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## Do public grants to American theatres crowd-out private donations?

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**Abstract.** This paper examines the relationship between public support and private donations by disaggregating the crowding effect into two components: one determined by level of public support and one determined by changes in public support levels. The analysis of a panel of American non-profit theatres shows that the crowding effect induced by the level of public support takes an inverted *U* shape: at low levels public support crowds-in private donations while at higher levels it displaces them. The change in total public support in the past year produces a constant crowding-in effect on the level of private donations. The paper finally illustrates how federal and state support have a crowding-in effect at all levels, while local support has a similar impact to total public support.

### 1. Introduction

The question “does government support stimulate or inhibit philanthropic donations?” is at the basis of a growing literature on the crowding effect of public support to non-profit organizations on private donations. The crowding effect can be described on a number of dimensions: direction, intensity and whether it occurs at the institutional or sectoral level. In terms of direction a crowding in occurs when public support stimulates private donations while crowding out corresponds to the situation where public support inhibits donations. The literature further distinguishes between total and partial effects to indicate the intensity of the relationship (Clotfelter, 1985). In the presence of a total effect changes in public support produce equal changes in private donations, while in the case of a partial effect such changes produce a less than equal response in private donations.

A further distinction concerns the level at which the crowding effect is studied and identifies institutional and sectoral effects. Government spending may affect private donations received by the single institution in a way, or to a degree that is different from the effect that public support has on an entire sector. At the micro level the institutional crowding effect makes private patrons more (or less) likely to give to organizations that receive public support rather than to others, even if aggregate spending is constant. The sectoral crowding effect modifies total private giving to a sector as a consequente

of changes in public support, even if recipient organizations are no more likely than others to get funded by private donors (Borgonovi & O'Hare, 2004; Kingma, 1989). The literature is roughly evenly split with the earlier literature concentrating on the sectoral effect and more recent studies focusing primarily on the institutional effect.

This paper analyzes the institutional crowding effect using data from a panel of non-profit American theatres. Theatres considered in the paper consist of non-profit organizations performing non-musical drama. They range from companies with standard repertoires to organizations that commission and put on stage new plays. It develops the existing literature by considering two components of the effect of public support on private donations: the first considers the effect of the *level* of public support on private donations and the second the effect of *changes* in public support levels on private donations. The hypothesis is that the relationship between the level of total public support and the size of the crowding effect is inverse, with the sign of the effect starting off as positive and ending up as negative. On the contrary changes in public support levels are expected to exert a positive constant effect on private donations.

With few exceptions, empirical studies of the crowding effect consider government support as homogenous and no distinction is made with respect to the type of agency that awards public grants. In this paper federal, state and local funding are considered separately as they are most likely to exert a very different influence on private donations. Moreover most crowding effect studies do not take into account factors, such as quality or level of competition for donative revenues, that are most likely to influence the amount of support that an organization receives both from public and private donors. Although these criteria can be difficult to identify, the paper uses proxies to reduce the omitted variable bias possibly present in previous empirical research. The paper develops the use of a quadratic specification to characterize the impact that levels of public support have on levels of private donations that was first used by Brooks (2000, 2003). These studies rely on a very limited sample size (35 observations in the symphony orchestra research and 77 in the public radio one), while the empirical section presented in this paper draws from a much larger sample size (82 theatres that have been followed for a total of 5 years). The use of small sample sizes to test the functional form that the relationship between private and public support takes might lead to biased results due to a lack of sufficient variation in both the amount of private and public support that organizations in the panel receive.

The first section of the paper introduces a review of the empirical literature on the crowding effect. It advances some hypotheses on the possible reasons for having inconclusive evidence on the direction and intensity of the crowding phenomenon and discusses how these fit the theoretical framework developed in the literature. The second section discusses the data and

the methods used in the empirical model developed to test the crowding effect. The paper then presents the econometric analysis and results and finally highlights conclusions and provides an agenda for future research.

## 2. Crowding out Versus Crowding in: Evidence and Explanations

The empirical evidence on the direction and intensity of the crowding effect of public support on private donations is mixed. Most studies analyze the crowding effect in the United States, although there are examples of similar studies in Canada (Day & Devlin, 1996), the United Kingdom (Khanna, Posnett, & Sandler, 1995; Jones, 1983) and Germany (Paque', 1982). The studies differ greatly in terms of period covered – from pre-WWII period (Abrams & Schmitz, 1978) to the late 1990's (Andreoni & Payne, 2001; Brooks, 2003), non-profit sectors analyzed and type of government support awarded.

At the institutional level, some studies find a total crowding out effect (Roberts, 1984); others report a partial crowding out effect in the social services field (Steinberg, 1985; Andreoni & Payne, 2001), public radio stations (Kingma, 1989) and a variety of non-profit organizations (Payne, 1998). Schiff (1985) presents evidence that in certain circumstances a moderate crowding in effect can occur. Khanna et al. (1995) also find a partial crowding in effect of government support on UK health organizations and independence in the case of religion and social welfare organizations. When the sectoral crowding effect of public support on individual charitable contributions is considered, Lindsey and Steinberg (1990) report a partial crowding out effect of federal support, while a crowding in effect of federal grants on state spending. Similarly Abrams and Schmitz (1978) report a partial crowding out effect of federal expenditures on health, education and welfare organizations and Jones (1983) a partial crowding out of total government expenditure on non-profits. Reece (1979) on the other hand finds independence among public support and private donations to religious, educational and political organizations.

Kingma (1989) attributed the inconsistencies on the direction and intensity of the crowding effect in the literature to the use of a broad definition of recipients and of government support. However the review of the available empirical studies in the non-profit art sector reveals that even when the analysis is restricted to a fairly homogenous recipient category, such inconsistencies remain. The great majority of the crowding effect studies in the arts are sector specific and the evidence that they provide is again mixed, with some reporting a crowding in effect (Smith, 2003; Paque', 1982), others a crowding out effect (Andreoni & Payne, 2001; Hughes & Luksetich, 1997) or independence (Brooks, 1999).

While discrepancies among studies have often been attributed to differences in the effects *among* non-profit sectors and geographical areas, Brooks

argues that the assumption of linearity of the relationship between public support and private donations could be at the basis of such inconsistencies (Brooks, 2000, 2003). Brook's findings on the crowding effect for American symphony orchestras and public radio stations seem to confirm that a nonlinear specification of public support is indeed more appropriate. Brook's model considers a non-constant crowding effect, where the relationship between levels of government spending and levels of private donations takes an inverted *U* shape. Initially crowding in occurs and the higher the level of public support awarded to non-profit institutions, the higher the level of private donations. However after a certain point crowding out dominates and the higher the level of public support the lower the level of private donations (Brooks, 2000).

The bulk of the literature on the impact of government spending on private donations assumes a negative relationship between public and private support and sets itself the goal of testing whether the crowding out effect is total or partial (Nyborg & Rege, 2003). However the theoretical framework upon which this assumption is usually based, the interdependent utility model, provides a strong justification also for the crowding in effect. In such a model the utility function of donors and recipients are interdependent and the utility that donor *A* derives from making a private donation depends on the utility that recipient *B* derives from that same donation. The fundamental assumption that has been traditionally made by proponents of this model is that the greater the need of recipients, the higher the marginal utility of donors (Abrams & Schmitz, 1978). As recipients are less needy once they receive public funding and need is at the basis of the desire to donate, donors have an incentive to shift their giving and fund organizations not receiving public support and as a result crowding out will occur (Warr, 1982; Roberts, 1984; Vickrey, 1962; Becker, 1974). In the presence of simple interdependent utility functions where recipients' utility is the only factor determining donations, the donors' marginal utility decreases with government support because the latter lowers the utility of additional donations for recipient organizations (Abrams & Schmitz, 1978). In this system the only donations observed are the ones of patrons with a weight attached to recipients' utilities that is higher than the one agreed in the social contract determining levels of public support (Hochman & Rodgers, 1977).

However the interdependent utility framework can also be used to justify the crowding in effect: the additional support that public grants provide at low levels of total donative revenues (public and private) allows recipients to expand their activities and undertake new and/or better projects. In these cases rather than a decrease in need, public support corresponds to an expanded set of opportunities and possible uses of private contributions, a higher marginal utility of donations for the recipients and therefore the donors. The interdependent utility framework can be reinterpreted taking into account the positive

effect that initial levels of public support have on the prospects and activities of non-profit organizations. This provides a strong theoretical argument for the inverted *U* shape of the crowding effect empirically found by Brooks (2000, 2003).

Other factors may also contribute to a partial crowding out effect. Examples of aspects affecting the utility function of donors are warm-glow effects (Boulding, 1962; Amos, 1982; Andreoni, 1989, 1993); level of control (Andreoni, 2001); private benefits associated with being a patron (Amos, 1982; Andreoni, 2001); social pressure (Nyborg & Rege, 2003; Rose-Ackerman, 1986; Rabin, 1997) and aversion for dependent recipients (Borgonovi & O'Hare, 2004). Last but not least, motivation crowding theory suggests that if individuals are given incentives to undertake activities that they were planning on undertaking altruistically, their motivation will decrease and as a result a crowding out will occur (Frey & Jegen, 1999; Frey & Oberholzer, 1997).

There are also additional aspects that determine a positive influence of public support on private donations and they reside in the fact that if donors derive utility from giving to "needy and deserving recipients", some potential donors might be impeded because of lack of information on recipients' suitability and/or lack of screening ability. When government grants are accompanied by information activities, the associated decrease in uncertainty can stimulate private giving and partly offset the negative effect of declining recipients' need (Rose-Ackerman, 1986; Bolton & Katok, 1998). There is some empirical evidence that the form of support governments use to allocate resources affects the impact on philanthropic donations (Schiff, 1985; Day & Devlin, 1996).

An alternative theory views the crowding out effect as the result of reduced fundraising efforts of organizations receiving government support (Andreoni & Payne, 2001). This model presupposes that the decrease in need following public grants makes organizations less active in looking for private funds, while private patrons donate less as a response to less aggressive fundraising campaigns. The marginal utility of a donation remains unchanged for the donors while it decreases for the recipients that consequently increase the share of spending allocated to core activities. However as in the case of the interdependent utility function model, low levels of public support are unlikely to greatly reduce fundraising efforts and, on the contrary, might stimulate them. If organizations receive some form of public support they might in fact feel encouraged to invest in planning more ambitious activities that require additional private support. In order to formally incorporate such positive influence some public granting bodies have developed matching requirements that condition the award of public support on the ability of the non-profit organization to find additional private resources as a match (Schuster, 1989).

An important feature of the interdependent utility function and of the fundraising model is that in both cases the *level* of public support plays a role in explaining the *level* of private support and therefore the existence, intensity and direction of the crowding effect. These models predict that two organizations *A* and *B* that have the same level of public support will attract, other things being equal, the same level of private donations and that the correlation will be positive at first and then negative, being well described by an inverted *U* shape. However the models analyzed above fail to fully consider the effect of *changes* in levels of public support. As a consequence they predict the same crowding effect in the case of organization *A* that received increases in public support and organization *B* that saw its public support cut from the levels reached in previous years, if the amount of support they receive in year *t* is the same.

Advocates of the crowding in effect have long pointed out that public support leverages private donations because it can signal quality, managerial ability and increase the reputation of recipient organizations (Hodsoll, 1984; NEA, 1998; Wyszomirsky & Mulcahy, 1995; Mulcahy, 1992). Given the high competition that exists for public support among non-profit organizations, *changes* in public support might influence private donation *levels* in a way that is different and independent from the effect that *levels* of public support have on *levels* of private donations. The use of the reputational effect to account for the additional influence that public support has on private contributions, could be an important factor in explaining donation levels ignored by previous empirical studies (Khanna, Posnett, & Sandler, 1995). Connolly (1997) explores the relationship between internal and external funding of academic research and finds that because of the signaling effect that contributions from one source have on others, the higher the funding from one source is, the higher the additional funding the institution can expect to receive from other sources. Similarly Vesterlund (2003) shows how, contrary to what the interdependent utility framework and standard economic theory predicts, fundraisers announce past contributions and that they do so because an announcement strategy functions as a signal of institutional quality.

### 3. Data

The dataset used to analyze the effect of public support on private contributions comes from a total of 82 American theatres that are members of Theatre Communication Group (TCG). Since 1974 TCG conducts an annual survey (*Theatre Facts*) on the finances of its member theatres. In 2001 a total of 363 theatres responded, 197 of which completed a full in-depth questionnaire. The panel of 82 trend theatres used in the analysis includes those theatres that completed the questionnaire in the 1997–2001 period (five years). As six

theatres did not complete the questionnaire in 2001 the panel is unbalanced and consists of a total of 404 observations. The TCG dataset contains information on a panel of both large and small theatres (total income ranges between 200,000 and 58 M constant 1997 dollars) and constitutes an adequate sample of American non-profit theatres.

The important feature of the TCG panel is that unlike the data used in most previous empirical studies on the crowding effect, it differentiates public support into federal, state and local (city and county) funding. As noted above, one of the hypotheses of this paper is that different forms of public support have distinct effects on private donations and such a separation in the data is therefore fundamental. According to the 1997 Economic Census, federal public support accounts for 0.5% of theatre revenues, while non federal funding accounts for just less than 6% of total revenues of non-profit theatres (U.S. Census Bureau, 2000). As one of the hypotheses of the paper is to test whether the impact of federal, state and local spending differs, it is important that grants from each of these funding sources are allocated with similar formulae. In the case of theatres federal and state support come almost exclusively from the National Endowment for the Arts (federal support) and from State Arts Agencies (state support).

Table 1 provides a brief description and summary statistics of variables used in the model while Table 2 summarizes partial correlations among the model covariates. All monetary variables are in constant 1997 dollars and all variables have been coded adjusting for scale of operation (number of performances given in year  $t$ ) as in Brooks (2000). The dependent variable “private contributions” aggregates donations from individuals, foundations and corporations. Government support is disaggregated into federal, state and local contributions. The correlation matrix suggests that there is no multicollinearity problem among the model covariates, apart from the variables TIME and  $NEA_{it}$  (NEA real budgets consistently decreased in the five years under consideration) and the variables  $TICK_{it}$  and  $QUALITY_{it}$  (a strong correlation between quality and ticket income seems logical as high quality performances are usually sold out and consequently generate a higher income per performance). The lack of a strong correlation between level and change in public support is especially important as severe collinearity among the public support measures would affect the interpretation of the regression results presented in Section 4.

The aim of the paper is to test two main hypotheses:

- 1) *Level and Change*: The relationship between public and private support to non-profit organizations depends on both the *level* and the *change* in public support. While the relationship between levels of public and levels of private support takes an inverted *U* shape, the relationship between changes in public support and levels of private donations is linear and



Table 1. Description of variables and summary statistics (panel 1997–2001)

Variable	Definition	Mean (Std. Dev)	Min	Max
$D_{it}$	Private giving divided by number of performances	389.486 (4127.043)	40	27789.93
$PUB_{it}$	Total government spending divided by number of performances	860.088 (1582.354)	0	18334.18
$PUBSQ_{it}$	Quadratic term total government	3237399 (2.17e+07)	0	336142156
$\Delta PUB_{it}$	Change in public support ( $PUBLIC_{it} - PUBLIC_{it-1}$ )	83.097 (1111.602)	-6617.96	12694.35
$FD_{it}$	Federal spending divided by number of performances	87.587 (171.069)	0	1308.537
$FDSQ_{it}$	Quadratic term federal	36863.78 (152766.6)	0	1712269
$\Delta FED_{it}$	Change in federal spending ( $FD_{it} - FD_{it-1}$ )	-3.631 (109.298)	-837.41	380.04
$STATE_{it}$	Total state support divided by number of performances	378.354 (652.388)	0	6617.963
$STATESQ_{it}$	Quadratic term – state support	567709.4 (2942190)	0	43800000
$\Delta STATE_{it}$	Change in state spending ( $STATE_{it} - STATE_{it-1}$ )	1.397 (602.559)	-6617.96	3569.466
$LOC_{it}$	Total local support divided by number of performances	394.146 (1397.305)	0	17707.46
$LOCSQ_{it}$	Quadratic term – local support	2102979 (19400000)	0	314000000
$\Delta LOC_{it}$	Change in local spending ( $LOCAL_{it} - LOCAL_{it-1}$ )	85.693 (970.221)	-4968.177	13330.32
$DVLOP_{it}$	Total development expenses divided by number of performances	543.708 (626.151)	0	5375.383
$TICK_{it}$	Total ticket income divided by number of performances	6222.056 (5216.099)	236.317	39360.32
TIME	Time trend	3	1	5
$DISPOS_{it}$	Median per capita disposable income in the state where the theatre is located	23895.82 (2798.518)	17325	31149.3
$QUALITY_{it}$	Ratio of artistic payroll to number of performances	3038.448 (2113.88)	351.523	20631.62
$THEATRE_{it}$	Number of theatres for 100,000 people in the state where the theatre is located	0.634 (0.313)	0.261	2.119
$SAA_{it}$	State Arts Agency appropriation of the state where the theatre is located	14100000 (15700000)	482951	61900000
NEA <sub>t</sub>	National Endowment for the Arts appropriations	95100000 (2828044)	90800000	99500000

Table 2. Correlation matrix of independent variables included in the model

	PUB <sub>it</sub>	ΔPUB <sub>it</sub>	FD <sub>it</sub>	ΔFED <sub>it</sub>	STATE <sub>it</sub>	ΔSTATE <sub>it</sub>	LOC <sub>it</sub>	ΔLOC <sub>it</sub>	DVLOP <sub>it</sub>	TICK <sub>it</sub>	TIME	DISPOS <sub>it</sub>	QUALITY <sub>it</sub>	THEATRE <sub>it</sub>	SAA <sub>it</sub>	NEA <sub>it</sub>
PUB <sub>it</sub>	1.00															
ΔPUB <sub>it</sub>	-0.090	1.00														
FD <sub>it</sub>	-	-	1.00													
ΔFED <sub>it</sub>	-	-	-0.370	1.00												
STATE <sub>it</sub>	-	-	0.106	-0.027	1.00											
ΔSTATE <sub>it</sub>	-	-	0.026	0.013	-0.551	1.00										
LOC <sub>it</sub>	-	-	-0.014	-0.006	0.043	0.032	1.00									
ΔLOC <sub>it</sub>	-	-	0.060	0.060	0.047	-0.059	0.022	1.00								
DVLOP <sub>it</sub>	0.304	0.132	0.162	-0.042	0.237	0.026	0.202	0.140	1.00							
TICK <sub>it</sub>	0.358	0.065	0.291	-0.035	0.312	-0.042	0.203	0.105	0.543	1.00						
TIME	0.081	-0.005	-0.002	0.015	0.011	0.012	0.090	-0.015	0.121	0.064	1.00					
DISPOS <sub>it</sub>	0.098	-0.028	0.414	-0.024	0.184	-0.040	-0.050	-0.004	0.238	0.201	0.217	1.00				
QUALITY <sub>it</sub>	0.438	0.051	0.363	-0.026	0.405	-0.066	0.212	0.102	0.465	0.793	0.095	0.257	1.00			
THEATRE <sub>it</sub>	-0.040	-0.017	0.554	0.004	-0.068	-0.015	-0.093	-0.010	0.109	0.117	-0.032	0.506	0.115	1.00		
SAA <sub>it</sub>	0.013	0.030	-0.063	-0.021	-0.025	0.031	0.039	0.018	0.182	0.186	0.207	0.264	0.101	0.063	1.00	
NEA <sub>it</sub>	-0.078	-0.000	0.002	-0.011	-0.005	-0.021	-0.090	0.014	-0.123	-0.063	-0.995	-0.220	-0.094	0.032	-0.200	1.00

positive.

$$D_{it} = \beta_1 + \beta_2 \text{PUB}_{it} + \beta_3 \text{PUBSQ}_{it} + \beta_4 \Delta \text{PUB}_{it} + \beta_5 X_{it} + u_{it} \quad (1)$$

where  $i = (1, \dots, 82)$  denotes theatre;  $t = (1, \dots, 5)$  denotes year;  $u_{it} = \mu_i + \varepsilon_{it}$  represents the structure of the error terms and  $X_{it}$  is a vector of other characteristics such as fundraising expenditures, ticket income, number of theatres present in the state where the theatre is located, state median per capita disposable income, State Arts Agency and NEA appropriations, the payroll ratio and a time trend.

- 2) *Type of support matters*: Different sources of government spending – federal, state and local – have a different impact on private donations, both in terms of *level* and in terms of *change*.

$$D_{it} = \beta_1 + \beta_2 \text{FD}_{it} + \beta_3 \text{STATE}_{it} + \beta_4 \Delta \text{LOC}_{it} + \beta_5 X_{it} + u_{it} \quad (2)$$

where  $\text{FD}_{it}$ ,  $\text{STATE}_{it}$  and  $\text{LOC}_{it}$  are vectors that contain the linear, quadratic and change terms of federal, state and local support and  $X_{it}$  is a vector of other characteristics.

As suggested in the introduction an unresolved problem of most crowding effect studies is that if the allocation criteria used by private and public donors coincide or are very similar, a positive correlation between the two sources of support will mask a correlation between the two and a separate variable. While fundraising expenses are an indication of the effort and managerial ability to attract donative revenues, quality and its effect on private donations have not been considered by previous crowding effect studies. This paper uses the payroll ratio (ratio of artistic payroll to number of performances) as a proxy for the quality of the production offered by theatres in the sample. Lange and Luksetich first used a similar payroll ratio index (ratio of artistic payroll to total payroll) to indicate quality in their estimation of the demand for Broadway performances (Lange & Luksetich, 1984). The hypothesis is that high quality theatres will invest more in their artistic activity compared to management and other wage expenses and therefore the higher the ratio, the higher the artistic quality.

As people respond to fundraising campaigns and every previous empirical study shows the positive effect that fundraising expenditures have on private donations, the variable  $\text{DVLOP}_{it}$  controls for this influence and the hypothesis is of a strong and positive correlation between fundraising expenditures and private donations. Another factor considered in the analysis is the average amount of ticket revenues that each performance accrues to the organization. This represents both the scale of operation and to a degree the demand for performances of theatre  $i$ .

A large fraction of donations to theatre companies comes from individuals (individuals account for 10.3% of total revenues, while corporate donations represent 5.5% and foundations 6.9% according to the 1997 Economic Census). Individual patrons give locally and since it is predominantly the very wealthy who donate to art institutions (Independent Sector, 1994), disposable income in the state where the theatre is located was added to the model. Sectoral studies usually estimate the effect of government spending on individual donations using time-series data (Schwartz, 1970; Abrams & Schmitz, 1978) and one of the factors that they often consider is the effect of changes in federal income tax rates on donations. Taxes have two effects on donations: (i) by lowering disposable income they tend to reduce donations; (ii) as donations are fully deductible, changes in federal income tax rates modify the price of donating thus increasing donations. If  $m$  = marginal tax rate and  $D$  the donation, the price of donating is  $P = (1 - m)D$ . Federal tax rates did not change much in the 1997–2001 period – the top federal income tax rate has fallen from 39.5% in 1997 to 39.1% in 2001. The data used in the paper consists of panels of organizations located in different states followed for five years. Incorporating variations in state income tax would seem like an attractive option to include the price of donating in the model. However calculating a homogenous highest marginal state income tax is difficult as fiscal legislations differ greatly among states in terms of deductibility of donations, existence of an income tax and deductibility of federal income tax paid when calculating state income tax. It was therefore decided not to take into account the price effect of taxes while median per capita disposable income was used to include in the analysis the impact that taxes (and not just income tax) have on the ability to donate.

A state with many theatres relative to its population is more likely to be a state where people have more developed tastes for theatre performances and therefore theatres in such a state are more likely to receive private donations. However, more theatres also mean more competition for what are limited funds from both public and private sources and in this case theatres in states with a higher theatre concentration may be less likely, other things being equal, to receive private donations. The number of theatres per 100,000 people present in the state controls for such effects. However this variable is introduced without prior hypotheses as to the direction of the relationship given the contrasting forces at play.

As the model estimates the effect that changes in public support have on levels of private donations, and these are assumed to be due to organizational changes rather than changes in the budgets available to government agencies, two variables are constructed to control for shifts in state and federal budget availability:  $SAA_{it}$  and  $NEA_t$ . Finally the model controls for possible historical trends in private donations to theatre companies through the variable TIME.

#### 4. Methodology

Ordinary least squares are not an appropriate estimation method for panel data as the estimates are likely to suffer from heteroskedasticity and autocorrelation within the panels (Greene, 1997). Generalized least squares have been used to account for the fact that 82 theatres have been followed for a period of five years. Table 3 presents regression estimates for model (1) using OLS and GLS random effect estimators to show the bias induced by OLS estimation. Table 4 presents regression estimates for model (2) using GLS. Relevant test statistics and their results are reported at the bottom of each table.

Tables 3 and 4 report the Breusch and Pagan Lagrangian multiplier test for random effects. In each case they indicate that the random effects specification is more appropriate than OLS on the pooled sample. The Hausman specification test has been used to assess the adherence of the dataset used in the analysis to the assumptions at the basis of the random effects model. In all the cases considered the Hausman test indicates that there are no theatre specific effects and that  $\mu_i$  can be considered a random variable with mean zero,

Table 3. The crowding effect of public support on private donations (1997–2001)

Dependent variable = PRIVATE	OLS model <sup>a</sup>		GLS model <sup>b</sup>	
	Coefficients	SE	Coefficients	SE
Independent variables				
Constant	27242.58 (0.53)	51343.73	26427.08 (0.70)	37599.24
PUB <sub>it</sub>	0.611** (2.03)	0.301	1.266* (3.93)	0.322
PUBSQ <sub>it</sub>	-0.00001 (-0.49)	0.00002	-0.00006* (-2.61)	.00002
ΔPUB <sub>it</sub>	0.538* (3.58)	0.150	.636* (4.74)	0.134
DVLOP <sub>it</sub>	2.176* (5.72)	0.380	2.157* (4.88)	0.442
TICK <sub>it</sub>	0.267* (4.84)	0.055	0.225* (3.06)	0.073
THEATRE <sub>it</sub>	-253.64 (-0.43)	584.87	44.06 (0.05)	906.46
DISPOS <sub>it</sub>	0.098 (1.36)	0.073	0.055 (0.50)	0.109
SAA <sub>it</sub>	0.00001 (1.12)	0.00001	0.00002 (1.35)	0.00001
QUALITY <sub>it</sub>	0.016 (0.12)	0.134	0.063 (0.41)	0.156
TIME	-783.16 (-0.55)	1415.79	-761.71 (-0.74)	1028.007
NEA <sub>it</sub>	-0.0002 (-0.57)	0.0005	-0.0002 (-0.75)	0.00036
Breusch Pagan Lagrangian multiplier	$N = 322, R^2 = 0.50$		$N = 322, R^2 = 0.49$	
$\chi^2(1) = 103.55^*$	$F(11, 310) = 28.32$		Wald $\chi^2(11) = 183.37^*$	
Hausman specification	$\chi^2(11) = 10.29$			

\*Significance greater than 0.01; \*\*Significance greater than 0.05; °Significance greater than 0.10; <sup>a</sup>t statistics in parenthesis; <sup>b</sup>z statistics in parenthesis.

Table 4. The crowding effect of federal, state and local support on private donations (1997–2001)

Dependent variable = PRIVATE	Federal, state and local spending	
	Coefficients	SE
Independent variables		
Constant	24649.91 (0.65)	38153.66
FD <sub>it</sub>	5.145** (2.05)	2.515
FDSQ <sub>it</sub>	−0.003 (−1.21)	0.002
ΔFED <sub>it</sub>	1.112 (0.80)	1.399
STATE <sub>it</sub>	1.420** (2.24)	0.634
STATESQ <sub>it</sub>	−0.00009 (−0.80)	0.0001
ΔSTATE <sub>it</sub>	0.841* (2.58)	0.326
LOC <sub>it</sub>	1.270* (3.11)	0.408
LOCSQ <sub>it</sub>	−0.00007* (−2.28)	0.00003
ΔLOC <sub>it</sub>	0.504* (3.45)	0.146
DVLOP <sub>it</sub>	2.012* (4.47)	0.450
TICK <sub>it</sub>	0.221* (2.99)	0.073
TIME	−684.07 (−0.66)	1039.14
DISPOS <sub>it</sub>	0.032 (0.29)	0.112
QUALITY <sub>it</sub>	0.050 (0.31)	0.162
THEATRE <sub>it</sub>	−111.71 (−0.11)	1041.39
SAA <sub>it</sub>	0.00002 (1.39)	0.00001
NEA <sub>t</sub>	−0.0002 (−0.68)	0.0003
	$N = 322, R^2 = 0.49$	
	Wald $\chi^2(17) = 190.26^*$	
	Breush Pagan $\chi^2(1) = 97.64^*$	
	Hausman $\chi^2(17) = 20.81$	

Note. z statistics in parenthesis.

\*Significance greater than 0.01; \*\*Significance greater than 0.05; °Significance greater than 0.10.

$E(\mu_i) = 0$  and that the covariance between  $\mu_i$  and the independent variables present in the model is zero. The hypothesis that fixed and random effects coefficient are the same can be rejected in both cases at the 1% confidence level.

Crowding effect models like the one presented in this study often exhibit another violation of a key assumptions of regression analysis, as public funding cannot be considered an exogenous covariate. In most circumstances it is possible to imagine public support as an endogenous variable that determines

and at the same time is determined by private contributions (Brooks, 1999). The most widely used technique to address the problem of an endogenous independent variable is to find an instrument that is highly correlated with the independent but not with the dependent variable (Kingma, 1989; Day & Devlin, 1996).

Contrary to most previous studies, the model includes variables, such as the quality index, that are likely to determine the endogeneity of public support if omitted from the model. Moreover the American art field exhibits specificities that suggest using a model based on information lags and that views public support as exogenous rather than using a two stage least squares technique (Brooks, 2000, 2003; Smith, 2003; Andreoni & Payne, 2001). Specifically the allocation procedure of government spending at both the federal, state and local level ensures exogeneity. At the federal level the NEA awards funding for projects using panels of experts that make recommendations using artistic quality and adherence of the proposed project to the funding guidelines as criteria. The matching requirements are an incentive for art organizations to look for private donations, but often other resources are used as a match (Borgonovi & O'Hare, 2004). At no stage in the process the NEA or the panels consider the amounts of private donations received by an applicant and recommend funding accordingly. Likewise at the local level, most state arts agencies and county/city arts councils award their support to those organizations that best address the funding priorities decided by public authorities (Heilbrun & Gray, 2001) and private donations are unlikely to significantly influence allocations decisions.

Although theoretical reasons support the hypothesis that public support is exogenous, a simultaneous equations model was developed to test the exogeneity of the public support variables. The two stage least squares results support the hypothesis that a one year lag measure of public support better reflects the relationship between public support and private donations in the American non-profit theatre sector. Hausman test results in fact indicate that public support and private donations should not be considered as endogenous and are not jointly determined.<sup>1</sup>

Since government grants allocated in year  $t$  are awarded and communicated to the general public in  $t - 1$ , the government spending measures used in the econometric model are current rather than lagged by one year. This ensures that the effective lag present in the model is a one-year lag rather than a two-years lag.

## 5. Results

When considering aggregate government support, the econometric results in Table 3 are consistent with the theoretical framework developed in Section 2 and the findings previously indicated by Brooks (2000, 2003). They indicate

that the relationship among levels of public support and private donations is non linear and exhibits an inverted *U* shape. Low levels of government support correspond to low levels of private donations; at higher levels private donations increase, but after a certain threshold is reached the higher the level of public support, the lower the level of private donations. At \$10,550 the marginal effect of *levels* of public support is zero. Before such threshold there is a positive (although declining effect) or public support levels; while after this a negative effect starts occurring. Initially private donors appear to be feeling the “value added” in terms of information and expanded possibility that government grants provide. Besides the impact on perceived need is negligible and private donors are unlikely to feel that low levels of public support mean a substantial degree of government control. The positive effect of small government grants could also be due to the fact that private donors feel positively towards a diversified funding base as it implies greater managerial ability and better sustainability prospects (Borgonovi & O’Hare, 2004). Figure 1 shows the relationship between levels of public and private support as predicted by the model estimated in Table 3, keeping change in public support constant.

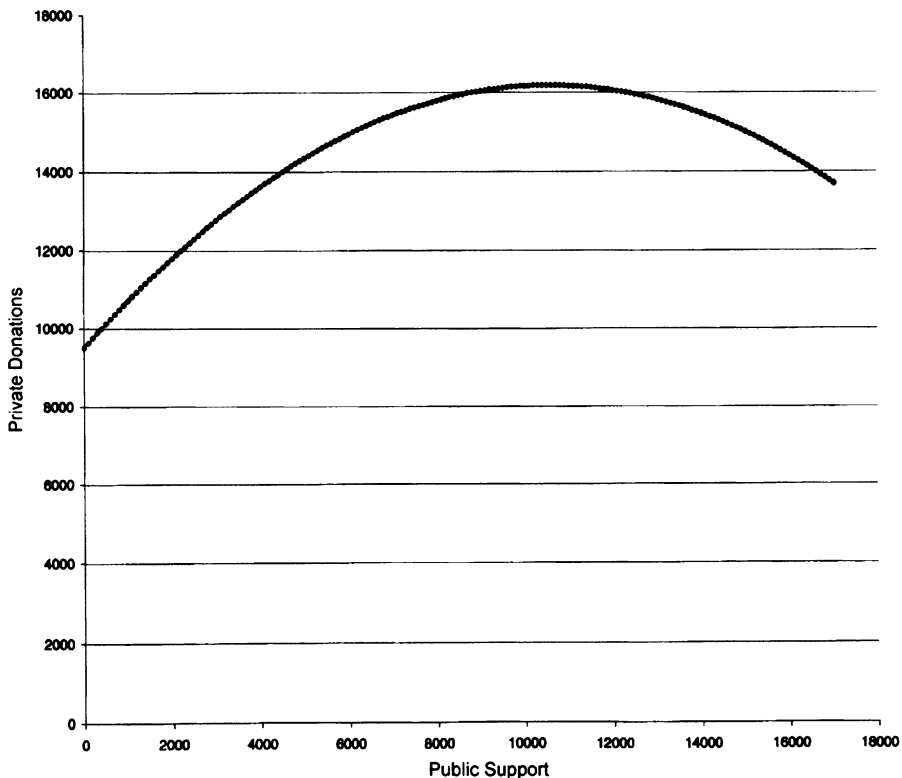


Figure 1. Predicted levels of private donations as a function of levels of public support.



Table 3 confirms the first hypothesis and indicates that the crowding effect is determined by two factors: *level* of public support and *change* in public support levels. While the first component produces a non-constant effect, the second component represented by changes in public support has a linear positive effect on private donations. Keeping initial levels of public support constant, increases in grants from government agencies produce increases in private donations (\$0.64 cents per dollar), while decreases are associated to decreases in private donations. *Ceteris paribus* the significance of  $\Delta\text{PUB}_{it}$  shows that the level of private support of two organizations that receive the same level of public support differs according to whether such a level represents an increase or a decrease in government grants. This illustrates the additional effect produced by the signal that public agencies send to private donors whenever they change their allocation levels to a certain organization.

Figure 2 shows the joint crowding effect and its two components: level effect and change effect. The solid line represents the joint crowding effect, while the broken line represents the level effect. The change effect is constant and positive and as a result of its action the broken line shifts upwards to become the solid line.

Keeping other factors constant, the figure shows that while a crowding out starts occurring at approx. \$10,550 in the case of the level effect, this threshold is much higher approx. \$16,000 in the case of the joint crowding effect. In the first part of the curve the use of the simple level effect determines an

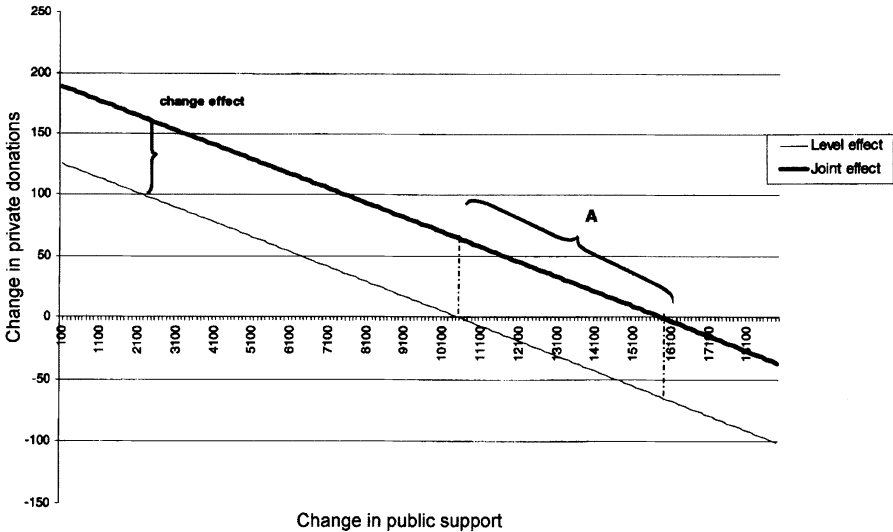


Figure 2. Joint crowding effect, level effect and change effect. The figure describes the level effect, the change effect and the joint effect associated with an increase in \$100 in public support, at different levels of initial government funding (calculations based on the model presented in Table 3).

underestimation of the intensity of the crowding in effect. Similarly in the last part of the curve, the level effect overestimates the extent to which a crowding out occurs. Even more problematic is the situation in the section of the curve denominated **A** in the figure, where the use of the simple level effect leads to a misinterpretation not only of the intensity, but also of the direction of the crowding effect: while there is still a partial crowding in effect, the model predicts a partial crowding out.

In the first part of the curve described in Figure 1 the additional effect produced by changes reinforces the main effect and produces a shift in the intensity of the joint crowding effect, but not in the direction. As public support levels get closer to the point at which the positive impact of the level effect decreases, increases in public grants lead to an outcome where not only the intensity, but also the direction changes. Finally in the case of very high levels of public support, the positive effect exercised by the change is not sufficient to compensate for the strong negative effect produced by the high level of public support. Both level and joint effects are negative, although the joint effect is smaller.

Table 4 shows estimation results for equation (2) when public support is disaggregated into federal, state and local and confirms the second hypothesis, namely that the effects induced by different public sources should be considered separately. Only local support exhibits a quadratic crowding effect induced by *level* and a linear crowding in effect determined by *change* as in the case of aggregate support. The only public spending term that is statistically significant in the case of federal support is the linear level variable  $FD_{it}$  while in the case of state support both level and change effects determine crowding in and act as reinforcements of each other.

The results presented in Tables 3 and 4 provide a useful interpretation for the inconsistencies on the intensity and direction of the crowding effect present in the literature previously described. Andreoni and Payne (2001) use tax return data of social services and art organizations and report a crowding out effect. As most organizations in the dataset<sup>2</sup> used by Andreoni and Payne have very high levels of public support,<sup>3</sup> which according to the model presented in this paper is consistent with a crowding out effect as in the case of Payne (1998).<sup>4</sup> The findings are also consistent with the results obtained by Smith (2003) who reports a more than proportional crowding in effect of federal grants to non-profit dance companies.

Two reasons determine the type of effect that federal, state and local support exert on private donations: the size of typical grants and the allocation procedure used to award funding. National Endowment for the Arts grants (federal support) are typically very small and therefore no awards are present in the descending section of the level effect curve. Besides the allocation procedure based on recommendations of panels of experts and the fact that grants are awarded to projects, rather than institutional support could again play a

role in the fact that no crowding out effect was observed in the case of federal support. Theatres receive a much higher proportion of their total support from State Arts Agencies than from federal sources and therefore the fact that the analysis does not show an inverted *U* shape relationship should be found in the nature of the allocation procedure, rather than the typical size of awards. State support is not as consistent as federal support and different schemes are present in different states, however grants are generally dependent on quality assessment of recipient organizations and support is given to foster artistic merit, creativity and innovation. The bulk of local support is on the other hand predominantly awarded as a form of support to the local economy, using systems like hotel tax revenues that are distributed more evenly among recipient organizations and a crowding out effect occurs.

Like the time trend, the variables used to control for the effect of federal and state budget contractions/expansions –  $NEA_t$  and  $SAA_{it}$  – are not significant in any of the models. The insignificance of time trend suggests that there is no overall trend (either upwards or downwards) that makes private donations increase or decrease over the five years of the data, but a longer series might reveal one. Likewise a larger variation in budget allocations to the arts present in longer time series might reveal a significant effect of these components on private donations. Fundraising expenditures are positively associated to increases in private donations as expected and as indicated in the literature (see Clotfelter, 1985 for a review) and the coefficient is highly significant in all models. Ticket income is highly related to private donations; *ceteris paribus* the higher the income, the higher the level of private contributions. This can equally be the effect of the scale of operation and of the higher ability of large organizations to inform about their programs, activities and needs. The positive association between private donations and ticket income per performance might also result from the fact that both are the outcome of a high demand for those performances.

The payroll ratio is not significant in any of the three specifications and this might be the result either of the strong correlation with the ticket income variable or of its inadequacy in indicating quality. Better indices of quality should be developed to take into account an important factor in determining private donations among non-profit organizations. As Throsby's analysis (1983) indicates it is very difficult to measure the overall quality of performances and the wage of performers might not be the most appropriate indication of either subjective or objective quality criteria. In the case of performing art organizations the use of critic reviews could serve this purpose, while in other sectors performance indicators such as hospital mortality in health and league tables with exam results in education could be used. However all these crude measures lack insight in other dimensions that potential donors might feel as indicating quality in a non-profit activity for example the capacity to cater for disadvantaged communities.

## 6. Conclusions

Private donations have played a fundamental role both symbolically and financially in the support of the non-profit sector in the United States. This is why the political and academic debate over whether federal and local government spending determines a decrease in private donations has been of primary interest to those in the non-profit sector and politicians. While most previous theoretical and empirical research considered the relationship between government spending and private donations as constant, this paper examines the rationale and implications of allowing the crowding effect to vary with (i) *level* of government support, (ii) *change* in government support and (iii) *type* of government agency awarding support. The findings suggest that public support and private donations can be both complements and substitutes depending on the size of government support, whether funding levels represent an increase or a decrease over previous support levels and that private patrons react very differently to federal, state and local spending.

Although this study confirms that the use of a non-linear relationship to characterize government support is useful, it also indicates that this applies just to the effect of level of public support and the effect of change is at least as important. Ignoring the effect of change leads to an underestimation of the intensity of the crowding in effect at low levels and an overestimation of the intensity of the crowding out effect at high levels of public support. Moreover as there is a series of values for which level and change effect have a contrasting impact on private donations, ignoring the change effect results in the identification of crowding out while crowding in is occurring. In such circumstances omitting the effect of change leads to incorrect estimates of both the direction and intensity of the crowding effect. Future research should look into whether this framework would be applicable and useful in the empirical analysis of other non-profit sectors.

These results have far reaching implications for policy makers and managers of non-profit institutions. They highlight the complexity of the crowding effect relationship, how multifaceted this is and how changes in the amount of public support awarded have a different effect depending on the size of the change, the initial level of public support and the type of agency responsible for such support. If public decision makers want to maximize the impact that government spending has on non-profit institutions, they should carefully consider their granting strategies so that the combined effect of level and change is positive while considering the peculiarities determined by the type of government agency they work for. On the other hand managers of non-profit institutions should consider the joint crowding effect in order to maximize their total donative revenues. Currently managers allocate fundraising costs weighting the amount that the organization is likely to receive from donors, the probability of success and the amount of resources that are necessary to

submit grant applications or convince individual patrons. However they should also incorporate in their decisions the relationship between public and private support in order to exploit the crowding effect to maximize total donative revenues.

Disaggregating sources of government spending has revealed large differences in the effect of public support on private donations depending on the type of support: federal, state and local. Future research should aim at further disaggregating the primary components of private giving: individuals, corporations and foundations and determine how responsive each of these is to changes in public support. There are a number of existing studies that examines changes of government support on individual giving; but none examines corporate and foundation giving. However the existing literature on the effect of public support on individual giving (i) does not consider federal, state and local support separately (ii) uses predominantly either IRS tax files or surveys of individual giving and not institutional data and (iii) does not consider the effect of interrelations among the other sources of private giving, namely corporations and foundations. Filling these gaps should be an aim of future research in the nature of the crowding effect.

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### Notes

1. Results from the two stage least squares analysis on the simultaneous equations model are available from the author upon request.
2. The National Centre for Charitable Statistics (NCCS) Statistics of Income dataset includes all organizations with \$10 million in assets and only a sample of smaller organizations.
3. Mean of public support for art organizations \$1.193 million, mean of public support for social service organizations \$2.711.
4. The mean of public support to organizations present in the sample is \$1.87 million.

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