Crowding Out and Crowding In: Evidence from a Large Organization

Grant Gannaway
University of Chicago

Garth Heutel
Georgia State University and NBER

Michael Price
Georgia State University and NBER

November 2014
Preliminary Draft

Abstract

Using a dataset that includes every private donation made to the University of California, Los Angeles (UCLA) from 1938 to 2012, we test several hypotheses about how individual donors respond to large private and public grants. Donors may respond differently to government funding than to private grants. California residents, who fund UCLA through their taxes, may respond differently to government funding than non-residents. Our data show that large private grants crowd out smaller private donations to the same unit of the University. Government funding may crowd in private donations, and the magnitude of crowd-in is lower for California residents than for non-California residents.

I. Introduction

Public goods can be provided by governments or by private individuals or organizations. Nonprofit organizations and universities can receive both government and private funding. Private donors may change their donation levels in response to changes in government funding. A donor who is concerned only about the total funding of a charity will reduce his individual donation level when funding from the government increases; this is the classic crowd out effect. This crowding out effect may be tempered if donors experience a warm glow from their individual donation. Government or private grants may also signal charity quality and thus may crowd in private donations. Charities themselves may respond to grants by changing their level of fundraising effort.

Several studies have used laboratory evidence, observational data, and data from field experiments to identify these effects in the nonprofit sector. Andreoni (1993) finds in a laboratory setting that respondents exhibit crowding out behavior that is less than one-for-one, consistent with a warm glow model (Andreoni 1990). Kingma (1989) uses observational data from donations to public radio stations to show that donations are crowded out by public funds. Landry et al. (2010) conduct a field experiment to test whether giving a small gift has any effect on donations.

The purpose of this paper is to examine questions related to crowding out and crowding in of private donations by government grants and large private grants. We use a dataset that contains every donation in the nearly 100-year history of the University of California, Los Angeles (UCLA). We observe the date, amount, and targeted area within the university of each donation, and we observe some demographic information of the donor for many donations. We test whether donations respond to changes in government funding of UCLA or to receipt of large private donations. We test for different responses between California residents and non-California residents. We test for evidence of crowding in due to a signaling effect. We develop a model that generates several testable hypotheses that we bring to the data.

Our contribution lies in the use of this novel and exhaustive data set, which is proprietary and was accessed with participation from UCLA's advancement office. Previous studies have used relatively small datasets collected from laboratory or field experiments. Other studies have used large observational datasets that cover many nonprofits but with limited information about the different types of donations that each nonprofit earns (for instance, tax return data from nonprofits' form 990 filings are publicly accessible, see http://nccs.urban.org/). Our data only include one organization. However, we have an individual observation for each donation made to that organization. We can also observe what unit the donation was targeted to (e.g. the medical school, the athletics program). We observe the day of the donation, allowing us to examine time intervals shorter than one year.

We find that large, well-publicized private grants crowd out smaller private donations, in that donations to the unit within the university receiving the large private grant are reduced relative to donations to other units. Although are data on government funding are available only at the annual level, we find evidence that government funding may crowd in private donations. Furthermore, the magnitude of crowd-in is smaller for California residents than it is for non-California residents, consistent with our theoretical prediction.

II. Model

We consider how public and private grants to an organization affect a consumer's level of giving. We allow for the quality of the organization to be uncertain, and thus a grant may serve as a quality signal. We also allow for different organizations (or for different units within a organization), and for giving over time.

To begin, suppose there exists one representative consumer endowed with income y who is deciding over how much to donate to a single charity, d, and how much to spend on the composite consumption good, c. She also faces a tax imposed by a government, τ. Thus, the consumer's budget constraint is $y \geq c + d + \tau$.

The consumer has preferences over consumption and over the level of charitable activity, G. The quality of the charity is α; a higher value of α indicates a higher-quality charity. The consumer's utility is given by $U(c, G; \alpha)$. Assume that utility from consumption is separable from utility from the charity, as in Andreoni (2006): $U(c, G; \alpha) = u(c) + v(G, \alpha)$, with $u' > 0$, $u'' < 0$, $v_G > 0$, $v_{GG} < 0$, $v_\alpha > 0$, and $v_{G\alpha} > 0$. This last inequality ensures that the marginal utility of charitable activity is increasing in charity quality.

The consumer does not observe α but has a belief function μ that describes her assessment of the probability distribution of α. Suppose that α can take only one of two values: α_L or α_H, with $\alpha_L < \alpha_H$. Let μ denote the consumer's belief that $\alpha = \alpha_H$. The consumer maximizes expected utility: $u(c) + \mu v(G, \alpha_H) + (1-\mu)v(G, \alpha_L)$.

The total level of charitable activity G is determined by four sources: the consumer's voluntary contribution d, the consumer's tax payment τ (all of which is assumed to go directly to the charity), an exogenous level of public contributions g_{pub} (not including the consumer's tax payment), and an exogenous level of private contributions g_{priv}. Thus $G = d + \tau + g_{pub} + g_{priv}$.

The consumer does not directly observe α, but she does observe total private grants g_{priv} and total public grants $g_{pub} + \tau$. Her beliefs about charity quality may be determined by the level of public or private grants that she sees the charity receiving: $\mu = \mu(g_{pub} + \tau, g_{priv})$. Public and private grants may have differential signaling effects.[1]

The consumer's decision can be written as

$$\max_{d\geq 0} u(y-d-\tau)+\mu\left(g_{pub}+\tau, g_{priv}\right)\cdot v\left(\tau+d+g_{pub}+g_{priv},\alpha_H\right)$$
$$+\left(1-\mu\left(g_{pub}+\tau,g_{priv}\right)\right)\cdot v\left(\tau+d+g_{pub}+g_{priv},\alpha_L\right)$$

Assuming an interior solution, this yields a first-order condition of:

$$-u'(y-d-\tau)+\mu\left(g_{pub}+\tau, g_{priv}\right)\cdot v_G\left(\tau+d+g_{pub}+g_{priv},\alpha_H\right)$$
$$+\left(1-\mu\left(g_{pub}+\tau,g_{priv}\right)\right)\cdot v_G\left(\tau+d+g_{pub}+g_{priv},\alpha_L\right)=0$$

This first-order condition can be used for comparative statics. In particular, how does a change in the tax imposed on the consumer affect her donation? The implicit function theorem shows that

$$\frac{dd}{d\tau}=-1+\frac{d\mu}{d\tau}\cdot\frac{v_G(G,\alpha_H)-v_G(G,\alpha_L)}{-u''(c)-E[v_{GG}(G)]} \tag{1}$$

Here $E[v_{GG}(G)] = \mu v_{GG}(G, \alpha_H) + (1-\mu)v_{GG}(G, \alpha_L)$ is the expected value of the second derivative of the subutility from the charitable good. If a consumer's belief about charity quality is independent of the tax ($d\mu/d\tau = 0$), then this derivative is -1. In other words, absent any signaling effect, an increased government contribution to the charity is perfectly crowded out by a decreased private contribution. This result is originally found in Warr (1982) and Roberts (1984).

The remainder of the expression represents a signaling effect. It is of the same sign as $d\mu/d\tau$ (the denominator is positive from the concavity of u and v, and the numerator is positive

[1]The belief function $\mu(g_{pub} + \tau, g_{priv})$ is exogenous; for a more general treatment in which beliefs are derived from donors' actions in a Bayesian equilibrium see Heutel (2009).

from the assumption on the cross-partial derivative of v). If a higher level of government grants from τ signals to the consumer that the charity is more likely to be high quality, then the signaling effect will lead her to increase her contributions. The magnitude of this depends on parameters, including by how much the signal affects her beliefs. This positive signaling effect may or may not dominate the negative crowd-out effect.

The classic one-for-one crowd out result was replicated when the increase in government funding of the charity came directly from the consumer, via τ. Consider instead an increase in g_{pub}, the exogenous level of government grants (i.e. not funding coming directly from the consumer).

$$\frac{dd}{dg_{pub}} = \frac{E[v_{GG}(G)]}{-u''(c) - E[v_{GG}(G)]} + \frac{d\mu}{dg_{pub}} \cdot \frac{v_G(G, \alpha_H) - v_G(G, \alpha_L)}{-u''(c) - E[v_{GG}(G)]}$$

The second term (the signaling effect) is identical to the signaling effect in the previous expression, for $dd/d\tau$, since beliefs μ are affected by g_{pub} or by τ in the same way. The first term here again represents a crowding out effect, but it is not equal to –1. Instead, this term is strictly between –1 and 0. Thus, the crowding-out from this effect is less than one-for-one. Crowd out is only partial because the consumer does not believe that the increased governmental funding is coming from her. Thus, the increase in g_{pub} creates an income effect; the consumer is now effectively wealthier, and chooses to spend some of her additional wealth on private donation. An alternative way to write this derivative that accommodates this effect is

$$\frac{dd}{dg_{pub}} = -1 + \frac{u''(c)}{u''(c) + E[v_{GG}(G)]} + \frac{d\mu}{dg_{pub}} \cdot \frac{v_G(G, \alpha_H) - v_G(G, \alpha_L)}{-u''(c) - E[v_{GG}(G)]} \tag{2}$$

In this expression, the first term is the crowd-out effect, and it is one-for-one. The middle term is an income effect, it is positive but less than one. The final term is the signaling effect.

The distinction between $dd/d\tau$ and dd/dg_{pub} depends on this income effect. In practice, the relevant question is whether or not the increase in government funding is directly tied to a decrease in the consumer's wealth via a tax, and whether the consumer recognizes this. For instance, if a consumer learns that a charity's government grants increase, he may infer (perhaps correctly) that the increased funding came not from increased taxes but rather from a reallocation of government expenditures from something that he did not care for to something that he does. In this instance, the increased government funding will create an additional income effect that will not be present if the consumer infers that the increased government grant is being paid for by him.

The last comparative static result from this one-period, one-charity model is the effect on donations of a change in private grants:

$$\frac{dd}{dg_{priv}} = -1 + \frac{u''(c)}{u''(c) + E[v_{GG}(G)]} + \frac{d\mu}{dg_{priv}} \cdot \frac{v_G(G, \alpha_H) - v_G(G, \alpha_L)}{-u''(c) - E[v_{GG}(G)]} \tag{3}$$

The first term in this expression, representing the crowd out effect and the income effect, is identical to the analogous term in the expression for dd/dg_{pub}. The signaling effect differs only in that it depends on $d\mu/dg_{priv}$. Thus, if a consumer's beliefs are affected differentially by public vs. private grants, then these signaling effects may differ. For example, a consumer may hold more faith in a private foundation's assessment of a charity's quality than in the government's assessment, and thus the impact of g_{priv} on μ is greater than the effect of g_{pub} on μ.

Multiple Charities

Suppose now that there exist two charities, with total charitable output of G_1 and G_2, respectively. This can also be thought of as two units within an organization, for instance two colleges within a university. Donors are often asked to specify to which unit their donation is targeted. The consumer chooses among composite consumption c and donations to either charity d_1 and d_2. The consumer's knows how her tax payment is allocated across charities: $\tau = \tau_1 + \tau_2$. Public and private grants can go to either of the two charities: g_{pub1}, g_{pub2}, g_{priv1}, and g_{priv2}. Each charity can have one of two quality levels, α_H or α_L. The consumer's beliefs about quality may differ between the two charities. Assume that μ_1, the consumer's belief that charity 1 is high-quality, depends only on grants to charity 1: $\mu_1 = \mu_1(\tau_1 + g_{pub1}, g_{priv1})$. Similarly, $\mu_2 = \mu_2(\tau_2 + g_{pub2}, g_{priv2})$. The consumer's utility function is $u(c) + E[v(G_1)] + E[v(G_2)]$.

The consumer's problem is

$$\max_{d_1, d_2 \geq 0} u(y - d_1 - d_2 - \tau_1 - \tau_2)$$

$$+ \sum_{j=1}^{2} \mu_j(g_{pubj} + \tau_j, g_{privj}) \cdot v(\tau_j + d_j + g_{pubj} + g_{privj}, \alpha_H)$$

$$+ \left(1 - \mu_j(g_{pubj} + \tau_j, g_{privj})\right) \cdot v(\tau_j + d_j + g_{pubj} + g_{privj}, \alpha_L)$$

The consumer's first order condition for the choice of d_j, assuming an interior solution, is

$$-u'(y-d_1-d_2-\tau_1-\tau_2)+\mu_j(g_{pubj}+\tau_j,g_{privj})\cdot v_G(\tau_j+d_j+g_{pubj}+g_{privj},\alpha_H)$$
$$+\left(1-\mu_j(g_{pubj}+\tau_j,g_{privj})\right)\cdot v_G(\tau_j+d_j+g_{pubj}+g_{privj},\alpha_L)=0$$

We perform comparative statics using these first-order conditions. First consider the impact of a change in the consumer's tax revenue going towards charity 1.

$$\frac{dd_1}{d\tau_1}=-1+\frac{d\mu_1}{d\tau_1}\cdot\frac{(v_G(G_1,\alpha_H)-v_G(G_1,\alpha_L))\cdot(-u''(c)-E[v_{GG}(G_2)])}{D} \tag{4}$$

The denominator $D=u''(c)\cdot(E[v_{GG}(G_1)]+E[v_{GG}(G_2)])+E[v_{GG}(G_1)]\cdot E[v_{GG}(G_2)]$ is positive. The first term is the crowd-out effect, and it is again –1. The second term is the signaling effect. It is the same sign as $d\mu_1/d\tau_1$. As before, if increased government funding via τ_1 increases the consumer's belief that the charity is high quality, this effect increases her voluntary contributions.

What effect does a change in τ_1 have on d_2?

$$\frac{dd_2}{d\tau_1}=\frac{d\mu_1}{d\tau_1}\cdot\frac{(v_G(G_1,\alpha_H)-v_G(G_1,\alpha_L))\cdot u''(c)}{D} \tag{5}$$

There is no crowd-out effect, only a signaling effect. The signaling effect is of the opposite sign of $d\mu_1/d\tau_1$. If a higher government contribution via τ_1 signals higher quality, then the consumer will divert donations away from charity 2 and towards charity 1. With no signaling, a change in τ_1 has no effect on d_2.

The effect of an exogenous change in government grants to charity 1 on donations to charity 1 can be decomposed into three terms:

$$\frac{dd_1}{dg_{pub1}}=-1+\frac{u''(c)\cdot E[v_{GG}(G_2)]}{D}+\frac{d\mu_1}{dg_{pub1}}\cdot\frac{v_G(G_1,\alpha_H)-v_G(G_1,\alpha_L)}{D}\cdot u''(c)\cdot E[v_{GG}(G_2)] \tag{6}$$

These three terms are analogous to the three terms in dd/dg_{pub} in the one-charity case. The first term is the crowd-out effect (one-for-one); the second term is the income effect (positive and less than one); and the third term is the signaling effect (the same sign as $d\mu/dg_{pub1}$).

The effect on donations to the other charity is

$$\frac{dd_2}{dg_{pub1}} = \frac{u''(c) \cdot E[v_{GG}(G_1)]}{D} + \frac{d\mu_1}{dg_{pub1}} \cdot \frac{v_G(G_1, \alpha_H) - v_G(G_1, \alpha_L)}{D} \cdot u''(c)$$

(7)

This contains two effects: an income effect that is positive but less than one (almost identical to the income effect in the second term of the previous expression, but replacing G_2 with G_1), and a signaling effect that is of the opposite sign of $d\mu_1/dg_{pub1}$ (identical to the signaling effect in the expression for $dd_2/d\tau_1$).

The effects on d_1 and d_2 from a change in g_{priv1} are analogous to the two expressions above, except replacing $d\mu_1/dg_{pub1}$ with $d\mu_1/dg_{priv1}$. They differ if the consumer infers different information about charity quality from government vs. private grants.

Multiple Periods

Suppose now that there are two periods over which the consumer is choosing consumption and charitable donations, but once again there is only one charity. (In this section, subscripts refer to period, not to charity.) The consumer is endowed with income in each period y_1 and y_2, chooses consumption c_1 and c_2, pays taxes τ_1 and τ_2, and also chooses in the first period an amount of income to save, s, receiving a return $(1 + r)s$ in the second period. The consumer's two budget constraints are $y_1 \geq c_1 + \tau_1 + d_1 + s$ and $y_2 + (1+r)s \geq c_2 + \tau_2 + d_2$. Her discount factor is β. The consumer's belief about the quality of the charity is allowed to differ by period. Her belief in the first period μ_1 is a function of public and private grants in the first period: $\mu_1(g_{pub1} + \tau_1, g_{priv1})$. Her belief in the second period μ_2 is a function of grants in both the first and second period: $\mu_2(g_{pub1} + \tau_1, g_{priv1}, g_{pub2} + \tau_2, g_{priv2})$. Thus, the signal from the first period lasts into the second period and may inform the consumer's beliefs.

In the first period, the consumer observes g_{pub1} and g_{priv1} and chooses c_1, d_1, and s. Then, in the second period she observes g_{pub2} and g_{priv2} and chooses c_2 and d_2. Her choices in the first period depend on her beliefs in the first period about what the charity quality will be in the second period; assume that these beliefs are identical to her beliefs in the first period μ_1, since she does not yet observe the second-period signals. It follows that in the first period she makes a contingent choice of d_2, call it d_2', based on the signals available in the first period only. This contingent choice is then potentially revised in the second period, depending on the second period's signals.

The consumer's first-period problem is

$$\max_{d_1,d_2',s\geq 0} u(y_1 - d_1 - \tau_1 - s) + \mu_1\big(g_{pub1} + \tau_1, g_{priv1}\big) \cdot v\big(\tau_1 + d_1 + g_{pub1} + g_{priv1}, \alpha_H\big)$$
$$+ \Big(1 - \mu_1\big(g_{pub1} + \tau_1, g_{priv1}\big)\Big) \cdot v\big(\tau_1 + d_1 + g_{pub1} + g_{priv1}, \alpha_L\big) + \beta$$
$$\cdot \Big\{u(y_2 + (1+r)s - d_2{}' - \tau_2) + \mu_1\big(g_{pub1} + \tau_1, g_{priv1}\big)$$
$$\cdot v\big(\tau_2 + d_2{}' + g_{pub2} + g_{priv2}, \alpha_H\big) + \Big(1 - \mu_1\big(g_{pub1} + \tau_1, g_{priv1}\big)\Big)$$
$$\cdot v\big(\tau_2 + d_2{}' + g_{pub2} + g_{priv2}, \alpha_L\big)\Big\}$$

The contingent d_2' chosen from this problem is not necessarily the same as that chosen in the consumer's second-period problem, which is

$$\max_{d_2\geq 0} u(y_2 + (1+r)s - d_2 - \tau_2) + \mu_2\big(g_{pub1} + \tau_1, g_{priv1}, g_{pub2} + \tau_2, g_{priv2}\big)$$
$$\cdot v\big(\tau_2 + d_2 + g_{pub2} + g_{priv2}, \alpha_H\big)$$
$$+ \Big(1 - \mu_2\big(g_{pub1} + \tau_1, g_{priv1}, g_{pub2} + \tau_2, g_{priv2}\big)\Big)$$
$$\cdot v\big(\tau_2 + d_2 + g_{pub2} + g_{priv2}, \alpha_L\big)$$

This problem has four first-order conditions (one each for d_1, s, d_2', and d_2). We investigate the effect of a change in the exogenous level of first-period public funding, g_{pub1}, on donations in the first or second period.

First,

$$\frac{dd_1}{dg_{pub1}} = -1 + \frac{-(1+r)(2+r)\beta u''(c_1)u''(c_2') \cdot E_1[v_{GG}(G_2{}')]}{D} + \frac{d\mu_1}{dg_{pub1}} \cdot \frac{1}{D}$$
$$\cdot \{[v_G(G_1, \alpha_H) - v_G(G_1, \alpha_L)] \cdot [u''(c_1)u''(c_2')$$
$$+ E_1[v_{GG}(G_2{}')](u''(c_1) + (1+r)^2\beta u''(c_2')] + [v_G(G_2{}', \alpha_H) - v_G(G_2{}', \alpha_L)]$$
$$\cdot [-u''(c_1) \cdot u''(c_2') \cdot \beta(1+r)]\} \tag{8}$$

In this expression the denominator $D = -u''(c_1)u''(c_2{}')E_1[v_{GG}(G_1)] - E_1[v_{GG}(G_2)]((1+r)^2u''(c_1)u''(c_2{}')\beta + E_1[v_{GG}(G_1)](u''(c_1) + (1+r)^2u''(c_2{}')\beta)) > 0$. The variables c_2' and G_2' represent the values of consumption and of charitable activity in the second period based on the contingent choice of d_2', respectively.

The first term in the derivative above is the one-for-one crowd-out effect. The second term is the positive income effect. The rest of the expression is from signaling effects, which in this case has two components, one positive, one negative. The positive component (the part including $v_G(G_1, \alpha_H) - v_G(G_1, \alpha_L)$) arises if a higher level of government funding in period 1 signals a higher quality for the charity. However, this also brings about a negative component to the signaling effect (the part including $v_G(G_2', \alpha_H) - v_G(G_2', \alpha_L)$), since the same signal also affects the beliefs about the charity's quality in the second period. If, in period 1, the consumer believes that the charity will be high quality in period 2, then she will want, in period 1, to increase her period 2 giving, thus reducing period 1 giving.

Next,

$$\frac{dd_2}{dg_{pub1}} = \frac{-1}{u''(c_2) + E_2[v_{GG}(G_2)]} \cdot \left\{ -(1+r) \cdot u''(c_2) \cdot \frac{ds}{dg_{pub1}} + \frac{d\mu_2}{dg_{pub1}} \cdot [v_G(G_2, \alpha_H) - v_G(G_2, \alpha_L)] \right\} \tag{9}$$

The coefficient outside of the curly brackets is positive. The two terms inside the curly brackets represent an income effect and a signaling effect. The income effect depends on the sign of ds/dg_{pub1}. This is a comparative static result with a long expression not presented here. If it is positive, then a higher level of government grants in the first period leads to higher savings, and thus higher income in the second period. Some of that higher income will be spent on donations. The signaling effect is straightforward: if a higher g_{pub1} indicates a higher assessment of charity quality in period 2, then giving will increase.

Testable Hypotheses

The model generates the following hypotheses that we can test using our dataset on giving to UCLA. Each hypothesis is written as a null hypothesis to test; the model predicts that these null hypotheses will be rejected.

Null Hypothesis 1: The average response in private donations to government grants is equal to the average response in private donations to private, controlling for the size of the grant.

This hypothesis assumes that the signal that comes from a private grant is identical to a signal that comes from a government grant. If this hypothesis can be rejected, then consumers' beliefs about quality are differentially affected by private and public grants. That is, the last term in equation (2) is not equal to the last term in equation (3).

Null Hypothesis 2: The average response in private donations from California residents to changes in state funding for UCLA is equal to the average response in private donations from non-California residents to changes in state funding for UCLA, controlling for the size of the funding change.

This hypothesis assumes that consumers respond identically to a government grant if it is paid by their tax dollars or if it is paid exogenously. If this hypothesis can be rejected, then consumers react differentially to government funding based on whether the source of the funding is their own tax dollars or not. This means that the middle term (the income effect) of equation (2) is non-zero, and therefore equation (2) differs from equation (1).

Null Hypothesis 3: Consider two divisions of the University, A and B. The average response to a grant received by division A in private donations to division A is equal to the average response to a grant received by division A in private donations to division B.

This hypothesis assumes that a grant received by one division will have an equal effect on private donations to all divisions. If this hypothesis can be rejected, then consumers respond differentially to grants to different divisions, which could be either because of differential signals, because of the crowd-out effect not being present, or because of differential income effects. This amounts to equation (6) differing from equation (7).

Null Hypothesis 4: The average response in private donations in period t to a grant received in period t is identical to the average response in private donations in period t to a grant received in period t–1.

If this hypothesis can be rejected, then equations (8) and (9) are not equal to each other.

In our preliminary analysis so far, we will only be able to begin exploring there hypotheses. In particular, we will not yet be able to directly test hypothesis 1 – comparing the magnitude of crowd out or crowd in between government and private grants. However, we will be able to test the response to private donations at the individual donation level. We will be able to directly test hypothesis 2, albeit using our data on government funding only at the annual level.

III. Data

The dataset we use for this analysis contains the historical charitable donations to UCLA. Each observation is a donation, complete with details about the time, amount, and donor-specified location within the university that will receive the donation (such as "law school" or "medical school"). We combine the donations data with alumni data from UCLA that contains the state of residence, gender, and race of the donor, provided the donor is a UCLA alumnus. The donations data cover all gifts from 1938 to 2012. Each observation is a donation, including the donor's identification number (created by UCLA), the amount donated, and the unit within UCLA that will receive the donation. We combine that data with publicly available funding data from the State of California that records the annual government grants to the entire University of California system and to UCLA itself. Summary statistics are shown in Table 1. There were over 1.8 million total observations. We do not observe the donor's state of residence for 46% (863,635) of the donations, and we do not observe the donor's gender for 42% (796717) of the donations. Since no large donations were made before 1980, we will limit our donations data to after that year. Furthermore, the UCLA Alumni Association became fully operational in the late 1970's and started making significant fundraising efforts in the early 1980's. The second column of Table 1 shows the summary statistics for the limited data set. There were about 1.7 million donations since 1980, with mean and median donation sizes of $2029.749 and $88.439, respectively. The donations range in size from $.01 to $200 million, not inflation-adjusted. The third and fourth columns of Table 1 break the post-1980 data into categories based on donation size: donations less than $1000 are summarized in column 3, and donations above $1000 are summarized in column 4. The mean and median donation size for gifts under $1,000 are $141 and $80, while the mean and median for donations larger than $1,000 were $24,600 and $2,285.

Table 2 describes the destination of gifts within the university to the 24 different possible allocations. Each entry lists the number of gifts to that unit both above and below $1000.

The three largest donations in our data set ($200 million, $48.1 million, and $44.9 million) were all donated to the David Geffen School of Medicine. Two of these donations occurred in 2002 and the other in 1996. There were 4 other donations larger than $40 million. All of these donations received extensive media attention, and were widely publicized on the UCLA website. These donations exemplify donations that potentially cause crowd out or crowd in effects. For example, Mr. Geffen reported in an interview following his large donation that he hoped his donation would "inspire others"[2], clearly hoping for a crowd in effect. We will investigate the effect that large private gifts have on all other giving. Initially, we set the cutoff

[2]http://newsroom.ucla.edu/releases/David-Geffen-Donates-200-Million-3199

for large gifts at $10 million, but we find that our analysis is robust to $1 million and $5 million cutoffs instead. There were 33 gifts over $10 million in our data and 487 gifts over $1 million.

Figure 1 plots inflation-adjusted mean annual donation size since 1980. Figure 1 also plots the total number of donations each year to any unit within UCLA, indicating that the number of donations has decreased over time.

Government grants to UCLA have varied in size over time. We plot inflation-adjusted government grants to UCLA each year in figure 2. We also plot the ratio of government funding to UCLA over government funding to the entire UC system.

IV. Results

IV.A. Response to Large Private Donations

Donors essentially make three main decisions regarding their donations: how much to donate, how often to donate, and where to donate. Our first analysis uses donation quantity and frequency as outcome measures for two of these decisions. First, to avoid cross-contamination of different large gifts, we classify each donation as being within a certain time frame of the nearest large donation. We successively expand the time frame size, starting with whether or not the donation was within 1 month (before or after) a large gift, then 3 months, then 6, and finally within 12 months. Then, for each time frame, we assign the donation to either a "pre" or a "post" group, based on whether or not the donation was after the local large donation or before (all within the specified time frame). Depending on the time frame, some small donations are in the time frames of two different large gifts, and are classified as both before a large donation and after a different large donation. This prevents us from effectively measuring the impact of large donations that have overlapping time frames. To solve this problem, we only examine the impact of large donations whose time frames do not overlap with other large donations. For example, in the year 2000, there were 5 gifts over $10 million: two in March, one in July, one in September, and one in December. When looking at the one month time frame, donations given in August of 2000 fall into two large gift time frames – in the "post" group for the gift in July of 2000 and in the "pre" group for September of 2000. Therefore, we assume the gifts in August of 2000 were impacted by the large gift in July of 2000 and cannot be a valid "pre" group for the gift in September of 2000 since we need our "pre" group to be free from contamination from previous large gifts. For the 1 month time frame, we would only examine the impact of the large gift given in July of 2000. We examine increasing time windows to measure whether the crowd out or in effect wears off over time. This approach leaves 18 large donations in the one month window, 9 in the three month window, 6 in the six month window, and 4 in the twelve month window. We report the results for the 6 month time window here, but the results are robust to different time windows. The summary statistics for the observations used in the 6 month time window are shown in Table 3.

After we have narrowed our set of large donations, we assign the small donations within the time frame of a large donation to either a treatment group or a control group based on whether or not the smaller donations were given to the same unit as the local large donation. Now, we have classified each small donation based on 3 different categories: within the time frame of a large gift, within the time frame *and* before or after a large gift, and within the time frame *and* to the same unit as the large gift. These classifications form the basis for our first analysis.

We run a difference-in-differences specification for each of the outcome measures, in each of the four time frames, using only those donations that fall within the time frame of some large donation. The *post* variable indicates the donation was after the local large donation, the *treatment* variable indicates the donation was made to the same unit as the local large donation, and the *interaction* variable indicates the donation was made after the local large donation and to the same unit. The interaction term gives the coefficient of interest, as it reveals the change in the outcome measure for donations to the same unit as the local large donation before and after the large donation was made, relative to donations to other units. This provides a measure of the crowd out effect since it reveals the relative changes in donors' giving decisions before and after the local large donation. Results for the gifts under $1,000 are shown in Table 4.

We find that large private donations to a unit have a negative impact on the gift amount of gifts given to that unit. The first two columns in Table 4 show the coefficients in the above difference-in-differences specification with inflation-adjusted gift amount and log inflation-adjusted gift amount as the outcome variables respectively. The third and fourth columns of Table 4 add controls for gender, California residency, and state funding to UCLA. When we add controls, the coefficients on the interaction terms decrease but remain negative and significant. The interaction term in each regression is negative, implying that large private donations crowd out smaller private donations to the same unit relative to donations to that same unit prior to the large donation. As reported in Table 4, we find the decrease to be between $15 and $25, or about 4% and 12% of the donation amount.

Since the relevant question from UCLA's perspective is whether or not the crowding out actually decreases the donations to the unit that received the large gift, we provide Table 5, which estimates the impact on total donations received after large gifts. The data set we use in Table 5 is the donations data we use above collapsed to the unit-month level. In this data set, each observation is a unit within UCLA for each month in the data. We sum the donations received by each unit in the month, and then use this sum as the outcome variable in the difference- in-differences regression reported in Table 5. The coefficient of interest is the interaction term between the post indicator and the treatment indicator (which indicates whether or not the observation is for a month that occurred after the large gift-within the time window -and the observation is the same unit which received the large donation). This coefficient is the relative change in total donations received by a unit after a large donation to the unit, relative to units that did not receive a large donation. As Table 5 reports, the coefficient suggests a decrease in total donations received by over $3.3 million. These regressions do not include the actual large donation, so we can see that while the donations over $10 million crowd out roughly $3 million in other donations, the net change for the unit is at least positive $7 million. Thus, the unit net benefits from large donations, though our analysis suggests large donations made in secret might provide a larger benefit by eliminating the crowd out effect.

IV.B. Response to Changes in Government Grants by State of Residency

Since we only have annual data on government grants, we collapse our donations data to the annual level, recording (for California and non-California residents separately) the total number of gifts each year, the total dollar amount given each year, and the mean and median dollar amount given each year. We also include the variables on government grants each year (grants to UCLA and to the entire UC system).

We begin by examining the correlation between government grants and donation outcome measures for California and non-California residents separately. We use as outcome measures the total number of gifts each year, the total dollar amount given each year, and the mean and median dollar amount given each year. We regress the outcome measure on government grants to UCLA and then on the ratio of UCLA grants to total UC system grants first for California residents and then for non-California residents. Results are shown in Table 6. These coefficients suggest that the number of private donors each month decreases with the percentage of state funding to UCLA, with a less negative correlation for CA residents than for non-CA residents. The table also suggests a positive correlation between mean gift amount and state funding, with smaller correlation for CA residents. Column 3 of Table 6 indicates that a percentage point increase in state funding to UCLA correlates with a $64 increase in gift amount for CA residents and a $301 increase in gift amount for non-CA residents.

Next, we regress inflation adjusted gift amount on an indicator variable for California residency, the annual state funding ratio of UCLA grants to UC system grants, and an interaction between the two, to examine the impact of state funding on gift amounts for California residents and non-residents separately. Results are shown in Table 7.

The first column of Table 7 gives results identical to those in Table 6: a percentage point increase in state funding to UCLA is correlated with a $301 average increase in gift amount for non-CA residents, and a $64 increase in gift amount for CA residents. When we split the sample at the $1000 gift amount, we see that for gifts under $1000, the effect of increasing the percent of funding UCLA receives on gift amount vanishes for both groups. For gifts over $1000, however, the effect of increasing the percent of funding given to UCLA by one percentage point is $7119 for non-California residents, and $228 for California residents. The difference in correlation with state funding is likely because public grants act as a substitute for donations from CA residents, but as a complement to donations from non-CA residents.

Table 8 shows a specification that includes the state income tax rate and an interaction between it and the indicator for California residency. This table shows that for gifts under $1000, a percentage point increase in the state tax rate leads to a $0.85 increase in gift amount for non-CA residents, and a $5 increase for CA residents. This may suggest that donors do not view their tax payments as substitutes to charitable donations.

V. Conclusion

We have used a unique dataset with a great deal of detail about every donation made to UCLA to explore the determinants of private donations. In particular, we explore the extent to which government funding and/or large private grants may crowd out or crowd in private donations. Our theory describes several mechanisms by which funding can have positive (crowd in) or negative (crowd out) effects on other private donations. We test some of these testable hypotheses using our data. We find evidence of crowding out from large private donations and crowding in from government funding. The crowd-in effect is smaller for California residents than it is for non-California residents, consistent with our theory.

Our research is relevant to the literature examining crowd-in and crowd-out (Andreoni 1993, Landry et al. 2010). Uniquely, we use a dataset with observations at the individual donation level, rather than aggregated annual data at the organization level or smaller samples of collected data (e.g. from field experiments). The limitation is that our data is just from one organization. The advantage is that we have much richer information about the timing of donations and about the giver.

References

Andreoni, J. (1990). Impure altruism and donations to public goods: a theory of warm-glow giving. *The economic journal*, 464-477.

Andreoni, J. (1993). An experimental test of the public-goods crowding-out hypothesis. *The American Economic Review*, 1317-1327.

Andreoni, James. "Leadership Giving in Charitable Fund-raising." *Journal of Public Economic Theory* 8, no. 1 (2006): 1-22.

Heutel, Garth. "Crowding Out and Crowding In of Private Donations and Government Grants." *NBER Working Paper #15004*, 2009.

Kingma, B. R. (1989). An accurate measurement of the crowd-out effect, income effect, and price effect for charitable contributions. *The journal of political economy*, 1197-1207.

Landry, C. E., Lange, A., List, J., Price, M. K., & Rupp, N. G. (2010). Is a Donor in Hand Better Than Two in the Bush? Evidence from a Natural Field Experiment. *American Economic Review*, *100*(3), 958-83.

Roberts, Russell. "A Positive Model of Private Charity and Public Transfer." *Journal of Political Economy* 92, no. 1 (1984): 136-148.

Warr, Peter. "Pareto Optimal Redistribution and Private Charity." *Journal of Public Economics* 19, no. 1 (1982): 131-138.

Figure 1

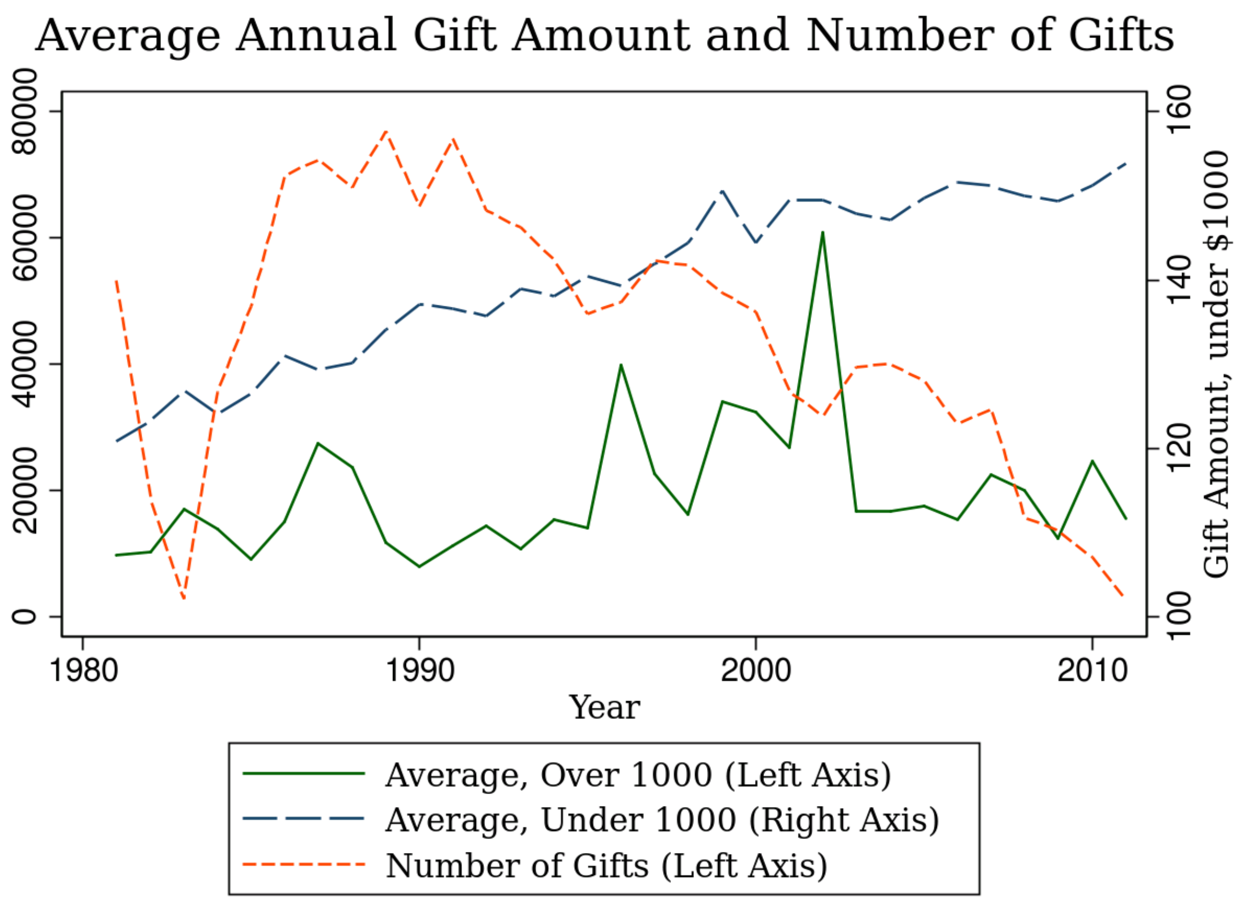
Average Annual Gift Amount and Number of Gifts
0
20000
40000
60000
80000
100
120
140
160
Gift Amount, under $1000
1980
1990
2000
2010
Year
Average, Over 1000 (Left Axis)
Average, Under 1000 (Right Axis)
Number of Gifts (Left Axis)

Figure 2

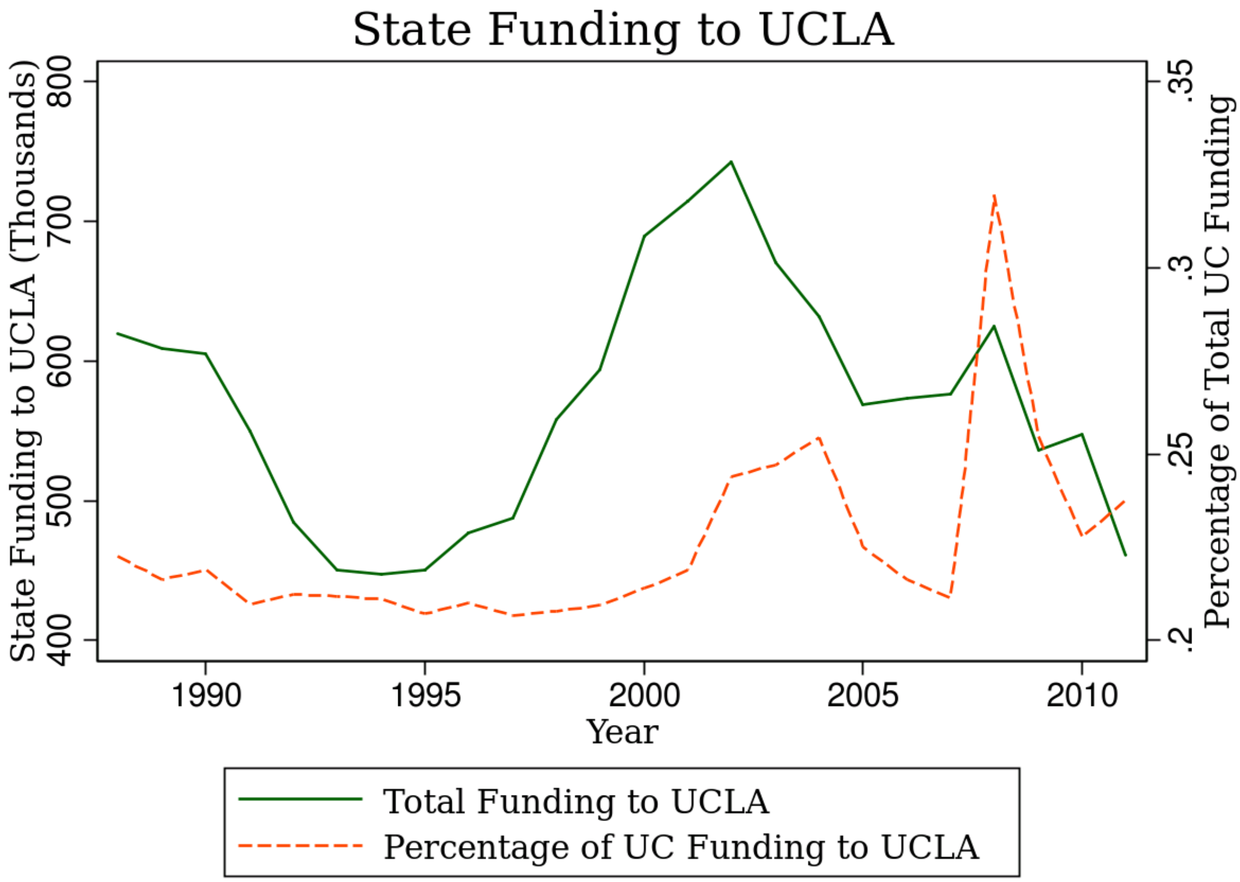
State Funding to UCLA
State Funding to UCLA (Thousands)
400
500
600
700
800
Percentage of Total UC Funding
.2
.25
.3
.35
1990
1995
2000
2005
2010
Year
Total Funding to UCLA
Percentage of UC Funding to UCLA

Table 1 – Summary Statistics

	All years	Post-1980	Post-1980, under $1000	Post-1980, Over $1000
Inflation-Adjusted Gift Amount				
Mean	1,950.74	2,029.75	140.77	24,600.00
Median	83.50	88.44	80.31	2,285.33
Standard Deviation	177,000.00	186,000.00	182.35	669,000.00
N	1,893,277	1,706,480	1,574,777	131,703
Male				
Mean	0.63	0.62	0.61	0.80
Median	1.00	1.00	1.00	1.00
Standard Deviation	0.48	0.48	0.49	0.40
N	1,096,560	1,007,746	942,998	64,748
CA Resident				
Mean	0.81	0.81	0.80	0.90
Median	1.00	1.00	1.00	1.00
Standard Deviation	0.39	0.39	0.40	0.30
N	1,029,642	960,681	898,895	61,786

Table 2 – Gift Count by Destination

Unit	Gifts below $1000	Gifts above $1000	Total	Percent below $1000	Percent above $1000
Anderson	64150	8575	72725	0.88	0.12
Arch & Urban Plan	3243	295	3538	0.92	0.08
Arts and Architecture	74737	13198	87935	0.85	0.15
Chancellor's Greatest Needs	717312	28950	746262	0.96	0.04
College of L&S	91812	11379	103191	0.89	0.11
David Geffen School of Medicine	329958	41113	371071	0.89	0.11
Dentistry	20156	2118	22274	0.90	0.10
Fielding SPH	15004	1352	16356	0.92	0.08
Fine Arts & Perf. Arts	1316	76	1392	0.95	0.05
GSEIS	43220	2972	46192	0.94	0.06
General Campus	80394	3119	83513	0.96	0.04
Graduate Program	852	71	923	0.92	0.08
Henry Samueli SEAS	37949	2714	40663	0.93	0.07
Independent Organized Units	1	1	2	0.50	0.50
Intercollegiate Athletics	113630	26110	139740	0.81	0.19
International Institute	425	129	554	0.77	0.23

Law	63749	7273	71022	0.90	0.10
Luskin SPA	5528	478	6006	0.92	0.08
Nursing	17815	602	18417	0.97	0.03
Other Health Sciences	0	1	1	0.00	1.00
Student Affairs	16363	1283	17646	0.93	0.07
TFT	10968	4230	15198	0.72	0.28
UCLA Extension	4635	404	5039	0.92	0.08
UCLA Library	19240	4377	23617	0.81	0.19
Total	1732457	160820	1893277	0.92	0.08

Table 3

Summary Statistics, 6 Month Time Window			
	All	Below 1000	Over 1000
Inflation-Adjusted Gift Amount			
Mean	2,186.34	146.06	24,300.00
Median	91.12	83.66	2,358.59
Standard Deviation	124,000.00	187.77	426,000.00
N	385,944	353,375	32,569
Male			
Mean	0.61	0.60	0.79
Median	1.00	1.00	1.00
Standard Deviation	0.49	0.49	0.41
N	230,639	214,349	16,290
CA Resident			
Mean	0.81	0.80	0.90
Median	1.00	1.00	1.00
Standard Deviation	0.39	0.40	0.29
N	224,106	208,307	15,799

Table 4

Inflation-Adjusted Gift Amount and Log Inflation-Adjusted Gift Amount, under $1000				
	Gift Amount	Log Gift Amount	Gift Amount	Log Gift Amount
Post	18.19***	0.0239***	14.71***	0.00153
	[0.688]	[0.00412]	[0.819]	[0.00493]
Same Unit	-12.39***	-0.242***	1.33	-0.125***
	[1.191]	[0.00713]	[2.161]	[0.0130]
Interaction	**-25.00*** **	**-0.119*** **	**-15.19*** **	**-0.0458** **
	[1.746]	**[0.0105]**	**[3.214]**	**[0.0193]**
Controls?	No	No	Yes	Yes
Observations	353,375	353,375	208,307	208,307

Notes: Each column represents a separate regression. Standard errors in brackets. *** p<0.01, **p<.05

Table 5

Unit Level Regression		
	Gift Amount	Inflation-Adjusted Gift Amount
Interaction	**-3,292,000*** **	**-3,347,000*** **
	[470,433]	**[447,704]**
Same Unit	6,430,000***	6,302,000***
	[332,528]	[316,462]
Post	17,591	10,925
	[109,771]	[104,468]
Observations	1,543	1,543

Notes: Each column represents a separate regression. Standard errors in brackets. *** p<0.01

Table 6

	Number of Givers		Total Gift Amount		Mean Gift Amount	
	CA	Non CA	CA	Non CA	CA	Non CA
Total Government Grants	41.37***	8.689***	118.8***	40.59***	0.00289***	0.00555***
	[0.0987]	[0.0689]	[0.256]	[0.158]	[7.60e-06]	[2.19e-05]
Percentage of State Funding to UC System	-182,045***	-328,101***	2.49e+6***	2.05e+6***	64.12***	301.2***
	[5,748]	[3,861]	[14,977]	[8,914]	[0.428]	[1.205]
Observations	706,359	168,672	706,359	168,672	706,359	168,672

Notes: Standard errors in brackets. Each cell represents a separate regression. The dependent variable is shown at the top of each column. The regressions for CA residents are shown in columns under "CA" and the regressions for non CA residents are shown in columns under "Non CA." The independent variable in each regression is shown in the row titles. *** $p<0.01$

Table 7

	Inflation Adjusted Gift Amount			Log of Inflation Adjusted Gift Amount		
	All	Under $1,000	Over $1,000	All	Under $1,000	Over $1,000
CA Resident	5,728**	21.06***	149,415***	0.123***	0.173***	0.531***
	[2,247]	[4.624]	[42,579]	[0.0355]	[0.0281]	[0.130]
Percentage of Total Funding to UC System	301.2***	-0.106	7,119***	-0.0197***	-0.0271***	0.0531***
	[89.57]	[0.184]	[1,772]	[0.00141]	[0.00112]	[0.00543]
Interaction	-237.0**	0.00506	-6,891***	0.00374**	-0.00473***	-0.0222***
	[98.90]	[0.204]	[1,857]	[0.00156]	[0.00124]	[0.00569]
Observations	875,031	817,176	57,855	875,031	817,176	57,855
R-squared	0	0.002	0	0.004	0.006	0.007

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 8

	Log Inflation Adjusted Gift Amount					
	Since 1980	Under 1000	Over 1000	Since 1980	Under 1000	Over 1000
CA Resident	0.0624	0.335***	0.353**	-0.0636**	0.0906***	-0.0674
	[0.0463]	[0.0365]	[0.176]	[0.0317]	[0.0251]	[0.126]
Percentage of UC System Funding	-0.0148***	-0.0214***	0.0470***			
	[0.00145]	[0.00114]	[0.00555]			
State Funding*Resident Interaction	0.00316**	-0.00245*	-0.0248***			
	[0.00160]	[0.00127]	[0.00582]			
State Tax Rate	-0.0848***	-0.0979***	0.117***	-0.0169***	-0.0338***	0.133***
	[0.00574]	[0.00450]	[0.0236]	[0.00484]	[0.00383]	[0.0201]
Tax*Resident Interaction	0.0126**	-0.0352***	0.0379	0.0431***	-0.00642	0.0148
	[0.00634]	[0.00500]	[0.0247]	[0.00534]	[0.00424]	[0.0211]
Observations	875,031	817,176	57,855	960,681	898,895	61,786

Standard errors in brackets. The coefficient on State Tax Rate is the effect of increasing the state tax rate by 1 percent on the outcome variable for non-CA residents, controlling for the percentage of state funding received by UCLA. To get the effect for CA residents, we add the coefficient on State Tax Rate to the coefficient for the Tax Interaction variable. *** p<0.01, ** p<0.05, * p<0.1