The Supply of and Demand for Charitable Donations to Higher Education

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Abstract: Charitable donations are an important revenue source for many institutions of higher education. We explore how donations respond to economic and financial market shocks, accounting for both supply and demand channels through which these shocks operate. In panel data with fixed effects to control for unobservable differences across universities, we find that overall donations to higher education – and especially capital donations for university endowments or for buildings– are positively and significantly correlated with the average income and house values in the state where the university is located (supply effects). We also find that when a university suffers a negative endowment shock that is large relative to its operating budget, donations increase (demand effects). This is especially true for donations earmarked for current use. We conclude by discussing the importance of understanding how donations respond to economic shocks for effective financial risk management by colleges and universities.

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Charitable donations are an important source of funding for higher education, equaling 6.5% of total university and college spending in 2011.[1] For research/doctoral institutions, donations are even more important, equaling 10.5% of total spending. Roughly speaking, these donations are split between current-use gifts, which can be spent immediately, and capital gifts, which are used for buildings or added to the university's endowment fund. Payouts from these endowments, which are themselves the result of past donations, are also an important source of funding, equaling an additional 5.2% of research/doctoral universities' total spending (see Brown et al. 2012).

Given the importance of donations to university budgets, effective financial management of a university requires understanding the expected size of donations *and* how donations are correlated with other revenues and with expenditure needs. When universities are exposed to a broad economic downturn – such as the recent financial crisis and Great Recession – many of their revenue sources suffer simultaneous shocks. For example, during an economic downturn, endowment-dependent universities suffer reductions in endowment payouts, state universities may need to absorb a reduction in appropriations due to fiscal pressure on the state, and there may also be public pressure to keep tuition low. Thus, the relation between charitable donations and economic shocks is important for understanding whether donations help to hedge, or, in contrast, exacerbate, the volatility of a university's revenues.

Of course, the same economic forces that affect other revenue sources to a university may also have a direct effect on donations. Indeed, we posit that there are two potentially offsetting effects that are important to disentangle. On the supply side, potential donors (e.g., alumni, corporations, etc.) may suffer a reduced capacity to give during bad economic times. Assuming that donations to a university are a normal good for donors, we would expect donations to fall

[1] http://www.cae.org/content/pdf/VSE_2011_Press_Release.pdf.

when donors' incomes and asset values decline. On the other hand, the demand for donations increases during an economic downturn, as universities seek to maintain their operations in the face of declining resources from other sources. In essence, the marginal value of a donated dollar – especially a dollar that can be used for current spending – increases during bad economic times.

It is quite difficult to disentangle these two offsetting effects using only cross-sectional or aggregate time series data. In this paper, we attempt to separately identify these effects in panel data by using plausibly exogenous sources of variation on both the supply and demand side of the donations market, while controlling for university fixed effects. On the supply side, we proxy for potential donors' resources by using state-level measures of average income, house values, and the equity returns of firms headquartered in the same state as the university. On the demand side, we use shocks to a university's endowment as a measure of a university's demand for donations. Specifically, we construct a measure of endowment shocks that weights endowment returns by the size of the endowment relative to total university costs. In addition to university fixed effects, we also use region-by-Carnegie classification fixed effects to control for a wide range of both observable and unobservable characteristics that might otherwise lead to spurious correlations.

Our results indicate that both supply and demand side factors are important determinants of charitable giving to higher education. On the supply side, we find that overall giving to higher education institutions is positively and significantly correlated with per capita income, the returns of local stocks, and house values. Put simply, when donors are doing better financially, they donate more to higher education. On the demand side, we find that when a university suffers an endowment shock, donors respond by increasing donations to the school. Importantly,

we show that it is not endowment returns that matter, as returns might be correlated with donors' economic well-being in a way that may not be controlled for by our supply-side variables. Rather, consistent with a measure of a university's demand for donations, it is the return weighted by the size of the endowment shock relative to the university's total costs that has a significant effect.

Additional supporting evidence comes from separately examining capital donations versus current-use donations. We find that capital donations – for which use of the funds is long-term and typically more restricted – are more responsive to our proxies for donor ability (i.e., income and house prices). In contrast, current-use donations (which are more highly valued by universities during an economic downturn as a substitute for other declining resources) are much more responsive to endowment shocks. In other words, when a university suffers a negative endowment shock, which in turn leads to a decline in contemporaneous endowment payouts to the university (see Brown, et al. 2012), donors respond to the need for immediate resources by directing gifts toward current use. Interestingly, these gifts do not appear to come at the expense of capital donations, at least after conditioning on the same set of covariates.

This paper proceeds as follows. Section 1 provides background on donations to universities and reviews the literature. Section 2 introduces the data and explains the empirical strategy. Section 3 presents and discusses the empirical results. Section 4 concludes.

1. Background and Literature Review

Educational institutions are the second largest recipients of charitable donations in the United States, second only to religious institutions. In 2011, it is estimated that individuals and corporations donated $39 billion to educational institutions, which is about 13% of all charitable

donations to any cause.[2] As with other charitable giving, donations to higher education are generally tax deductible,[3] and thus gifts to colleges and universities represent a significant "tax expenditure" for the federal treasury.

Charitable donations to a university can take the form of current-use gifts or capital gifts. Current-use gifts can be fully spent in the year received or according to the schedule provided by the donor. Capital gifts are for the university's long-term use, and come in two major types: gifts for buildings and gifts to the university's endowment funds. In the latter case, the investment income generated by the endowment provides support for the university in perpetuity. As discussed in Brown et al (2012), endowments have grown enormously in importance for universities over the past few decades, although there is substantial heterogeneity in the extent to which universities rely on endowment income. According to our data (which we will discuss in more detail below), about 48% of donations to universities in the 2008-2009 academic year ($12.4 billion total) were capital gifts, whereas the remaining 52% ($13.2 billion total) were current use gifts. We will show below that these two types of gifts exhibit differential sensitivities to the economic environment, a factor that is important for universities to consider when planning and managing financial risks.

A number of papers have analyzed the determinants of charitable contributions in general, and contributions to higher education specifically. Due to the tax deductibility of charitable contributions, a large literature in public finance has examined how marginal tax rates affect charitable giving (e.g., Auten, Cilke, and Randolph, 1992; Auten, Sieg, and Clotfelter, 2002; Clotfelter, 2012). Specific to higher education, a number of papers have examined the

[2] See http://www.voanews.com/content/us-charitable-donations-near-300-billion/1212970.html.
[3] In general, donations to colleges and universities are deductible from income for those itemizing expenses on their tax returns at the federal level. However, only 80% of donations made to athletic departments are deductible: this is Congress' way of approximating the non-charitable portion of such gifts (e.g., access to better football tickets).

determinants of overall giving as well as of alumni giving.[4] These papers tend to find that educational quality and student involvement in campus activities are associated with greater alumni donations. Further, alumni donations are higher at universities that spend more on fundraising and at universities that admit students from wealthier families. Other researchers have focused on carefully identifying the impact on donations of specific factors such as financial aid granted to alumni when they were students (e.g., Dugan, Mullin, and Siegfried, 2000; Cunningham and Cochi-Ficano, 2002; Meer and Rosen, 2012), the school's recent athletic performance (e.g., Rhoads and Gerking, 2000, and cites therein; Meer and Rosen, 2009a), and self-interested giving (e.g., Butcher, Kearns, and McEwan, 2011; Meer and Rosen 2009b).

The strand of the literature that is most relevant to ours is that examining whether donations are crowded out by other university resources. Oster (2001) uses the Voluntary Support of Education (VSE) data to examine whether endowment growth crowds out donations. She finds evidence of crowding out in the 1999 cross-section, although there are concerns about identification due to unobserved differences across universities. When she controls for fixed effects, using panel data from the early 1980s through 1997, she finds no evidence of crowding out in the early years of her sample, although she continues to find some evidence of crowding out in later years. Earlier papers (e.g., Roberts, 1984; Kingma, 1989; Steinberg, 1993) also report small crowding-out effects. Segal and Weisbrod (1998) examine whether donations are crowded out by commercial revenues, and find the opposite: the two revenue sources tend to positively co-vary.

[4] Examples include Steinberg (1987); Baade and Sundberg (1996); Harrison, Mitchell, and Peterson (1995); Shulman and Bowen (2000); Cunningham and Cochi-Ficano (2002); Clotfelter (2003); and Ehrenberg and Smith (2003).

Our results also relate to the literature on university endowment funds. There is also a small theoretical literature that considers (among other things) the joint relation of donation risk and endowment fund risk. Tobin (1974) argues that universities should ignore donation risk when making endowment decisions. In contrast, Black (1976) and Merton (1992) argue that universities should hedge donation risk through their portfolio allocations of endowment assets. Consistent with this hedging argument, Dimmock (2012) shows that universities with greater volatility of revenues (which include revenues from current use donations) hold less volatile endowment portfolios. However, Brown et al (2012) show that universities do not alter endowment fund payout rates to smooth out fluctuations in other revenues. Although several studies have shown that at least some endowments appear able to generate alpha (Lerner, Schoar, and Wang, 2008; Brown, Garlappi, and Tiu, 2010; Barber and Wang, 2011) a factor that could influence a donor's decision of whether and when to give, these studies suggest that alpha is generated by allocations to risky alternative asset classes such as hedge funds, private equity and venture capital. As shown by Dimmock (2012), the ability of universities to invest in these alternative asset classes depends, in turn, on the riskiness of the universities' non-endowment revenues, such as from donations.

In this paper, we provide new evidence on how broader economic and financial market shocks affect donations to colleges and universities, taking into account both supply and demand effects. An important advance over the existing literature on donations is that we are able to separately identify these supply and demand effects by using plausibly exogenous variation in the size of the budget shocks faced by universities that result from endowment investment and payout decisions. Additionally, we use state-level measures of income, house values, and equity returns to identify the response of donations to economic shocks to likely donors.

2. Data and Empirical Strategy

2.1 Data and Sample

We combine data from multiple sources in this study, so as to create a dataset with information on university finances, donations, and endowment funds, as well as on economic shocks. Our data source for university finances is the Integrated Postsecondary Education Data System[5] (IPEDS), collected by the National Center for Educational Statistics, a division of the U.S. Department of Education. IPEDS includes information from each university's financial statements, as well as university characteristics such as whether the university is public or private. Providing information through IPEDS is mandatory for all U.S. post-secondary institutions, and institutions that fail to provide information are barred from accessing federal funding and their students are ineligible for federally guaranteed student loans.

Our sources for university endowment fund data are a series of annual surveys produced by the National Association of College and University Business Officers (NACUBO) and by the Commonfund.[6] For the period 1997-2008, our endowment data come from the NACUBO Endowment Survey. Beginning in 2009, NACUBO joined forces with the Commonfund to produce the NACUBO-Commonfund Endowment Survey, which is our source of endowment data for the 2008-2009 academic year.

Our source for data on university donations is the Voluntary Support of Education (VSE) dataset produced by the Council for Aid to Education.[7] The VSE contains detailed information on charitable contributions to universities, including donation amounts, the purpose of gifts, and

[5] For more information about this data set, see: http://nces.ed.gov/ipeds/.
[6] For more information on this data set, see: http://www.nacubo.org/Research/NACUBO-Commonfund_Study_of_Endowments.html.
[7] For more information about the VSE and the Council for Aid to Education, see: http://www.cae.org/content/pro_data_trends.htm.

donor type. We merge the IPEDS data, endowment data, and VSE data by hand, matching on university name.

We use data from two additional sources for some of our measures of economic shocks. We use state level economic variables from the Federal Reserve Economic Data (FRED) produced by the St. Louis Federal Reserve Bank.[8] We also create state level stock return portfolios using data from the Center for Research in Securities Prices (CRSP) and Compustat databases.

2.2 Variables and Summary Statistics

From the data sources just described, we create the variables summarized in Table 1 (See Appendix Table 1 for variable definitions.) The summary statistics are pooled over the period 1997-2009, where year indicates the academic year end, i.e., 2009 indicates either values for the period July 2008 through June 2009 (for flow variables), or values as of June 2009 (for stock variables). The average university in our sample has total costs of $288.6 million, while the average endowment fund is $451.9 million. On average, the endowment-to-university cost ratio of 1.83 across universities during the sample.

The average university in our sample receives donations of $31.2 million per year, equal to 15% of total costs.[9] Both the time-series and cross-sectional variation in the donations-to-costs ratio are summarized in Figure 1. This figure shows a small overall decline in this ratio over time; although donations rose over this period, this was more than offset by the increase in

[8] See http://research.stlouisfed.org/fred2/.

[9] In the introduction, we cited figures from the Council for Aid to Education stating that in 2011 aggregate donations to universities totaled 6.5% of aggregate university costs. The ratio of 15%, reported in Table 1, is equal weighted across all universities in our sample, over the full sample period. The value weighted average donation-to-cost ratio for the universities in our sample is 8.7% as of 2009 (our most recent data). Thus, the universities in our sample appear to be slightly more dependent on donations than the overall population of universities.

university costs. The cross-sectional dispersion in the 2007-2008 period shows that the proportional decline in giving was greater for universities with higher ratios of donations-to-total costs. These donations are nearly evenly divided between capital gifts to current-use gifts. Capital gifts include all gifts that cannot be immediately spent, but instead are intended to provide ongoing support for the university.[10] Current-use gifts include all gifts that can be immediately spent by the university. From the VSE data we are also able to see the number of individual donors that the university solicited for a donation, as well as the number of individuals who made a donation to the university.

In the lower half of Table 1, we summarize the variables that measure shocks to the supply of and demand for donations. Changes in per capita income and the housing price index for the states are both calculated using data from the FRED dataset. The housing price index is based on data provided by the Federal Housing Finance Agency, and is calculated following the method proposed by Case and Shiller (1989) as described by Calhoun (1996).

Using state headquarter locations from the Compustat database and stock returns from the CRSP database, we calculate equal and value weighted returns for portfolios composed of all firms headquartered in each state.

Following Brown, et al. (2012), we define endowment shocks as follows:

$$\text{Shock}_{i,t} = \text{Return}_{i,t} \times \frac{\text{Endowment Fund Size}_{i,t-1}}{\text{Total University Costs}_{i,t-1}} \tag{1}$$

where subscript *i* denotes the university and subscript *t* denotes the academic year. This variable captures the idea that a university with a large endowment-to-cost ratio may be more responsive to endowment returns than a university with a small endowment-to-cost ratio. For intuition,

[10] During our sample period, approximately one-third of capital gifts were gifts for the construction or renovation of buildings. The remaining gifts were for endowment funds.

consider the extremes: a university that relies on endowment income to cover the majority of its expenses would likely respond to a given percentage return differently from a university whose endowment is a trivial share of its expenses. In essence, this means that there is variation in the "shock" variable arising from both the rate of return realized by the endowment and the size of the endowment relative to university costs. One can also think of the "shock" variable as the ratio of the change in the dollar value of the endowment attributable to its performance to the dollar flow of university expenditures.

2.3 Empirical Strategy

Our primary dependent variable is the log of total donations, although in some specifications we also separately examine current-use donations and capital donations. In our analysis we include measures of both supply and demand side determinants of donations, and we make use of the panel structure of the data to control for both university and year-by-Carnegie classification fixed effects.

Our basic empirical specification is as follows:

$$\begin{aligned}\ln(Donations_{i,t}) = {} & \beta_1 \cdot \ln(Avg\ Income_{s,t}) + \beta_2 \cdot \ln(House\ Price_{s,t}) \\ & + \beta_3 \cdot Stock\ Return_{s,t} + \beta_4 \cdot Endowment\ Shock_{i,t} \\ & + \beta_5 \cdot X_{i,t} + \mu_i + \delta_{c,t} + \varepsilon_{i,t}\end{aligned} \quad (2)$$

The dependent variable is the log of donation to university *i* in year *t*. The first set of explanatory variables are meant to proxy for the impact of the economy on donor's ability to contribute, and includes the log of average state income, log average state house price, and average in-state stock return for state *s* in year *t*. The endowment shock variable measures the size of the endowment's return shock relative to the size of the university's operating budget. X is a vector of other control variables. μ_i represents university fixed effects, and $\delta_{c,t}$ represents

Carnegie classification-by-year fixed effects.[11] $\varepsilon_{i,t}$ is a mean-zero error term. Because we use a log-log specification for most variables, we can interpret the coefficients as elasticities.

3. Results

3.1 Baseline Results

We begin our analysis in Table 2 by implementing the above-specification. Looking first at the factors affecting the supply of donations, the significant coefficient of 0.52 on average state income implies that a 10% increase in average income in the university's home state increases donations to the university by about 5.2%. We also find that a 10% increase in home values in the state is associated with a 1.3% increase in donations to the university. Additionally, we also test the relation between donations and the returns of in-state companies. Our inclusion of this variable is motivated by the large literature indicating the prevalence of a local geographic "home bias" in individual investor portfolios (e.g., Ivković and Weisbenner, 2005).[12] We find that donations respond to the equally-weighted average return of stocks that are headquartered in the state: a 10 percentage point increase in the return of in-state companies increases giving by 0.7%, a small but statistically significant effect. Taken together, these results support the intuitive hypothesis that university donations rise and fall with the economic well-being of their likely contributors (i.e., home-state residents).

We then turn to an analysis of the demand side by focusing on the endowment shock variable. We find that when a university suffers a negative shock that is equivalent to losing

[11] For more information on Carnegie classifications, see http://classifications.carnegiefoundation.org/.
[12] We have also constructed alternative measures of average income, home values, and local equity returns that account for the variation in students' state-of-origin. In these alternative measures, each university's shock variable is a weighted average of state shocks, where the weights are equal to the percentage of the university's alumni who were originally from that state. We find extremely similar results for all specifications, and thus we report only the state-level results in the interest of space.

10% of one year's operating budget (i.e., Shock = -0.10), donors respond by increasing donations by 0.2%. This effect is significant at the 10% level, although its economic magnitude is relatively small. Our preferred interpretation of this finding is that donors respond to the increased need of the university, either on their own or through targeted efforts on the part of the university. We will explore these ideas in more detail below. The results in Table 2 also show that donations to the university are unrelated to the level of state appropriations to the university.

Column (2) repeats the specification from column (1), but replaces the equal-weighted in-state stock returns with value-weighted in-state stock returns. The results are virtually the same as column (1). In column (3), we also add a control for the state's population; the coefficient for this variable is insignificant. This is, perhaps, not surprising given that we include university fixed effects, which effectively function as state fixed effects because universities do not move across state lines. This, combined with year fixed effects, means that the log of population would only control for differential population growth trends across states, but the results suggest that any such differential trends are uncorrelated with donations.

The coefficient on the endowment shock variable is quite stable in columns (1), (2) and (3), with significance just above the 10% level. As discussed above, we believe that this shock variable – which weights endowment returns by the importance of the endowment to university operations – is a useful proxy for the relative need of a university for additional resources (see Brown et al. 2012, for evidence that endowment shocks have real effects on university operations). To ensure that endowment returns only matter insofar as they affect the university's budget, in column (4) we replace our shock variable with a simple measure of endowment returns. The coefficient on endowment returns is quite small and statistically insignificant. This

is comforting, as it confirms that it is our return-measure that accounts for the endowment's importance to the university that is significantly correlated with donations to the university.

Although our specifications above control for an institution's Carnegie classification (and, indeed, interact this classification of the university with year effects), in column (5) we restrict the sample to the subset of doctoral institutions, a group for which endowments and donations play a particularly important role. The effects are, again, nearly identical to those from columns (1) through (3). If anything, the coefficient on the endowment shock variable is slightly larger than before (although, statistically different from zero, it is not statistically different from the prior specifications).

Overall, the results from Table 2 suggest that donations rise with the economic well-being of the individuals in the state where the university is located (or, alternatively, the states from which many students likely originated). In addition, donations also rise with university need, as proxied by the endowment shock variable. This suggests that macro-economic shocks affect university donations through both supply and demand channels, although our estimates suggest that the supply channel is quantitatively more important.

3.2 Capital Donations versus Current-Use Donations

As noted earlier, donations to universities can be designated for current use or for capital purposes (buildings or the endowment fund), and it is natural to expect that these types of donations may respond differently to economic shocks. Specifically, we expect that during a financial crisis universities' prefer current-use donations. Current-use gifts are particularly valuable during financial crises, because they can be entirely spent in the current period, when

the marginal utility of spending is very high. Capital gifts, in contrast, must are consumed over many future periods, in which the marginal utility of spending is likely to be lower.

In Table 3, we explore these differences. The first column is for comparison purposes only – it is simply a replication of column (1) from Table 2, and shows the effect on total donations. In column (2), we add the logarithm of lagged university costs as an additional control variable. We add a control for lagged university costs because if donors are sensitive to the university's need, they might increase giving in response to higher costs. There is, however, a potential endogeneity concern in that universities might increase their budgets in anticipation of higher donations. Because of this concern, we show results both with and without this additional control variable. The results in column (2) are similar, although the significance of the coefficient on endowment shocks falls just below the 10% level.

In columns (3) and (4), the dependent variable is the log of donations that are specifically designated for capital purposes. The effects of average income, house prices, and stock returns are still significant, and in fact have slightly larger coefficients than in the regression of total donations. The coefficient on the endowment shock variable is of similar size as in the regression of total donations, but due to the larger standard error, it is no longer significant (the p-value drops from approximately 0.1 to 0.3). Thus, it appears that supply-side considerations (i.e., the resources of donors) are quite relevant for capital gifts and we cannot rule out the possibility that endowment shocks have no effect on donation levels.

When we turn to donations for current use, in columns (5) and (6), we find that current-use donations are less responsive to the economic characteristics of the donors, but are significantly responsive to endowment shocks. A negative endowment shock equal to 10% of a university's operating budget increases donations for current use by 0.24 percent. It is worth

noting, however, that the magnitudes of the coefficients across the "capital" and "current use" donations are not significantly different, although the extent to which each is statistically different from zero does vary across the specifications.

We are unable to distinguish to what extent the differential responsiveness of capital gifts and current use gifts to endowment shocks is driven by donor perceptions of needs versus the university's own efforts to guide donations into certain categories. In all likelihood, both effects probably matter: the university may try to steer donors towards current use donations, and donors may be more responsive to the need for current-use funds following an exogenous negative shock to the university's finances.

The results in columns (3) – (6) suggest that supply side factors have a stronger effect on capital donations than on current-use donations. This may reflect a preference among donors for "legacy" gifts, which allow the donor to attach her name to a building or professorship in perpetuity. Thus without the active guidance of the university, donors may naturally gravitate towards capital donations. The greater effect of supply side factors on capital donations may be related to one of the key differences between current-use and capital donations. Capital donations tend to be significantly larger and come from fewer donors. Thus, economic shocks may primarily affect large gifts, rather than smaller donations.

There are two ways in which donations can increase: either the number of donors can increase or the average amount given per donor can increase. In the remaining columns, we explore how each of these factors is affected by our explanatory variables. In columns (7) and (8), the dependent variable is the number of individuals who make a donation, rather than the aggregate amount given to the university. The results show that increases in local house prices

and state stock returns lead to a significant increase in the number of donors. In these specifications, however, the effect of per capita income is not significant.

In columns (9) and (10), we regress the number of individuals solicited for gifts on the economic shock variables. None of the results are significant; we fail to find support for the idea that universities change their solicitation efforts in response to either university need or donors' ability to give. There are several possible reasons for this finding. First, in all periods, the university should set the marginal cost of soliciting donations equal to the marginal benefits. During a financial crisis, the marginal benefit of donations is greater to the university, but the marginal cost of diverting resources towards fundraising is also greater. These effects may offset one another. Second, university financial need usually coincides with financial shocks to donors, and so the marginal benefits to fundraising may be lower because donors are less receptive. Finally, as readers who are alumni of U.S. institutions may know from personal experience, many universities solicit virtually all alumni every year.[13] The number of individuals solicited variable does not reflect the intensity of solicitations (i.e., someone receiving ten solicitations is counted the same as someone receiving one solicitation), and it may be the intensity of solicitation, rather than the simple number of individuals contacted, that varies with economic conditions of the university and its likely donors.

3.3 Allowing for Lagged Effects

There are numerous reasons to think that donation responses to both supply and demand side factors may operate with a partial lag. For example, donors may plan their charitable contributions in advance, and universities, in turn, may take time to adjust their solicitation

[13] The median ratio of solicited alumni to total alumni is 0.90, with 36% of universities soliciting greater than 95% of their alumni each year.

efforts. Thus, in Table 4, we augment our basic specifications with lagged version of all of the independent variables. For example, in column (1) we use the log of total donations as the dependent variable, and regress it against contemporaneous and lagged income, contemporaneous and lagged house values, and so forth. Because the lagged values of the variables are often correlated with the contemporaneous measures, we examine the F-tests of the joint significance of each contemporaneous/lagged pair of controls in addition to the statistical significance of the individual variables. In general, we find that our earlier results hold, and often have slightly larger cumulative effects. For example, a 10% increase in average income increases donations in the following year by 6.7%, and the contemporaneous and lagged income variable are jointly highly significant (p-value of .009). The effect of changes in house prices remains significant, but the return of the state stock portfolio is no longer significant.

As discussed in Brown et al. (2012), it is especially important to control for lagged values when analyzing the effect of endowment shocks because university endowments typically follow payout policies that calculate payouts based upon lagged asset values. Thus endowment shocks can have lasting effects. Consistent with this, we find a significant relation between lagged endowment shocks and donations to the university, with the contemporaneous and lagged effects jointly being highly significant.

As before, when we separate donations into capital gifts (column (2)) versus current-use gifts (column (3)), we find that income, housing, and the stock returns of in-state companies are significant predictors of capital gifts, whereas the combined effect of contemporaneous and lagged endowment shocks is not significant. In contrast, when we focus on current-use gifts, the income variables remain jointly significant, but the effect of house prices and stock returns are not significant. As before, a large endowment shock affects the level of current-use donations.

Specifically, a negative endowment shock equal to 10% of a university's budget increases current-use donations by 0.17% in current year, and by an additional 0.31% in the subsequent year.

3.4 Asymmetric Effects of Endowment Shocks

In our prior work (Brown et al. 2012), we documented important asymmetries in how university endowment funds adjust payouts in response to positive versus negative endowment shocks. Specifically, we found that universities tend to closely follow their spending guidelines following positive shocks, but actively reduce their payouts below the level specified in their own payout guidelines following a negative shock.

In Table 5, we explore whether donations also respond asymmetrically to positive versus negative endowment shocks. In column (1), we do not find a significant effect between contemporaneous endowment shocks and total donations. However, when we control for lags in column (2), we find that lagged negative endowment shocks have a significant effect on university donations. Specifically, in the year after a university experiences a negative shock equal to 10% of one year's university budget, donations increase by nearly 1%. In contrast, donations do not respond to positive shocks, even with a lag, suggesting that individuals do not stop giving when the university experiences positive shocks, but that they do "step up" and assist following negative shocks. This finding has important implications for the question of whether endowment shocks "crowd out" endowment giving (e.g., Oster 2001). We find no evidence to suggest that positive shocks reduce giving, but there is some evidence that donors help to smooth the results of negative endowment shocks.

In columns (3)-(6), we again separately analyze capital gifts and current-use gifts (both with and without lags). Summarizing these four columns, we find that the effect of lagged negative endowment shocks on donations is concentrated in current-use gifts. It is not difficult to imagine the "sales pitch" that a university would make to donors in this case: "Last year, through no fault of our own, we suffered a large loss in our endowment. The endowment will be fine in the long-run (after markets recover), but in the meantime we have an urgent and immediate need for current-use donations so that we can continue to serve our students." This result suggests that donors provide a form of revenue insurance for universities.

4. Conclusions

The evidence presented in this paper suggests that donations to universities are strongly affected by macroeconomic factors through both supply and demand channels. On the supply side, donations increase when the economic resources available to donors – personal income, house values, and equity values – are higher. On the demand side, current-use donations respond to need: when a university suffers a negative endowment shock, donors respond by opening up their checkbooks and providing additional funds. Thus, when the economy as a whole suffers a negative shock (such as the global financial crisis or the Great Recession), these factors partially offset one another. As donors see their own resources dwindle, they are less likely to donate, consistent with charitable donations being a normal good. However, this effect is partially mitigated by the fact that donors appear to respond to the perceived need of the university.

Our findings have implications for the overall financial risk management of a university. Donations, payouts from endowments, tuition, state appropriations, and other income are all part of an overall revenue portfolio for the typical university. As with any portfolio management decision, it is important to consider the co-variances of the different components of the portfolio.

Donations positively co-vary with in-state income, home prices, and equity returns, and these same factors likely affect a university's ability to raise tuition revenue, obtain public funding, and so forth. As such, all else equal, a university ought to invest its endowment portfolio in such a way as to limit further correlations. This would involve, for example, under-weighting the stocks of in-state companies (and companies in other states from which their student body comes). Of course, it is unclear whether universities think of their endowments in this way. Dimmock (2012) shows that endowment asset allocation is significantly related to the standard deviations of revenues, but fails to find support for the hypothesis that endowment funds consider the correlations between endowment returns and other revenue sources. Our prior work (Brown et al. 2012) suggests that universities manage endowment payout rates so as to maintain the size of the endowment for its own sake, rather than changing payout rates to provide a form of insurance against bad economic outcomes.

Although the endowments themselves are not invested to provide revenue insurance, our evidence suggests that donors are willing to play that role. That is, they are willing to donate more for current use when the university is suffering from economic hard times. Unfortunately, the effectiveness of donors as a form of insurance is severely limited by the fact that the donors are themselves subject to the same macroeconomic shocks. For the sake of illustration, consider the coefficients estimated in column (1) of Table 2 combined with the median values for the 2008-2009 academic year. The direct effect of the median endowment shock in that year implies an increase in donations of 0.4%. However, this is more than offset by the decrease in personal income and housing prices as well as the negative returns to the state-stock portfolios, for a net decrease to donations of 2.6%.

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Figure 1: Total Donations to Total Costs

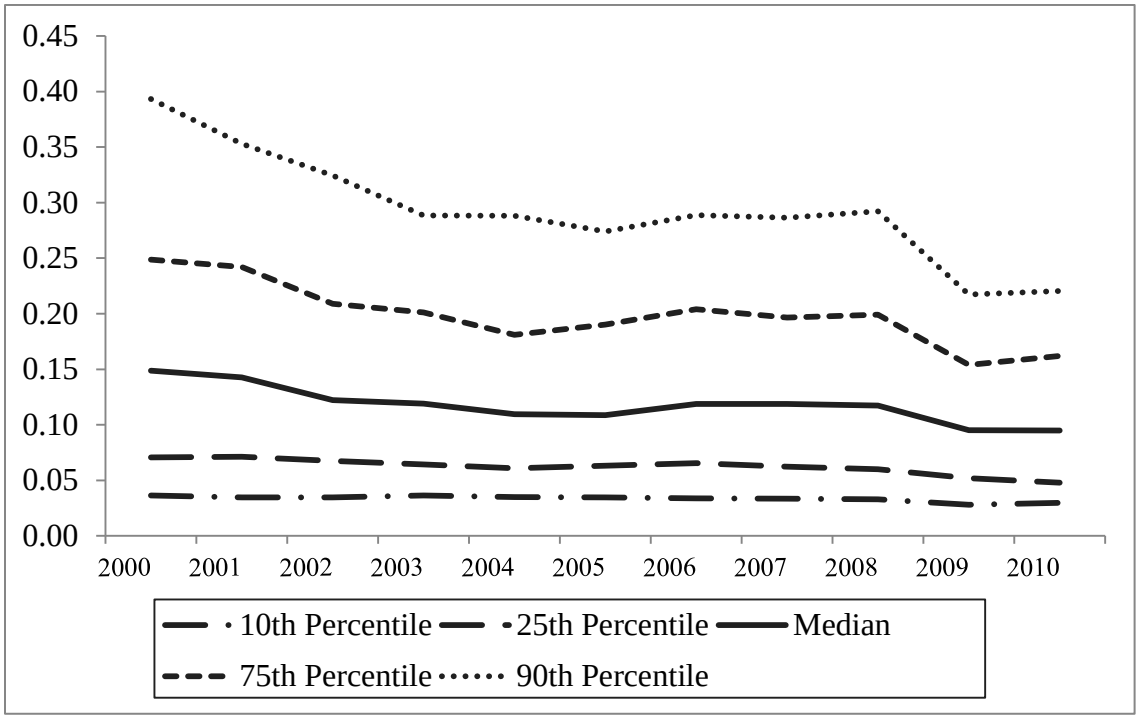

Table 1: Summary Statistics of Universities, Donations to Universities, and State Economic Conditions, 1997-2009

	Mean	Std Dev	10th	25th	Median	75th	90th
University-Size and Donation-to-University Measures							
Total University Costs ($M)	288.6	531.6	24.1	40.7	86.1	266.0	765.5
Endowment Assets (market value, $M)	451.9	1,758.8	17.5	36.5	91.6	280.0	840.9
Endowment-to-University-Cost Ratio	1.83	2.51	0.15	0.40	1.02	2.18	4.26
Total Donations to University ($M)	31.2	66.0	2.5	4.5	9.4	24.0	76.5
Total-Donations-to-University-Cost Ratio	0.15	0.14	0.03	0.06	0.11	0.20	0.31
Capital Donations to University ($M)	14.9	32.5	0.9	2.0	5.1	12.9	34.2
Current-Use Donations to University ($M)	16.3	36.4	1.1	1.9	4.0	10.4	43.0
Ratio of Capital Donations to Total Donations	0.51	0.20	0.24	0.37	0.52	0.66	0.76
Number of Individual Donors	12,372	17,323	1,823	3,475	6,268	13,214	30,791
Number of Individuals Solicited	61,724	81,600	9,821	16,183	29,949	70,507	159,019
Supply and Demand Factors for Donations to University							
% annual change in Income per Capita in the state	0.036	0.027	0.003	0.022	0.037	0.055	0.070
% annual change in House Price Index in the state	0.046	0.065	-0.030	0.022	0.046	0.075	0.120
Stock Return of firms in state (equal weight)	0.094	0.208	-0.193	-0.037	0.114	0.207	0.340
Stock Return of firms in state (value weight)	0.057	0.218	-0.243	-0.095	0.084	0.208	0.298
Return of University Endowment	0.062	0.122	-0.101	-0.019	0.084	0.156	0.195
Shock to University Endowment	0.123	0.505	-0.122	-0.008	0.041	0.179	0.457
State Government Appropriations to University ($M)	45.3	91.6	0.0	0.0	0.0	51.7	160.8
Ratio of State Appropriations to University Costs	0.12	0.18	0.0	0.0	0.0	0.27	0.40
% annual change in University Costs	0.053	0.101	-0.014	0.029	0.058	0.086	0.118
University is Private Institution?	0.65	0.48	0.0	0.0	1.0	1.0	1.0
University is Doctoral Institution?	0.29	0.46	0.0	0.0	0.0	1.0	1.0

Source: IPEDS. Year represents academic year (e.g., 2009 represents the 2008-09 academic year). "Shock to University Endowment" represents the product of the return on the endowment and the lagged endowment-to-university-cost ratio (i.e., the fall in endowment value attributed to returns normalized by last year's university budget).

Table 2: Determinants of Donations to Universities

	Ln(Donations to University in $), 1997-2009				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Ln(Income Per Capita in state)	0.52**	0.54**	0.51**	0.53**	0.51*
	(0.23)	(0.23)	(0.24)	(0.23)	(0.31)
Ln(House Price Index in state)	0.13**	0.13**	0.14**	0.11*	0.16**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)
Stock Return in state (equal weighted)	0.07*		0.07*	0.06*	0.07
	(0.04)		(0.04)	(0.04)	(0.05)
Stock Return in state (value weighted)		0.05*			
		(0.03)			
Shock to University Endowment	-0.020*	-0.019*	-0.020*		-0.034*
	(0.012)	(0.012)	(0.012)		(0.019)
Ln(State Population)			-0.07		
			(0.20)		
Return to University Endowment				0.02	
				(0.09)	
Ln(1 + State Appropriations to University)	0.002	0.002	0.002	0.003	0.007
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
Type of Universities Included in Regression	All	All	All	All	Doctoral
University Fixed Effects	Yes	Yes	Yes	Yes	Yes
University Type-by-Year-by-Private Fixed Effects	Yes	Yes	Yes	Yes	Yes
R-squared (within a university)	0.21	0.21	0.21	0.21	0.36
Number of Observations	6,661	6,661	6,661	6,869	2,108

See the Appendix for variable definitions. Standard errors, shown in parentheses, allow for correlations among observations of a given university over time as well as cross-sectional correlations.

***, **, * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 3: Regressions of Various Components of Donations to Universities, 1997-2009, (all dependent variables are in logarithms)

	Total Donations to University		***Capital Donations***		***Current-Use Donations***		***Number of Individual Donors***		***Number of Individuals Solicited***	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Ln(Income Per Capita in state)	0.52**	0.52**	0.66*	0.65*	0.37*	0.38*	0.17	0.17	0.04	0.06
	(0.23)	(0.23)	(0.38)	(0.38)	(0.22)	(0.22)	(0.18)	(0.18)	(0.23)	(0.22)
Ln(House Price Index in state)	0.13**	0.13**	0.21**	0.20**	0.07	0.07	0.16***	0.16***	0.08	0.05
	(0.06)	(0.06)	(0.10)	(0.10)	(0.06)	(0.06)	(0.04)	(0.04)	(0.06)	(0.06)
Stock Return in state (equal weighted)	0.07*	0.07*	0.10*	0.10*	0.04	0.04	0.05*	0.05*	0.01	0.01
	(0.04)	(0.04)	(0.06)	(0.06)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
Shock to University Endowment	-0.020*	-0.018	-0.021	-0.012	-0.024**	-0.024**	-0.001	-0.003	-0.007	0.016
	(0.012)	(0.012)	(0.020)	(0.020)	(0.011)	(0.012)	(0.009)	(0.009)	(0.012)	(0.011)
Ln(1 + State Approp. to University)	0.002	0.002	0.004	0.003	0.000	0.000	-0.004	-0.004	-0.003	-0.004
	(0.003)	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Ln(Lagged University Costs)		0.02		0.10**		-0.00		-0.02		0.36**
		(0.03)		(0.04)		(0.02)		(0.02)		(0.03)
University Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type-by-Year-by-Private Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within a university)	0.21	0.21	0.13	0.13	0.26	0.26	0.18	0.18	0.23	0.25
Number of Observations	6,661	6,661	6,646	6,646	6,660	6,660	6,592	6,592	6,534	6,534

See the Appendix for variable definitions. Standard errors, shown in parentheses, allow for correlations among observations of a given university over time as well as cross-sectional correlations.

***, **, * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 4: Regressions of Components of Donations to Universities Allowing for Response to Lagged Conditions, 1997-2009

	Total Donations to University	*Capital Donations*	*Current-Use Donations*	*Number of Individual Donors*	*Number of Individuals Solicited*
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Ln(Income Per Capita in state)	0.00	-0.28	0.18	-0.16	0.23
	(0.39)	(0.64)	(0.37)	(0.29)	(0.37)
Ln(Income Per Capita in state Lagged)	0.67*	1.10*	0.35	0.36	-0.33
	(0.39)	(0.64)	(0.37)	(0.30)	(0.38)
Ln(House Price Index in state)	0.22*	0.29	0.06	0.06	0.04
	(0.13)	(0.21)	(0.12)	(0.10)	(0.12)
Ln(House Price Index in state Lagged)	-0.10	-0.12	-0.01	0.13	0.06
	(0.12)	(0.20)	(0.12)	(0.09)	(0.12)
Stock Return in state (equal weighted)	0.08**	0.13**	0.04	0.07**	0.00
	(0.04)	(0.06)	(0.04)	(0.03)	(0.04)
Stock Return in state Lagged	-0.03	0.03	-0.04	0.02	0.03
	(0.04)	(0.06)	(0.04)	(0.03)	(0.04)
Shock to University Endowment	-0.015	-0.021	-0.017	0.004	-0.004
	(0.012)	(0.021)	(0.012)	(0.009)	(0.012)
Shock to Univ. Endowment Lagged	-0.034**	-0.018	-0.031**	-0.014	-0.022
	0.015)	(0.024)	0.014)	(0.011)	(0.014)
Ln(1 + State Approp. to University)	0.005	0.008	0.003	-0.004	-0.002
	(0.004)	(0.007)	(0.004)	(0.003)	(0.004)
Ln(1 + State Approp. to Univ. Lagged)	-0.004	-0.007	-0.004	0.001	-0.002
	(0.004)	(0.006)	(0.004)	(0.003)	(0.004)
p-value of joint test for:					
Income and Income Lagged	0.009***	0.049**	0.029**	0.302	0.687
House Price and House Lagged	0.061*	0.082*	0.332	0.000***	0.072*
Stock Return and Return Lagged	0.432	0.095*	0.951	0.034**	0.593
Shock and Shock Lagged	0.005***	0.173	0.004***	0.453	0.119
Approp. and Approp. Lagged	0.812	0.907	0.740	0.298	0.291
University Fixed Effects	Yes	Yes	Yes	Yes	Yes
Type-by-Year-by-Private Fixed Effects	Yes	Yes	Yes	Yes	Yes
R-squared (within a university)	0.22	0.13	0.27	0.19	0.24
Number of Observations	6,455	6,440	6,454	6,390	6,334

See the Appendix for variable definitions. All dependent variables are in logarithms. Standard errors, shown in parentheses, allow for correlations among observations of a given university over time as well as cross-sectional correlations.

***, **, * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 5: Relation Between Donations to University and Financial Shocks to the Endowment (broken into positive and negative shocks), 1997-2009

	Total Donations to University		*Capital Donations*		*Current-Use Donations*	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Shock Positive = Max(Shock, 0)	-0.016	-0.012	-0.038	-0.041	-0.013	-0.003
	(0.019)	(0.020)	(0.032)	(0.034)	(0.018)	(0.019)
Shock Positive Lagged		-0.011		-0.011		-0.018
		(0.020)		(0.033)		(0.019)
Shock Negative = Min(Shock, 0)	-0.025	-0.019	0.007	0.013	-0.040	-0.039
	(0.028)	(0.030)	(0.045)	(0.049)	(0.026)	(0.029)
Shock Negative Lagged		-0.098**		-0.030		-0.073*
		(0.041)		(0.068)		(0.039)
p-value of test Shock Positive+Shock Positive Lagged=0		0.358		0.216		0.386
p-value of test Shock Negative+Shock Negative Lag=0		0.015**		0.827		0.015**
Other contemporaneous RHS controls?	Yes	Yes	Yes	Yes	Yes	Yes
Other lagged RHS controls?	No	Yes	No	Yes	No	Yes
University Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Type-by-Year-by-Private Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within a university)	0.21	0.22	0.13	0.13	0.26	0.27
Number of Observations	6,661	6,455	6,646	6,440	6,660	6,454

See the Appendix for variable definitions. Dependent variables are in logarithms. "Shock" represents the product of the return on the endowment and the lagged endowment-to-university-cost ratio (i.e., the fall in endowment value attributed to returns normalized by last year's university costs). Standard errors, shown in parentheses, allow for correlations among observations of a given university over time as well as cross-sectional correlations.
***, **, * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Appendix Table 1: Variable Definitions

Variables	Data Source	Definition
Total University Costs	IPEDS	Total costs from the income statement
Endowment Assets	NACUBO/Commonfund	$ value of the endowment fund
Endowment-to-University-Cost Ratio		
Total Donations to University	VSE	$ donations to university
Total-Donations-to-University-Cost Ratio		
Capital Donations to University	VSE	$ capital donations to the university
Current-Use Donations to University	VSE	$ donations for current operations of university
Ratio of Capital Donations to Total Donations		
Number of Individual Donors	VSE	# of alumni, parents, faculty, students, and other individuals who donated
Number of Individuals Solicited	VSE	# of alumni, parents, faculty, students, and other individuals who were solicited for a donation
% annual change in Income per Capita in the state	FRED	Total personal income divided by population
% annual change in House Price Index in the state	FRED	House price index for state
Stock Return of firms in state (equal weight)	CRSP/COMPUSTAT	Equal weighted portfolio returns for the companies headquartered in the state
Stock Return of firms in state (value weight)	CRSP/COMPUSTAT	Value weighted portfolio returns for the companies headquartered in the state
Return of University Endowment	NACUBO/Commonfund	Return of the endowment portfolio
Shock to University Endowment	IPEDS/NACUBO	Endowment return multiplied by the lagged endowment-to-university-cost ratio
State Government Appropriations to University	IPEDS	$ government appropriations to the university
Ratio of State Appropriations to University Costs	IPEDS	
% annual change in University Costs	IPEDS	
University is Private Institution?	IPEDS	Indicates if the university is public or private
University is Doctoral Institution?	IPEDS	Carnegie classification is Doctoral