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Education's gambling problem: The impact of earmarking lottery revenues for education on charitable giving and government spending

Daniel Jones

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Centre for Market and Public Organisation
University of Bristol
2 Priory Road
Bristol BS8 1TX
http://www.bristol.ac.uk/cmpo/

Tel: (0117) 33 10952
Fax: (0117) 33 10705
E-mail: cmpo-admin@bristol.ac.uk

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Daniel Jones[1]

[1] University of South Carolina

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Address for correspondence
CMPO
University of Bristol
2 Priory Road
Bristol BS8 1TX
cmpo-admin@bristol.ac.uk
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* Darla Moore School of Business, Department of Economics.
Email: daniel.jones@moore.sc.edu. Website: http://www.pitt.edu/~dbj3.

1. Introduction

Over the past several decades, state governments in the United States have come to embrace lotteries as an alternative source of revenue. Lotteries have proven to be successful in this regard; on average, lotteries add nearly 500 million dollars to each states' budgets yearly.[1] While a handful of states add lottery revenue to their general funds, states typically earmark the revenue to support particular public goods. States adopt lotteries with the intention of funding causes as diverse as environmental protection, the arts, and support for their elderly, but most commonly lottery funds are earmarked for education. Twenty of the forty-three states that currently sponsor lotteries direct all of their revenues towards education, while several more dedicate at least some fraction to education. However, some existing research suggests that the purported beneficiaries of state lotteries rarely experience a significant increase in state government expenditures (Borg et al., 1991; Erekson et al., 2002; Spindler, 1995)[2].

Even if earmarked lottery revenues do not increase government's contribution to the intended public good, government is of course not the only source of funding for many public goods. In most cases, the causes supported by state lotteries also benefit from and rely on charitable contributions. This is especially true of education. In aggregate, education-related organizations consistently receive more donations than any other secular cause in the United States. Americans donated a total of 38.87 billion dollars towards education in 2011, which is roughly twice the amount of money that was raised through state lotteries in the same year.[3] An examination of government expenditures alone therefore does not capture the full impact that a lottery has on public good provision, as the lottery may also affect charitable contributions.

With this in mind, I examine the impact of the introduction of education lotteries on overall education funding, considering both government expenditures and – as the main focus of the paper – private donations. Standard models of public good provision suggest that if individuals' utilities depend at least in part on the overall level of the public good, then government spending

[1] Based on the 2008 *Survey of Government Finances*
[2] This literature is discussed in more detail in section 2.3.
[3] Giving USA, 2012

serves as a substitute for charitable contributions (Andreoni, 1989; Bergstrom et al., 1986). Thus, we should expect charitable contributions to decrease with an increase in government spending. Numerous empirical tests have generally found this to be the case, though in many cases the degree of crowd out is relatively small.[4] If donors respond to the *announced* increase in government funding associated with the introduction of a lottery, then this – combined with the fungibility of lottery revenue – may imply that lotteries lead to a *decrease* in total provision.

I assess the degree to which lottery revenue impacts donors' contributions using three individual-level surveys: *Center on Philanthropy Panel Study* (COPPS), *Giving and Volunteering Survey* (GVS), and *Consumer Expenditures Survey* (CES). Collectively, these surveys span from 1989 to 2008, so all of the analysis in the paper focuses on this time period. All of these surveys ask respondents to indicate how much money they have donated recently to a variety of causes, including education. In a difference-in-differences framework I compare the level of education-related donations before and after a state has introduced an education-funding lottery. I find a significant decrease in education giving when an education lottery is introduced.

I then address *why* contributions fall in this context and speak to a more general question in the literature on donors' response to government activity. Andreoni and Payne (2003), Andreoni and Payne (2011) show that the negative relationship between charitable contributions and government grants to nonprofits can in some cases almost entirely be explained by a decrease in fundraiser effort. Their results might suggest that donation decisions are in fact relatively unresponsive to the overall level of the public good. In this paper, I explore a different explanation for their result and for the small degree of crowd-out that is often observed in the literature: donors may be largely unaware of government activity in most settings. While this theoretical possibility has been discussed in the literature,[5] to my knowledge this is the first paper to empirically assess the importance of the salience of government spending.

[4] See Vesterlund (2006) for a review of the empirical crowd-out literature.
[5] In particular, both Garrett and Rhine (2010) and Monti (2010) point to higher awareness of government activity as a potentially important difference between direct government spending and spending through government grants. Monti presents a model demonstrating the impact that increased awareness may have on donations.

Unlike government spending in the form of grants to nonprofits, the intended increase in spending associated with the introduction of a lottery is highly publicized and the beneficiary is well known. States are eager to advertise that revenues go towards a "good cause," perhaps to overcome moral opposition to the lottery and draw in customers who might not otherwise gamble (Clotfelter & Cook, 1990); advertisements therefore typically include some reminder of the cause supported by lottery revenues (Clotfelter & Cook, 1991). Thus, state lotteries provide the opportunity to test whether donors (and not just fundraisers) respond to government activity in a setting where government spending is highly salient.

To determine whether donors or nonprofits drive crowd-out, I analyze the tax returns of a random sample of nonprofits in the same difference-in-differences framework. I find that an education lottery decreases donations received by education-related organizations by roughly 8%. This is not driven by a change in fundraising behavior. Moreover, there is a negative relationship between donations received and a proxy for a state's lottery advertising expenditures. This suggests that donors' response to (the perception of) increased spending is dependent on the salience of government activity.

A few empirical studies have examined the interaction of lottery expenditures and charitable giving; however, these studies primarily examine the general charitable activities of lottery players. In cross-sectional data, (Borg et al., 1991) report a negative relationship between charitable giving and lottery expenditures; they then provide some evidence that suggests that lottery players would have been contributing less even in the absence of a lottery. Lin and Wu (2007) find a positive relationship between charitable giving and government-sponsored lottery expenditures in Taiwan, where lottery revenues are used to support a variety of public goods.[6] However, in a follow-up paper also based on the Taiwanese lottery, Wu (2012) more fully accounts for selection bias and shows that there is in fact little relationship between the amount that lottery players spend on the lottery and the amount that they donate to charity. However, the question of whether the introduction of a lottery impacts charitable contributions more generally

[6] Devlin (2004) show that there is a positive relationship between charitable donations and participation in smaller scale *charity-sponsored* lottery fundraisers.

– and not just at the level of individuals who choose to play the lottery – has been neglected. [7] By focusing on the charitable expenditures of lottery players, these existing results can not speak to the potential for more general crowding-out of donations.

A related theoretical and experimental literature examines the use of lotteries and raffles as substitutes for relying on voluntary contributions. This literature suggests that a fixed-prize lottery can lead to higher public good provision than voluntary contributions (Lange et al., 2007; Morgan, 2000; Morgan & Sefton, 2000). However, these results do not hold for lotteries where the prize is a function of the number of tickets sold (pari-mutuel lotteries). State lotteries include both fixed prize and pari-mutuel components, so I do not claim to speak directly to this theoretical literature here. However, Morgan's model does highlight the idea that donors might view the lottery as an alternative method of contributing to education. If this is the case, a decrease in giving is not necessarily indicative of a decrease in private support for education. I consider this possibility empirically in a later section of this chapter.

The decrease in charitable support for education reported here exacerbates the redistributive concerns associated with lotteries, which are already known to be a highly regressive (albeit voluntary) tax (Grote and Matheson, 2011). In the United States, there is a significantly negative relationship both between (1) income and lottery expenditures (as a fraction of income) and (2) education and lottery expenditures (Clotfelter & Cook, 1991). Charitable giving, on the other hand, shows just the opposite patterns: (1) giving (as a fraction of income) increases with income for most of the range of incomes and (2) giving significantly increases with education (Andreoni, 2006). Thus, lotteries may decrease overall public good provision *and* shift the burden of financing a public good from high- to low-income individuals.

While researchers have examined a variety of issues related to state lotteries, the general impact of state lotteries as a means to finance public goods is not well understood. This paper fills this gap by examining not just government activity but also the impact of lotteries on charitable

[7] One very recent exception is Andreoni, Payne, and Smith's (2013) analysis of donations received by charitable organizations selected to receive funds from the UK National Lottery. They find that, for small organizations, receiving lottery funds actually increases the donations an organization receives. This result is discussed in greater detail in my concluding remarks.

expenditures. In doing so, the results also contribute to the more general literature on the interaction of government activity and charitable giving. Recent work in this area has generally found that crowd-out is largely explained by fundraiser behavior. The results presented here point to the importance of salience of government activity; when donors are more aware of government activity, their behavior is more in line with the crowd-out predicted by classic models of voluntary contributions to public goods.

2. Additional background: Lottery and charitable support for education

Before proceeding to the analysis, some additional detail on state lottery and charitable support for education will help fix ideas. In particular, the degree to which we might expect donors to reduce their contributions depends in part on their perception of the overlap between the causes they support and the specific causes supported by the lottery. Thus, despite the fact that most of the analysis will center on the impact of lotteries on education spending and giving in general (in part because I am unable to decompose education giving any further in the donor-level data), here I discuss which particular causes within education tend to benefit from each source of funding.

As noted, education is typically the most popular secular category of giving in the United States, second only to religious giving. In 2011, 38.87 billion dollars and 13% of all charitable donations went to education-related causes. This figure – and the "education giving" discussed throughout – includes donations to a wide array of education-related organizations: "*giving to the education subsector includes giving to schools; non-profit and public colleges and universities; vocational and technical schools; education programs; tutoring programs; and student services organizations.*"[8] However, a majority of donations to education (roughly 78% in 2011) support public and private higher education (including scholarship and financial aid programs). There is a fairly even split between

[8] Source: *Giving USA 2012* report

support for public and private institutions: in 2011, private institutions received 55% of donations to higher education, while public institutions received 45% of donations.[9]

Table 1: Education lotteries introduced during sample period

State	Education lottery established	Specific beneficiary**
Georgia	1993	Higher ed. scholarships (public & private schools), funding for pre-K programs
Missouri	1993*	Programs at all levels of public education
New Mexico	1996	Higher ed. scholarships (public universities / community colleges)
Texas	1997*	Public K-12
Vermont	1998*	"Education fund"
Virginia	2000*	Public K-12
Washington	2001*	Higher ed. scholarships/fin. aid (public & private schools), low-income pre-K programs
South Carolina	2002	All levels of education, scholarships/fin. aid for public & private universities
Tennessee	2004	Higher ed. scholarships (public & private), pre-K and after-school programs
Kentucky	2005*	Higher ed. scholarships (public & private), early childhood literacy programs
Oklahoma	2005	Public K-12, Higher ed. grants / loans / scholarships, Other higher ed. programs
North Carolina	2006	Public K-12, Higher ed. scholarships / financial aid, and pre-K programs

* These states already had a lottery (with revenues going towards a different cause or a general fund) but switched to earmarking funds only for education in the year indicated.
** Information on specific beneficiaries is obtained from state lottery websites and is current as of early 2013.

So while a broad array of causes fall under the umbrella of "support for education," the main beneficiaries are public and private institutions of higher education. We will see that this is generally true of education lotteries introduced during the sample period as well. In the difference-in-differences framework employed in this paper, the impact of an education lottery is identified by changes that occur in states that introduce a lottery at some point during the sample period. The main donor-level data I use spans from 1989 to 2008 so I focus on this time period throughout. The states that introduced education lotteries during these years and the specific

[9] Source: Council for Aid to Education Annual Survey (2012)

causes that they currently support are listed in Table 1.[10]

Like private charitable support for education, a majority of these lotteries are currently designed – at least in part – to fund higher education. Many of these lotteries were accompanied by the introduction of large-scale, state-run, lottery-funded scholarship programs.[11] Many of the lottery programs also support programs outside of higher education that often fall within the private nonprofit sector, such as literacy programs and pre-kindergarten programs for low-income children.

3. General empirical strategy

Throughout the paper, I employ a difference-in-differences (DID) approach to identify the impact of an education lottery on government finances (Section 3), donors' contributions (Section 4), and donations received by nonprofits (Section 5). The generic empirical specification employed throughout is:

$$y_{ist} = \alpha + edulot_{ist} + X_{ist} + [state\ FE's]_s + [year\ FE's]_t$$

where y_{ist} is the outcome variable of interest and X_{ist} is a vector of individual-level covariates. More importantly, "$edulot_{ist}$" is an indicator variable equal to one if observation *i* is in a state (*s*) that, at that point in time (*t*), sponsors an education-funding lottery.[12] Throughout, standard errors are adjusted to allow for clustering at the state-level. As noted in the previous section, the identification of an effect of introducing an education lottery stems from changes that occurred within the twelve states listed in Table 1.

[10] A comprehensive historical listing of specific beneficiaries is not available. All lotteries listed have supported *some* education-related cause(s) since the date indicated. Some states (like South Carolina) adjust the specific composition of their beneficiaries on a year-to-year basis.

[11] Georgia's HOPE Scholarship is a prominent example and seems to have served as a model for several states that followed.

[12] An "education-funding lottery" is defined here as a lottery that is introduced solely for the purpose of funding education. Some states defined here as education lotteries use a small fraction of their revenues for other causes, but only after achieving a certain threshold of funding for education. Thus, more precisely, an education lottery is defined here as a lottery for which the entire first dollar of revenue is earmarked for education.

There is some unavoidable imprecision in defining when the education lottery "treatment" begins in some cases. It is unclear, for instance, whether we should expect a lottery introduced in November of 2005 to generate observable changes in donations or government spending during the entire 2005 calendar year. Thus, a lottery that is introduced in the second half of the year (after June 30) is coded as beginning in the following year. Similarly, data from nonprofit tax returns and government finances are reported by fiscal year rather than calendar year. Thus, data from states or nonprofits with fiscal years ending in the first half of the calendar year (prior to June 30) is interpreted as data from the preceding year, which is the year during which the majority of the relevant activity took place.

One potential concern with the difference-in-differences approach is that states may introduce education lotteries in response to a decrease in the availability of education funding from either private or public sources. This would violate the assumption of parallel pre-treatment trends across treatment and control states. However, factors that are unrelated to education financing (e.g., within-state religiosity, the adoption of a lottery in a neighboring state) have been shown to be more important predictors of lottery adoption than fiscal crises (Coughlin et al., 2006), particularly in lotteries introduced after the 1970s (Alm et al., 1993). Additionally, in the next section I offer evidence that lottery states do not experience drops in revenue or increases in education expenditures in the years preceding to the adoption of a lottery.

4. State lotteries & government finances

In this section, I examine the impact of the introduction of an education-funding lottery on state expenditures and revenues. The main focus of the paper is the analysis of charitable donations (Sections 5 and 6). This section is included both as an introduction to the lottery "treatment" (as it is implemented by government) and to allow for considerations of the impact of a lottery on *overall* education funding, accounting for both charitable donations and government spending.

4.1 Existing literature on fungibility of earmarked lottery revenue

If education lotteries crowd out charitable donations to education without an accompanying increase in state expenditures, then the true impact of an education lottery is a reduction in overall education funding. As noted, a handful of studies have examined the extent to which earmarked lottery revenue increases government expenditures for the intended beneficiary. While all of the papers in this literature find at least some evidence of fungibility, the degree of fungibility varies widely across studies.

Novarro (2005) and Evans and Zhang (2007) find that, conditional on sponsoring a lottery, an additional dollar of lottery proceeds intended for education does increase K-12 education expenditure, but by significantly less than a dollar. For instance, Evans & Zhang estimate that a dollar of lottery proceeds generates $0.50-$0.70 of education spending. Garrett (2001), Spindler (1995) find that earmarked lottery spending is completely offset by decreases in spending from other revenue sources so that total spending does not change. Borg et al. (1991), Erekson et al. (2002) find that earmarking lottery revenues actually *decreases* total spending on education.
However, some of these studies either compare state expenditures for just one state (or a handful of states) before and after a lottery (Garrett, 2001; Spindler, 1995) or, alternatively, for all 50 states but within just one year in a cross-section (Borg et al., 1991; Erekson et al., 2002). It is difficult to determine whether the effect (or lack of effect) of the lottery is causal. Novarro (2005) and Evans & Zhang (2007) are exceptions to this as they construct panels of all fifty states and employ state fixed effects; however, both focus is on dollar-for-dollar changes in spending conditional on sponsoring a lottery rather than the total average change in spending after the introduction of a lottery. Some of Novarro's results at least seem to suggest that there is little *overall* change in spending. More importantly, both Novarro (2005) and Evans & Zhang (2007) study a different outcome variable (elementary education spending) and an earlier time period (1976-2000) than the present research. Thus, before proceeding to the analysis of charitable contributions, I begin by assessing the impact of education lotteries on government finances in a panel of all 50 states during the time period studied in the remainder of the paper (1989-2008).

4.2 Data & empirical approach

I use data from the Census Bureau's *Survey of Government Finances*. The *Survey* provides a yearly account of states' expenditures and revenues, broken into detailed categories. From this data, I construct a panel of all fifty states from 1989 through 2008 where each observation represents a particular state-year combination. I follow the difference-in-differences framework discussed in Section 3 and estimate fixed-effects regressions, with fixed-effects at the state level. The dummy variable "Edulot," indicating that the state operates an education-funding lottery, is of primary interest. I examine the impact of being treated on several revenue and expenditure measures; all outcome variables are in logs and measured at a per capita level. All specifications in this subsection include controls for available time-varying state-level variables that may impact state revenues and expenditures: log of population, log of per capita income, a dummy for the presence of a non-education lottery, and (when revenue is not an outcome variable) log of non-lottery revenue.

4.3 Results

The impact of an education lottery is reported in Table 2, with each column taking a different measure of revenue (columns 1-3) or expenditure (columns 4 & 5) as the dependent variable. Education lotteries are successful in increasing state revenue: overall revenue increases by roughly 3% with the introduction of a state lottery (column 1); non-tax revenue (which still includes lottery revenue) increases by 7% (column 2). One might be concerned that states introduce new taxes in the same year that they introduce a lottery as part of a broader funding initiative; this would be problematic for our interpretation of the cause of crowded-out charitable contributions in future sections. However, we see in column 3 that this is not the case.

We now turn to the impact of lotteries on expenditure. Most importantly, we see that the introduction of an education lottery does not significantly increase education spending (column 4). The introduction of an education lottery *is* associated with an increase in non-education related spending (column 5). Non-education spending is defined here as total spending minus education related spending. The model predicts that non-education spending increases by 5.6%.[13]

[13] The main results from Table 2 are robust to the inclusion of additional time-varying controls and the inclusion of pre-treatment and post-treatment trends. See Appendix Table A1.

Table 2: DID estimates of state revenue and expenditure response to education lottery (FE-Reg.)

VARIABLES	(1) Revenue	(2) Non-tax revenue	(3) Tax revenue	(4) Education expenditure	(5) Non-education expenditure
Edulot	0.0302*	0.0692**	-0.0235	-0.00932	0.0561**
	(0.0159)	(0.0265)	(0.0251)	(0.0312)	(0.0230)
Population	-0.402***	-0.426***	-0.359***	-0.214**	-0.179
	(0.0714)	(0.156)	(0.0985)	(0.106)	(0.191)
Income per capita	0.975***	0.657***	1.514***	0.581**	0.493***
	(0.192)	(0.241)	(0.304)	(0.226)	(0.166)
Non-educ. lot.	-0.00509	0.0210	-0.0393	-0.0460	0.0292
	(0.0236)	(0.0325)	(0.0371)	(0.0412)	(0.0259)
Other revenue				0.224***	0.258***
				(0.0759)	(0.0598)
Constant	4.174***	11.71***	1.236	1.077	1.449
	(1.311)	(2.489)	(1.774)	(1.744)	(2.875)
State FE's	X	X	X	X	X
Year FE's	X	X	X	X	X
Observations	950	950	950	950	950
R-squared	0.962	0.936	0.934	0.953	0.978

Robust standard errors (clustered at the state-level) in parentheses.
All continous controls and outcome variables are in logs and measured at the per-capita level.
*** p<0.01, ** p<0.05, * p<0.1

Relative to the existing literature, these empirical specifications are closest to those of Novarro (2005) and Evans & Zhang (2007), in the sense that they assess the impact of earmarking in a panel with state fixed effects. Both of their papers find that, while there is evidence of fungibility, there is *some* positive relationship between lottery revenue and education spending. Thus, while charitable donations are the main focus of this paper, the fact that I observe no increase in government education expenditure warrants a brief comment. First, both of their papers take elementary (K-12) education expenditures as the dependent variable and focus on an earlier time period (1976-2000). If I restrict my analysis to elementary education spending and shift my analysis to the years they cover (reported in Appendix Table A2), I too find a positive impact of an education lottery. However, this still fails to generate a significant increase in overall education expenditures. Thus, the extreme fungibility observed here may be a more recent phenomenon.

Table 3: State expenditure response to education lottery – other expenditure categories (FE-Reg.)

Expenditure category	Mean per capita spending (2008 dollars)	Treatment effect (Edulot)	Expenditure category	Mean per capita spending (2008 dollars)	Treatment effect (Edulot)
Elem. educ.	*$905.76*	-0.0574	Public safety	*$187.76*	-0.00468
	(302.33)	(0.0578)		*(73.81)*	(0.0560)
Higher educ.	*$607.94*	0.0208	Health	*$177.23*	-0.0312
	(168.52)	(0.0355)		*(86.14)*	(0.0695)
Public welfare	*$1077.62*	0.0715	Hospitals	*$152.37*	0.0741
	(387.78)	(0.0508)		*(97.84)*	(0.158)
Govt. salaries	*$864.53*	0.0122	Interest on debt	*$174.51*	0.0661
	(451.90)	(0.0402)		*(142.83)*	(0.100)
Insurance trust	*$527.19*	0.130**	Utilities	*$38.12*	-0.380
	(245.12)	(0.0626)		*(93.71)*	(0.227)
Highways	*$418.10*	-0.00516	Financial admin.	*$83.73*	0.227*
	(206.58)	(0.0452)		*(50.00)*	(0.120)

What non-education expenditure areas *are* benefitting from lottery revenue? In Table 3, the empirical specification employed in Model 4 of Table 2 is repeated but with the top ten (non-education) expenditure categories as dependent variables. I also report the predicted impact of the lottery on higher and K-12 education expenditures separately. The introduction of an education lottery has the most impact on insurance trust expenditures [14] and financial administration[15], both of which significantly increase by more than 10%.

In Table 4, I assess the parallel trends assumption necessary for the difference-in-differences approach and also examine changes in revenue and education expenditure over time more generally. I regress expenditures and revenues on a dummy indicating that an education lottery is in place ("Edulot"), but I also include a dummy set to one 2 years prior to the introduction of a lottery ("Edulot – 2 years") and a dummy set to one 2 years after a lottery ("Edulot + 2 years"). Included (but not displayed) are the same controls included in preceding specifications (population, income per capita, presence of a non-education lottery, state fixed effects, year fixed effects, and – in Models 3-5 only – non-lottery revenue.)

[14] Defined by the Census Bureau as "Cash payments to beneficiaries (including withdrawals of retirement contributions) of employee retirement, unemployment compensation, workers' compensation, and disability benefit social insurance programs." Though not displayed here, I can demonstrate that this result is not entirely driven by employees' retirements – which would include teacher pensions.

[15] Defined by the Census Bureau as "Activities involving finance and taxation. Includes central agencies for accounting, auditing, and budgeting; the supervision of local government finances; tax administration; collection, custody, and disbursement of funds; administration of employee- retirement systems; debt and investment administration; and the like."

The variable "Edulot – 2 years" is included to test whether there is a change in government revenue or education expenditures in the years leading up to the adoption of a lottery, which – as noted in the previous section – might impact our interpretation of the "treatment effect" associated with the introduction of a lottery, both here and in the remainder of the paper. However, we see that there is no significant difference between soon-to-be-treated and untreated states with respect to revenue (Models 1-2), education expenditures (Model 3), or either of the non-education expenditure categories that appear to benefit most from education lotteries (Models 4-5).

It is possible that it takes time for lottery revenues to be funneled into education spending. If this were the explanation for the absence of an increase in education expenditures, we would expect a significant and positive coefficient on "Edulot + 2 years." This is not observed (Model 3).

Table 4: Robustness test - State revenue and expenditure response to education lottery in years preceding and following treatment

VARIABLES	(1) Revenue	(2) Non-tax revenue	(3) Education expenditure	(4) Insurance trust expenditure	(5) Financial admin. expenditure
Edulot – 2 years	-0.00811	-0.00293	-0.0139	0.0136	0.0108
	(0.0268)	(0.0424)	(0.0195)	(0.0388)	(0.0892)
Edulot	0.0245	0.0519*	-0.00265	0.0714	0.251***
	(0.0175)	(0.0282)	(0.0170)	(0.0484)	(0.0645)
Edulot + 2 years	0.0198	0.0331	0.00623	0.0825*	-0.0546
	(0.0176)	(0.0206)	(0.0154)	(0.0481)	(0.0831)
Observations	950	950	950	950	950
R-squared	0.962	0.937	0.953	0.931	0.881

Robust standard errors (clustered at the state-level) in parentheses.
All outcome variables are in logs and measured at the per-capita level.
Specifications include additional controls included (but not displayed) as noted in the text.
*** p<0.01, ** p<0.05, * p<0.1

Of course, a related concern – particularly given the focus on donations in this paper – is that a lottery is introduced because private support for education (donations) is falling. However, using an empirical specification and data that will be discussed in more detail in Section 6, this does not appear to be the case (Appendix Table A3). There are no observable differences in donations to education across treated and untreated states two years prior to treatment.

To summarize, education lotteries significantly increase revenue but fail to significantly increase education expenditures for education lotteries introduced between 1989 and 2008. This is consistent with most of the existing literature on the fungibility of earmarked lottery revenues. Thus, overall funding available for education hinges on the impact of an education lottery on private donations to education-related causes, which we examine next.

5. Donor response to education lottery revenue

5.1 Data & empirical approach

How do donors respond to the introduction of an education lottery? To begin to answer this question, I analyze responses from three individual-level surveys: the Giving and Volunteering in the United States Survey (GVS), the Center on Philanthropy Panel Study (COPPS), and the Consumer Expenditure Survey (CES). All three of these surveys ask respondents to indicate how much they have donated to a variety of causes, including education.

GVS and COPPS were designed to gather information about individuals' charitable activities and are two of the most widely used sources of data on the topic. Both surveys ask detailed questions about the amount donated to various charitable causes such as education, health, public services, etc., in addition to more basic demographic information. COPPS follows a panel of individuals between 2001 and 2009 (with surveys every two years). GVS is not a panel, but I have constructed a repeated cross-section of surveys between 1990 and 1999 (again, with waves every two years – until 1996, when the next wave was not administered until 1999). In both surveys, participants are asked about their charitable giving in the preceding calendar year, so collectively GVS and COPPS provide results for the years 1989 through 2008.

The COPPS data is preferable as it is a panel and allows for individual fixed effects, thereby controlling for unobserved differences in altruism. However, given that identification in the difference-in-differences framework stems from a state establishing an education lottery within 2001 to 2009, one might be concerned that the results are driven by something specific about this handful of states. Thus, the GVS data is included to further support the robustness of the results

by providing additional observations during a different decade with different states introducing education lotteries.

The Consumer Expenditure Survey (CES) – which follows respondents for four quarters and rotates in a new wave of respondents each quarter – is of course not primarily designed to address charitable giving. However, the survey does ask respondents to indicate how much they give to charitable organizations (which they define as organizations "such as United Way, Red Cross, etc."), religious organizations, political organizations, and education organizations. Moreover, since 2001 the survey has asked respondents to indicate how much they spend on "Lotteries and games of chance." Neither GVS nor COPPS ask participants to indicate their lottery expenditures. Thus, CES (from 2001-2008) is used here to examine how the introduction of a lottery differentially impacts individuals who do and do not play the lottery. Because CES is a quarterly dataset, respondents are considered "treated" if there is an education lottery in their state in the *quarter* (as opposed to year) of response.

CES indicates respondents' state of residence. However, a drawback of the CES is that if there are too few respondents from a particular state, then it is not possible to identify state of residence for anyone from that state. Thus, while six states introduce an education lottery during the time period covered by CES, there are only observations from four of these states. Because of this, CES is primarily used to test the relationship between charitable expenditures and lottery expenditures.

The primary outcome variable of interest in all three datasets is total giving to education. In both COPPS and GVS, respondents report education giving for the preceding calendar year. In CES, respondents report education giving for the preceding quarter. In all three datasets, a handful of exceedingly high donations are removed; given the relatively low number of individuals who make positive contributions, a few contributions may wield excessive influence over the estimated mean impact of treatment.[16] To apply a consistent rule across all three datasets, observations with contributions above the 99th percentile of education contributions (conditional

[16] For instance, in the GVS data, the inclusion of these extreme observations leads to estimates that suggest that the average drop in giving associated with an education lottery is larger than the initial mean of giving.

on making a positive education) contribution are removed. This amounts to 55 of the total 221,067 observations in CES, 52 of the 39,795 observations in COPPS, and 15 of the 12,133 observations in GVS. This allows me to estimate the impact of an education lottery on the "typical" donor; Section 6 – where I analyze data from nonprofit tax returns – provides the opportunity to assess the impact of the lottery on contributions at a more aggregate level.

Included covariates vary by the survey and empirical approach being used. In the COPPS data, all specifications control for family income. When the COPPS data is estimated without individual fixed-effects, I also include a variety of additional controls: number of children, employment (respondent and spouse), marital status, urban-rural residence status, age, sex, and race. GVS specifications include controls for race, gender, employment (respondent and spouse), church attendance, age, education level, income, marital status, children in household, and confidence in education (as indicated in the survey). Finally, in analyzing the CES data, I control for education level, total consumption expenditures, education level, age, sex, and race. Regardless of the survey being used, all specifications include year fixed effects and state fixed effects (unless the specification includes individual-level fixed effects.)

5.2 Results

5.2.1 Main results

Results from the baseline specifications in both datasets are presented in Table 5. Column 1 reports the results of a fixed-effects regression in the COPPS data; column 2 reports the results of the repeated cross-section analysis in the GVS data. In either case, we find that education giving significantly decreases when an education lottery is introduced. To provide some sense of the magnitude of these coefficients, the mean of education giving is roughly $40 in both datasets.

I also estimate logit models to assess how an education lottery impacts giving on the extensive margin. Results are presented in columns 3 and 4 for COPPS and GVS, respectively. In both models, the dependent variable is equal to one if the respondent reports any education giving. There is little response to the introduction of an education lottery. Thus, the baseline results are driven by changes on the intensive margin. This provides an initial indication that these results

may not be entirely driven "fundraiser crowd-out." If the only reason that contributions decrease is a decline in the number of donors being solicited, then we might expect to find that the drop in giving is driven by the extensive margin.

Table 5: Baseline results – Impact of education lottery on education giving

	(1)	(2)	(3)	(4)
VARIABLES	Educ. giving	Educ. giving	Any educ. giving	Any educ. giving
Edulot	-9.372*	-33.49***	-0.033	-0.003
	(5.153)	(11.94)	(0.032)	(0.019)
Observations	29,715	11,017	7,985	11,012
Dataset	COPPS (2000-2008)	GVS (1989-1998)	COPPS (2000-2008)	GVS (1989-1998)
Model	FE Reg.	OLS	FE Logit	Logit

Robust standard errors (clustered at state-level) in parentheses
Columns 3 and 4 report marginal effects.
*** p<0.01, ** p<0.05, * p<0.1

There is reason to be concerned that the simple baseline results might be biased due to the large number of individuals who contribute nothing to education. This concern is addressed in two ways, with results reported in Table 6. In analyzing the COPPS data, I can restrict the sample to "education-givers" – individuals who donate to education at *any point* in the panel. This substantially reduces the number of zero-contribution observations. This specification is also interesting in its own right as it estimates the impact of the treatment on the individuals who *would* be giving. As the GVS is not a panel, the GVS parallel to this is to restrict the sample to observations with positive education contributions.[17] Results from these estimations are reported in Columns 1 and 3 respectively. Again, we see a significant decrease in giving in both datasets/decades but, as we would expect, the magnitude is much larger than the baseline result.

In Models 2 and 4, I estimate Tobit models to address "censoring" of contributions at $0. There is not a straightforward and unbiased implementation of fixed effects in Tobit models for panel data, so in the COPPS data I instead estimate a standard Tobit model, adjusting standard errors for clustering at the individual-level (Column 3)[18]. Similarly, in Column 4 I report the results of

[17] Restricting our attention to education givers would be problematic if the treatment changed *the set of donors* and not just the size of their contribution.
[18] Estimating a random-effects Tobit model yields similar results.

estimating a Tobit model in the GVS data. For each of these specifications, I report the marginal effect of "Edulot" on the unconditional expected value of *observed* giving. In both cases, we continue to observe a significant decrease in giving after accounting for the large number of censored observations. These estimates suggest that the introduction of an education lottery decreases average giving by between eight and twelve dollars; from an average of $40, this represents a drop in giving of between 20 and 30 percent.

Table 6: Alternative specifications – Impact of education lottery on education giving

	(1)	(2)	(3)	(4)
VARIABLES	Educ. giving (Educ. givers only)	Educ. giving	Educ. giving (Educ. givers only)	Educ. giving
Edulot	-27.77*	-8.44*	-191.9***	-11.96*
	(16.27)	(5.12)	(53.09)	(7.01)
Observations	9,279	28,426	1,801	11,017
Dataset	COPPS	COPPS	GVS	GVS
Model	FE	Tobit	OLS	Tobit

Robust standard errors in parentheses (clustered at state level in Models 1 and 3, individual level in Models 2 and 4). Columns 2 and 4 report marginal effect on the unconditional expected value of observed giving.

*** p<0.01, ** p<0.05, * p<0.1

5.2.2 Alternatives to the crowd-out explanation

What is driving this drop in giving? The decrease is consistent with classic models of crowd-out; the expected introduction of a new source of funding for a public good serves as a substitute for individual contributions and as such donors reduce their level of giving. There are of course alternative explanations. Kearney (2005) finds that, for the average lottery player, lottery spending is entirely financed by a reduction in non-gambling expenditures; thus, it is reasonable to expect that lottery spending may come at the expense of a particular category of non-gambling expenditures: charitable giving. If this were the case, we would expect charitable giving to decrease generally instead of finding a drop only in education-related giving.

Table 7: Giving to other non-education related causes

VARIABLES	(1) Non-educ. giving	(2) Non-educ. giving	(3) Non-educ. giving	(4) Non-educ. giving
Edulot	68.98	35.61	-25.38	22.69
	(73.38)	(47.70)	(47.16)	(32.15)
Observations	29,715	28,426	11017	11,017
Dataset	COPPS	COPPS	GVS	GVS
Model	FE-Reg	Tobit	OLS	Tobit

Robust standard errors in parentheses (clustered at state level in Models 1 and 3, individual level in Models 2 and 4). Columns 2 and 4 report marginal effect on the unconditional expected value of observed giving.

*** p<0.01, ** p<0.05, * p<0.1

It is not the case that giving to other causes substantially decreases with the introduction of an education lottery. To show this, I again estimate the baseline specifications (Columns 1 and 2 of Table 5) and the Tobit models (as in Table 6) but take "non-education giving" as the dependent variable.[19] Results are reported in Table 7. With the exception of Column 3 (where there is a small and insignificant drop in non-education giving), we see that giving to other causes actually slightly increases, but this increase is not significant. (The magnitudes of these coefficients are larger than those of the education-only estimations as the mean of giving to the sum of other causes is naturally much higher than giving to just education. For instance, average non-education giving in GVS is roughly $224.)

Another alternative explanation is that donors view the lottery as a good substitute for education donations. This is the assumption made by Morgan (2000) in claiming that raffles and lotteries can lead to higher provision than voluntary contributions; in his model, one dollar of lottery spending increases public good provision by the same amount that one dollar of direct donation does. However, lottery "contributions" are subsidized, in that there is some chance of winning a prize. As a result, his model predicts that individuals who *would* be donating to education in the absence of a lottery will shift their donation expenditures to the lottery. Because of this, *direct*

[19] In GVS, "non-education giving" is defined as total reported giving minus education giving. In COPPS, respondents do not report "total giving" and the way that they are asked to report giving to several causes changed between the 2002 wave and the remaining waves. However, questions regarding education giving, religious giving, "combined purpose" giving (e.g., United Way), health giving, and "help for the needy" are consistent across waves. Thus, in COPPS "non-education giving" is the sum of these consistently measured categories (religious, health, combined purpose, and needy).

donations drop but *total* contributions (donations + lottery expenditures) actually increase. Thus, a decrease in direct donations – as has been demonstrated thus far – arguably does not sufficiently demonstrate that overall public support for education has fallen. This pattern of behavior seems more plausible in the context of smaller-scale charitable raffles, but it remains an alternative explanation for the present results.

If Morgan's donation substitution was driving the results, then we would expect the decrease in giving to stem entirely from individuals who play the lottery. Using the Consumer Expenditure Survey (CES) we can identify individuals who do and do not play the lottery, and how much each group contributes to education related causes. Recall that the CES provides quarterly observations of respondents throughout the course of a year. Thus, I identify an individual as a "lottery nonparticipant" if they never report positive lottery expenditures. A "lottery participant" reports lottery expenditures at some point during the year.

Table 8: Consumer Expenditure Survey – Quarterly education giving by lottery participation

		(1)	(2)	(3)
	VARIABLES	Educ. giving	Educ. giving	Any educ. giving
	Model:	FE-Reg.	Tobit	FE-Logit
Panel A:	Edulot	-22.18**	-0.103	-0.077
Full sample		(8.593)	(1.75)	(0.081)
	Observations	203,486	203,510	12,624
Panel B:	Edulot	-24.30*	-0.828***	-0.133
Lottery nonparticipant		(13.80)	(0.944)	(0.091)
	Observations	153,087	153,099	8,488
Panel C:	Edulot	-16.92	0.636	0.039
Lottery participant		(10.45)	(2.64)	(0.175)
	Observations	50,399	50,411	4,136

Robust standard errors in parentheses
Columns 2 and 3 report marginal effects
*** p<0.01, ** p<0.05, * p<0.1

Using this data, I estimate fixed-effects regressions (Column 1 of Table 8) and (cross-sectional) Tobits (Column 2), taking *quarterly* education giving as the dependent variable. I also estimate fixed-effects logits to assess the likelihood of giving any positive amount to education (Column 3). In the fixed-effects regression and logit, I include a control for income and also quarter, state, and year fixed effects. In addition to these controls, the Tobit also includes controls for

education, gender, and race. I conduct each estimation for three samples: all observations (Panel A), lottery nonparticipants (Panel B), and lottery participants (Panel C).

Comparing Panels B and C, contrary the predictions of the Morgan model, there is more evidence that the drop in giving is driven by lottery *nonparticipants* in this setting. The estimated impact of the lottery in the fixed effects model is negative for both participants and nonparticipants, but the magnitude is larger (and more precisely estimated) for nonparticipants. Based on the Tobit estimations, the impact of the lottery remains negative and significant for nonparticipants, but is positive and insignificant for participants. Finally, although the logit estimates are insignificant for all samples, the impact of the lottery on the extensive margin is again greater for nonparticipants. The generally larger negative impact of the lottery for *nonparticipants* and weak impact for participants is the opposite of what we expect based on a strict interpretation of the Morgan model. Moreover, these results paired with the results from Table 6 provide additional evidence that the drop in giving is not simply a more general shift of expenditures from charity to lottery. This suggests that the main result is in line with classic models of crowd-out; donations drop because there is a new source of revenue (lottery revenue) that serves as a substitute for one's own donations.

To summarize, the introduction of an education lottery reduces donors' contributions to education lotteries by 20 to 30 percent. This reduction appears to be driven by changes on the intensive margin; the lottery does not impact the probability that an individual will make a contribution. Moreover, there is evidence that the drop in giving might be explained by (expected) government spending crowding out private contributions, as opposed to individuals sacrificing charitable contributions to play the lottery. However, while the decrease in giving seems to be a response to new government funds, it remains unclear whether this is a response by *donors* or a response by *nonprofit firms*. This issue is explored in the next section.

6. Nonprofit firm response to education lottery revenue

How does the introduction of an education-funding lottery impact education-related nonprofits? We have already seen that an education lottery crowds out donations to education organizations,

but it is possible that the result is driven by a reduction in the effort of fundraisers – either because they expect the marginal benefit of fundraising to be lower or because they have benefitted directly from lottery revenues and their level of need has reduced. Andreoni and Payne (2003) document that, in a more general setting, the crowd-out that results from government grants to nonprofits can almost be entirely explained by this "fundraising crowd-out." In some of their results that account for fundraising, donors' contributions are either unaffected by or slightly increase with grants. One explanation for their observed lack of "traditional crowd out" (and, more generally, for the relatively small degree of crowd-out typically observed in response to government grants) is that individuals are largely unaware of government grants to nonprofits. In the United States, the introduction of a lottery to fund education tends to be highly publicized and as such individuals are more likely to be aware of this change in government funding. Thus, it may be reasonable to expect that the crowd-out observed in the previous section is driven by donor preferences.

6.1 Data & empirical approach

To examine whether this is the case, I next turn to data on nonprofit organizations' revenue and expenses from federal tax returns spanning from 1989 to 2007. The data is collected and constructed by the IRS Statistics of Income division, and then compiled and provided for research purposes by the National Center for Charitable Statistics (NCCS). Each year a subset of tax returns from nonprofit organizations that hold 501(c)(3) status are randomly sampled for inclusion in the dataset, which reports a variety of financial variables from the their tax return (from the year sampled) such as operation expenses, charitable contributions received, fundraising expenses, etc. The dataset also includes groupings of nonprofit organizations by function, categorizing organizations as *Arts, Education, Health, Human Services,* or *Other*.

A broad array of education-related organizations are represented in the data, including colleges, universities, preschools, libraries, remedial reading organizations, etc. However, as noted in the introduction, a vast majority of charitable activity in the education subsector is directed towards higher education. These data of course include private nonprofit colleges and universities, but many public universities and colleges are also represented: either because (1) they officially hold

501(c)(3) status or (2) their fundraising activities are accomplished through an affiliated but independent nonprofit foundation, both of which are common.

While the dataset is not constructed as a true panel of nonprofit organizations, nonprofit organizations reappear in the data often enough that it can be treated as panel (as Andreoni & Payne do, for instance).[20] Thus, I construct an unbalanced panel where each observation is a particular nonprofit firm in a particular year; there are typically (but not always) gaps between a nonprofit firm's appearances in the panel but these appearances are randomly determined.

The goal of this section is to examine the donations received and the fundraising behavior of nonprofit firms in response to the introduction of a lottery. Thus, I restrict my sample to firms that receive donations at any point in the panel. The resulting dataset consists of a total of 192,478 observations and 19,505 unique nonprofit firms. 39,410 of these observations are education-related organizations.

Throughout this section, I use a fixed-effects approach (with fixed-effects at the firm level) within the same difference-in-differences framework employed in previous sections. Two questions are of primary interest: First, how does the introduction of an education lottery impact the amount of donations received by education-related organizations? This essentially tests the robustness of the results from the previous section, but with much richer data. Here, for instance, we do not suffer from the censoring at $0 that plagued the assessment of the donor-level data. Second, are changes in donations received by nonprofits driven by changes in fundraising efforts?

With these questions in mind, the primary outcome variables of interest is log of *contributions received*. I regress contributions on the "Edulot" indicator variable and, in all specifications, I include controls for the log of total revenue (excluding public support), the log of total expenditures (excluding fundraising), and year fixed effects. I additionally control for state-level covariates which may impact donations: log of income per capita, log of state population, log of education expenditure per capita, and log of other expenditures per capita. To address the impact

[20] The median firm in the dataset I use appears seven times.

of fundraising, I then control for fundraising expenditures. In doing so, I use an instrumental variables approach to account for the endogeneity between fundraising and donations received, using *liabilities at the beginning of the fiscal year* as an instrument for fundraising.[21]

6.2 Results

6.2.1 Main results

Table 9 provides an initial assessment of the impact that a lottery has on contributions received by nonprofits. Columns 1 and 2 report the results of fixed-effects estimations, with fixed-effects at the firm level, for education organizations and non-education organizations respectively. Consistent with the findings from the previous section, the introduction of an education lottery reduces the contributions received by education organizations – in this case, by an estimated 8% – but has no significant impact on contributions to other causes.

Columns 3 and 4 offer two robustness tests. Between 1989 and 2008, three states[22] attempted to introduce a lottery through referenda or ballot initiatives, butto achieve enough votes. In Column 3, I replace the "Edulot" dummy with a "Failed edulot" dummy. If the treatment effects here are merely picking up trends in giving that *cause* a state to introduce a lottery, the coefficient on "Failed edulot" should be negative and significant. While negative, the coefficient is substantially smaller in magnitude than the result from Column 1 and is not significantly different than zero. Column 4 adds a dummy to indicate a non-education lottery to the main specification. No drop in giving to education organizations is observed when the lottery is not intended to benefit education.

Table 9: The impact of an education lottery on contributions received

	(1)	(2)	(3)	(4)

[21] Andreoni & Payne (2011) use this instrument for fundraising as well arguing that higher debt impacts the need for fundraising in a way that is unrelated to the amount of donations one expects to receive.
[22] Oklahoma in 1995, Alabama in 2000, Arkansas in 2001.

VARIABLES	Contributions received: **Educ. orgs.**	Contributions received: **Non-educ. orgs.**	Contributions received: **Educ. orgs.**	Contributions received: **Educ. orgs.**
	FE-Reg.	FE-Reg.	FE-Reg.	FE-Reg.
Edulot	-0.0817***	0.0119		-0.0734*
	(0.0275)	(0.0282)		(0.0369)
Failed Edulot			-0.0247	
			(0.0817)	
Non-educ. lottery				0.0138
				(0.0363)
Other expenditures	0.339***	0.282***	0.340***	0.339***
	(0.0374)	(0.0142)	(0.0373)	(0.0374)
Other revenues	-0.0747***	-0.0659***	-0.0745***	-0.0747***
	(0.0216)	(0.00876)	(0.0217)	(0.0217)
State: income	0.850***	1.053***	0.783***	0.851***
	(0.258)	(0.294)	(0.258)	(0.258)
State: population	0.433	0.666***	0.264	0.425
	(0.270)	(0.198)	(0.241)	(0.280)
State: educ. exp.	0.0443	0.0149	0.0565	0.0435
	(0.105)	(0.0889)	(0.108)	(0.104)
State: non-educ. exp.	-0.131	-0.217*	-0.149	-0.135
	(0.140)	(0.115)	(0.145)	(0.139)
Observations	38,585	129,267	38,585	38,585
R-squared	0.263	0.066	0.227	0.331

Robust standard errors (clustered at state-level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Is the decrease in contributions to education organizations driven by a change in fundraising efforts? To answer this, I add a control for fundraising to the preceding specification. However, to account for potential endogeneity between fundraising and donations, I do so in an instrumental variables framework, taking liabilities as an instrument for fundraising. Results for education (Columns 1 and 2) and non-education organizations (Columns 3 and 4) are presented in Table 10. Columns 1 and 3 report the first stage of the instrumental variables regression. Notably, the introduction of an education lottery has very little impact on education organizations' fundraising expenditures (Column 1). Thus, in turning to the impact of the lottery after accounting for fundraising (Column 2), it is unsurprising to find that the estimated decrease in giving is very close to the estimate from Table 9.

Table 10: The impact of an education lottery – Accounting for fundraising

	(1) Educ. orgs: Fundraising	(2) Educ. orgs: Contributions received	(3) Educ. orgs: Contributions received	(4) Non-educ. orgs: Fundraising	(5) Non-educ. orgs: Contributions received	(6) Non-educ. orgs: Contributions received
	FE-Reg. (first-stage)	IV-FE-Reg.	FE-Reg.	FE-Reg. (first-stage)	IV-FE-Reg.	FE-Reg.
Edulot	-0.00296	-0.0689**	-0.0650**	0.0685	0.00314	0.0247
	(0.0324)	(0.0279)	(0.0296)	(0.0422)	(0.0412)	(0.0372)
Liabilities	0.0346**			0.0432***		
	(0.0130)			(0.00644)		
Fundraising		0.0614	0.130***		0.4851***	0.176***
		(0.2656)	(0.0116)		(0.1273)	(0.00924)
Obs.	27,905	27,905	28,828	58,374	58,374	61,996
R-squared	0.452	0.155	0.512	0.245	0.469	0.363

Robust standard errors (clustered at state-level) in parentheses
Additional controls included as noted in text
*** p<0.01, ** p<0.05, * p<0.1

On average the introduction of an education lottery reduces contributions received by education organizations by between 7-8%. To link this result more closely to the existing literature on crowding-out of charitable giving, we would ideally like to know the extent to which charitable giving decreases as a function of the *amount* that government spends. Answering this question is difficult because there is very little actual increase in spending, but we do know how much government *claims* it will spend. That is, in the state government finance data I observe "lottery proceeds," which is the amount of money remaining for the beneficiaries after accounting for prizes awarded and administrative costs. Thus, we can estimate the continuous impact of treatment by adopting the same specifications as before but replacing the "Edulot" dummy with log of lottery proceeds in education-lottery states. Appendix Table A4 reports the results of these estimations for both education and non-education organizations. Based on the instrumental variable specification which controls for fundraising (Table A4, Panel B), a 10% increase in lottery proceeds is associated with a 5.25% decrease in contributions received by education related organizations.

6.2.1 Salience of government activity as an explanation for crowd-out?

Consistent with the findings from Section 5, contributions to education-related organizations fall after the introduction of an education lottery, which is not true of contributions to other organizations. However, we can now say that this result appears to be driven by donors' decisions to reduce their contributions as opposed to reduced fundraising efforts.

This result differs from a recent literature which demonstrates that crowd-out is often largely explained by a change in nonprofits' fundraising behavior (Andreoni & Payne, 2003; Andreoni & Payne, 2011; Heutel, 2009; Monti, 2010). I have suggested that an important difference between state lotteries and other forms of government spending is the high level of publicity that lotteries receive. Relative to government grants to nonprofits, donors are likely to be more aware of government spending resulting from lotteries – and therefore more likely to respond – in large part because states themselves heavily advertise the recipient of lottery revenues.

Is there more direct evidence to support this suggestion? I take two approaches answer this question. First, if the crowd-out observed in this paper is indeed driven by donors' awareness of government activity and if this awareness is (at least in part) the result of government advertising, then we would expect the magnitude of the crowd-out to increase with governments' advertising activities. The *Survey of Government Finances* (used in Section 3) reports states' yearly lottery administrative costs, which includes advertising expenditures.[23] Advertising expenditures are not reported, so I use the ratio of *administrative costs to ticket sales* as a proxy for advertising. In addition to advertising, administrative costs include the cost of printing and distributing tickets which obviously varies with the number of tickets sold, so most of the variation in administrative costs after accounting for tickets sales presumably comes from advertising.

I extend the previous empirical specifications (FE and FE-IV-Regressions controlling for fundraising) to include controls for *the ratio of administrative costs to ticket sales* ("Advertising") and the interaction of "Advertising" with "Edulot." In doing so, I re-center "Advertising" around its mean so that the main effect of "Edulot" can be interpreted as the

[23] According to the Census Bureau, administrative costs "includes salaries of officials as well as advertising, supplies, and the like."

impact of an education lottery evaluated at the mean level of advertising. If crowd-out is increasing in advertising we would expect the coefficient on "Edulot X Advertising" to be negative.

This is indeed the case, as can be seen in Columns 1 and 3 of Table 12 which report the results of these estimations for education organizations. Based on Column 3, an education lottery is associated with a 6% decrease in contributions received by education organizations. For each additional cent of ticket sales that a state devotes to administrative costs, contributions decrease by an additional 1%. The same significant relationship does not hold for non-education organizations (Columns 2 and 4).

Table 12: Crowd-out and awareness of government spending – Proxy for advertising expenditures

VARIABLES	(1) Contributions received: **Educ. orgs.** (FE-Reg.)	(2) Contributions received: **Non-educ. orgs**. (FE-Reg.)	(3) Contributions received: **Educ. orgs.** (FE-IV-Reg.)	(4) Contributions received: **Non-educ. orgs.** (FE-IV-Reg.)
Edulot	-0.0686**	0.0263	-0.0594**	0.0154
	(0.0286)	(0.0280)	(0.0256)	(0.0393)
Edulot X Advertising	-1.274***	-0.589	-0.988**	-0.247
	(0.387)	(0.485)	(0.466)	(0.488)
Advertising	0.655***	0.00285	0.556***	-0.243
	(0.200)	(0.270)	(0.197)	(0.221)
Observations	38,585	129,267	27,905	58,374
R-squared	0.294	0.068	0.156	0.000

Robust standard errors (clustered at state-level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A second approach allows for the possibility that the political method of introducing the lottery impacts crowd-out. In particular, seven of the twelve states that introduced an education lottery between 1989 and 2008 did so through referenda or ballot initiatives.[24] The remaining states introduced their lottery through legislative action. One might expect that citizens are more aware of the lottery and its beneficiary when they vote directly on the issue. Thus, if salience is important to crowd-out, there should be more crowd-out in states that introduced their lotteries through direct voting (referenda/ballot initiatives).

[24] These states are Georgia, Missouri, Virginia, Washington, South Carolina, Tennessee, and Oklahoma.

I test whether this is the case in Table 13, which includes a separate treatment dummy for *legislative action* and *direct vote* states. Columns 1 and 3 report the results of these estimations for education organizations. Crowd-out is indeed higher in *Direct vote* states. The same relationship is not observed for non-education organizations (Columns 2 and 4).

Table 13: Crowd-out and awareness of government spending – Political method of lottery introduction

VARIABLES	(1) Contributions received: **Educ. orgs.** (FE-Reg.)	(2) Contributions received: **Non-educ. orgs**. (FE-Reg.)	(3) Contributions received: **Educ. orgs.** (FE-IV-Reg.)	(4) Contributions received: **Non-educ. orgs.** (FE-IV-Reg.)
Edulot (Legislative)	-0.0627*	-0.00842	-0.0413	-0.00215
	(0.0329)	(0.0296)	(0.0473)	(0.0468)
Edulot (Direct vote)	-0.0921**	0.0261	-0.0842***	0.00658
	(0.0355)	(0.0374)	(0.0275)	(0.0562)
Observations	38,585	129,267	27,905	58,374
R-squared	0.266	0.066	0.155	0.000

Robust standard errors (clustered at state-level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Of course, these results should be taken as merely suggestive: we cannot directly observe advertising expenditures, nor do we *know* that donors are more aware of the lottery beneficiary in "Direct voting" states. However, the results are consistent with the suggestion that a higher level of awareness of government activity leads to more crowd-out. This may help explain why crowd-out is driven by donors when the source of funding is a state lottery, while crowd-out is driven mostly by nonprofits when the source of funding is much-less-publicized government grants.

7. Conclusion

In this paper I assess the impact that education-funding state lotteries have on total funding available for education. I find that – for lotteries introduced between 1989 and 2008 – the introduction of an education lottery fails to significantly increase state education expenditures. Instead, unrelated expenditures increase. Thus, the lottery does not change government's

contribution to education. Though education relies on government for funding, it is also heavily supported by charitable donations. The absence of an increase in government funding with the introduction of a lottery implies that any change in *overall* funding therefore depends on the effect that lotteries have on charitable contributions.

I find that charitable contributions to education significantly decrease after the introduction of an education lottery; contributions received by education-related nonprofit firms drop by 8% with a lottery. There is evidence to suggest that this drop is driven by a crowding-out of donations, consistent with classic models of voluntary public good provision. In particular, I am able to rule out alternative explanations that might suggest that individuals are merely shifting charitable expenditures to lottery expenditures.

Additionally, unlike recent work that finds that crowd-out stemming from grants to nonprofits is often mostly explained by nonprofit fundraising behavior, here the effect is almost entirely driven by donors. I argue that this is because of the high level of publicity that lotteries and their intended beneficiaries receive. Consistent with this suggestion, I show that crowd-out is increasing in a measure of state advertising activity. Also, crowd-out is higher for states that introduce a lottery through referenda instead of legislative action, which is presumably less salient to citizens. Though the *potential* importance of salience as a determinant of charitable crowd-out has been discussed in recent work by Monti (2010), to my knowledge this is the first paper to provide empirical evidence that crowd-out is indeed increasing in awareness of government activity.

There are of course a variety of policy-oriented reasons why some oppose state-sponsored lotteries; for instance, it has been repeatedly shown that, as a tax, lotteries are highly regressive. This paper highlights an additional trade-off that states face in implementing a lottery as a way to fund public goods. While some existing work shows that earmarking for a "good cause" increases a lottery's revenue (Landry & Price, 2007), I find that this comes at a price: private, voluntary support for the cause falls.

However, the fact that state governments are vocal about the *particular* cause being supported (education) seems to be critical to this result. This suggests that a government that is vocal about supporting "good causes," but does not support or highlight any one cause in particular, may enjoy the benefits of higher revenue without disrupting charitable activity. The UK National Lottery operates in this manner, advertising that the Lottery supports "380,000 … good causes … across the UK."[25] Indeed, in an analysis of UK charities that have received lottery grants, Andreoni et al. (2013) find no evidence of charitable crowd-out.[26]

[25] http://www.national-lottery.co.uk/player/p/goodcausesandwinners.ftl
[26] In fact, for small organizations, they find evidence of *crowd-in*.

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Appendix: Additional Results

Table A1: Main government outcomes – additional time varying controls

VARIABLES	(1) Revenue	(2) Educ. exp.	(3) Non-educ. exp.
Edulot	0.0133	0.00215	0.0143
	(0.0178)	(0.0324)	(0.0200)
Pre-treat trend	-0.00120	0.00273	-0.00574**
(Years before Edulot)	(0.00253)	(0.00202)	(0.00260)
Post-treat trend	0.00556***	0.00714	0.00348
(Years after Edulot)	(0.00175)	(0.00545)	(0.00288)
Non-educ. lottery	-0.00533	-0.0272	0.0202
	(0.0255)	(0.0439)	(0.0269)
Population	-0.127	-0.495***	0.163
	(0.106)	(0.156)	(0.178)
Income	0.941***	0.738***	0.510**
	(0.215)	(0.274)	(0.213)
Other revenue		0.203***	0.224***
		(0.0675)	(0.0596)
Total students	-0.247**	0.288*	-0.326**
	(0.0927)	(0.148)	(0.125)
Unemp. rate	0.00109	-0.0379	0.0488**
	(0.0336)	(0.0333)	(0.0240)
Republican gov.	-0.0140*	-0.00659	-0.0224**
	(0.00734)	(0.0135)	(0.00869)
Constant	3.417***	1.106	0.572
	(1.169)	(1.938)	(2.466)
Observations	950	950	950
R-squared	0.963	0.957	0.980

Robust standard errors (clustered at the state-level) in parentheses.
All continous controls and outcome variables are in logs. All monetary variables (including outcome variables) are measured at the per-capita level.
*** p<0.01, ** p<0.05, * p<0.1

Table A2: Education expenditures in an earlier time period for comparison with existing literature

	Years: 1989-2008 (as covered in this paper)			Years: 1976-2000 (as covered in Novarro and Evans & Zhang)		
	(1) Educ. exp.	(2) Elem. educ. exp.	(3) Higher educ. exp.	(4) Educ. exp.	(5) Elem. educ. exp.	(6) Higher educ. exp.
Edulot	-0.00692	-0.0574	0.0208	0.00811	0.378*	0.0130
	(0.0314)	(0.0578)	(0.0355)	(0.0298)	(0.199)	(0.0307)
Obs.	950	950	950	1,250	1,092	1,250
R-squared	0.952	0.882	0.966	0.978	0.900	0.972

All specifications include the same controls and fixed effects as those reported in Table 2.
Education expenditure variables are in logs and measured at per capita level.
Robust standard errors (clustered at state-level) in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A3: The impact of an education lottery on contributions received -- Allowing for treatment effects 2 years before and after the treatment date

VARIABLES	(1) Contributions received: Educ. orgs.	(2) Contributions received: Educ. orgs.
Edulot – 2 years		0.00414
		(0.0328)
Edulot	-0.0689**	-0.0475***
	(0.0279)	(0.0168)
Edulot + 2 years		-0.0451
		(0.0333)
Observations	27,905	27,905
R-squared	0.155	0.155

Empirical specifications match those reported in Table 10 (Column 2): IV-fixed effects regressions with fixed effects at the nonprofit level. The dependent variable is donations received by education related organizations. Column 1 matches the main result reported in Table 10. Column 2 extends this specification to allow for differential pre- and post-treatment trends.

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A4: Contributions received as a function of education-earmarked lottery proceeds

VARIABLES	(1) Contributions received: Educ. orgs.	(2) Contributions received: Non-educ. orgs.
	Panel A: Fixed effects regressions	
ln(Edulot proceeds)	-0.00632***	0.000901
	(0.00204)	(0.00206)
	Panel B: IV Fixed effects regressions	
ln(Edulot proceeds)	-0.00525**	0.00119
	(0.00216)	(0.00307)

Unit of observation: nonprofit firm. Dependent variable: donations received. Empirical specifications match those reported in the text either without accounting for fundraising (Panel A) or accounting for fundraising through the IV strategy (Panel B).

Robust standard errors (clustered at state-level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1