cum_gpa	0.428***	0.598***	0.583***
	(0.0788)	(0.112)	(0.111)
soc	0.445***	0.444***	0.606***
	(0.0658)	(0.0656)	(0.0834)
prospect	1.240***	1.237***	2.670***
	(0.192)	(0.191)	(0.193)
satstand	0.0186	-0.0270	0.0179
	(0.0564)	(0.0783)	(0.0544)
Ethnicity Controls	Yes	Yes	Yes
State Controls	No	No	No
Major Controls	No	No	No
Observations	3,624	3,624	3,624
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The three models vary in controls for determining the amount of giving. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. Variables determining selection into the model are consistent throughout. This sample doesn't include the Class of 2013. There are no major and state controls in both the selection model and the amount model due to missing predicted values encountered within the estimation sample when included.			

Table 22: Hurdle Model for Ethnicity Variables for first four years after first year			
	Model1-Demographic Controls	Model 2- Demographic and Income controls	Model 3-All Controls
VARIABLES	ln(Amount donated in first four years after first year)	ln(Amount donated in first four years after first year)	ln(Amount donated in first four years after first year)
African American/Non-Hispanic	-0.279	-0.211	-0.248
	(0.189)	(0.195)	(0.188)
American Indian/Alaskan	-0.510	-0.456	-0.546
	(0.631)	(0.636)	(0.607)
Asian/White	-145.1***	-93.75***	-89.25***
	(0.823)	(0.528)	(0.442)
Asian	-0.518**	-0.480**	-0.347
	(0.233)	(0.234)	(0.227)
Bi-Racial (B&W or W&B)	0.640	0.605	0.665
	(1.030)	(1.043)	(0.999)
Bi-Racial (B and any other)	0.000111	-0.0336	0.0485
	(0.911)	(0.918)	(0.891)
Hispanic American	-0.234	-0.231	-0.142
	(0.184)	(0.185)	(0.181)
Hispanic and other not Black	4.965***	5.077***	4.895***
	(0.518)	(0.513)	(0.505)
Hispanic/White (H&W or W&H)	-146.2***	-94.21***	-90.32***
	(0.830)	(0.530)	(0.448)
Other	0.145	0.190	0.116
	(0.367)	(0.368)	(0.355)
Prior to 201001 (B&H or H&B)	1.457*	1.358	1.383
	(0.866)	(0.886)	(0.842)
Missing	0.0208	0.00865	0.00691
	(0.178)	(0.178)	(0.174)
Observations	3,624	3,624	3,624
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$ . The three models vary in controls for determining the amount of giving. The excluded variable is White/Non-Hispanic/American. Model 1 only has demographic controls, model 2 includes income controls and model 3 has all controls. Variables determining selection into the model are consistent throughout. This sample doesn't include the Class of 2013.			

Table 23: IV Probit did give in the first five years out of college				
VARIABLES	Model 1 Did Give in the First Five years	Model 2 Did Give in the First Five years	Model 3 Did Give in the First Five years	Model 4 Did Give in the First Five years
<b>total_loan</b>	3.80e-06 (2.46e-06)	3.79e-06 (2.33e-06)	2.30e-06 (2.35e-06)	2.07e-06 (2.34e-06)
<b>total_simulatedloans</b>	-3.66e-06*** (2.72e-07)	-3.24e-06*** (2.33e-07)	-4.39e-06*** (3.97e-07)	-4.13e-06*** (3.69e-07)
<b>didneed</b>	0.0153 (0.0187)	0.0202 (0.0175)	0.0235 (0.0160)	0.0304* (0.0159)
<b>posttrust</b>	0.00263 (0.00920)	-0.00628 (0.0185)	-0.0101 (0.0176)	-0.00437 (0.0173)
<b>years_out</b>		0.00107 (0.0126)	0.00107 (0.0156)	0.00161 (0.0149)
<b>years_out2</b>		-0.000557 (0.000781)	-0.000559 (0.000871)	-0.000537 (0.000841)
<b>female</b>		0.0319*** (0.00897)	0.0343*** (0.00834)	0.0191** (0.00869)
<b>married</b>		0.126*** (0.0135)	0.0934*** (0.0124)	0.0844*** (0.0124)
<b>lnmedian_income_households</b>			-0.00520 (0.0103)	-0.0133 (0.0100)
<b>total_efc</b>			5.74e-08 (9.81e-08)	5.52e-08 (1.16e-07)
<b>satstand</b>			0.00156 (0.00751)	0.00225 (0.00707)
<b>soc</b>				0.0646*** (0.00905)
<b>prospect</b>				0.142*** (0.0482)
<b>Ethnicity Variables</b>	No	Yes	Yes	Yes
<b>State Variables</b>	No	Yes	Yes	Yes
<b>Major Variables</b>	No	No	Yes	Yes
<b>Observations</b>	3,921	3,921	3,815	3,815
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$ . Coefficients shown in the table are average marginal effects, cum GPA had to be excluded due to missing values. Had to use margins, dydx(*) pred(pr) command in stata to accurately calculate the average marginal effects.				

Table 24: DID analysis with controls				
VARIABLES	Model 1	Model 2	Model 3	Model 4
	Did Give in the First Five years	Did Give in the First Five years	Did Give in the First Five years	Did Give in the First Five years
<b>didneed</b>	-0.0170 (0.0141)	-0.00908 (0.0137)	-0.0198* (0.0119)	-0.0141 (0.0118)
<b>posttrust</b>	-0.00800 (0.0134)	-0.0247 (0.0216)	-0.00461 (0.0163)	-0.00351 (0.0162)
<b>c.posttrust#c.didneed</b>	0.0464** (0.0184)	0.0441** (0.0181)	0.0192 (0.0136)	0.0192 (0.0135)
<b>years_out</b>		-0.00961 (0.0129)	0.0145 (0.0120)	0.0153 (0.0120)
<b>years_out2</b>		-2.98e-05 (0.000817)	-0.00114 (0.000717)	-0.00118* (0.000714)
<b>female</b>		0.0317*** (0.00904)	0.0109 (0.00679)	0.00101 (0.00718)
<b>lnmedian_income_households</b>			0.000884 (0.00886)	-0.00427 (0.00886)
<b>total_efc</b>			6.33e-08 (5.76e-08)	7.11e-08 (5.81e-08)
<b>cum_gpa</b>			0.0372*** (0.00962)	0.0403*** (0.00973)
<b>married</b>		0.102*** (0.00894)	0.0367*** (0.00736)	0.0323*** (0.00732)
<b>soc</b>				0.0423*** (0.00863)
<b>prospect</b>				0.0332*** (0.00624)
<b>satstand</b>			-0.00699 (0.00520)	-0.00680 (0.00519)
<b>Constant</b>	0.911*** (0.00984)	0.957*** (0.0556)	0.786*** (0.124)	0.802*** (0.124)
<b>Ethnicity Variables</b>	No	Yes	Yes	Yes
<b>State Variables</b>	No	Yes	Yes	Yes
<b>Major Variables</b>	No	No	Yes	Yes
<b>Observations</b>	3,921	3,921	3,624	3,624
<b>R-squared</b>	0.003	0.037	0.034	0.045
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Demographic Controls and Income Controls not shown in the table are ethnicity, major, and state variables. Doesn't include Class of 2013.				